

TUBERCULOSIS REPORT 2013

ENGLISH VERSION



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មជ្ឈមណ្ឌលជាតិកំចាត់រោគរបេង និងហង់សិន

Acknowledgement

The impressive achievements of the National TB Program could not have occurred were it not for the support of the Royal Government of Cambodia as well as the Ministry of Health. These government entities made TB control a priority on the national health agenda and have enabled the National TB Program to achieve a 100% DOTS coverage, increase case notification and maintain successful treatment outcomes. These achievements were also the direct result of active participation from all health workers throughout the country together with the support and collaboration of various other partners. These partners include local authorities, community, financial and technical partners from International and Non-Governmental Organizations. The National Tuberculosis Control Program would like to express deep appreciation to:

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- All health workers, for their active participation, and in particular those working in TB related services across the country,
- International and Non-Governmental Organizations for their technical and financial assistance to the TB program, and
- Local authorities, communities and other partners for their support and collaboration

Director of CENAT

Mao Tan Eang, MD, MPH

Editors:

From the National Tuberculosis Program:

Dr. Mao Tan Eang, Dr. Tieng Sivanna, Dr. Huot Chan Yuda, Dr. Koeut PichChenda, Dr. Khloeung Phally, Dr. Uong Mardy, Dr. Prum Chom Sayoeun, Dr. Keo Sokunth, Dr. Khun Kim Eam, Dr. Saint Saly, Dr. In Sokhanya, Dr. Nou Chanly, Dr. Chea Manith, Dr. Tan Kun Dara, Dr. Pheng Sok Heng, Mr. Boy Sambo, Dr. Kien Sorya, Dr. Seng Sao Rith, Dr. Long Ngeth, Dr. PengVesna, Dr. Leng Chhenglay, Dr. Ngoun Chandara, Dr. Narith Ratha, Dr. Kim Samoeurn, Dr. Ly Sothin, Dr. Chay Sokun.

From WHO Cambodia

Dr. Rajendra Yadav, Dr. Miwako Kobayashi, Mr. Fukushi Morishita, Ms. Valérie Burrus

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List of abbreviations

ACF	Active Case Finding
ACSM	Advocacy, Communication and Social Mobilization
AHEAD	Action for Health Development
ARC	Australian Respiratory Council
ART	Antiretroviral Therapy
CATA	Cambodian Anti-TB Association
CENAT	National Centre for Tuberculosis and Leprosy Control
CHC	Cambodian Health Committee
CMS	Central Medical Store
CPT	Co-trimoxazole Preventive Therapy
DDF	Department of Drugs and Food
DM	Diabetic
DST	Drug Susceptibility Testing
EQA	External Quality Assessment
GDF	Global Drug Facility
GF	Global Fund to Fight AIDS, Tuberculosis & Malaria
HC	Health Center
HIV	Human Immunodeficiency Virus
IEC	Information, Education and Communication
IOM	International Organization for Migration
IPT	Isoniazid Preventative Therapy
JICA	Japan International Cooperation Agency
MDG	Millennium Development Goals
MDR-TB	Multi Drug Resistant Tuberculosis
MoH	Ministry of Health
MSF	Médecins Sans Frontières
NCHADS	National Centre for HIV/AIDS, Dermatology and STD Control
NTP	National TB Control Program
OD	Operational District
PDR	Poly Drug Resistant
PMDT	Programmatic Management of Drug-resistant Tuberculosis
PPM	Public-Private Mix
PR	Principle Recipient
RACHA	Reproductive and Child Health Alliance
RHAC	Reproductive Health Association of Cambodia
RR-TB	Rifampicin Resistant Tuberculosis
SOP	Standard Operating Procedure
SR	Sub Recipient
TB	Tuberculosis
TBCAP	The Tuberculosis Control Assistance Program
TBDM	TB Drug Management
TBIC	TB Infection Control
TST	Tuberculin Skin Test
URC	University Research Co.
VCCT	Voluntary Confidential Counselling and Testing
VHSG	Village Health Support Groups
WHO	World Health Organization

Executive summary

With the continued strong support from all stakeholders both in and out of Government, Cambodia has accomplished impressive achievements in TB control in 2013. Using routine surveillance data this annual report provides the most recent epidemiological assessment as well as presents the summary of activities conducted in 2013. The report includes data on case notification, case finding, treatment outcome, drug resistance, TB/HIV surveillance, laboratory services, and systematic case finding of TB within the country.

The report highlights the following:

Case notification

In 2013, a total of 39,055 TB cases were notified, of which 36% were new smear-positive cases (14,082). Case notification rates for all forms of TB and new smear-positive TB were 261 and 94 per 100,000 population respectively. For all forms of TB, a higher case notification rate was observed in Quarter 3 and 4, relative to Quarter 1 and 2. The highest case notification rate for smear-positive TB was found in the group of males aged over 65 years, at 618 per 100 000 population. In 2013, case notification rate for all forms of TB is more than 7 times higher in Svay Rieng than it is in Monduliri, the highest and lowest provincial rates respectively.

Case finding

A total 168,493 TB suspects were examined for TB by smear microscopy in 2013. This is slightly less than the previous year of 173,629. Since 2005, the population screening rate has been kept at over 1% (1000 per 100,000 population) with a slightly increasing trend. In 2013, the population screening rate was 1.13% and the smear positivity rate was 8.1%. A higher smear positivity is likely to be reported in provinces with a lower population screening rate. The sputum smear conversion rates at 2/3 months and at 5 months were 95% and 98.6% respectively.

Treatment outcome

In 2013, the treatment success and cure rates for new smear-positive TB were 92.8% and 89.2% respectively. The rates of unfavourable treatment outcomes (death, failure, loss to follow-up, and transferred-out) slightly increased from 2012 to 2013.

Drug resistance TB

There was a large increase in the number of MDR-TB suspects tested by Drug Susceptibility Testing (DST) in recent years. The increase from 874 in 2011 to 1593 in 2013, demonstrates the rapid expansion of DST services in the country. In 2013, the numbers of RR/MDR-TB and other DR-TB (non RR/MDR-TB) cases enrolled in second-line treatment were 121 and 22 respectively.

TB/HIV

In 2013, the percentage of TB patients with known HIV status was 82.7%, which was the highest rate in the past seven years. The number of TB patients with HIV infection was 1241 and its percentage among tested patients was 3.8%. Since 2009, both number and percentage of those infected have constantly decreased every year, which demonstrates remarkable achievements in TB/HIV collaborative activities.

Case finding among special population groups

The NTP has intensified its activities to ensure equity and universal access to quality TB services. The NTP has piloted different strategies for systematic screening of TB including active case finding (ACF) in various high-risk groups in collaboration with national and international partners. The high-risk groups include TB contacts, the elderly, diabetics, prisoners, migrants and people living in urban slums.

Childhood TB

The number of ODs providing routine childhood TB services increased from 17 in 2012 to 27 in 2013. In 2013, 6919 childhood TB cases were notified across the country, which accounted for about 17% of total TB cases notified. Prey Veng and Battambang reported the highest and second highest cases. In 2012, 96.8% of children registered for Isoniazid Preventive Therapy (IPT) successfully completed a 6 month course.

Policies, strategies and guidelines

In 2013, the NTP developed and revised a number of documents including (1) Tuberculosis Standard Treatment Regimens, (2) Training curriculum on the revised case definition including recording and reporting formats, and (3) Draft National Strategic Plan for TB Control 2014-2020

Financing

The NTP has been granted an extension to the existing round 7 GF funding in the form of US\$3 million interim funding for the period from April to December 2014. Moreover, a New Funding Model recently launched by the GF is a good opportunity for TB programs to request the continuing financial support from the GF. The NTP is also seeking more funding support from the Ministry of Health and other partners, including existing and new partners.

Human resource development

The NTP has invested in capacity building and human resource development. There was a wide variety of training courses and workshops as well as staff attending international training courses, study tours and meetings/conferences in 2013. Among others, a number of TB program refresher training courses were organized across the country to disseminate and operationalize updated guidance in line with WHO policy on TB control.

Drug and laboratory supplies

In 2013, the NTP received first-line TB drugs for both adult and children from the Global Drug Facility and second-line TB drugs from Ministry of Health, Global Fund, Cambodian Health Committee and Médecins Sans Frontières.

Infection control

In collaboration with partners, the NTP conducted a series of activities to strengthen TB infection control which included organizing the monthly meeting of the Technical Working Group, revising the National TB infection control SOP, and developing the implementation plan for TB infection control in referral hospitals.

Community DOTS

There was a notable increase in the number of health facilities implementing C-DOTS between 2002 and 2010. However, there is a decrease in recent years, a number of national and international NGO partners continue to provide their support for C-DOTS implementation.

Public and Private Mix DOTS

In 2013, PPM-DOTS activities contributed to the detection of 660 TB cases which was 1.7% among 39,055 cases notified nationwide and 3.7% among 17,919 cases notified in ODs that had been implementing PPM-DOTS. Considering the low referral success rate and high proportion of TB suspects who sought care at private facilities, there is a large potential to increase case detection by ensuring successful referral and further strengthening suspect identification.

TB in congregate settings

In recent years, the NTP has focused on case finding in congregate settings, such as prisons and factories, where TB transmission is high. The number of prisons implementing TB control activities increased from 8 in 2009 to 22 in 2013. 299 TB cases and 7 TB/HIV cases were detected through this activity in 2013. As of 2013, 14 factories and enterprises have been providing TB-DOTS services at workplaces. The yield per population seems to be low ranging from 55 to 114 per 100,000 which is much lower than the national average of case notification rate (261 per 100,000 for all forms of TB in 2013).

Advocacy, Communication and Social Mobilization

Due to financial resource constraints, a very limited number of IEC materials were produced in 2013. However a notable success was that the NTP produced short educational movies on general TB awareness, MDR-TB and the World TB Day in collaboration with partners including USAID, FHI360, TB CARE I and JICA.

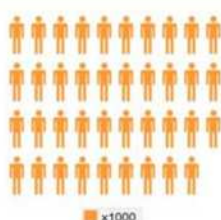
Research

In recent years, a number of operational research studies have been conducted with the purpose of improving program implementation. Through documenting activities and disseminating the study results, the NTP continues to provide evidence-based programmatic responses within the country as well as contributing to evidence-based global policy development in collaboration with other technical agencies and research institutions.

Infographic summary of key findings

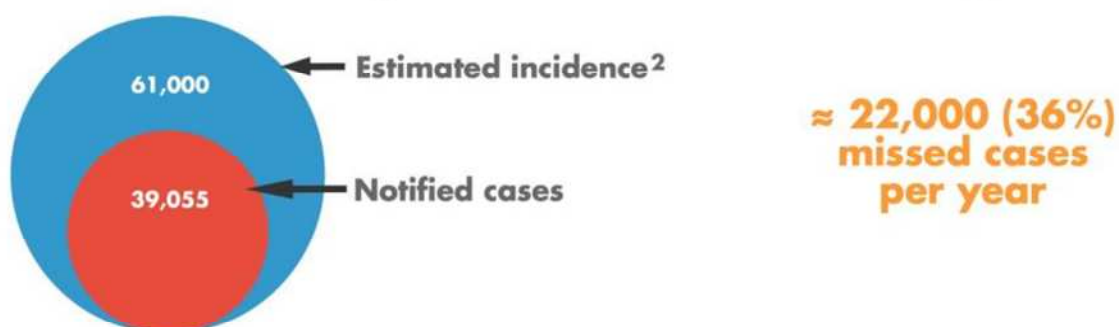
The following graphics highlight the key findings from this annual report with a focus on programmatic gaps and achievements in 2013.

Case Notification

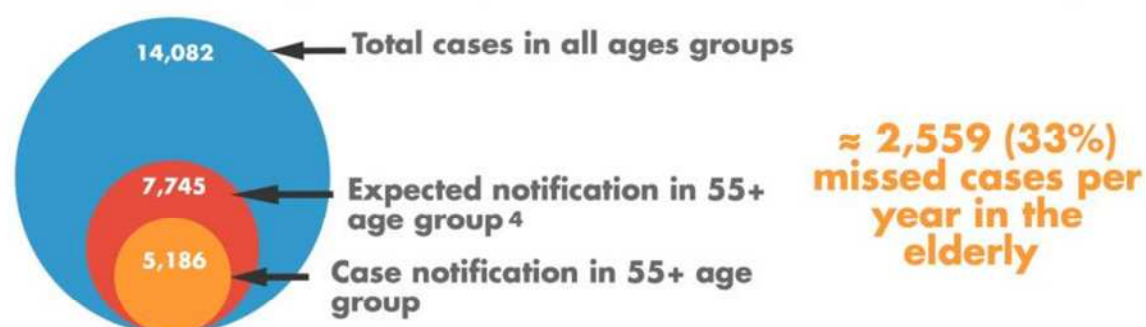


Total notified cases:
39,055

How many TB cases are we missing? ¹



How many elderly TB cases are we missing? ³



1: for all forms of TB

2: sourced from WHO Global TB Database 2013

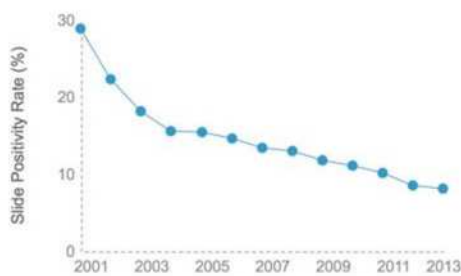
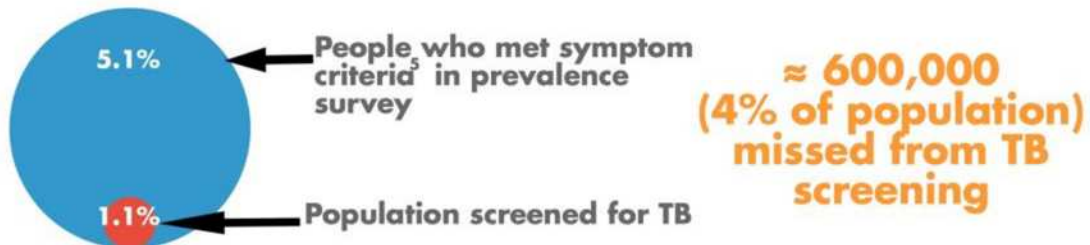
3: for new smear-positive TB

4: calculated using the result of the prevalence survey 2011/2012 that 55% of smear-positive cases were found in the age group of 55 and over.

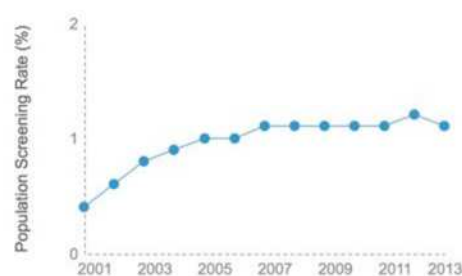
Case Finding

Are current screening efforts enough?

Total cases examined: 168,498



Increased case finding efforts have resulted in decreased smear positivity rate⁶



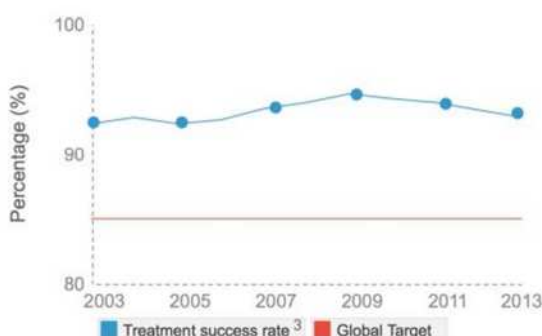
2013 Population Screening Rate⁷
1.13%

5: cough more than 2 weeks or haemoptysis

6: calculated using the number of positive smear slides divided by the total number of slides examined for TB diagnosis

7: proportion of people screened for TB in the country

Treatment Outcomes



High treatment success rate maintained



Low treatment failure rate³

0.4%

Drug Resistance

How many MDR-TB cases are being missed?



Are case finding efforts for MDR-TB enough?

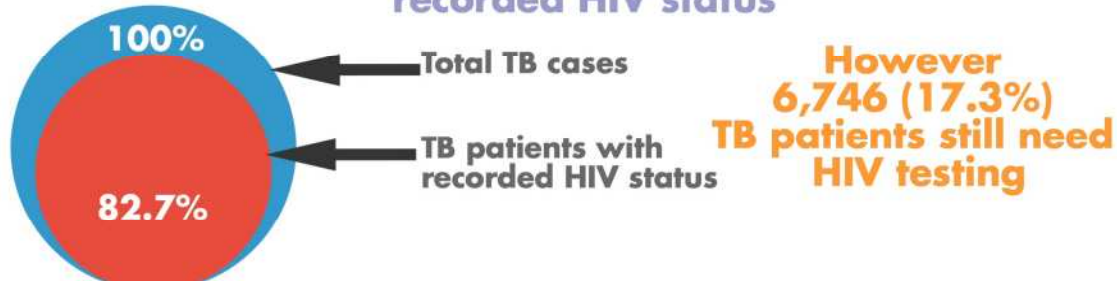


8: estimation made using surveillance data with assumptions: the number of total retreatment cases notified, estimated number of retreatment cases misclassified as new (=100% of notified retreatment cases), non-converters among new smear-positive cases, and estimated number of symptomatic MDR-TB contacts.

TB/HIV

What is the proportion of TB patients with recorded HIV status in the register?

Highest ever % of TB patients with recorded HIV status



Introduction

The Kingdom of Cambodia has made tremendous efforts in controlling tuberculosis (TB) in the past two decades. The morbidity and mortality rates of TB have markedly decreased. According to the 2013 WHO report, the estimated rates of incidence, prevalence and death for 2012 were 411, 764, 63 per 100,000 population respectively. This illustrates the fact that Cambodia has achieved the Millennium Development Goals (MDGs) target 6 of reducing the prevalence and death rate due to TB by half by 2015 compared with the 1990 baseline.

During the last 13 years, the number of TB cases notified under the National TB Control Program (NTP) has increased more than two fold, from 19,007 cases in 2000 to 39,055 in 2013. The NTP has consistently achieved outstanding treatment outcomes since 2000, with treatment success and cure rates for new smear-positive TB of over 91% and 87% respectively. The National Prevalence Surveys in 2002 and 2011 revealed a 45% reduction in bacteriologically positive cases over 15 years. The potentially disastrous impact of HIV on TB has been significantly reduced and the levels of multidrug resistance kept low.

The Joint Program Review, conducted in August 2012, highlighted that in addition to significant external financial and technical support, these successful results were made possible through the strong leadership of the National Centre for Tuberculosis and Leprosy Control (CENAT) and continued funding and commitment from the Royal Government of Cambodia, which at all levels consulted, articulated TB as a public health priority.

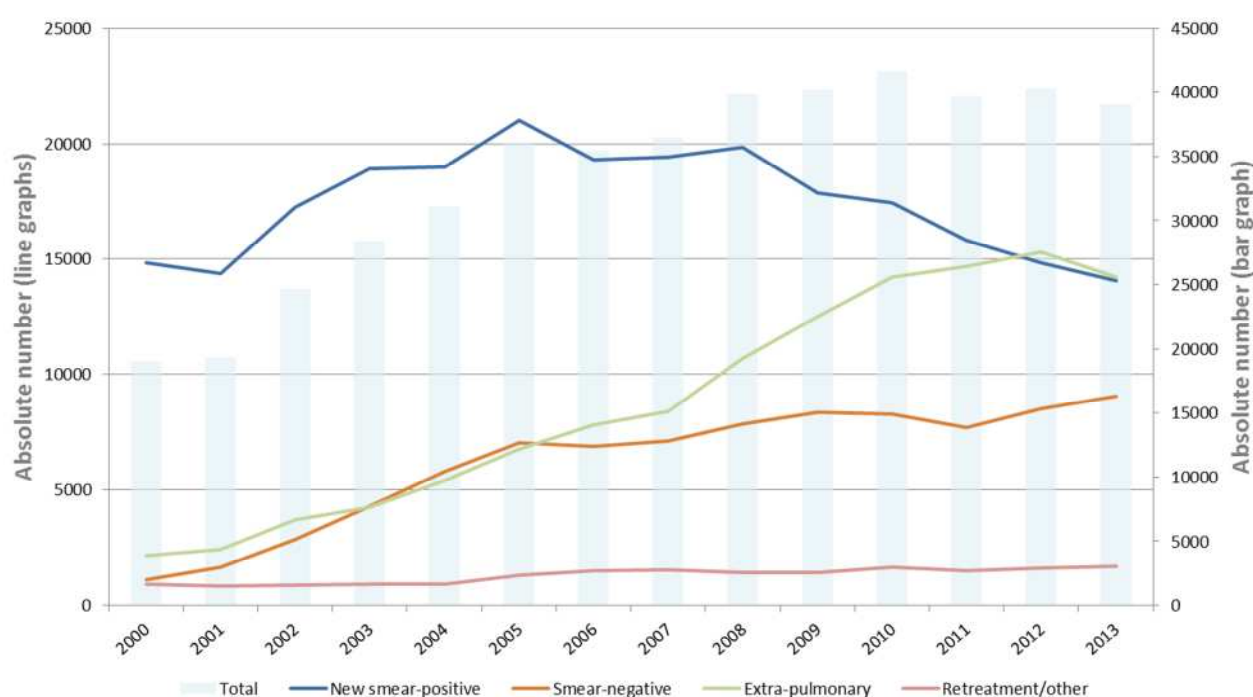
The NTP can also take pride in its efforts to document a series of achievements and highlight programmatic challenges by analysing routine surveillance data that is collected through the robust Recording & Reporting system. Recognizing that public health surveillance plays a critical role in informed decision-making and appropriate public health action, the NTP continues to promote the effective use of TB surveillance data for programmatic decision-making at every level.

With the continued strong support from all stakeholders both in and out of Government, Cambodia has accomplished impressive achievements in TB control in 2013. Using routine surveillance data this annual report provides the most recent epidemiological assessment as well as presents the summary of activities conducted in 2013. The report includes data on case notification, case finding, treatment outcome, drug resistance, TB/HIV, systematic case finding, childhood TB as well as other highlights of the activities conducted within the country. It is hoped that this document will help disseminate among all stakeholders, including local health workers, key programmatic achievements and gaps and further accelerate our joint efforts to advance an evidence-based programmatic response.

1. Case notification

Figure 1 shows the case notification trend by category between 2000 and 2013. From 2000 until 2010, the total number of notified cases (shown in blue bar) climbed steadily from 19,007 to 41,628. In 2013, a total of 39,055 TB cases were notified. The number of new smear-positive TB rose to a peak of 21,001 in 2005 but has decreased, especially in recent years, to approximately 14,000 (14,082 in 2013). On the other hand, case notification of smear-negative TB and extra-pulmonary TB has increased over time (9,069 and 14,203 respectively in 2013). Case notification for retreatment/other has been stable at less than 2000. Using the estimated incidence of all forms of TB 61,000 (WHO global TB database 2013) and total notified cases of 39,000 in 2013, the calculated missed cases are approximately 22,000 (see [graphic summary/case notification](#)).

Figure 1: Case notification by category, by year: 2000-2013



Basic facts about TB epidemiology

Currently nearly one-third of the global population, nearly two billion people, is infected with *Mycobacterium tuberculosis*. In 2012, around nine million people developed active TB, and about in million and a half died. More people are dying of TB today than ever before. TB is the biggest curable infectious killer of young people and adults in the world today. More than 90% of global TB cases and deaths occur in the developing world, where 75% of cases are in the most economically productive age group (15-54 years). In general, an adult with TB loses on average three to four months of work time. This results in the loss of 20-30% of annual household income and, if the patient dies of TB, an average of 15 years income loss.

In addition to the devastating economic costs, TB imposes indirect negative consequences such as children leaving school because of their parents contracting tuberculosis, and women are abandoned by their families.. TB/HIV co-infection significantly increases the risk of developing TB. Hence the number of TB cases will increase, particularly for countries with a high prevalence of both diseases. Multi-drug resistance, which is caused by poorly managed TB treatment, is a growing public health problem of serious concern in many countries around the world.

Figure 2: Case notification rate by year: 2000-2013

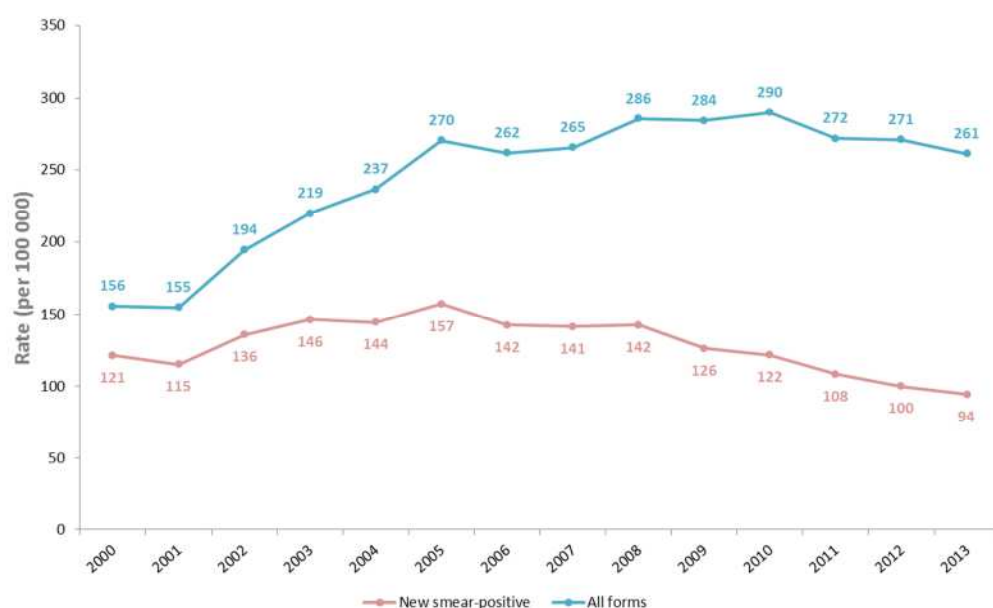


Figure 2 shows the trend in case notification rate for all forms of TB and new smear-positive TB from 2000 to 2013. Case notification rate for new smear-positive TB peaked in 2005 at 157 per 100,000 populations. The rate has been gradually falling since 2005 to the current level, which is 94 per 100,000 in 2013. Case notification rate for all forms of TB increased sharply between 2001 and 2005 then stabilising to 261 per 100,000 in 2013.

Figure 3: Percentage of notified cases by category (among all notifications): 2000-2013

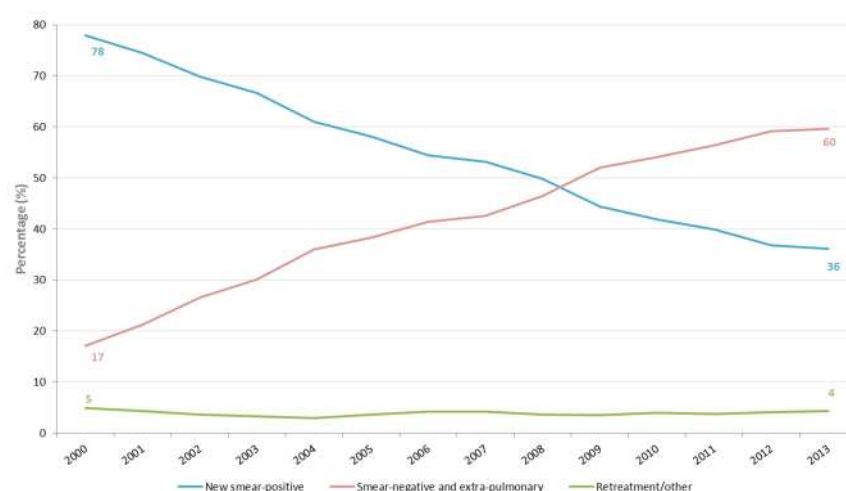


Figure 3 shows the percentage of notified TB cases by category among all TB notifications since 2000. The graph indicates a clear time trend and relationship between new smear-positive cases and smear-negative& extra-pulmonary cases. While the percentage of new smear-positive cases of all notifications has steadily decreased from 78% in 2000 to 36% in 2013, those of smear-negative and extra-pulmonary cases have increased from 17% in 2000 to 60% in 2013, indicating a reduced smear positivity in overall TB patient pool in the country. These said categories were found to be converged in 2008 as shown in the graph. The share of retreatment/other among all notifications has stayed at a low level at approximately 4%.

