Laboratory Capacity: a Global Analysis

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IOM
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Diagnostic gaps & needs

- Estimated Smear+ TB: 9.1 million
- Reported Smear+ TB: 2.5 million
- Estimated All TB: 5.1 million
- Reported All TB: 4.1 million
- Estimated MDR-TB: 5.1 million
- Reported MDR-TB: 4.1 million


More laboratories
Better technology
More staff
Quality assurance
Reliable systems
### HBC laboratory capacity 2006
(Source: WHO Global Report 2008)

<table>
<thead>
<tr>
<th></th>
<th>National Reference Laboratory</th>
<th># culture laboratories per 5 million population</th>
<th># DST laboratories per 10 million population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>India</td>
<td>Yes</td>
<td>0.03</td>
</tr>
<tr>
<td>2</td>
<td>China</td>
<td>Yes</td>
<td>1.4</td>
</tr>
<tr>
<td>3</td>
<td>Indonesia</td>
<td>No</td>
<td>0.9</td>
</tr>
<tr>
<td>4</td>
<td>South Africa</td>
<td>Yes</td>
<td>1.3</td>
</tr>
<tr>
<td>5</td>
<td>Nigeria</td>
<td>No</td>
<td>0.0</td>
</tr>
<tr>
<td>6</td>
<td>Bangladesh</td>
<td>Yes</td>
<td>0.1</td>
</tr>
<tr>
<td>7</td>
<td>Ethiopia</td>
<td>Yes</td>
<td>0.1</td>
</tr>
<tr>
<td>8</td>
<td>Pakistan</td>
<td>No</td>
<td>0.1</td>
</tr>
<tr>
<td>9</td>
<td>Phillipines</td>
<td>Yes</td>
<td>0.2</td>
</tr>
<tr>
<td>10</td>
<td>DR Congo</td>
<td>Yes</td>
<td>0.1</td>
</tr>
<tr>
<td>11</td>
<td>Russian Federation</td>
<td>No</td>
<td>34</td>
</tr>
<tr>
<td>12</td>
<td>Viet Nam</td>
<td>Yes</td>
<td>1.0</td>
</tr>
<tr>
<td>13</td>
<td>Kenya</td>
<td>Yes</td>
<td>0.3</td>
</tr>
<tr>
<td>14</td>
<td>UR Tanzania</td>
<td>Yes</td>
<td>0.4</td>
</tr>
<tr>
<td>15</td>
<td>Uganda</td>
<td>Yes</td>
<td>0.5</td>
</tr>
<tr>
<td>16</td>
<td>Brazil</td>
<td>Yes</td>
<td>5.1</td>
</tr>
<tr>
<td>17</td>
<td>Mozambique</td>
<td>Yes</td>
<td>0.2</td>
</tr>
<tr>
<td>18</td>
<td>Thailand</td>
<td>Yes</td>
<td>5.1</td>
</tr>
<tr>
<td>19</td>
<td>Myanmar</td>
<td>Yes</td>
<td>0.2</td>
</tr>
<tr>
<td>20</td>
<td>Zimbabwe</td>
<td>Yes</td>
<td>0.4</td>
</tr>
<tr>
<td>21</td>
<td>Cambodia</td>
<td>Yes</td>
<td>1.1</td>
</tr>
<tr>
<td>22</td>
<td>Afghanistan</td>
<td>No</td>
<td>0.2</td>
</tr>
</tbody>
</table>
## Technical proficiency on process from primary isolation to DST

(1997-2005)

<table>
<thead>
<tr>
<th>Case</th>
<th>S(+) cultured</th>
<th>TB obtained (primary culture)</th>
<th>Sub-culturing</th>
<th>DST done</th>
</tr>
</thead>
<tbody>
<tr>
<td>1P</td>
<td>1413 (100%)</td>
<td>1169 (82.7)</td>
<td>1126 (79.7)</td>
<td>1126 (79.7)</td>
</tr>
<tr>
<td>2C</td>
<td>319 (100%)</td>
<td>289 (90.6)</td>
<td>255 (79.9)</td>
<td>255 (79.7)</td>
</tr>
<tr>
<td>3Y</td>
<td>790 (100%)</td>
<td>610 (77.2)</td>
<td>?? (under process)</td>
<td>?? (under process)</td>
</tr>
<tr>
<td>4J</td>
<td>4298 (100%)</td>
<td>4052 (94.3)</td>
<td>4052 (94.3)</td>
<td>4052 (94.3)</td>
</tr>
</tbody>
</table>

