MEASURING THE LEVEL OF UNDER-REPORTING AND ESTIMATING INCIDENCE FOR TUBERCULOSIS IN VIET NAM

Interim Report

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Missed TB cases

All TB Cases

All Diagnosed TB Cases

All Reported TB Cases
Objectives

- Estimate the level of under-reporting of pediatric and adult TB cases to the national TB surveillance system within Viet Nam.
  - Determine the level of under-reporting from paper registers to VITIMES within the NTP.
  - Determine the level of under-reporting from non-NTP partners to VITIMES.
  - Describe where under-reporting is occurring most in Viet Nam.
  - Determine what characteristics are associated with under-reporting in Viet Nam.
- Estimate TB incidence for children and adults in Viet Nam.
Overview

- Viet Nam has a mixed paper-based and electronic TB surveillance system that captures registered TB cases from NTP facilities.
- Among NTP providers, patient data are routinely collected on paper registers then entered to VITIMES system.
- Non-NTP providers are required by law to refer or report TB cases to the NTP through uniform referral and reporting forms, but the degree to which this happens is unknown.
Methods (Non-NTP data)

- **Prospective** longitudinal surveillance for diagnosed incident (i.e., new and relapse) TB cases were carried out from **October-December 2016** in **12 randomly selected provinces** across Viet Nam, Hanoi and **5 randomly selected districts** in Ho Chi Minh City.

- NTP data were collected **retrospectively** and from the **electronic, case-based national TB register** (VITIMES).
Data Preparation and Analysis

- Deduplication and linkage
  - LinkPlus 2.0
  - Manual verification of all potential matches
- Estimated under-reporting:
  - Survey adjusted ratio of Not_Notified/Detected
- Capture-Recapture Modeling
  - Poisson regression using three lists
    - NTP
    - Non-NTP Public
    - Private
Facility mapping and enrollment

Facilities mapped 2,628

Facilities contacted 2,610 (99.3%)

Facilities eligible 592 (22.7%)

Facilities enrolled 552 (93.2%)

Facilities with cases identified 261 (47.3%)

Not contacted 18

Not eligible 2,018

Not enrolled 40

No cases identified 291
Scenario 1: Total cases, adjusted for stratification and weighted

<table>
<thead>
<tr>
<th>Strata</th>
<th>Under-reporting (%)</th>
<th>Standard deviation (%)</th>
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</thead>
<tbody>
<tr>
<td>Very high</td>
<td>39.9</td>
<td>14</td>
</tr>
<tr>
<td>High</td>
<td>48.3</td>
<td>7.5</td>
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<tr>
<td>Medium</td>
<td>3.27</td>
<td>0.64</td>
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<tr>
<td>Low</td>
<td>12.7</td>
<td>6.3</td>
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<tr>
<td>HCMC+HN</td>
<td>15.3</td>
<td>0</td>
</tr>
<tr>
<td>Total country</td>
<td>30.9 (14 - 39)</td>
<td>7</td>
</tr>
</tbody>
</table>
Venn Diagram for B+ TB cases

- NTP (n=2,322)
- Public non-NTP (n=659)
- Private (n=44)

Counts:
- 1,964
- 336
- 321
- 20
- 0
- 22
**Scenario 2: B+ cases, adjusted for stratification and weighted**

<table>
<thead>
<tr>
<th>Strata</th>
<th>Under-reporting (%)</th>
<th>Standard deviation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high</td>
<td>7.4</td>
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<tr>
<td>High</td>
<td>18.8</td>
<td>12.3</td>
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<tr>
<td>Medium</td>
<td>4.8</td>
<td>2.4</td>
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<tr>
<td>Low</td>
<td>2.7</td>
<td>0.09</td>
</tr>
<tr>
<td>HCMC+HN</td>
<td>21.7</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total country</strong></td>
<td><strong>9.5 (5.6 – 14)</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>
Capture recapture

- Not interpretable on all cases due to high differential of under-reporting in non confirmed vs confirmed (leads to massive over-estimation of total incidence)

- Only considered in B+

- Poisson regression models, using 3 lists: NTP, Public non NTP, Private

- Model selection based on lowest AIC and stability

- Predict the number not in any list: undetected incidence B+
Capture recapture of B+

- Ratio of notified to incident B+
  \[= 51\% \, (47 - 55)\%\]

- Incidence B+ (2016, country-wide)
  \[= 117,000 \, (109,000 - 125,000)\]

- Total Incidence (WHO)
  \[= 126,000 \, (103,000 - 151,000)\]
Key findings

- High under-reporting of non B+ confirmed cases
- Low under-reporting of B+ confirmed cases
- Likely over-diagnosis of clinically diagnosed in private and/or public non NTP
- 10% under-reporting of B+ consistent with current incidence estimate, leads to reduced uncertainty
- Capture-recapture modelling will not be feasible to estimate incidence
Recommendations

- Complete prevalence survey and compare estimates between these sources
- Identify strategies to increase reporting in VITIMES and use of data
  - 100% transition of aggregate paper to case-based reporting
  - Automated cleaning, analysis, and reports, directly from VITIMES
  - Find mechanisms to ensure reporting from private sector
  - Encourage improved reporting from all TB facilities (supervision, workforce development)
- Develop/use unique identifier strategies to allow direct linkage between all TB forms and data systems
- Improve quality of clinical diagnoses, particularly in public non NTP and private sectors (training, validation through referral, …)
Acknowledgments

- **Vietnam NTP**: study team and TB staff at 14 study provinces
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THANK YOU VERY MUCH

For your attention!