Figure 4: Case notification by category, by quarter: 2000-2013

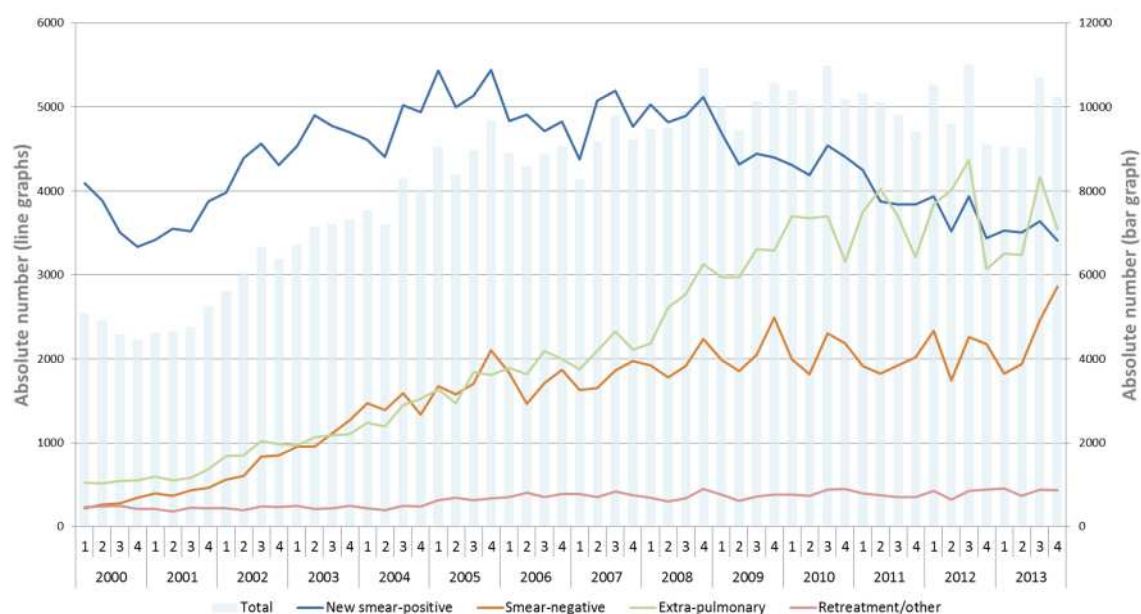


Figure 4 shows the case notification trend by category by quarter since 2000. Quarterly case notification for all forms of TB (blue bar) have fluctuated in recent years, with the greatest changes happening in between late 2011 and 2013. This might be due to the yield of massive active case finding activities that have been implemented across the country in recent years. Large fluctuations have occurred in smear-negative and extra-pulmonary TB since mid 2004 and early 2006 respectively.

Figure 5 shows the trend in case notification rate for all forms of TB and smear-positive TB by quarter since 2000. The rates are annualized by multiplying by four. Case notification rate for all forms of TB by quarter has had large fluctuations since early 2004. For all forms of TB, the higher rates tend to be observed in Quarter 3 and 4, relative to Quarter 1 and 2. This trend is more clearly found in Figure 6 that compares annualized case notification rates between quarters. In particular, case notification rate increased from Quarter 2 to Quarter 3 in most years with a few exceptions. Case notification rate for new smear-positive TB has been relatively stable between quarters. This suggests that case finding efforts in the second half of the year largely contributed to the yield of smear-negative TB and extra-pulmonary TB.

Figure 5: Case notification rate by quarter: 2000-2013



Figure 6: Comparison of quarterly case notification rate for all forms of TB: 2000-2013

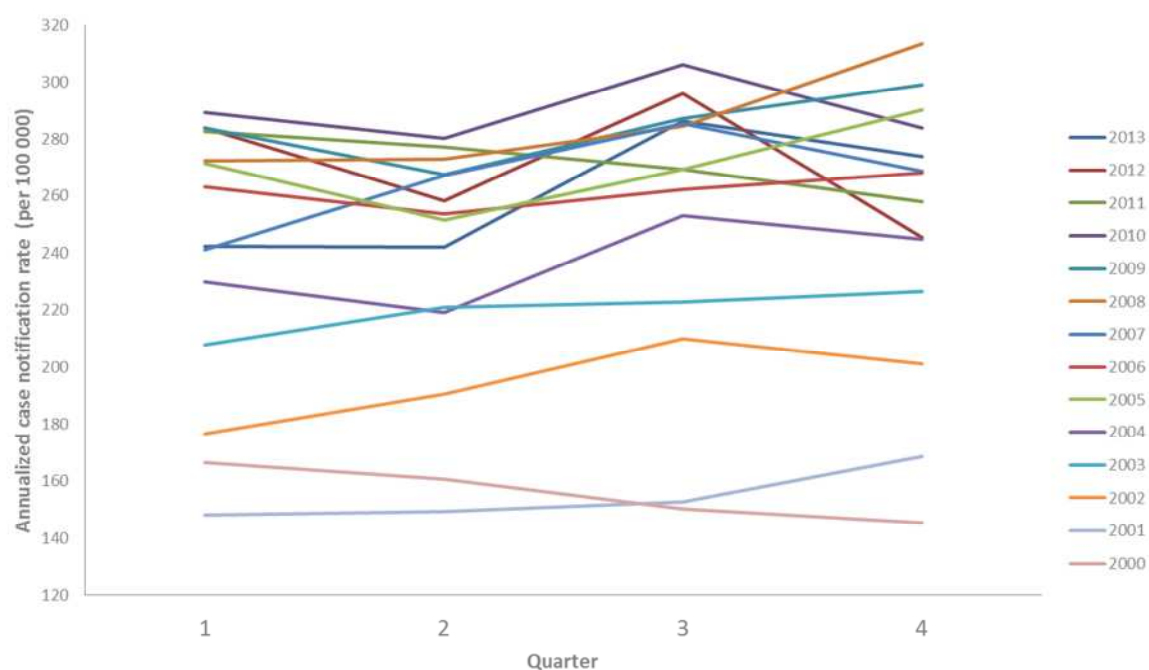


Table 1: Case notification by province: 2013

Province	New and relapse	New cases			Relapse	Re-treatment, excl. Relapse	Total retreatment	Other/history unknown	% of smear-positive among new pulmonary
		Smear-positive	Smear-negative	Extra-pulmonary					
BANTEAY MEANCHEY	2038	584	460	970	24	3	27	110	55.9
BATTAMBANG	2651	836	635	1147	33	9	42	74	56.8
KAMPOT	1265	661	244	347	13	3	16	42	73.0
KANDAL	2635	1160	550	902	23	5	28	40	67.8
KEP	78	37	11	30	0	0	0	0	77.1
KOH KONG	181	92	30	58	1	0	1	0	75.4
KOMPONG CHAM	4233	1392	1021	1766	54	17	71	62	57.7
KOMPONG CHHNANG	1226	638	208	374	6	0	6	19	75.4
KOMPONG SOM	422	150	60	208	4	0	4	7	71.4
KOMPONG SPEU	2621	950	916	739	16	2	18	61	50.9
KOMPONG THOM	1078	711	157	204	6	0	6	4	81.9
KRATIE	374	175	77	122	0	0	0	2	69.4
MONDOLKIRI	47	36	4	5	2	0	2	0	90.0
ODOR MEANCHEY	583	270	78	230	5	0	5	11	77.6
PAILIN CITY	270	73	51	145	1	0	1	12	58.9
PHNOM PENH	2107	1143	383	548	33	9	42	22	74.9
PREAH VIHEAR	275	151	66	55	3	2	5	16	69.6
PREY VENG	4345	997	863	2472	13	1	14	41	53.6
PURSAT	1075	439	305	321	10	0	10	19	59.0
RATTANAKIRI	132	72	12	44	4	1	5	4	85.7
SIEM REAP	3067	1293	707	1044	23	9	32	137	64.7
STUNG TRENG	251	136	19	95	1	0	1	0	87.7
SVAY RIENG	2109	556	762	766	25	0	25	284	42.2
TAKEO	3370	1161	1073	1123	13	0	13	150	52.0
NATIONAL HOSPITAL	1310	369	377	488	76	13	89	121	49.5
Grand Total	37743	14082	9069	14203	389	74	463	1238	60.8

Figure 7 shows age and sex-specific case notification for new smear-positive TB for 2011, 2012 and 2013. The highest case notification in number was observed in the age group of 45-54 for both males and females. There has been very little change to the sex ratios over the last three years. The case notification rate for new smear-positive TB is strongly biased toward males especially in older age groups, having twice as high a rate as females in the same age group. In younger age groups, the bias toward males is relatively low. The highest case notification rate for smear-positive TB was found in the group of males aged over 65 years, which was 618 per 100 000 population in 2013. This is more than six times higher than the national average of 94 per 100 000 for both sexes.

Results from the prevalence survey 2011/2012 show that 55% of smear-positive TB cases were found in the 55 and older age group. Using this finding and the total smear-positive case notification for 2013 (14,082), the expected number of smear-positive elderly TB cases is 7745 cases. However the notification in this age group was reported to be 5186, which implies that, despite higher case notification rates in the older age groups, 2559 (7745–5186) cases may still be missed from the program (see [graphic summary/case notification](#)).

Figure 7: Case notification for new smear-positive TB, by age and sex, Cambodia, 2011-2013

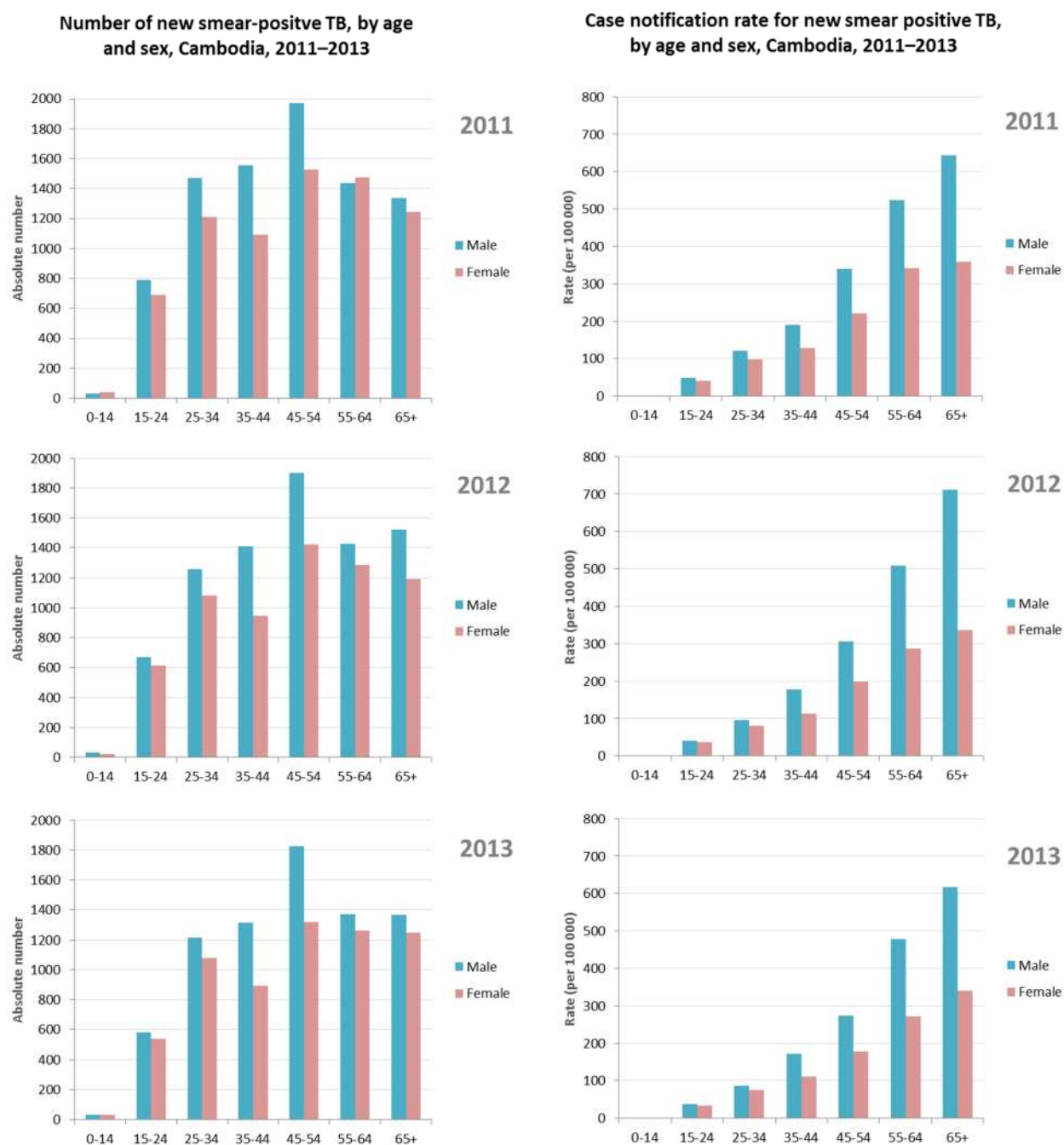


Figure 8 shows the case notification rate for new smear-positive TB by province for 2013. The range of case notification rate for new smear-positive TB is found to be large between provinces, ranging from 42 per 100,000 in Rattanakiri to 132 in Takeo. Thirteen provinces out of the 24 have a rate that is less than the national average of 94 per 100,000.

Figure 8: Case notification rate for new smear-positive TB by province: 2013

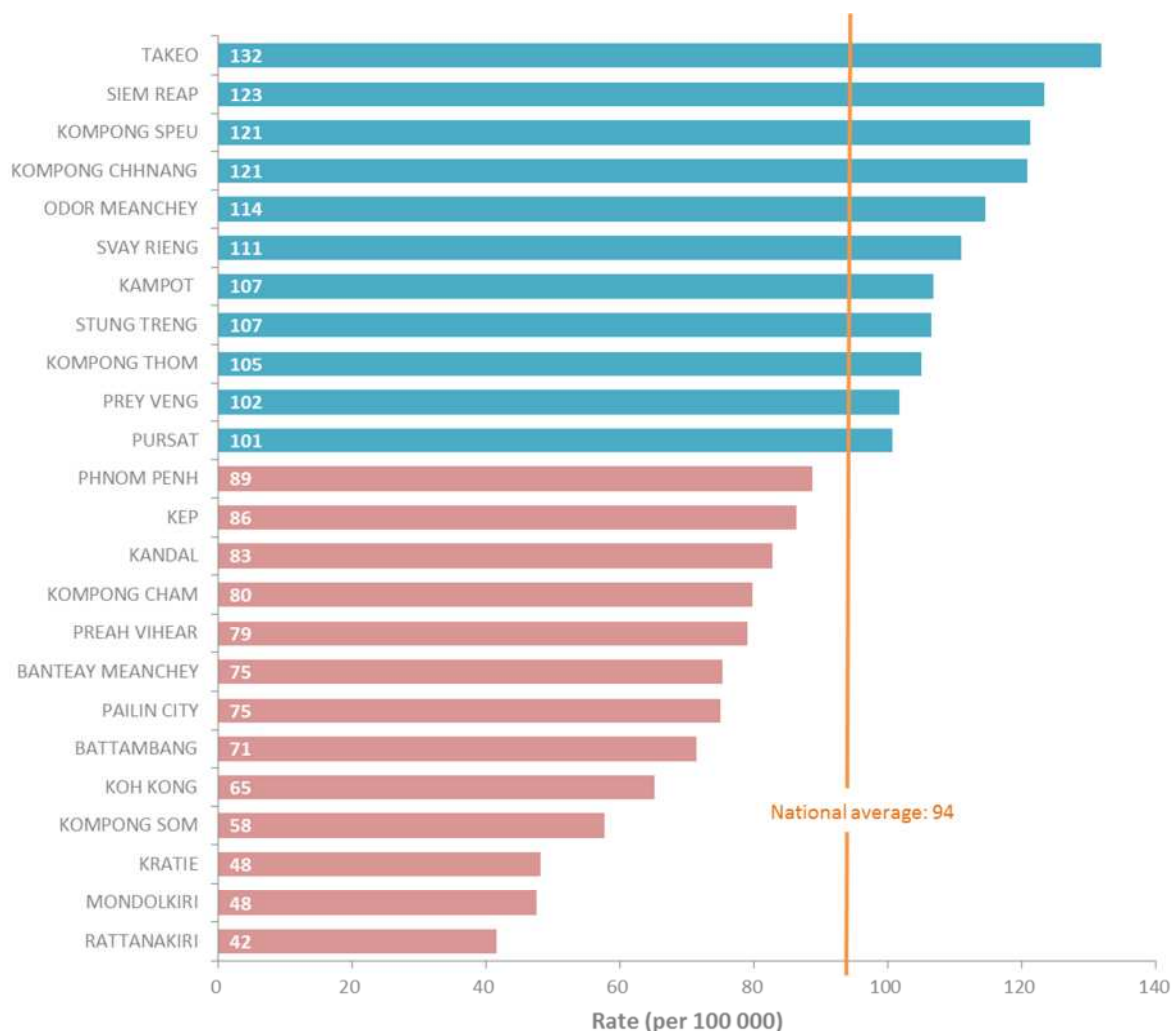


Figure 9: Case notification rate for all forms of TB by province: 2013

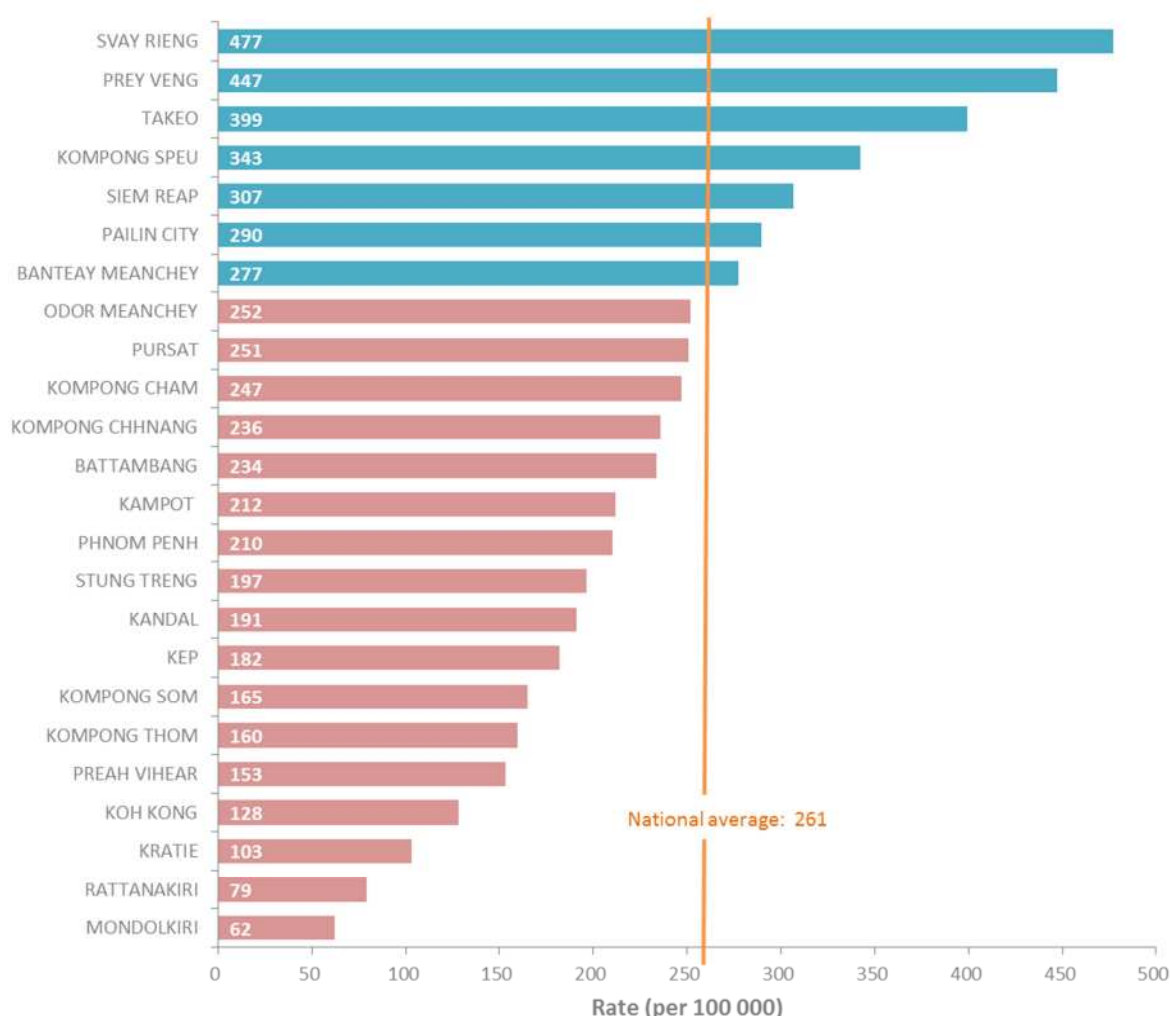


Figure 9 shows the case notification rate for all forms of TB by province for 2013. Similar to new smear-positive TB, there is a wide range of case notification rate for all forms of TB between provinces. Case notification rate for all forms of TB is more than 7 times higher in SvayRieng than it is in Mondolkiri, the highest and lowest rates respectively. Of the 24 provinces in the country, seven were above the national average which was 261 per 100,000.

Figure 10 shows the geographic distribution of case notification rate for new smear-positive TB. The map indicates areas of high case notification rate for new smear-positive TB running from North to South in the middle of the country. The areas of low case notification rates were found in the outlying provinces especially in the East of the country with rates being less than 60 per 100,000. The areas with a high case notification rate at the centre of the country are of over 120 per 100,000.

Figure 10: Map of case notification rate for new smear-positive TB by province: 2013

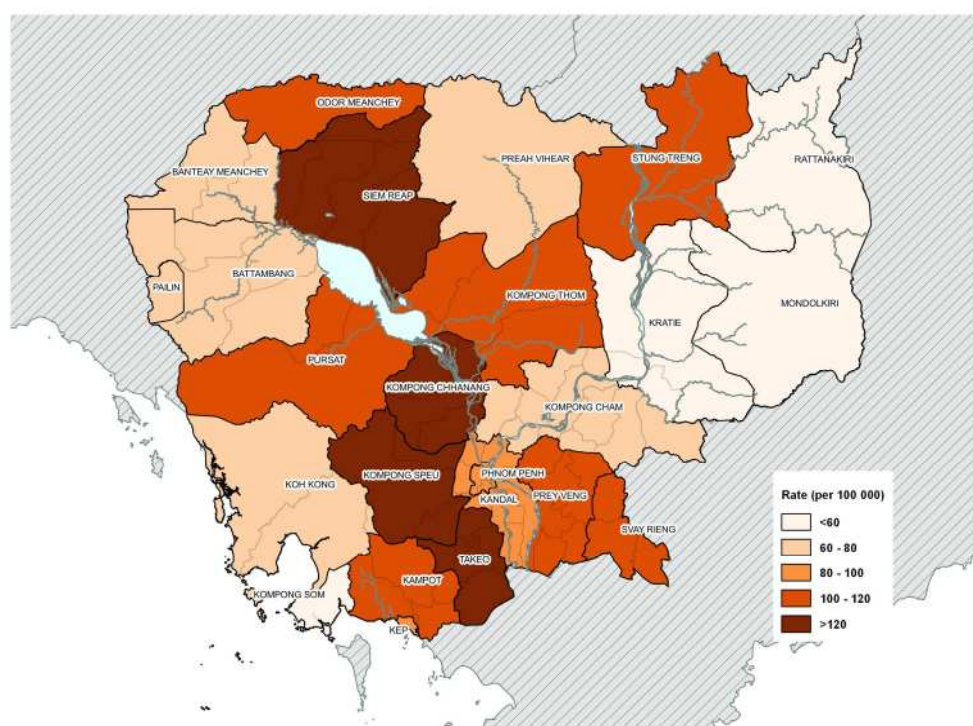
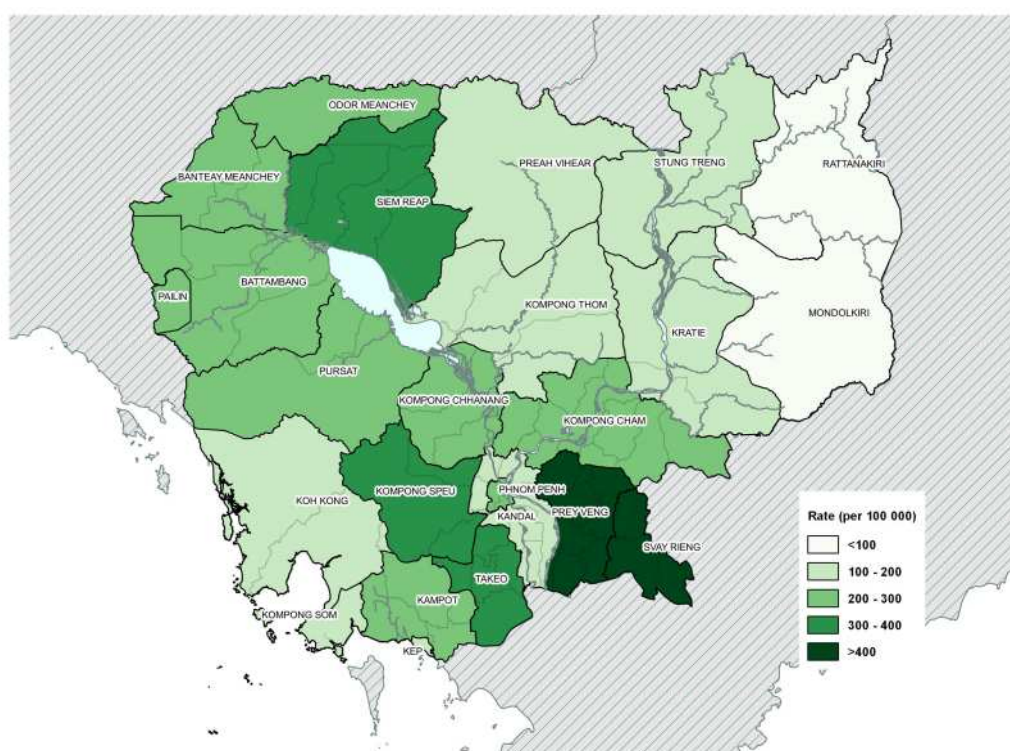


Figure 11 shows the geographical distribution of case notification rate for all forms of TB. The areas with majority of a higher case notification rate were found in the south of the country. Svay Rieng and Prey Veng have the highest rates with over 400 per 100,000. The area to the East of the country has the lowest rate with less than 100 per 100,000.

Figure 11: Map of case notification rate for all forms of TB by province: 2013



2. Case finding

The population screening rate (proportion of people screened for a disease in a defined population) is an important indicator to monitor and assess the effort in case finding activities. Figure 12 shows the number of suspects examined by smear microscopy and population screening rate for TB between 2001 and 2013. The number of suspects examined has risen since 2001 from 53,209 to 168,493 in 2013. 2001 to 2005 saw the greatest rise in number of suspects examined. The population screening rate also rose sharply between 2001 and 2005 from 0.43% to 1.04%. This suggests that the increased number of TB suspects examined during this period was largely driven by the increased case finding efforts and not only due to an increased population size. Since 2005, it has been kept at over 1% (1000 per 100,000 population) with a slightly increasing trend. The rate was 1.13% in 2013.

