Kingdom of Cambodia

Nation Religion King

Ministry of Health

Report

National HIV Seroprevalence Survey Amongst TB Patients in Cambodia, 2009

National Center for Tuberculosis and Leprosy Control
(CENAT)

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Acknowledgements

On behalf of the National TB Control Program we would like to express our deep thanks and appreciation to all organizations and individuals for their contributions in making this survey successful.

We profoundly thank GFATM, CENAT/JICA TB control Project, USAID, US-CDC, JATA/ RIT and WHO for their financial and technical supports to the survey.

We sincerely hope the survey results will be of great importance for combating TB/HIV in Cambodia and also for bringing a brighter future to those who suffer from Tuberculosis and HIV/AIDS.

Phnom Penh, 24 May, 2011

National Center for TB and Leprosy Control

Director

Dr. Mao Tan Eang

Executive Summary

The 4th National sero-prevalence survey amongst TB patients was conducted again in July, 2009 in order to monitor the trend of HIV epidemic and its impact among TB patients.

The unlinked anonymous HIV testing was applied. The first test was performed using immunochromatography: ICA (*Determine HIV1/2*, ABOTT, USA) and this was confirmed by ICA (*Uni Gold*, USA). This HIV testing strategy is according to the recommendation of National Center for HIV/AIDS, Dermatology and STD Control (NCAHDS). All data was entered into a computerized database and analyzed using SPSS.

3,130 TB patients were registered in July 2009. Among them, 2,877(91.9%) patients were contacted in total. 13(0.45%) were excluded due to not being obtained serum from and 59(2.1%) were also excluded because they were not confirmed as TB. Finally, we analyzed the data of 2,805 patients who were contacted then obtained blood and TB was confirmed.

Overall HIV sero-prevalence among all TB patients was 6.3%, lower than the result of the past survey (7.8% in 2007). Higher HIV sero-prevalence was seen more among age 25 to 34, and 35 to 44 , non-Cambodian,relap and other retraetement cases, smear-negative pulmonary and extra-pulmonary TB (p-value <0.01) . The prevalence in Phnom Penh is still the highest. Among smear-positive pulmonary TB with/without extra-pulmonary TB cases, overall HIV sero-prevalence continued to a little bit decline from 3.9% in 2007 to 3.7% in 2009. Among smear-negative pulmonary TB and/or extra-pulmonary TB cases, the sero-prevalence also continue to decline from 12.6% in 2007 to 9.2% in 2009. The risk factors on HIV sero-prevalence were analyzed by logistic regression model. These were Phnom Penh, all age groups except 45 to 54, Non-Cambodian and smear negative pulmonary TB and/or Extra-pulmonary TB .

It is inferred that decline of the HIV sero-prevalence among TB patients reflect decline of HIV epidemic in Cambodia (HIV prevalence 0.9% in 2006; NCHADS), expansion of OI/ART services and overall improvement of TB/HIV activities in Cambodia. We need to make more effort to continue to reduce the burden of TB/HIV.

I. INTRODUCTION

Since the framework for TB/HIV collaborative activities was established by National TB control program (NTP) and National HIV/AIDS control program (NAP) in 2002, several TB/HIV collaborative activities has been implemented in all over Cambodia.

The Cambodian National Center for Tuberculosis and Leprosy Control (CENAT) has started HIV sero-prevalence surveillance among TB patients (TB/HIV surveillance) since 2003 in order to measure the HIV epidemic impact on TB epidemic and monitor the trend of HIV epidemic by cross-sectional population surveillance using NTP network expanded in the whole country.

The first HIV prevalence population surveys of TB patients showed much higher HIV prevalence than those obtained from the previous sentinel surveillance which reported HIV prevalence among TB patients as 2.5% in 1995, 3.9% in 1996, 5.2% in 1997, 7.9% in 1999, 6.0% in 2000 and 8.4% in 2002.