Ref: A. Fujiki, RIT
To reach MDG targets, a global capacity need of **120 million smears, 60 million cultures** and **6 million DST investigations** must be met by 2015, requiring at least **1 billion USD** investment in laboratory infrastructure and annual variable cost.
StopTB Partnership-Global Laboratory Initiative

Key STP-GLI activities

**Guidance**
- Laboratory policies
- Laboratory manuals
- Training materials
- Resource mobilization
- National roadmap advice

**Assurance activities**
- Coordination of EQA
- Equipment specifications
- Global accreditation system
- Monitoring/evaluation

~100,000 smear lab centers
200,000-300,000 personnel

~8,000 advanced diagnostic centers
40,000 – 50,000 personnel

150 National Reference Labs

70 GLI Members

WHO GLI Office

7 STP WGs

Technical Agencies

Other Laboratory Networks

Other Diseases

Knowledge Sharing
- Coordinating TA, training
- Communication technologies
- Online knowledge resource network

Interface Connection
- Matchmaking projects between countries and implementing partners
- National "roadmaps"
- Advocacy
- Other disease networks

Capacity building
(expanding SRLN, building diverse and flexible national, regional, international consultants base, systematic and structured training)
The New Global Health

Private foundations
- Bill & Melinda Gates Foundation
- Google.org
- Ford Foundation
- Institut Pasteur
- Wellcome Trust

International organizations
- PATH
- ECOH
- Australian Government
- Stop TB Partnership
- OIE
- UNICEF
- The World Bank

Other governments
- Canada
- CIDA

Academia
- Duke Global Health Institute
- Emory Global Health Institute
- Johns Hopkins Center for Global Health

US Government
- USAID
- Naval Medical Research Center
- Food and Agriculture Organization of the United Nations
- Department of Defence
- Red Cross
Are These Efforts Coordinated?

- Do the efforts overlap?
- Do they duplicate each other?
- Are they synergistic?
- Are there opportunities to leverage new partners?
- How many such relationships are there?

Ref: Rand Corp, CDC GLB 2008
GLI strategic priorities

- Establishing GLI partnership projects
- Developing a template for country-specific roadmaps for laboratory strengthening
- Developing human resource strategies, including consultant training, training of different laboratory technical cadres, career development and retention
- Developing appropriate and adequate laboratory biosafety norms and standards, strategies and documents
- Developing a TB laboratory accreditation system
- Moving new diagnostics into countries
GLI Guidance, Tools, Programs

Acid-Fast Direct Smear Microscopy
Training Package

External Quality Assessment for AFB Smear Microscopy

Recommended interim formats for TB laboratory recording and reporting

USAID
FROM THE AMERICAN PEOPLE
WHO Guidance on Line Probe Assays for MDRTB

MOLECULAR LINE PROBE ASSAYS FOR RAPID SCREENING OF PATIENTS AT RISK OF MULTIDRUG-RESISTANT TUBERCULOSIS (MDR-TB)

POLICY STATEMENT

27 June 2008
UNITAID
GLI/FIND/GDF project

74,000 MDR-TB patients diagnosed (and provided with treatment)

- 15% of global MDR-TB burden
- At least 3-fold increase over current situation

Diagnostics
Drugs
Patients
Biosafety Initiatives

- CDC/WHO Technical consultation, Atlanta, Sept 08
- Guidance on process, design principles and ventilation for laboratory construction and renovation (funding proposal)
- Recommendations and guidance for simple “fan boxes” for smear microscopy (funding proposal)
- Guidance and training on TB laboratory biosafety (TBCAP)
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  - Case Gordon
  - Moses Joloba
  - Kai Man Kam
  - John Ridderhof (Chair)
  - Rick O'Brien
  - Tom Shinnick
  - Armand van Deun

• GLI Partners
  - American Society for Microbiology (ASM)
  - Association of Public Health Laboratories (APHL)
  - Bill & Melinda Gates Foundation
  - Centers for Disease Control and Prevention (CDC)
  - CDC Global AIDS Programme (GAP)
  - Fondation Merieux
  - Foundation for Innovative New Diagnostics (FIND)
  - International Union Against TB and Lung Disease
  - PEPFAR
  - USAID
  - KNCV
  - Merieux Alliance
  - Management Sciences for Health (MSH)
  - Medicins Sans Frontiers
  - Stop TB Partnership Working Groups (New Diagnostics, MDR-TB, Retooling Task Force, DOTS Expansion)
  - National TB Programmes
  - WHO
  - World Bank
  - Global Fund
  - and growing…

The findings and conclusions in this report are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention