Updates on DNO and Integration: Eswatini and Nigeria (and Lesotho)

Dianna Edgil
USAID/OHA/SCH
September 13, 2019
Process of Diagnostic Optimization

- Ensure complete national stakeholder **buy-in and political will**
- Clearly define the country **goal** for optimization (e.g. cost; TAT; access; testing priorities; integration; surveillance)
- **Data collection** — laboratories, instruments, testing volumes, sample collection sites, programmatic patient demands by site, existing referral linkages, HR
  - Use **GIS visualization** tool to present outputs, refine assumptions, and establish data gaps
- Establish a **stakeholder workshop** to present initial models and further refine models
- Inclusion of integrated approach in National Lab Strategic Plan and development of an **implementation** plan and timeline
Country Examples:

Eswatini
**Eswatini: Lab Network – Capacity by Test Type**

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Count of Test Locations/Equip</th>
<th>Annual Cap*</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD4 - Conventional</td>
<td>21</td>
<td>790,800</td>
<td>FACS Calibur/Count/Pres to</td>
</tr>
<tr>
<td>CD4 - POC</td>
<td>79</td>
<td>303,360</td>
<td>PIMA</td>
</tr>
<tr>
<td>EID - Conventional</td>
<td>1</td>
<td>36,960</td>
<td>CAPCTM96 EID</td>
</tr>
<tr>
<td>EID - POC</td>
<td>19</td>
<td>27,360</td>
<td>AlereQ</td>
</tr>
<tr>
<td>TB - Xpert</td>
<td>28</td>
<td>155,520</td>
<td>GeneXpert 4/8/16</td>
</tr>
<tr>
<td>Viral Load - Conventional</td>
<td>4</td>
<td>275,760</td>
<td>Biocentric, CAPCTM96 VL</td>
</tr>
</tbody>
</table>

*Assuming 12*20 = 240 testing days/yr

NOTE: GX Implementation Report suggests 180 testing days/yr
Eswatini: Viral Load Baseline Network

Assumptions:
• Capacity based on 8 hr work day;
• 100% capacity availability

KEY TAKEAWAYS
• Capacity issues!
• Current targets cannot be met
Eswatini: HPV/HIV integration

Assumptions:
- Capacity based on 8 hr work day;
- 80% capacity availability at TB and Lumombo

**KEY TAKEAWAYS**

- Utilizing existing capacity at NMRL and redistributing instruments can relieve capacity issues at some sites
- National TB Hospital requires additional support
- Hologic Panther capacity needed to meet FY19 Targets
Eswatini: EID and TB Networks

EID - Conventional

NOTE: 11 sites remaining with no geocodes

- Centralized EID with 100% Coverage; TAT = 2 weeks
- Introduction of birth testing and focus on efficiencies
- Overlap of Genexpert footprint with HIV program sites = 100%

KEY TAKEAWAYS
Eswatini: GeneXpert Capacity Assumptions

<table>
<thead>
<tr>
<th>Annual Test units</th>
<th>eSwatini</th>
<th>NHLANGANO HEALTH CENTRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserved for TB program expansion</td>
<td>77,760</td>
<td>5,760</td>
</tr>
<tr>
<td>Current TB Tests</td>
<td>32,114</td>
<td>2,065</td>
</tr>
<tr>
<td>EID Need*</td>
<td>11,235</td>
<td>459</td>
</tr>
<tr>
<td>VL for Pregnant Women</td>
<td>11,235</td>
<td>459</td>
</tr>
<tr>
<td>VL for HIV/TB Patients</td>
<td>22,479</td>
<td>1,445</td>
</tr>
<tr>
<td>Available for Add'l Multiplex Tests</td>
<td>34,411</td>
<td>3,236</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>155,520</strong></td>
<td><strong>1,332</strong></td>
</tr>
</tbody>
</table>
**eSwatini: GeneXpert Capacities**