In the population survey, the HIV prevalence among all TB patients was 11.8 % in 2003. Thereafter, according to the second and third HIV prevalence population surveys of TB patients, the HIV prevalence among TB patients continue to decline 9.9% in 2005 and 7.8% in 2007. From 2003 through 2005, especially the HIV prevalence among smear-positive pulmonary TB with/without extra-pulmonary TB cases was declined. And then, the result of the third survey conducted in 2007 showed that HIV sero-prevalence declined not only among smear-positive pulmonary TB, but also among smear-negative pulmonary TB, reflecting the continuous decline of HIV epidemic in Cambodia. However, the HIV prevalence among TB patients is still the highest in Phnom Penh, the capital city of Cambodia (21.7% in 2007). Logistic regression analysis of the risk factors in 2007 showed that residences along the Thai border and the coast, and in Phnom Penh, all age group except more than 65 years old and less than 24 years old are significantly associated with high HIV prevalence.

The TB/HIV surveillance was conducted again in July 2009 following the same protocol of the surveillance through 2003 to 2007 in order to monitor the trend of HIV epidemic among TB patients by comparing the results to those in 2003, 2005 and 2007. It was also expected to gain the whole picture of HIV epidemic in Cambodia and to investigate the associations of the risk factors which previously identified and effectiveness of the TB/HIV collaborative activities. The result would be useful to plan interventions for both TB control and HIV/AIDS control in the country.

II. METHODOLOGY

1. Sampling Size and Sampling Procedure

Patients were enrolled during one calendar month (1st July – 31st Jul, 2009). All eligible TB patients diagnosed during the study period were enrolled as a representative sample (consecutive sampling). Patients of any forms of TB would be eligible in this study, but the same sample size was applied in order to allow the accuracy and validity of the results. For the calculation of sample size, the following formula was used:

$$N = PQ/ (E/z)^{2*}$$

The estimated prevalence rate of HIV among all TB patients was assumed of 9%, because of the previous survey. Allowing for a 2% difference as an acceptable error with a 95% confidence interval, 780 samples would be necessary. Refusal rate was estimated on approximately 10% and misclassification rate of approximately 20%, then 780/0.9/0.8= 1070.

However, for operational reasons, the inclusion period would cover one month, which would allow fulfilling the necessary sample size in this survey. There were about 36,000 TB patients registered in 2006 and 2007. Therefore, inclusion period of one month was enough to fulfill the necessary sample size in this surveillance (36,000/12=3,000).

2. Study Population

This surveillance was cross-sectional study. All TB patients who were diagnosed as TB and newly registered to NTP in July 2009 were all contacted as eligible persons regardless of whether they knew their HIV sero-status or not. The study included patients with all forms of TB (smear-positive and negative pulmonary TB, and extra-pulmonary TB) and with any treatment categories (new, relapse, other re-treatment and others). The patients whose serum was not obtained and who were not confirmed as TB were all excluded from the analysis.

To calculate sample size for values not shown in the table, the following formula can be used:

$N = PQ/ (E/Z)^2$

where

N = the minimum sample size required
P = the maximum expected prevalence rate or expected population proportion
Q = 100 – P
E = the margin of sampling error tolerated
(*Note:* In general a sampling error of greater than 5% is not acceptable)
Z = the centile of the standard normal distribution.

3. Study Regimens

The unlinked anonymous HIV testing was applied. Minimum unidentifiable data on patient's basic demographic information and TB were taken in the data collection form. The form and the serum sample of each patient were labeled by a unique study number.

4. Laboratory Procedures

The HIV testing strategy of the surveillance in the population with an HIV prevalence less than 10% recommended by UNAIDS and WHO was applied. The first test was performed using immunochromatography: ICA (*Determine HIV1/2,* ABOTT, USA). If the first test was negative, the sample was considered as negative. The positive results in the first test would be confirmed by ICA (*Uni Gold,* USA). After this last test, the sample with positive results was considered as positive and the sample with negative result was considered as negative. This HIV testing strategy is according to the recommendation of NCHADS.

5. Data Management and Analysis

All data collection forms were carefully checked for errors prior to the analysis. The CENAT staff responsible for data management and the analysis did link demographic data with HIV test result. All data was entered into a computerized database and analyzed using SPSS.

