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DISCLAIMER
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Recommended citation

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### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>Acquired immune deficiency syndrome</td>
</tr>
<tr>
<td>ANC</td>
<td>Antenatal care</td>
</tr>
<tr>
<td>ART</td>
<td>Antiretroviral therapy</td>
</tr>
<tr>
<td>ASSIST</td>
<td>USAID Applying Science to Strengthen and Improve Systems Project</td>
</tr>
<tr>
<td>CHAPS</td>
<td>Centre for HIV and AIDS Prevention Studies</td>
</tr>
<tr>
<td>CQI</td>
<td>Continuous quality improvement</td>
</tr>
<tr>
<td>DBS</td>
<td>Dried blood spot</td>
</tr>
<tr>
<td>EID</td>
<td>Early infant diagnosis</td>
</tr>
<tr>
<td>FY</td>
<td>Fiscal year</td>
</tr>
<tr>
<td>GSM</td>
<td>Global system for mobile communications</td>
</tr>
<tr>
<td>HCW</td>
<td>Health care worker</td>
</tr>
<tr>
<td>HIV</td>
<td>Human immunodeficiency virus</td>
</tr>
<tr>
<td>HRH</td>
<td>Human resources for health</td>
</tr>
<tr>
<td>HTC</td>
<td>HIV testing and counseling</td>
</tr>
<tr>
<td>ICF</td>
<td>Intensified case finding</td>
</tr>
<tr>
<td>IEC</td>
<td>Information, education, and communication</td>
</tr>
<tr>
<td>IST</td>
<td>In-service training</td>
</tr>
<tr>
<td>IP</td>
<td>Implementing partner</td>
</tr>
<tr>
<td>IPT</td>
<td>Isoniazid preventive therapy</td>
</tr>
<tr>
<td>IQR</td>
<td>Interquartile range</td>
</tr>
<tr>
<td>KAP</td>
<td>Knowledge, attitudes, and practices survey</td>
</tr>
<tr>
<td>LIS</td>
<td>Laboratory information system</td>
</tr>
<tr>
<td>LTFU</td>
<td>Lost to follow-up</td>
</tr>
<tr>
<td>MDR-TB</td>
<td>Multi-drug-resistant tuberculosis</td>
</tr>
<tr>
<td>MMC</td>
<td>Medical male circumcision</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>MOPS</td>
<td>Ministry of Public Service</td>
</tr>
<tr>
<td>NSTS</td>
<td>National Sample Transport System</td>
</tr>
<tr>
<td>NTCP</td>
<td>National TB Control Program</td>
</tr>
<tr>
<td>PCR</td>
<td>Polymerase chain reaction</td>
</tr>
<tr>
<td>PEPFAR</td>
<td>U.S. President's Emergency Plan for AIDS Relief</td>
</tr>
<tr>
<td>PMTCT</td>
<td>Prevention of mother-to-child transmission</td>
</tr>
<tr>
<td>PNC</td>
<td>Perinatal care</td>
</tr>
<tr>
<td>QA</td>
<td>Quality assurance</td>
</tr>
<tr>
<td>QI</td>
<td>Quality improvement</td>
</tr>
<tr>
<td>RHMT</td>
<td>Regional health management team</td>
</tr>
<tr>
<td>RR-TB</td>
<td>Rifampicin-resistant tuberculosis</td>
</tr>
<tr>
<td>SMATS</td>
<td>Screening in Maternity to Ascertain TB Status</td>
</tr>
<tr>
<td>SNAP</td>
<td>Swaziland National AIDS Programme</td>
</tr>
<tr>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>TBIC</td>
<td>Tuberculosis infection control</td>
</tr>
<tr>
<td>TNA</td>
<td>Training needs analysis</td>
</tr>
<tr>
<td>UNAIDS</td>
<td>United Nations Programme on HIV/AIDS</td>
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<tr>
<td>URC</td>
<td>University Research Co., LLC</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>VMMC</td>
<td>Voluntary medical male circumcision</td>
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<td>WHO</td>
<td>World Health Organization</td>
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</table>
1 Introduction

Swaziland is one of the countries with the highest HIV prevalence in the world, with 31% of 18-49 year-olds living with HIV. In the same age group, women are disproportionately affected, with a prevalence of 38% compared to 23% in men. In the context of the entire population, 31% of all women are living with HIV, compared to just 20% of men.\(^1\)

Tuberculosis (TB) is also a major public health problem currently confronting Swaziland. Swaziland has one of the highest TB incidence rates in the world at 733/100,000 population (69/100,000 for multi-drug-resistant TB). About 8% of the new and 36% of the previously treated TB patients have multi-drug-resistant TB (MDR-TB), yet only 60% of the MDR or rifampicin-resistant (RR) TB patients are initiated on treatment. Treatment success stands at 78% among the susceptible TB cases and 60% among the MDR-TB cases.

Swaziland has made commendable progress in recent years in scaling up HIV and TB treatment and prevention services. TB and prevention of mother-to-child transmission (PMTCT) of HIV services are integrated within maternal, newborn, and child health services to ensure that as many HIV-positive women and children as possible are identified and cared for. Given Swaziland’s generalized HIV epidemic and high HIV prevalence, voluntary male medical circumcision (VMMC) was adopted as an HIV prevention strategy in 2008 at the community level. In addition, VMMC was integrated into most health care facilities across the country. Other fixed site and mobile VMMC services are provided by non-governmental organizations (NGOs) and other community based organizations. Swaziland concentrated its efforts on young men aged 15-24 years, where HIV prevalence was lowest for males. However, less than 50% of the target has been reached to date.