Figure 12: TB suspects examined by smear microscopy by year: 2001-2013

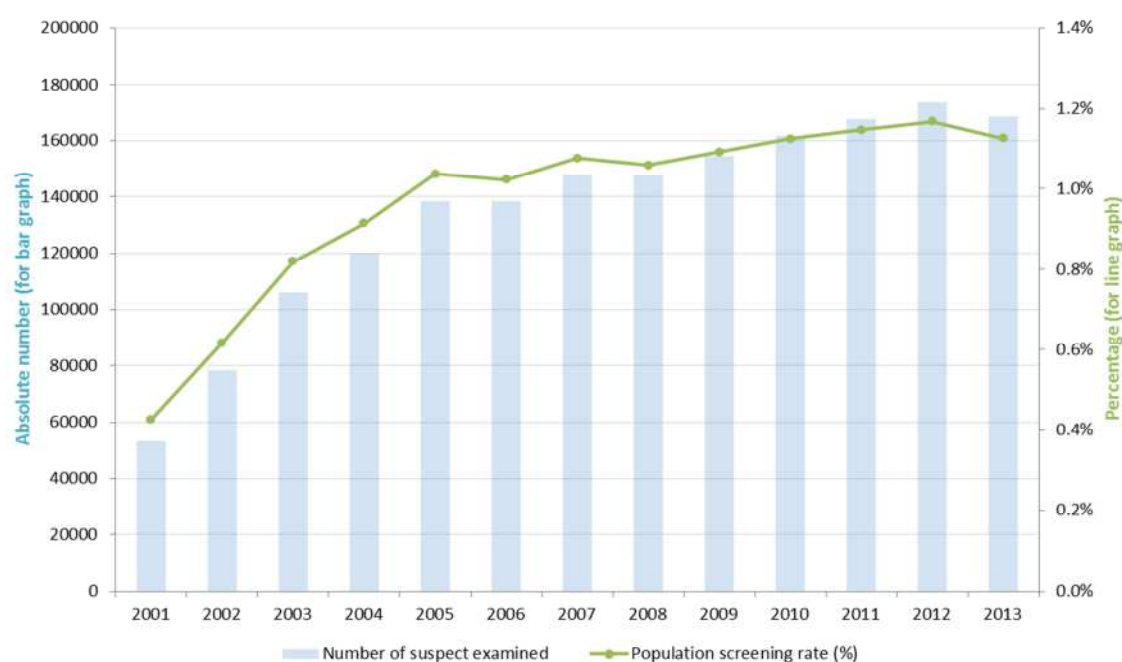


Figure 13 shows the number of suspects examined by smear microscopy and the population screening rate (annualized) by quarter between the years 2001 and 2013. Both the number of suspects examined and the population screening rate have risen since 2001, with decreases mostly being reported in the second quarter.

Figure 13: TB suspects examined by smear microscopy by quarter: 2001-2013

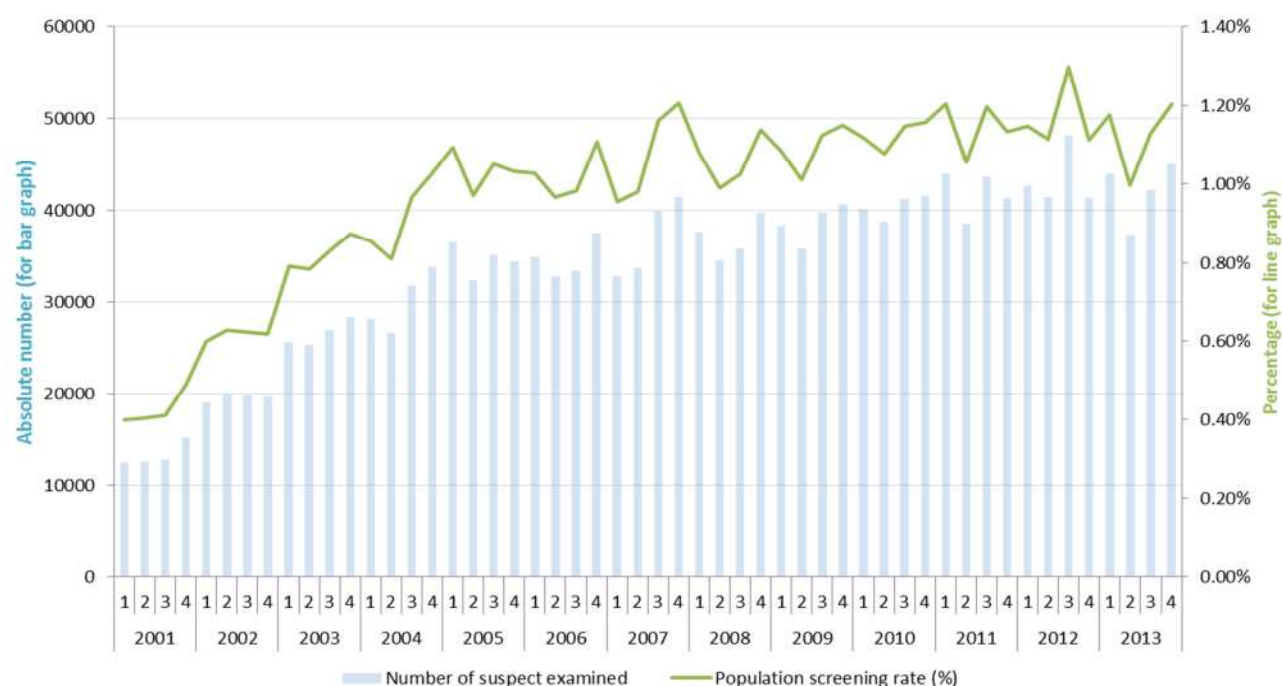
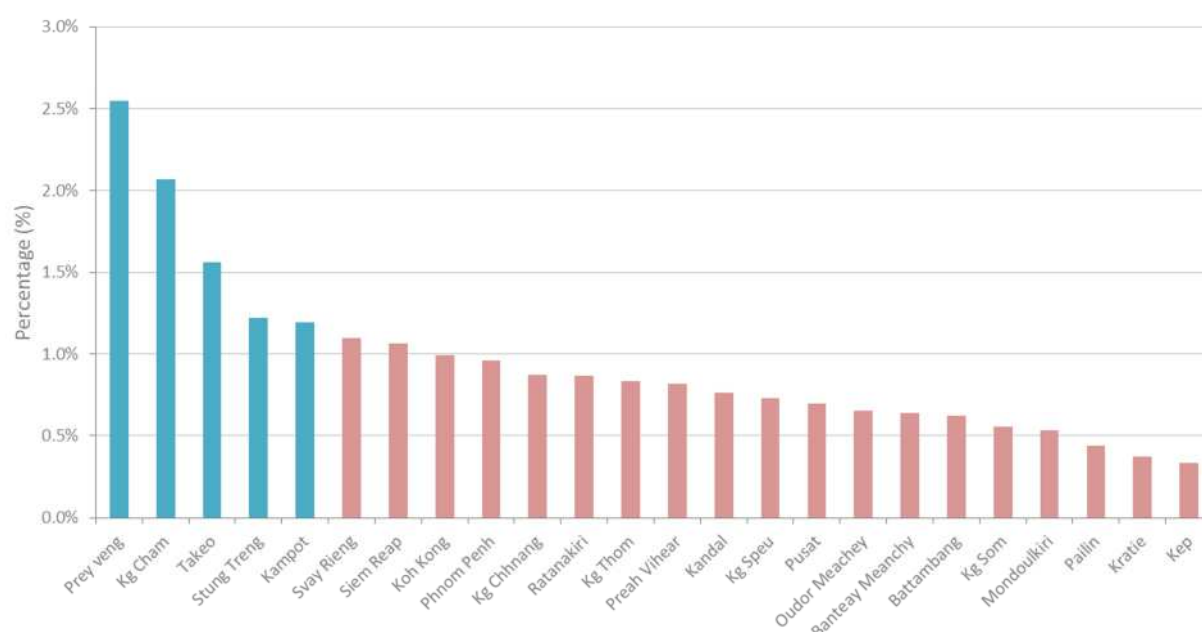


Figure 14 shows the population screening rate by province in 2013. Provinces with a blue bar reported a higher rate than the national average of 1.1%. Prey Veng and Kompong Cham have a high population screening rate with more than 2%, while other provinces such as Kep, Kratie, and Pailin have a lower population screening rate of less than 0.5%.

Figure 14: Population screening rate by province: 2013



A summary of TB laboratory services is presented in Table 2. In 2013, a total of 168,493 TB suspects were examined for TB using smear microscopy with a smear positivity rate of 8.1%. The sputum smear conversion rates at 2/3 months and at 5 months were 95% and 98.6% respectively.

The NTP performs the external quality assessment (EQA) to monitor and strengthen the quality of sputum smear microscopy. The results from the first three quarters of 2013 show a 98.6% correction rate, a 2.3% false positive rate and a 1.3% false negative rate.

Table 2: Summary of TB laboratory services: 2013

Province	Number of suspects examined*	Smear positivity rate**	Smear conversion rate at 2/3 month	Smear conversion rate at 5 month
Banteay Meanchy	4,936	11.9	95.0	99.6
Battambang	7,270	13.0	90.8	98.7
Kampot	7,399	7.5	98.5	100
Kandal	10,689	9.4	96.0	99.7
Kep	143	17.5	96.8	100
Kg Cham	36,134	4.6	86.5	95.9
Kg Chhnang	4,596	15.6	99.0	100
Kg Som	1,438	10.4	97.4	100
Kg Speu	5,699	13.1	97.6	99.9
Kg Thom	5,636	13.1	98.4	90.8
Koh Kong	1,398	7.9	88.4	98.5
Kratie	1,352	9.2	96.6	100
Mondoukiri	403	9.3	83.9	100
Oudor Meachey	1,535	14.4	91.8	99.4
Pailin	425	13.5	92.6	100
Phnom Penh	16,360	9.0	93.0	98.8
Preah Vihear	1,558	10.5	98.7	99.3
prey veng	24,992	2.7	99.4	100
Pusat	3,044	11.4	97.7	99.7
Ratanakiri	1,500	5.1	75.3	97.6
Siem Reap	11,163	11.3	97.8	100
Stung Treng	1,558	8.3	97.1	100
Svay Rieng	5,490	8.8	99.5	99.8
Takeo	13,775	9.1	96.1	99.1
Grand Total	168,493	8.1	95.0	98.6

* this includes suspects examined by smear microscopy only

** this is calculated by the number of positive slides divided by the total number of slides examined. Due to the availability of data, smear positivity rate using the number of cases was not obtained.

Figure 15 shows the trend in population screening rate and smear positivity rate from 2001 to 2013. The smear positivity rate has decreased over time as population screening rate increased, indicating a clear association between both rates. For the past 13 years, population screening rate has increased by nearly three times from 0.4% in 2001 to 1.1% in 2013. The increasing screening efforts have resulted in the reduced smear positivity rate as shown in the graph.

Figure 15: Trend in population screening rate and smear positivity rate: 2001-2013

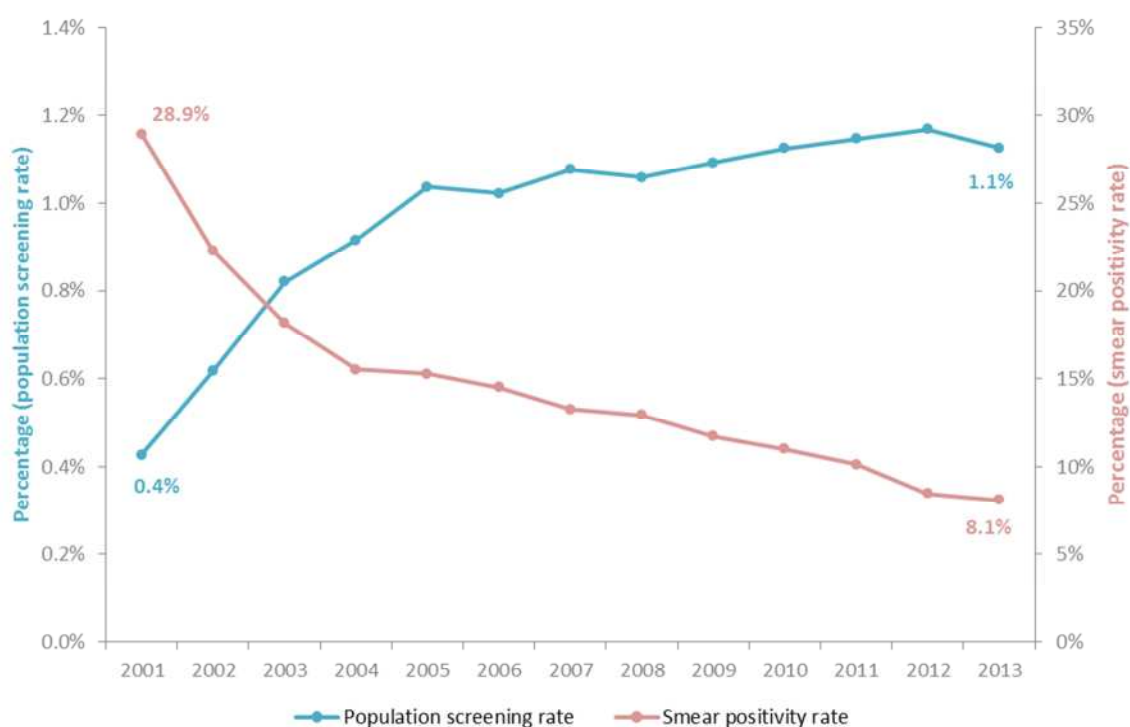


Figure 16 shows the smear positivity rate by province in 2013. The rate ranged from 2.7% in Prey Veng to 17.5% in Kep. Provinces, with a red bar, had a rate higher than the national average of 8.1%.

Figure 16: Smear positivity rate by province: 2013

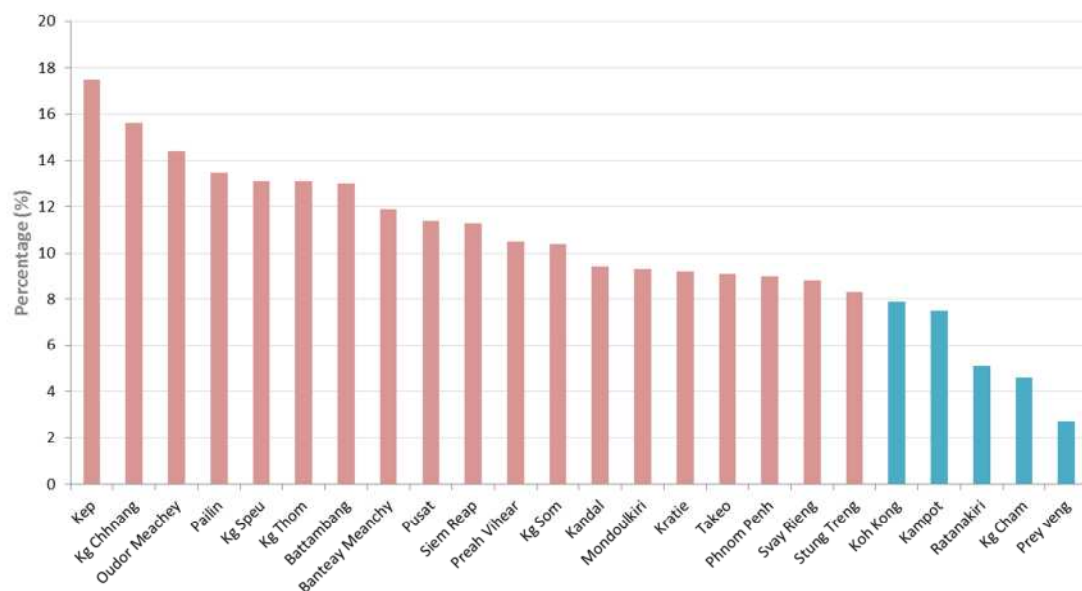
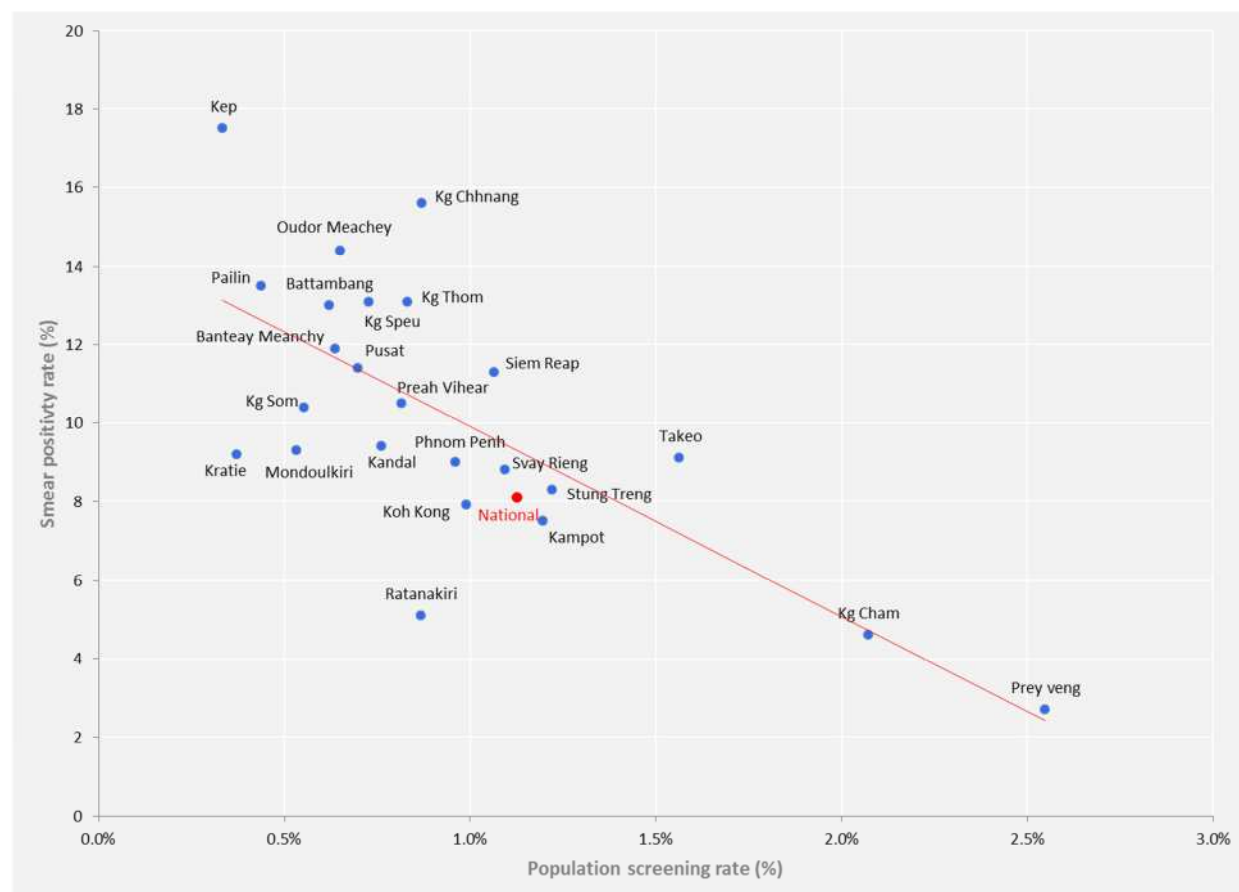


Figure 17 shows the correlation between population screening rate and smear positivity rate in 2013. The trend line shows a negative correlation between these rates. A higher smear positivity is likely to be reported in provinces with a lower population screening rate. This may imply that provinces on the upper left side still have more room to increase case finding efforts that can result in a reduced smear positivity rate.

Figure 17: Correlation between population screening rate and smear positivity rate: 2013



3. Treatment outcome

Cambodia has consistently achieved outstanding treatment outcomes over the years, with treatment success and cure rates for smear-positive TB at over 91% and 87% respectively. The graph (Figure 18) shows that there was a relatively sharp decrease from 2000 to 2001, then, the rates climbed until 2004. After seeing stagnation and a slight decrease in 2005 and 2006, the rates again rose to a peak in 2009. Since 2009 both rates have been in a slightly declining trend. In 2013, the treatment success and cure rates for new smear-positive TB were 92.8% and 89.2% respectively.

Figure 18: Treatment success and cure rates for new smear-positive TB by year: 2000-2013

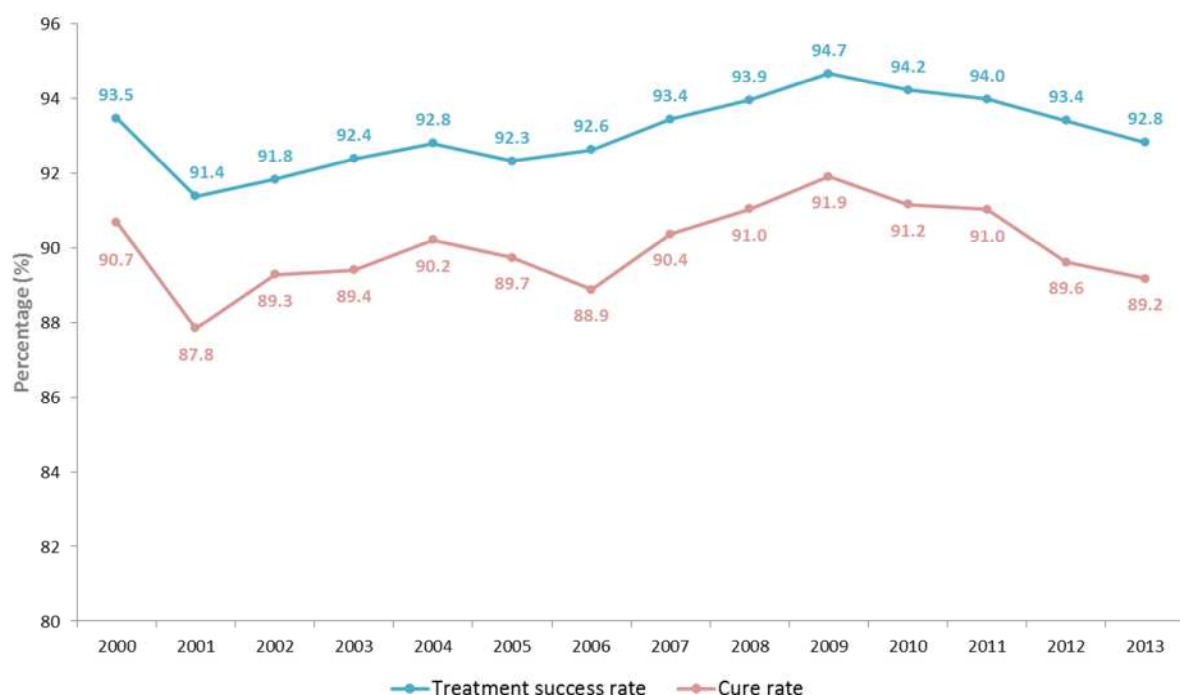


Figure 19: Gap between treatment success and cure rates (treatment completion rate) for new smear-positive TB: 2000-2013

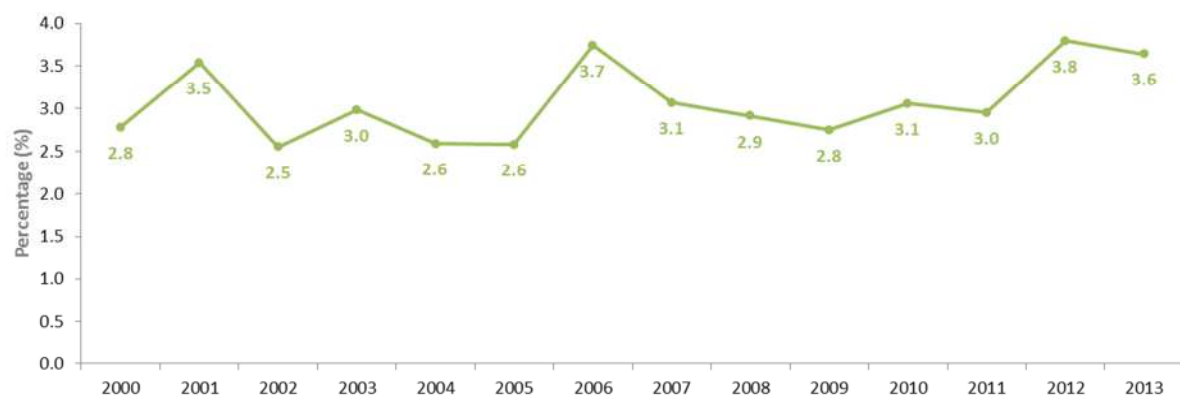


Figure 19 shows the gap between treatment success and cure rates (treatment completion rate) for new smear-positive TB from 2000 to 2013. The percentage represents the missed chance in performing a control sputum smear examination in the cohort of new smear-positive TB. The relatively higher percentages were reported in 2001, 2006, 2012 and 2013, with over 3.5%.

Figure 20 shows the treatment success and cure rates for new smear-positive TB by quarter between 2000 and 2013. Since the cure rate comprises a large part of the treatment success rate, it is reasonable that both rates have a certain similarity in trend over the years. Unlike a quarterly case notification trend (shown in Figure 5 and 6), there has been an irregular fluctuation for treatment success and cure rates regardless of quarter. In the last quarter of 2013, the treatment success rate increased, while the cure rate decreased. This implies increased missed chances in performing control sputum smear examinations.

Figure 20: Treatment success and cure rates for new smear-positive TB by quarter: 2000-2013

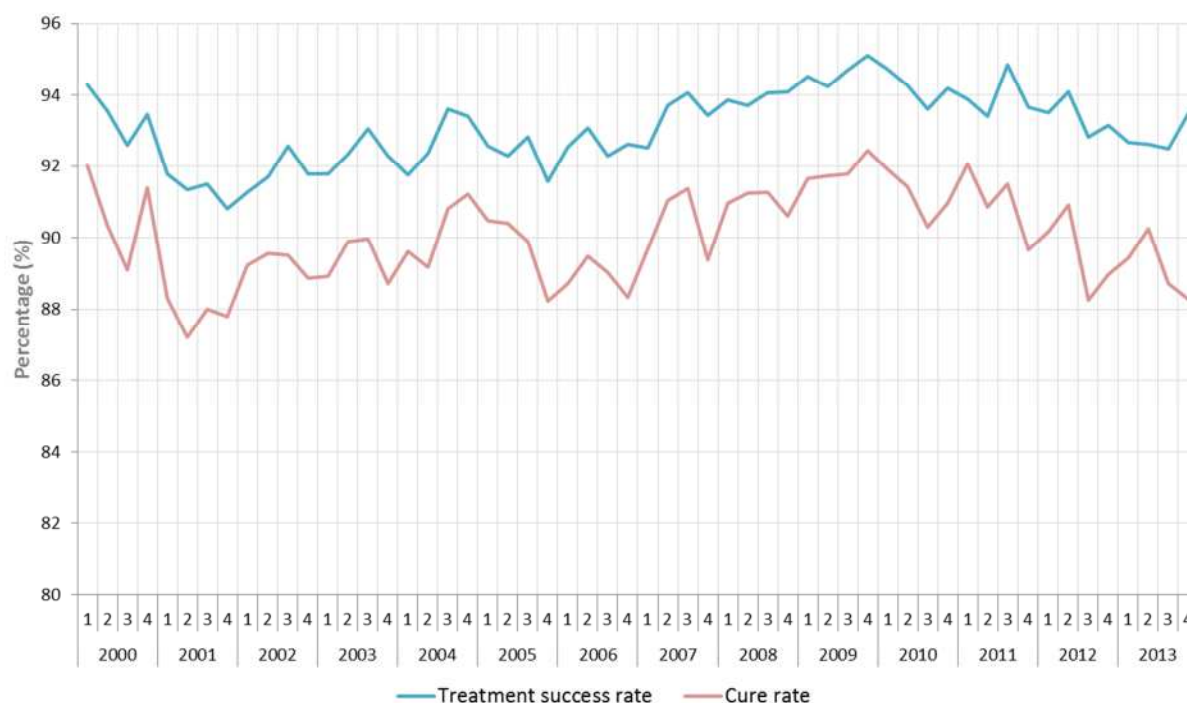


Figure 21 shows the rates for unfavourable treatment outcomes between 2000 and 2013. These outcomes include, death, failure, lost to follow-up and transferred out. The failure rate has stayed fairly stable at around 0.4%. The transferred-out rate has steadily increased from 0.5% in 2000 to 2.7% in 2013. The lost to follow-up rate has decreased steadily to 1.8% in 2013. The death rate has decreased to 2.4% in 2013. All rates slightly increased from 2012 to 2013.