6. Ethical Consideration

The unlinked anonymous HIV testing was applied based on the ethical approach. Informed consent to the study was taken from all participants who agreed for blood drawing. The protocol of the surveillance was reviewed and accepted by the National Ethics Committee for Human Subject Research, Ministry of Health, Cambodia.

III. RESULTS

3,130 TB patients were registered in July 2009. Among them, 2,877(91.9%) patients were contacted in total. 13(0.45%) were excluded due to not being obtained serum from. The reasons that serum was not obtained were; the patient refused (2); the patients did not come for blood taking (9); blood drawing was technically difficult (1); reason unknown (1). 59(2.1%) were also excluded because they were not confirmed as TB. The reasons that they were not confirmed as TB were; diagnosis of smear negative pulmonary TB made without chest X-ray(29); site of extra-pulmonary TB was not mentioned (14); TB site, sputum smear result and X-ray result were not mentioned(16). Finally, we analyzed the date from 2,805 patients who were contacted, obtained blood and were confirmed as TB.

Overall HIV sero-prevalence among all TB patients was 6.3% among 2,805 patients.

Characteristics of the all participants and the HIV sero-prevalence rates by these characteristics were shown in Table 1. The HIV sero-prevalence among male and female were almost same. Higher HIV sero-prevalence was seen more among age 25 to 34 and 35 to 44 , non-Cambodian, relap and other re-treatment cases, smear-negative pulmonary TB and extra-pulmonary TB (p-value <0.01).

Table 2 showed sex distribution and the HIV sero-prevalence. The prevalence among female was higher than male except the age group 45 to 54 years old and 55 to 64 years old.

The HIV sero-prevalence rates of all TB patients by province were shown with those of previous surveys in Table 3. The prevalence in Phnom Penh was still high at 14.3% which declined from 34.3% in 2003, 26.0% in 2005 and 21.7% in 2007. The prevalence in Thai border area (8.1%) and coastal area (8.4%) were also declined. However, the prevalence rate is also still high in Sihanouk Ville (39.2%) and Koh Kong(29.4%).Kg Thom Province experienced prevalence increase from 1.7% in 2003 to around 9% in 2009.

The analysis was conducted by disease forms and geographical areas among only new TB cases (Table 4). Disease forms were categorized smear-positive pulmonary TB with/without extra-pulmonary TB, or smear-negative pulmonary TB and/or extra-pulmonary TB. All provinces were categorized by five areas according to geographical and socio-economical similarities (Phnom Penh, Thai border area, Coastal area, North east area, and Others).

Among smear-positive pulmonary TB with/without extra-pulmonary TB cases, overall HIV sero-prevalence continuously declined from 11.4% in 2003, 5.2% in 2005 and 3.9% in 2007 to 3.7% in 2009. In HIV hot areas such as Phnom Penh and Thai border, decline were observed, but it was slightly raised in Coastal area. Among smear-negative pulmonary TB and/or extra- pulmonary TB cases, an overall number of the cases increased from 1032 in 2007 to 1349 in 2009 and the HIV sero-prevalence continuously declined from 18.5% in both 2003 and 2005 and 12.6% in 2007 to 9.1% in 2009.

The risk factors on HIV sero-prevalence were analyzed by logistic regression model (Table 5). The factors which were significantly associated to the HIV sero-prevalence were; Phnom Penh, all age groups except 45 to 54, Non-Cambodian and Smear negative pulmonary TB and/or Extra-pulmonary TB.

IV. DISCUSSION

This is the fourth national HIV sero-prevalence survey amongst TB patients in Cambodia. The HIV sero-prevalence 11.8% in 2003 was much higher than previous report by NCHADS. Thereafter, our second and third survey showed the continuous decline of HIV sero-prevalence among TB patients. We still found the decline of the prevalence in this latest survey conducted in 2009. This may reflect decline of HIV epidemic in Cambodia (HIV prevalence 0.9% in 2006; NCAHDS).

