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**TB CARE I**



**TB CARE I – South Sudan  
Final Report**

**October 1, 2010 – December 31, 2014**

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**Submitted: December 10, 2014**



**Cover photo:** Refurbished laboratory in Magwi PHCC, Eastern Equatoria State.

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The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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## List of Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
CBO	Community Based Organization
CPT	Cotrimoxazole Preventive Therapy
CSO	Civil Society Organization
CTRL	Central TB Reference Laboratory
DOTS	Directly Observed Treatment Short Course
DR-TB	Drug Resistant TB
DST	Drug Susceptibility Test
EPI	Epidemiological analysis
EQA	External Quality Assurance
GF	Global Fund
HCW	Health care workers
HIV	Human Immunodeficiency Virus
HSS	Health Systems Strengthening
IC	Infection Control
IDP	Internally Displaced Persons
IPT	Isoniazid Preventive Therapy
JTH	Juba Teaching Hospital
KNCV	KNCV Tuberculosis Foundation
M&E	Monitoring and Evaluation
MDR-TB	Multi Drug Resistant Tuberculosis
MOH	Ministry of Health
MSH	Management Sciences for Health
NFM	New Funding Model
NGO	Non-governmental Organization
NSP	National Strategic Plan
NTP	National TB Program
OR	Operational Research
PHCC	Primary Health Care Center
PMDT	Programmatic Management of Drug Resistant TB
SRL	Supranational Reference Laboratory
TB CAP	Tuberculosis control assistance program
TB CARE I	TB Collaboration and Coordination Access to TB Services for All People Responsible and Responsive Management Practices Evidence-Based Project
TB	Tuberculosis
TBCTA	TB Coalition of Technical Assistance
TFM	Transition Funding Mechanism
TOT	Training of Trainers
USAID	United States Agency for International Development
USD	United States Dollar
VCT	Voluntary Counseling and Testing
WHO	World Health Organization

## Executive Summary

In South Sudan, the Tuberculosis (TB) Collaboration and Coordination Access to TB Services for All People Responsible and Responsive Management Practices Evidence-Based Project (TB CARE I), coordinated by Management Sciences for Health (MSH), works with the World Health Organization (WHO) and KNCV Tuberculosis Foundation as part of the Tuberculosis Coalition of Technical Assistance (TBCTA). The total buy-in for Years one through four is United States Dollars (USD) 4,206,000. The project is working at the national level and focuses on four major priority areas: 1) universal and early access of TB treatment; 2) strengthening of laboratory services; 3) health system strengthening; and 4) collaborative TB/human immunodeficiency virus (HIV) activities.

South Sudan is the youngest nation in the world, and relative peace was observed until December 15, 2013, when the country plunged into civil unrest following political divide. The country has one of the highest maternal mortality rates (2054/100,000 live births) and under 5 years mortality rates (135/1,000 live births). More than 90% of the population lives on less than one USD a day. Currently, the country is experiencing a humanitarian crisis, with over 1 million people displaced, 200,000 refugees moving into neighboring countries, and over 5 million people facing starvation. This has resulted in difficulties accessing basic health services. TB programs have collapsed in some areas, causing many TB patients to lose access to treatments. The WHO estimate the incidence of disease at 146/100,000 people, and mortality at 30/100,000 people (Global Tuberculosis report 2013).

A notable achievement during the implementation of the TB CARE I project was an increase in case notification, from 6,411 in 2010 to 8,924 in 2013. This can be attributed to increased access to TB services through the expansion of directly observed treatment short course (DOTS) centers, from 65 in 2010 to 87 in 2014. In June of 2013, 159 (males (M) 123, females (F) 26) community mobilizers were trained to refer suspects and follow-up patients for treatment adherence. Over 43,100 people were sensitized on TB, 1,249 with symptoms of TB were referred, and about 3% (43/1,249) of presumptive TB patients were smear positive. In Juba County, through the involvement of community mobilizers, the treatment success rate improved in Munuki primary health care center (PHCC) from 52% (cohort Q1 2012) to 92% (cohort Q3 2013), compared to the Juba Teaching Hospital (JTH), which is without community mobilizers, which reported a treatment success rate of 60% (cohort Q1 2012) and 58% (cohort Q3 2013).

The quality of TB microscopy has improved and expanded through the refurbishment and supply of equipment and starter kits for the newly established TB diagnostic centers. TB CARE I has renovated 10 peripheral and one state level laboratory. This has increased the number of labs performing TB microscopy from 65 in 2010 to 87 in 2014. The laboratory technicians have been trained, and 33% (29/87) of the laboratories are included in the networking of external quality assurance (EQA). In the second quarter of 2014, 21 out of 29 laboratories participated in EQA blinded re-checking, out of which 81% (17/21) performed acceptably.

TB CARE I has revised the 2<sup>nd</sup> National Strategic Plan (NSP) 2012 – 2016 and developed the 3<sup>rd</sup> NSP 2015 – 2019. The revision is an attempt to improve program performance, address the challenges faced during implementation of the previous plan, and to be in line with the Post-2015 Global TB Strategy. The Epidemiological (EPI) analysis of the National TB Program (NTP) data was conducted to support the NSP review process.

TB CARE I has supported the writing of the concept note to apply for the Global Fund through the new funding model (NFM). This offers an opportunity for the NTP to access more financial resources to scale up TB service delivery in South Sudan.

TB CARE I partnered with local and international non-governmental organizations (NGOs) to address the delivery of TB/HIV services to displaced and refugee populations. TB CARE I supported the establishment of TB/HIV services in Maban (Bunj Hospital) for over 100,000 refugees in Maban. The process of establishing TB services for internally displaced persons (IDP) in the Protection of Civilian (PoC) sites is on-going in Juba and in the IDP camp in Mingkaman. Over the period of April – July 2014, over 10,000 IDPs in Juba were sensitized on TB and over 345 presumptive TB cases were referred for further evaluation at the PoC hospital. Sputum samples were collected from 81 presumptive TB cases and transported to Juba Teaching Hospital for smear microscopy, and 48 TB cases were enrolled for TB treatment. Due to challenges involved in sample transportation, TB CARE I partnered with International Medical Corps in the protection of civilian site in Juba, where TB CARE I is supporting the establishment of TB services at the PoC Hospital.

## Introduction

In 2010, the United States Agency for International Development (USAID) awarded TB CARE I to the TBCTA. Management Sciences for Health (MSH) has been the coordinating partner in South Sudan. Other TBCTA partners that worked in South Sudan include the World Health Organization (WHO) and KNCV. The total buy-in for year one through four is USD 4,206,000. The project worked at the national level with the aim of strengthening the capacity of the NTP to coordinate all TB control efforts in South Sudan. TB CARE I built on the successes and lessons learned in the implementation of the TB Control Assistance Program (TB CAP) project (2005-2010) and was designed not only to strengthen the existing system, but to also implement new approaches and scale-up TB interventions identified in the NTP strategic plan. The plan focused on four major priority areas: 1) universal and early access of TB treatment; 2) strengthening laboratory services; 3) health system strengthening; and 4) collaborative TB/HIV activities. The need for a smooth transition from TB CAP to the TB CARE I mechanism called for well-coordinated efforts from coalition partners implementing the TB CARE I project in South Sudan. This entailed having skilled and experienced personnel in TB CARE I to build on the challenges and lessons learned during implementation of TB CAP.