Figure 21: Rates for unfavourable treatment outcomes: 2000-2013

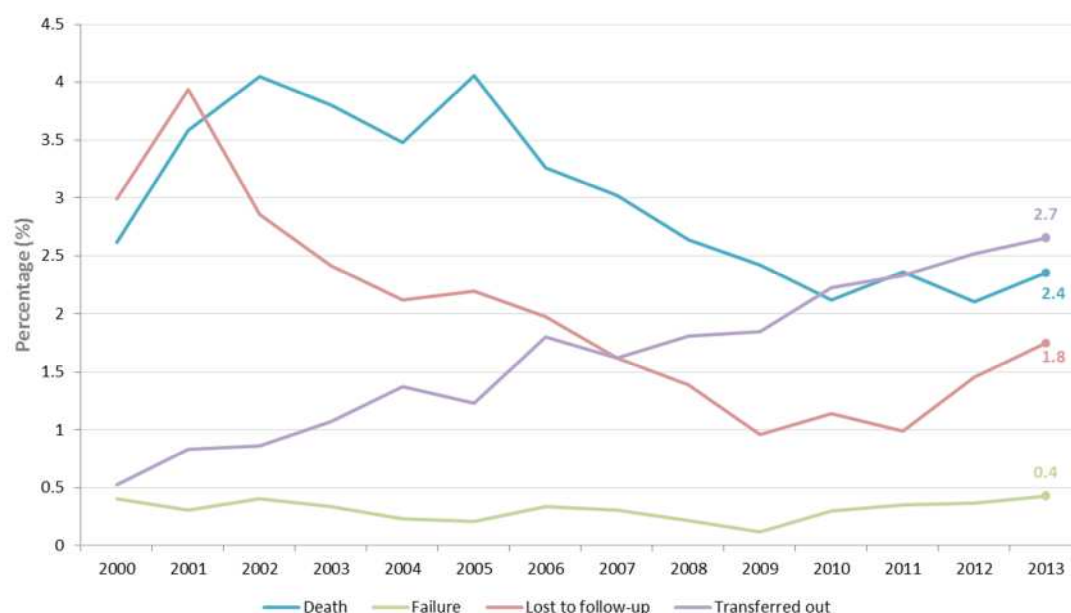


Table 3 shows the treatment success rate for new smear-positive TB by province in 2012 and 2013. The national averages were 93.4% in 2012 and 92.8% in 2013. Most provinces in the group of higher treatment success rate in 2012 continued to be in the same group in 2013 except Kratie and Phnom Penh.

Table 4 shows the cure rate for new smear-positive TB by province in 2012 and 2013. The national averages were 89.6% in 2012 and 89.2% in 2013. Similar to treatment success rate, most provinces in the group of higher cure rate in 2012 remained in the same group in 2013 except Battambang and Kompong Thom. Kep and Rattanakiri had the best and worst rates respectively for both years.

Table 3: Treatment success rate for new smear-positive TB: 2012 (left) and 2013 (right)

Rank	Province	Treatment Success Rate (%)	Rank	Province	Treatment Success Rate (%)
1	KEP	100	1	KEP	100
2	STUNG TRENE	98.4	2	PURSAT	97.9
3	KOMPONG SPEU	97.2	3	KAMPOT	97.5
4	PREY VENG	96.9	4	KOMPONG SPEU	96.7
5	KOMPONG THOM	96.8	5	PREY VENG	95.8
6	SVAY RIENG	96.6	6	TAKEO	95.2
7	KOMPONG CHHANANG	96.5	7	SVAY RIENG	95.0
8	KAMPOT	96.4	8	KOMPONG CHHNANG	94.5
9	PREAH VIHEAR	95.8	9	KOMPONG THOM	94.4
10	KRATIE	95.7	10	KANDAL	93.9
11	KANDAL	95.0	11	STUNG TRENG	93.7
12	PURSAT	94.8	12	PREAH VIHEAR	93.6
13	TAKEO	94.4	13	BANTEAY MEANCHEY	93.1
14	PHNOM PENH	93.5	National Average: 92.8%		
National Average: 93.4%			14	KOMPONG SOM	92.7
15	ODORMEANCHEY	93.0	15	PHNOM PENH	92.1
16	SIEM REAP	92.8	16	SIEM REAP	92.0
17	BANTEAY MEANCHEY	91.9	17	BATTAMBANG	90.9
18	BATTAMBANG	91.5	18	ODOR MEANCHEY	90.7
19	KOMPONG SOM	91.2	19	KRATIE	90.1
20	PAILIN	90.3	20	MONDOLKIRI	90.0
21	KOMPONG CHAM	88.2	21	KOMPONG CHAM	88.8
22	NATIONAL HOSPITALS	80.4	22	KOH KONG	86.4
23	KOH KONG	76.6	23	PAILIN CITY	84.2
24	MONDOLKIRI	76.3	24	RATTANAKIRI	77.6
25	RATTANAKIRI	72.1	25	NATIONAL HOSPITALS	76.2

“NATIONAL HOSPITALS” includes CENAT, Hope Hospital, IOM, Khmer Soviet Hospital, National Paediatric Hospital, PreahKetMeleah Hospital, PrasKosomak Hospital.

Table 4: Cure rate for new smear-positive TB: 2012(left) and 2013 (right)

Rank	Province	Cure Rate (%)	Rank	Province	Cure Rate (%)
1	KEP	100	1	KEP	100
2	SVAY RIENG	96.3	2	KAMPOT	97.2
3	KAMPOT	96.2	3	PURSAT	97.1
4	PREY VENG	95.7	4	SVAY RIENG	95.0
5	KOMPONG SPEU	95.2	5	KOMPONG SPEU	94.5
6	KOMPONG CHHANANG	94.4	6	PREY VENG	93.1
7	PURSAT	94.0	7	KOMPONG CHHNANG	92.6
8	STUNG TRENE	92.9	8	TAKEO	91.8
9	PREAH VIHEAR	91.6	9	KANDAL	91.0
10	BATTAMBANG	90.5	10	PREAH VIHEAR	90.9
11	BANTEAY MEANCHEY	90.4	11	BANTEAY MEANCHEY	90.4
12	KOMPONG THOM	89.9	12	STUNG TRENG	90.1
National Average: 89.6%			13	PHNOM PENH	89.5
13	KANDAL	89.5	National Average: 89.2%		
14	PHNOM PENH	89.1	14	BATTAMBANG	89.1
15	ODORMEANCHEY	88.4	15	ODOR MEANCHEY	88.9
15	TAKEO	88.4	16	SIEM REAP	88.4
17	SIEM REAP	87.8	17	KOMPONG SOM	87.7
18	PAILIN	86.0	18	KOH KONG	85.2
19	KOMPONG SOM	83.4	19	PAILIN CITY	84.2
20	KRATIE	82.8	20	KOMPONG CHAM	82.7
21	KOMPONG CHAM	82.2	21	KOMPONG THOM	81.9
22	NATIONAL HOSPITALS	78.3	22	KRATIE	77.3
23	KOH KONG	74.5	23	NATIONAL HOSPITALS	71.4
24	MONDOLKIRI	60.5	24	MONDOLKIRI	70.0
25	RATTANAKIRI	57.0	25	RATTANAKIRI	67.1

“NATIONAL HOSPITALS” includes CENAT, Hope Hospital, IOM, Khmer Soviet Hospital, National Paediatric Hospital, PreahKetMeleah Hospital, PrasKosomak Hospital.

Figure 22 shows the difference in treatment success rate for new smear-positive TB between 2012 and 2013 by province. From 2012 to 2013, 9 provinces had an improved treatment success rate (as shown with a blue bar) whereas 15 provinces had a decreased rate (as shown with a red bar).

Figure 22: Difference in treatment success rate for new smear-positive TB between 2012 and 2013 by province

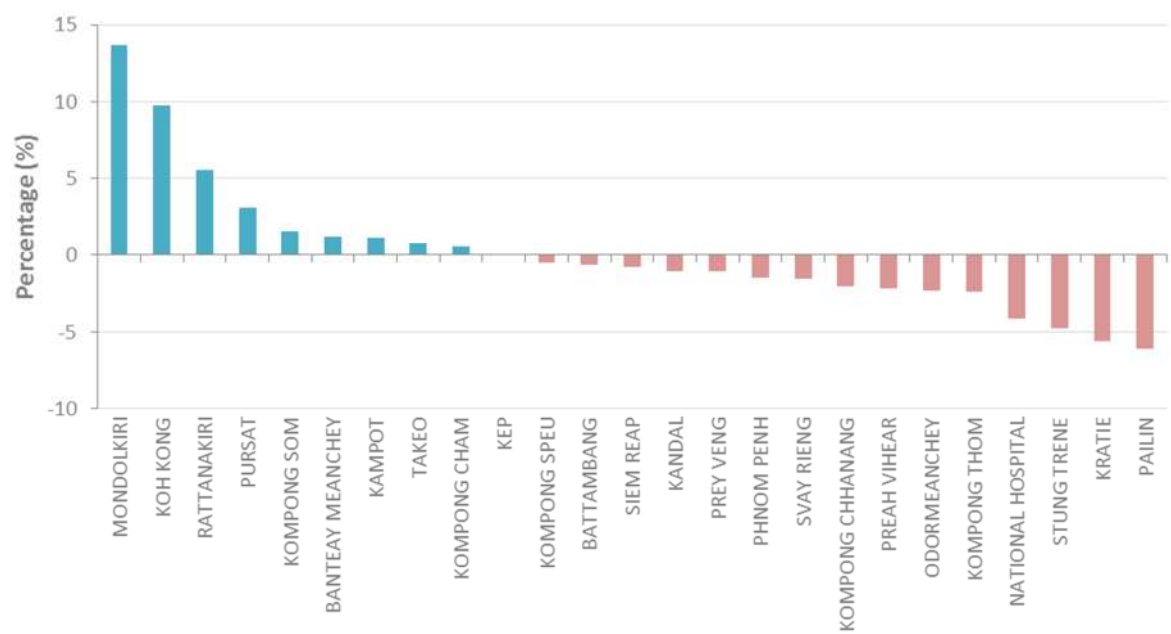


Figure 23 shows the difference in cure rate for new-smear positive TB between 2012 and 2013 by province. From 2012 to 2013, 12 provinces had an improved curerate (as shown with a blue bar) whereas 12 provinces had a decreased rate (as shown with a red bar).

Figure 23: Difference in cure rate for new smear-positive TB between 2012 and 2013 by province

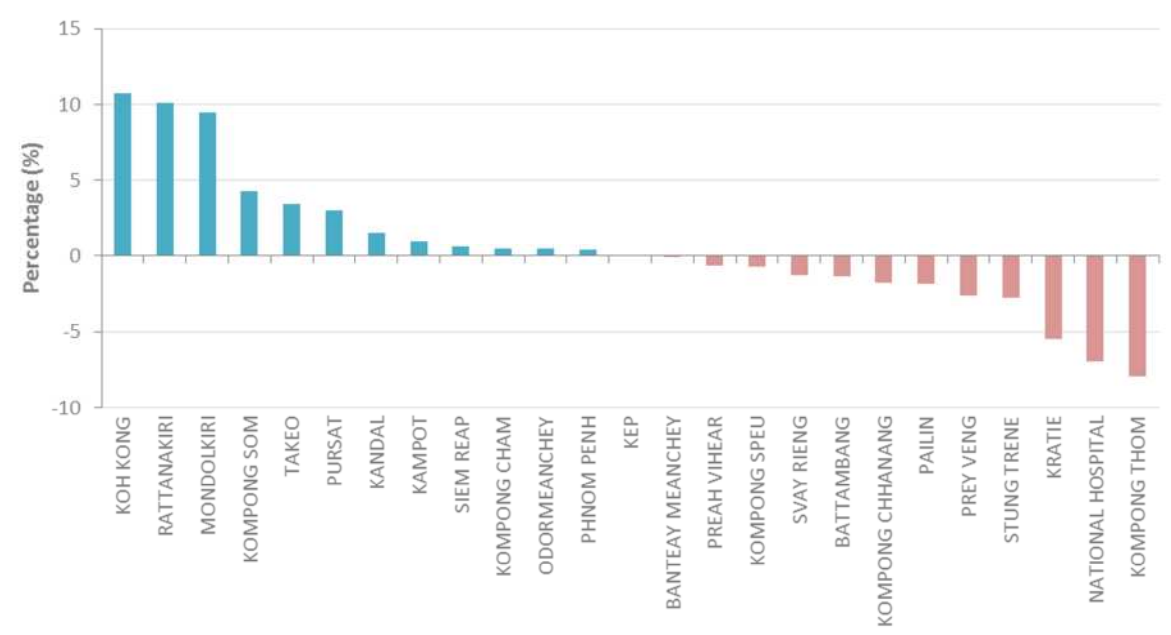


Table 5: Treatment outcome for new smear-positive TB by province: 2013

Province	Number notified (cohort size)	Treatment success rate	% of cohort					
			Cured	Completed	Died	Failed	Loss to follow-up	Transfer out
BANTEAY MEANCHEY	696	93.1	90.4	2.7	2.6	0.6	1.4	2.3
BATTAMBANG	806	90.9	89.1	1.9	3.3	1.1	2.0	2.6
KAMPOT	638	97.5	97.2	0.3	1.3	0.0	1.3	0.0
KANDAL	1,166	93.9	91.0	2.9	2.8	0.3	0.9	2.0
KEP	27	100	100	0.0	0.0	0.0	0.0	0.0
KOH KONG	88	86.4	85.2	1.1	4.5	0.0	6.8	2.3
KOMPONG CHAM	1,543	88.8	82.7	6.1	2.9	0.8	2.6	4.9
KOMPONG CHHNANG	585	94.5	92.6	1.9	2.7	0.0	0.7	2.1
KOMPONG SOM	179	92.7	87.7	5.0	4.5	0.0	0.6	2.2
KOMPONG SPEU	909	96.7	94.5	2.2	1.4	0.0	1.2	0.7
KOMPONG THOM	853	94.4	81.9	12.4	2.3	0.0	2.1	1.2
KRATIE	172	90.1	77.3	12.8	2.3	0.6	3.5	3.5
MONDOLKIRI	20	90.0	70.0	20.0	0.0	0.0	10.0	0.0
NATIONAL HOSPITAL	458	76.2	71.4	4.8	4.1	3.3	7.2	9.2
ODOR MEANCHEY	333	90.7	88.9	1.8	2.4	1.2	2.4	3.3
PAILIN CITY	38	84.2	84.2	0.0	2.6	0.0	5.3	7.9
PHNOM PENH	1,024	92.1	89.5	2.6	1.5	0.6	2.1	3.7
PREAH VIHEAR	220	93.6	90.9	2.7	2.7	0.5	0.5	2.7
PREY VENG	1,081	95.8	93.1	2.8	1.9	0.0	1.6	0.7
PURSAT	478	97.9	97.1	0.8	1.3	0.0	0.0	0.8
RATTANAKIRI	76	77.6	67.1	10.5	7.9	2.6	7.9	3.9
SIEM REAP	1,384	92.0	88.4	3.5	2.0	0.2	1.2	4.6
STUNG TRENG	142	93.7	90.1	3.5	2.8	0.7	2.8	0.0
SVAY RIENG	565	95.0	95.0	0.0	1.8	0.0	0.7	2.5
TAKEO	1,135	95.2	91.8	3.3	2.3	0.0	0.9	1.7
Grand Total	14,616	92.8	89.2	3.6	2.4	0.4	1.8	2.7

4. Drug resistance

The NTP started Programmatic Management of Drug-resistant Tuberculosis (PMDT) in 2006 in collaboration with partners including the World Health Organization (WHO), the Cambodian Health Committee (CHC), Médecins Sans Frontières (MSF) France and MSF Belgique. A drug resistance survey from 2006–2007 showed MDR-TB in 1.4% (95% confidence interval [CI]: 0.8%–2.5%) of new cases and 10.5% (95% CI: 4.8%–19.6%) among previously treated cases.

Figure 24 shows the number of MDR-TB suspects tested by Drug Susceptibility Testing (DST) between 2007 and 2013. The number has dramatically increased since 2007. In particular, there was a large increase from 874 in 2011 to 1578 in 2012, which demonstrates rapid expansion of DST services in recent years. Using surveillance data together with some assumptions, the number of MDR-TB suspects was estimated to be 1,973. Estimation was made using the number of pulmonary smear positive retreatment cases notified [463], number of pulmonary TB smear negative retreatment cases [941 = 76% of Others notified 1,238], non-converters at month 3 [62], number of new smear positive/symptomatic MDR-TB close contacts [183], and HIV new smear positive [325]. Given the estimated number of MDR-TB suspects of 1,973 and the number of tested MDR-TB suspects for 2013, 380 MDR-TB suspects (1973 - 1593) may be missed from DST (see [graphic summary/drug resistance](#)).

Figure 24: Number of MDR-TB suspects tested by Drug Susceptibility Testing: 2007-2013

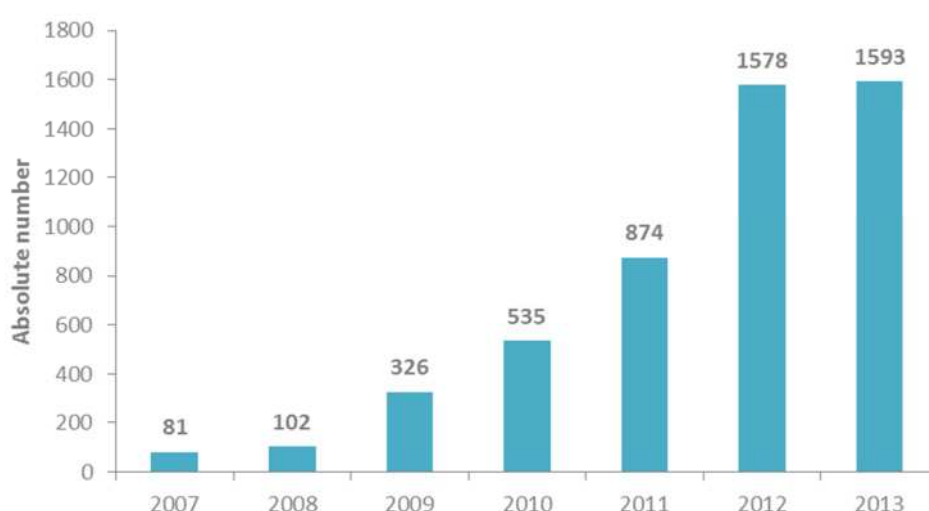


Figure 25 shows the number of patients enrolled in second-line TB treatment between 2007 and 2013. The total number of enrolled patients has increased by more than three times from 45 in 2010 to 143 in 2013. While the number of mono- & poly-drug resistant TB cases has been reported to be low, there was an increase in the number of RR/MDR-TB cases. In 2013, the numbers of RR/MDR-TB and mono- & poly-drug resistant TB cases were 121 and 22 respectively (see [graphic summary/drug resistance](#)).

Figure 25: Number of patients enrolled in second-line TB treatment: 2007-2013

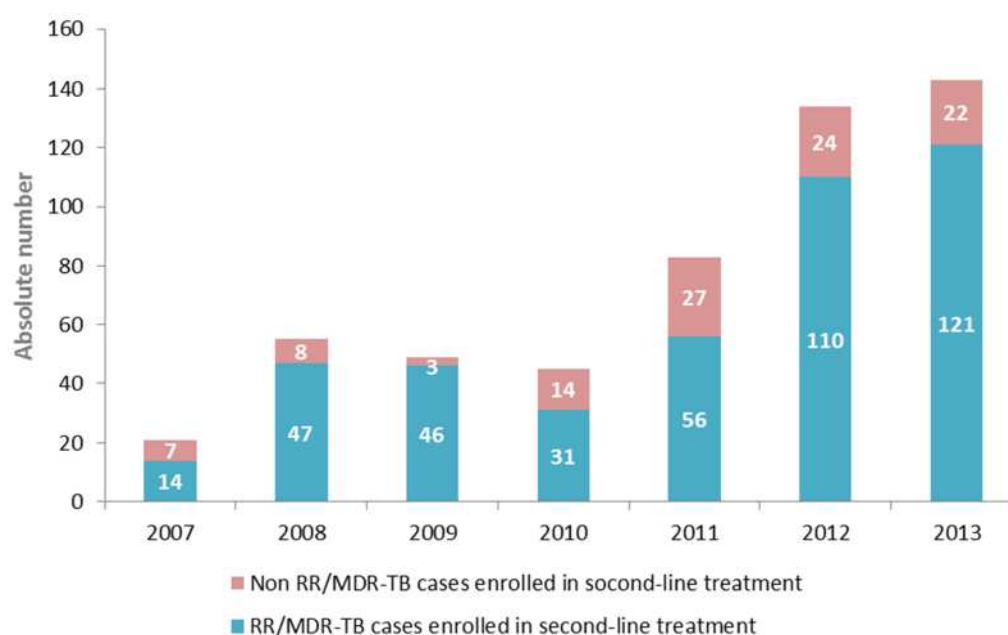


Figure 26 shows the percentage of patients enrolled in second-line TB treatment among tested MDR-TB suspects between 2007 and 2013. The rate peaked at 53.9% in 2008 and then decreased in 2009 and 2010. Since 2010 it has been relatively stable, at less than 10%.

Figure 26: Percentage of patients enrolled in second-line TB treatment among tested MDR-TB suspects: 2007-2013



As of the end of 2013, there are 11 MDR-TB treatment sites with 65 isolation rooms in the country. Figure 27 shows the number of MDR-TB cases and mono- & poly-drug resistant TB cases enrolled in second-line TB treatment by treatment site in 2013. CENAT reported the highest number of MDR-TB cases with 63 cases, which was followed by Kompong Cham and the Khmer Soviet Hospital. The highest numbers of mono- & poly-drug resistant TB cases were reported in Kompong Cham with 11 cases in 2013.

Figure 27: Number of MDR-TB cases (left) and mono/poly-drug resistant TB cases (right) enrolled in second-line TB treatment by treatment site: 2013

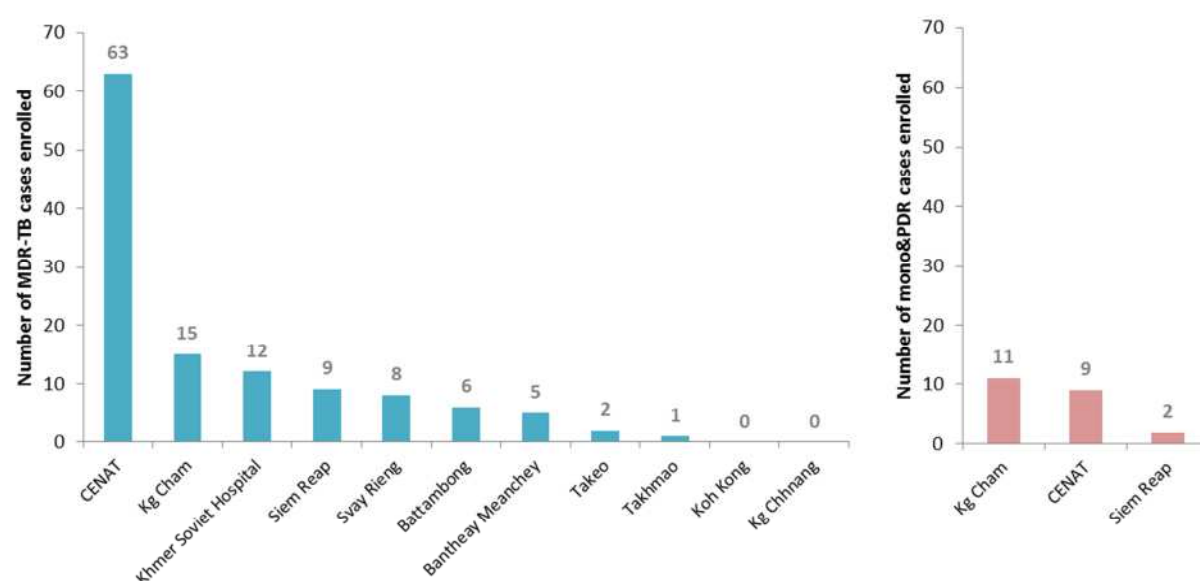


Table 6 shows the number of RR/MDR-TB patients tested for culture conversion at 6 months and its conversion rate in the patient cohort of 2011 and 2012.

Table 6: Culture conversion rate at 6 months for RR/MDR-TB patients: 2012-2013

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%	10

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

Table 7 and Figure 28 show treatment outcomes for RR/MDR-TB patients between 2007 and 2011. The treatment success rate increased from 64% in 2007 to 78% in 2009. After seeing a drop in treatment success rate and an increase in death rate in 2010, the 2011 cohort achieved the highest treatment success rate with 85% and the lowest death rate with 7%. For the past 5 years, the patient cohorts of 2009 and 2011 have achieved the global target of 75% treatment success rate.

Figure 28: Treatment outcome for RR/MDR-TB patients: 2007-2011

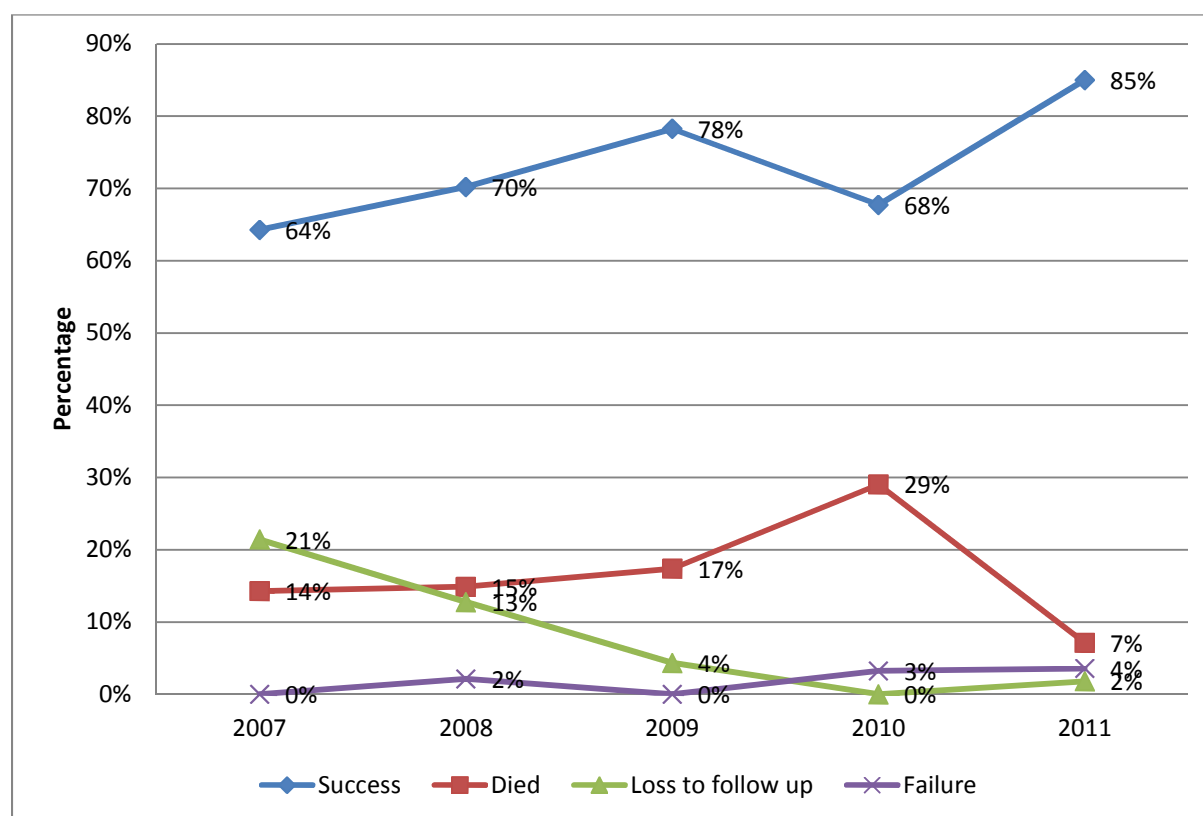


Table 7: Treatment outcome for RR/MDR-TB patients: 2007-2011

Treatment outcome	2007		2008		2009		2010		2011	
	Number (n=14)	%	Number (n=47)	%	Number (n=46)	%	Number (n=31)	%	Number (n=56)	%
Success	9	64%	33	70%	36	78%	21	68%	48	85%
Cured	0	-	0	-	0	-	0	-	47	84%
Died	2	14%	7	15%	8	17%	9	29%	4	7%
Loss to follow-up	3	21%	6	13%	2	4%	0	-	1	2%
Failure	0	-	1	2%	0	-	1	3%	2	4%

Note; In 2011 patient cohort, treatment outcome of 1 MDR-TB case was not determined.

5. TB/HIV

A summary of TB/HIV collaborative services for 2013 is presented in Table 8. Among all notified TB cases with unknown HIV status, 84% (31,947/37,998) were referred for HIV testing of which 97.8% (31,252/31,947) were tested for HIV at VCCT. A positivity rate for HIV in newly-tested TB patients was 0.59% (184/31,252). The proportion of TB patients with known HIV status was 82.7% (32,309/39,055).

