Measurement of TB Indicators using e-TB Manager (TB Patient Management Information System)

July 2017
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The goal of the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program is to assure the availability of quality pharmaceutical products and effective pharmaceutical services to achieve desired health outcomes. Toward this end, the SIAPS result areas include improving governance, building capacity for pharmaceutical management and services, addressing information needed for decision-making in the pharmaceutical sector, strengthening financing strategies and mechanisms to improve access to medicines, and increasing quality pharmaceutical services.

Recommended Citation

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Key Words

e-TB Manager, tuberculosis, TB indicators
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ACRONYMS AND ABBREVIATIONS

DGHS  Directorate General of Health Services
e-TBM  e-TB Manager
MDR-TB  multidrug-resistant TB
MOHFW  Ministry of Health and Family Welfare
MSH  Management Sciences for Health
NGFS  nongovernment field staff
NTP  National Tuberculosis Control Program
SIAPS  Systems for Improved Access to Pharmaceuticals and Services
TB  Tuberculosis
TLCA  TB and leprosy control assistant
TOT  training of trainers
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PURPOSE OF THIS MEASUREMENT GUIDE

This document offers a wide selection of indicators relevant to the TB program in Bangladesh. To calculate the TB indicators, this document is based on the nationally adopted, web-based e-TB Manager (e-TBM; http://etbmanagerbd.org/), which is being implemented by the National Tuberculosis Control Program (NTP) with technical assistance from the USAID-funded Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program, implemented by Management Sciences for Health (MSH).

**e-TB Manager**

e-TB Manager is a web-based, patient-management tool for managing all the information needed by NTPs. It is an electronic platform that captures data across all aspects of TB control and management, including information on presumptive and confirmed patients, medicines, laboratory testing, diagnosis, treatment, and outcomes.

The TB indicators calculation guidance explains the key steps of measurement and suggests how to use the indicator for data-informed decision making for the improvement of TB programs.
INDICATOR 1: NOTIFICATION RATE FOR ALL FORMS OF TB

Case notification rate of all forms of TB cases

\[ \text{Number of new and relapse TB cases reported during the year} \times 100,000 \]

\[ \text{Total population} \]

Usefulness

This indicator is used to assess the quality of case finding, access, and progress. Moreover, together with treatment outcome, it is the most important global indicator of the overall quality of the TB program.

Data needed from e-TBM (number of new and relapse TB cases reported during the year):

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Pulmonary</th>
<th>Extrapulmonary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bacteriologically Confirmed TB cases</td>
<td>Clinically Diagnosed</td>
</tr>
<tr>
<td>&lt;4</td>
<td>Treatment history unknown</td>
<td>New</td>
</tr>
<tr>
<td>5-14</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15-24</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25-34</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>35-44</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>45-54</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>55-64</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>≥65</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Total: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Steps to Find/Prepare the Indicator in e-TB Manager

1. Go to e-TBM (etbmanagerbd.org)
2. Click on management module
3. Click on report TB 10
4. Then select division/district/upazila (sub-district)/treatment unit and period
5. Find the columns New and Relapse in each of the Bacteriologically Confirmed, Clinically Diagnosed, and Extrapulmonary columns
INDICATOR 2: CASE NOTIFICATION RATE OF NEW PULMONARY, BACTERIOLOGICALLY CONFIRMED TB CASES

Case notification rate of new pulmonary bacteriologically confirmed TB cases

\[ \text{Number of new pulmonary bacteriologically confirmed TB cases reported during the year} \times \frac{100,000}{\text{Total population}} \]

Usefulness

This indicator is very useful to assess the quality of case finding. Moreover, together with treatment outcome, it is the most important indicator of the overall quality of the TB programme.

Example (How to Prepare it from e-TB Manager)

Badalgachi Upazila under Naogaon District

Population of Badalgachi upazila: 217,320 (Source: NTP)

Number of new pulmonary bacteriologically confirmed TB cases reported during the year 2015 at Badalgachi upazila: 96 (Source: e-TB Manager, screen shot below)

\[ \frac{96 \times 100,000}{217,320} = 44.174 \]

Now, the performance of Badalgachi can be compared to the national trend. The local health authority in Badalgachi may explore opportunities and necessary actions if performance variances are observed.
Indicator 2: Case Notification Rate of New Pulmonary, Bacteriologically Confirmed TB Cases

Steps to Find/Prepare the Indicator in e-TBM

1. Go to e-TBM (etbmanagerbd.org)
2. Click on management module
3. Click on report TB 10
4. Then select division/district/upazila (sub-district) and period
5. Find the column Bacteriologically Confirmed, then the New columns
INDICATOR 3: TB CASE NOTIFICATION RATE

<table>
<thead>
<tr>
<th>TB case notification rate</th>
<th>= Number of new TB cases detected during the year × 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>___________________________________________________________</td>
</tr>
<tr>
<td></td>
<td>Total population</td>
</tr>
</tbody>
</table>

Usefulness

This global TB indicator is easily understood by decision makers: the rate of TB cases that is actually detected.