South Sudan, the youngest nation in the world, attained its independence on July 9, 2011, after more than two decades of intensive civil war and violence dating back half a century. As a young nation with multiple competing priorities, the government contribution to health services is still progressing through support for the staff salaries and maintenance of health infrastructure. The general health service coverage is only 30%. The country has one of the highest maternal mortality rates (2054/100,000 live births) and under 5 mortality rates (135/1,000 live births). More than 90% of the population lives on less than one USD a day. According to the South Sudan Health Facility mapping conducted from 2009-2011 (Annex 1), about three quarters of health facilities in the country require renovation, and a third of them need total reconstruction. Integration of human resources within the Ministry of Health (MoH) payroll remains a challenge.

WHO estimates the incidence of TB at 146/100,000 and a mortality rate of 30/100,000 (Global Tuberculosis Report 2013). This report highlights key achievement within the technical areas highlighted above, challenges faced during implementation of activities, and future plans.

## Core Indicators

TB CARE I has seven core indicators that the program as a whole is working to improve across all countries. Table 1 summarizes the core indicator results across the life of the project for TB CARE I- South Sudan, as well as the Tuberculosis Control Assistance Program (TB CAP), the precursor to TB CARE I, which our coalition also led.

**Table 1: TB CARE I Core Indicator Results**

		<b>C1. Number of cases notified (all forms)</b>	<b>C2. Number of cases notified (new confirmed)</b>	<b>C3. Case detection rate (all forms)</b>	<b>C4. Number (and percent) of TB cases among healthcare workers</b>	<b>C5. Treatment success rate of confirmed cases</b>	<b>C6. Number of multi-drug resistant (MDR) cases diagnosed</b>	<b>C7. Number of MDR cases treated</b>
<b>TB CAP</b>	2005	N/a	N/a	N/a	N/a	N/a	N/a	N/a
	2006	N/a	N/a	N/a	N/a	N/a	N/a	N/a
	2007	N/a	N/a	N/a	N/a	N/a	N/a	N/a
	2008‡	4,414	3,955		N/a	79	N/a	N/a
	2009‡	5,789	5,407		N/a	78	N/a	N/a
	2010‡	6,441	6,011		N/a	75†	3	0
<b>TB CARE I</b>	2011	7,595	7,053	48	N/a	73†	4	0
	2012	8,924	8,218	53	N/a	52*	5	0
	2013	6,959	6,422	39	N/a		3	0

†Treatment success rate for new smear positive and/or culture positive cases registered (WHO report 2011 and 2012).

\*Treatment success rate for new and relapse cases registered in 2012 (WHO report 2013).

‡NTP database has data from 2008. The data from 2008 – 2010 is from the EPI analysis report.

N/a– Prior to 2011, the South Sudan tuberculosis program was reported as part of the Sudan program, and thus the report is not available.

During the five-year period of 2008 – 2012, a total of 33,163 cases of all forms of tuberculosis were reported to the NTP in South Sudan. The annual case notification rates for all forms of TB in South Sudan increased from 53.4/100,000 population in 2008 to 73.5/100,000 in 2010 and 96/100,000 in 2012. This progressive increase in the number of cases reported occurred in parallel to increasing the number of TB Management Units (TBMUs). TB CARE I has contributed to the increase of nine health facilities providing TB services in South Sudan. It has also re-established TB services in ten health facilities where services had collapsed during the project period.

## Universal Access

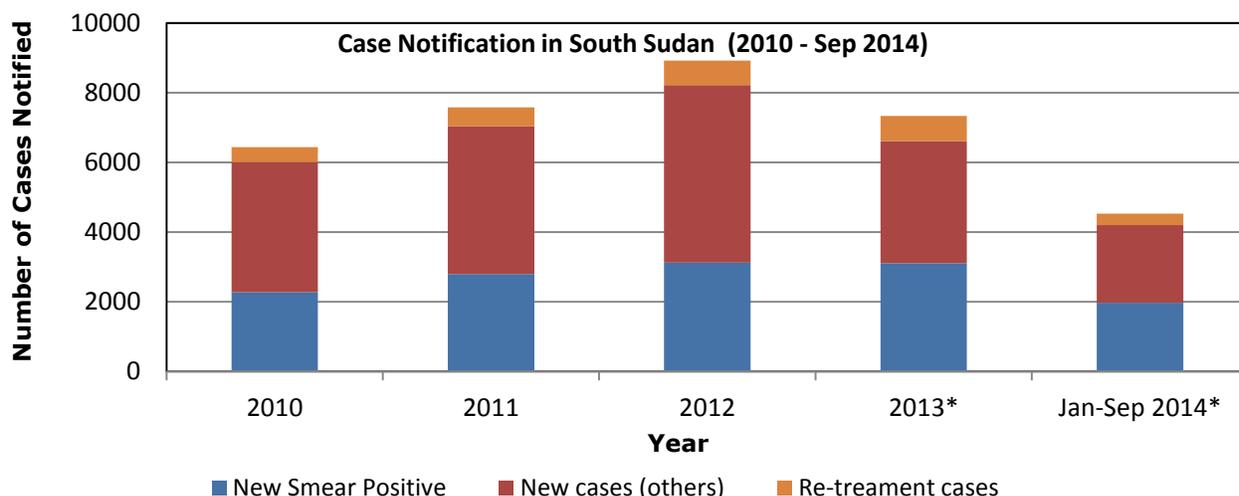
This technical area is jointly implemented by MSH and WHO, and focuses on increase in case notification and improves treatment outcomes through expansion and strengthening of DOTs services. The project focused on expansion of TB diagnostic and treatment facilities, training of health workers to build their capacity diagnose and treat TB and improving the quality of TB services provided. An assessment tool was used to identify facilities that need to integrate TB services into general health services. Health workers from the facilities were trained, supervised and mentored through joint visits. SOPs, job aids and other tools have been printed and disseminated.