Table 8: Summary table of TB/HIV services: 2013

Quarter	TB cases registered for treatment (including HIV+)	TB Cases Registered for treatment (excluding HIV+)	Cases with known HIV+ before TB treatment	TB Cases Referred to VCT for HIV testing	TB Cases tested for HIV at VCT	HIV+	HIV -	CPT	ARV
1	9058	8795	263	7271	6947	47	6803	300	301
2	9048	8806	242	7584	7483	42	7443	282	274
3	10708	10348	359	8694	8508	41	8467	282	282
4	10241	10049	193	8265	8181	54	8146	243	243
Total	39055	37998	1057	31814	31119	184	30859	1107	1100

Figure 29 shows the number and percentage of TB patients with a known HIV status between 2007 and 2013. Since the NTP started receiving funds from TBCAP/TBCARE, GF, CHC, and other NGOs for referral of TB patients and their blood to VCCT for HIV testing, the uptake of HIV testing among TB patients has dramatically increased. There was a sharp rise both in number and percentage from 2007 to 2010. Since 2010, the absolute number has been stable at between 32,000 and 33,000 however the percentage of TB patients with known HIV status has increased by 5.3%. 2013 marked the highest rate with 82.7%, showing the increased efforts in ensuring uptake of HIV test among TB patients. Yet this also suggests that 17.3% (6746 TB patients) still need HIV testing (see [graphic summary/TB/HIV](#)).

Figure 29: Number and percentage of registered TB patients with HIV test results recording in TB register: 2007-2013

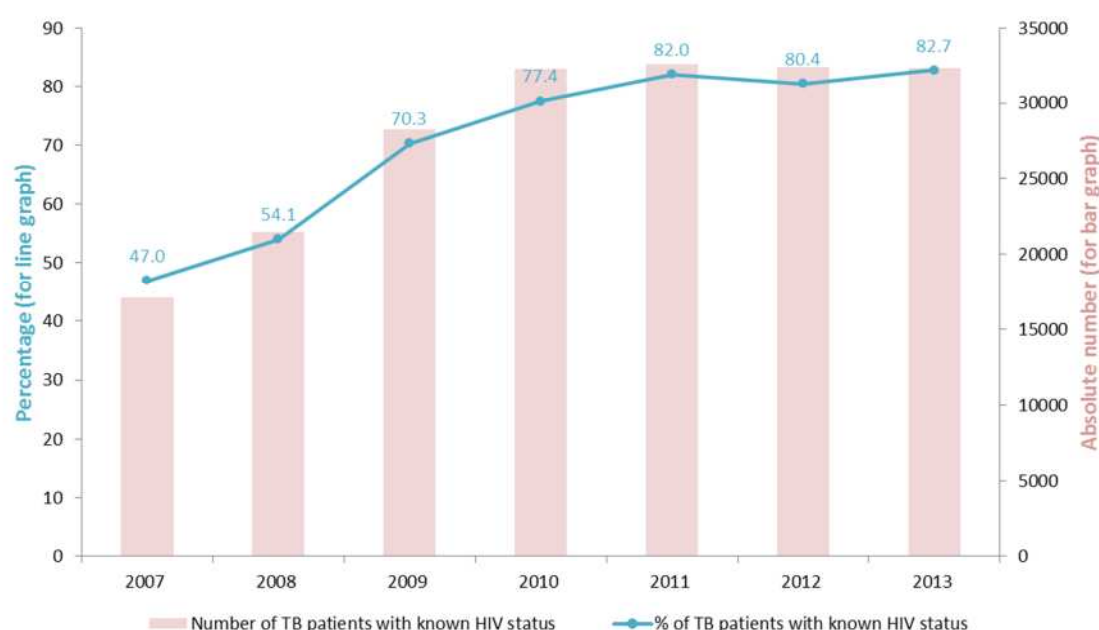


Figure 30: Number and percentage of HIV-positive TB patients (based on NTP surveillance data): 2007-2013

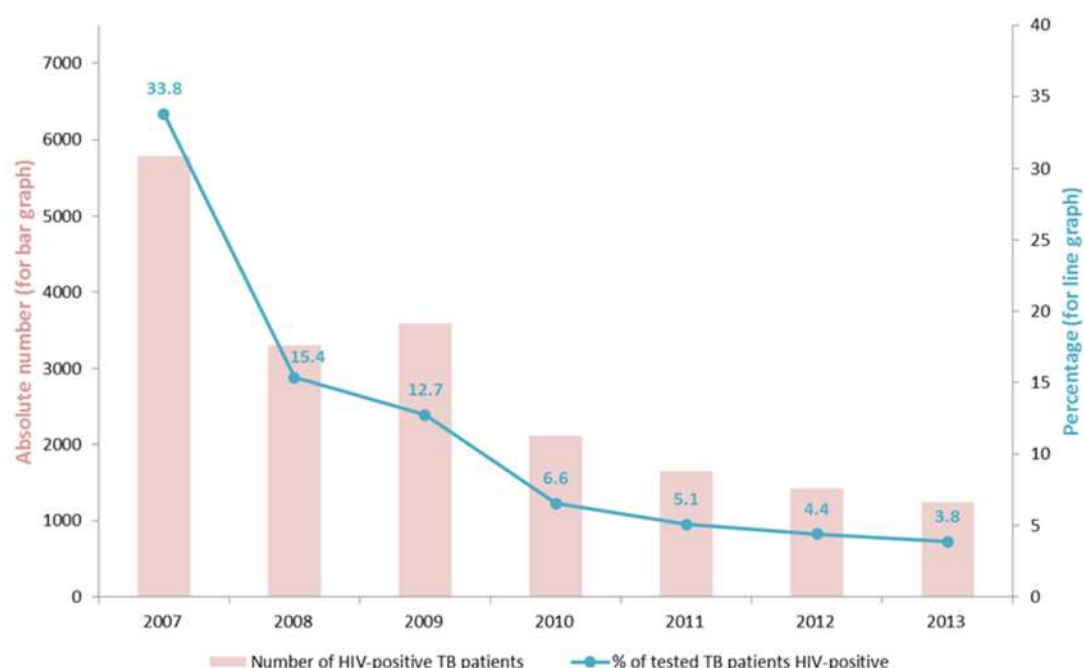


Figure 30 shows the number and percentage of HIV-positive TB patients between 2007 and 2013 based on the NTP TB surveillance data. There was a sharp decrease both in number and percentage from 2007 to 2008. Since 2009, both number and percentage have constantly decreased every year, which demonstrates remarkable achievements in TB/HIV collaborative activities. In 2013, the number and percentage of HIV-positive TB patients were 1,241 and 3.8% respectively.

Figure 31: Percentage of HIV-positive TB patients on CPT and ART: 2007-2013

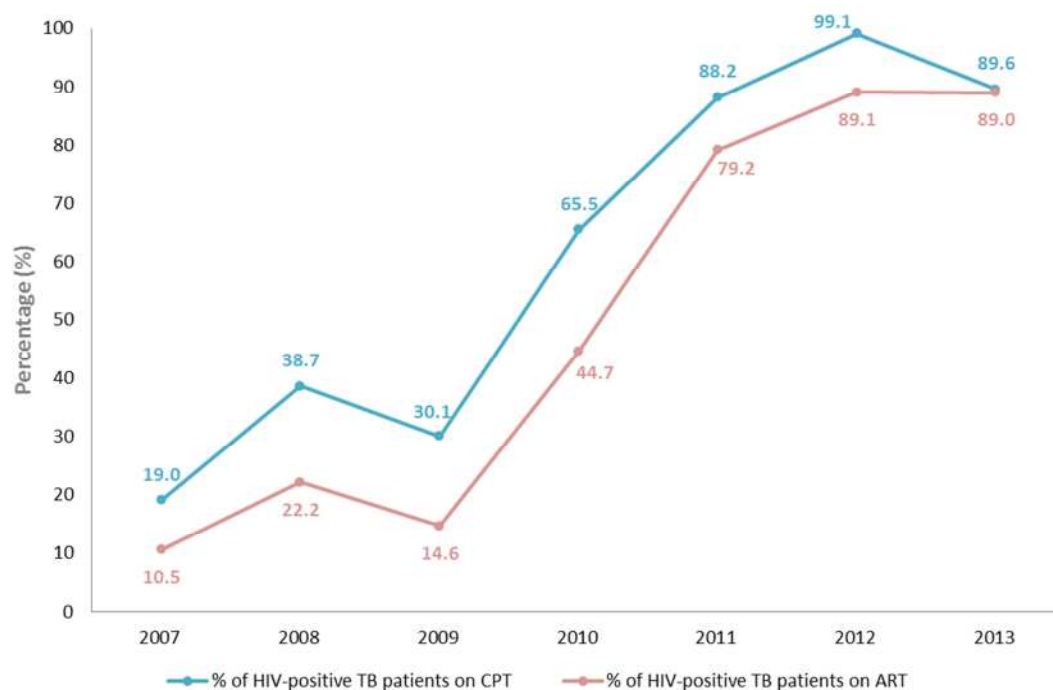


Figure 31 shows the percentage of HIV-positive TB patients on Co-trimoxazole Preventive Therapy (CPT) and Antiretroviral Therapy (ART) between 2007 and 2013. For the last 6 years, the percentage of HIV-positive TB patients on CPT has increased more than 4 times. For ART, it was more than 8 times. The

highest rates were reported in 2012 for both CPT and ART. From 2012 to 2013, the uptake of ART remained high at 89% while that of CPT decreased from 99.1% to 89.6%.

The result of TB screening among people living with HIV (PLHIV) is presented in Table 9. In 2013, among PLHIV screened for TB at OI/ART service, 26% was found to have TB in 2013. The number of HIV-positive clients on Isoniazid Preventive Therapy (IPT) increased more than 7 times from 172 in 2010 to 1,343 in 2013. The number of new HIV-positive clients has decrease every year, therefore the NTP is considering providing IPT for PLHIV who are currently on ART in 2014.

Table 9: Results of TB screening among PLHIV: 2013

Quarter	HIV + clients registered at VCCT	HIV+ clients referred to OI/ART service for TB screening	HIV+ clients screened for TB at OI/ART	TB cases detected in PLHIV			% among screened HIV+ client	HIV+ clients on IPT
				BK+	BK- and EPTB	Total		
1	699	624	832	58	159	217	26%	313
2	773	644	810	54	135	189	23%	280
3	722	536	794	40	132	172	22%	316
4	963	762	851	116	162	278	33%	434
Total	3,157	2,566	3,287	268	588	856	26%	1,343

Figure 32 shows the percentage of registered TB patients with HIV test results recording in TB register by province in 2013. The national average was 82.7%. Kompong Som and Kep had the highest rates at 100%. National Hospitals had the lowest rate at 59.2%, implying operational challenges to establish a strong linkage between TB and HIV services in national hospitals.

Figure 32: Percentage of registered TB patients with HIV test results recording in TB register by province: 2013

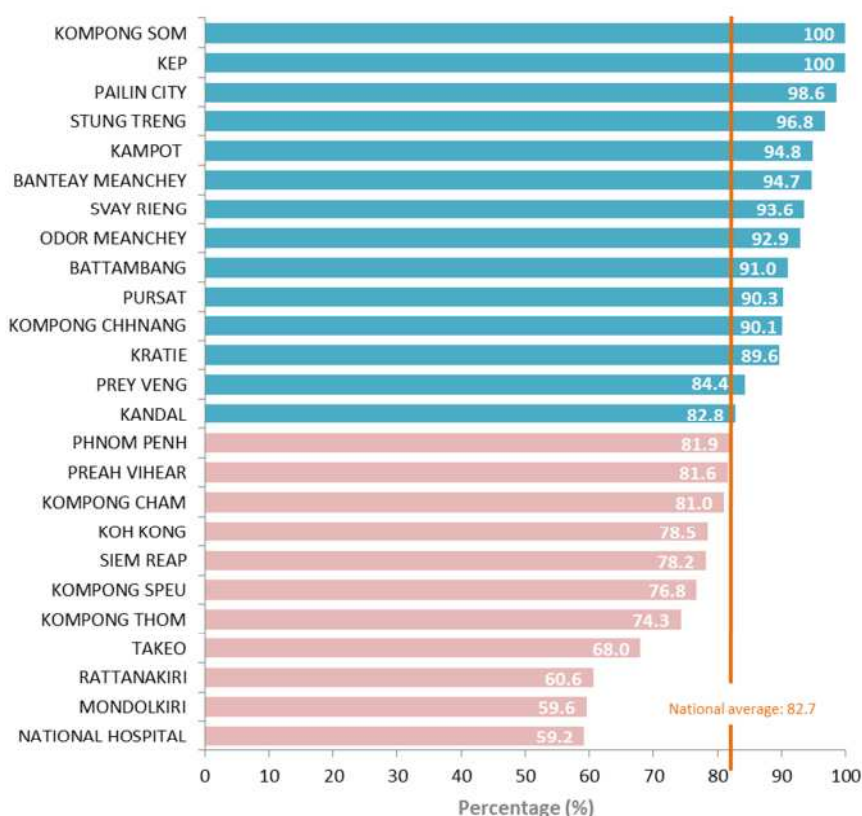
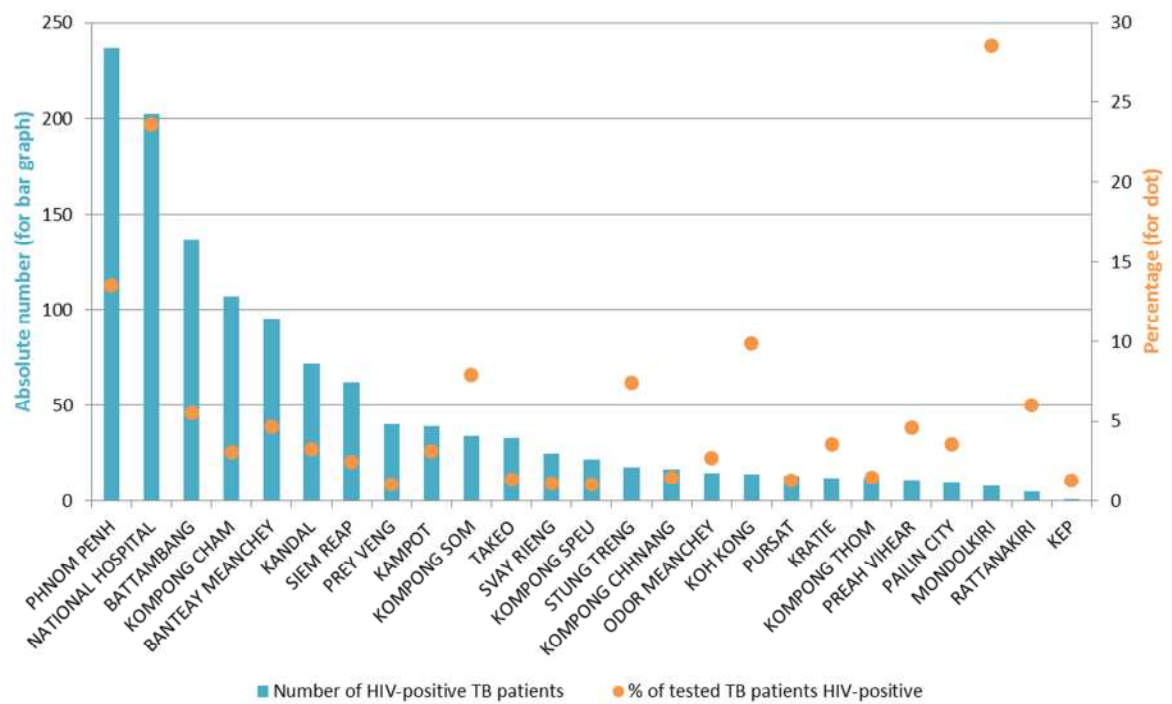


Figure 33 shows the number and percentage of tested TB patients with HIV infection by province in 2013. National Hospitals and Phnom Penh reported a high number and rate of TB/HIV co-infected patients, showing a relatively higher concentration of TB/HIV co-infection in urban areas. Battambang, Kompong Cham and Banteay Meanchey follow these localities in terms of number. Mondolkiri had the highest percentage of tested TB patients with HIV infection at 28.6% but the number of co-infected patients was small with only 8 patients.

Figure 33: Number and percentage of tested TB patients with HIV infection by province: 2013



6. Active case finding

In 2011-2015, the NTP has intensified its activities to ensure equity and universal access to quality TB services. The NTP has piloted different strategies for systematic screening of TB including active case finding (ACF) in various high-risk groups in collaboration with national and international partners. The following are the key systematic screening activities conducted by different agencies in the country.

(NOTE: Depending on the screening approach and availability of data, denominators of the yield calculation are different, therefore, the results presented below are not comparable.)

TB CONTACTS

Since 2012, the CENAT, supported by WHO/TBREACH, has been conducting outreach ACF sessions nationwide for people in poor communities with limited access to formal healthcare services. The project mobilized Village Health Support Groups (VHSG) for suspect identification. They identified household TB contacts of smear-positive TB cases registered for treatment in the past two years as well as their symptomatic neighbourhood. All identified suspects were invited to the ACF camps that were set up at the nearest health centres for TB symptom re-screening and chest X-ray screening. After the screening, those who were suspected to have TB were asked to submit sputum for GeneXpert testing. Preliminary results from the Year1 and Year2 (on going) showed that, among the 66,614 contacts screened, 3,775 (5.67%) had all forms of TB and 1,558 (2.34%) bacteriologically positive TB.

ELDERLY

The CENAT conducted a pilot case finding project targeting elderly aged 55 and older in Preykabas and Kivong ODs in Takeo Province. The sessions were conducted from September to December 2013 by using symptom screening and smear microscopy. Of 4,672 suspects screened, 305 cases (6.5%) had all forms of TB and 7 (0.15%) had smear-positive cases.

Since April 2013, the Cambodia Anti-Tuberculosis Association (CATA) has been conducting ACF activities targeting elderly aged 55 and older and vulnerable groups aged 15-54 such as the poor. The screening sessions were organized in a total of 91 HCs across 5 ODs by using symptom screening, Chest X-ray and GeneXpert. The CATA set up Chest X-ray teams at HCs and also arranged mobile lab teams going into difficult-to-reach areas to collect specimens. Of 11,502 symptomatic suspects screened, 1,053 (9.2%) had all forms of TB and 392 (3.4%) had bacteriologically positive TB.

Since December 2013, MSF-France has been conducting ACF sessions targeting elderly aged 55 and older in TboungKhmum OD in Kompong Cham Province. Screening and diagnostic methods involve symptom screening, Chest X-ray, GeneXpert and culture. Preliminary results from about two-months implementation showed that, of 2,852 people screened, 74 (2.6%) had all forms of TB and 31(1.09%) had bacteriologically positive TB.

DIABETICS (DM)

The CENAT and the University Research Co. (URC) conducted a cross sectional survey to determine the TB prevalence among DM patients in Prey Veng (late 2012) and Siem Reap (early 2013). A total of 600 DM patients were randomly selected and screened for TB. In Siem Reap, systematic screening for TB was performed for all selected DM patients regardless of symptoms. In Prey Veng, TB screening was

performed only for symptomatic patients. TB prevalence among DM patients in Siem Reap and Prey Veng was 4.4% (95% CI: 2-8.2) and 0.7% (95% CI: 0.1-2.4) respectively.

PRISON

In collaboration with CENAT, FHI 360/ TB CARE conducted annual mass screening of prison inmates and staff in ten prisons using chest X-ray, sputum examination and GeneXpert MTB/RIF assay from April to October 2013. Among 5,666 inmates screened by chest X-ray, 104 (1.84%) cases of all forms of TB were identified through this screening, 27 (0.48%) of which were bacteriologically positive.

Since 2010, the Action for Health Development (AHEAD) has performed TB screening and HIV/AIDS tests in four prisons in Battambang, BanteayMeachey, Pursat Prison and Correction Centre 4. In addition to routine case finding by trained cell leaders, the AHEAD organized entry TB screening for all new inmates by using a questionnaire, symptom screening and smear microscopy. Of 1,785 inmates screened, 107 (5.99%) had all forms of TB and 50 (2.8%) had smear-positive TB.

MIGRANT

With funding from TBREACH, the International Organization for Migration (IOM) conducted ACF among irregular Cambodian migrants deported from Thailand. The project was implemented in Poipet OD in Banteay Meanchey from February 2012 to January 2013. The returned migrants were classified into two groups – those who had spent more than one month in detention centres and those who had spent less than one month in detention. Each group was assigned a different diagnostic algorithm that involved symptom screening, Chest X-ray and GeneXpert. Aggregated data show that, of 11,604 migrants screened, 140 (1.21%) had all forms of TB and 127 (1.09%) had bacteriologically positive TB.

URBAN SLUM

Since 2012, with the main funding from TBREACH, the Sihanouk Hospital for Centre of HOPE has implemented ACF in high poverty urban areas by using Village Health Volunteers and community TB workers. They provide TB education, perform house-to-house suspect identification and collect sputum from suspects. During the two-year implementation period, the project screened 18,837 suspects by symptom screening and sputum tested 15,655, and yielded 1,264/18,837 (6.71%) all forms of TB cases and 1,175/15,655 (7.5%) bacteriologically positive TB cases.

HIGH RISK GROUPS

Operation ASHA has been working in Cambodia since December 2010. Operation ASHA conducts enhanced case finding by employing community health workers and mobilizing Village Health Volunteers to do outreach throughout the year. They visit households and neighborhoods of TB high-risk groups including TB contacts, the elderly, DM patients and people living with HIV/AIDS in 5 ODs in Phnom Penh and Takeo Province. In 2013, 234,554 households were screened for TB. Of which, 12,170 individuals were suspected to display symptoms or signs of TB. Among those screened, 3,093 (1.32%) were diagnosed to have all forms of TB and 1,176 (0.5%) had smear-positive TB.

7. Childhood TB

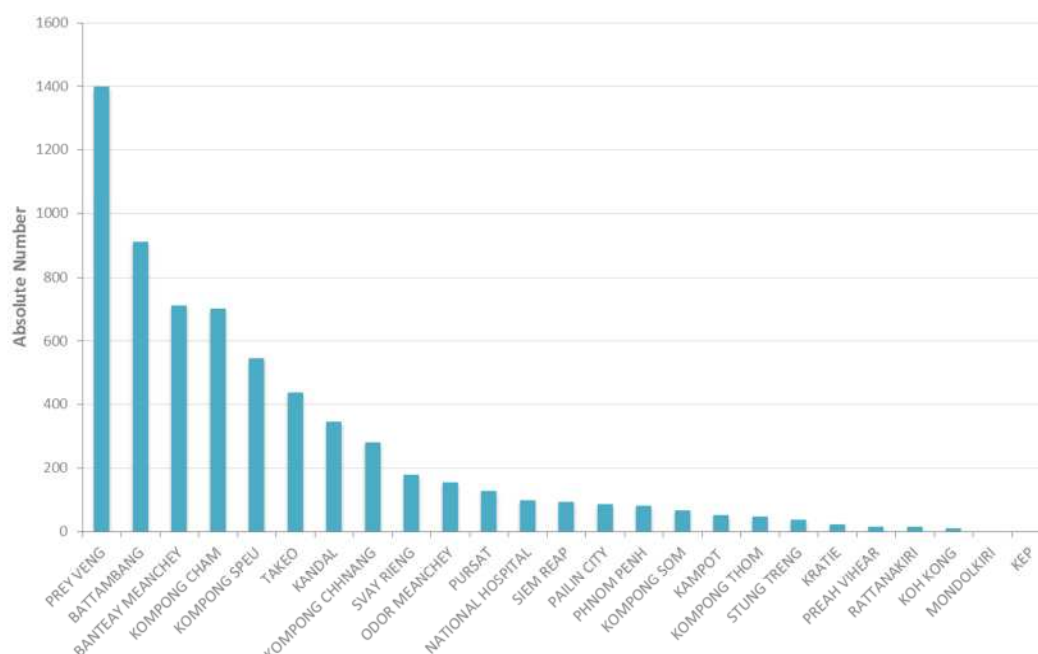
Recognizing the importance of addressing childhood TB, the NTP has been expanding childhood TB services in recent years. In collaboration with JATA under USAID-TBCARE I project, childhood TB services were successfully scaled up in 2013. The number of ODs providing childhood TB services including case finding, case management and contact tracing increased from 17 in 2012 to 27 in 2013. Through this expansion, the childhood TB services are routinely available in all referral hospitals in 13 provinces (Svay Rieng, Prey Veng, Kg Cham, Kg Thom, Siem Reap, Odor Meanchey, Banteay Meanchey, Battambang, Pursat, Kg Chhnang, Kg Speu, Takeo and Kampot). To strengthen the quality of diagnosis, the NTP developed diagnostic algorithms for childhood TB. These were printed and distributed to all referral hospitals for implementation. At the same time, the NTP conducted many training workshops for TB and paediatric staff on childhood TB management. Training topics included diagnosis and treatment, TST administration, X-ray reading skills and IPT management as well as its implementation.

Table 10: Case notification of childhood TB by province: 2013

Province	Total cases	Extra-pulmonary		Smear-negative		All other	
		Number	%	Number	%	Number	%
BANTEAY MEANCHEY	711	619	87.1	91	12.8	1	0.1
BATTAMBANG	912	691	75.8	219	24.0	2	0.2
KAMPOT	51	41	80.4	9	17.6	1	2.0
KANDAL	345	308	89.3	37	10.7	0	0
KEP	0	0	0	0	0	0	0
KOH KONG	9	9	100	0	0	0	0
KOMPONG CHAM	701	636	90.7	58	8.3	7	1.0
KOMPONG CHHNANG	280	179	63.9	85	30.4	16	5.7
KOMPONG SOM	66	66	100	0	0	0	0
KOMPONG SPEU	547	361	66.0	176	32.2	13	2.4
KOMPONG THOM	47	24	51.1	18	38.3	5	10.6
KRATIE	22	21	95.5	1	4.5	0	0
MONDOLKIRI	1	0	0	1	100	0	0
NATIONAL HOSPITAL	97	64	66.0	30	30.9	3	3.1
ODOR MEANCHEY	155	148	95.5	6	3.9	1	0.6
PAILIN CITY	85	79	92.9	4	4.7	2	2.4
PHNOM PENH	81	67	82.7	3	3.7	11	13.6
PREAH VIHEAR	15	14	93.3	0	0	1	6.7
PREY VENG	1400	1336	95.4	34	2.4	30	2.1
PURSAT	127	109	85.8	17	13.4	1	0.8
RATTANAKIRI	15	15	100	0	0	0	0
SIEM REAP	93	90	96.8	2	2.2	1	1.1
STUNG TRENG	37	37	100	0	0	0	0
SVAY RIENG	178	150	84.3	26	14.6	2	1.1
TAKEO	437	424	97.0	9	2.1	4	0.9
TOTAL	6412	5488	85.6	826	12.9	101	1.6

Case notification of childhood TB for 2013 is presented in Table 10 and Figure 34. In 2013, 6,412 childhood TB cases were notified across the country, which accounted for about 16% of total TB cases notified. Prey Veng and Battambang reported the highest and second highest cases with 1400 and 912 respectively. These are followed by Banteay Meanchey and Kompong Cham.

Figure 34: Number of notified childhood TB cases by province: 2013



In 27 ODs with routine childhood TB services, 21840 children suspected of having TB were referred from health centers and communities to referral hospitals for diagnosis. Out of these cases, 17% (3,807/21,840) were diagnosed with TB and registered for treatment. Among the 3,807 TB cases, 23.7 % (902/3,807) and 76.3% (2,905/3,807) were diagnosed with pulmonary TB and extra-pulmonary TB respectively.

The NTP has scaled up the provision of IPT for TB contacts aged under 5 years old who are found not to have TB disease. Adherence to IPT for children was reported to be very high. In 2012, 220 children were registered for IPT, and out of them 96.8% (213/220) successfully completed a 6 month course. With the progressive scale up of IPT provision, 2,050 children have been enrolled in IPT at health centers in 27 ODs in 2013.

8. Policies, strategies and guidelines

The NTP continues to provide clear policy and strategic direction through developing new guidelines and strategic plans. As of 2013, the key national policies on TB control include;

- National Policies and Strategies for TB control 2011-2015
- National Strategic Plan for TB control 2011-2015
- National Monitoring and Evaluation plan of the National TB control program, 2011-2015
- Clinical TB/HIV Operational Guideline

In 2013, the NTP also developed and revised a number of documents that include;

- Tuberculosis Standard Treatment Regimens
- Training curriculum on the revised case definition including recording and reporting formats
- Draft National Strategic Plan for TB Control 2014-2020

9. Financing

The NTP formulated a 5-year expenditure framework in accordance with the strategic plan with active consultation from major donors and clear indication of funding gaps. The NTP negotiated with potential partners for program financing, indicating the improved capacity of CENAT in terms of financial mobilization for TB control activities.

