Underreporting of childhood tuberculosis in Pakistan: Inventory Study

Presented by:
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Epidemiologist / Research Coordinator
Pakistan ranks 5th among the countries with highest burden of TB in the world.

The TB prevalence and incidence are respectively, 348 per 100,000 and 276 per 100,000.

No exact statistics for childhood TB under reporting for the country exist.

148 NTP childhood TB managing facilities in all over Pakistan

Private sector is huge and majority of private providers are unengaged and the extent of underreporting in children is unknown.
A recent inventory study that identified TB cases among all non-NTP sectors in 12 districts of Pakistan showed that 27% of cases identified were not reported to the NTP and 32% of all identified cases were diagnosed in the non-NTP sector.
Objective:

- To quantify the level of under reporting of diagnosed childhood TB cases to national surveillance systems
The study will be carried out in all non-NTP child TB managing facilities in 10 randomly selected districts allover the country.

**Inclusion criteria**

- Physicians delivering care to childhood TB patients in the non-NTP sectors in the selected districts who will be consented to participate in the study.

- The study will be preceded by mapping of all childhood TB managing health care providers in selected areas followed by data collection
Sources of Data

Non–NTP Childhood TB Managing Health Facilities
- Private hospitals
- Private teaching hospitals (private universities)
- Private clinics
- Private polyclinics
- NGOs
- Public hospitals
- University hospitals (governmental)
- Medical organizations (Social security, etc)
- Ministry of Interior (prisons)

Exclusion criteria
- Non–consented health workers.
Fig 1. FLOW CHART FOR EVALUATION OF A CHILD with SUSPECTED TB

SUSPECTED CHILD

Does child seriously ill?
If yes refer to tertiary center

Administer PPD

Positive: TST >10 mm

1. Do a CXR
2. AFB Smears – Sputum or Gastric
3. Apply PPA Scoring

Negative: TST <10 mm

*TB strongly suspected

AFB Sputum Smear Positive

Gastric, Aspirate Positive

Declare TB and Register

±TB not strongly suspected

CXR Sugg, PPA Score>7

Give antibiotics and evaluate after 7-10 days

CXR not Sugg, PPA Score <7

If no response refer to tertiary center

*Prolong unexplained illness such as cough, fever, weight loss, lymphadenopathy, abdominal mass, hepatosplenomegaly, failure to thrive etc. and Strong history of contact with a TB Case in Family
§ Absence of above
± Negative TST does not rule out TB. Evaluate further if strongly suspected
¥ Severe distress or disease, unconsciousness or comatose, co-morbid conditions, meningitis
<table>
<thead>
<tr>
<th>Features</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td>&lt;2 Yrs</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Close Contact in last 2 years</strong></td>
<td></td>
<td>With TB patient</td>
<td>With sputum +ve TB patient</td>
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<tr>
<td><strong>BCG scar</strong></td>
<td></td>
<td>Absent</td>
<td></td>
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<tr>
<td><strong>History of measles and whooping cough</strong></td>
<td></td>
<td>Between 3–6 months</td>
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<td></td>
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<tr>
<td><strong>Immunocompromised/Immunosuppressant</strong></td>
<td></td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>PCM grade 3</strong></td>
<td></td>
<td>Yes</td>
<td>Not improving</td>
<td></td>
<td></td>
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</tbody>
</table>

**Examination and Investigation**

<table>
<thead>
<tr>
<th>Physical examination</th>
<th>Suggestive</th>
<th></th>
<th>Strong sugg</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiological Findings</td>
<td>Non specific</td>
<td>suggestive</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Tuberculin skin test</td>
<td>5–10mm</td>
<td></td>
<td>&gt;10mm</td>
<td></td>
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<tr>
<td>Granuloma</td>
<td>Non specific</td>
<td></td>
<td>Specific for TB</td>
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</tbody>
</table>

**INTERPRETATION**

- <2 points TB unlikely
- 3-4 points Keep under observation for three months for possible TB
- 5-6 points TB probable investigations may justify therapy
- 7 or more points TB “confirmed”
- PCM grade 3: Protein Calorie Malnutrition grade 3 not improving after 4 weeks of “adequate” caloric intake
Sample size:

P = proportion of underreporting = .27
K = Co-efficient of variation between cluster = 0.4
M = Harmonic mean of cluster size = 13.73
DEFF = Design effect = 1.67

n = 481 Childhood TB cases
Stratified cluster random sampling are used to obtain a representative sample i.e. 10 districts, with strata defined by four equal-sized groups (quartiles) according to levels of smear positive notification rates.

The number of selected districts from each stratum is allocated proportionately based on its population size.

<table>
<thead>
<tr>
<th>low notification rate</th>
<th>Intermediate</th>
<th>High</th>
<th>Very high</th>
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<tbody>
<tr>
<td>&lt; 25% percentile</td>
<td>26–50% percentile</td>
<td>51–75% percentile</td>
<td>&gt; 75% percentile</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>6</td>
<td>1</td>
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<tr>
<td>3</td>
<td>7</td>
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10 districts will be selected based on random number
Study Flow diagram

1. Intense Mapping of Non-NTP Providers with distribution of modified registers to consenting providers
2. Data Collection from all health providers
3. Data entry, data cleaning, data quality Audit
4. Record Linkage with NTP data Base
5. Data analysis using log linear modeling (Capture–Recapture)
Monitoring

- PI
  - Epidemiologist
  - Coordinator
    - NPOs
    - Field Supervisors
      - Data collectors
  - Bio-statistician
    - DTCs
Record Linkage

- Four names will be used as a unique identifier when all four names were not recalled by the patient the National ID number will be recorded.

- The NTP register will examined two quarters before and one quarter after the study period to check and correct any misclassification of patients not diagnosed during the study period or referred late for notification.
Record linkage will be done by using the combination of first, father’s and family name as unique identifiers.

After data cleaning and validation by double data entry in EPI data, completeness of registration will be explored by adding records from all three sources and duplicates will be removed (Inventory Method).
# Work plan

**Project duration: 1 year**

<table>
<thead>
<tr>
<th>Activities</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Quarter</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Quarter</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; Quarter</th>
<th>4&lt;sup&gt;th&lt;/sup&gt; Quarter</th>
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</thead>
<tbody>
<tr>
<td>Tool development</td>
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<td>Mapping</td>
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<tr>
<td>Data collection</td>
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<tr>
<td>Data Entry</td>
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<tr>
<td>Data cleaning and Analysis</td>
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<tr>
<td>Report Writing</td>
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Principle Investigator:
Research Coordinator NTP

Implementing Agency:
National TB Control Program

Technical Assistance needs:
Field Operations
Study design / Analysis
Manuscript Review / Publication

Total budget:
200,000 $
Thanks for your attention