**Table 2: Technical Outcomes – Universal Access**

Number	Outcome Indicators	Indicator Definition	Baseline (Year 2)	Target	Result
				Y4	Y4
1.2.8	Community-based DOTS (CB-DOTS) program is implemented	Score based on the following: 0 = There is not a CB-DOTS program in the country and there are no plans prepared for this purpose. 1 = There is not a CB-DOTS program in the country but plans are ready for piloting. 2 = NTP has piloted CB-DOTS in selected geographic areas. An implementation plan, including a timeline and budget with activities, should be in the plan. 3 = NTP has scaled-up the implementation of CB-DOTS to additional geographic areas, and data are available at the national level on CB-DOTS referrals and patients on treatment in CB-DOTS areas.	2	2	2
1.2.10	Health facilities offering CB-DOTS services	Number/percent of health facilities offering CB-DOTS. <b>Numerator:</b> Number of health facilities providing CB-DOTS services. <b>Denominator:</b> Total number of health facilities in the area (number of functional public health facilities at all levels, including Primary Health Care Unit, according to health facility mapping of 2011).	3.7% (43/1,147)	5.2% (60/1,147)	6.2% (72/1,147)
1.2.11	Number and percentage of health facilities with integrated TB services	<b>Description:</b> The purpose is to determine the extent to which TB services have been integrated in the health service. <b>Indicator value:</b> Number (percent).	3.7% (54/1,147)	8% (90/1,147)	7.6% (87/1,147)

		<p><b>Level:</b> National.</p> <p><b>Source:</b> NTP/ministry of health (MOH) monitoring and evaluation (M&amp;E) department.</p> <p>Means of verification: NTP database.</p> <p><b>Numerator:</b> Number of health facilities with integrated TB services</p> <p><b>Denominator:</b> Total number of health care facilities.</p>			
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During the implementation of the TB CARE I, the number of TB diagnostic facilities increased from 65 in 2010 to 87 in 2014. TB case notification has gradually increased to 8,995 in 2012 compared with 4,414 in 2008 (Figure 1). The data for 2013 and 2014 is not complete due to non-reporting of the health facilities from the crisis-affected states of Jonglei, Upper Nile, and Unity States.



\*Data for 2013 and 2014 is not complete. Some facilities have not been able to report due to the on-going crisis.

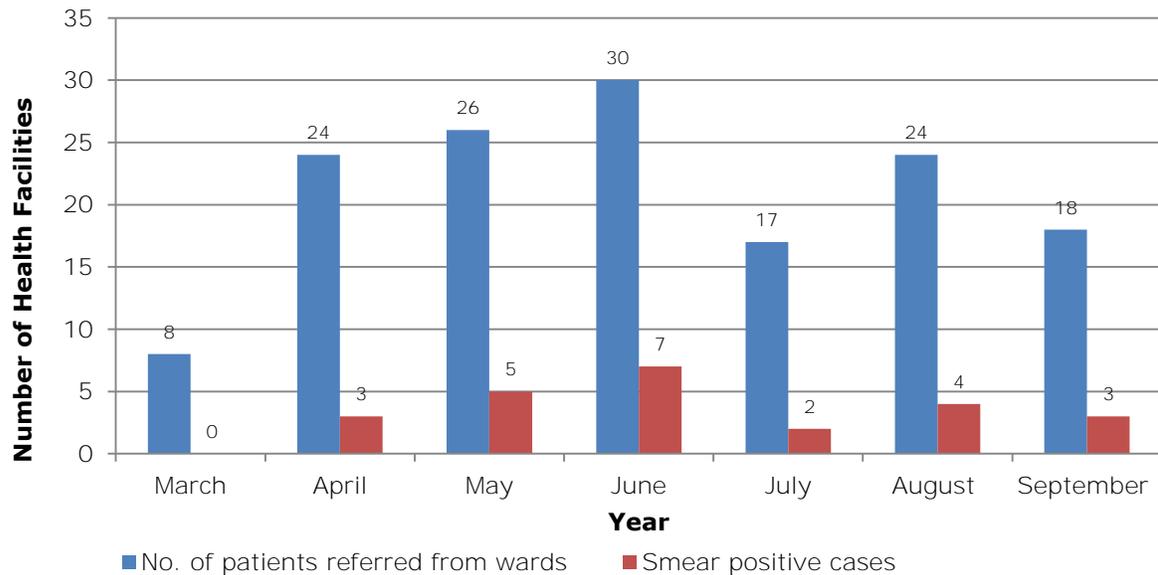
**Figure 1: Case Notification (2010 – September of 2014)**

### Key Results

- 1) Improved access to TB services through the integration of TB services and use of standard operating procedures (SOPs) in health facilities.**

TB services have been established in 19 health facilities (newly established in ten and re-established in nine health facilities) during the project period. The health facilities are located in Western, Eastern, and Central Equatoria state, except one in the Jonglei and Upper Nile states. SOPs for improving case detection have been introduced in 17 health facilities. In total, 176 individuals (M 76; F 96) have been trained on the use of the SOPs. A total of 193 SOPs have been distributed during the training and mentorship visits. The outcome of this

intervention was measured in Juba teaching Hospital (JTH) from March – September 2014, where about 16% (24/147) of patients referred for smear microscopy were bacteriologically confirmed.



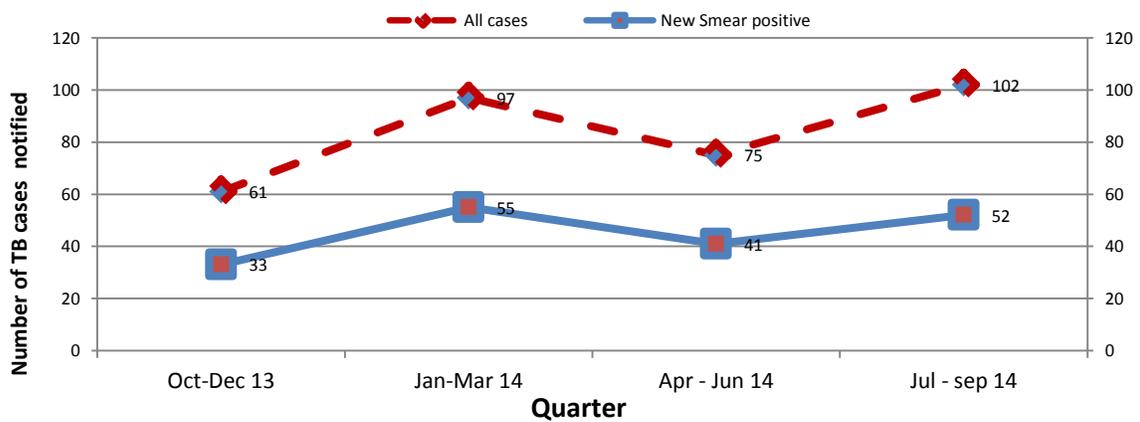
**Figure 2: Number of Bacteriologically Confirmed Patients among Those Referred from the In-Patient Department in JTH (March – September 2014)**

**2) Quality TB services are provided to the displaced population in the IDP camps (case finding and treatment adherence).**

This activity was planned in Year 4 of TB CARE I to respond to the displacement of South Sudanese following the crisis of December 2014. From April through November of 2014, TB CARE I has supported TB activities for the displaced population in the PoC in Juba city. A total of 8,158 people were sensitized on TB, out of which 70 TB cases have been enrolled for treatment in TBMUs within Juba (53 in Juba Teaching Hospital, 11 in Munuki PHCC, and 6 in Kator PHCC). In order to improve and coordinate implementation of TB services to the displaced population, TB CARE I supported a technical assistant in developing a framework for integrating TB services in the primary health care settings. This includes assessing the sites, training health care workers, providing equipment and lab supplies, linking the labs to the network of EQA, monitoring and supervision. In Juba, PoC sites were assessed and recommendations have been implemented. A laboratory technician has been trained on sputum smear microscopy, 16 (M 10; F 6) clinicians have been trained on TB diagnosis, treatment, recording, and reporting. In addition, 82 (M 54; F 28) community health workers have been trained on active case finding and referral of presumptive TB cases for diagnosis and follow up of patients on TB treatment in the community.