Example (How to Prepare it from e-TB Manager)

Badalgachi Upazila under Naogaon District

Population of Badalgachi upazila: 217,320 (Source: NTP)

Number of new TB cases detected during 2015 in Badalgachi upazila: 166 (Source: e-TB Manager, screen shots below)

<table>
<thead>
<tr>
<th>TB case notification rate for Badalgachi for 2015</th>
<th>= 166 × 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>_____</td>
</tr>
<tr>
<td></td>
<td>217,320</td>
</tr>
</tbody>
</table>

= 76.38

Now, the performance of Badalgachi can be compared to the national trend. The local health authority in Badalgachi may explore opportunities and necessary actions if performance variances are observed.
Calculating the Number of Cases

There are 2 ways to obtain the number of cases.

From figure 3.1

1. Go to e-TBM (etbmanagerbd.org)
2. Click on management module
3. Click on new report
4. Add filters and variables
5. Click update

Alternatively, from figure 3.2
## Indicator 3: TB Case Notification Rate

### Figure 3.2

1. Go to e-TBM (etbmanagerbd.org)
2. Click on management module
3. Click on report TB 10
4. Then select division/district/upazila (sub-district) and period
5. Under Pulmonary, find the columns New under Bacteriologically Confirmed and Clinically Diagnosed and under Extrapulmonary, find the column New

Total new cases = $68 + 28 + 17 + 10 + 23 + 20 = 166$
INDICATOR 4: PERCENTAGE OF NEW PULMONARY BACTERIOLOGICALLY CONFIRMED CASES AMONG ALL TB CASES

<table>
<thead>
<tr>
<th>Percentage of new pulmonary bacteriologically confirmed cases among all TB cases</th>
<th>= Number of new pulmonary bacteriologically confirmed cases (\times 100)</th>
<th>Number of all TB cases</th>
</tr>
</thead>
</table>

**Usefulness**

This indicator can determine whether sufficient emphasis is being put on detecting sputum-positive patients and whether smear-negative and extra-pulmonary cases are being over/under diagnosed. It is also possible to calculate the percentages of pulmonary clinically diagnosed TB cases and extrapulmonary cases as well as the percentage of P+ retreatment cases, pediatric TB rate, etc.

**Example (How to Prepare It from e-TB Manager)**

**Badalgachi Upazila under Naogaon District**

Number of new pulmonary bacteriologically confirmed cases for Badalgachi for the year 2015 is 96 (Source: e-TB Manager screen shot below)

Number of all TB cases for Badalgachi for 2015 is 176 (Source: e-TB Manager, screen shot below)

\[
\text{Percentage of new pulmonary bacteriologically confirmed cases among all TB cases for Badalgachi for 2015} = \left(\frac{96}{176}\right) \times 100 = 54.54
\]
Steps to Find/Prepare the Indicator in e-TB Manager

1. Go to e-TBM (etbmanagerbd.org)
2. Click on management module
3. Click on report TB 10
4. Then select division/district/upazila (sub-district) and period
5. Under Pulmonary, find the columns New under Bacteriologically Confirmed
INDICATOR 5: PERCENTAGE OF TB CASES PUT ON TREATMENT

<table>
<thead>
<tr>
<th>Percentage of TB cases put on treatment</th>
<th>= Number of TB cases that began treatment during one quarter × 100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total number of TB cases detected during the same period</td>
</tr>
</tbody>
</table>

**Usefulness**

As soon as a diagnosis of smear-positive pulmonary TB is made, treatment should begin immediately. Patients defaulting before treatment should be avoided at all cost. When calculating this indicator, the supervisor will also check if all smear-positive patients in the lab register have also been registered in e-TB Manager.

