

**TB CARE I -Ghana
Final Report**

January 1, 2011 –December 31, 2014

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Cover photo: World TB Day celebration message to promote early detection of TB and to give the message to the general public that TB can be cured. (Bismarck Adusei)

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Table of Contents

EXECUTIVE SUMMARY	5
INTRODUCTION.....	7
CORE INDICATORS	9
UNIVERSAL ACCESS.....	9
LABORATORIES.....	22
INFECTION CONTROL.....	25
PROGRAMMATIC MANAGEMENT OF DRUG RESISTANT TB.....	27
TB/HIV	29
HEALTH SYSTEM STRENGTHENING (HSS).....	30
MONITORING & EVALUATION, SURVEILLANCE AND OR.....	34
LESSONS LEARNED AND RECOMMENDATIONS.....	43
ANNEX I: KNOWLEDGE EXCHANGE.....	45

List of Abbreviations

AIDS	acquired immunodeficiency syndrome
ART	anti-retroviral therapy
ATS	American Thoracic Service
CCM	country coordinating mechanism
CN	concept note
CP	condition precedents
CPT	cotrimoxazole preventive therapy
DOTS	directly observed therapy short course
DR-TB	drug-resistant tuberculosis
EQA	external quality assurance
GCDB	Great Consolidated Diamond Ghana
GF	Global Fund
GHS	Ghana Health Service
HCW	health care worker
HIV	human immunodeficiency virus
HSS	health system strengthening
IC	infection control
JATA	the Japanese Anti-Tuberculosis Association
KNCV	KNCV Tuberculosis Foundation
M&E	monitoring and evaluation
MDR-TB	multi-drug-resistant tuberculosis
MOH	Ministry of Health
MSH	Management Sciences for Health
MTB +Ri	mycobacterium tuberculosis positive rifampicin-indeterminate
MTB +Rr	mycobacterium tuberculosis positive and rifampicin-resistant
MTB +Rs	mycobacterium tuberculosis positive and rifampicin-sensitive
MTB	mycobacterium tuberculosis
MTB/RIF	mycobacterium/rifampicin
NFM	new funding module
NSP	national strategic plan
NTP	National Tuberculosis Control Program
OPD	outpatient department
OR	operational research
PLHIV	people living with HIV
PR	principal recipient
RDQA	Rapid Data Quality Assessment
SLD	second-line Drug
SOP	standard operating procedure
STTA	short-term technical assistance
TA	technical assistance
TB	tuberculosis
TB CAP	Tuberculosis Control Assistance Programme
TOT	trainer of trainers
USAID	US Agency for International Development
WHO	World Health Organization

Executive Summary

Developed by the US Agency for International Development (USAID), TB CARE I provided high-quality technical assistance (TA) to the National Tuberculosis Control Program (NTP), aimed at improving overall tuberculosis (TB) control services. Providing high-quality TA in the implementation of the Global Fund (GF) Round 10 Grant Interventions remained TB CARE I's highest priority. Its interventions were implemented within the framework of the NTP Central Unit targeting the entire population of Ghana.

The major substantial results achieved over the life of the project include the following:

1. An assessment of the implementation of hospital TB case detection activities using standard operating procedures (SOPs) was conducted. The results showed that the number of TB cases identified after the intervention showed a consistent increase. In 2012, there was an increase of 54% (519 TB cases, all forms) relative to the 2011 baseline and in 10% (569, all forms) relative to the 2012 performance. Comparative analysis of the TB data of the first three quarters of 2012 (384 TB cases), 2013 (416 TB cases) and 2014 (420 TB cases) showed a consistent increase, which indicates that there will be a dramatic increase of TB cases from the six hospitals in the Eastern Region of Ghana by the end of 2014.

Through the implementation of intensified hospital-based TB case detection activities, the capacity of clinicians to manage TB complications was improved. These efforts were aimed at reducing TB mortality. The total number of TB patients dying during TB treatment in these six hospitals reduced from 87 in 2011 (baseline-year data) to 64 in 2012 (26.4% decrease with respect to baseline) to 45 in 2013 (48.3% decrease with respect to baseline) and to 11 in 2014 as of September (87.4% decrease with respect to baseline).

2. Monitoring and evaluation surveillance and operational research (OR) were among the expected outcomes for TB CARE I. The project therefore worked effectively with the NTP in many different monitoring and evaluation (M&E) areas to strengthen the M&E system from the national to the facility level through in-country technical team and external consultants. The in-country technical team worked with the NTP to review, assess and update their routine data collection tools and developed a data dashboard with live charts with data from 2007 to 2014.

To improve data validation at all levels, TB CARE I developed the Rapid Data Quality Assessment Tool (RDQA) for conducting monitoring and supervision at the national, regional, and district levels to check for data accuracy, consistency, and completeness. Seven regions were supported by using the RDQA tool to improve data quality.

In an effort to address the data inaccuracies and inconsistencies in data validation review meetings, TB CARE I demonstrated an innovative approach for conducting review meetings at the regional level in seven regions, which involved TB Treatment Registers being swapped among District TB Coordinators, thus permitting them to review and validate each other's data.

High TAs were also provided by external consultants in conducting epidemiological analysis for the development of the national strategic plan (NSP) and the concept note (CN). The M&E and the infection control (IC) component of the NSP and CN were also reviewed by external consultants with recommendations.

The project also supported the development and printing of the Ghana Health Service (GHS) M&E.

3. TB CARE I produced a TB Case Detection Awareness documentary for the purpose of improving TB case detection and reducing TB deaths. The TB case detection documentary was released on May 15, 2014, and has been handed over to the NTP for distribution to the regions, districts, and facilities. The film specifically targeted policy makers, development partners, senior managers of the Ministry of Health (MOH) and GHS, and other relevant

government ministries and department for the purpose of advocating for continued funding of TB control services across the country in order to sustain gains made over the last decade. The TB documentary also targets the public at large, including unconventional health care providers such as prayer camps.

4. TB CARE I provided substantial support to the NTP to conduct a TB prevalence survey to assess the true burden of TB in the country and also serve as baseline data used to assess trends of TB disease prevalence over time. Support included the designing of tools and a questionnaire at the preparatory stage, funding the electronic data capturing software for the survey, and providing financial support for the monitoring of field work throughout the entire survey. The provisional results shows TB prevalence in Ghana as 327/100,000, as opposed to the earlier estimate by the World Health Organization (WHO) of 92/100,000 population.
5. The NTP has finished developing and submitting a new NSP and CN for the GF's new funding mechanism. TB CARE I actively participated in all NSP and CN development meetings with the country coordinating mechanism (CCM) from start to finish through the in-country team (the former and current Country Directors and the M&E Advisor). Since the NSP and the CN were evidence-based documents, TB CARE I also provided support through external consultants to conduct epidemiological analysis using the NTP's routine data, conduct a research road map for inclusion, and review the M&E and the IC control components of the NSP and the CN.
6. NTP decided to employ new TB-diagnosing technologies like GenXpert to help increase their TB case detection rate (CDR), especially among people living with HIV (PLHIV) and at teaching and regional hospitals. Since February 2013, the program has procured 12 GenXpert machines. TB CARE I supported the NTP during several short-term technical assistance (STTA) missions with an external consultant, Alaine Nyaruhirira, who helped install all 12 GenXpert machines across the country and also instructed future trainers on the use and maintenance of these machines. In addition, she supported Ghana's NTP in developing GenXpert guidelines and a scale-up plan for the development of the new NSP and the CN.
7. A comprehensive review of the TB program by external consultants was successfully conducted in March 2013 with major contributions from TB CARE I. The major strength observed by external consultants was that the estimated TB incidence, prevalence, and mortality in Ghana have all been declining steadily since the mid-1990s, but more rapidly since the year 2000. Ghana had already achieved the core Millennium Development Goal target of halting and beginning to reverse the incidence of TB, as well as the expanded Stop TB Partnership targets of cutting TB prevalence and mortality by 50% relative to 1990 rates.
8. Four OR studies were also conducted, mostly in the Eastern Region, to strengthen the TB program. Some of the OR studies conducted were assessing the effectiveness of the TB referral and feedback systems, data quality assessment in the Eastern Region, the effect of patient treatment delay from the date of TB diagnosis to the date of initiating TB treatment, and the characteristics of TB deaths from the six health facilities in the Eastern Region.