**3) Increase access to community TB services through linking CB-DOTs to the health facilities.**

TB CARE I has supported community approaches to improve case detection since October of 2013. The support includes holding the quarterly meetings for 71 active community mobilizers in Yei, Lainya, and Morobo Counties. From October 2013 – September 2014, over 43,100 people were sensitized on TB, of which 1,249 with symptoms of TB were referred. About 3% (43/1,249) of presumptive TB patients were smear positive. There has been a gradual increase in case notification in Yei due to the community mobilizers (Figure 3, Figure 4, and Figure 5).



**Figure 3: Presumptive Cases and Cases Notified in Greater Yei County (October 2013 - September 2014)**



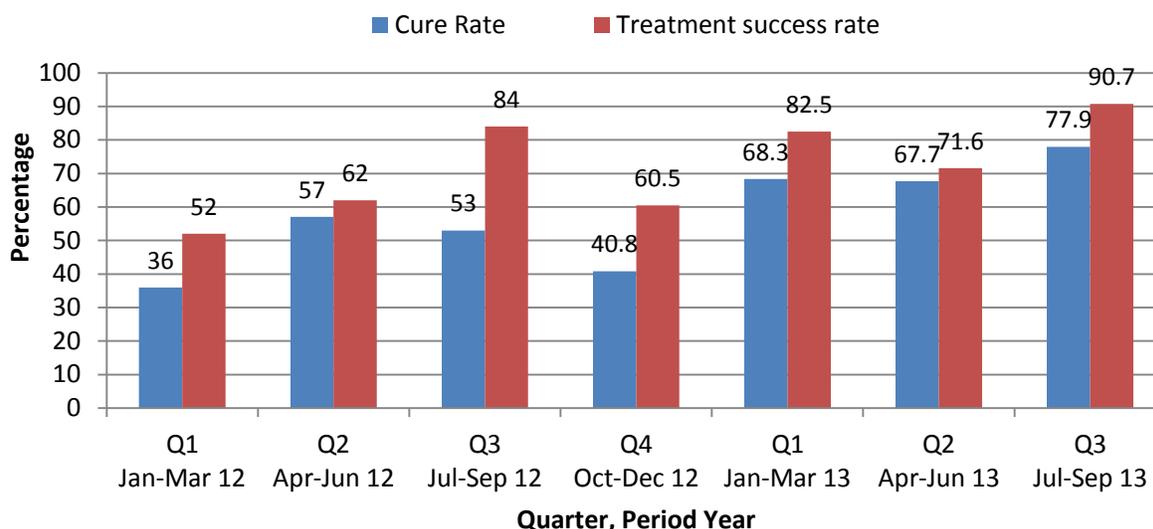
**Figure 4: Community Mobilizers Visiting a TB Patient in the Community**



**Figure 5: Patients Followed Up for Treatment Adherence by Community Mobilizers in Yei County**

#### **4) Improve treatment outcomes in Munuki TBMU in Juba City**

A community mobilizer and support to the TB focal persons were used to follow up on treatment. TB CARE I supported the sensitization meetings and provided airtime for community health workers. The TB patients who interrupt treatment are retrieved from the electronic register. An SMS is sent via mobile phone, and, when necessary, called by the health care workers. For those who do not appear, the list is provided to the community mobilizers, who then follow them in the community. This has been piloted in Munuki PHCC and has shown an improvement of treatment outcome from 52% for the cohort registered in January – March 2012 to 90.7% for the cohort registered in July – September 2013 (Figure 6).



**Figure 6: Treatment Success Rate for Bacteriologically Confirmed Patients Enrolled in Treatment (January 2012 – September 2013)**

### Challenges

- Since the violence that gripped the country in December of 2013, a significant proportion of the country cannot be accessed due to insecurity. The movement of populations has affected the quality and timeliness of reporting. Some health facilities have stopped reporting to the National TB program.
- Follow-up of patients on treatment in Juba City was interrupted by the displacement of population within and outside Juba.
- Limitation of movement has affected the plan to have the senior technical officers mentor other staff.
- Poor remuneration and irregular payment of government health care workers has led to a high turnover of skilled staff, thus reversing previously achieved gains.

### Next Steps

- Integrate TB services into the primary health care by involving all health partners.
- Establish mechanisms to provide services to displaced population and refugees. Continue to collaborate with partners to provide health services in the IDP and refugee settings.
- Engage communities in TB services by strengthening collaboration with Community Based Organizations (CBOs)/ Civil Society Organizations (CSOs) working at the community level. The government structure has recognized the need for home health promoters at the community level. This cadre can be involved in community TB services.

## Laboratories

TB CARE I continued to strengthen laboratory services by improving access to TB diagnosis through strengthening the peripheral laboratory network and establishing the EQA system. The training of 11 M) trainers (TOT) on sputum smear microscopy enabled the program to have skilled laboratory staff that can roll out trainings at the state level. The project trained 102 (87 M; 15 F) laboratory workers from peripheral laboratories on sputum smear microscopy. SOPs and job aides were developed and distributed during trainings and supervisory visits. , Refurbishment (renovation and equipment) of the laboratories has begun in order to improve the quality of TB lab diagnosis and integration of lab services. Through innovative approaches, EQA has been established in four states and will be rolled out to other states through the Global Fund (GF). Limited knowledge and skills of staff on TB laboratory is a challenge.

**Table 3: Technical Outcomes – Laboratories**

Number	Outcome Indicator	Indicator Definition	Baseline (Year 1)	Target	Result
				Y4	Y4
2.1.1	A national strategic plan developed and implemented for providing the TB laboratory services needed for patient diagnosis and monitoring, and to support the NTP.	Yes/No	0	1	1
2.1.2	Laboratories with working internal and external QA programs for smear microscopy and culture/drug susceptibility test (DST).	Percent of laboratories with working EQA for smear microscopy and culture/DST. <b>Indicator:</b> Number/percent. <b>Numerator:</b> Number of laboratories enrolled in EQA program for smear microscopy and/or culture/DST, both nationwide and in TB CARE I areas. <b>Denominator:</b> All laboratories (national and TB CARE I areas separately) that perform smear microscopy and/or culture/DST.	0% (0/65)	34% (30/87)	25% (22/87)
2.1.3	Laboratories demonstrating acceptable EQA performance.	This WHO indicator measures the percent of laboratories enrolled in EQA for smear microscopy and/or culture/DST that successfully passed EQA in the last reporting period.	N/a	90% (27/30)	74% (17/23) from April-September 2014

		<p><b>Indicator:</b> Number/percent.</p> <p><b>Numerator:</b> Number of laboratories enrolled in EQA for smear microscopy and/or culture/DST that passed the EQA assessment from the last reporting period.</p> <p><b>Denominator:</b> Number of laboratories enrolled in EQA for smear microscopy and/or culture/DST.</p>			
2.2.1	Confirmed link with a Supranational Reference Laboratory (SRL) through a memorandum of agreement.	The country has a written memorandum of agreement with an SRL as confirmation of a formal link with that SRL.	Yes	Yes	Yes

**Key Results**

**1) Improve access to quality TB services**

Ten peripheral laboratories and one state level laboratory were renovated and supplied with microscopes, equipment, and supplies (Figure 7 and Figure 8). Laboratory technicians from the ten renovated laboratories were trained on sputum smear microscopy. Follow-up mentorship has been conducted by senior Technical Officer TB lab services since September of 2013. The number of health facilities with TB diagnostic services has increased from 65 to 87, with TB CARE I playing a key role in the introduction of 45% (10/22) of the new laboratories during the project period.