Because of the high HIV and TB burden, the Swaziland Ministry of Health (MOH) made significant investments in building the capacity of its health workforce to deliver quality health services related to HIV and TB through in-service training (IST). Despite these investments, IST in Swaziland continues to be faced with immense challenges including: poorly coordinated trainings organized by different training providers targeting the same health care workers (HCWs), resulting in duplication of trainings and disruption of services. Since 2014, the USAID Applying Science to Strengthen and Improve Systems (ASSIST) Project has been working with the MOH to improve coordination of trainings and develop minimum standards to guide the design and delivery of training, evaluation of learning, and strengthen post-training follow-up.

In fiscal year (FY) 2016, ASSIST Swaziland worked on three activities: 1) improving Option B+/antiretroviral therapy (ART) laboratory-related care and treatment monitoring; 2) in-service training; and 3) improving quality in the national VMMC program. Results and accomplishments for each activity are provided in this report.

## Program Overview

### What are we trying to accomplish?  
### At what scale?

1. **Improve Option B+/antiretroviral therapy (ART) laboratory-related care and treatment monitoring**

   - **a.** Strengthen National Sample Transport System  
     National; 121 health facilities
   
   - **b.** Establish mHealth options patient feedback system to ensure they return to the facility once laboratory results are available  
     National; 15 clinics

   - **c.** Strengthen screening for active tuberculosis in pregnant and lactating mothers Swaziland  
     National; 3 facilities

   - **d.** Conduct an evaluation on the implementation of TB/HIV collaborative activities in Swaziland  
     National; 11 facilities

   - **e.** Conduct a research on using the TB LAM test among persons living with HIV (PLHIV)  
     National; 3 facilities

2. **In-service training**

   - **a.** Assess human resources for health (HRH) capacity to deliver HIV/AIDS services required for epidemic control and achieve the 90-90-90 by 2020 HIV targets  
     National: covering nurses and doctors

   - **b.** Provide technical assistance, technical expertise, and consultations to improve effectiveness of IST  
     Regional PEPFAR clinical partners

   - **c.** Conduct systematic training needs assessment of priority lay cadres involved in HIV care (facility and community expert clients, lay counselors and data clerks) and utilize findings to improve training delivery for lay cadres  
     National among high and moderate volume sites  
     Community and facility expert clients, data clerks, lay counselors

   - **d.** Establish collaborations with at least one local training institution and provide direct technical support for development of IST training curricula for lay cadres  
     1 training institution

   - **e.** Provide direct technical assistance to the MOH training unit and the Ministry of Public Service (MOPS) training department  
     All MOH programs nationally, training providers, MOH training unit, facility IST coordinators and committees
What are we trying to accomplish?  At what scale?

3. Improve quality in the national VMMC program through strengthening the national QA/QI/CQI oversight and support for the program

- Conduct VMMC continuous quality improvement (CQI) baseline assessments  National: 5 health facilities
- Conduct quality assurance (QA)/CQI training  National: MOH and partner staff – 20
- Provide appropriate QA/quality improvement (QI)/CQI equipment, training, and support to the national office to develop a quality management database  National: Strengthen data management system
- Provide technical assistance to the National VMMC team to strengthen CQI assessment, coaching and oversight  CQI visits and quarterly CQI assessment of 5 facilities
- Provision of honorarium to support senior national VMMC manager  National VMMC manager to create sustainability

Improvement Activity

Cross-cutting Activity

3  Key Activities, Accomplishments, and Results

Activity 1. Improve Option B+/ART Laboratory-related Care and Treatment Monitoring

1.a. Strengthen the National Sample Transport System to improve sample transportation for viral load testing among HIV-infected pregnant women

BACKGROUND

The revision of the PMTCT guidelines in Swaziland to align with the World Health Organization (WHO) 2013 PMTCT recommendations meant that all pregnant women be initiated on ART regardless of their CD4 cell counts (Option B+). In FY15, ASSIST began to support the National Sample Transport System (NSTS) to improve Option B+/ART laboratory-related care and treatment monitoring. In FY16, ASSIST provided support to increase the capacity of the NSTS to support peripheral clinics more regularly and frequently to ensure specimen transportation for viral load testing for the clients.

ACCOMPLISHMENTS AND RESULTS

- Provided support to increase the capacity of the NSTS to service peripheral clinics to ensure specimen transportation for viral load testing. Figure 1 shows the increasing volumes of samples for viral load testing collected from the three regions (Lubombo, Hhohho and Manzini) from July 2015 to February 2016, due to additional vehicles provided to the NSTS.
- Procured and distributed refrigerators to improve specimen storage for viral load testing at facilities providing Life-Long Antiretroviral Therapy for Pregnant and Lactating Women (LLAPLa) (June 2016). Ten facilities in the Lubombo Region were found to need the equipment to enable them provide a comprehensive service for HIV care and treatment. The delivery of refrigerators and centrifuges contributed to improving laboratory-related clinical support systems for the roll-out of LLAPLa. The activity was completed in June 2016.

**1.b. Establish mHealth platform to improve viral load results delivery for HIV-infected pregnant women**

**BACKGROUND**

The mHealth project started in FY16 aims to improve viral load results delivery and retain HIV-infected mothers and their babies in care. The roll-out of Option B+ for all pregnant HIV-infected women to help eliminate mother-to-child transmission of HIV has necessitated that all pregnant women on ART be monitored to ensure viral load suppression. With strengthening of the NSTS to deliver samples for viral load testing, it was important that the results be delivered in a timely manner to improve treatment monitoring. Our mHealth platform delivers results to the clinics, informs the patient about available results, and reminds the patient of scheduled appointments. The platform also links the infant to the mother and reminds the health care worker to retest both if they are eligible for retesting for HIV. The platform is being rolled out in phases, with 15 clinics using the platform in the first phase; Phase 1 began in FY16.

