TB Disease Prevalence Survey

Lessons, Challenges and Implications to active case detection

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Data shown in this presentations are still preliminary

This presentation shows unofficial results of preliminary analysis of TB prevalence surveys in Asia with published papers and official and unofficial country reports/ or draft reports.

This presentation includes some data that country will publish near future.

Further analysis with country databases has been planned. Report/Paper will be published (target early 2012), following official releases of the survey data of Myanmar 2009/10, China 2010 and Cambodia 2011.
BREAKING NEWS  3 OCT 2010

Ethiopia Launched National TB Prevalence Survey

The first comprehensive national survey with culture and CXR in Africa since 1960s
Global progress, prevalence surveys

21 Global Focus countries identified by Task Force

Asia
Africa
Non Global Focus country

Cambodia
Philippines
Thailand
Eritrea
Indonesia
Malaysia
Bangladesh
Myanmar
Cambodia
Ghana
Kenya
Viet Nam
Viet Nam
China
Nigeria
Malawi
Indonesia
Pakistan
Tanzania
S. Africa
Lao PDR
Ethiopia
Rwanda
Zambia
Mozambique
Nepal

Number of surveys


Asia
Africa
Non Global Focus country
TB Prevalence survey

• To know TB burden in a country
• To measure the change/impact

(new)
• To know limitation of the current programme to improve the programme/ to revise the strategy
TB Prevalence Survey

• One time active case detection
• Attempt to detect Bacteriologically confirmed pulmonary TB as much as possible to measure TB prevalence with certain limitations
A carefully designed survey can tell you lots more than TB prevalence

- Changes in TB burden and re-estimation of burden
- Performance of strategies for screening of TB suspects
- Health-seeking behaviour of TB patients and individuals reporting chest symptoms
- Where and why are cases missed by the NTP e.g. access to care, role of private sector
- Risk factors
Today, national TB surveys are on-going in Cambodia, Ethiopia, Laos and Pakistan.
Can we really detect TB cases enough to control TB by current case detection strategies?
Recent National Surveys with CXR screening and culture with Notification Data by routine surveillance

<table>
<thead>
<tr>
<th>/100,000</th>
<th>Notification rate</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>S+ New</td>
</tr>
<tr>
<td>Cambodia 2002</td>
<td>125</td>
<td>178</td>
</tr>
<tr>
<td>Philippines 2007</td>
<td>98</td>
<td>160</td>
</tr>
<tr>
<td>Viet Nam 2007</td>
<td>62</td>
<td>111</td>
</tr>
<tr>
<td>Myanmar 2009</td>
<td>83</td>
<td>257</td>
</tr>
</tbody>
</table>

Conservative point estimates assuming that there is no bacteriologically+ case in children.
High Prevalence and Gap between prevalence and Notification

National TB Prevalence Survey 2009/10 Myanmar - Preliminary Result
Notification and Prevalence
S+ with Chronic Cough, 2009
Past surveys showed high proportion of known cases among prevalent cases. However now most prevalent cases are unknown undetected cases

Impact of DOTS=quality treatment to decrease chronic cases in community
TB history of Prevalent Cases
96% of C+ (295/306) are undetected cases

• 118 S+C+
  110 Not on treatment (91.5%)
  – 89 New Cases (75.4%)
  – 21 Previously Treated
  – 7 First Treatment
  – 1 Retreatment

• 188 S-C+
  185 Not on treatment (98%)
  – 167 New (88.8%)
  – 18 Previously treated

  3 On treatment
  – 2 on 1st treatment
  – 1 on retreatment

• 5 S+C-
  – 2 New
  – 1 Previously treated

  2 On Tx
  – 1 On 1st treatment
  – 1 On Retreatment

Myanmar 2009/10 National Survey
Preliminary Result
Most prevalent cases are undetected

New: never detected before survey

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Smear Positive</th>
<th>Bac Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>2002</td>
<td>85%</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(New 77%)</td>
<td>(New 83%)</td>
</tr>
<tr>
<td>Philippine</td>
<td>2007</td>
<td>96.5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(New 89%)</td>
<td>(New 72%)</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>2007</td>
<td>91.5%</td>
<td>96%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(New 75.4%)</td>
<td>(New 84%)</td>
</tr>
<tr>
<td>Myanmar</td>
<td>2009</td>
<td>96%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(New 75.4%)</td>
<td>(New 84%)</td>
</tr>
</tbody>
</table>
Smear examination can detect only 60% of culture positive cases in clinical setting and less than 50% of those in community.
Proportion of smear + in bacteriologically confirmed cases, 34 countries/areas

- Median: 59.1%
- Min: 41.7%
- Max: 83.8%
- Average: 60.8%

(source: WHO Impact Measurement Task Force)
60% of culture confirmed cases are smear negative = unable to detect by LED FL microscopy

Myanmar National Survey: Preliminary Analysis (NTP Dec 2010)
The proportion of S (+) cases in survey
Smear microscopy alone misses >50% of bacteriologically-confirmed TB

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia$</td>
<td>2002</td>
<td>30%</td>
</tr>
<tr>
<td>Philippines*</td>
<td>2007</td>
<td>41%</td>
</tr>
<tr>
<td>Korea**</td>
<td>1995</td>
<td>41%</td>
</tr>
<tr>
<td>Zambia+</td>
<td>2005</td>
<td>28%</td>
</tr>
</tbody>
</table>

*NTP Philippines. Presented in UNION APR Conference, Beijing, Sept 2009
** Hong YP et al. Int J Tubercu Lung Dist 1998
+sub-national surveys: smear examination is done only for culture positive cases. H Ayles et al. Plos one May 2009. e 5602
Most survey cases were detected by CXR screening rather than symptom.