Since April 2009, CENAT was charged with the new responsibility of being the Principal Recipients (PR) for GF-TB Round 7 funding and managing the financing of 11 sub-recipients (SRs). The NTP has been granted an extension to the existing round 7 GF funding in the form of US\$3 million interim funding for the period from April to December 2014. Moreover, a New Funding Model recently launched by the GF is a good opportunity for TB programs to request the continuing financial support from the GF. Based on the National Strategic Plan 2014-2020 that is being developed by the NTP, a concept note is being drafted for submission to the GF for new funding for the period 2014 to 2016. The new funding is expected to fill the financial gaps for the next 2-3 years. However, the funding that the NTP can mobilize may not be sufficient for more aggressive TB control.

10. Human resource development

The NTP has invested in capacity building and human resource development. Table 11 showcases the wide variety of training courses and workshops as well as staff attending international training courses, study tours and meetings/conferences in 2013. Among others, a number of TB program refresher training courses were organized across the country to disseminate and operationalize the updated WHO policy on TB control. Other highlights include 9 basic MDR-TB training courses and 12 child TB diagnosis, care and treatment workshops. Furthermore in collaboration with the National Center for HIV/AIDS, Dermatology and STD (NCHADS), CENAT conducted training on the Three Is Strategy and implementation in OI/ART clinics. To strengthen TB control activities and improve the capacity of staff at peripheral levels, the NTP conducted regular supervisory visits throughout the country.

Table 11: Summary of training and workshop and international travel: 2013

Training Course	Number of Courses	Workshop	Number of Courses
Core Trainer	1	World TB Day	1
Nationwide TB program refresher training	92	Annual TB Conference for TB control	1
Basic MDR-TB	9	Workshop on National and Provincial TB Planning 2014-2020	1
TB in Children	6	TB Quarterly M&E	3
Smear microscopy reading	3	Ban of Sale of TB Drugs and Use of Serological Test for TB Diagnosis	1
TST	2	National workshop on TB program Evaluation	1
E-TB Manager	2	Management of Diabetes in TB patients	1
Managing Diabetes in TB patients	1	Gene-Xpert	1
Laboratory refresher	4	Intensified case-finding and Isoniazid preventive therapy in children	2
Active Case Finding	1	Improved Quality of Chest X-ray reading	2
X-ray reading for diagnosis	2	Active Case Finding in TB	1
TB in prison	1	TB/HIV in prison supported by USAID/TB CARE1/FHI 360	3
External Quality Assurance	1	MDR-TB	1
Quality Assurance in Pulmonary Film translati	1	MDR-TB and collaborative TB/HIV services	6
Total	126	TB Quality Assurance by microscopy	1
		Childhood TB diagnosis, treatment and care	12
International travel (Country)	Number of delegates	External Quality Assurance	2
Philippines	7	TB in Prison Planning	1
France	10	Leprosy Control	3
Thailand	1	Factory Awareness	7
Vietnam	6	Three Is Strategy	1
Ethiopia	2	Total	52
Morocco	2		
Kenya	1		
Malaysia	4		
Malawi	1		
India	1		
Laos	4		
Ghana	2		
Japan	4		
Total	45		

11. Drug and laboratory supplies

Proving highly important in TB Control, TB Drug Management (TbDM) is deemed the core element of the DOTS program. The NTP works closely with the Department of Drugs and Food (DDF), the Central Medical Store (CMS), the MoH, as well as TB partners in order to improve TB Drug Management. The NTP monitors stock and distribution of TB drugs and laboratory supplies on a monthly basis. The NTP also reports once a quarter to the CMS and MoH so that estimates of future needs can be made and budgeted for.

Table 12 shows the first-line TB drugs for both adult and children received from the Global Drug Facility (GDF) in 2013. Table 13 shows the second-line TB drugs for treating drug resistant TB received from

MoH, GF, CHC and MSF. Table 14 shows ancillary drugs received by the NTP for treatment of side effects of TB drugs.

Table 12: First Line Drugs procured in 2013

Product and formulation		Total Quantity (Tablet or vial)
Adult formulation		
RHZE	Rifampicin/Isoniazid/Pyrazinamide/Ethambutol 150/75/400/275 mg	7,670,880
RH	Rifampicin/Isoniazid 150/75 mg	11,020,800
E	Ethambutol 400mg	635,040
Z	Pyrazinamide 400mg	161,280
H	Isoniazid 100mg	2,007,500
STR	Streptomycin 1g	148,500
	Water for Injection	148,500
Paediatric formulation		
RHZ	Rifampicin/Isoniazid/ Pyrazinamide 60/30/150 mg	2,123,100
RH	Rifampicin/Isoniazid 60/30mg	4,126,080
RH	Rifampicin/Isoniazid 60/60mg	2,370,060
E	Ethambutol 100mg	242,500

Table 13: Second Line Drugs procured in 2013

Product and formulation		Total Quantity (Tablet, capsule, vial, packet)
Capreomycin	1g	3,231
Kanamycin	1g	25,550
Cycloserine	250mg	211,800
Ethambutol	400mg	246,288
Ethionamide	250mg	257,600
Levofloxacin	250mg	191,800
Moxifloxacin	400mg	10,000
Para Aminosalicic Acid	100mg	3,272
Pyrazinamide	400mg	400,512
Prothionamide	250mg	4,400
Aminosalicic Acid	600mg/g 9.2g	7,200
Syringe+Needle	5ml	8,100
Water for Injection	5ml	8,100

Table 14: Ancillary Drugs procured in 2013

Product and formulation		Total Quantity (Tablet or capsule)
Amitriptyline	25mg	3,000
Chlorpheniramine	4mg	2,000
Ibuprofen	400mg	18,500
Levothyroxine	100mcg	7,000
Metoclopramide	10mg	13,000
Omeprazol	20mg	36,000
Vitamin B6	50mg	3,000

12. Infection control

In collaboration with partners (WHO, US/CDC, FHI 360, MSF/F, Sihanouk Hope Center, CHC and URC), the NTP successfully performed the following activities related to strengthening TB infection control (TBIC).

- Organized the monthly meeting of the Technical Working Group for monitoring activities of TBIC
- Revised the National TBIC SOP for healthcare settings and congregate setting which was drafted in 2010
- Charter of TBIC (administration, ventilation and PPE) was integrated into the National Massive Training for all facilities in Nov-Dec 2013
- Though the US/CDC project 2014, the NTP developed the implementation plan for TBIC in CENAT's hospital and 4 provincial referral hospitals (Prusat, Battambang, BanteayMeanchey and Pailin)

13. Community DOTS

Expanding and strengthening DOTS is among the priorities for successful TB case management and case finding. In 2013, there were 1,283 health facilities, including 1,089 health centres, which provided TB treatment using the DOTS protocol.

Strengthening community DOTS (C-DOTS) is also an essential program component to bring TB services closer to communities. C-DOTS aims to improve case finding through referral of TB suspects as well as to ensure daily treatment supervision at community level. As shown in Figure 35, there was a notable increase in the number of health facilities implementing C-DOTS between 2002 and 2010. Although there is a slight decrease in recent years, a number of national and international NGO partners continue to provide their support for C-DOTS implementation as shown in Figure 36.

Figure 35: Number of health facilities implementing C-DOTS: 2002-2013

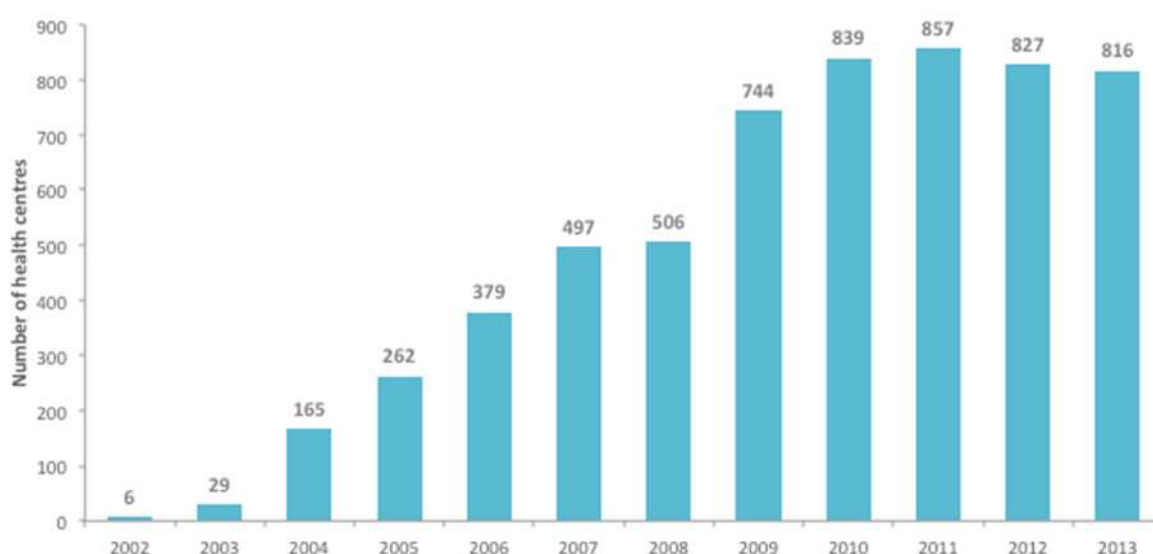
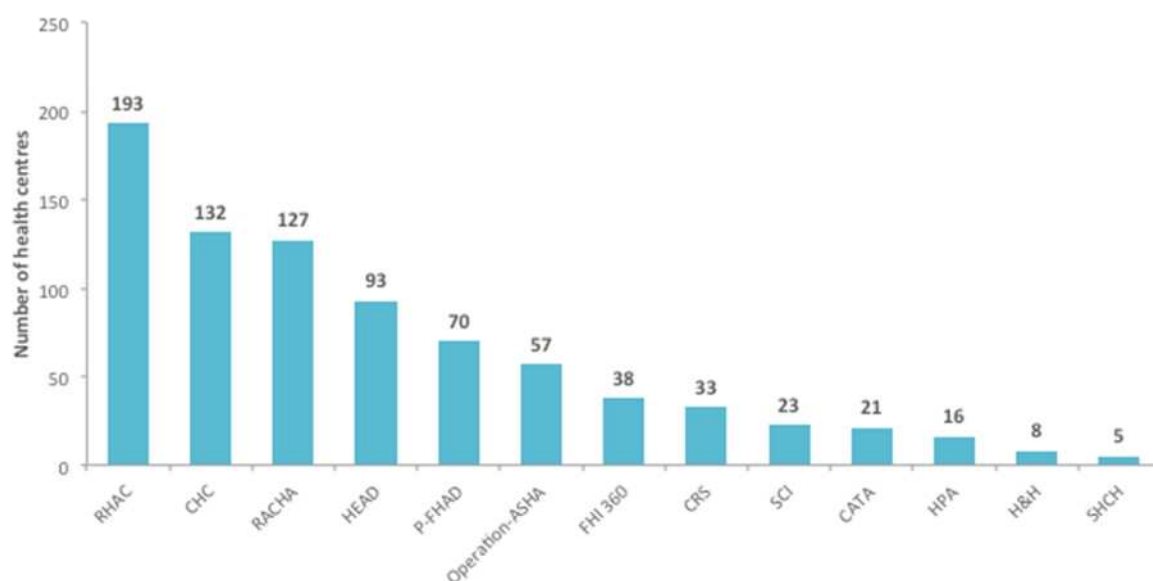


Figure 36: NGO partners implementing C-DOTS: 2013



C-DOTS supervision aims to ensure that TB patients are registered and treated in accordance with the NTP's policies, standards and procedures. It is also an opportunity for C-DOTS supervisors to acknowledge and reinforce good performance of DOT watchers and TB treatment compliance.

There are some constraints and challenges in C-DOTS. Inadequate financial resources affect all levels of C-DOTS implementation. There is little resource to motivate VHSG/DOT watchers as well as TB supervisors and HC staff. This leads to limited capacity at the frontline of TB services. This is further

compounded by the uncertainty of further funding once GF Round 7 funding has ended. Furthermore there is a turnover of trained TB staff at health facilities and many VHSG/DOT watchers migrate seasonally for employment, which has to be addressed for sustainable C-DOTS implementation.

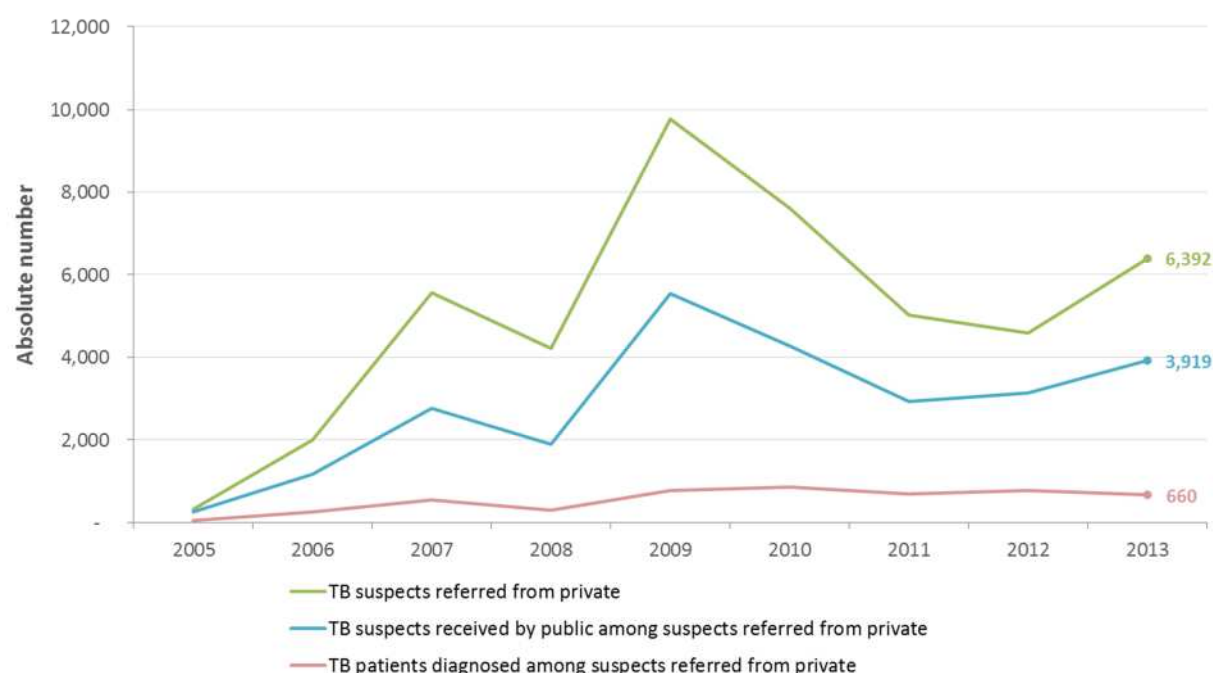
14. Public and Private Mix DOTS

Public-Private Mix (PPM) DOTS is a collaboration between NTP and public and private healthcare providers to promote DOTS expansion. This approach aims to strengthen referral of TB suspects from the private sector (including pharmacy, consultation room, private clinics etc.) to public health facilities to diagnose and treat TB. In collaboration with many NGOs and International partners, the NTP has intensified the implementation of PPM-DOTS since 2005, and its results are shown in the table 15. The number of PPM-DOTS implementers has increased six-fold in the past 8 years, demonstrating the steady expansion of PPM-DOTS in the country. Accordingly the numbers of TB suspects referred from private and received by public also increased with some fluctuations as shown in Figure 37.

Table 15: Summary table of PPM-DOTS: 2005-2013

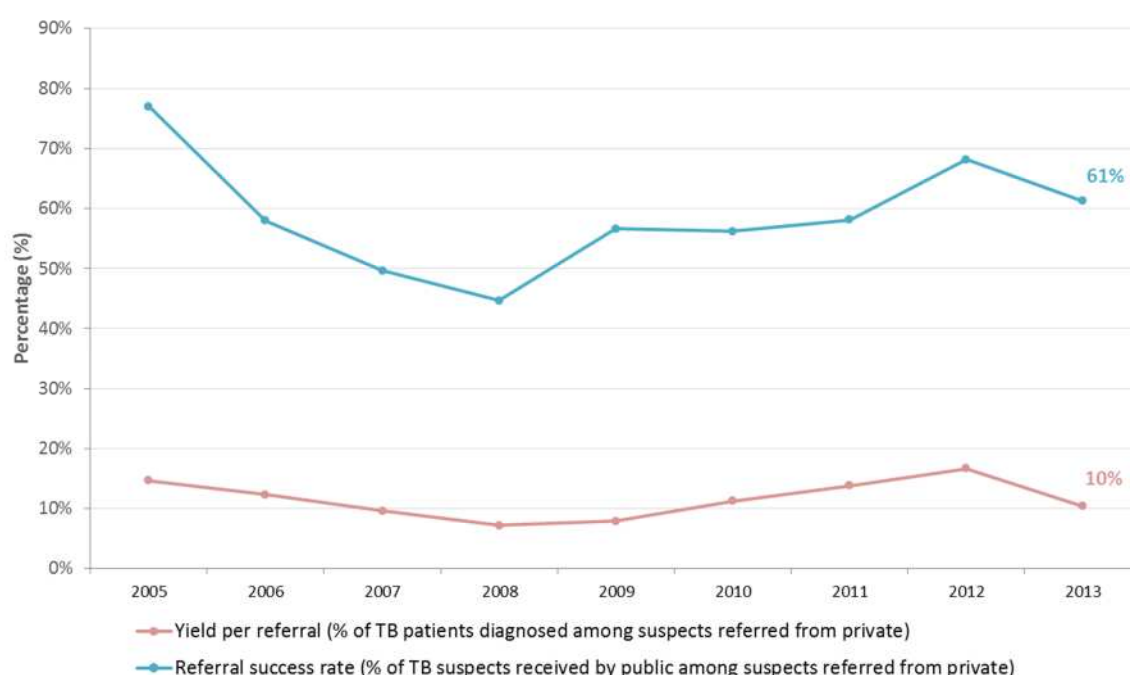
Year	Number of province	Number of OD	PPM-DOT implementer	TB suspects referred from private	TB suspects received by public	TB patients diagnosed among suspects referred from private	Referral success rate	Yield per referral (all forms)
				(a)	(b)	(c)	(b)/(a)	(c)/(a)
2005	2	3	287	314	242	46	77%	15%
2006	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%

Figure 37: Results of PPM-DOTS activities: 2005-2013



In 2013, PPM-DOTS activities contributed to the detection of 660 TB cases which was 1.7% among 39,055 cases notified nationwide and 3.7% among 17,919 cases notified in ODs that had been implementing PPM-DOTS. Figure 38 shows referral success rate and yield per referral in PPM-DOTS activities. Between 2005 and 2013, the referral success rate ranged from 45% to 77%, which indicates that 23-55% of identified suspects did not reach health facilities after referral. This represents missed opportunities for TB diagnosis among suspects. Since the results of the prevalence survey 2011/2012 showed that 43.3% of TB suspects first sought care at private facilities including pharmacy, there is a large potential to increase case detection by ensuring successful referral and further strengthening suspect identification. This PPM approach also contributes to a ban on sale of anti-TB drugs in open market and use of serological testing for TB diagnosis.

Figure 38: Referral success rate and yield per referral in PPM-DOTS: 2005-2013



15. TB in congregate settings

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

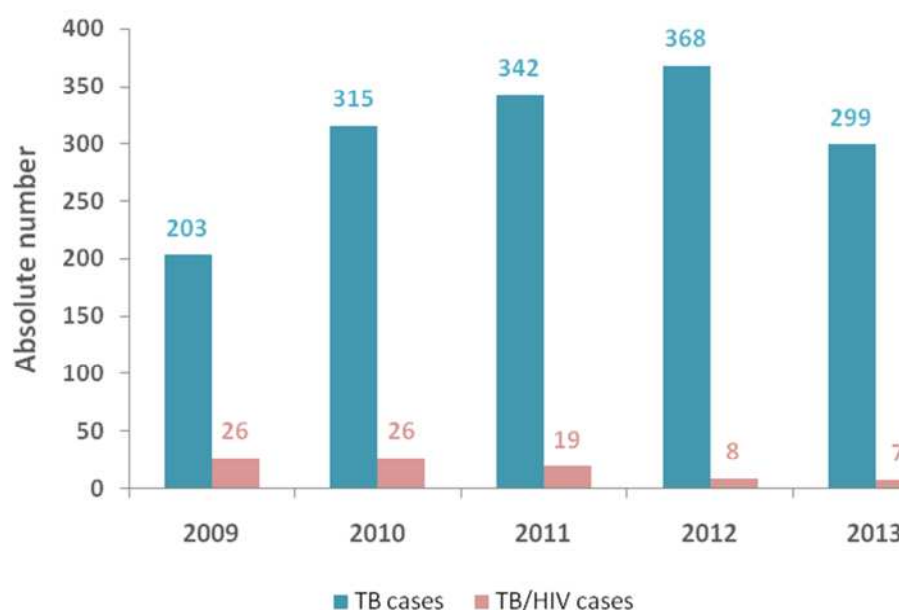
PRISON

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 under DOTS protocol. 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 22 in 2013. In 2013, 299 TB cases and 7 TB/HIV cases were detected through this activity. Although there is a challenge in obtaining the prison population data that is always influx, the available evidence suggests that yield of TB cases in prison is more than 7 times higher than general populations in Cambodia. The Standard Operating Procedure for TB control in prisons has been revised and will be published in Khmer and English in early 2014.

Table 16: TB control activities in prisons: 2009-2013

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

Figure 39: Number of TB cases and TB/HIV cases detected in prison activities: 2009-2013



FACTORIES AND ENTERPRISES

Factory and enterprises are ideal for TB transmission as employees work together and have high interaction with people. With support from CATA, the Ministry of Labor and Vocational training, the NTP has been implementing DOTS in factories and enterprises since 2007.

The focus of the activities is to raise TB awareness among health staff working at dispensaries located within factories and enterprises. The trained health staff then refer TB suspects to health centers for diagnosis. Supervision and quarterly meetings are routinely conducted to motivate staff for up coming quarters. In 2012, 5 factories and enterprises discontinued TB-DOTS services due to the ending of the external support from ARC. As of 2013, 14 factories and enterprises have been providing TB-DOTS services at workplaces.

A summary of TB control activities in factories and enterprises is presented in Table 17. The table shows that the number of workers covered by the activities has doubled in the past 6 years with some fluctuations. In recent years, the number of TB suspect referred and TB cases detected are around 100-150 and 15-24 respectively. Yield per referral is reported to be high at 10-24% whereas yield per population seems to be low ranging from 55 to 114 per 100,000 which is much lower than the national average of case notification rate (261 per 100,000 for all forms of TB in 2013).

Table 17: TB control activities in factories and enterprises: 2007-2013

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%

16. 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 training courses and workshops. Besides, the NTP has raised awareness of TB on the World TB Day at all levels throughout the country.

Due to financial resource constraints, a very limited number of IEC materials were produced in 2013. However a notable success was that the NTP produced short educational movies on general TB awareness, MDR-TB and the World TB Day in collaboration with partners including USAID, FHI360, TB CARE I and JICA. 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.

Examples of IEC materials



17. Research

In recent years, there have been a lot of efforts in conducting operational research studies which can improve program implementation. Through documenting activities and disseminating the study results, the NTP continues to provide evidence-based programmatic responses within the country as well as contributing to evidence-based global policy development in collaboration with other technical agencies and research institutions. A summary of these studies, including published and unpublished papers, is presented below.

Operational research on Patient-centered approach to TB control in hospital

Abstract: This research project was conducted in five national and provincial hospitals; Kampongseu, Baty, Takeo, SamdachOv and Khmer Soviet Friendship hospital. The TB patients registered for treatment were interviewed on the staff performance and quality of TB service. The Quote TB light and performance score interview tools were used for data collection. The tools helped facilitate the understanding of the strengths and weaknesses in the current TB service provision from the patients' perspectives. The results showed that the majority of the patients seemed to be satisfied with the availability of TB services, while they still felt the need for improved availability of necessary information about TB care. Inclusion of the contents of the Patients' Charter in the routine training setting (i.e. for health care workers and for VHSGs) could help further disseminate the information and lead to improvement in the care of TB patients. The NTP could benefit from reviewing these findings and applying the lessons learned to further improve the program.

Early detection of tuberculosis through community-based active case finding in Cambodia

Authors: Mao Tan Eang, PeouSatha, Rajendra Prasad Yadav, FukushimaMorishita, Nobuyuki Nishikiori, Pieter van-Maaren and Catharina Lambregts-van Weezenbeek

Background: Since 2005, Cambodia's national tuberculosis programme has been conducting active case finding (ACF) with mobile radiography units, targeting household contacts of TB patients in poor and vulnerable communities in addition to routine passive case finding (PCF). This paper examines the differences in the demographic characteristics, smear grades, and treatment outcomes of pulmonary TB cases detected through both active and passive case finding to determine if ACF could contribute to early case finding, considering associated project costs for ACF.

Methods: Demographic characteristics, smear grades, and treatment outcomes were compared between actively (n = 405) and passively (n = 602) detected patients by reviewing the existing programme records (including TB registers) of 2009 and 2010. Additional analyses were performed for PCF cases detected after the ACF sessions (n = 91).

Results: The overall cost per case detected through ACF was US\$ 108. The ACF approach detected patients from older populations (median age of 55 years) compared to PCF (median age of 48 years; $p < 0.001$). The percentage of smear-negative TB cases detected through ACF was significantly higher (71.4%) than that of PCF (40.5%). Among smear-positive patients, lower smear grades were observed in the ACF group compared to the PCF group ($p = 0.002$). A fairly low initial defaulter rate (21 patients, 5.2%) was observed in the ACF group. Once treatment was initiated, high treatment success rates were achieved with 96.4% in ACF and with 95.2% in PCF. After the ACF session, the smear grade of TB patients detected through routine PCF continued to be low, suggesting increased awareness and early case detection.

Conclusions: The community-based ACF in Cambodia was found to be a cost-effective activity that is likely to have additional benefits such as contribution to early case finding and detection of patients

from a vulnerable age group, possibly with an extended benefit for reducing secondary cases in the community. Further investigations are required to clarify the primary benefits of ACF in early and increased case detection and to assess its secondary impact on reducing on-going transmission.

The multi-step process of building TB/HIV collaboration in Cambodia

Authors: Mao Tan Eang, Mean ChhiVun, Khun Kim Eam, SamrethSovannarith, Seng Sopheap, Ngauv Bora, Rajendra Yadav, Masami Fujita, Bernard Tomas, Massimo Ghidinelli, Pieter van Maaren and William A Wells

Abstract: Tuberculosis and HIV/AIDS have synergistic health impacts in terms of disease development and progression. Therefore, collaborative TB and HIV/AIDS activities are a logical health systems response. However, the establishment of these activities presents a challenge for countries that have strong vertical disease programs that differ in their implementation philosophies. Here, we review the process by which TB/HIV collaboration was established in Cambodia. A cycle of overlapping and mutually reinforcing initiatives – local research; piloted implementation with multiple options; and several rounds of policy formulation guided by a cross-functional Technical Working Group – was used to drive nationwide introduction of a full set of TB/HIV collaborative activities. Senior Ministry of Health officials and partner organizations brought early attention to TB/HIV. Both national programs implemented initial screening and testing interventions, even in the absence of a detailed, overarching framework. The use of multiple options for HIV testing identified which programmatic options worked best, and early implementation and pilots determined what unanswered questions required further research. Local conduct of this research – on co-treatment timing and TB symptom screening – speeded adoption of the results into policy guidance, and clarified the relative roles of the two programs. Roll-out is continuing, and results for a variety of key indicators, including screening PLHIV for TB, and testing TB patients for HIV, are at 70-80% and climbing. This experience in Cambodia illustrates the influence of health research on policy, and demonstrates that clear policy guidance, the pursuit of incremental advances, and the use of different approaches to generate evidence can overcome structural barriers to change and bring direct benefits to patients.

The association between household poverty rates and tuberculosis case notification rates in Cambodia, 2010

Authors: Man Kai Wong, Rajendra-Prasad Yadav, NobuyukuNishikiori and Mao Tan Eang

Introduction: Poverty is a risk factor for tuberculosis (TB); it increases the risk of infection and active disease but limits diagnostic opportunities. The role of poverty in the stagnant case detection in Cambodia is unclear. This study aims to study the relationship between district household poverty rates and sputum-positive TB case notification rates (CNR) in Cambodia in 2010.

Methods: Poisson regression models were used to calculate the relative risk of new sputum-positive TB CNR for Operational Districts (ODs) with different poverty rates using data from the National Centre for Tuberculosis and Leprosy Control and the National Committee for SubNational Democratic Development. Models were adjusted for other major covariates and a geographical information system was used to examine the spatial distribution of these covariates in the country.

