The 1st National TB Prevalence Survey
Lao PDR
2010-2011

April 2012

National Tuberculosis Centre
Department of Hygiene & Prevention
Ministry of Health
Lao PDR
Prevalence Survey Primary Objective

“To determine the **prevalence** of bacteriologically confirmed pulmonary TB (culture positive) in Lao PDR during 2010-2011”

Or

How many people in Lao PDR have pulmonary TB disease during 2010-2011?
**TB prevalence surveys: Why do it? (1)**

- **To obtain a direct measurement of the burden of TB in Lao PDR**
  - Especially in places where disease surveillance is uncertain

- **To measure trends in the burden of TB with future repeat surveys:**
  - Is the burden increasing, decreasing or the same?
  - Are the activities aimed to decrease TB burden working?
TB prevalence surveys: Why do it? (2)

- To obtain additional information
  - Who is getting TB?
  - Who is not accessing TB services
  - Who is not entering the notification system?
  - Use such information to create strategies to increase TB detection

- To allow for in-depth analysis of survey data and programmatic data to update estimates of TB burden in the country
TB in the region: Prevalence per 100,000
(All ages – All TB - WHO Global Tuberculosis Report 2010)

- China: 108
- Vietnam: 334
- Myanmar: 525
- Laos PDR: "Estimated" prevalence: 130 per 100,000
- Thailand: 182
- Cambodia: 660
- New TB cases: 4136
- 5 USA
- 8 Australia
- 12 France
## TB Prevalence Survey - Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>Global Fund (R2) initial support approved</td>
</tr>
<tr>
<td>November 2008</td>
<td>Proposal &amp; Manual developed by WHO TAs</td>
</tr>
<tr>
<td>November 2009</td>
<td>TB reference laboratory completed</td>
</tr>
<tr>
<td>November 2009</td>
<td>Pilot survey undertaken in Vientiane Capital</td>
</tr>
<tr>
<td>May 2010</td>
<td>Laboratories accredited by KIT</td>
</tr>
<tr>
<td>August 2010</td>
<td>Field operation began</td>
</tr>
<tr>
<td>December 2011</td>
<td>Field operation completed</td>
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</tbody>
</table>
Methodology: Screening algorithm

*Assessing tuberculosis prevalence through population based survey, WHO 2011 (LIME BOOK)
Study Case Definitions (Revised)

● **Screening Positive** (Eligible for Sputum Examination):

Participants who reported

Cough for 2 weeks or more

and/or

Blood in sputum

and/or

Showed any lung abnormality suggestive of TB
By Chest X-ray in the field

● **Culture Positive TB** (Bacteriologically confirmed TB): among Screening Positive, those who have at least one colony of *Mycobacterium tuberculosis* by culture.

● **Smear Positive TB**: among culture positive TB, those who have at least one AFB/100 fields by ZN smear microscopy
Methodology: outline

1. Find people to participate in survey

2. Screen people with a questionnaire and a chest x-ray

3. Collect sputum specimens from those with symptoms and/or signs suggestive of TB

4. Test the sputum specimens in the laboratory

5. Analyze the data and determine the prevalence of TB
Selection of participants

50 clusters × 800 people = 40,000 Target

Inclusion criteria
Age: ≥15 years
AND
Living in the household for 2 weeks prior to the survey
Cluster selection (N=50)

- Clusters were *randomised* and selected based upon the *population size* of the district (National Statistics 2005 census). Villages were then randomly selected within the district.

- Clusters were made up of 1-4 villages.
- All provinces had at least 1 cluster.
- Total 96 villages in 50 clusters.

4 laboratories:
- Vientiane (Central - Reference)
- Luangnamtha (North)
- Savannakhet (South)
- *Christophe Merieux Centre* (ID)
Field operations

- **3 teams**
  - 2 active, 1 on stand-by
- **10 days in the field per cluster**
- **2 clusters undertaken consecutively**
1. Census collection
2. Interview
3. Chest X-Ray
3. Specimen collection

Field Activities
Health officials search for TB patients

Xayana Louka

The Tuberculosis (TB) Centre is conducting a survey to determine what percentage of the population is infected by TB in Laos, with the aim of providing fast and effective treatment in the future.

Deputy Director of the Tuberculosis Centre in Vientiane, Di Saveng Sayxayphual said that this was the first time the centre’s medical team had gone to look for infected people in local communities.

"In the past we would wait for people to come to us, but now we go to them in the hope that we can provide more effective treatment," she said.

The World Health Organisation (WHO) estimates that the new annual TB infection rate in Laos is 63 people per 100,000. However, the Ministry of Health sets the figure at 55 in every 100,000.

Figures from a new up to date survey will reveal the exact numbers and help medical staff fight the disease in the years to come.