**Figure 7: Laboratory Technician in Obbo PHCC after Renovation**



**Figure 8: Laboratory Technician in Magwi PHCC after Renovation**

**2) Expand Quality Assessment (EQA)**

TB CARE I hired a Technical Officer for TB laboratory services in August of 2013. Through his support, and despite the security situation, 29 laboratories have been included in the EQA (Figure 9) compared to zero in 2010. There have been 41 (32 M; 9 F) laboratory workers mentored and trained on-the-job on smear microscopy and how to store the slides for sampling for the blinded re-checking (Figure 10 and Figure 11). The activity has been accelerated through the opening of a TB microscopy section at the central TB reference laboratory (CTRL) in June of 2014. However, the culture and drug sensitivity testing (DST) sections are pending because of the delay in redesigning the rooms assigned to these activities. The database for EQA activities was designed for easy analysis of the quality assurance of participating laboratories. Since 2011, TB CARE I has managed to expand EQA to 33% of health facilities with TB diagnostic services (29/87) by September of 2014. Between April and June of 2014, the EQA performance was evaluated in 23 out of 29 facilities, and 74% (17/23) had acceptable results.

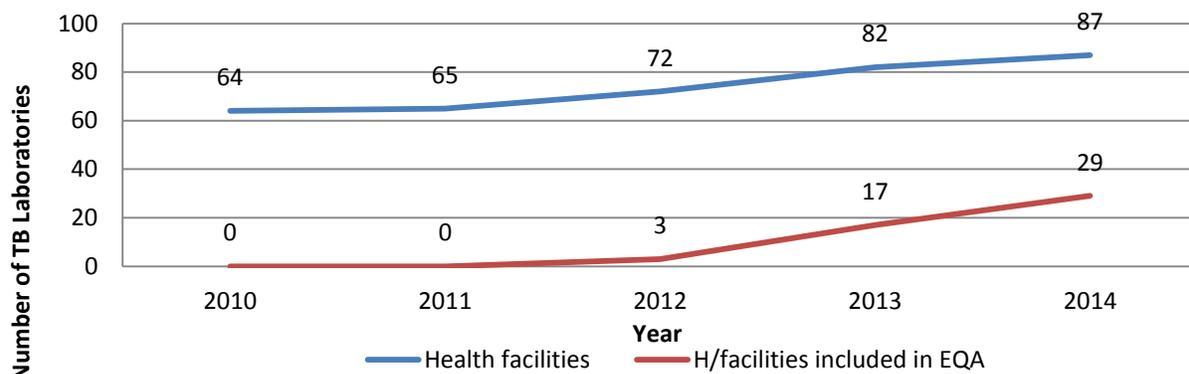


Figure 9: EQA Coverage in South Sudan (2010 – 2014)



**Figure 10: Sampling of Slides for EQA in Yei Civil Hospital**



**Figure 11: Sampling of Slides for EQA in Magwi PHCC**

### **Key Challenges**

- Some laboratories lack adequate infrastructure and require refurbishment to accommodate quality TB diagnostic services.
- There has been poor integration of laboratory services due to the perception of the laboratory technicians that TB microscopy should run vertical and parallel to general laboratory services.
- Motivation of staff through trainings, support supervision, and mentorship.
- The EQA expansion plan was to have 34% (30/87) of TB microscopy laboratories included in the EQA. Due to the current geo-political environment, the project has only managed to expand to 33% (29/87) by September of 2014.

### **Next Steps**

- Expand quality TB microscopy through assessment of peripheral laboratories, renovating the existing labs to accommodate TB microscopy, supplying labs with microscopes and starter kits, and training more laboratory workers on sputum smear microscopy.
- Build the capacity of the NTP and partners to expand EQA activities to all laboratories providing TB microscopy.
- Intensify mentorship and support visits to laboratories providing TB microscopy.
- Support CTRL to carry out its functions, including culture and DST, EQA, and training of laboratory technicians.

## Infection Control

The implementation of a package of TB infection control (IC) measures, with emphasis on managerial and administrative components, should alleviate the risk of transmission. TB CARE I provided technical assistance from KNCV to develop TB IC guidelines and train health care workers on TOT on TB IC. The “FAST” strategy, as stated in the National TB IC Guidelines, has been adopted selectively but was not rolled out as planned due to changes resulting from the crisis in December of 2013.

**Table 4: Technical Outcomes – IC**

Number	Outcome Indicator	Indicator Definition	Baseline (Year/ timeframe)	Target	Result
				Y4	Y4
3.2.2	Facilities implementing TB IC measures with TB CARE I support.	Facilities that received support for implementation of TB IC measures through TB CARE I out of the number of facilities planned to receive support for TB IC implementation. Number and percent. <b>Numerator:</b> The number of facilities where TB CARE I supported the implementation of TB IC measures. <b>Denominator:</b> Total number of facilities where TB CARE I planned to support the implementation of TB IC.	0	10	0

## Key Results

The Tuberculosis Infection Control Guidelines for South Sudan were developed through a technical assistant provided by TB CARE I from September 9-22, 2012. The guidelines were to provide a preparatory step for expansion of TB services and improve the quality of the program. The guidelines stipulate minimum standards that all health practitioners, civil society organizations, community members, and stakeholders can embrace to stop transmission of TB in households and in places of work.

Following the development of TBIC guidelines, TB CARE I supported training of 19 (17 M, 2F) health care workers from nine of ten states. The participants included the state TB coordinators and clinicians at the state hospital. Juba teaching hospital was used to demonstrate the infection control practices (Figure 12 and Figure 13). The training supported the participants to develop a plan of action for rolling out TB IC trainings to health facilities in South Sudan.



**Figure 12: TB Ward in Juba Teaching Hospital**



**Figure 13: Outpatient Department in Juba Teaching Hospital**

### **Challenges**

- The current challenges facing TB infection control include the emerging MDR-TB cases and the lack of strategies to address TB infection control in congregate settings, such as prisons and military barracks, where the defaulter rate is high.
- There is a significant potential risk of TB transmission among health care workers (HCWs). Hospital management interviewed during the assessment showed that eight out of 1,377 (580 per 100,000) HCWs in seven health facilities have been treated for TB in one year.

### **Next Steps**

- TB IC committees should be formed to implement the National TB IC guidelines developed for South Sudan. This is to be followed by trainings of HCWs in TB diagnostic and treatment centers to roll out TB IC in health facilities.
- All TB diagnostic and treatment centers in South Sudan should have a trained and designated TB infection control focal point responsible for writing and implementing an annual facility-level TB infection control plan (either integrated with an existing overall facility infection control plan or as a separate TB-specific infection control plan).
- Practical support for improvements of facility-level TBIC plans can be provided.