Introduction

The National TB Control Program

Ghana's population is now 26,594,183, as projected from the 2010 Population Census by the Ghana Statistical Service. Of this number, 51% are women, and 42% are children less than 15 years old. Furthermore, 33% of households in urban areas and 44% of households in rural areas have at least one child aged less than 5 years. The mean household size is 3.5 in urban areas and 4.3 in rural areas. The most common household size is 2–3 household members (30%), while 27% have 4–5 household members.

Ghana is divided into 10 administrative regions with currently 216 districts. In Ghana, the MOH and the GHS describe TB as the most common cause of premature death in adults (NTP Strategic Plan 2009–2013).

Established in 1994, the NTP in Ghana is seemingly integrated into general health services. Ghana achieved 100% directly observed therapy short course (DOTS) coverage in 2005.

Since 2001, the major source of funding for TB control in Ghana has come from the Global Fund to Fight AIDS, Tuberculosis, and Malaria through Round 1 and five grants. In 2010, the NTP also won the GF Round 10 Grant, amounting to \$70 million over five years. The Ghana government also contributes significantly to TB control by making staff available to implement TB control services and by providing infrastructure support such as health and diagnostic facilities where TB patients are diagnosed and treated. Starting in 2007, USAID has been supporting the NTP mainly in the area of providing TA initially through the Control and Prevention of Tuberculosis (TB CAP) and currently through TB CARE I.

The most significant achievement of the NTP is the progressive increase of the TB treatment success rate (TSR) from 43.6% to 86.2% for the 1997 and 2012 cohort, respectively. The improved TB TSR resulted from the drastic decline of the lost to follow-up rate, which decreased from 59% in 1997 to 86% in 2012. Prior to 2011, low TB case detection was regarded as the main key challenge facing the NTP. However, after the World Health Organization (WHO) revised its estimate, Ghana TB case detection went up to 88% for 2013. The decline of the lost to follow-up rate was a result of the implementation of community TB care through the use of enablers' package. Case notification rates, however, appear to have been stagnant (around 60/100,000 person population) in the last five years.

The major challenge facing the NTP in Ghana is the high TB mortality rate, which has been consistently above 5% during the last decade. This is in spite of the relatively low human immunodeficiency virus (HIV) rates (<2%) in the general public. Another challenge is weak programmatic management of drug-resistant TB (PMDT), resulting in a wide gap between estimated multi-drug-resistant tuberculosis (MDR-TB) cases, MDR-TB diagnosed cases, and MDR-TB cases enrolled in treatment programs. While the WHO-estimated TB case detection rates appear to be high, TB case detection in health facilities and communities is not optimized and not routine, so there is the potential that many TB cases are not being detected.

TB CARE I is a USAID five-year cooperative agreement (2010–2015). It is a unique coalition of the major international organizations in TB control, consisting of the prime partner, KNCV Tuberculosis Foundation (KNCV), and coalition partners American Thoracic Society (ATS), FHI360, the International Union Against Tuberculosis and Lung Disease (the Union), the Japanese Anti-Tuberculosis Association (JATA), Management Sciences for Health (MSH), and WHO.

The overall aim of TB CARE I was to reach the following goals in the TB CARE I countries with

significant investment: Sustain or exceed an 84% CDR and 87% TSR, successfully treat 2.55 million new sputum-positive TB cases, and diagnose and treat 57,200 new cases of MDR-TB.

TB CARE I is a follow-up of TB CAP project. MSH is the lead partner for TB CARE I in Ghana, and KNCV and WHO are collaborating partners. The main technical areas of the project were Universal Access, Laboratories, Infection Control (IC), PMDT, TB/HIV, Health System Strengthening, M&E, OR, and Surveillance.

The key local partner for TB CARE I was the MOH GHS through the NTP. Other local partners are National AIDS Control Program, Ghana AIDS Commission, Ghana Stop TB partnership, the association for PLHIV, and the Country Coordinating Mechanism (CCM)–Ghana. TB CARE I also worked closely with other USAID-funded health projects such as the Regional Focus Health Project. Throughout its lifetime, TB CARE I has supported and worked with the regional and district health directorate in implementing effecting TB control services.

TB CARE I worked within the framework of the NTP and provided high-quality TA to the NTP and other partners. TA was provided through the TB CARE I country director and the M&E officer and periodically through external senior consultants.

As previously stated, TB CARE I worked within the framework of the NTP Central Unit, and its activities were aimed at complementing the achievements of the goals and objectives of the NTP's national strategic plan (NSP). Furthermore, TB CARE I supported the NTP in ensuring that the approved GF Round 10 proposal was implemented in a coordinated fashion, ensured improved absorptive capacity of the grant, and made sure that all planned interventions provide the greatest impact. Since the CCM provides important oversight to grant implementation, TB CARE I, through its Country Director, participated in activities of the CCM. The TB CARE I Country Director chaired the HIV-TB oversight committee of the CCM. In summary, TB CARE I worked toward supporting the improved performance of the NTP in Ghana and therefore relies on the NTP for most of its data.

TB CARE I coordinated and collaborated with the technical and managerial teams from the national, regional, district, and facility levels in all activities conducted to achieve maximum participation and the greatest impact. As part of the project's TA to the NTP, TB CARE I worked with all 10 regions of Ghana and most of its districts and facilities to increase the capacity of health care workers (HCWs) in the area of improving TB case detection, reducing TB deaths and improving M&E activities and OR.

To address the potential for weak TB case detection activities, especially at the health facility level, TB CARE I collaborated with the NTP to demonstrate the best approach to implementing systematic TB case detection so that lessons learned and best practices can be communicated to all the health facilities in the country. TB CARE I also worked with the NTP to improve the capacity of HCWs to strengthen the M&E system by implementing RDQA tool for the purpose of improving data quality, as well as increasing their ability to use and analyze data for decision making.

At the time that TB CARE I was supporting the NTP, the true burden of TB in Ghana was not known. Thus, TB CARE I supported the NTP's efforts to conduct a TB prevalence survey. TB CARE I support mainly focused on data management of the survey, which helped Ghana get the results much faster than anticipated. The preliminary results of the TB prevalence survey show that the prevalence rate for all forms of TB in Ghana is 286/100,000 population, which is three times higher than the WHO estimate.

Core Indicators

TB CARE I has seven core indicators, which the project as a whole is working to improve across all countries. Table 1 summarizes the core indicator results across the life of TB CARE I in Ghana, as well as the CAP-TB, the precursor to TB CARE I.