<table>
<thead>
<tr>
<th>Site</th>
<th>Modules</th>
<th>Annual Cap</th>
<th>TB TESTS Aug '17 - July '18</th>
<th>EID Available Cap</th>
<th>EID Need*</th>
<th>% EID Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHF LAMVELASE</td>
<td>4</td>
<td>2,880</td>
<td>1,131 35%</td>
<td>1,749</td>
<td>309</td>
<td>1,314 24%</td>
</tr>
<tr>
<td>BAYLOR C.O.C CLINIC</td>
<td>4</td>
<td>2,880</td>
<td>412 14%</td>
<td>2,468</td>
<td>1,028</td>
<td>268 100%</td>
</tr>
<tr>
<td>BHIOL CLINIC</td>
<td>4</td>
<td>2,880</td>
<td>732 25%</td>
<td>2,148</td>
<td>708</td>
<td>0 100%</td>
</tr>
<tr>
<td>DYOKOLWAKO HEALTH CENTER</td>
<td>4</td>
<td>2,880</td>
<td>736 26%</td>
<td>2,144</td>
<td>704</td>
<td>355 100%</td>
</tr>
<tr>
<td>EMKHZWENI HEALTH CENTER</td>
<td>8</td>
<td>5,760</td>
<td>1,394 24%</td>
<td>4,366</td>
<td>1,486</td>
<td>272 100%</td>
</tr>
<tr>
<td>GOOD SHEPHERD HOSPITAL</td>
<td>8</td>
<td>5,760</td>
<td>1,847 32%</td>
<td>3,913</td>
<td>1,033</td>
<td>1,044 99%</td>
</tr>
<tr>
<td>HLATHIKULU GOVERNMENT HOSPITAL</td>
<td>16</td>
<td>11,520</td>
<td>3,108 28%</td>
<td>8,552</td>
<td>2,592</td>
<td>406 100%</td>
</tr>
<tr>
<td>LUBOMBO REFERRAL HOSPITAL</td>
<td>16</td>
<td>11,520</td>
<td>708 6%</td>
<td>10,812</td>
<td>5,052</td>
<td>150 100%</td>
</tr>
<tr>
<td>LUZENGO CLINIC</td>
<td>4</td>
<td>2,880</td>
<td>372 13%</td>
<td>2,508</td>
<td>1,068</td>
<td>885 100%</td>
</tr>
<tr>
<td>MANKAYANE GOVERNMENT HOSPITAL</td>
<td>8</td>
<td>5,760</td>
<td>1,570 27%</td>
<td>4,190</td>
<td>1,310</td>
<td>316 100%</td>
</tr>
<tr>
<td>MATSANIENI HEALTH CENTRE</td>
<td>8</td>
<td>5,760</td>
<td>869 15%</td>
<td>4,891</td>
<td>2,011</td>
<td>139 100%</td>
</tr>
<tr>
<td>AMF MATSAPHA COMPREHENSIVE HEALTH CARE</td>
<td>16</td>
<td>11,520</td>
<td>2,056 18%</td>
<td>9,444</td>
<td>3,704</td>
<td>627 100%</td>
</tr>
<tr>
<td>MATSAPHA CORRECTIONAL CLINIC</td>
<td>4</td>
<td>2,880</td>
<td>201 7%</td>
<td>2,676</td>
<td>1,236</td>
<td>12 100%</td>
</tr>
<tr>
<td>MBABANE GOVERNMENT HOSPITAL</td>
<td>16</td>
<td>11,520</td>
<td>3,282 33%</td>
<td>7,692</td>
<td>1,932</td>
<td>613 100%</td>
</tr>
<tr>
<td>NATIONAL TB HOSPITAL</td>
<td>16</td>
<td>11,520</td>
<td>1,878 16%</td>
<td>9,642</td>
<td>3,862</td>
<td>1,384 100%</td>
</tr>
<tr>
<td>NHLANZANDO HEALTH CENTRE</td>
<td>16</td>
<td>11,520</td>
<td>2,001 18%</td>
<td>9,450</td>
<td>5,095</td>
<td>459 100%</td>
</tr>
<tr>
<td>PHOCWENI MILITARY CLINIC</td>
<td>4</td>
<td>2,880</td>
<td>984 32%</td>
<td>3,946</td>
<td>506</td>
<td>227 100%</td>
</tr>
<tr>
<td>PINES PSK GOVERNMENT HOSPITAL</td>
<td>16</td>
<td>11,520</td>
<td>1,470 13%</td>
<td>10,050</td>
<td>4,290</td>
<td>1028 100%</td>
</tr>
<tr>
<td>NATIONAL PSYCHIATRIC HOSPITAL</td>
<td>4</td>
<td>2,880</td>
<td>313 11%</td>
<td>2,567</td>
<td>1,127</td>
<td>42 100%</td>
</tr>
<tr>
<td>RFM HOSPITAL</td>
<td>4</td>
<td>2,880</td>
<td>2,200 77%</td>
<td>660</td>
<td>(780)</td>
<td>1016 100%</td>
</tr>
<tr>
<td>SIGOMBENI RED CROSS CLINIC</td>
<td>4</td>
<td>2,880</td>
<td>244 8%</td>
<td>2,256</td>
<td>1,090</td>
<td>100 100%</td>
</tr>
<tr>
<td>RSC MHUME</td>
<td>4</td>
<td>2,880</td>
<td>404 14%</td>
<td>2,475</td>
<td>1,038</td>
<td>102 100%</td>
</tr>
<tr>
<td>RSC SIMUNYE</td>
<td>4</td>
<td>2,880</td>
<td>469 23%</td>
<td>2,231</td>
<td>751</td>
<td>76 100%</td>
</tr>
<tr>
<td>SIFOTOFANE CLINIC</td>
<td>4</td>
<td>2,880</td>
<td>624 22%</td>
<td>2,256</td>
<td>816</td>
<td>777 100%</td>
</tr>
<tr>
<td>SITHOBELA RURAL HEALTH CENTRE</td>
<td>4</td>
<td>2,880</td>
<td>292 10%</td>
<td>2,588</td>
<td>1,148</td>
<td>225 100%</td>
</tr>
</tbody>
</table>