The availability of a functional contextualized mHealth platform enabling real time notification and retrieval of viral load test results from a centralized testing laboratory to peripheral and hard-to-reach clinics is of critical importance for timely patient management and follow-up. The cellular phone GSM (global system for mobile communications) signal provides a cheaper and more practical alternative to augment network connectivity where conventional landline telephone and internet network infrastructure is not available. In addition, GSM VPNs (virtual private networks) can be used to achieve cost containment for data and ensure data security as traffic is isolated and access is targeted.
ACCOMPLISHMENTS AND RESULTS

- ASSIST mHealth team held regular project meetings with the software development consultant (Technobrain Ltd), GSM service provider (MTN Swaziland), and the hardware vendor (PC Systems) to coordinate the mHealth system development and readiness for deployment process (Q1).

- Developed and tested the interface for capturing details of pregnant mothers when they come for testing and recording their results and appointment (Oct – Dec 2015). A consultant software developer created the mHealth application (see Figure 2 and Figure 3), and the ASSIST mHealth project team tested it.

Figure 2. Sample of text message received by test patient from the mHealth app

Figure 3. Interface for the mHealth application

- Following meetings in Q1 conducted by the ASSIST mHealth team with key stakeholders (MOH, Strategic Information Department, Swaziland Health Laboratory Services, Sexual Reproductive Health Unit, Health Information Systems Coordination Committee, and PEPFAR implementing partners, ASSIST agreed to implement the mHealth project in additional regions (Jan 2016). The following pilot sites were selected:
  - **Lubombo Region:** Good Shepherd Hospital, Siteki Public Health Unit, Siphofaneni Rural Health Center, Sithobela Health Center, Cabrini Ministries, Ubombo Hospital, Lomahasha, New Thulwane, Nkalashane, and Hlane
  - **Hhohho Region:** Lobamba, Motshane, Bhaalekane, and Horo
  - **Manzini Region:** Raleigh Fitkin Memorial Hospital and King Sobhuza II

- Chose 15 sites in three regions, conducted site readiness assessments, procured hardware (desktop computers), and developed a software installation and training schedule for the facility-based health care workers (Jan – Feb 2016).

- Tested system on 15 test patients, who received text messages (i.e., SMSs reminding them of clinic appointments as well as availability of their laboratory results in the clinic) (Mar 2016).

- Collected baseline data (Mar 2016). See Table 1.
Baseline data for PMTCT indicators and values of the mHealth application (Sept 2015 – Mar 2016)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Data source (for verification/validation of report from mHealth server)</th>
<th>Sept 2015 (Baseline)</th>
<th>Mar 2016 (Baseline)</th>
</tr>
</thead>
<tbody>
<tr>
<td># of HIV+ pregnant and lactating women who are registered in care</td>
<td>ANC register, PNC register, HTC tally sheet</td>
<td>906</td>
<td>3413</td>
</tr>
<tr>
<td># of HIV+ pregnant and lactating women who are initiated on ART</td>
<td>ANC register, ART register</td>
<td>136</td>
<td>535</td>
</tr>
<tr>
<td># HIV+ pregnant and lactating women who had a viral load test done and received their results within the reporting period</td>
<td>Lab log book at facility, ANC register</td>
<td>57</td>
<td>304</td>
</tr>
<tr>
<td># pregnant and lactating women who were retested for HIV during care in the reporting period</td>
<td>ANC register, PNC register, HTC tally sheet</td>
<td>517</td>
<td>2169</td>
</tr>
<tr>
<td># exposed babies who had an early infant diagnosis (EID) between 6-8 weeks</td>
<td>DBS log book at facility</td>
<td>207</td>
<td>1091</td>
</tr>
<tr>
<td># exposed babies who had EID between 6-8 weeks and received their results</td>
<td>DBS log book at facility</td>
<td>168</td>
<td>812</td>
</tr>
<tr>
<td># exposed babies who were retested between 12 and 24 months (rapid test)</td>
<td>CWC register</td>
<td>4</td>
<td>38</td>
</tr>
</tbody>
</table>

- Finalized the mHealth platform for HIV+ pregnant women, lactating mothers, and their babies to inform patients about viral load and dry blood spot (DBS) results from the laboratory (Apr 2016). The mHealth platform enables real time notification and retrieval of viral load test results from a centralized testing laboratory to peripheral and hard to reach clinics is of critical importance for timely patient management and follow up. (See Figure 4 for diagram.)

**Figure 4. Diagram of mHealth platform’s functionality**

- Presented the mHealth system to the Viral Load Roll-out Technical Working Group (May 2016). It was well received and recommended for scale-up and adoption for other conditions and laboratory results.
- Resolved laboratory configuration issues (Aug 2016). The Laboratory Information System (LIS) vendor rolled out an upgrade which changed the functionality of the LIS. This was done by changing the way in which lab results were named (e.g., previously instead of choosing a unique identifier, the LIS used the patient’s name and was therefore generating multiple reports for one patient since in
Swaziland, many people share the same name -- making it impossible to match lab results generated with patients captured in the mHealth system. This stalled the implementation of the mHealth system to facilities. ASSIST engaged the Swaziland Health Laboratory Service, Association of Public Health Laboratories (partner supporting the implementation of the LIS in Swaziland), and Laboratory System Technologies (vendor implementing LIS in Swaziland) to revert to naming the lab results using the unique identifier.