Table 1. TB CARE I Core Indicator Results for Ghana

		C1. Number of Cases Notified (All Forms)	C2. Number of Cases Notified (New Confirmed)	C3. Case Detection Rate (All Forms)	C4. Number (and Percentage) of TB Cases Among HCWs	C5. TSR of Confirmed Cases	C6. Number of MDR Cases Diagnosed	C7. Number of MDR Cases Put on Treatment
	2005	12,220	11,680	U	U	71	U	U
CAP-TB	2006	12,511	11,974	U	U	75	U	U
	2007	12,964	12,283	U	U	81	U	U
	2008	14,479	13,766	U	U	82	2	0
	2009	15,286	14,426	U	U	83	U	U
	2010	15,145	14,124	68	6	86	14	0
TB CARE I	2011	15,849	14,971	70	18	87	28	2
	2012	15,213	14,352	78	U	86	30	2
	2013	15,541	14,568	88	U	N/A	38	27

Universal Access

The Universal Access technical area focuses on improving TB case detection and reducing TB deaths across the country, with a special emphasis on increasing in the TB CARE's pilot region and districts. MSH, KNCV, and WHO were involved in this area. MSH led the implementation of SOPs in Lower Manya Krobo and Kwaebibirim, two districts in the Eastern Region. The purpose of this activity was to demonstrate best practices to be rolled out nationwide by the NTP. The interventions mainly focused on improving the capacity of HCWs in systematic implementation of TB case detection in adults, children, and PLHIV, as well as reducing TB deaths. The capacity to improve M&E and data use and analysis, as well as OR, was also increased. The main challenge in this technical area was that in the district and health facilities that TB CARE I supported, there was high turnover of HCWs, requiring continual training of new staff. The other challenge was the weak referral and feedback systems for TB patients diagnosed in one facility and referred to other facilities close to their homes to continue their treatment. There was limited information to suggest that TB patients have arrived in facilities where they were referred to. Low TB case detection among children and high TB deaths remained.

Table 2: Technical Outcomes

#	Outcome Indicators	Indicator Definition	Baseline (Year/Time Frame)	Target	Result
				Y4	Y4
1	Children younger than 5 (contacts of ss+ adults) that were put on IPT	No data available	Data not routinely collected	Data on IPT among children aged <5 yrs who are contacts of SS+ adults in 6 districts supported by TB CARE I are reported	Contact investigation not routinely conducted thus IPT data not available
2	Childhood TB approach implemented	3	Capacity of HCWs to diagnose TB in children improved in the 3 districts in Eastern Region	9 health facilities in 6 districts implementing childhood TB approaches	9 health facilities in 6 districts in the Eastern Region implemented childhood TB activities within the framework of increasing TB case detection
3	Number of TB cases (all forms) diagnosed in children 0-4	8 in TB CARE I geographical area	NTP Figure Children 0-14 in 2012 = 820 (14 TB CARE I)	50 TB cases diagnosed in children aged 0-14 years (up from 14 in 2012 in TB CARE I supported areas)	National figure of children aged 0-14 years diagnosed with TB in 2013=777 TB CARE I geographical area, 2013 data =25
4	Number of health facilities implementing intensified TB case detection	Description: Number TB cases notified between October 1, 2013 and September 30, 2014 in nine facilities in six old and new districts relative 2012 results Value: Number Frequency: Quarterly Source: Monitoring reports	793 from 6 districts	1000 TB cases notified in the 9 TB CARE I supported districts	887 from 9 districts. Target not achieved as there was a prolonged period when there was stock outs of sputum containers.

5	Proportion of prison inmates at Nsawam Prison screened for TB	<p>Description: Proportion of prison inmates at Nsawam Prison screened for TB disaggregated by gender, age and remand and convicted (date on prisoners screened at the time of entry into prison will be separated from those screened while already in the prison)</p> <p>Numerator: Number of prisoners screened for TB during the specified period</p> <p>Denominator: Total number of prisoners during the specified period</p> <p>Value: Percent</p> <p>Frequency: Quarterly</p> <p>Source: Monitoring reports</p>	No data available	80% of inmates screened for TB	Screening of prison inmates for TB not started because prison health staff were only trained in August 2014 due to protracted process to receive approval from prison authority.
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Key Results

Hospital-Based TB Case Detection

TB CARE I began supporting the implementation of intensified hospital-based TB case detection intervention in six hospitals in the Eastern Region of Ghana in early 2012. This followed a bottleneck analysis workshop that clearly revealed that low TB case detection and high TB deaths were the major challenges hampering the prevention and treatment of TB in the Eastern Region.



Photo 1. Former Eastern Regional director of health services, Dr Erasmus Agongo reacting to a question during the bottleneck analysis meeting.



Photo 2. Participants in a roundtable discussion during the bottleneck analysis meeting.

Two districts, with three facilities in each district, were selected to pilot the implementation of SOPs for TB case detection. TB CARE I trained 123 HCWs (84 women and 49 men) in these two districts using the SOPs for TB case detection developed under CAP-TB.

After implementing the interventions for one year, and based on the preliminary results, TB CARE I supported the training of HCWs from all 10 regions of the country. These HCWs were trained to serve as trainers of trainers (TOTs) in their respective regions. The key deliverable for the TOT was the development of action plans for the implementation of the SOPs for TB case detection in all the regions. During this effort, it came clear that although Ghana achieved 100% DOTS coverage in 2005, based on anecdotal information provided by Regional TB Coordinators, public health facility, DOTS coverage was about 50%, and as a result, all the regions were asked to conduct a TB situation analysis to assess the true DOTS coverage statistics for Ghana.



Photo 3. Participants in a Trainer of Trainers (TOT) workshop about implementation of the SOPs for TB case detection.

An assessment of the implementation of TB case detection intervention from the six facilities in the two districts since 2012 has shown consistent improvement in TB control services, especially TB case detection and quality clinical care of TB patients. TB case detection in these six hospitals rose by 53.5% in 2012 and 68% in 2013, relative to the baseline year of 2011 (338 TB cases, all forms). This also means that an additional 181 TB cases and 231 TB cases relative to the baseline were detected in 2012 and 2013, respectively. Comparative analysis of first- and third-quarter data between 2012 and 2014 has shown a coherent increase in TB cases. There were 384 TB cases reported between January

and September 2012, and this number increased to 416 and 420 over the same time frame in 2013 and 2014, respectively (see Table 3).

Table 3. Summary of the Performance of the Six Hospitals (2011–September 2014)

Hospitals	2011 Cases (Baseline)	2012 Cases	2013 Cases	2014 Cases (Jan–Sep)	Total (2012–2014)	Percentage of Achievement
St. Dominic's	110	129	152	134	415	26.62
Great Consolidated Diamond Ghana (GCDG)	36	48	42	25	115	7.38
Kade	13	44	42	47	133	8.53
St. Martin's	78	125	144	121	390	25.02
Akuse	23	54	61	47	162	10.39
Atua	78	119	128	97	344	22.07
Total	338	519	569	471	1,559	100.00

Through the implementation of intensified hospital-based TB case detection activities, the capacity of clinicians and HCWs to manage TB complications increased. This was aimed at reducing TB mortality. The total number of TB patients dying during TB treatment in these six hospitals reduced consistently, from 26% of TB cases (338) in 2011 to 12% of TB cases (519) in 2012, then to 8% of TB cases (569) in 2013, and finally to 3% of 2014 TB cases (471) in 2014 (see Figure 1).