**GeneXpert Current Locations**

**Key Takeaways**

- EID volumes are small in comparison to remaining capacity
- Placing new instruments at sites with high TB volumes
- A pilot for feasibility is recommended at high functioning and lower functioning sites: HR requirements are critical consideration
- Layering additional tests (e.g. VL for Pregnant women; VL for HIV/TB co-inf)
Country Examples:

Nigeria
Nigeria: Optimizing referral linkages with existing instruments

- Not all clinic volumes assigned to the nearest lab due to capacity constraints
- 19 of 27 labs would be at full capacity
- Some clinics sending to multiple labs due to full lab capacities

Instruments placement and capacity are not aligned with the geographic distribution of patients.
Nigeria: Selection of 11 PEPFAR Sites from Existing (GF and FGoN Locked)

- Leaving FGoN and GF Sites in place
- Removing Planned Discontinuation sites
- Selecting best 11 locations from remaining existing lab locations
- No capacity constraints (currently not enough capacity within the 16 sites)
Nigeria: Updated Instrument Capacity

- Updated the capacity to expected volumes
  - Adding high-throughput machines in 6 locations
- Changes to the “optimal” referral assignments
  - Most significant changes to Benue
  - Tests get re-routed to Abuja area when realistic future capacities are included
- Average Distance and Ranges stay the same
**KEY TAKEAWAYS**

- TB and HIV sample collection sites overlapped by over 85%
- Heavy concentration of Genexpert instruments in urban areas with low utilization
Nigeria: Integrated PCR and TB Sample Referral Network
Network Efficiencies Gained:

- Reduction in footprint from 27 to 16 labs
  - 11 PEPFAR-supported sites
- Cost reduction due to optimized network footprint and integrated SR estimated at 40%
- Testing volumes increased by 1,001%
- 7-fold increase in specimens (sputum, DBS, VL, CD4) transported
- Health facility coverage increased from 1,700 to 2,969 (+75%)
- Sample rejection rates were reduced from 36% to 8%

Publication: Faruna, T., Akintunde, E. Odelola, B., Leveraging private sector transportation/logistics services to improve the National Integrated Specimen Referral Network in Nigeria, Business Management Dynamics, Vol 8, No.7, Jan 2019, pp.08-20
Country Examples:

Lesotho
Lesotho: HIV VL, EID, and TB Instruments

**Instrument Overview: ALL**

Current: 35 Test Sites & 72 Machines

Projected: 46 Test Sites & 87 Machines

<table>
<thead>
<tr>
<th>Marker</th>
<th>Equipment Type</th>
<th>Total #</th>
</tr>
</thead>
<tbody>
<tr>
<td>✕</td>
<td>Alere-Q</td>
<td>15</td>
</tr>
<tr>
<td>✖</td>
<td>GeneXpert</td>
<td>50</td>
</tr>
<tr>
<td>✗</td>
<td>Roche CAP/CTM48</td>
<td>1</td>
</tr>
<tr>
<td>✘</td>
<td>Roche CAP/CTM96</td>
<td>3</td>
</tr>
<tr>
<td>✙</td>
<td>Roche 4800</td>
<td>2</td>
</tr>
<tr>
<td>✚</td>
<td>Hologic Panther</td>
<td>1</td>
</tr>
</tbody>
</table>

**Current State: Grand Total** 72

| ✚      | GeneXpert (Mini-Labs) | 13      |
| ✙      | Roche 4800            | 1       |
| ✚      | Hologic Panther       | 1       |

**Projected: Grand Total** 87

*Roche CAP/CTM96 @ NRL does both EID & VL testing

**Data Source:** Lesotho LabEQIP Template (VL) & GeneXpert Directory – 2019 (MOH) & URC Comments
# Viral Load Utilization

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Machine(s)</th>
<th>Annual Site Testing Capacity</th>
<th>FY2020 Baseline Utilization</th>
<th>FY2020 Finalized Current State 70% Coverage</th>
<th>FY2020 Finalized Targets Achieved</th>
</tr>
</thead>
</table>
| B1011: Botha-Bothe HOSP | Roche CAP/CTM 96 (1)  
Roche C4800 (1)           | 34,560  
44,640                   | 116%  
39,925                    | 86%  
29,687                     | 95%  
42,410                     |
| C1011: Motebang HOSP   | Roche C4800 (1)  
Hologic Panther (1)      | 46,080  
76,800                   | 135%  
62,354                    | 109%  
50,040                     | 93%  
71,485                     |
| D1011: Berea HOSP     | Roche C4800 (1)         | 46,080                        | 94%  
30,282                     | 66%  
43,260                     | 94%  
43,260                     |
| NRL                    | Roche CAP/CTM 96 (1)  
Roche C4800 (1)  
Roche C4800 (1)  
Hologic Panther (1)      | 156,000  
166,080                   | 108%  
168,227                    | 65%  
100,633                     | 87%  
143,761                     |
| A4021: Bots-abelo Leprosy HOSP (PIH) | Roche CAP/CTM 48 (1)      | 20,160                         | 41%  
8,282                      | 63%  
12,722                     | 90%  
18,174                     |
| E1011: Mafeteng HOSP | Roche CAP/CTM 96 (1)  
Roche C4800 (1)           | 34,560  
44,640                   | 306%  
105,641                    | 83%  
28,824                     | 92%  
41,177                     |
| F1011: Nts’ekhe HOSP | Hologic Panther (1)      | 76,800                        | 62%  
47,324                      | 88%  
67,606                     |
| **Total**              |                          | **414,240**                   | **427,873**                  | **299,511**                   | **427,873**                   |
Lesotho: FY2020 Optimized Integrated Sample Transport Network

![Map of Lesotho showing transport network]

**Table: Route Types**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Route Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Health Facility to Hub</td>
</tr>
<tr>
<td></td>
<td>Hub to Lab</td>
</tr>
</tbody>
</table>

**Table: Equipment Types**

<table>
<thead>
<tr>
<th>Marker</th>
<th>Equipment Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alere-Q</td>
</tr>
<tr>
<td></td>
<td>GeneXpert</td>
</tr>
<tr>
<td></td>
<td>Roche CAP/CTM48</td>
</tr>
<tr>
<td></td>
<td>Roche CAP/CTM96</td>
</tr>
<tr>
<td></td>
<td>Roche 4800</td>
</tr>
<tr>
<td></td>
<td>Hologic Panther</td>
</tr>
</tbody>
</table>

**Current State: Grand Total**

<table>
<thead>
<tr>
<th>GeneXpert (Mini-Labs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roche 4800</td>
</tr>
<tr>
<td>Hologic Panther</td>
</tr>
</tbody>
</table>

**Projected: Grand Total**

*Roche CAP/CTM96 @ NRI. does both ED & VL testing*
Multiplexing Opportunities

- 70% of the GeneXpert capacity dedicated for TB Testing
- Reviewed TB & EID combined capacities to assess VL opportunity
- BFPW prioritized
- 19 potential multiplexed sites