**Example (How to Prepare it from e-TB Manager)**

_Boalkhali Upazila under Chittagong District, quarter 1, 2013_

<table>
<thead>
<tr>
<th>Number of TB cases that began treatment during one quarter</th>
<th>= Total number of TB cases detected during the same period – number of TB cases that did not begin treatment during the same period</th>
</tr>
</thead>
</table>

Total number of TB cases detected during the period = 56 (Source: e-TB Manager, Figure 5.1)

Number of TB cases that did not begin treatment during the same period = 3 (Source: e-TB Manager, Figure 5.2)

<table>
<thead>
<tr>
<th>Percentage of TB cases put on treatment in Boalkhali, Q 1, 2013</th>
<th>= (53/56) × 100</th>
<th>= 94.64</th>
</tr>
</thead>
</table>
Steps to Find/Prepare the Indicator in e-TB Manager (for both figures)

1. Go to e-TBM (etbmanagerbd.org)
2. Click on case
3. Click on advance search
INDICATOR 6: FEMALE /MALE RATIO OF TB PATIENTS

<table>
<thead>
<tr>
<th>Female/male ratio of TB patients</th>
<th>Number of women among registered TB cases during a quarter or year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of men among registered TB cases during the same period</td>
</tr>
</tbody>
</table>

Usefulness

This indicator helps identify whether gender differences are due to operational or epidemiological factors.

Example (How to Prepare it from e-TB Manager)

**Badalgachi Upazila under Naogaon District, 2015**

Number of women among registered TB cases during one year = 61 (Source: e-TB Manager, screen shot below)

Number of men among registered TB cases during one year = 115 (Source: e-TB Manager, screen shot below)

Female: Male ratio = 61:115 (1:1.9)

Steps to Find/Prepare the Indicator in e-TB Manager

1. Go to e-TBM (etbmanagerbd.org)
2. Click on Management
3. Click on data analysis tool
INDICATOR 7: TREATMENT DELAY

<table>
<thead>
<tr>
<th>Treatment delay (days)</th>
<th>= Diagnosis date – treatment start date</th>
</tr>
</thead>
</table>

Usefulness

As soon as a diagnosis of TB is made, treatment should begin immediately. Otherwise, infection control will fail and the death rate will increase. Any delay in the start of treatment should be minimal.

Steps to Find/Prepare the Indicator in e-TB Manager

<table>
<thead>
<tr>
<th>AC</th>
<th>AD</th>
<th>AE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis date</td>
<td>Start treatment date</td>
<td>Difference (days)</td>
</tr>
<tr>
<td>16/08/2016</td>
<td>27/08/2016</td>
<td>11</td>
</tr>
<tr>
<td>20/03/2016</td>
<td>27/08/2016</td>
<td>160</td>
</tr>
<tr>
<td>27/08/2016</td>
<td>27/08/2016</td>
<td>0</td>
</tr>
<tr>
<td>27/08/2016</td>
<td>27/08/2016</td>
<td>0</td>
</tr>
<tr>
<td>24/08/2016</td>
<td>27/08/2016</td>
<td>3</td>
</tr>
<tr>
<td>22/08/2016</td>
<td>27/08/2016</td>
<td>5</td>
</tr>
<tr>
<td>23/08/2016</td>
<td>27/08/2016</td>
<td>4</td>
</tr>
<tr>
<td>24/08/2016</td>
<td>27/08/2016</td>
<td>3</td>
</tr>
<tr>
<td>27/08/2016</td>
<td>27/08/2016</td>
<td>0</td>
</tr>
<tr>
<td>22/08/2016</td>
<td>27/08/2016</td>
<td>5</td>
</tr>
<tr>
<td>18/08/2016</td>
<td>27/08/2016</td>
<td>9</td>
</tr>
<tr>
<td>25/08/2016</td>
<td>27/08/2016</td>
<td>2</td>
</tr>
<tr>
<td>14/08/2016</td>
<td>27/08/2016</td>
<td>13</td>
</tr>
<tr>
<td>28/08/2016</td>
<td>29/08/2016</td>
<td>0</td>
</tr>
</tbody>
</table>

1. Go to e-TBM (etbmanagerbd.org)
2. Click on Management module
3. Click on Export TB/DR TB case data in Excel
4. Sort/filter data as needed
INDICATOR 8: MODE OF CASE DETECTION

Percentage of cases detected through various methods

Usefulness

This indicator provides information regarding the:

- Access of all care providers
- Efficiency of case finding
- Awareness of the population
- Integration of the program into the general health services and its sustainability
- Performance of the referral system; this is more useful when used in comparison to the previous two or more quarters