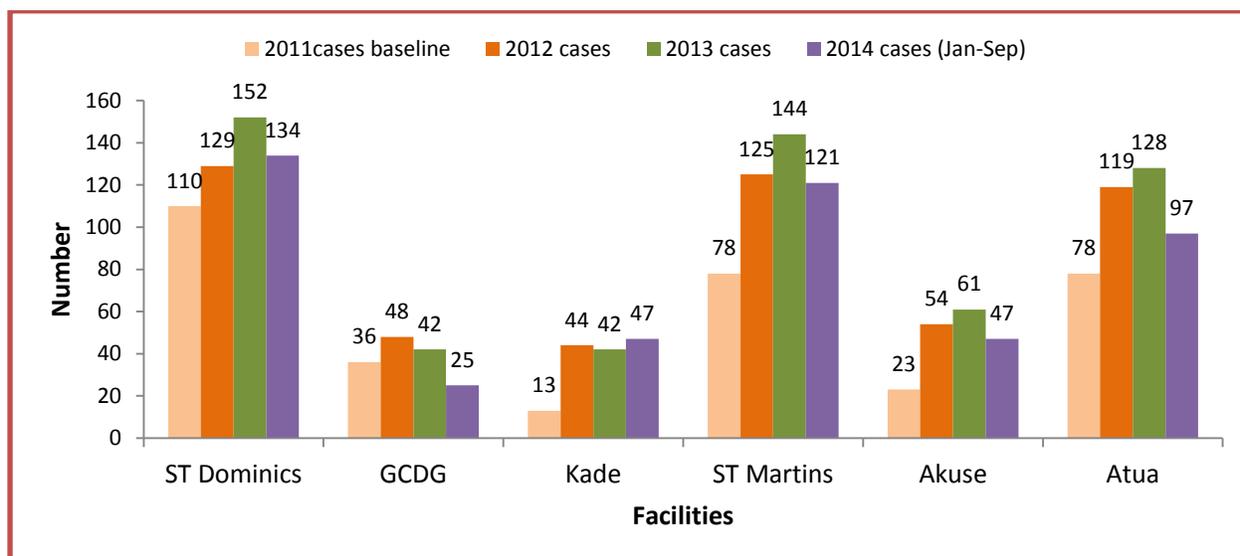


Figure 1. Total TB cases notified by the six hospitals

The results show a consistent increase of 54% (519, all forms) and 68% (569, all forms) in 2012 and 2013, respectively, compared to the 2011 baseline (338, all forms). Between January and September 2014 alone, 471 TB cases were reported by the six facilities, which is more than the baseline.

This intervention has shown that intensifying the use of SOPs for TB case detection at the facility can have great impact without requiring substantial financial input since the clients and patients being screened for TB have already come to the health facility for various other reasons. With these excellent results, therefore, the NTP has adopted this approach in its NSP and the CN to reflect the current prevalence survey results of 327/100,000 population. TB CARE I further increased their support by providing additional funding to the six hospitals to intensify TB screening among all outpatient department (OPD) attendees, irrespective of their presenting symptoms, and implementing contact tracing. Within six weeks, this support yielded 135 TB cases (all forms), with 42 being smear positives.

Lessons learned and best practices for implementing intensified hospital-based TB case detection using SOPs in these six hospitals have been disseminated to all 26 districts in the Eastern Region, 27 districts in the Ashanti Region, 22 districts in the Western Region, 11 districts in Upper West Region, 27 districts in Brong Ahafo Region and 18 districts in the Northern Region. The NTP will disseminate the SOPs for implementation best practices to the remaining regions, thus achieving national coverage. SOPs implementation results were also disseminated during the 2013 NTP midyear review meeting, which attracted over 80 participants drawn from all 10 regions of Ghana.

In spite of these achievements, there remain some challenges as indicated below in table 4.

Table 4. Challenges Related to the Implementation of the SOPs for TB Case Detection

Challenges	Suggestions and Recommendations
As many as 48% of the TB patients detected in the six hospitals are referred to other hospitals before start of TB treatment, with no feedback to indicate whether they have reached their destinations.	Improve feedback mechanisms and consider the use of mobile text messaging to provide feedback between facilities.
There is still underdiagnoses and underreporting of TB in children aged 0–14 years. Only 4% (53) of the total TB cases detected from the six hospitals were children aged 0–14.	Disseminate guidelines for the diagnosis and management of TB children in all the 10 regions.
Although there has been a decline of TB deaths, the figure is still unacceptably high.	Develop and disseminate a guide to providing quality clinical care to TB patients, including collecting TB mortality statistics and ensuring that all TB patients receiving treatment are reviewed every month.
According to the preliminary results of the TB prevalence survey, the burden of TB is much higher than currently estimated by WHO. The preliminary results show that Ghana has a TB prevalence rate of 327/100,000, which is much higher than the estimated 92/100,000, and that the TB case detection rate is 21%, which is substantially lower than the WHO's estimate of 81%. This level of TB burden requires more resources than what is currently being allocated.	Mobilize additional resources for TB control from government of Ghana, GF, US Government, and other development partners.
Misconceptions and negative perceptions about TB have led to presumed TB patients shunning early TB diagnostic services or coming late to the hospital.	Develop and implement an Advocacy Communication Mobilization Strategy that also focuses on mitigating against TB stigma.
The Eastern Region has one of the highest human immunodeficiency virus (HIV) rates in Ghana, making it more difficult to diagnose TB among PLHIV because the main diagnostic tool is still the light microscope	Deploy additional GenXpert machines, especially in districts with high HIV rates.
Not all clients and patients accessing health services, especially at the OPD, are systematically screened for TB due to competing priorities among HCWs.	Intensify TB screening among clients attending services at the OPD and advocate for the effective use of registration of presumptive TB cases. Each day, at each clinic, an HCW should be responsible for ensuring that all clients at the OPD are screened for TB.

TB Documentary Developed and Released

Despite the progress made by the NTP in providing access to high-quality TB control services, many people in Ghana with TB remain undiagnosed or are diagnosed late, resulting in a high rate of TB deaths and complications. One of the contributing factors associated with this fact is the stigma attached to TB. In some communities, TB is known as a “ghost disease,” which makes many people seek treatment at prayer camps and spiritual healers. As a result, TB patients are not diagnosed and treated promptly.

In light of this consideration, TB CARE I has produced a TB case detection awareness documentary for the purpose of improving TB case detection, both in health facilities and the community, ultimately reducing TB deaths. The TB Case Detection Documentary was released on May 15, 2014, and it has been given to the NTP for distribution to facilities in all districts and regions. The release specifically targeted policy makers, development partners, and senior managers of the MOH and GHS, as well as other relevant government ministries and departments, civil organizations, and community members for the purpose of advocating for continued funding of TB control services and involvement of care providers across the country to sustain gains made over the last decade. This documentary also targets the public at large, including unconventional health care providers such as prayer camps.



Photo 4. The prayer camp Owner (middle) giving testimony at the TB documentary launch about her experience with TB treatment.



Photo 5. National Health Insurance Scheme official and the NTP manager in a discussion during the TB documentary launch. Looking on is the TB CARE I country director.

TB Prevalence Survey

The true burden of TB in Ghana is unknown, as no TB prevalence survey has been done in the country since 1957. Therefore, Ghana has been relying on WHO estimates to develop its strategies and targets. In response to this issue, the NTP has conducted a TB prevalence survey to assess the true burden of TB in the country, and also provide baseline data for setting targets in future NSPs.

TB CARE I provided substantial technical and financial support for this survey throughout the process, mainly focusing on data management. This support has permitted the survey data to be available earlier than anticipated. The provisional results of the survey show that TB prevalence in Ghana is 327/100,000 population, which is three times higher than the WHO estimate.