## Programmatic Management of Drug Resistant TB (PMDT)

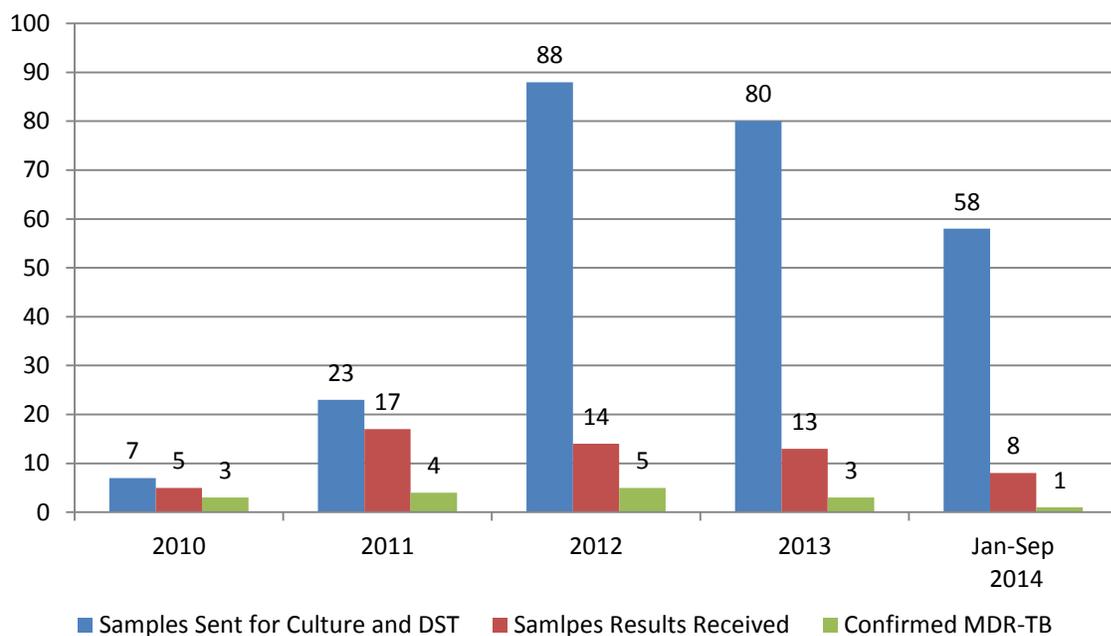
The routine surveillance of re-treatment TB cases for MDR-TB is conducted through the support of CTRL in Nairobi. This is because the CTRL at Juba in South Sudan is not functional due to the current setup. With the support of TB CARE I through WHO, NTP has been collecting sputum samples and sending them to Nairobi for culture and DST. There is no PMDT in South Sudan. Although ambulatory treatment has been advocated, the government has not been able to procure drugs for the confirmed cases.

**Table 5: Technical Outcomes - (PMDT)**

Number	Outcome Indicator	Indicator Definition	Baseline (Year 3)	Target	Result
				Y4	Y4
4.1.5	Previously treated TB patients with DST results	MDR cases among the retreatment of TB patients. <b>Indicator Value:</b> Percent. <b>Level:</b> National. <b>Source:</b> NTP. <b>Means of verification:</b> NTP database and MDR TB database. <b>Numerator:</b> Number of previously treated TB patients with DST result. <b>Denominator:</b> Total number of previously treated TB patients.	49	59	57

## Key Results

From 2010 through September of 2014, 256 samples have been sent to Nairobi, out of which 16 have been confirmed as MDR-TB cases. Through TB CARE I support, there was an increase in the number of samples sent for culture and DST in Nairobi (Figure 14). In addition, five health care workers from South Sudan have been trained on MDR-TB through regional training programs.



**Figure 14: Surveillance of TB Retreatment Cases for MDR-TB (2010 – September 2014)**

### Challenges

- Results for over 77% (199/256) of the samples have not been received, and there has been no feedback on the status report on whether the samples were viable at the time of delivery.
- The CTRL in Juba, South Sudan, is not able to do culture and DST because the rooms have not been re-designed.

Despite training of five health care workers on PMDT in Kigali, Rwanda, and in Cairo, Egypt, the infrastructure and MDR-TB drugs are not available to start treatment in South Sudan.

### Next Steps

- Support the NTP to prepare to establish comprehensive MDR-TB management through training of health care workers in PMDT courses within the region.
- Strive to carry out culture and DST in the country by ensuring the CTRL has been redesigned and equipped to carry out all the necessary functions.
- Use GeneXpert in the CTRL to screen patients whose samples can be sent for culture and DST.

## TB/HIV

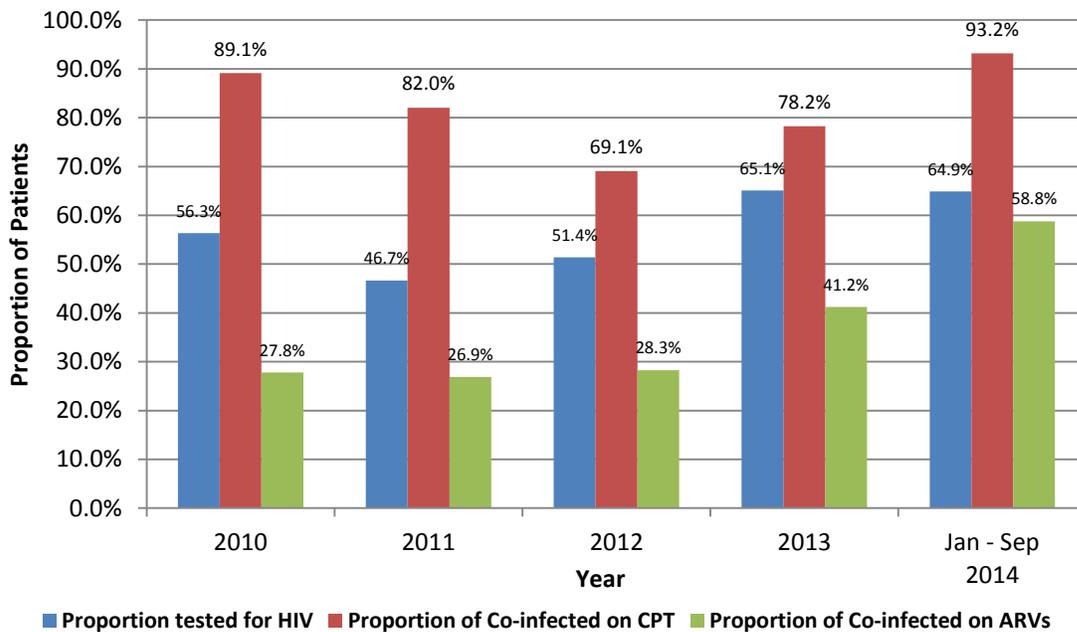
The prevalence of HIV among TB patients in South Sudan is 13% according to the recent prevalence survey of HIV infection among TB patients. The Ministry of Health developed a policy for collaborative TB/HIV activities. Collaborative mechanisms were established at central, state, and peripheral levels, although the functions at the state and peripheral health facility level are weak. Strengthening of the TB/HIV teams at the central, state and health facility levels is required for monitoring the implementation of TB/HIV activities.