<table>
<thead>
<tr>
<th>Marker</th>
<th>Facility Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Marker-1]</td>
<td>GeneXpert</td>
</tr>
<tr>
<td>![Marker-2]</td>
<td>Multi-Plex GeneXpert</td>
</tr>
</tbody>
</table>
Thank you

For additional information, please contact Jason Williams (jwilliams@usaid.gov) and/or Dianna Edgil (dedgil@usaid.gov) for additional information
PEPFAR’s Approach for Diagnostic Network Optimization

September 12, 2019
Understanding Diagnostic Networks

- Diagnostic Network Challenges
- The Network Approach
- What is Diagnostic Network Optimization
- PEPFAR’s STTT Process for Network Optimization
- Challenges
- Specific Considerations/Assumptions
Diagnostic Network Challenges

• **Areas of focus:** Instrument placement, sample transport, patient access to appropriate testing services to derive a complete **diagnostic network approach**

• **Challenges**
  - Resource limitations for continued expansion of testing services
  - Fragmented and parallel sample transport networks
  - Suboptimal instrument placement and utilization
  - Insufficient patient access to appropriate testing services
  - Limited visibility into complete diagnostic capabilities
  - Diverse strategies and implementation approaches across donors, implementing partners and laboratory stakeholders
Benefits and Efficiency Gains

• Increased testing coverage, reduced testing turnaround times and improved patient care

• Elimination of duplicative referral lanes (HIV CD4/ VL/ IVT, HPV, HCV and TB GeneXpert/ Culture/ LPA)
  — Leverage overall investment in sample transport
  — Ensure standardization – reporting and oversight

• Evidence based instrument placement for improved patient access and/or increased utilization

• Reduced commodity distribution burden and needs

• Reduced instrument maintenance obligations

• Forward looking strategy to increase negotiation leverage with manufacturers and vendors
What is Network Optimization?

Areas of focus: Instrument placement, integrated sample transport, improved patient access to appropriate testing services to derive a complete diagnostic network approach

Optimization

• The action of making the best or most effective use of a situation or resources

Network Optimization and Modeling

• Use of data in decision-making tools
• Explore various what-if scenarios
• “Virtual Piloting”
• Not a one-time action or the final answer
PEPFAR’s Short Term Task Team: A Two-Step Approach to Network Optimization

Step 1

– Ensure complete national stakeholder buy-in and political will

– Work with country teams to collect data from MOH and PEPFAR (Datim) data sources to complete a modified LabEQIP template

– Data to include – existing testing sites, instruments, testing volumes, sample collection sites, programmatic patient demands by site, existing referral area, and turnaround times.

– Desktop-assessment of the existing HIV diagnostic network to calculate testing site capacity versus testing need and turnaround times.

  • Identification of geographically-localized gaps for rapid corrective action
  • Prioritization of countries with insufficient or excess (>150%) HIV molecular testing capacity and/ or VL/ IVT turnaround times that exceed targets for expanded (Step 2) optimization exercises

→ Repeat Step 1 routinely for continuous quality improvement
PEPFAR’s Short Term Task Team: A Two-Step Approach to Network Optimization

Step 2

- Clearly define the country goal — priorities for expanded optimization
- Collect additional data for geospatial analysis and modeling assumptions
- Import data into a GIS visualization tool
- Present outputs to refine assumptions, establish data gaps and further refine expectations for the optimization
- Establish a stakeholder workshop - present initial models
- Complete full data review with stakeholders — testing sites, instruments, testing volumes, sample collection sites, programmatic patient demands by site, existing referral linkages and further refine models
- Develop a prioritized, time-bound implementation plan
Challenges to Network Optimization

• Demand is high! High LOE

• Quality of exercises depends on high quality data
  – Testing site, clinical site and linkage data requirements

• Clearly defining the core questions of optimization
  – Disease Integration: Efficiency that considers centralized and decentralized strategies to improve patient access to testing

• Political boundaries versus proximity-driven placement

• Sample referral optimization vs. molecular network optimization (right sizing vs. expansion)

• Investment in sample referral networks

• Ensuring political will and coordination with implementation

• Lab infrastructure and capacity
Thank You