Photo 6. Survey participants in the TB prevalence survey in one of the clusters in Upper East Region, waiting to be called for screening.



Photo 7. One of the houses that was included in the census for the TB prevalence survey

World TB Day Celebrations:

TB CARE I has actively participated in the National Launch of **World TB Day** every year. In 2013 World TB Commemoration that took place in Kumasi TB CARE I mounted a booth to showcase the results of implementing TB case detection activities in Eastern region. Some of the high level dignitaries that attended the World TB day in 2013 included the USAID Mission Director and the World Health Organization Resident Representative. The USAID Mission directors also visited the TB CARE I booth

Below are some pictures for the 2013 World TB day celebrations held in Kumasi:



Photo 8: The USAID Mission Director being briefed by the TB CARE I Country Director on TB case detection project results at the TB CARE I booth



Photo 9: The USAID Mission Director, the Chief of Kumawu (Chairman) and the Honourable Minister of Health at the 2013 world TB Day launch



Photo 10: TB Coordinators from Eastern Region taking a closer look of their TB case detection performance at the TB CARE I booth



Photo 11: The USAID Mission Director in a group photograph with TB coordinators from the Eastern Region at the TB CARE I booth

Printing of Poster and Algorithms:

The project supported the NTP in designing and printing of TB posters and TB algorithms in support of the diagnosis and Management of in adults, children and persons living with HIV. Below are examples of posters and algorithms developed.

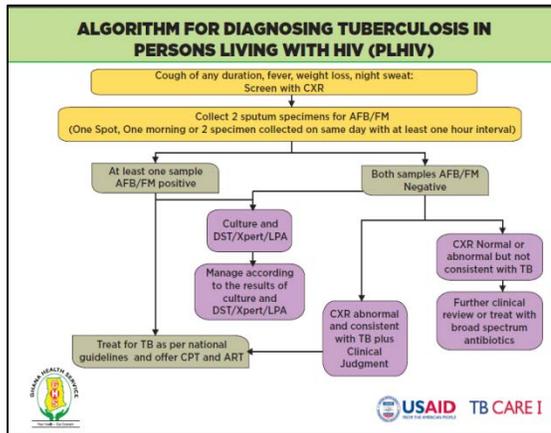


Figure 2: TB Algorithm for diagnosing TB in PLHIV

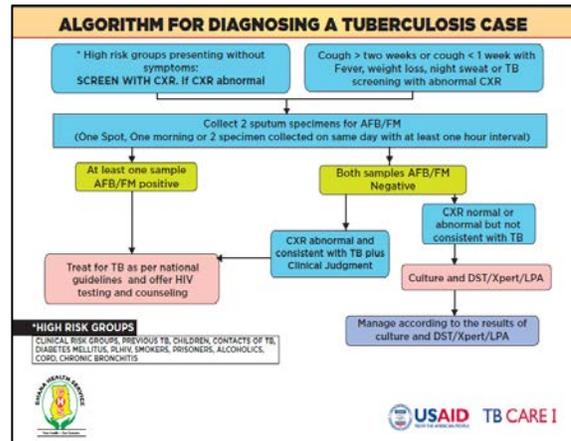


Figure 3: TB Algorithm for diagnosing TB case in our facilities

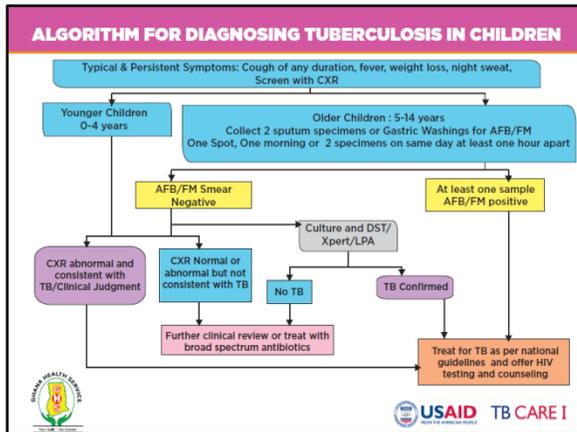


Figure 4: TB Algorithm for diagnosing TB in Children

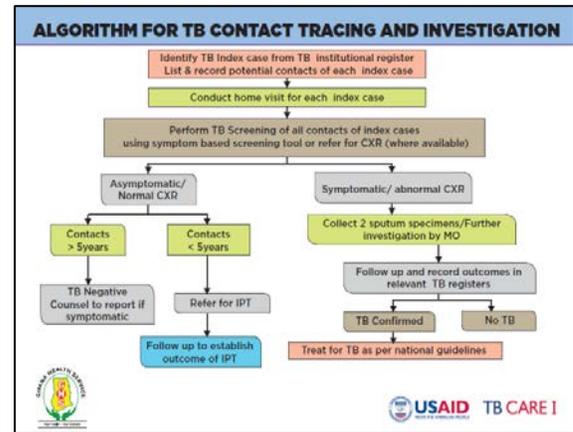


Figure 5: TB Algorithm for conducting contact tracing

Success Story

Photo credit: B. Adusei /MSH



Grace Tsawe (see photo to the left), a prayer camp owner, encourages other prayer camp owners to promote medical screening and referral for tuberculosis control.

“I now know that TB is not a spiritual disease and, when it is promptly tested and treated, TB is indeed curable. TB treatment has saved my life and I am ready to proudly give my testimony to my counterparts across the country.”

TB control in Ghana is challenging: Detection of TB cases has been low, and TB mortality rates are high. In many communities, such as Lower Manya Krobo district, these challenges are compounded by the popular belief that TB is a spiritual disease. Some members of the Ghanaian population who contract TB seek healing in prayer camps and at shrines rather than going to health facilities for testing and treatment. By the time such patients seek medical care, it often is too late to recover and avert death.

Lower Manya Krobo district has over 93,000 residents and a high incidence of TB: 209 cases per 100,000 people in 2011. The district is also home to many of the nation's mushrooming prayer camps, where local healers provide daily services for residents who are ill.

A prayer camp is a traditional prayer house, usually owned by an individual or a family and located in a rural area or on the outskirts of an urban area. People with various physical and mental illnesses temporarily stay at these houses for spiritual consultation and healing. Clients are normally advised to fast so that their prayers are answered by the spiritual power. Some of the prayer camp owners are known as prophets or prophetesses. There are more than 50 prayer camps in Lower Manya Krobo district, and only 18 health facilities.

Grace Tsawe owns a prayer camp in Lower Manya Krobo district. She usually sees over 100 people on her main clinic day. Until recently, Grace did not recognize the need to refer her patients to health facilities because she believed that TB could only be cured through prayer. In December 2011, Grace developed a persistent cough and began to rapidly lose weight. Although she prayed fervently, Grace's symptoms persisted. Eventually, she decided to visit Atua Government Hospital. The doctors tested her and, finding her infected with TB, promptly initiated treatment.

The USAID-funded TB CARE I in Ghana, led by MSH in partnership with the KNCV Tuberculosis Foundation and the WHO, has been working to increase TB case detection in the Lower Manya Krobo district since early 2012. As part of this process, the project facilitated a workshop on improving TB case detection for over 120 of the district's HCWs. In addition to training staff on TB screening, diagnosis, and treatment, TB CARE I taught them to encourage prayer camp owners to screen their patients for TB and refer them to health facilities if they need testing and treatment.