**Table 3: Technical Outcomes – TB/HIV**

Number	Outcome Indicator	Indicator Definition	Baseline (Year 2)	Target	Result
				Y4	Y4
5.2.2	TB patients (new and re-treatment) with an HIV test result recorded in the TB register.	Percent of TB patients (new and re-treatment) with an HIV test result recorded in the TB register. <b>Numerator:</b> Total number of all TB patients registered over a given time period with an HIV test result recorded in the TB register. <b>Denominator:</b> Total number of TB patients registered over the same time period.	3,549 (47%)	80%	65% (4,712/7,255)
5.3.2	HIV-positive TB patients started or continued on Cotrimoxazole Preventive Therapy (CPT).	Percent of HIV-positive TB patients started or continued on CPT. <b>Numerator:</b> Number of HIV-positive TB patients, registered over a given time period, who receive (given at least one dose) CPT during their TB treatment. <b>Denominator:</b> Total number of HIV-positive TB patients registered over the same time period.	389 (84%)	95%	78% (539/689)

## Key Results

- There was an increase in the proportion of TB patients tested for HIV (56% in 2010 to 65% in 2014) (**Figure 15**).



**Figure 15: Proportion of Registered TB Patients Tested for HIV, Tested Positive for HIV, and Receiving CPT and ART (October 2012 – September 2013)**

- The proportion of TB patients being tested for HIV from 2010 to September 2014 has gradually increased, from 56% in 2010 to 65% by September 2014. Among the TB/HIV co-infection patients, the CPT uptake has increased to 93%, compared to the downward trend that was observed from 2010 to 2012. The increase is also proportionate to the ART uptake, which is 58.8% as of September of 2014 (Figure 15).
- Through the support of TB CARE I, joint TB/HIV quarterly review meetings have been established in four out of ten states. Support for these meetings continued in 2014 with support of the GF.
- During the TB CARE I project period, basic training on TB was conducted for 50 health care workers from voluntary counseling and testing (VCT) and ART sites to refer presumptive TB cases to the nearest TB diagnostic center. Another 50 health care workers in TB sites were also trained in HIV counseling and testing.

### Challenges

- The proportion of HIV co-infected TB patients enrolled on CPT and ART is low. This is partly due to weak collaboration of TB and HIV programs at health facilities, resulting in under reporting.
- The proportion of DOTS centers providing TB/HIV services is low, at 32% (28/87). There are only 22 ART centers in the country, which implies that in some DOTS centers, HIV positive TB patients have to be referred for ART services.
- The current TB/HIV guidelines do not include provision of Isoniazid preventive therapy (IPT). Although studies have shown benefit of IPT as a prophylaxis against TB in HIV positive patients, South Sudan has not

embraced the idea due to fear of creating resistance to Isoniazid, which is used throughout the TB treatment regimen. There is a need to revise the guidelines to conform to the internationally proven interventions.

### **Next Steps**

- Strengthen TB/HIV collaborative activities.
- Expand ART services in those health facilities providing TB services.
- Support the state TB coordinators to conduct quarterly review meetings at the state level.
- Improve data collection and sharing of information by TB and HIV programs.

## Health System Strengthening (HSS)

The integration of TB services at the service delivery point requires the strengthening of health systems and improvements in the capacity of the health workers to diagnose and treat TB. In order to achieve this, health care workers in the health facilities were trained on diagnosis and case management, including management of TB programs. Through MSH and WHO, TB CARE I has supported training and supervision and mentorship of health care workers at health facilities.

**Table 6: Technical Outcomes – HSS**

Number	Outcome Indicator	Indicator Definition	Baseline (Year/ timeframe)	Target	Result
				Y4	Y4
6.2.1	TB CARE I supported supervisory visits conducted	Percent TB CARE I supported supervisory visits conducted. <b>Numerator:</b> Number of TB CARE I supported supervisory visits conducted. <b>Denominator:</b> Number of TB CARE I supported supervisory visits conducted.	N/a	100% (50/50)	94% (47/50)
6.2.2	People trained using TB CARE I funds	This indicator is a number measuring health care workers at all levels trained on any area of TB control using TB CARE I funds.	222	100	745 (M 492; F 253 - includes community mobilizers)

## Key Results

**Supervision and mentorship visits:** TB CARE I's senior technical officers for laboratory services and community TB services conducted joint supportive supervision and mentorship visits to health facilities in the newly established TB centers and in existing centers. Two technical officers were hired in Year 4 of TB CARE I implementation. This has improved supervision and mentorship, as over 90% of the planned visits were conducted during the final year of TB CARE I work plan implementation.

The training and capacity building of health care workers was conducted from 2010 through September of 2014. A total of 745 (34% F) health care workers have been trained, in topics such as TB microscopy (133 (M98; F15)); TB diagnosis and case management (257 (M197; F60)); TB/HIV (99 (M44; F52)); TB infection control (19 (M17; F 2)); and PMDT (3 (M3)). In addition, 176 people (M 76; F 96) were trained on the use of the SOPs for improving case detection in health facilities, and 82 community health workers were trained on basics of TB, referral of presumptive TB cases, and adherence to TB treatment.

**Table 4: Health Care Workers Trained From APA 1 - APA 4**

	APA 1		APA 2		APA 3		APA 4		APA 1- 4	
	M	F	M	F	M	F	M	F	M	F
<b>Universal Access</b>	64	14	34	11	40	16	189	143	327	184
<b>Laboratories</b>	19	1	19	1	42	6	18	7	98	15
<b>TB IC</b>	0	0	0	0	17	2	0	0	17	2
<b>PMDT</b>	0	0	3	0	0	0	0	0	3	0
<b>TB/HIV</b>	2	23	10	12	35	17	0	0	47	52
<b>Total</b>	85	38	66	24	134	41	207	150	492	253



**Figure 16: Joint Support Supervision in Kator PHCC Laboratory**



**Figure 17: Training of Health Care Workers on the use of SOPs**

## **TB CARE I's Support to Global Fund implementation**

The Global Fund has been the main donor for the TB care and control services in South Sudan and has released funds for TB services during the Global Fund Round 2, Round 5, and Round 7 and the transition funding mechanism (TFM). The current funding is USD 7.8 million, which has been earmarked to maintain the activities in 2014 and 2015 as they were under GF Round 7. However, the investment specified in the framework of the concept note has an indicative amount allocated to TB control in South Sudan of only USD 7.06 million for 2015, 2016, and 2017. Given that half of the TFM grant (USD 7.8 million ÷ 2 years = USD 3.9 million) will be used in 2015 to maintain TB care and control activities, the indicative USD 7.06 million will be used to maintain TB services in 2016 and 2017. The National HIV/acquired immunodeficiency virus (AIDS) Program transferred USD 2.0 million from the concept note to NTP. This will cover the development of TB/HIV collaborative activities in 2015, 2016, and 2017. The concept note was submitted on October 15, 2014.

