Patient pathway analysis

Methods and Global Findings

Christy Hanson
Senior Program Officer
Bill & Melinda Gates Foundation

Mike Osberg
Senior Associate
Linksbridge, SPC
The goal: Meeting patients where they are

Reaching all TB patients: To reach all patients and avoid delays in diagnosis, treatment, and cure, TB services must be available where patients seek care. Planning patient-centered care will require knowing more about how patients seek care and aligning the delivery of services to patient preferences.
Data Sources

Assessing Alignment

Patient Care Seeking

TB Service Availability

TB Specific Care Seeking

General Care Seeking

How does the supply of services align with the demand for services?

Public Sector

Private Sector

Informal Sector

Data Sources

TB Prevalence Surveys

Published Literature

Population Based Surveys*

Patient Care Seeking

Service Availability Assessments

Government Reports and Plans

Technical Partner Reports

Service Availability
Diagnosed by non-NTP, not notified

Over 40% of people initiate their care seeking journey in private (formal or informal) facilities. Diagnostic capacity exists in the private sector, however only notifications from the private sector only account for 13% of the estimated burden.

Presenting to health facilities, not diagnosed

43% of people with TB are likely to visit a health facility with capacity for TB diagnosis on their first visit to the health care system. Even fewer are likely to receive a DR diagnosis on their first visit.

EXAMPLE: EVIDENCE INPUT INTO THE CARE CONTINUUM (1/2)

2017 Patient Pathway Analysis
STEP 1: DATA GENERATION
IDENTIFYING RELEVANT DATA SOURCES

Patient Care Seeking
- TB Prevalence Survey
  - Population-based surveys of health utilization
  - Published literature

Service Availability
- Service Availability Assessments
  - Inventory Studies
  - Government data and reports
Kenya has a variety of data sources

<table>
<thead>
<tr>
<th>TB Context</th>
<th>Barriers to Care</th>
<th>Care Seeking</th>
<th>Service Availability</th>
<th>Additional Context</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TIBU Case Registry</strong></td>
<td>2014 DHS</td>
<td>2014 DHS</td>
<td>2010 SPA</td>
<td>2013 HHEUS</td>
</tr>
<tr>
<td>• TB cases registered</td>
<td>• Biggest barriers to care</td>
<td>• Care seeking for fever</td>
<td>• Availability of TB Dx and Tx by facility type</td>
<td>• Health spending per capita</td>
</tr>
<tr>
<td><strong>2015 Annual Report</strong></td>
<td></td>
<td>• Care seeking for diarrhea</td>
<td>• Most common methods of TB Dx and Tx by facility type</td>
<td>• Health insurance coverage</td>
</tr>
<tr>
<td>• Case notification rate</td>
<td></td>
<td>• Care seeking for HIV test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Location of case notifications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(public vs private)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2015 Prevalence Survey (preliminary)</strong></td>
<td>2013 HHEUS</td>
<td>2014 SARAM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Prevalence rates</td>
<td>• Location of outpatient visits</td>
<td>• TB readiness index</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Location of admission visits</td>
<td>• Availability of TB tracer items</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Availability of equipment (e.g.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>microscopes, x-ray viewers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2015 Prevalence Survey (preliminary)</strong></td>
<td><strong>Health Facility Register</strong></td>
<td><strong>Kenya Open Data Platform</strong></td>
<td><strong>2013 HHEUS</strong></td>
<td><strong>HIV Prevalence</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Count of all facilities by type,</td>
<td>• Health spending per capita</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>owner and level</td>
<td>• Health insurance coverage</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Data Standardization: Categories of Health Facilities

PUBLIC

3 | referral hospitals
2 | district hospitals
1 | rural health care centers
0 | community health + health extension workers

PRIVATE

3 | urban specialty hospitals
2 | private/NGO hospitals
1 | private clinics + practitioners
0 | pharmacies, drug shops, traditional healers

LEVELS
Data standardization: Health Facility Mapping

To allow for comparison across data sources, we mapped the facilities listed from each data source to standardized categories.
Health Facility Mapping

Using health system definitions, we can map variety of data to a standardized view