One of the project's trainees, Victoria, is a TB coordinator at Atua Government Hospital. After Grace began TB treatment, Victoria encouraged her to give her prayer camp clients the same opportunity for testing and treatment. Having experienced a full recovery, Grace was easily persuaded. Victoria taught her how to identify TB symptoms and conduct a timely referral to the hospital.

Grace is now encouraging her fellow prayer camp owners to refer patients who they suspect have TB to the hospital. She has also requested support from the hospital to hold a workshop for other prayer camp owners so that they can be trained in TB case detection activities. TB CARE I and the Atua Hospital managers are working with Grace to organize this training. Last year, TB CARE I arranged for Grace to give her testimony to a gathering of over 200 health professionals and local residents in Koforidua Region. The project is now developing a documentary about Grace's life that will be broadcast on radio and TV stations across the country.

Since early 2012, TB CARE I has been supporting TB case detection activities at the three main hospitals in Lower Manya Krobo district. With this intervention, an active OPD screening is being conducted in all three facilities in Lower Manya Krobo district. There has been a remarkable improvement in 2012 and 2013, according to a review of the intervention. Nearly 140,000 and 149,000 people were screened for TB in 2012 and 2013, respectively. Out of the number screened, a total of 298 and 333 TB cases (all forms) were identified in 2012 and 2013, respectively, and started on TB treatment. This represents an additional 119 (67%) and 154 (86%) TB cases in 2012 and 2013, respectively, relative to the number of TB cases (179) detected in the three facilities in the Lower Manya Krobo district.

The project is conducting similar training and support in four districts in Ghana's Eastern Region. The TB CARE I team is documenting best practices and lessons learned from these activities and disseminating them to HCWs in all 10 regions of the country.

Bismarck Owusu Adusei is the Monitoring and Evaluation Specialist for TB CARE I Ghana at MSH.

Photo 13. General In-Patient-Ward at St. Martin's Government Hospital



Photo credit: B. Adusei /MSH

Laboratories

MSH is the only partner responsible for this technical area. The focus in this technical area was to support the NTP in the introduction of the GenXpert MTB/RIF (Xpert) in the country. This was followed up with the initial assessment for the introduction of the Xpert as well as conducting pilot for the external quality assessment (EQA) for the technology. TA was provided by Dr. Alaine Nyaruhirira. TB CARE also supported the NTP in developing the Xpert roll out plan as part of the new national strategic plan (2015-2020).

TB CARE I also supported the NTP conducting EQA for sputum smear microscopy.

Table 5: Technical Outcomes

#	Outcome Indicator	Indicator Definition	Baseline (Year/ timeframe)	Target	Result
				Y4	Y4
1	National Rollout plan for Xpert Developed and incorporated into the new strategic plan	Description: National Rollout plan for GeneXpert developed and incorporated into the new strategic plan Value: Yes/No Level: National Means of Verification: STTA mission report	No baseline	GeneXpert roll out plan available	GeneXpert roll out plan developed, incorporated and informed the development of the NFM concept note
2	Patients diagnosed with GeneXpert	0	22 MTB positive and 3 Rifampicin Resistant (as at end of June 2013)	100	53 MTB+ and no RR. (Jan to June 2014) Target not achieved because there was a period when there was stock out of Cartridges

Key Results

In February, 2013, TB CARE I supported in the installation of first 4 Xpert machines and build capacity of the laboratory staff on the use of the Xpert machines.

In September 2013, TB CARE provided support to the NTP to conduct an initial evaluation of the Xpert technology. Key findings of the assessment include:

- Clinicians were not adequately oriented to the Xpert algorithm thus resulting to low uptake of the technology which led to the expiry of the cartilages
- Infection control measures in the Xperts sites were inadequate

In June 2014 TB CARE through external consultant (Dr. Alaine Nyaruhirira) supported the NTP in developing Xpert guidelines and a scale-up plan and also help to install additional eight Xpert machines. The Xpert scale up informed the development of the new NSP. Laboratory diagnostic algorithm in line with Xpert was also developed.

According to the scale-up plan, Ghana will have an additional 38 Xpert machines in the next five years. At the end of the five-year period, there will be a total of 53 Xpert machines in Ghana that include 15 machines that are already in the country.

Figure 6 shows the Xpert results from the four sites (March-September 2013).

Table 6: Xpert tests conducted in the TB CARE supported sites

Patients diagnosed with GenXpert in TB CARE supported 4 sites (Number as of September 30th, 2013)	
Presumptive new TB	816
Total successful tests	780
Number of MTB+ cases diagnosed using Xpert	135
Number of Rif+ (and MTB+) diagnosed	21
MTB positivity rate	17%
Rif resistant/all MTB positive	16%

Figure 6: Xpert test results for the four sites (March - September, 2013)

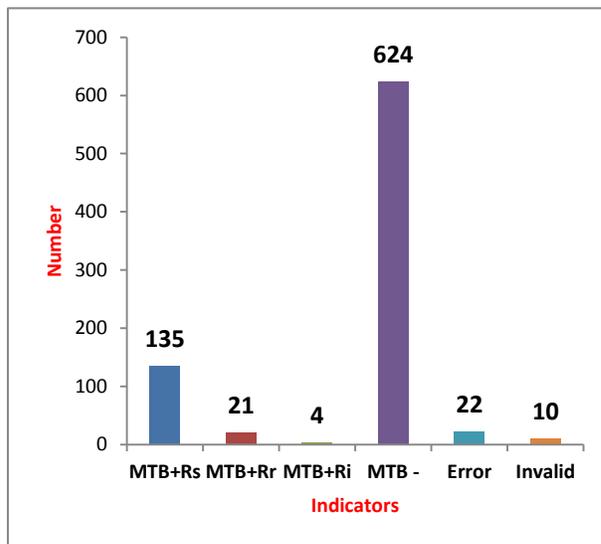


Photo 14: The consultant, Dr. Alaine Nyaruhirira interpreting results of the Xpert examination to participant during the training



Photo 15: The consultant, Dr. Alaine Nyaruhirira, training laboratory staff on the use and installation of Xpert machines

Quality Assurance Training:

Quality assurance performance in most of the parameters of TB microscopy in the Eastern Region decreased and within the context of increasing TB case detection in the region there was the need to train laboratory personnel in TB smear preparation and examination to enhance their skills and improve the quality of TB microscopy ultimately improving TB case detection in the region. In 2012 TB CARE I supported the training of 24 microscopists (23 male and one female) one from each TB diagnostic center.

In order to assess baseline performance of these TB diagnostic centers prior to this training, participant brought 15 slides for blind rechecking by TB laboratory supervisors. The results of the blind re-checking showed that general performance for the six main parameters in TB microscopy was just above average. The national target performance in TB microscopy is 80% and this performance fell short of this target with a score of 61%. However, considering the individual parameters, staining quality of smears was good with an average of 83%.

All other parameters were below the 80% target though there was an improvement in sputum quality (54%) compared to the 2011 third quarter EQA performance of 51%. There was also an improvement in performance for size (79%) and evenness (64%) of smears compared to the 2011 third quarter EQA where performance scores were 53% for size and 57% for evenness.

In summary, it was only one hospital (St Dominic's hospital) that achieved a performance of 89% which was above the 80% target.