- **Installed the mHealth system in three sites** (Sept 2016). The project team installed the system and trained staff members at three facilities on using the application. Retrospective data entry is ongoing, and patient appointments have been entered into the system.

### 1.c. Conduct operational research for TB screening among pregnant women

#### BACKGROUND

The Screening in Maternity to Ascertaining TB Status (SMATS) Study, conducted by ASSIST in collaboration with the MOH, evaluates the sensitivity and specificity of the current TB screening tool for pregnant and lactating women (both HIV-infected and not) as well as the additional benefits of adding screening diagnostics like the interferon-gamma release assay (IGRA) and a chest x-ray. This is a cross-sectional analytical study involving pregnant and lactating women attending antenatal or postnatal care, respectively, at three facilities. Data were collected from all participants who agreed to take part in the study, regardless of results of the four-symptom screening. It is anticipated that this study will assist in identifying the most sensitive screening algorithm for pregnant and lactating women in Swaziland that will maximize the number of true cases detected to facilitate timely diagnosis and initiation of TB treatment. This, in turn, will help to improve maternal and child health outcomes in the country.

#### ACCOMPLISHMENTS AND RESULTS

- **Recruited 990 study participants** (Aug 2015 – Mar 2016). The study reached the minimum required sample. As shown in Figure 5, the recruitment rate declined from December 2015 until the completion of data collection in March 2016.

**Figure 5. Monthly participant recruitment for the SMATS study (Aug 2015 – March 2016)**

- **Figure 6** shows the study enrollment figures for all the recruitment categories from August 2015 to March 2016. The HIV-positive lactating category recorded less than 250, however more than the minimum sample required 173.
Figure 6. Total recruitment by category of women, SMATS study (Aug 2015 – Mar 2016)

- **Tuberculin skin test loss to follow-up:** The tuberculin skin test was administered to 990 women, however the loss to follow-up (LTFU) was high at 21% (249). The return rate within 48-72 hours for the reading of the skin reaction was very low due to various reasons, most relating to other engagements considered higher priority.

- **Completed data collection, cleaning, and analysis** (July – Sept 2016). Report writing is ongoing, and dissemination of the results is planned for the first quarter of FY17.

### 1.d. Evaluation of TB-HIV collaborative activities in Swaziland

#### BACKGROUND

As recommended by WHO, ASSIST Swaziland has implemented TB-HIV collaborative activities since 2012. These activities aimed to decrease the burden of TB among PLHIV through the 4I’s:

- **Intensified TB case-finding (ICF),** the main strategic intervention to reduce TB-associated morbidity and mortality among PLHIV
- **Isoniazid preventive therapy (IPT) provision,** a strategy used to reduce the risk of progression of TB from latent to active disease, and to initiate patients diagnosed with active TB on treatment
- **TB infection control (TBIC) practices in health care and congregate settings,** especially TB clinics and hospitals
- **Early ART initiation among TB patients regardless of their CD4 cell count**

ASSIST, in collaboration with the MOH, evaluated the implementation of these activities to identify key performance areas in which the HIV and TB programs needed to improve in their collective quest to contain the dual epidemic which has put enormous pressure on the health delivery system in Swaziland. There were two main components to this evaluation: 1) a retrospective quantitative review and data abstraction from TB and HIV facility data sources, and 2) a TB infection control evaluation involving completion of a facility assessment tool and HCW knowledge, attitudes, and practices (KAP) survey. Data collection was conducted from August to October 2015. The evaluation was conducted in 11 TB and HIV care and treatment sites. The sites were purposefully selected to ensure representation of all four regions of Swaziland and all facility types (hospitals, health centers, and clinics). Sites were required to have provided both TB and HIV services and been operational at least one year prior to study initiation, with enough patients to achieve sample size.

A cohort sampling strategy was used to assess the ICF cascade and ART uptake. For the ICF cascade assessment, HIV care and treatment facility records were retrospectively examined to identify a cohort of eligible patients for data abstraction. Patients were considered eligible for inclusion if they were at or older than 15 years, seen at a select site July – November 2014, and not diagnosed with TB within the 12 months preceding the beginning of the study. For the ART assessment, TB facility records were retrospectively examined to identify a cohort of eligible patients aged ≥15 years, seen during and retained by the end of Nov 2014, and with an unknown or positive HIV status.
ACCOMPLISHMENTS AND RESULTS

- **Completed data analysis** (Jan 2016). 2,058 PLHIV were included in this evaluation for ICF. Of these, 45.6% were male, 54.2% were female. The median age was 33 [interquartile range (IQR): 27-41]. The median age for men [36 (IQR: 30-43)] was higher than for women [30 (IQR: 25-38)].

Nineteen percent (19%) of PLHIV received their care at a clinic, 34% at a health center, and 46.5% at a hospital. The cascade showed that about half (12/23) of the people with a positive TB screen received a diagnostic evaluation, however 75% (9/12) of those who had a diagnostic evaluation were found to have a positive TB diagnosis, and 89% (8/9) went on to initiate appropriate TB treatment (Figure 7). The study revealed that more women than men access care, which is in keeping with known health-seeking behavior patterns, and also that more female than male eligible clients start IPT (see Table 2). However, once on treatment, especially anti-TB treatment, more men than women achieved treatment success; with more women failing or defaulting treatment (Table 2. Percentage of eligible patients started on IPT by sex (July-Nov 2014))

<table>
<thead>
<tr>
<th>Sex</th>
<th># IPT eligible (negative screen or diagnostic)</th>
<th># IPT started (% of eligible per category/row)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>697</td>
<td>48 (6.9%)</td>
</tr>
<tr>
<td>Female</td>
<td>891</td>
<td>69 (7.7%)</td>
</tr>
</tbody>
</table>

- **Figure 8 and Figure 9.** This information will be used to inform interventions for women living with HIV on TB treatment to improve their outcomes.