The process of writing the concept note started with developing key documents that supported the country to application process. TB CARE I provided a lead consultant to support the development of the 2<sup>nd</sup> TB National Strategic Plan (2012 – 2016). This was a reference document that supported the country to successfully apply for the GF TFM that covered 2014 – 2015, which was also developed with support of TB CARE I. The New Funding Model required that the country submit a revised NSP based on the EPI analysis of the country TB program. TB CARE I, through technical support, provided a comprehensive analysis of the TB epidemiology in South Sudan, which informed the program to devise TB strategies and formed the basis of revising the 2<sup>nd</sup> NSP. TB CARE I supported a workshop to revise the 2<sup>nd</sup> NSP, which was held in Nairobi due to the crisis that occurred in December of 2013. A total of 35 persons from over 23 partners and donors (including USAID) participated in the review process of the NSP 2012 - 2016. MSH's principal technical advisor, TB CARE I's country project director, and the NTP's senior technical officer for laboratory services participated in the meeting.

TB CARE I supported the writing of the concept note and meetings for the writing team. The country project director for TB CARE I has been a key member of the writing team and led the costing process of the concept note. The concept note was submitted on October 15, 2014.

Through the technical officers, TB CARE I supports the implementation of activities under the Global Fund to accelerate delayed activities, which has improved the grant rating from B1 to A2.

## **The Way Forward**

Reflecting on TB CARE I results through the lenses of the U.S. Government TB strategy and the Post-2015 Global TB Strategy indicates there are many lessons to learn from TB CARE I and new approaches to prioritize going forward. Lessons learned from the project and an analysis of strategic priorities for the country is summarized below, which can inform future work and investment in the country.

### **Universal Access**

The environment under which TB CARE I was implemented has seen interruption of services by recurrent insecurity in three out of the ten states. The worst humanitarian crisis has been in 2014, which resulted from a political crisis in December of 2013. The implementation of the follow on mechanism will depend on the environment under which the activities will be implemented.

### **Lessons Learned**

- Assessment of the existing functional health facilities using an assessment tool can easily identify the needs for integrating health services in primary health care. Involvement of stakeholder implementing primary health care in the integration of TB services can rapidly improve access of TB services to the general population. Use of SOPs for increasing case findings can help to identify TB patients who would otherwise be missed from the health facilities.
- Engaging communities in TB services has improved patient adherence to TB treatment. Strengthening collaboration with CBOs/CSOs working at the community level can help identify potential and active groups or community members who will engage in community TB care. Mapping the CBOs/CSOs in targeted population can help in rolling out community TB care activities.
- Responding to TB during the security and humanitarian crisis has been an opportunity to deliver services to the displaced populations in South Sudan. Supporting partners implementing health services has enabled the program to establish TB diagnostic and treatment services in two sites (Juba and Mingkaman) in South Sudan.

### **Recommendations**

- Expand DOTS coverage through integration of TB services in the health facilities at all levels.
- Use of the community network in TB care and prevention can improve treatment adherence, especially in the urban settings.
- Special groups, like internally displaced populations and refugees, can also be reached through the existing primary health care services in the camps.

### **Laboratories**

Despite the prevailing circumstance, TB CARE I expanded smear microscopy and EQA in existing and newly refurbished laboratories in the Western Equatoria, Central Equatoria, and Eastern Equatoria States. Security and poor road networks remain a challenge to EQA expansion.

### **Lessons Learned**

- Assessment of the laboratories has highlighted the gaps inhibiting the integration of TB microscopy in the general laboratory services.

- Renovation of existing general laboratories can rapidly expand TB microscopy coverage in South Sudan.
- EQA networking can be established and expanded, even in resource limited setting and with a poor and expensive transport system.

### **Recommendations**

- Expand quality TB microscopy through an assessment of peripheral laboratories, renovating the existing labs to accommodate TB microscopy, supplying microscopes and starter kits, and training laboratory workers on smear microscopy. Expand the use of GeneXpert.
- Build the capacity of the NTP and partners to expand EQA activities to all laboratories providing TB microscopy.
- Support the CTRL to carry out culture and DST, EQA, and training of laboratory technicians.

## **Health System Strengthening**

### **Lesson Learned**

Adequately trained human resources at all levels are necessary. Program performance is better in health facilities where the TB services are supported by NGOs as compared to the government. High turnover of health care workers from the government to NGOs has resulted in a shortage of skilled person to support TB services.

### **Recommendations**

- Build the management and technical capacity of the NTP at all levels.
- Continue to support human resource development at the central, state, and county levels.

## **Infection Control**

TB diagnostic and treatment centers in South Sudan should have a trained and designated TB infection control focal point responsible for writing and implementing an annual facility-level TB infection control plan (either integrated with an existing overall facility infection control plan or as a separate, TB-specific infection control plan).

## **PMDT**

Support NTP to transport samples from the peripheral health facilities to the CTRL for culture and DST.

## **TB/HIV**

- Strengthen the TB/HIV collaborative activities through support to the state TB and HIV coordinators to conduct joint quarterly review meetings at the state level, involving all TB and HIV centers. This will improve data collection and sharing of information by TB and HIV programs.
- Expand coverage of ART services in health facilities providing TB services, from the baseline 22 ART centers to 50 in 2015.

## **Monitoring & Evaluation, Operational Research, and Surveillance**

- Support the program to establish a quality system that will ensure recording and reporting is implemented at all levels within the current crisis.
- Support the program to carry out a drug resistant survey to establish the baseline for drug resistant TB (DR-TB) in South Sudan.

## **Annex I: Knowledge Exchange**

Below is a list of tools and publications that were developed with support from TB CARE I in South Sudan over the life of the project. Please contact the project staff for copies of or links to any of the listed documents.

**Technical Tools:** Includes manuals, guides, guidelines, websites, etc.

- An assessment tool for integrating TB services in primary health care.
- SOPs for increasing case detection in health facility, including guidelines and posters.
- Laboratory assurance guidelines.
- TB infection control guidelines for South Sudan.
- National strategic plan (2012 – 2016).
- National strategic Plan (2015 – 2019).

**Scientific Publications or Presentations:**

- Integration of Tuberculosis Diagnosis and Treatment into Primary Health Care Services: Experience and lessons learned from South Sudan – Poster presentation in Kuala Lumpur, 2012.
- Saving Lives in Areas of Conflict or Disaster: Partnering for results – Oral presentation in Kuala Lumpur, 2012.
- Partnership for DOTS expansion in Post-conflict Situations: -Experience from South Sudan – Kuala Lumpur, 2012.
- Improving TB control through service integration and community outreach: Experiences from South Sudan – Paris, 2013.

**Educational Materials:** Includes brochures, information, education, and communication materials, websites, etc.

- Laboratory job aids.
- Training manual for sputum AFB microscopy.

**Other:**

- Global Fund application to Round 11.
- Global Fund application to TFM.
- Global Fund application to NFM.