However there are still many symptomatic prevalent cases in community.
Strategies for screening TB suspects

40-60% of confirmed cases in surveys do not have chronic cough

<table>
<thead>
<tr>
<th></th>
<th>No Chronic Cough</th>
<th></th>
<th>No symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S+</td>
<td>Bac +</td>
<td>Bac +</td>
</tr>
<tr>
<td>Cambodia</td>
<td>38%</td>
<td>61%</td>
<td>15%</td>
</tr>
<tr>
<td>Zambia</td>
<td></td>
<td>57%</td>
<td>10%</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>40%</td>
<td>45%</td>
<td>25%</td>
</tr>
</tbody>
</table>

### Proportion of "asymptomatic" cases

National TB surveys in China

<table>
<thead>
<tr>
<th></th>
<th>2010 survey</th>
<th>2000 survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smear Positive</td>
<td>26.3%</td>
<td>6.7%</td>
</tr>
<tr>
<td>All Pulmonary</td>
<td>43.0%</td>
<td>14.2%</td>
</tr>
</tbody>
</table>

(Preliminary Results: Dr S Jiang CDC/NTP China)
<table>
<thead>
<tr>
<th></th>
<th>Among Participants</th>
<th>Proportion in SS+ subjects</th>
<th>Proportion in Bac + subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic cough (2w)</td>
<td>4%</td>
<td>41%</td>
<td>25%</td>
</tr>
<tr>
<td>Cough any duration</td>
<td>24%</td>
<td>72%</td>
<td>51%</td>
</tr>
<tr>
<td>Any symptom</td>
<td>37%</td>
<td>79%</td>
<td>62%</td>
</tr>
<tr>
<td>CXR TB susp</td>
<td>5%</td>
<td>79%</td>
<td>73%</td>
</tr>
<tr>
<td>CXR any abnormality in lung</td>
<td>12%</td>
<td>95%</td>
<td>92%</td>
</tr>
</tbody>
</table>
Can we control TB only to target bacteriologically positive TB?

Active case detection can detect not only bacteriologically positive cases.

High prevalence of Bacteriologically negative CXR TB suggestive and Healed TB calls clear guidance.
### CXR abnormality among survey participants

<table>
<thead>
<tr>
<th>CXR</th>
<th>Philippines 2007</th>
<th>Cambodia 2002 (C- only)</th>
<th>Myanmar 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB disease suggestive</td>
<td>6.4%</td>
<td>1.5%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Inactive/Healed TB</td>
<td>2.5%</td>
<td>8.1%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Non-TB pulmonary</td>
<td>0.6%</td>
<td>1.4%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Extra Pulmonary</td>
<td>1.8%</td>
<td>0.2%</td>
<td>0.9%</td>
</tr>
</tbody>
</table>
Two years Follow up of C-Participants – Cambodia
Most cases are from those with CXR shadow

<table>
<thead>
<tr>
<th>National Prevalence Survey 2002</th>
<th>Logbook check (= A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-ray group</td>
<td>population</td>
</tr>
<tr>
<td>Active TB</td>
<td>309</td>
</tr>
<tr>
<td>Inactive TB</td>
<td>1,173</td>
</tr>
<tr>
<td>(Normal)</td>
<td>20,407</td>
</tr>
<tr>
<td>Total</td>
<td>21,889</td>
</tr>
</tbody>
</table>

To be published (NTP Cambodia, RIT)
ACD after two years of the first intervention

<table>
<thead>
<tr>
<th>National Prevalence Survey in 2002</th>
<th>Nonparticipants in medical re-checkup</th>
<th>Results of medical re-checkup</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>died (TB death)</td>
<td>move /busy</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>S(+)-TB</td>
<td>81</td>
<td>12 (10)</td>
</tr>
<tr>
<td>S(-)-C(+)-TB</td>
<td>190</td>
<td>13 (7)</td>
</tr>
<tr>
<td>Active TB</td>
<td>309</td>
<td>10 (2)</td>
</tr>
<tr>
<td>Inactive TB</td>
<td>1,173</td>
<td>37 (2)</td>
</tr>
<tr>
<td>Total</td>
<td>1,753</td>
<td>72 (21)</td>
</tr>
</tbody>
</table>

Very high prevalence rates of S(-)C(+)
Some lessons and challenges
Capacity

- Survey team often carries out 40/hour, 200-250/day with conventional CXR
- 300+ CXR is feasible with digital equipment
- Most limiting factor is the capacity of Lab rather than that of CXR
Lab results positive in ACD: All of them are TB disease? Creating Ethical Concern

- Possibility of false positive due to cross-contamination
- Possibility of detecting infection: Transitional positive results due to early transbronchial dissemination following infection (suggested by the previous study: Oka S., 1939)
- Other evidence such as CXR might be required if only one tube/specimen is positive with a few colonies.
Post processing – Digital only
Value additions

- Teleradiology
- CRRS (Chest/Computed Radiology Reading and Recording System/Services)
- Computer-Aided-Detection (CAD)
- Computed-Aided-Diagnosis (CADx)
- Temporal subtraction imaging
CXR: Digitalization may help
Challenges
Epidemiological impact

• One time intervention to clean up chronic cases and decrease the burden in community – studies in Japan in industries

• Intervention (such as IPT) on asymptomatic Culture negative subjects with TB suspected shadow

We need more studies and guidelines
Thank you!