Photo 16: Laboratory technicians in a practical session during the lab training



Photo 17: Participants for the laboratory training in a group photograph

Infection Control

MSH and KNCV were partners responsible for this technical area. TA was provided to the NTP to adopt a guide on monitoring active TB disease incidence among HCWs to the local setting and incorporate the key strategies into the national strategic plan. This TA mission resulted in the two main teaching hospitals pay more attention to introducing the policy of screening HCWs for TB. This was after it had become evident that a number of HCWs were diagnosed with TB but no quality data was available

Furthermore, in the district where TB CARE I was supporting the implementation of the SOPs for TB case detection infection control activities were incorporated. The major challenges observed were that TB screening among HCWs was not adequately implemented due to high TB stigma among HCWs.

Table 6: Technical Outcomes

#	Outcome Indicator	Indicator Definition	Baseline (Year/ timeframe)	Target	Result
				Y4	Y4
1	Availability of a guide on the monitoring of TB disease incidence among health care workers	Description: A guide on the monitoring of TB disease incidence among health care workers incorporated into the national strategic plan Value: yes/no Frequency: Annual/once Source: Project reporting	No	Yes	Guide incorporated in the new strategic plan (2015-2020)
2	"FAST" strategy has been adapted and adopted		no	FAST Strategy Adopted	Components of the FAST Strategy incorporated in the new national strategic plan (2015-2020)
3	Facilities implementing TB IC measures with TB CARE I support		9	9	All nine health facilities implementing intensified TB case detected implemented TB IC activities.

Key Results

TB infection control (IC) activities were implemented within the framework of implementing the SOPs for TB case detection in the six hospitals. During the training of HCWs on the implementation of hospital based TB case detection, IC especially among HCWs was one of the main contents of all the trainings conducted and made recommendations through the regional health directorate to screen all HCWs.

STTA was provided to review the IC control component of the new Strategic Plan and the CN with recommendations for inclusion was provided by an external consultant Rose Pray.

The project also supported a high TA mission for the development of IC curriculum for the NTP and this has been completed and printed out.

Challenges

- Systematic reporting of TB among HCWs is not yet part of the overall TB surveillance system to ensure that TB incidence among HCWs is monitored at facility, district, regional and national levels.
- Considering that TB stigma among HCWs is still high there is still no dedicated HCW health monitoring occupational database or register to store this confidential information.
- SOPs for infection prevention and control (IPC) have been developed and disseminated at national and regional level but not fully implemented at health facility level.
- The TB infection control budget line in the GF R10 Grant was not adequate to scale up TB infection control activities across the country.

Programmatic Management of Drug Resistant TB

MSH, KNCV and WHO were the partners responsible for this technical area. TB CARE I contributed to the development of the MDR-TB guidelines, MDR-TB training curriculum and training of HCWs in managing MDR-TB patients. TB CARE I supported the NTP to conduct a mapping of all suspected MDR-TB cases in the two main culture and DST centers (Korle Bu Teaching Hospital and Koforidua Regional Hospital)

The main challenge under this technical area is the poor recording and reporting (R&R) of MDR-TB cases across the country. Most of the confirmed MDR-TB cases are still not started on second line drugs (SLDs).

Table 7: Technical Outcomes

#	Outcome Indicator	Indicator Definition	Baseline (Year/ timeframe)	Target	Result
				Y4	Y4
1	Number of MDR cases diagnosed		38	100	50
2	Number of MDR cases put on treatment		27	50	14
3	MDR TB patients who are still on treatment and have a sputum culture conversion 6 months after starting MDR-TB treatment		No data	20	This is not routinely measured by the NTP
4	A functioning National PMDT coordinating body	A functioning National PMDT coordinating body a key component of the MDR-TB curriculum	0	MDR-TB sub-group meeting conducted and MDR-TB clinical team supported	3 MDR-TB sub-group meeting held and 2 Clinical team meeting supported

Key Results

- MDR-TB guidelines produced.
- MDR-TB training curriculum developed and being used to train HCWs in the management of patients.
- TB CARE I supported the NTP to undertake a mapping of all MDR-TB patients from the two culture and DST facilities. The aim was to develop a national surveillance system for DR-TB cases for early identification of suspects and follow up, so that all newly diagnosed cases would then be rapidly enrolled into care to minimize pool of infectious DR-patients in the community.

The mapping exercise showed that a total of 1,507 suspects were listed in both facilities since January 2012 to June 2014. The Chest Clinic received 1,225 (81.2%) of the suspects and Koforidua received 282 (18.7%). Of all the samples received, Greater Accra constituted the largest source of suspects 48.8% followed by the Eastern Region 19.2%.

Challenges

- Lack of admission facility especially for the critically ill cases as the NTP has currently adopted an ambulatory treatment for MDR-TB patients
- Treatment refusal in some patients due the serious treatment reactions associated with the injection and the drugs
- No facility for baseline auditory assessments
- High transportation cost incurred by MDR-TB patients especially during the intensive phase
- There is no active DOT during continuous phase
- No follow up culture in some patients
- No treatment protocols for other forms of DR-TB such as mono and poly resistant TB
- No DST for SLDs

TB/HIV

MSH and WHO was responsible for this technical. The focus was to advocate for the early initiation of the ART in HIV-TB co-infected patients as well as supporting the development of the revised TB-HIV policy guidelines and support meetings for TB-HIV sub-group meetings.

The main challenge under this technical area is the weak TB/HIV collaboration especially at peripheral levels.

Table 8: Technical Outcomes

Code	Outcome Indicator	Baseline (year/timeframe)	Target Year 4	Results Year 4
1	HIV-positive patients who were screened for TB in HIV care or treatment settings	1,216 TB CARE I geographical area in 2012	2000	1,285
2	TB patients (new and re-treatment) with an HIV test result recorded in the TB register	78%	85%	73%
3	TB patients (new and re-treatment) recorded as HIV-positive	24%	No target	24%
4	HIV-positive TB patients started or continued on antiretroviral therapy (ART)	37%	50%	37%
5	HIV-positive TB patients started or continued on CPT	72%	85%	65%

Key Results

- The revised TB-HIV policy guidelines developed.
- TB-HIV sub-group meetings supported.
- Improved uptake of ART among TB-HIV conected patients advocated during the entire life of the project.
- PLHIVs prioritized as one of the key affected populations in the Ghana CN that was submitted to the Global Fund during the October 2014 window.

Almost all targets were not achieved because in 2013 through to 2014 there was a nationwide stock outs of HIV test Kits, Cotrimoxazole tablets and ARV drugs due to reduced funding to HIV and AIDS response from the Global Fund and other partners

Health System Strengthening (HSS)

KNCV and MSH were the main partners for this technical area and the main focus was to provide support for the development the new five year strategic plan and also the activities of the CCM. TB CARE I provided a substantial support to the NTP for the development of the NSP and the CN through the in-country technical team.

Table 9: Technical Outcomes

#	Outcome Indicator	Indicator Definition	Baseline (Year/ timeframe)	Target	Result
				Y4	Y4
1	Government budget includes support for anti-TB drugs		57% of the total budget for FLD and SLD expected to come from Ghana. Likely will come from GF	25% of the budget for FLD and SLD comes from the government)	23% of the annual anti-TB drug costs paid by the government
2	CCM and/or other coordinating mechanisms include TB civil society members and TB patient groups			6 CCM and HIV/TB oversight meetings attended by the Country Director	The Country Director attended all the 6 planned CCM and HIV/TB oversight meetings. In addition to CCM meetings TB CARE I staff actively participated in the national dialogue leading to the development of the NFM concept note
3	TB CARE-supported supervisory visits conducted		6	10	7
4	People trained using TB CARE funds		400	400	756 The overachievement of the target is due to the implementation of the on-job training where health care workers are trained in their own districts or health facilities.