<table>
<thead>
<tr>
<th>DHS Fever Care Seeking</th>
<th>SPA 2010 Health Facilities</th>
<th>HHEUS 2013 Level</th>
<th>SARAM 2014 Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>government hospital</td>
<td>national referral hospital</td>
<td>Public Hospital</td>
<td>1 - Hospital</td>
</tr>
<tr>
<td>government health center</td>
<td>provincial hospital</td>
<td>Private Hospitals</td>
<td>2 - Health Centres</td>
</tr>
<tr>
<td>government dispensary</td>
<td>district hospital</td>
<td>Mission Hospital</td>
<td>3 - Dispensaries</td>
</tr>
<tr>
<td>other public</td>
<td>sub-district hospital</td>
<td>Public Health Centre</td>
<td>4 - Medical Clinics, Stand Alone HTC/VCT &amp; Others</td>
</tr>
<tr>
<td>cs public</td>
<td>other hospital</td>
<td>Private Health Centre</td>
<td></td>
</tr>
<tr>
<td>private hospital, clinic</td>
<td>health centre</td>
<td>Mission Health Centre</td>
<td></td>
</tr>
<tr>
<td>pharmacy</td>
<td>clinic</td>
<td>Nursing/Maternity Homes</td>
<td></td>
</tr>
<tr>
<td>private doctor</td>
<td>dispensary</td>
<td>All Others</td>
<td></td>
</tr>
<tr>
<td>mission hospital/ clinic</td>
<td>maternity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cs private</td>
<td>stand-alone vct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>other private</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mobile clinic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>community health worker</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>shop</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>traditional practitioner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>relative/friend</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Full details of health facility mapping included in the appendix*
Patient Pathway Analysis: How-to Guide

Assessing the Alignment of TB Patient Care Seeking & TB Service Delivery
STEP 2: CALCULATIONS AND VISUALIZATION
### Patient Pathway Analysis: How-to Guide

**Assessing the Alignment of TB Patient Care Seeking & TB Service Delivery**

## CALCULATIONS

<table>
<thead>
<tr>
<th>CORE METRICS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Place of Initial Care Seeking</strong></td>
</tr>
<tr>
<td>Proportion of patients who initiate care, by facility level and sector.</td>
</tr>
<tr>
<td>Number of patients initiating care for illness or symptoms (preferably TB symptoms) in a specific facility level and sector.</td>
</tr>
<tr>
<td>Total number of patients initiating care for illness or symptoms (preferably TB symptoms) in the survey population.</td>
</tr>
</tbody>
</table>

| **2. Diagnostic Coverage** |
| Proportion of health facilities with a given TB diagnostic service, by facility level and sector. |
| Number of health facilities with a given TB diagnostic service, by facility level and sector. This can be calculated for each type of TB diagnostic service, e.g., smear microscopy, Xpert, X-ray |
| Total number of health facilities, by facility level and sector. |

| **3. Access to Diagnosis and Initial Care Seeking** |
| Estimated proportion of care seekers that accessed diagnostic services on their first visit. |
| This metric is the product of multiplying initial care seeking (core metric 1) and diagnostic coverage (core metric 2) at each level and sector. It can be interpreted as the estimated proportion of care seekers that access TB diagnostic services on the first visit. Alternatively, it can be interpreted as the likelihood that a patient has access to TB diagnostic services on his or her first visit to the health care system. One can sum up the diagnostic access for all facility levels and sectors to derive an indicator of overall diagnostic access. Overall diagnostic access can be calculated for each type of TB diagnostic service or for a combination of diagnostic tools. The latter could be considered as access to any of the diagnostic tools available. Importantly, this metric assumes that care seekers visit all health facilities in a sector uniformly, which may or may not be true. These assumptions and related limitations are described in more detail in section 0.7. |
| \[ \sum \frac{1}{n} \times \frac{2}{d} \] |
| \[ \sum \frac{1}{n} \times \frac{2}{d} \] |
| Percent of patients who initially sought care at each level and sector. |
| Diagnostic coverage at each level and sector. |

| **4. Treatment Coverage** |
| Proportion of health facilities that have anti-TB medicines in stock or can supervise patients during treatment, by facility level and sector. |
| Number of facilities that have anti-TB drugs in stock or can supervise patients during treatment, by facility level and sector. |
| Total number of health facilities, by facility level and sector. |
VISUALIZATIONS