At present, health officials from the centre are working with medical staff in Hadsafhong district from there they will travel to the districts of Chanthabody and Xaysetha on August 26 to continue their work.

The programme was started on August 8 and is expected to conclude in about 8 to 12 months. Di Saveng said that medical staff will stop at 50 stages around the country, assisting 40,000 people aged over 15.

During their visits to communities, the staff will provide on the spot radiology checks and take sputum samples that will be tested in the laboratory in Vientiane.

In addition to providing free diagnosis, treatment and transportation, each patient also receives 50,000 kip per month while undergoing treatment.

The programme to control TB in Laos is supported by the government, WHO, Damien Foundation and the Global Fund to Fight AIDS, Tuberculosis and Malaria.

Last year in Laos, about 31,293 people suspected of having TB were examined and there were almost 3,930 confirmed cases across all forms of TB.

There were about 3,034 new TB cases diagnosed from sputum tests, placing the total number of infected at 78 percent—outstripping the WHO’s goal of 70 percent. Nevertheless, the success rate of TB treatment in Laos in 2008 was 93 percent, which surpassed the WHO’s objective of 85 percent.

In the seven countries that comprise the Asia-Pacific Region it is estimated that about 3.5 million people are infected with TB each year. There are about 1.9 million new cases of TB and 300,000 or 40 out of every 100,000 people are killed by the disease annually.

According to a WHO report, the world population is now about 6.8 billion people. Two billion people are infected with TB, with an average of 9 million people developing the disease annually.

TB causes about 3 million deaths per year, with the average age of victims set between 15 and 34, when people are at their most productive.
### Summary of Results

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered people</td>
<td>72,519</td>
<td>14,800 households</td>
</tr>
<tr>
<td>Eligible people</td>
<td>46,079</td>
<td>63.5%</td>
</tr>
<tr>
<td>Participants</td>
<td>39,212</td>
<td>85.1%</td>
</tr>
<tr>
<td>Suggestive of TB</td>
<td>6,346</td>
<td>16.2%</td>
</tr>
<tr>
<td>People who submitted specimens</td>
<td>6,299</td>
<td>99.3%</td>
</tr>
<tr>
<td>Smear positive (Any)</td>
<td>186</td>
<td>3.0%</td>
</tr>
<tr>
<td>Culture positive (MTB)</td>
<td>226</td>
<td>3.6%</td>
</tr>
</tbody>
</table>
Average participation rate: 85.1%
### Screening and Laboratory results

**SCREENING RESULTS**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>CXR</th>
<th>N</th>
<th>Sputum tested</th>
<th>S+ MTB</th>
<th>%</th>
<th>S- MTB</th>
<th>%</th>
<th>All MTB</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Negative</td>
<td>1926</td>
<td>1885</td>
<td>3</td>
<td>0.16</td>
<td>4</td>
<td>0.21</td>
<td>7</td>
<td>0.37</td>
</tr>
<tr>
<td>Positive</td>
<td>Positive</td>
<td>1212</td>
<td>1212</td>
<td>120</td>
<td>4.80</td>
<td>44</td>
<td>3.35</td>
<td>107</td>
<td>8.16</td>
</tr>
<tr>
<td>Negative</td>
<td>Positive</td>
<td>32715</td>
<td>32715</td>
<td>32</td>
<td>0.91</td>
<td>84</td>
<td>2.62</td>
<td>112</td>
<td>3.63</td>
</tr>
<tr>
<td>Positive</td>
<td>NA</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Negative</td>
<td>Negative</td>
<td>32715</td>
<td>10</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>NA</td>
<td>Positive</td>
<td>8</td>
<td>8</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>39061</td>
<td>6299</td>
<td>94</td>
<td>1.49</td>
<td>132</td>
<td>2.10</td>
<td>226</td>
<td>3.59</td>
</tr>
</tbody>
</table>

- Most TB cases detected by CXR and not just by symptom screening
- Most TB cases are smear negative
Age & Sex distribution of Smear Positive cases

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td></td>
</tr>
<tr>
<td>25-34</td>
<td></td>
</tr>
<tr>
<td>35-44</td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td></td>
</tr>
<tr>
<td>55-64</td>
<td></td>
</tr>
<tr>
<td>65-74</td>
<td></td>
</tr>
<tr>
<td>75+</td>
<td></td>
</tr>
</tbody>
</table>

- **MALE**
- **FEMALE**
Age & Sex distribution of Culture Positive cases

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>MALE</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>65-74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75+</td>
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Limitation of the current diagnostic strategy: culture confirmed cases (N=226)

- Smear + TB: Symptomatic 30%
- Smear - MTB: Symptomatic 36%
- Smear + Non-TB: Symptomatic 13%
- Smear - Non-TB: Symptomatic 21%