From the first two surveys, we found that HIV sero-prevalence declined from 11.4% in 2003 to 5.2% in 2005 only among smear-positive pulmonary TB with/without extra-pulmonary TB cases. However, we found following decline of HIV prevalence among smear-negative pulmonary TB and/or extra-pulmonary TB cases in 2007. In 2009, HIV prevalence both among smear-positive pulmonary TB with/without extra-pulmonary TB cases and among smear-negative pulmonary TB and/or extra-pulmonary TB cases continue to declined. These also reflect the continuous decline of HIV epidemic in Cambodia due to the expansion of AIDS services such as VCCT services and OI/ART services.

Another considerable reason that contributes the decline of HIV sero-prevalence among TB patients is that expanded TB/HIV activities. In 2003, TB/HIV collaborative activity had been implemented only in 4 pilot areas but by the end of 2008, 68 of all 77 Operational Health Districts have been trained and have ntensified TB/HIV collaborative activities in 22 provinces (except Kep and Preah Vihear Province) <CENAT, Annual TB Report 2008>. NTP started distributing the new TB register book with the columns for TB/HIV data from 2006. Since then, more TB staff working at the health facility under NTP becomes interested in TB/HIV activities and they engaged in the TB/HIV activities to improve the situation. Nowadays, more PLHA can be screened TB and more TB patients can reach VCCT services to know their HIV status, and if the patients are found that they are co-infected, they can be referred to both HIV and TB services.

The former two TB/HIV surveillances revealed the some HIV spots in the country; Phnom Penh, Thai border provinces and Coastal provinces. HIV sero-prevalence is still high in these areas, but the HIV sero-prevalence declined in Phnom Penh, Thai border area and Coastal area. However, it is still high in Coastal provinces especially in Sianoukville and Koh Kong.

And the HIV prevalence among female is higher than it's of male among almost all age groups. Non-Cambodian and Smear negative pulmonary TB and/or Extra-pulmonary TB are still remained to be high risk groups. We need to implement some more activities that can focus on these groups.

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Table 1. Characteristics of the Cambodia TB/HIV surveillance 2009 participants and HIV prevalence

	Total		HIV-positive	%HIV	OR#	p-value
All TB cases	2805		176	6.3%		
Sex						
Male	1404	(50.5%)	91	6.5%	reference	
Female	1378	(49.5%)	80	5.9%	0.89	0.459
Age Group						
0-14	234	(8.3%)	4	1.7%	3.65	0.12
15-24	264	(9.4%)	5	1.9%	4.03	0.83
25-34	436	(15.6%)	66	15.3%	37.43	<0.01
35-44	472	(16.8%)	67	14.3%	34.59	<0.01
45-54	511	(18.2%)	24	4.8%	10.33	<0.01
55-64	468	(16.7%)	8	1.7%	3.65	0.07
>=65	418	(14.9%)	2	0.5%	reference	
Nationality						
Cambodian	2769	(99.3%)	167	6.1%	reference	
non Cambodian	19	(0.7%)	7	36.8%	9.00	<0.01
Treatment Category						
New	2629	(94.7%)	162	6.2%	reference	
Relapse	55	(2.0%)	7	12.7%	2.12	0.06
Other re-treatment	9	(0.3 %)	1	11.1%	1.88	0.44
Others	83	(3.0%)	5	6.0%	1.03	0.94
TB Site						
Sm(+)PTB* only	1441	(52.1%)	53	3.7%	reference	
Sm(+)PTB +EPTB†	2	(0.1%)	0	0%	-	-
Sm(-)PTB‡ only	582	(21.0%)	49	8.5%	2.39	<0.01
EPTB only	739	(26.7%)	73	9.9%	2.85	<0.01
Sm(-)PTB +EPTB	3	(0.1%)	0	0%	-	

Table 2. Comparison of HIV sero-prevalence by sex in each age group of the

OR: Odds ratio
* Sm(+)PTB: Smear-positive Pulmonary TB
† EPTB: Extra Pulmonary TB
‡ Sm(-)PTB: Smear-negative Pulmonary TB

Cambodia TB/HIV surveillance 2009 participants

Age group	Total	Male	Female	Male No(%)HIV	Female No(%)HIV	OR*	p-value
0-14	230	118	112	2(1.7)	2(1.8)	0.95	1.00
15-24	260	131	129	2(1.5)	3(2.3)	0.65	0.68
25-34	427	204	223	28(13.7)	36(16.1)	0.83	0.48
35-44	463	254	209	35(13.8)	30(14.4)	0.95	0.86
45-54	499	256	243	18(7.0)	5(2.1)	3.60	<0.01
55-64	459	203	256	5(2.5)	3(1.2)	2.13	0.31
>=65	415	223	192	1(0.4)	1(0.5)	0.86	1.000

* Odds ration of HIV-positive in male compared to female

Table 3. HIV Prevalence of All TB Patients by Provinces in the Cambodia TB/HIV Surveillance 2003, 2005, 2007 and 2009

	2003		2005		2007		2009	
Province	**Total**	**HIV-positive** No(%)	**Total**	**HIV-positive** No(%)	**Total**	**HIV-positive** No(%)	**Total**	**HIV-positive** No(%)
Total	2244	265(11.8)	2632	261(9.9)	2572	200(7.8)	2805	176(6.3)
Phnom Penh	**289**	**99(34.3)**	**235**	**61(26.0)**	**212**	**46(21.7)**	**245**	**35(14.3)**
Thai Border Provinces	**445**	**57(12.8)**	**568**	**85(15.0)**	**537**	**70(13.0)**	**565**	**46(8.1)**
Oudor Meanchey	31	4(12.9)	23	0(0)	14	1(7.1)	38	2(5.3)
B. Meanchey	86	10(11.6)	175	32(18.3)	155	26(16.8)	131	14(10.7)
Siem Reap	216	27(12.5)	184	12(6.5)	235	19(8.1)	248	12(4.8)
Batam Bang	106	14(13.2)	172	39(22.7)	122	24(19.7)	127	16(12.6)
Pailin	6	2(33.3)	14	2(14.3)	11	0(0)	21	2(9.5)
Coastal Provinces	**134**	**22(16.4)**	**154**	**21(13.6)**	**148**	**21(14.2)**	**191**	**16(8.4)**
Kampot	77	6(7.8)	108	11(10.2)	95	3(3.2)	141	4(2.8)
Krong Kep	4	1(25.0)	7	0(0)	4	0(0)	9	0(0)
Sihanouk Ville	33	11(33.3)	24	7(29.2)	28	11(39.3)	24	7(39.2)
Koh Kong	20	4(20.0)	15	3(20.0)	21	7(33.3)	17	5(29.4)
North East Provinces	**58**	**3(5.2)**	**68**	**3(4.4)**	**51**	**3(5.9)**	**51**	**0(0)**
Stung Treng	15	1(6.7)	15	1(6.7)	17	3(17.6)	17	0(0)
Preah Vihear	27	1(3.7)	36	0(0)	24	0(0)	25	0(0)
Mondul Kiri	6	0(0)	4	1(25.0)	6	0(0)	2	0(0)
Rattanakiri	10	1(10.0)	13	1(7.7)	4	0(0)	7	0(0)
Others	**1318**	**84(6.4)**	**1607**	**67(4.2)**	**1624**	**60(3.7)**	**1725**	**79(4.6)**
Kandal	154	15(9.7)	225	13(5.8)	203	12(6.4)	241	16(6.6)
Svay Rieng	164	6(3.7)	180	5(2.8)	152	2(1.3)	209	4(1.9)
Pursat	72	4(5.6)	61	5(8.2)	99	2(2.0)	72	0(0)
Kg.Thom	115	2(1.7)	137	3(2.2)	121	6(5.0)	135	12(8.9)
Takeo	137	9(6.6)	216	26(12.0)	138	9(6.5)	187	13(7.0)
Kg. Speu	105	4(3.8)	112	3(2.7)	147	2(1.4)	118	5(4.2)
Prey Veng	211	22(10.4)	244	5(2.0)	218	9(4.1)	360	12(3.3)
Kg. Chunang	109	6(5.5)	93	6(6.5)	186	6(3.2)	101	2(2.0)
Kratie	46	5(10.9)	46	3(6.5)	29	1(3.4)	40	1(2.5)
Kg. Cham	205	11(5.4)	293	22(7.5)	331	10(3.0)	262	14(5.3)

Table 4. Comparison of HIV prevalence of New Smear-Positive Pulmonary TB cases between the Cambodia TB/HIV surveillance 2003, 2005, 2007 and 2009

	2003		2005		2007		2009	
	Total	(%)HIV	Total	(%)HIV	Total	(%)HIV	Total	(%)HIV
All New TB	2149	10.1	2533	9.7	2410*	7.8	2602	6.2
Area								
Phnom Penh	280	31.4	226	26.5	196	19.9	223	12.6
Thai Border Provinces	427	9.8	545	14.7	514	13.2	535	7.9
Coastal Provinces	127	12.6	152	13.2	138	13.0	180	8.4
North East Provinces	102	6.9	112	4.5	50	6.0	48	0
Others	1213	5.4	1498	5.4	1512	3.9	1616	4.8
All Sm(+)PTB +/- EPTB	1559	11.4	1674	5.2	1354	3.9	1425	3.7
Area								
Phnom Penh	131	22.7	97	19.6	85	15.3	109	12.8
Thai Border Provinces	323	8.7	347	8.1	251	5.2	270	3.7
Coastal Provinces	98	11.2	105	9.5	92	5.4	123	5.7
North East Provinces	63	7.9	80	3.8	29	0	40	0
Others	933	5.5	1045	2.6	897	2.5	883	2.5
All Sm(-)PTB and/or EPTB	590	18.5	859	18.5	1032	12.6	1349	9.1
Area								
Phnom Penh	139	41.7	129	31.8	110	22.7	135	15.6
Thai Border Provinces	104	19.2	198	26.3	256	20.7	294	12.2
Coastal Provinces	29	17.2	47	21.3	46	28.3	68	13.2
North East Provinces	39	10.3	32	6.3	21	14.3	11	0
Others	279	7.9	453	11.9	599	6.0	841	6.8

*Site of TB or Smear result was not mentioned for 24 cases in 2007

Note: 1. New smear-positive pulmonary TB cases include those who having only smear-positive pulmonary TB and those who have both smea-positive pulmonary TB and extra-pulmonary TB: 2. Thai Border Provinces include Oudor Meanchey, B. Meanchey, Siem Reap, Battam Bang, and Pailin provinces: 3. Coastal Provinces include Kampot, Krong Kep, Sihanouk Ville, and Koh Kong provinces: 4. North East Provinces include Pheah Vihear, Stung Treng, Kratie, Mondul Kiri, and Rattanakiri provinces:5. Others include Kandal, Svay Rieng, Pursat, Kg Thom, Takeo, Kg Speu, Prey Veng, Kg Chnnang, and Kg Cham.

Table 5. Logistic Regression Analysis of risk factors on HIV prevalence in Cambodia, 2009 July

Factor	AOR	95%C.I	p-value
Area			
Others + North East provinces	reference		
Thai border provinces	1.63	(1.08-2.47)	0.13
Costal provinces	2.32	(1.27-4.23)	0.16
Phnom Penh	2.55	(1.61-4.03)	<0.01
Age group			
0-14	2.72	(0.49-15.10)	<0.01
15-24	3.04	(0.55-16.85)	<0.01
25-34	35.88	(8.65-148.78)	<0.01
35-44	32.19	(7.79-133.09)	<0.01
45-54	10.46	(2.44-44.86)	0.11
55-64	3.56	(0.75-16.93)	<0.01
>=65	reference		
Sex			
Male	reference		
Female	0.88	(0.63-1.23)	0.36
Nationality			
Cambodian	reference		
Non- Cambodian	6.75	(2.10-21.64)	<0.01
Category			
New	reference		
Not-new	1.92	(0.99-3.75)	0.25
TB-site			
Smear+ PTB +/- EPTB	reference		
Smear- PTB and/or EPTB	2.94	(2060-4.20)	<0.01

‡ PTB: pulmonary TB

EPTB: extra-pulmonary TB

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