Fig 23 Download the example Tableau workbook

Demo PPA Excel and Tableau Workbooks online: http://linksbridge.com/work/tb-ppa/
County-Level PPAs
**Baringo - Patient Pathway Analysis**

### Number of Health Facilities

<table>
<thead>
<tr>
<th>Health Facility Type</th>
<th>Level 5</th>
<th>Level 4</th>
<th>Level 3</th>
<th>Level 2</th>
<th>Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informal Private</td>
<td>0%</td>
<td>2%</td>
<td>1%</td>
<td>7%</td>
<td>11%</td>
</tr>
<tr>
<td>Formal Private</td>
<td>32%</td>
<td>24%</td>
<td>6%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Public</td>
<td>1%</td>
<td>45%</td>
<td>40%</td>
<td>6%</td>
<td>2%</td>
</tr>
</tbody>
</table>

**Data Sources:**
- Number of Health Facilities: 2016 Kenya Facility Master List
- Care Seeking: Kenya HHEUS, 2013
- 2 & 4: Diagnostic and Treatment Services: Denominator: 2016 Kenya Facility Master List
- Numerator: Dx and Tx Services Data from NTP and 2013 SARAM

### Coverage of Diagnostic Services Among Health Facilities

#### DS-TB

- Level 5: 1%
- Level 4: 45%
- Level 3: 40%
- Level 2: 6%
- Level 1: 3%

#### DR-TB

- Level 5: 1%
- Level 4: 45%
- Level 3: 40%
- Level 2: 6%
- Level 1: 3%

**Microscopy**
- X-ray

**Xpert**
- Xpert Referral

**Sector**
- Formal Private
- Public
Bomet - Patient Pathway Analysis

1. Place of initial careseeking by people with possible TB
- Informal Private: Level 2 - 0%, Level 1 - 0%
- Formal Private: Level 4 - 2%, Level 3 - 4%, Level 2 - 16%, Level 1 - 0%
- Public: Level 5 - 4%, Level 4 - 13%, Level 3 - 16%, Level 2 - 51%, Level 1 - 0%

2. Coverage of diagnostic services among health facilities
- DS-TB: 0%, 0%, 100%, 25%, 25%
- DR-TB: 0%, 0%, 0%, 0%, 0%

3. Diagnosis access at initial careseeking

4. Coverage of treatment services among health facilities

5. Treatment access at initial careseeking

Data Sources:
- Number of Health Facilities: 2016 Kenya Facility Master List
- Care Seeking: Kenya HHEUS, 2013
- Diagnosis and Treatment Services: 2016 Kenya Facility Master List
- Denominator: 2016 Kenya Facility Master List
- Numerator: Dk and Tx Services Data from NFP and 2013 SARAM
**Bungoma - Patient Pathway Analysis**

### Number of Health Facilities

<table>
<thead>
<tr>
<th>Type</th>
<th>Level</th>
<th>Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informal</td>
<td>Level 2</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Level 1</td>
<td>2%</td>
</tr>
<tr>
<td>Formal</td>
<td>Level 4</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Level 3</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Level 2</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td>Level 1</td>
<td>0%</td>
</tr>
<tr>
<td>Public</td>
<td>Level 5</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Level 4</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>Level 3</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Level 2</td>
<td>88%</td>
</tr>
<tr>
<td></td>
<td>Level 1</td>
<td>0%</td>
</tr>
</tbody>
</table>

### 1. Place of Initial Careseeking by People with Possible TB

- **DS-TB:**
  - Level 5: 49%
  - Level 4: 49%
  - Level 3: 49%
  - Level 2: 49%
  - Level 1: 49%

- **DR-TB:**
  - Level 5: 51%
  - Level 4: 51%
  - Level 3: 51%
  - Level 2: 51%
  - Level 1: 51%

### 2. Coverage of Diagnostic Services Among Health Facilities

- **Microscopy**
  - Level 5: 100%
  - Level 4: 100%
  - Level 3: 100%
  - Level 2: 100%
  - Level 1: 100%