- Only 51% have TB symptoms
- Only 30% of Culture + cases are smear positive & symptomatic!
- 43% are smear + MTB
- 57% are Smear - MTB
- 49% cases detected by CXR only
Provisional Results of TB Prevalence: Age ≥15 years*

1) Smear + Culture + MTB:

243 per 100,000 (95%CI 169-317)

2) Bacteriologically Confirmed MTB:

i.e. Smear+ Culture+ AND Smear- Culture+

580 per 100,000 (95%CI 436 – 725)

*Cluster level analysis, no imputation, adjusted for participation
## Prevalence of culture confirmed cases

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Smear Positive MTB cases</th>
<th>Bacteriologically Positive MTB cases</th>
<th>Added benefit of Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>25-34</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>75+</td>
<td></td>
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</tbody>
</table>

**Crude Prevalence (per 100,000):**

- Smear Positive MTB cases
- Bacteriologically Positive MTB cases
- Added benefit of Culture
Prevalence of culture confirmed smear positive TB: Male/Female = 2.85
Notification compared to prevalence in 2011: Smear + Male: N/P = 104/372 = 0.28
Notification compared to Prevalence in 2011: Smear + Female: N/P= 63/130=0.48

- Female Prevalence
- Female Notification

<table>
<thead>
<tr>
<th>Age Group (Years)</th>
<th>Prevalence (per 100,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td>0.27</td>
</tr>
<tr>
<td>25-34</td>
<td>0.55</td>
</tr>
<tr>
<td>35-44</td>
<td>0.66</td>
</tr>
<tr>
<td>45-54</td>
<td>0.55</td>
</tr>
<tr>
<td>55-64</td>
<td>1.00</td>
</tr>
<tr>
<td>65-74</td>
<td>0.46</td>
</tr>
</tbody>
</table>
## Results of recent TB surveys in Asia

<table>
<thead>
<tr>
<th>* Provisional</th>
<th>Age group</th>
<th>Smear Positive</th>
<th>Bact. Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>China 2010</td>
<td>≥15yrs</td>
<td>66 (53-79)</td>
<td>119 (103-135)</td>
</tr>
<tr>
<td>Viet Nam 2007</td>
<td>≥15yrs</td>
<td>197 (149-254)</td>
<td>307 (248-367)*</td>
</tr>
<tr>
<td>*1 culture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myanmar 2009</td>
<td>≥15yrs</td>
<td>242 (186-315)</td>
<td>613 (502-748)</td>
</tr>
<tr>
<td>Lao 2010/11*</td>
<td>≥15yrs</td>
<td>243 (169-317)</td>
<td>580 (436-725)</td>
</tr>
<tr>
<td>Cambodia 2011*</td>
<td>≥15yrs</td>
<td>251 (194-354)</td>
<td>829 (704–975)</td>
</tr>
<tr>
<td>Philippines 2007</td>
<td>≥10yrs</td>
<td>260 (170-360)</td>
<td>660 (510-880)</td>
</tr>
</tbody>
</table>
Discussion & Implications
1. National Survey has been completed successfully

- Participation rate of 85% (achieved target)
- High quality CXR images taken
- High sputum collection rate
- Culture performed by 3 laboratories
  - Contamination rates: 3-5% (ideal range)
- Quality data management and monitoring (can be a model)
- Other indirect benefits:
  - Improved human resource capacity at NTP, provincial and district level
  - Improved laboratory capacity
  - Improved community awareness
  - Improved advocacy: donors & MoH
2. Higher prevalence than it was estimated

- However it is consistent with recent survey results in other ASEAN countries.

- Case detection efforts are not enough.

- Large cluster variations:
  - 7 clusters with 0 cases detected
  - 5 clusters with >10 cases detected

- Survey was not designed to determine prevalence at the provincial level, only a national estimate.
3. Ten times higher prevalence in older age group than young adults

- Has the situation improved?
  - Programme impact
  - Impact of other factors (better life, better nutrition….)

- Probably due to:
  - higher incidence
  - lower case detection
  - longer duration illness
  - chronic nature of the disease

- Risk to infection to grandchildren!

- What is the role of Re-activation of old TB/infection?
4. Gender imbalance

- Prevalence in men is higher than in women
- Case detection is lower in men than in women
- However, this is similar to other countries
- Issues to be explored:
  - Health seeking behaviour
  - Access to health services
  - Biological differences
  - Different social & working environments
Conclusion

- The survey was done **successfully**, providing essential information to the program.

- TB burden (≥15 years) in Lao is **very high** but similar to those in other ASEAN countries.

- Most symptomatic smear positive cases in community are **not** detected by routine program.

- NTP's top priority should be given to **case detection** especially **high risk groups**.

- Contact tracing and screening should be prioritised esp. in children.

**Revise the TB national strategy to increase case detection and place it into action!**