Steps to Find/Prepare the Indicator in e-TB Manager

<table>
<thead>
<tr>
<th>Number of patients referred by various providers generated from TB 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Practitioner (Graduate)</td>
</tr>
<tr>
<td>Non-graduate private practitioner</td>
</tr>
<tr>
<td>Nongovernment field staff (NGFS)</td>
</tr>
<tr>
<td>Government hospital</td>
</tr>
<tr>
<td>TB patient</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

From the data in TB 10, the percentages of patients referred by various providers are as follows:
1. Go to e-TBM (etbmanagerbd.org)
2. Click on Management
3. Click on report TB 10
## INDICATOR 9: SMEAR CONVERSION PERCENTAGE

<table>
<thead>
<tr>
<th>Percentage of smear conversion</th>
<th>[ \frac{\text{Number of new pulmonary bacteriologically confirmed cases registered during one quarter that are smear-negative after 2 months of initial phase treatment} \times 100}{\text{Total number of pulmonary bacteriologically confirmed cases registered during the same period}} ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of smear conversion</td>
<td>[ \frac{\text{Number of retreated pulmonary bacteriologically confirmed cases registered during one quarter that are smear-negative after 3 months of initial phase treatment} \times 100}{\text{Total number of retreated pulmonary bacteriologically confirmed cases registered during the same period}} ]</td>
</tr>
</tbody>
</table>

**Usefulness**

If the percentage is high, it may be because the lab technician is unable to detect low grades of positivity. If the percentage is really very low, it may indicate a patient management problem or suggest the presence of drug resistance. Non-sputum converted patients must meet 9 criteria to be referred for GeneXpert testing. Thus, it can be determined if all GeneXpert-eligible patients under this category have been sent for testing. This indicator is also very useful for comparison to recent trends.
**Indicator 9: Smear Conversion Percentage**

**Example (How to Prepare It from e-TB Manager)**

**Badalgachi Upazila under Naogaon District, First Quarter, 2015**

### Percentage of sputum conversion for new pulmonary bacteriologically confirmed cases in Badalgachi upazila, Q1, 2015

\[
\text{Percentage} = \frac{11}{17} \times 100 = 64.70
\]

### Percentage of sputum conversion for retreated pulmonary bacteriologically confirmed cases in Badalgachi upazila, Q1, 2015

\[
\text{Percentage} = \frac{3}{4} \times 100 = 75
\]
Steps to Find/Prepare the Indicator in e-TB Manager

1. Go to e-TBM (etbmanagerbd.org)
2. Click on Management
3. Click on report TB 12

Special notes: To generate an accurate report, first the user needs to remove case tags (pulmonary bacteriologically confirmed cases without microscopy result at the intensive phase), if any.

For instructions on how to remove case tags, see annex 1.
**INDICATOR 10: TB TREATMENT OUTCOME PERCENTAGE**

| Percentage of successful TB treatment outcomes for new pulmonary bacteriologically confirmed cases | = Number of new pulmonary bacteriologically confirmed cases registered in one quarter that achieve treatment outcome × 100 |
| Number of pulmonary bacteriologically confirmed cases registered during the same quarter |

**Usefulness**

This indicator is useful for assessing the quality of patient management. It is also closely linked to early case finding.

Together with case notification rate/detection rate, they are the most important global indicators of the overall quality of the TB programme.

**Example (How to Prepare It from e-TB Manager)**

*Badalgachi Upazila under Naogaon District, First Quarter, 2015*

<table>
<thead>
<tr>
<th>Pulmonary Bacteriologically Confirmed</th>
<th>Total No. of patients reported during the above quarter</th>
<th>Outcomes</th>
<th>Other Status</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>T</td>
<td>M</td>
</tr>
<tr>
<td>New / Treatment History (unknown)</td>
<td>15</td>
<td>2</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Relapse</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Treatment after failure</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Treatment after loss to follow-up</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other previously treated</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>2</td>
<td>21</td>
<td>16</td>
</tr>
</tbody>
</table>

| Percentage of successful TB treatment outcomes for new pulmonary bacteriologically confirmed cases | = (14/17) × 100 | = 82.35 |
| Percentage of default or loss to follow up | = (2/17) × 100 | = 11.76 |
| Percentage of deaths | = (1/17) × 100 | = 5.88 |

**Steps to Find/Prepare the Indicator in e-TB Manager**

1. Go to e-TBM (etbmanagerbd.org)
2. Click on Management
3. Click on report TB 11
4. Select division/district/upazila/treatment unit/period and appropriate column
Special notes: To generate an accurate report, first the user needs to remove case tags (cases without outcomes by the end of treatment), if any.

For instructions on how to remove case tags, see annex 2.
INDICATOR 11: DATA ACCURACY

\[
\text{Percentage of reports that are accurate and complete} = \frac{\text{Number of reports that are filled in accurately and completely}}{\text{Number of reports that have been checked for accuracy and completeness}} \times 100
\]

Data source: cases presented in the manual report versus e-TB Manager generated report (also known as the ABCD report)

**Site Performance Rating through ABCD Report (Difference between Manual and e-TB Manager-Generated TB10 Reports)**

A rating = 0 to 5 cases  
B rating = 6 to 24 cases  
C rating = 25 to 49 cases  
D rating = 50 or more cases

<table>
<thead>
<tr>
<th>Reported Site: 249</th>
<th>Period Q4/2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>203</td>
</tr>
<tr>
<td>B</td>
<td>15</td>
</tr>
<tr>
<td>C</td>
<td>13</td>
</tr>
<tr>
<td>D</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>249</td>
</tr>
</tbody>
</table>

Usefulness

This indicator provides insight into the quality of data management and site performance.
ANNEX 1: SMEAR CONVERSION PERCENTAGE (INDICATOR 9)

To ensure accurate reporting when using indicator 9, case tags must be removed.

Case tag: pulmonary bacteriological confirmed cases without microscopy result at the end of the intensive phase

To remove the case tag, click on it.
The list of names will appear; click on a patient’s name.

The individual patient’s file will appear; click on Treatment to check the last date of the intensive phase. For this patient, the last day of the intensive phase was 4 February 2017.
Click on Exams to check the microscopy result. For this patient, the last TB sputum was tested on 28 November 2016. No microscopy result was found on/after the last day of the intensive phase, which was 4 February 2017.

Now check the patient’s treatment card, which lists the microscopy result. This result must be added to e-TB Manager.

To add the microscopy result to e-TB Manager, click on New result.
This form will appear. Fill in correctly and click on Save.

The case tag for this patient has been removed.
Repeat for each patient in the list.

Once case tags have been removed for all patients in the list, indicator 9 (smear conversion percentage) can be generated.
ANNEX 2: TB TREATMENT OUTCOME PERCENTAGE (INDICATOR 10)

To ensure accurate report when using indicator 10, case tags must be removed.

Case tag: cases without outcome by the end of treatment

To remove a case tag, click on it.
The list of names will appear; click on a patient’s name.

<table>
<thead>
<tr>
<th>Patient name</th>
<th>Classification</th>
<th>Notification health unit</th>
<th>Date of treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHAHANUR BEGUM</td>
<td>TB Case</td>
<td>BARISAL SADAR UHC</td>
<td>Since Aug 2016</td>
</tr>
<tr>
<td>201948</td>
<td></td>
<td>Barisal, CHANDRA MOHON</td>
<td>Authorized</td>
</tr>
<tr>
<td>MONI BEGUM</td>
<td>TB Case</td>
<td>BARISAL SADAR UHC</td>
<td>Since Aug 2016</td>
</tr>
<tr>
<td>202135</td>
<td></td>
<td>Barisal, CHAR KOVA</td>
<td>Authorized</td>
</tr>
<tr>
<td>MDS.MONSUR HOY/LADER</td>
<td>TB Case</td>
<td>BARISAL SADAR UHC</td>
<td>Since Aug 2016</td>
</tr>
<tr>
<td>202157</td>
<td></td>
<td>Barisal, CHAR MONAI</td>
<td>Authorized</td>
</tr>
<tr>
<td>MDS.MOHAMAD HOY/LADER</td>
<td>TB Case</td>
<td>BARISAL SADAR UHC</td>
<td>Since Aug 2016</td>
</tr>
<tr>
<td>202177</td>
<td></td>
<td>Barisal, TUNGIA BARIYA</td>
<td>Authorized</td>
</tr>
</tbody>
</table>

The individual patient’s file will appear; click on Exams and Treatment to be sure that both sections are completely filled out.
Click on close case.
This form will appear. Fill in correctly and click Ok.

The case tag for this patient has been removed. Repeat for each patient in the list.

Once case tags have been removed for all patients in the list, indicator 10 (TB treatment outcome percentage) can be generated.