- **X-ray**
  - Level 5: 100%
  - Level 4: 100%
  - Level 3: 100%
  - Level 2: 100%
  - Level 1: 100%

### 3. Diagnosis Access at Initial Careseeking

- **Public:**
  - 5%

### 4. Coverage of Treatment Services Among Health Facilities

- **Xpert Referral**
  - Level 5: 55%
  - Level 4: 55%
  - Level 3: 55%
  - Level 2: 55%
  - Level 1: 55%

### 5. Treatment Access at Initial Careseeking

- **Public:**
  - 48%

**Data Sources:**
- Number of Health Facilities - 2016 Kenya Facility Master List
- Care Seeking - Kenya HHEUS, 2013
- 2.4. Diagnostic and Treatment Services - Denominator: 2016 Kenya Facility Master List
- Numerator: Dx and Tx Services Data from NTP and 2013 SARAM
Embu - Patient Pathway Analysis

**Number of Health Facilities**

1. Place of Initial Careseeking by People with Possible TB

<table>
<thead>
<tr>
<th>Level</th>
<th>Informal Private</th>
<th>Formal Private</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2</td>
<td></td>
<td>7%</td>
<td>24%</td>
</tr>
<tr>
<td>Level 1</td>
<td></td>
<td></td>
<td>33%</td>
</tr>
</tbody>
</table>

**Coverage of Diagnostic Services Among Health Facilities**

- **DS-TB**
  - Level 2: 25%
  - Level 1: 7%

- **DR-TB**
  - Level 2: 4%
  - Level 1: 50%

**Diagnosis Access at Initial Careseeking**

- Level 2: 100%
- Level 1: 100%

**Coverage of Treatment Services Among Health Facilities**

- Level 2: 100%
- Level 1: 100%

Data Sources:
- Number of Health Facilities - 2016 Kenya Facility Master List
- Care Seeking - Kenya KHEUS, 2013
- 2.8.4. Diagnostic and Treatment Services - Denominator: 2016 Kenya Facility Master List
- Numerator: Dk and Tx Services Data from NTP and 2013 SARAM
Garissa - Patient Pathway Analysis

1. Place of Initial Careseeking by People with Possible TB

<table>
<thead>
<tr>
<th>Health Facilities</th>
<th>Informal Private</th>
<th>Formal Private</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2</td>
<td>NA</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Level 1</td>
<td>NA</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

2. Coverage of Diagnostic Services Among Health Facilities

- **DS-TB**
  - 0%
  - 0%
  - 0%
  - 0%
  - 0%
  - 0%
  - 0%
  - 0%
  - 0%

- **DR-TB**
  - 0%
  - 0%
  - 0%
  - 0%
  - 0%
  - 0%
  - 0%
  - 0%
  - 0%

3. Diagnosis Access at Initial Careseeking

- 0%
- 0%
- 0%
- 0%
- 0%
- 0%
- 0%
- 0%
- 0%
- 0%
- 0%
- 0%

4. Coverage of Treatment Services Among Health Facilities

- 63%
- 100%
- 100%
- 100%
- 100%

5. Treatment Access at Initial Careseeking

- 20%
- 0%
- 0%
- 0%
- 0%

Data Sources:
- Number of Health Facilities - 2016 Kenya Facility Master List
- 1. Care Seeking - Kenya HHEUS, 2013
- 2.4. Diagnostic and Treatment Services - Denominator: 2016 Kenya Facility Master List
- Numerator: Dx and Tx Services Data from NTP and 2013 SARAM
Resources Available

Demo PPA Excel and Tableau Workbooks online:  http://linksbridge.com/work/tb-ppa/
The tool will require user input, but will substantially decrease the time spent on data analysis and visualization.

**Automated Process for Steps 3 & 4:**

**User:**
- Go to a website and upload data sources
- Create a health facility mapping lookup table
- Create a subnational unit mapping lookup table
- Identify PPA variables from data sources

**Computer:**
- Summarize raw data
- Map summary data to health facility sectors and levels per the lookup table
- Maps subnational units across data sources per the lookup table
- Calculate PPA metrics
- Generate PPA visuals