Results: The univariate model showed a positive association between household poverty rates and sputum-positive TB CNRs. However, in multivariate models, adjusting for major covariates, household poverty rates showed a significantly negative association with sputum-positive TB CNRs (relative risk [RR] = 0.95 per 5% increase in poverty rate). The negative association was stronger among males than females (RR = 0.93 versus 0.96 per 5% increase in poverty rate). Similar spatial patterns were observed between household poverty rates and other covariates, particularly OD population density.

Conclusion: Household poverty rate is associated with a decrease in sputum-positive TB CNR in Cambodia, particularly in men. The potential of combining surveillance data and socioeconomic variables should be explored further to provide more insights for TB control programme planning.

Linkage of Presumptive Multidrug Resistant Tuberculosis (MDR-TB) Patients to Diagnostic and Treatment Services in Cambodia

Authors: SokhanKhann, Eang Tan Mao, Yadav Prasad Rajendra, SrinathSatyanarayana, Sharath BuruginaNagaraja, Ajay M. V. Kumar

Setting: National Tuberculosis Programme, Cambodia.

Objective: In a cohort of TB patients, to ascertain the proportion of patients who fulfil the criteria for presumptive MDR-TB, assess whether they underwent investigation for MDR-TB, and the results of the culture and drug susceptibility testing (DST).

Methods: A cross sectional record review of TB patients registered for treatment between July-December 2011.

Results: Of 19,236 TB patients registered, 409 (2%) fulfilled the criteria of presumptive MDR-TB; of these, 187 (46%) were examined for culture. This proportion was higher among relapse, failure, return after default (RAD) and non-converters at 3 months of new smear positive TB patients (60%) as compared to non-converters at 2 months of new TB cases (20%). Nearly two thirds (n=113) of the samples were culture positive; of these, three-fourth (n=85) grew Mycobacterium tuberculosis complex (MTBc) and one-fourth (n = 28) grew non-tuberculosis Mycobacteria. DST results were available for 96% of the MTBc isolates. Overall, 21 patients were diagnosed as MDR-TB (all diagnosed among retreatment TB cases and none from non-converters) and all of them were initiated on MDR-TB treatment.

Conclusion: There is a need to strengthen mechanisms for linking patients with presumptive MDR-TB to culture centers. The policy of testing non-converters for culture and DST needs to be reviewed.

Results from early programmatic implementation of Xpert MTB/RIF testing in nine countries

Authors: Jacob Creswell, Andrew J Codlin, Emmanuel Andre, Mark A Micek, Ahmed Bedru, E Jane Carter, Rajendra-Prasad Yadav, Andrei Mosneaga, BishwaRai, SayeraBanu, Miranda Brouwer, Lucie Blok, SuvanandSahu and LucicaDitiu

Background: The Xpert MTB/RIF assay has garnered significant interest as a sensitive and rapid diagnostic tool to improve detection of sensitive and drug resistant tuberculosis. However, most existing literature has described the performance of MTB/RIF testing only in study conditions; little information is available on its use in routine case finding. TB REACH is a multi-country initiative focusing on innovative ways to improve case notification.

Methods: We selected a convenience sample of nine TB REACH projects for inclusion to cover a range of implementers, regions and approaches. Standard quarterly reports and machine data from the first 12 months of MTB/RIF implementation in each project were utilized to analyze patient yields, rifampicin resistance, and failed tests. Data was collected from September 2011 to March 2013. A questionnaire was implemented and semi-structured interviews with project staff were conducted to gather information on user experiences and challenges.

Results: All projects used MTB/RIF testing for people with suspected TB, as opposed to testing for drug resistance among already diagnosed patients. The projects placed 65 machines (196 modules) in a variety of facilities and employed numerous case-finding strategies and testing algorithms. The projects consumed 47,973 MTB/RIF tests. Of valid tests, 7,195 (16.8%) were positive for MTB. A total of 982 rifampicin resistant results were found (13.6% of positive tests). Of all tests conducted, 10.6% failed. The need for continuous power supply was noted by all projects and most used locally procured

solutions. There was considerable heterogeneity in how results were reported and recorded, reflecting the lack of standardized guidance in some countries.

Conclusions: The findings of this study begin to fill the gaps among guidelines, research findings, and real-world implementation of MTB/RIF testing. Testing with Xpert MTB/RIF detected a large number of people with TB that routine services failed to detect. The study demonstrates the versatility and impact of the technology, but also outlines various surmountable barriers to implementation. The study is not representative of all early implementer experiences with MTB/RIF testing but rather provides an overview of the shared issues as well as the many different approaches to programmatic MTB/RIF implementation.

Identification of multidrug resistance in previously treated tuberculosis patients: a mixed methods study in Cambodia

Authors: S Royce, S Khann, RP Yadav, ET Mao, ACattamanchi, S Sam, MA Handley

Setting: Worldwide, previously treated tuberculosis (TB) patients are a priority group for drug susceptibility testing (DST) to identify cases with multidrug resistance (MDR). In Cambodia, a recent study found that only one-third of smear-positive previously treated patients had DST results.

Objective: To identify barriers, facilitators and potential interventions for MDR case-finding in previously treated patients in Cambodia.

Design: We analyzed case notifications in Cambodia (1996-2012) to estimate possible losses and conducted semi-structured interviews with key stakeholders to determine reasons for drop offs along the path to detecting MDR in smear-positive previously treated TB patients.

Results: Correct classification of patients' TB treatment history and ensuring specimens from previously-treated patients are both collected and reach the laboratory could nearly double the number of detected MDR-TB cases. Barriers include specimen transportation, availability of streptomycin only in hospitals, patients' reluctance to disclose treatment history, and staff difficulties in eliciting treatment history. Facilitators include trained health workers, collection of sputum for DST even if previously treated patients are not taking streptomycin, streamlining sputum transportation, and timely monitoring of MDR case-finding efforts.

Conclusion: Next steps include determining which barriers are most amenable to intervention, and which interventions represent the best resource investment.

Cost-Effectiveness of a Tuberculosis Active Case Finding Program Targeting Household and Neighbourhood Contacts in Cambodia

Authors: Rajendra P. Yadav, Nobuyuki Nishikori, PeouSatha, Mao T. Eang, and YoelLubell

Abstract: In many high-risk populations, access to tuberculosis (TB) diagnosis and treatment is limited and pockets of high prevalence persist. We estimated the cost-effectiveness of an extensive active case finding program in areas of Cambodia where TB notifications and household poverty rates are highest and access to care is restricted. Thirty operational health districts with high TB incidence and household poverty were randomized into intervention and control groups. In intervention operational health districts, all household and symptomatic neighbourhood contacts of registered TB patients of the past two years were encouraged to attend screening at mobile centers. In control districts, routine passive case finding activities continued. The program screened more than 35,000 household and neighbourhood contacts and identified 810 bacteriologically confirmed cases. The cost-effectiveness analysis estimated that in these cases the reduction in mortality from 14% to 2% would result in a cost per daily adjusted life year averted of \$330, suggesting that active case finding was highly cost-effective.

Annexes

Case notification, 2013

Province / OD	New and relapse	New cases			Relapse	Re-treatment, excl. Relapse	Total retreatment	Other/history unknown	% of smear-positive among new pulmonary
		Smear-positive	Smear-negative	Extra-pulmonary					
BANTEAY MEANCHHEY	2038	584	460	970	24	3	27	110	55.9
PREANEATPREAS (OD)	495	104	82	302	7	0	7	64	55.9
MONGKOL BOREI (OD)	898	160	198	533	7	2	9	35	44.7
POIPET (OD)	397	192	82	114	9	1	10	9	70.1
TMORPOUK (OD)	248	128	98	21	1	0	1	2	56.6
BATTAMBANG	2651	836	635	1147	33	9	42	74	56.8
BATTAMBANG (OD)	929	321	104	482	22	8	30	23	75.5
THMAR KOUL (OD)	317	185	68	61	3	1	4	2	73.1
MAUNG RUSSEY (OD)	801	98	376	320	7	0	7	39	20.7
SAMPOVLOUN (OD)	236	105	36	94	1	0	1	9	74.5
SANG KE (OD)	368	127	51	190	0	0	0	1	71.3
KAMPOT	1265	661	244	347	13	3	16	42	73.0
KAMPOT (OD)	337	183	49	103	2	0	2	4	78.9
ANGKOR CHEY (OD)	329	178	86	65	0	0	0	6	67.4
KOMPONG TRACH (OD)	242	132	36	71	3	0	3	4	78.6
CHHOUK (OD)	357	168	73	108	8	3	11	28	69.7
KANDAL	2635	1160	550	902	23	5	28	40	67.8
TAKMOV (OD)	597	154	235	204	4	3	7	14	39.6
SAANG (OD)	351	246	29	69	7	0	7	11	89.5
KOH THOM (OD)	327	182	125	16	4	1	5	2	59.3
KIEN SVAY (OD)	490	129	71	289	1	0	1	6	64.5
KHSACH KANDAL (OD)	264	88	23	152	1	0	1	3	79.3
MOUK KAMPOL (OD)	115	64	13	35	3	1	4	2	83.1
PONHEA LEU (OD)	112	75	20	16	1	0	1	0	78.9
ANG SNOUL (OD)	247	179	15	51	2	0	2	2	92.3
LOVEA EM (OD)	132	43	19	70	0	0	0	0	69.4
KEP	78	37	11	30	0	0	0	0	77.1
KRONG KEP (OD)	78	37	11	30	0	0	0	0	77.1
KOH KONG	181	92	30	58	1	0	1	0	75.4
SMUCH MEANCHHEY (OD)	105	47	25	32	1	0	1	0	65.3
SRE AMBIL (OD)	76	45	5	26	0	0	0	0	90.0
KOMPONG CHAM	4233	1392	1021	1766	54	17	71	62	57.7
KG CHAM (OD)	799	346	205	225	23	16	39	28	62.8
KRAUCH CHMAR (OD)	137	40	55	42	0	0	0	0	42.1
PREY CHHOR (OD)	290	89	42	157	2	0	2	1	67.9
TBONG KHMUM (OD)	231	90	75	63	3	0	3	4	54.5
CHOEUNG PREY (OD)	728	245	302	159	22	0	22	6	44.8
SREY SANTHOR (OD)	303	85	116	100	2	1	3	22	42.3
CHAMCAR LEU (OD)	1065	201	74	788	2	0	2	0	73.1
PONHEA KREK (OD)	398	172	117	109	0	0	0	0	59.5
ORAING OV (OD)	120	51	16	53	0	0	0	0	76.1
MEMOT (OD)	162	73	19	70	0	0	0	1	79.3
KOMPONG CHHNANG	1226	638	208	374	6	0	6	19	75.4
KG. CHHNANG (OD)	678	283	166	226	3	0	3	19	63.0
Bar Bo (OD)	262	150	15	94	3	0	3	0	90.9
KG TRALACH (OD)	286	205	27	54	0	0	0	0	88.4
KOMPONG SOM	422	150	60	208	4	0	4	7	71.4
PREASIHANOUK (OD)	422	150	60	208	4	0	4	7	71.4
KOMPONG SPEU	2621	950	916	739	16	2	18	61	50.9
KOMPONG SPEU (OD)	1214	495	351	365	3	0	3	23	58.5
KARNG PISEY(OD)	1003	277	428	289	9	1	10	35	39.3
OU Dong (OD)	404	178	137	85	4	1	5	3	56.5
KOMPONG THOM	1078	711	157	204	6	0	6	4	81.9
KG THOM (OD)	550	343	97	106	4	0	4	0	78.0
BARAY (OD)	308	215	39	53	1	0	1	1	84.6
STUNG (OD)	220	153	21	45	1	0	1	3	87.9
KRATIE	374	175	77	122	0	0	0	2	69.4
KRATIE (OD)	266	111	48	107	0	0	0	0	69.8
CHHLAUNG (OD)	108	64	29	15	0	0	0	2	68.8
MONDOLKIRI	47	36	4	5	2	0	2	0	90.0
SEN MONORUM (OD)	47	36	4	5	2	0	2	0	90.0
ODOR MEANCHHEY	583	270	78	230	5	0	5	11	77.6
SAMRONG (OD)	583	270	78	230	5	0	5	11	77.6
PAILIN CITY	270	73	51	145	1	0	1	12	58.9
PAILIN (OD)	270	73	51	145	1	0	1	12	58.9

Case notification, 2013 (cont.)

Province / OD	New and relapse	New cases			Relapse	Re-treatment, excl. Relapse	Total retreatment	Other/history unknown	% of smear-positive among new pulmonary
		Smear-positive	Smear-negative	Extra-pulmonary					
PHNOM PENH	2107	1143	383	548	33	9	42	22	74.9
CENTER (OD)	231	98	54	78	1	0	1	0	64.5
NORTH (OD)	353	192	58	91	12	3	15	12	76.8
SOUTH (OD)	695	321	157	203	14	4	18	4	67.2
WEST (OD)	536	401	54	78	3	2	5	6	88.1
SENSOK (OD)	292	131	60	98	3	0	3	0	68.6
PREAH VIHEAR	275	151	66	55	3	2	5	16	69.6
TBENG MEAN CHEY (OD)	275	151	66	55	3	2	5	16	69.6
PREY VENG	4345	997	863	2472	13	1	14	41	53.6
SVAY ANTOR (OD)	826	164	136	524	2	0	2	7	54.7
KAMCHEY MEAR (OD)	300	65	64	171	0	0	0	1	50.4
PEARING (OD)	742	169	205	365	3	0	3	6	45.2
KG TRABECK (OD)	493	105	126	262	0	0	0	9	45.5
MESANG (OD)	761	177	117	464	3	0	3	4	60.2
PREAH SDACH (OD)	474	177	50	246	1	0	1	3	78.0
NEAK LOEUNG (OD)	749	140	165	440	4	1	5	11	45.9
PURSAT	1075	439	305	321	10	0	10	19	59.0
SAMPOVMEAS (OD)	740	307	204	221	8	0	8	14	60.1
BAKAN (OD)	335	132	101	100	2	0	2	5	56.7
RATTANAKIRI	132	72	12	44	4	1	5	4	85.7
BANLUNG (OD)	132	72	12	44	4	1	5	4	85.7
SIEM REAP	3067	1293	707	1044	23	9	32	137	64.7
ANKOR CHUM (OD)	928	287	253	385	3	0	3	29	53.1
SIEM REAP (OD)	1023	503	246	264	10	9	19	81	67.2
SOTNIKUM (OD)	592	348	126	109	9	0	9	15	73.4
KRALANH (OD)	524	155	82	286	1	0	1	12	65.4
STUNG TRENG	251	136	19	95	1	0	1	0	87.7
STUNG TRENG (OD)	251	136	19	95	1	0	1	0	87.7
SVAY RIENG	2109	556	762	766	25	0	25	284	42.2
SVAY RIENG (OD)	1335	380	409	529	17	0	17	181	48.2
ROMEAS HEK (OD)	233	83	57	91	2	0	2	17	59.3
CHIPOU (OD)	541	93	296	146	6	0	6	86	23.9
TAKEO	3370	1161	1073	1123	13	0	13	150	52.0
DAUNKEOV (OD)	622	367	122	132	1	0	1	0	75.1
BATI (OD)	790	333	168	282	7	0	7	63	66.5
PREY KABAS (OD)	1099	146	410	543	0	0	0	78	26.3
ANGROKA (OD)	388	138	147	99	4	0	4	0	48.4
KIRIVONG (OD)	471	177	226	67	1	0	1	9	43.9
NATIONAL HOSPITAL	1310	369	377	488	76	13	89	121	49.5
CENAT	723	219	261	194	49	7	56	95	45.6
HOPE HOSPITAL	197	81	25	65	26	6	32	23	76.4
IOM	5	5	0	0	0	0	0	0	100
MKS	121	33	23	65	0	0	0	3	58.9
PREAH KET MELEAH	109	8	25	76	0	0	0	0	24.2
PREAS KOSMAK HOSPITAL	75	21	19	34	1	0	1	0	52.5
NATIONAL PEDIATRIC HOSPITAL	80	2	24	54	0	0	0	0	7.7
Grand Total	37743	14082	9069	14203	389	74	463	1238	60.8

New smear-positive case notification by age and sex, 2013

Province / OD	MALE							FEMALE							MALE:FEMALE RATIO
	0-14	15-24	25-34	35-44	45-54	55-64	65+	0-14	15-24	25-34	35-44	45-54	55-64	65+	
BANTEAY MEANCHHEY	0	23	67	69	96	64	51	0	30	34	29	44	44	31	1.7
MONGKOL BOREI (OD)	0	6	14	21	19	14	19	0	11	18	9	11	9	9	1.4
POIPET (OD)	0	8	24	28	28	23	15	0	12	9	6	17	12	8	2.0
PREANEATPREAS (OD)	0	2	15	9	22	13	11	0	2	3	4	6	12	5	2.3
TMORPOUK (OD)	0	7	14	11	27	14	6	0	5	4	10	10	11	9	1.6
BATTAMBANG	1	43	71	82	115	96	85	1	31	60	46	70	59	76	1.4
BATTAMBANG (OD)	0	16	36	42	44	36	24	1	7	26	20	17	22	30	1.6
MAUNG RUSSEY (OD)	0	5	4	10	14	9	10	0	7	6	5	18	2	8	1.1
SAMPOVLOUN (OD)	1	8	9	12	19	8	5	0	3	9	6	13	8	4	1.4
SANG KE (OD)	0	9	8	13	18	15	16	0	5	7	8	5	11	12	1.6
THMAR KOUL (OD)	0	5	14	5	20	28	30	0	9	12	7	17	16	22	1.2
KAMPOT	1	28	62	51	90	64	69	0	16	43	39	73	53	72	1.2
ANGKOR CHEY (OD)	0	11	11	12	28	17	18	0	4	9	15	21	9	23	1.2
CHHOUK (OD)	0	7	19	12	18	14	19	0	5	10	9	18	17	20	1.1
KAMPOT (OD)	0	8	19	17	30	22	18	0	4	15	4	17	15	14	1.7
KOMPONG TRACH (OD)	1	2	13	10	14	11	14	0	3	9	11	17	12	15	1.0
KANDAL	0	37	95	94	159	103	138	0	41	96	73	114	98	112	1.2
ANG SNOUL (OD)	0	10	20	11	15	15	18	0	12	14	12	19	11	22	1.0
KHSACH KANDAL (OD)	0	5	5	7	9	8	13	0	3	10	5	6	8	9	1.1
KIEN SVAY (OD)	0	5	13	7	15	12	17	0	5	10	7	11	9	18	1.2
KOH THOM (OD)	0	4	10	23	24	16	21	0	4	14	13	12	24	17	1.2
LOVEA EM (OD)	0	0	8	1	8	3	3	0	1	7	0	4	7	1	1.2
MOUK KAMPOL (OD)	0	0	6	4	12	6	2	0	2	9	2	10	6	5	0.9
PONHEA LEU (OD)	0	3	7	3	13	8	11	0	6	5	3	5	5	6	1.5
SAANG (OD)	0	5	11	15	33	18	43	0	4	10	19	34	26	28	1.0
TAKMOV (OD)	0	5	15	23	30	17	10	0	4	17	12	13	2	6	1.9
KEP	0	3	4	3	5	3	4	0	0	3	0	4	6	2	1.5
KRONG KEP (OD)	0	3	4	3	5	3	4	0	0	3	0	4	6	2	1.5
KOH KONG	0	5	5	7	16	14	5	0	5	6	7	7	10	5	1.3
SMUCH MEANCHHEY (OD)	0	3	3	1	11	8	2	0	3	1	3	3	6	3	1.5
SRE AMBIL (OD)	0	2	2	6	5	6	3	0	2	5	4	4	4	2	1.1
KOMPONG CHAM	5	59	124	153	179	109	153	5	55	103	81	117	116	134	1.3
CHAMCAR LEU (OD)	0	6	10	24	30	17	21	1	6	12	10	16	28	20	1.2
CHOEUNG PREY (OD)	0	8	21	21	30	19	26	0	14	17	23	19	22	25	1.0
KG CHAM (OD)	2	21	29	44	39	24	42	1	15	28	20	25	20	36	1.4
KRAUCH CHMAR (OD)	0	3	1	5	2	4	6	0	2	4	1	5	4	3	1.1
MEMOT (OD)	0	5	13	14	10	5	5	0	3	9	3	2	1	3	2.5
ORAING OV (OD)	0	1	6	4	6	3	7	0	3	4	0	6	4	7	1.1
PONHEA KREK (OD)	0	3	26	19	27	13	15	1	5	9	7	14	10	23	1.5
PREY CHHOR (OD)	1	1	1	5	9	8	17	0	2	11	5	12	9	8	0.9
SREY SANTHOR (OD)	0	2	7	7	15	8	9	0	2	4	4	11	8	8	1.3
TBONG KHMUM (OD)	2	9	10	10	11	8	5	2	3	5	8	7	10	1	1.6
KOMPONG CHHNANG	2	29	46	50	66	61	59	5	28	55	46	63	75	54	1.0
Bar Bo (OD)	2	8	13	13	17	7	11	3	11	13	11	15	19	7	0.9
KG TRALACH (OD)	0	12	9	15	25	19	21	0	12	16	18	17	23	19	1.0
KG. CHHNANG (OD)	0	9	24	22	24	35	27	2	5	26	17	31	33	28	1.0
KOMPONG SOM	0	10	21	12	20	15	16	1	5	16	9	15	7	3	1.7
PREASIHANOUK (OD)	0	10	21	12	20	15	16	1	5	16	9	15	7	3	1.7
KOMPONG SPEU	8	43	64	82	111	100	102	3	31	73	58	76	91	108	1.2
KARNG PISEY(OD)	0	18	18	28	33	39	27	0	9	14	13	22	19	37	1.4
KOMPONG SPEU (OD)	7	21	36	40	59	40	47	3	14	44	33	41	53	57	1.0
OU Dong (OD)	1	4	10	14	19	21	28	0	8	15	12	13	19	14	1.2
KOMPONG THOM	1	25	67	76	93	47	62	4	30	60	66	65	63	52	1.1
BARAY (OD)	1	7	15	24	18	14	21	4	12	23	22	18	18	18	0.9
KG THOM (OD)	0	15	43	38	52	25	21	0	9	28	25	33	31	23	1.3
STUNG (OD)	0	3	9	14	23	8	20	0	9	9	19	14	14	11	1.0

New smear-positive case notification by age and sex, 2013 (cont.)

Province / OD	MALE							FEMALE							MALE:FEMALE RATIO
	0-14	15-24	25-34	35-44	45-54	55-64	65+	0-14	15-24	25-34	35-44	45-54	55-64	65+	
KRATIE	0	3	10	24	16	34	16	0	11	19	10	10	17	5	1.4
CHHLAUNG (OD)	0	1	2	7	6	15	7	0	4	6	4	3	8	1	1.5
KRATIE (OD)	0	2	8	17	10	19	9	0	7	13	6	7	9	4	1.4
MONDOLKIRI	0	0	1	9	7	4	3	0	1	2	2	4	3	0	2.0
SEN MONORUM (OD)	0	0	1	9	7	4	3	0	1	2	2	4	3	0	2.0
NATIONAL HOSPITAL	2	26	36	41	36	27	29	1	21	31	29	34	30	26	1.1
CENAT	0	15	24	23	22	15	17	1	18	16	16	22	14	16	1.1
HOPE HOSPITAL	0	7	6	10	9	5	3	0	2	6	9	6	11	7	1.0
IOM	0	0	0	0	1	3	0	0	0	0	0	0	0	1	4.0
MKS	0	3	4	3	1	1	7	0	1	4	1	3	4	1	1.4
NATIONAL PEDIATRIC HOSPITAL	2	0	0	0	0	0	0	0	0	0	0	0	0	0	-
PREAH KET MELEAH	0	0	1	5	0	0	0	0	0	2	0	0	0	0	3.0
PREAS KOSMAK HOSPITAL	0	1	1	0	3	3	2	0	0	3	3	3	1	1	0.9
ODOR MEANCHEY	0	10	28	20	39	40	14	1	12	18	28	27	21	12	1.3
SAMRONG (OD)	0	10	28	20	39	40	14	1	12	18	28	27	21	12	1.3
PAILIN CITY	1	3	4	8	19	10	2	0	1	9	5	3	6	2	1.8
PAILIN (OD)	1	3	4	8	19	10	2	0	1	9	5	3	6	2	1.8
PHNOM PENH	3	82	130	106	141	99	79	5	63	125	66	77	78	89	1.3
CENTER (OD)	0	6	20	9	10	6	7	1	6	14	5	3	5	6	1.5
NORTH (OD)	0	20	21	23	30	16	17	1	8	17	8	8	13	10	2.0
SENSOK (OD)	0	9	18	9	18	11	4	2	8	13	11	7	11	10	1.1
SOUTH (OD)	0	30	31	24	32	29	20	0	22	46	19	26	18	24	1.1
WEST (OD)	3	17	40	41	51	37	31	1	19	35	23	33	31	39	1.2
PREAH VIHEAR	1	7	8	20	26	22	13	0	5	4	13	10	15	7	1.8
TBENG MEAN CHEY (OD)	1	7	8	20	26	22	13	0	5	4	13	10	15	7	1.8
PREY VENG	3	33	70	77	120	92	124	1	31	63	55	105	123	100	1.1
KAMCHEY MEAR (OD)	0	5	4	8	6	4	4	0	1	8	7	8	5	5	0.9
KG TRABECK (OD)	1	4	6	13	9	8	19	0	5	6	6	9	17	2	1.3
MESANG (OD)	0	6	11	13	19	22	22	0	7	10	10	18	21	18	1.1
NEAK LOEUNG (OD)	0	2	11	14	20	11	21	0	3	7	2	18	16	15	1.3
PEARING (OD)	1	6	11	10	28	14	17	0	2	11	12	13	22	22	1.1
PREAH SDACH (OD)	1	7	14	9	22	15	19	1	4	15	8	20	25	17	1.0
SVAY ANTOR (OD)	0	3	13	10	16	18	22	0	9	6	10	19	17	21	1.0
PURSAT	0	17	43	32	53	45	53	1	11	18	15	43	55	53	1.2
BAKAN (OD)	0	8	14	7	16	11	20	1	3	9	6	10	15	12	1.4
SAMPOVMEAS (OD)	0	9	29	25	37	34	33	0	8	9	9	33	40	41	1.2
RATTANAKIRI	0	4	6	11	12	8	1	0	2	8	11	5	2	2	1.4
BANLUNG (OD)	0	4	6	11	12	8	1	0	2	8	11	5	2	2	1.4
SIEM REAP	0	46	123	130	164	136	94	2	40	112	96	153	112	85	1.2
ANKOR CHUM (OD)	0	11	24	23	36	27	19	0	13	29	31	36	25	13	1.0
KRALANH (OD)	0	3	5	10	8	20	10	2	5	17	10	29	19	17	0.6
SIEM REAP (OD)	0	25	67	64	73	41	31	0	10	41	32	50	35	34	1.5
SOTNIKUM (OD)	0	7	27	33	47	48	34	0	12	25	23	38	33	21	1.3
STUNG TRENG	0	4	12	19	21	16	18	0	8	13	8	7	6	5	1.9
STUNG TRENG (OD)	0	4	12	19	21	16	18	0	8	13	8	7	6	5	1.9
SVAY RIENG	2	19	42	55	78	53	55	0	22	30	36	64	62	38	1.2
CHIPOU (OD)	1	9	9	13	14	15	6	0	4	6	3	7	5	1	2.6
ROMEAS HEK (OD)	0	4	8	5	13	8	11	0	3	5	5	6	5	10	1.4
SVAY RIENG (OD)	1	6	25	37	51	30	38	0	15	19	28	51	52	27	1.0
TAKEO	2	24	74	85	143	111	122	2	40	78	65	129	112	174	0.9
ANGROKA (OD)	0	7	8	11	15	15	18	0	5	7	2	17	8	25	1.2
BATI (OD)	1	3	17	28	46	31	40	1	8	18	23	46	29	42	1.0
DAUNKEOV (OD)	0	11	25	25	49	31	39	0	9	24	20	35	36	63	1.0
KIRIVONG (OD)	0	2	16	12	17	14	12	1	13	14	11	12	23	30	0.7
PREY KABAS (OD)	1	1	8	9	16	20	13	0	5	15	9	19	16	14	0.9
Grand Total	32	583	1213	1316	1825	1373	1367	32	540	1079	893	1319	1264	1247	1.2