**Figure 7. Cascade results of TB/HIV collaborative activities, 11 HIV clinics (July – Nov 2014)**

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**Table 2. Percentage of eligible patients started on IPT by sex (July-Nov 2014)**

<table>
<thead>
<tr>
<th>Sex</th>
<th># IPT eligible (negative screen or diagnostic)</th>
<th># IPT started (% of eligible per category/row)</th>
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<tr>
<td>Female</td>
<td>891</td>
<td>69 (7.7%)</td>
</tr>
</tbody>
</table>
Figure 8. Cascade results of TB/HIV collaborative activities disaggregated by sex, 11 HIV clinics (Jul – Nov 2014)

Figure 9. TB treatment outcomes for HIV patients in care by sex, 11 facilities (July – Nov 2014)

- Finalized the evaluation of the implementation of TB/HIV collaborative activities to identify key performance areas that the HIV and TB programs need to improve (Apr – Jun 2016). In the baseline assessment evaluating TBIC knowledge, attitudes, and practices of health care workers at each of the selected facilities:
  - 2,058 records were reviewed for the ICF cascade, and 466 for ART provision. Forty-three (43) health care workers participated in the KAP TBIC assessment. TB screening was excellent.
  - 97% of chronic care patients had documented TB screening at their last visit. However, of those screening positive for TB, 46% did not have a documented TB diagnostic test. Of those that were evaluated, only 64% were diagnosed TB.
  - IPT uptake was also found to be very low, at 7% among those eligible.
  - CD4 count at TB treatment initiation was not documented in almost a quarter (24%) of patients, which may be a reflection of the national guideline recommendations, which emphasize that HCWs should not to wait for receipt of CD4 count results when initiating ART.
  - Almost 90% of TB patients were initiated on ART within two months of starting TB treatment.
  - Overall, 85% of co-infected patients in this cohort were documented to have achieved TB treatment success (33% completed and 52% cured).

- Disseminated the results of the TB/HIV evaluation (Jul – Sept 2016). A report was finalized and printed. This report was disseminated to in-country stakeholders by ASSIST in conjunction with the Swaziland National AIDS Program (SNAP) and The National TB Control Program (NTCP).
1.e. Conduct research on using the TB LAM test among PLHIV

BACKGROUND
This study, conducted by UNAIDS and ASSIST in collaboration with the Swaziland MOH, evaluated the incremental utility of the TB LAM test as an added tool for intensified case-finding for TB in PLHIV due to its advantages such as easy handling procedures of less infectious specimen, less sophisticated and affordable laboratory instruments required, and quick turnaround time of results (within 25 minutes). It also aimed to evaluate utility and issues surrounding nationwide scale implementation of the urine TB LAM test when used in conjunction with the TB symptom screening tool. We targeted consecutive HIV-positive patients attending the ART clinics at Mbabane and Hlatikulu Government Hospitals and Raleigh Fitkin Memorial Hospital for treatment and care. Purposive sampling methods were used for this study. All HIV-positive adults (ages 18 years and above) who were patients attending the HIV care centers were eligible for enrollment in the study, regardless of their ART status, as long as they had no current TB diagnosis and were not previously initiated/enrolled for IPT for the past two months of the data collection period. The sample size was 417.

ACCOMPLISHMENT AND RESULTS

- **Recruited study participants (417) (Sept 2015).**
- **Received all laboratory results from Swaziland Health Laboratory Services (Dec 2015).**
- **Conducted data analysis (Feb 2016).**
- **Finalized evaluation (May 2016).** Key findings by objectives are listed in **Table 3** and include:
  - The TB LAM test was able to diagnose one out of four patients who would have been missed when using the Xpert MTB and conventional sputum culture because they were unable to spontaneously produce a sputum.
  - The proportion of reported signs and symptoms were: cough (99.5%) and night sweat, fever and weight loss (84.4%, 79.6% and 66.7%, respectively). The sensitivity of the cough symptom was 100% whether or not the duration was greater than two weeks or any duration. However, specificity was very low; 0.3% (95% CI: 0.0-1.7) for a cough of any duration and still very low at 0.65% (95% CI: 0.0-3.5) for a cough of more than 2 weeks. Except for weight loss (sensitivity 68.4% [95% CI: 51.3-82.5]), cough, night sweats, and fever each had a sensitivity greater than 90%. However, all had specificities that were less than 35%.
  - True positive TB LAM test was significantly affected by ART status and CD4 cell count. However, after controlling for age, sex, CD4 cell count, and ART status, only CD4 cell count <100 (reference to CD4 cell count ≥100) remained a significant predictor of true positive TB LAM. The odds ratio of having true TB LAM positivity was 43.57 (95% CI: 4.97-381.86; p-value < 0.01) if CD4 cell count was <100 cells/mm3 when compared to those with CD4 cell counts above 100 cells/mm3.
  - The sensitivity of TB LAM increased as the CD4 cell count decreased: 55.6% (95% CI: 21.2-86.3) and a specificity of 90.9% (95% CI: 75.7-98.1) among those who had CD4 cell count less than 100 cells/mm3 compared to 20% (95% CI: 7.7-38.6) and 96.4% (95% CI: 93.8-98.1) respectively, for the overall study population. The sensitivity and specificity of Xpert MTB/RIF results was 77.8% (95% CI: 40.0-97.2) and 100% (95% CI: 89.4-100) among those who had CD4 cell count less than 100 cells/mm3.
In January 2014, the MOH training unit initiated an IST improvement project to improve the effectiveness, efficiency, and sustainability of IST systems in the MOH in the face of the HIV epidemic. The activity is based on the USAID Global Improvement Framework for Health Worker In-service Training. The ultimate goal is to strengthen the capacity of the MOH training unit to coordinate IST in the

**SPREAD OF IMPROVEMENT**

ASSIST has worked with the Swaziland National AIDS Program to spread the lessons learned from these studies and improvement efforts through executive mandates of SNAP. TB LAM screening will be included in the SNAP package of diagnostic work-up for late presenters.

**Activity 2. In-service Training**

In January 2014, the MOH training office and ASSIST initiated an IST improvement project to improve the effectiveness, efficiency, and sustainability of IST systems in the MOH in the face of the HIV epidemic. The activity is based on the USAID Global Improvement Framework for Health Worker In-service Training. The ultimate goal is to strengthen the capacity of the MOH training unit to coordinate IST in the

<table>
<thead>
<tr>
<th>CD4 category</th>
<th>TB LAM % (CI)</th>
<th>Xpert MTB/RIF % (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100</td>
<td>55.6% (21.2-86.3)</td>
<td>20.0% (7.7-38.6)</td>
</tr>
<tr>
<td>100-200</td>
<td>16.7% (0.6-64.1)</td>
<td>77.8% (40.0-97.2)</td>
</tr>
<tr>
<td>≥200</td>
<td>0.0% (0-21.8)</td>
<td>66.7% (22.3-95.7)</td>
</tr>
<tr>
<td>Overall</td>
<td>20.0% (7.7-38.6)</td>
<td>22.7% (7.8-55.1)</td>
</tr>
</tbody>
</table>

**Records**

- **Sensitivity**
  - Sensitivity: 90.9% (75.7-98.1)
  - Specificity: 99.0% (89.4-100)
  - Positive predictive value: 62.5% (24.5-91.5)
  - Negative predictive value: 88.2% (72.5-96.7)

- **Specificity**
  - Sensitivity: 90.9% (75.7-98.1)
  - Specificity: 99.0% (89.4-100)
  - Positive predictive value: 62.5% (24.5-91.5)
  - Negative predictive value: 88.2% (72.5-96.7)

- **Receiver operator characteristic**
  - Sensitivity: 0.73
  - Specificity: 0.57
  - Positive predictive value: 0.49
  - Negative predictive value: 0.49
  - Positive likelihood ratio: 0.89
  - Negative likelihood ratio: 0.83
  - Positive predictive value: 0.63
  - Negative predictive value: 0.75

- **Recommendations to improve TB diagnosis and case detection using the evidence from this study:**
  
  - TB LAM can be used in severely immunocompromised patients with CD4 cell count <100 to aid the diagnosis of TB (the sensitivity and specificity of TB LAM is 55.6% and 90.9% in patients with CD4 cell count <100, without targeted selection of patients in this study).
  
  - Targeting the correct population, TB LAM may have a limited value in aiding the detection of TB in patients unable to produce sputum (the probability of confirming additional TB cases using TB LAM among those without sputum who would have otherwise been missed is 1.8% without proper patient targeting).
  
  - Using one sample for Xpert MTB/RIF testing is not sufficient to guarantee accurate ruling out of TB disease. Therefore at least two samples for each patient should be sent for Xpert MTB/RIF (the sensitivity of Xpert MTB/RIF is 50% and specificity is 99.5% using one sample).
  
  - Culture should be prioritized for all presumptive patients who test negative for Xpert MTB/RIF, specifically those PLHIV with CD4 cell count ≥200 cells/mm3 who had TB were missed negative on Xpert MTB/RIF.

- **Shared findings with in-country stakeholders, in conjunction with SNAP and NTCP** (July – Sept 2016).

- **Dr. Munyaradzi Pasipamire**, a member of the URC Swaziland team, wrote an award winning abstract on this study, which was presented during the 21st International AIDS conference, Durban (July 2016). The abstract was entitled “Evaluating the incremental value of using TB LAM test in Intensified case finding for TB in people living with HIV.” (See http://www.aids2016.org/Programme/ConferenceProgramme/Prizes-Awards/Young-Investigators)
country and to institutionalize sustainable models for IST coordination. The activity thereby aims to improve the quality, efficiency, and effectiveness of IST for health workers through enhanced design, delivery, coordination, and tracking of all in-service training, as well as improve linkages with pre-service training.

2.a. Assess HRH capacity to deliver HIV/AIDS services required for epidemic control and achieve the 90-90-90 HIV targets

BACKGROUND

This activity was led by the regional health management team (RHMT) and the MOH training unit at MOH headquarters. It aims to identify the health care workers who need to be trained in order to offer quality and safe HIV services according to the national guidelines. This will inform a competence-based training plan, strategy, and appropriate allocation of training resources.