Treatment outcomes of new smear-positive cases, 2013

Province / OD	Number notified (cohort size)	Treatment success rate	% of cohort					
			Cured	Completed	Died	Failed	Loss to follow-up	Transfer out
BANTEAY MEANCHEY	696	93.1	90.4	2.7	2.6	0.6	1.4	2.3
MONGKOL BOREI (OD)	205	92.2	92.2	0.0	2.9	1.0	0.5	3.4
POIPET (OD)	251	90.8	88.8	2.0	2.8	0.4	2.8	3.2
PREANEATPREAS (OD)	109	96.3	95.4	0.9	2.8	0.9	0.0	0.0
TMORPOUK (OD)	131	96.2	86.3	9.9	1.5	0.0	1.5	0.8
BATTAMBANG	806	90.9	89.1	1.9	3.3	1.1	2.0	2.6
BATTAMBANG (OD)	325	88.6	86.5	2.2	2.5	2.2	3.4	3.4
MAUNG RUSSEY (OD)	139	92.1	92.1	0.0	2.2	0.7	0.7	4.3
SAMPOVLOUN (OD)	82	90.2	86.6	3.7	3.7	1.2	2.4	2.4
SANG KE (OD)	111	98.2	96.4	1.8	1.8	0.0	0.0	0.0
THMAR KOUL (OD)	149	89.9	87.9	2.0	7.4	0.0	1.3	1.3
KAMPOT	638	97.5	97.2	0.3	1.3	0.0	1.3	0.0
ANGKOR CHEY (OD)	115	99.1	99.1	0.0	0.9	0.0	0.0	0.0
CHHOUK (OD)	198	96.5	95.5	1.0	1.5	0.0	2.0	0.0
KAMPOT (OD)	147	95.9	95.9	0.0	1.4	0.0	2.7	0.0
KOMPONG TRACH (OD)	178	98.9	98.9	0.0	1.1	0.0	0.0	0.0
KANDAL	1166	93.9	91.0	2.9	2.8	0.3	0.9	2.0
ANG SNOUL (OD)	180	95.0	93.3	1.7	4.4	0.0	0.0	0.6
KHSACH KANDAL (OD)	94	90.4	89.4	1.1	8.5	0.0	0.0	1.1
KIEN SVAY (OD)	119	99.2	92.4	6.7	0.0	0.0	0.0	0.8
KOH THOM (OD)	176	93.2	92.6	0.6	4.5	0.6	1.1	0.6
LOVEA EM (OD)	22	100	100	0.0	0.0	0.0	0.0	0.0
MOUK KAMPOL (OD)	76	93.4	84.2	9.2	2.6	0.0	0.0	3.9
PONHEA LEU (OD)	93	91.4	79.6	11.8	0.0	0.0	4.3	4.3
SAANG (OD)	250	99.2	99.2	0.0	0.4	0.0	0.0	0.4
TAKMOV (OD)	156	84.0	82.1	1.9	3.8	1.9	3.2	7.1
KEP	27	100	100	0.0	0.0	0.0	0.0	0.0
KRONG KEP (OD)	27	100	100	0.0	0.0	0.0	0.0	0.0
KOH KONG	88	86.4	85.2	1.1	4.5	0.0	6.8	2.3
SMUCH MEANCHEY (OD)	43	86.0	86.0	0.0	7.0	0.0	4.7	2.3
SRE AMBIL (OD)	45	86.7	84.4	2.2	2.2	0.0	8.9	2.2
KOMPONG CHAM	1543	88.8	82.7	6.1	2.9	0.8	2.6	4.9
CHAMCAR LEU (OD)	284	97.9	96.5	1.4	1.8	0.0	0.4	0.0
CHOEUNG PREY (OD)	328	89.9	89.6	0.3	3.7	0.0	0.9	5.5
KG CHAM (OD)	359	80.2	64.9	15.3	3.9	3.3	7.0	5.6
KRAUCH CHMAR (OD)	35	100	97.1	2.9	0.0	0.0	0.0	0.0
MEMOT (OD)	59	84.7	72.9	11.9	1.7	0.0	0.0	13.6
ORAING OV (OD)	54	85.2	74.1	11.1	1.9	0.0	5.6	7.4
PONHEA KREK (OD)	140	82.9	80.0	2.9	2.9	0.0	0.7	13.6
PREY CHHOR (OD)	132	95.5	95.5	0.0	4.5	0.0	0.0	0.0
SREY SANTHOR (OD)	79	92.4	86.1	6.3	1.3	0.0	5.1	1.3
TBONG KHMUM (OD)	73	86.3	71.2	15.1	0.0	1.4	4.1	8.2

Treatment outcomes of smear-positive cases, 2013 (cont.)

Province / OD	Number notified (cohort size)	Treatment success rate	% of cohort					
			Cured	Completed	Died	Failed	Loss to follow-up	Transfer out
KOMPONG CHHNANG	585	94.5	92.6	1.9	2.7	0.0	0.7	2.1
Bar Bo (OD)	133	99.2	99.2	0.0	0.8	0.0	0.0	0.0
KG TRALACH (OD)	197	94.9	94.9	0.0	1.5	0.0	0.5	3.0
KG. CHHNANG (OD)	255	91.8	87.5	4.3	4.7	0.0	1.2	2.4
KOMPONG SOM	179	92.7	87.7	5.0	4.5	0.0	0.6	2.2
PREASIHANOUK (OD)	179	92.7	87.7	5.0	4.5	0.0	0.6	2.2
KOMPONG SPEU	909	96.7	94.5	2.2	1.4	0.0	1.2	0.7
KARNG PISEY(OD)	238	95.8	92.0	3.8	1.7	0.0	1.7	0.8
KOMPONG SPEU (OD)	515	97.5	96.9	0.6	1.4	0.0	0.6	0.6
LOUDONG (OD)	156	95.5	90.4	5.1	1.3	0.0	2.6	0.6
KOMPONG THOM	853	94.4	81.9	12.4	2.3	0.0	2.1	1.2
BARAY (OD)	309	92.9	79.9	12.9	3.6	0.0	2.6	1.0
KG THOM (OD)	382	96.6	95.5	1.0	1.3	0.0	1.0	1.0
STUNG (OD)	162	92.0	53.7	38.3	2.5	0.0	3.7	1.9
KRATIE	172	90.1	77.3	12.8	2.3	0.6	3.5	3.5
CHHLAUNG (OD)	72	90.3	68.1	22.2	2.8	1.4	4.2	1.4
KRATIE (OD)	100	90.0	84.0	6.0	2.0	0.0	3.0	5.0
MONDOLKIRI	20	90.0	70.0	20.0	0.0	0.0	10.0	0.0
SEN MONORUM (OD)	20	90.0	70.0	20.0	0.0	0.0	10.0	0.0
NATIONAL HOSPITAL	458	76.2	71.4	4.8	4.1	3.3	7.2	9.2
CENAT	263	90.5	87.8	2.7	2.7	3.4	1.1	2.3
HOPE HOSPITAL	115	47.0	38.3	8.7	8.7	5.2	18.3	20.9
IOM	21	100	100	0.0	0.0	0.0	0.0	0.0
NORODOM SIAHNOUK	25	56.0	56.0	0.0	8.0	0.0	20.0	16.0
PREAH KET MELEAH	13	100	100	0.0	0.0	0.0	0.0	0.0
PREAS KOSMAK HOSPITAL	21	42.9	19.0	23.8	0.0	0.0	19.0	38.1
ODOR MEANCHHEY	333	90.7	88.9	1.8	2.4	1.2	2.4	3.3
SAMRONG (OD)	333	90.7	88.9	1.8	2.4	1.2	2.4	3.3
PAILIN CITY	38	84.2	84.2	0.0	2.6	0.0	5.3	7.9
PAILIN (OD)	38	84.2	84.2	0.0	2.6	0.0	5.3	7.9
PHNOM PENH	1024	92.1	89.5	2.6	1.5	0.6	2.1	3.7
CENTER (OD)	47	89.4	89.4	0.0	0.0	0.0	6.4	4.3
NORTH (OD)	239	92.5	86.2	6.3	1.7	1.3	2.5	2.1
SOUTH (OD)	244	93.4	90.2	3.3	1.6	0.0	0.0	4.9
WEST (OD)	494	91.5	90.7	0.8	1.4	0.6	2.6	3.8
PREAH VIHEAR	220	93.6	90.9	2.7	2.7	0.5	0.5	2.7
TBENG MEAN CHEY (OD)	220	93.6	90.9	2.7	2.7	0.5	0.5	2.7
PREY VENG	1081	95.8	93.1	2.8	1.9	0.0	1.6	0.7
KAMCHEY MEAR (OD)	74	95.9	93.2	2.7	4.1	0.0	0.0	0.0
KG TRABECK (OD)	88	92.0	92.0	0.0	3.4	0.0	4.5	0.0
MESANG (OD)	170	95.3	95.3	0.0	1.8	0.0	2.4	0.6
NEAK LOEUNG (OD)	122	96.7	85.2	11.5	2.5	0.0	0.0	0.8
PEARING (OD)	225	94.7	91.1	3.6	1.3	0.0	2.2	1.8
PREAH SDACH (OD)	255	99.6	97.6	2.0	0.0	0.0	0.4	0.0
SVAY ANTOR (OD)	147	93.2	92.5	0.7	3.4	0.0	2.0	1.4

Treatment outcomes of new smear-positive cases, 2013 (cont.)

Province / OD	Number notified (cohort size)	Treatment success rate	% of cohort					
			Cured	Completed	Died	Failed	Loss to follow-up	Transfer out
PURSAT	478	97.9	97.1	0.8	1.3	0.0	0.0	0.8
BAKAN (OD)	176	100	100	0.0	0.0	0.0	0.0	0.0
SAMPOVMEAS (OD)	302	96.7	95.4	1.3	2.0	0.0	0.0	1.3
RATTANAKIRI	76	77.6	67.1	10.5	7.9	2.6	7.9	3.9
BANLUNG (OD)	76	77.6	67.1	10.5	7.9	2.6	7.9	3.9
SIEM REAP	1384	92.0	88.4	3.5	2.0	0.2	1.2	4.6
ANKOR CHUM (OD)	345	95.1	91.9	3.2	1.7	0.3	1.7	1.2
KRALANH (OD)	190	96.8	96.3	0.5	2.1	0.0	0.0	1.1
SIEM REAP (OD)	522	85.8	85.8	0.0	2.1	0.4	1.7	10.0
SOTNIKUM (OD)	327	95.7	84.4	11.3	2.1	0.0	0.3	1.8
STUNG TRENG	142	93.7	90.1	3.5	2.8	0.7	2.8	0.0
STUNG TRENG (OD)	142	93.7	90.1	3.5	2.8	0.7	2.8	0.0
SVAY RIENG	565	95.0	95.0	0.0	1.8	0.0	0.7	2.5
CHIPOU (OD)	106	99.1	99.1	0.0	0.9	0.0	0.0	0.0
ROMEAS HEK (OD)	92	96.7	96.7	0.0	2.2	0.0	0.0	1.1
SVAY RIENG (OD)	367	93.5	93.5	0.0	1.9	0.0	1.1	3.5
TAKEO	1135	95.2	91.8	3.3	2.3	0.0	0.9	1.7
ANGROKA (OD)	101	96.0	91.1	5.0	3.0	0.0	0.0	1.0
BATI (OD)	254	93.3	82.3	11.0	2.0	0.0	0.4	4.3
DAUNKEOV (OD)	376	96.0	94.7	1.3	2.7	0.0	0.3	1.1
KIRIVONG (OD)	179	92.2	92.2	0.0	2.2	0.0	4.5	1.1
PREY KABAS (OD)	225	97.8	97.8	0.0	1.8	0.0	0.0	0.4
Grand Total	14616	92.8	89.2	3.6	2.4	0.4	1.8	2.7

HIV testing and provision of CPT and ART, 2013

Province / OD	Percentage of TB patients with known HIV status	Number of TB patients with known HIV status	Number of TB cases notified (new and retreatment)	Number of HIV-positive TB patients	% of tested TB patients HIV-positive	% of HIV-positive TB patients on CPT	% of HIV-positive TB patients on ART
BANTEAY MEANCHHEY	95	2036	2151	95	4.7	100	100
MONGKOL BOREI (OD)	89	832	935	56	6.7	100	100
POIPET (OD)	98	398	407	32	8.0	100	100
PREANEATPREAS (OD)	100	559	559	2	0.4	100	100
TMORPOUK (OD)	99	247	250	5	2.0	100	100
BATTAMBANG	91	2488	2734	137	5.5	97	93
BATTAMBANG (OD)	81	779	960	65	8.3	94	85
MAUNG RUSSEY (OD)	97	814	840	36	4.4	100	100
SAMPOVLOUN (OD)	97	238	245	18	7.6	100	100
SANG KE (OD)	100	369	369	8	2.2	100	100
THMAR KOUL (OD)	90	288	320	10	3.5	100	100
KAMPOT	95	1242	1310	39	3.1	100	100
ANGKOR CHEY (OD)	97	325	335	5	1.5	100	100
CHHOUK (OD)	93	360	388	4	1.1	100	100
KAMPOT (OD)	91	312	341	10	3.2	100	100
KOMPONG TRACH (OD)	100	245	246	20	8.2	100	100
KANDAL	83	2219	2680	72	3.2	99	99
ANG SNOUL (OD)	99	247	249	5	2.0	100	100
KHSACH KANDAL (OD)	40	108	267	0	0.0	-	-
KIEN SVAY (OD)	88	436	496	7	1.6	100	100
KOH THOM (OD)	86	285	330	30	10.5	100	100
LOVEA EM (OD)	100	132	132	0	0.0	-	-
MOUK KAMPOL (OD)	67	79	118	1	1.3	100	100
PONHEA LEU (OD)	92	103	112	4	3.9	75	75
SAANG (OD)	99	358	362	5	1.4	100	100
TAKMOV (OD)	77	471	614	20	4.2	100	100
KEP	100	78	78	1	1.3	100	100
KRONG KEP (OD)	100	78	78	1	1.3	100	100
KOH KONG	78	142	181	14	9.9	100	100
SMUCH MEANCHHEY (OD)	70	74	105	9	12.2	100	100
SRE AMBIL (OD)	89	68	76	5	7.4	100	100
KOMPONG CHAM	81	3492	4312	107	3.1	100	100
CHAMCAR LEU (OD)	99	1053	1065	3	0.3	100	100
CHOEUNG PREY (OD)	90	662	734	8	1.2	100	100
KG CHAM (OD)	86	728	843	71	9.8	100	100
KRAUCH CHMAR (OD)	93	128	137	0	0.0	-	-
MEMOT (OD)	98	159	163	0	0.0	-	-
ORAING OV (OD)	102	122	120	5	4.1	100	100
PONHEA KREK (OD)	17	68	398	2	2.9	100	100
PREY CHHOR (OD)	24	70	291	0	0.0	-	-
SREY SANTHOR (OD)	96	312	326	1	0.3	100	100
TBONG KHMUM (OD)	81	190	235	17	8.9	100	100
KOMPONG CHHNANG	90	1122	1245	17	1.5	100	100
Bar Bo (OD)	96	251	262	0	0.0	-	-
KG TRALACH (OD)	78	223	286	6	2.7	100	100
KG. CHHNANG (OD)	93	648	697	11	1.7	100	100
KOMPONG SOM	100	429	429	34	7.9	100	100
PREASIHANOUK (OD)	100	429	429	34	7.9	100	100

HIV testing and provision of CPT and ART, 2013(cont.)

Province / OD	Percentage of TB patients with known HIV status	Number of TB patients with known HIV status	Number of TB cases notified (new and retreatment)	Number of HIV-positive TB patients	% of tested TB patients HIV-positive	% of HIV-positive TB patients on CPT	% of HIV-positive TB patients on ART
KOMPONG SPEU	77	2060	2684	22	1.1	100	100
KARNG PISEY(OD)	97	1010	1039	5	0.5	100	100
KOMPONG SPEU (OD)	57	704	1237	13	1.8	100	100
LOUDONG (OD)	85	346	408	4	1.2	100	100
KOMPONG THOM	74	804	1082	12	1.5	100	100
BARAY (OD)	83	258	309	1	0.4	100	100
KG THOM (OD)	64	351	550	11	3.1	100	100
STUNG (OD)	87	195	223	0	0.0	-	-
KRATIE	90	337	376	12	3.6	117	117
CHHLAUNG (OD)	95	104	110	0	0.0	-	-
KRATIE (OD)	88	233	266	12	5.2	117	117
MONDOLKIRI	60	28	47	8	28.6	100	100
SEN MONORUM (OD)	60	28	47	8	28.6	100	100
NATIONAL HOSPITAL	59	855	1444	202	23.6	99	98
CENAT	50	412	825	23	5.6	100	100
HOPE HOSPITAL	65	147	226	60	40.8	100	100
MKS	84	104	124	56	53.8	102	100
NATIONAL PEDIATRIC HOSPITAL	100	80	80	23	28.8	100	100
PREAH KET MELEAH	100	109	109	38	34.9	89	89
Pras Kosomak / IOM	4	3	80	2	66.7	100	100
ODOR MEANCHEY	93	552	594	15	2.7	100	100
SAMRONG (OD)	93	552	594	15	2.7	100	100
PAILIN CITY	99	278	282	10	3.6	100	100
PAILIN (OD)	99	278	282	10	3.6	100	100
PHNOM PENH	82	1750	2138	237	13.5	49	49
CENTER (OD)	91	211	231	8	3.8	75	75
NORTH (OD)	94	345	368	44	12.8	100	100
SENSOK (OD)	38	111	292	5	4.5	100	100
SOUTH (OD)	83	580	703	44	7.6	100	100
WEST (OD)	92	503	544	136	27.0	13	13
PREAH VIHEAR	82	239	293	11	4.6	100	100
TBENG MEAN CHEY (OD)	82	239	293	11	4.6	100	100
PREY VENG	84	3701	4387	40	1.1	100	100
KAMCHEY MEAR (OD)	100	301	301	2	0.7	100	100
KG TRABECK (OD)	69	347	502	0	0.0	-	-
MESANG (OD)	83	634	765	2	0.3	100	100
NEAK LOEUNG (OD)	85	644	761	11	1.7	100	100
PEARING (OD)	85	637	748	8	1.3	100	100
PREAH SDACH (OD)	96	460	477	1	0.2	100	100
SVAY ANTOR (OD)	81	678	833	16	2.4	100	100
PURSAT	90	988	1094	13	1.3	100	100
BAKAN (OD)	94	321	340	3	0.9	100	100
SAMPOVMEAS (OD)	88	667	754	10	1.5	100	100
RATTANAKIRI	61	83	137	5	6.0	60	60
BANLUNG (OD)	61	83	137	5	6.0	60	60
SIEM REAP	78	2511	3213	62	2.5	100	100
ANKOR CHUM (OD)	70	673	957	5	0.7	100	100
KRALANH (OD)	59	315	536	2	0.6	100	100
SIEM REAP (OD)	98	1089	1113	48	4.4	100	100
SOTNIKUM (OD)	71	434	607	7	1.6	100	100

HIV testing and provision of CPT and ART, 2013 (cont.)

Province / OD	Percentage of TB patients with known HIV status	Number of TB patients with known HIV status	Number of TB cases notified (new and retreatment)	Number of HIV-positive TB patients	% of tested TB patients HIV-positive	% of HIV-positive TB patients on CPT	% of HIV-positive TB patients on ART
STUNG TRENG	97	243	251	18	7.4	100	100
STUNG TRENG (OD)	97	243	251	18	7.4	100	100
SVAY RIENG	94	2239	2393	25	1.1	100	100
CHIPOU (OD)	91	571	627	3	0.5	100	100
ROMEAS HEK (OD)	100	250	250	9	3.6	100	100
SVAY RIENG (OD)	94	1418	1516	13	0.9	100	100
TAKEO	68	2393	3520	33	1.4	100	100
ANGROKA (OD)	100	388	388	9	2.3	100	100
BATI (OD)	59	504	853	4	0.8	100	100
DAUNKEOV (OD)	78	487	622	4	0.8	100	100
KIRIVONG (OD)	92	441	480	11	2.5	100	100
PREY KABAS (OD)	49	573	1177	5	0.9	100	100
Grand Total	82.7	32309	39055	1241	3.8	89.6	89.0

Case notification, childhood TB, 2013

Province / OD	Total cases	Extra-pulmonary		Smear-negative		All other	
		Number	%	Number	%	Number	%
BANTEAY MEANCHHEY	711	619	87.1	91	12.8	1.0	0.1
MONGKOL BOREI (OD)	449	366	81.5	82	18.3	1	0.2
POIPET (OD)	50	42	84.0	8	16.0	0	0
PREANEATPREAS (OD)	210	209	99.5	1	0.5	0	0
TMORPOUK (OD)	2	2	100	0	0	0	0
BATTAMBANG	912	691	75.8	219	24.0	2	0.2
BATTAMBANG (OD)	318	301	94.7	16	5.0	1	0.3
MAUNG RUSSEY (OD)	337	166	49.3	171	50.7	0	0
SAMPOVLOUN (OD)	85	65	76.5	19	22.4	1	1.2
SANG KE (OD)	154	141	91.6	13	8.4	0	0
THMAR KOUL (OD)	18	18	100	0	0	0	0
KAMPOT	51	41	80.4	9	17.6	1	2.0
ANGKOR CHEY (OD)	15	15	100	0	0	0	0
CHHOUK (OD)	5	4	80.0	1	20.0	0	0
KAMPOT (OD)	10	10	100	0	0	0	0
KOMPONG TRACH (OD)	21	12	57.1	8	38.1	1	4.8
KANDAL	345	308	89.3	37	10.7	0	0
ANG SNOUL (OD)	1	0	0	1	100	0	0
KHSACH KANDAL (OD)	79	79	100	0	0	0	0
KIEN SVAY (OD)	153	149	97.4	4	2.6	0	0
KOH THOM (OD)	17	2	11.8	15	88.2	0	0
LOVEA EM (OD)	33	16	48.5	17	51.5	0	0
MOUK KAMPOL (OD)	15	15	100	0	0	0	0
PONHEA LEU (OD)	3	3	100	0	0	0	0
SAANG (OD)	16	16	100	0	0	0	0
TAKMOV (OD)	28	28	100	0	0	0	0
KEP	0	0	0	0	0	0	0
KRONG KEP (OD)	0	0	0	0	0	0	0
KOH KONG	9	9	100	0	0	0	0
SMUCH MEANCHHEY (OD)	5	5	100	0	0	0	0
SRE AMBIL (OD)	4	4	100	0	0	0	0
KOMPONG CHAM	701	636	90.7	58	8.3	7	1.0
CHAMCAR LEU (OD)	408	398	97.5	9	2.2	1	0.2
CHOEUNG PREY (OD)	43	40	93.0	3	7.0	0	0
KG CHAM (OD)	102	66	64.7	32	31.4	4	3.9
KRAUCH CHMAR (OD)	3	2	66.7	0	0	1	33.3
MEMOT (OD)	35	27	77.1	8	22.9	0	0
ORAING OV (OD)	10	10	100	0	0	0	0
PONHEA KREK (OD)	80	74	92.5	5	6.3	1	1.3
PREY CHHOR (OD)	10	10	100	0	0	0	0
SREY SANTHOR (OD)	10	9	90.0	1	10.0	0	0
TBONG KHMUM (OD)	0	0	0	0	0	0	0
KOMPONG CHHNANG	280	179	63.9	85	30.4	16	5.7
BAR BO (OD)	54	35	64.8	5	9.3	14	25.9
KG TRALACH (OD)	15	14	93.3	1	6.7	0	0
KG. CHHNANG (OD)	211	130	61.6	79	37.4	2	0.9

Case notification, childhood TB, 2013 (cont.)

Province / OD	Total cases	Extra-pulmonary		Smear-negative		All other	
		Number	%	Number	%	Number	%
KOMPONG SOM	66	66	100	0	0	0	0
PREASIHANOUK (OD)	66	66	100	0	0	0	0
KOMPONG SPEU	547	361	66.0	176	32.2	13	2.4
KARNG PISEY(OD)	349	194	55.6	155	44.4	0	0
KOMPONG SPEU (OD)	176	149	84.7	18	10.2	12	6.8
LOUDONG (OD)	22	18	81.8	3	13.6	1	4.5
KOMPONG THOM	47	24	51.1	18	38.3	5	10.6
BARAY (OD)	19	9	47.4	5	26.3	5	26.3
KG THOM (OD)	27	14	51.9	13	48.1	0	0
STUNG (OD)	1	1	100	0	0	0	0
KRATIE	22	21	95.5	1	4.5	0	0
CHHLAUNG (OD)	5	4	80.0	1	20.0	0	0
KRATIE (OD)	17	17	100	0	0	0	0
MONDOLKIRI	1	0	0	1	100	0	0
SEN MONORUM (OD)	1	0	0	1	100	0	0
NATIONAL HOSPITAL	97	64	66.0	30	30.9	3	3.1
CENAT	9	5	55.6	4	44.4	0	0
HOPE HOSPITAL	0	0	0	0	0	0	0
IOM	0	0	0	0	0	0	0
MKS	3	0	0	2	66.7	1	33.3
NATIONAL PEDIATRIC HOSPITAL	80	54	67.5	24	30.0	2	2.5
PREAH KET MELEAH	5	5	100	0	0	0	0
PREAS KOSMAK HOSPITAL	0	0	0	0	0	0	0
ODOR MEANCHEY	155	148	95.5	6	3.9	1	0.6
SAMRONG (OD)	155	148	95.5	6	3.9	1	0.6
PAILIN CITY	85	79	92.9	4	4.7	2	2.4
PAILIN (OD)	85	79	92.9	4	4.7	2	2.4
PHNOM PENH	81	67	82.7	3	3.7	11	13.6
CENTER (OD)	6	5	83.3	0	0	1	16.7
NORTH (OD)	3	2	66.7	0	0	1	33.3
SENSOK (OD)	32	30	93.8	0	0	2	6.3
SOUTH (OD)	27	23	85.2	2	7.4	2	7.4
WEST (OD)	13	7	53.8	1	7.7	5	38.5
PREAH VIHEAR	15	14	93.3	0	0	1	6.7
TBENG MEAN CHEY (OD)	15	14	93.3	0	0	1	6.7
PREY VENG	1400	1336	95.4	34	2.4	30	2.1
KAMCHEY MEAR (OD)	41	41	100	0	0	0	0
KG TRABECK (OD)	227	209	92.1	17	7.5	1	0.4
MESANG (OD)	290	290	100	0	0	0	0
NEAK LOEUNG (OD)	258	254	98.4	4	1.6	0	0
PEARING (OD)	152	142	93.4	10	6.6	0	0
PREAH SDACH (OD)	156	155	99.4	0	0	1	0.6
SVAY ANTOR (OD)	276	245	88.8	3	1.1	28	10.1
PURSAT	127	109	85.8	17	13.4	1	0.8
BAKAN (OD)	64	47	73.4	16	25.0	1	1.6
SAMPOVMEAS (OD)	63	62	98.4	1	1.6	0	0
RATTANAKIRI	15	15	100	0	0	0	0
BANLUNG (OD)	15	15	100	0	0	0	0

Case notification, childhood TB, 2013 (cont.)

Province / OD	Total cases	Extra-pulmonary		Smear-negative		All other	
		Number	%	Number	%	Number	%
SIEM REAP	93	90	96.8	2	2.2	1	1.1
ANGKOR CHILD HOSPITAL	0		0		0	0	0
ANKOR CHUM (OD)	30	30	100	0	0	0	0
KRALANH (OD)	47	46	97.9	0	0	1	2.1
SIEM REAP (OD)	0	0	0	0	0	0	0
SOTNIKUM (OD)	16	14	87.5	2	12.5	0	0
STUNG TRENG	37	37	100	0	0	0	0
STUNG TRENG (OD)	37	37	100	0	0	0	0
SVAY RIENG	178	150	84.3	26	14.6	2	1.1
CHIPOU (OD)	23	21	91.3	1	4.3	1	4.3
ROMEAS HEK (OD)	7	7	100	0	0	0	0
SVAY RIENG (OD)	148	122	82.4	25	16.9	1	0.7
TAKEO	437	424	97.0	9	2.1	4	0.9
ANGROKA (OD)	27	22	81.5	5	18.5	0	0
BATI (OD)	131	129	98.5	0	0	2	1.5
DAUNKEOV (OD)	0	0	0	0	0	0	0
KIRIVONG (OD)	6	5	83.3	0	0	1	16.7
PREY KABAS (OD)	273	268	98.2	4	1.5	1	0.4
TOTAL	6412	5488	85.6	826	12.9	101	1.6