ACCOMPLISHMENTS AND RESULTS

- Developed a training needs assessment tool and uploaded it into Open Data Kit collect, a software for real-time data collection using an android phone or tablet. Training needs analysis (TNA) data collection started in August 2016 and will end in the first week of October 2016. By September 2016, data had been collected from 129 health care workers (nurses and doctors) in 41 out of the 48 health facilities in the Lubomombo Region. The next steps include finalization of data collection; data analysis and reporting; dissemination of the TNA report; development of a regional training plan; and then scaling up the TNA to other regions drawing from lessons learnt in the Lubombo Region.

2.b. Provide technical assistance, technical expertise, and consultations to PEPFAR partners, the MOH training unit, and RHMTs in utilization of the new Swaziland IST guidelines to improve effectiveness of IST

BACKGROUND

Following the development of the IST guidelines in FY15, technical expertise and consultations are being provided to all trainers, RHMTs, program officers, and technical staff from MOH partner organizations to implement the IST guidelines to improve the effectiveness of trainings. This will improve and standardize training best practices.

ACCOMPLISHMENTS AND RESULTS

- Continued to support the MOH training unit and all MOH programs and partners to develop a quarterly training calendar (June – Sept 2016) and conducted a meeting for all IST providers to develop a national IST calendar. All the PEPFAR clinical partners complied with the requirement for submitting training calendars for consolidation in the national IST calendar as per IST guidelines.
- Provided technical assistance to the National Quality Management Program and led the process for reviewing the National Quality Management Training Manual as part of the efforts to standardize training curricula (July 2016). Also provided technical assistance during the review of national training curricula/manual for integrated management of acute malnutrition. During the review of these curricula, ASSIST mentored the assistant training officer on standardizing training curricula.

2.c. Conduct systematic training needs assessment of priority lay cadres involved in HIV care (facility and community expert clients, lay counsellors, and data clerks) and utilize findings to improve training delivery for lay cadres in line with the required skills and practice for achieving the 90-90-90 HIV targets

BACKGROUND

Lay cadres play a large role in achieving the 90-90-90 HIV targets. This activity aims to identify the competencies required by the lay cadre to link patients who test HIV-positive into care, retain ART patients in care through counselling and facilitating ART refill, and ensure that patients on ART are assisted to achieve viral suppression.
ACCOMPLISHMENTS AND RESULTS

- Implementation of this activity is scheduled for FY17. In FY16, training needs assessments were conducted for professional health care workers. Lessons will be applied to the lay cadre TNA.

2.d. Establish collaborations with at least one local training institution and provide direct technical support for development of IST training curricula for lay cadres

BACKGROUND

This activity is in line with the USAID Global Improvement Framework for IST, which recommends the strengthening of local training institutions and infrastructure to sustainably provide IST. The project will identify and work with one local training institution to pilot the development of a course that will be offered by the institution to train health care workers. The pilot results will inform a transition of selected courses to be offered by the local institution rather than a MOH partner.

ACCOMPLISHMENTS AND RESULTS

- Implementation of this activity is scheduled for FY17.

2.e. Provide direct technical assistance to the MOH training unit and the MOPS training department

BACKGROUND

ASSIST supported the MOH training unit and training providers to improve specific areas along the training cycle. These included TNA, design, delivery, coordination, and evaluation of trainings to increase quality and the return on training investment. Capacity of the training unit staff was strengthened to enable them to monitor, improve, and share training best practices.

ACCOMPLISHMENTS AND RESULTS

- Disseminated the new Swaziland in-service training guidelines (July – Sept 2016). The IST guidelines are a document that guides training providers nationally on how to plan, design, conduct, evaluate, and follow up IST. They aim to standardize training practices and improve the effectiveness of health care worker training. The guidelines were finalized and approved by MOH Principal Secretary in FY15. The guidelines were printed and disseminated in FY16 to all training providers, programs, partners, MOH senior staff, RHMTs, facility IST coordinators, Ministry of Public Service, and Ministry of Education.
  o Oriented 25 officers from the MOH headquarters including senior staff on the guidelines.
  o Conducted workshops and oriented 40 in-service training coordinators from different facilities and training providers from different programs and partners nationally.
- Printed and disseminated in-service training standard registers and offsite facility feedback forms (July – Sept 2016). Following the approval of the standard IST registers and offsite facility feedback form, ASSIST printed 250 and 200 copies, respectively, for dissemination nationally to all health facilities, programs, and training providers. Dissemination will continue into FY17.
- Developed, printed, and disseminated the quarterly in-service training coordination calendar (July – Sept 2016). Following the IST coordination mechanism that was developed by the project previously, the MOH led a process for developing the national quarterly (July-September) IST coordination calendar that was approved and signed off by Principal Secretary. The calendar eliminates or at least reduces trainings scheduled for the same period targeting the same people; reduces disruption of training; and improves coordination of training generally. The calendar also helps facilities plan to organize staff in a way that reduces disruption of service delivery when others are away on training. Calendars were disseminated nationally to all facilities.
- Revised and standardized the quality management curriculum (July – Sept 2016). ASSIST provided technical expertise to the National Quality Management Program officers and led the process of reviewing the national quality management training curriculum. This was in line with the new IST guidelines which call for standard national curricula.
SPREAD OF IMPROVEMENT

ASSIST spread improvement for Activity 2.e. during FY16 through a collaborative approach and executive mandate of the MOH. The standardized IST registers, the quarterly IST coordination calendars, and the IST guidelines that were initially piloted by three MOH Public Health programs are now implemented by all 16 MOH programs.

Activity 3. Improve Quality in the National VMMC Program through Strengthening the National QA/QI/CQI Oversight and Support for the Program

BACKGROUND

Aligned to the National Health Strategic Framework for HIV/AIDS (NSF) for 2009–2014, the Kingdom of Swaziland launched the national VMMC policy in August 2009 to provide guidance on implementation. The initial medical male circumcision (MMC) program was followed by the Accelerated Saturation Initiative and the Early Infant Male Circumcision Program. VMMC implementing partners (IPs) supporting the MMC program in Swaziland include: The Centre for HIV and AIDS Prevention Studies (CHAPS) (21 facilities), Population Services International (13 facilities), and “The Luke Commission” (82 mobile service points). In FY16, ASSIST was invited by USAID Swaziland to expand the VMMC CQI work done in other countries within the Southern African region to Swaziland. This included CQI support to improve the quality of VMMC care through providing support and mentorship in planning, implementation, evaluation, and documentation. In order to build on current ASSIST experience, reduce costs, and improve scalability, all support to the Swaziland USAID-funded VMMC program is provided from the ASSIST South Africa office, with support from the ASSIST Southern Africa Region and Uganda offices as well.

ACCOMPLISHMENTS AND RESULTS

- Conducted VMMC CQI baseline assessments in the five demonstration facilities (July – Sept 2016). A summary of the findings is shown in Figure 10. The national MMC manager and quality assurance manager joined the ASSIST team and participated in the assessments. During the assessments, none of the clients were found to be eligible for MMC. The baseline findings will inform the design of the capacity building interventions.

Figure 10: VMMC CQI baseline assessment findings (July – Sept 2016)
4 Sustainability and Institutionalization

During FY16, the USAID ASSIST Project in Swaziland provided direct technical assistance, expert consultation, and mentorship to the MOH Training Unit, Ministry of Public Service Training Department, SNAP VMMC Unit, MOH Sexual and Reproductive Unit, the Swaziland Health Laboratory Service, and the HRH technical working group. Tried and tested interventions, tools, and systems were incorporated by the training unit into the MOH HR Department processes manual to become part of how the Ministry conducts business. The personnel supported were incrementally capacitated to take the lead in ASSIST-initiated activities to encourage country ownership while the ASSIST staff provided technical support as necessary. For the mHealth activity, the MOH Sexual and Reproductive Unit and the Swaziland Health Laboratory Service were involved in the design of the project and worked collaboratively with ASSIST and other PEPFAR regional clinical implementing partners during the pilot of the PMTCT mHealth project. After the pilot phase, the MOH and regional implementation partners are expected to scale up the intervention in additional sites within their regions beyond the 15 pilot sites.

5 Knowledge Management Products and Activities

- **TB LAM research**: A peer-reviewed journal submission is being developed from the results.
- **Conferences/Meetings**:
  - Participated in the National HIV semi-annual review meetings to share lessons learned from viral load notification scale-up (June 17-19, 2016).
  - Poster on lessons learned from implementation of mHealth was presented at International Conference on Viral Load Implementation held June 27-30 2016: “Lessons learnt in the early phases of implementing an mHealth platform for the notification and retrieval of viral load test results in a limited resource setting.”
  - Poster on the TB LAM study results was presented at the 21st International AIDS conference in Durban (July 2016): “Evaluating the incremental value of using TB LAM test in intensified case finding for TB in people living with HIV.”

6 Gender Integration

**Activity 1.d**: Sex-disaggregated data were collected and analyzed, which led to the identification of gender-related gaps in treatment outcomes in the TB-HIV collaborative activities. Though study data are from 2014, the study was completed in FY16 and results will be used to inform interventions for women living with HIV on TB treatment to improve their outcomes.

7 Directions for FY17

**Activity 1. Improve Option B+/ART laboratory-related care and treatment monitoring**

- Data analysis and report dissemination
- Implement mHealth in the pilot sites in all four regions and train regional clinical partner staff as super users for the mHealth portal for partner organizations.
Activity 2. In-service training

- Assess HRH capacity to deliver HIV/AIDS services required for epidemic control and achievement of the 90-90-90 HIV targets through systematic training needs analysis for HCWs (nurses and doctors) and identification of the skills gaps that can be addressed by PEPFAR partners and MOH through IST and clinical mentoring.
- Provide direct support technical assistance, technical expertise, and consultations to PEPFAR partners, the MOH training unit, and RHMTs in utilization of the new Swaziland IST guidelines to improve effectiveness of IST.
- Conduct systematic training needs assessments of priority lay cadres involved in HIV care (facility and community expert clients, lay counsellors, and data clerks) and utilize findings to improve training delivery for lay cadres in line with the required skills and practices for achieving 90-90-90 targets. These are the core providers of direct service delivery for PEPFAR-supported high- and moderate-volume sites.
- Establish collaborations with at least one local training institution and provide direct technical support for development of IST training curricula for lay cadres in line with 90-90-90 targets for IST that can be sustained locally.
- Provide direct technical assistance to the MOH training unit and the MOPS training department to institutionalize systems for IST coordination and conducting training needs assessments. Technical assistance will also be provided in planning, design, and delivery of IST that addresses local skills gaps for optimal performance in the health sector in line with 90-90-90 targets and those for other priority diseases.

Activity 3. Improve quality in the National VMMC program through strengthening QA/QI/CQI oversight and support for the program

- Conduct QA/QI/CQI training for the national VMMC team. QA/QI/CQI training will transfer knowledge and skills on basic quality principles and techniques.
- Provide appropriate QA/QI/CQI equipment and tools and training in their use.
- Support the national VMMC team to establish a quality management database that demonstrates the level of quality of VMMC services over time by facility.
- Provide technical assistance to the national VMMC team to strengthen QA/QI/CQI assessment, coaching, and oversight.