Key Results

NSP and CN development:

TB CARE I provided a substantial support to the NTP for the development of the NSP and the CN through external consultants and the in-country team. The in-country team worked with the NTP from the beginning and participated in every meeting that concerns the development of the NSP and the CN. A number of TA was also provided to the NTP through TB CARE I.

Dr. Navindira Persaud and Dr. Belaineh Girma, in collaboration with the NTP and TB CARE I in-country team, performed an epidemiological assessment of TB in Ghana to provide an evidence based for the development of the NSP and the CN.

Dr. Eveline Klinkenberg (KNCV) helped the NTP to prioritize research areas to be included in the NSP and the CN. She also reviewed the M&E component of the NSP and provided a recommendation for inclusion into the NSP and the CN. Rose Pray also provided TA to the development of the NSP by reviewing the TB infection control component and suggested recommendation for inclusion.

Furthermore, the Country Director and the NTP Officials participated in the WHO/AFRO Regional Workshop on National Strategic Planning for TB Control. It was held from October 18-22, 2012 in Nairobi, Kenya. During the workshop participants were updated on the development of good TB strategic plans. The strategic planning roadmap for Ghana was developed. The workshop was timely as Ghana's strategic plan expired at the end of 2013.

GHS M&E Plan:

Within the context of the HSS TB CARE I supported the GHS to finalize the health Sector M&E plan. This support was provided knowing very well that contributing to the rolling out of a national health sector M&E plan, with the aim of improving data collection and data quality and analysis, will in turn contribute to the strengthening of TB data since TB Control Services are integrated into the general health services.

Conditions Precedents (CP) for the GF R10 Grant on Training Quality:

A TB CARE I Senior Human Resource Consultant supported the NTP to build the capacity of the Ghana NTP in assessing the quality and impact of training events utilizing the GF Round 10 Grant resources as well as expounding areas of potential duplication and lack of clarity of the training activities. This was part of addressing the Global Fund R10 Grant CP. The tasks of the consultant were to systematically review the training plan for it to be fully understood. A Training Plan Tool was developed to have a clear overview with relevant information of NTP's training courses to be used during implementation and monitoring of the training events for the Global Fund R10 Grant. The mission report was submitted to the GF by the NTP and this resulted into approval of the training budget by the GF Secretariat.

Country Coordinating Mechanism (CCM) Activities:

The TB CARE Country Director being a member of the HIV-TB Oversight Committee of the Ghana Global Fund CCM subsequently was elected on September 18, 2012 to chair the committee. He worked very hard to review the dashboard of various principal recipients (PRs) for the Global Fund Round 8 and 10 with focus to the round 10 TB Grant. He also participated in the site visits to PRs for

the Global Fund Round 5 and 8 Grants and the review of Progress Update and Disbursement Requests (PUDR).

NSP Development:

Ghana's current strategic plan expired at the end of 2013 and the development of the new one (2014-2018) was accomplished and submitted by the end of October, 2014. The development of the new one started in late 2012 and TB CARE I provided substantial support throughout the entire process. The Country Director and the NTP Officials participated in the WHO/AFRO Regional Workshop on National Strategic Planning for Tuberculosis Control which was held from October 18-22, 2012 in Nairobi, Kenya and later the WHO supported Work shop held in Cepina, Milan-Italy in November 2013.

During the workshop participants were updated on the development of robust national TB NSP as it is now a prerequisite for development of the Global Fund Concept Note within the frame work of the new funding module (NFM). The strategic planning roadmap for Ghana was developed.

HCWs trained using TB CARE I Funds:

Human Capacity Building is one of the key areas of strengthening the health system. Since the inception, TB CARE I trained many HCWs in public, private health facilities, community and prisons all with the aim of improving TB control services in the country using USG funds. A total of 1,775 HCWs (748 females and 1,027 males) across the country have been trained in almost all technical areas.

Most of these trainings took place in the Eastern Region where the project used as the model region to exhibit best practices. The table below is showing the number of HCWs trained in various technical areas.

Table 10: Total number of trainings conducted using TB CARE I funds for the life of TB CARE

#	Training/ Meetings conducted by TB CARE I	Male	Female	Total
1	TB Case management training	93	118	211
2	Laboratory and PMDR Training	97	26	123
3	Monitoring and Evaluation Training	66	35	101
4	Operational Research Training	73	49	122
5	Hospital Based TB Case Detection Training	317	134	451
6	Review Meetings	254	322	576
7	Leadership and Management Training	127	64	191
Total		1,027	748	1,775

Training of HCWs in all the prisons of Eastern and Greater Accra Regions

TB remains a serious health problem among inmates in Ghana Prisons. This is largely due to poor ventilation, overcrowding and malnutrition. Prison structures lay more emphasis on security than health and safety and therefore provide minimum ventilation which is a perfect environment for transmission of TB. Coupled with the above is the issue of overcrowding. On the average, Ghanaian prisons are overcrowded by over 350%, and indeed TB has been a major cause of death among prisoners. For the past five years TB has been the leading cause of death among inmates.

In 2014 TB CARE I supported the training of prisons health staff from greater Accra and Eastern Regions in TB case detection and TB management. The two-day training brought together 31 health staff (15 females) with NTP being the main facilitators.

Some of the main decisions that were taken at the training workshop were that health staff should screen all inmates in their prisons during entry and incarceration. Also all inmates should be offered the opportunity to know their HIV status and that those who are HIV positive treated with antiretroviral drugs.



Photo 18: Prisons health staff in a training session



Photo 19: Prison officers in a group photograph during their TB training

Support for the NTP's Epidemiological Assessment:

One of the main important prerequisites for the development of the new NSP and the CN within the framework of the NFM was the development of a comprehensive epidemiological analysis with decade of TB data collected by the NTP. This was because the basis of the development was evidence based with good data support. As mentioned previously, TB CARE I supported the NTP to perform an epidemiological assessment of TB in Ghana.

Monitoring & Evaluation, Surveillance and OR

The focus of this technical area was to improve the overall TB monitoring and evaluation by strengthening capacity of the NTP at all levels to conduct effective supervision, conduct data quality audit and validation as well as performing operation research using routine data. MSH and KNCV were the partners involved in this technical area. A number of regions and district were supported to conduct regional Monitoring and supervision visits and review meetings concentrating on data quality issues to improve the M&E systems at all levels. OR was also conducted aiming at writing up papers for publications using project or NTP data. The main challenges under this technical area are the capacity of NTP to analyze data at the lower level and the ability of NTP to conduct OR with their routine data to improve on the TB program.

Table 11: Technical Outcomes

#	Outcome Indicator	Indicator Definition	Baseline (Year/ timeframe)	Target	Result
				Y4	Y4
1	Data quality measured by NTP	Validation of NTP data using the RDQA tool in regional and district supportive supervisions	Data validation supported in 2 regions	Support supervision visit of 6 regions using the RDQA tool	Support supervision in 6 regions using the RDQA tool supported
2	NTP provides regular feedback from central to intermediate level			Feedback mechanisms for every supportive visit provided Mid-year review of the NTP work plan conducted with The regions and districts	NTP national stakeholders review meeting could not take due to the development of the NSP and CN
3	OR studies completed			TB referral OR study conducted National TB Prevalence Survey supported	Final report of the TB referral OR completed National tuberculosis Prevalence survey successfully completed and final results will be released at the beginning of 2015
4	OR study results disseminated			2 disseminations meetings at national and regional level	The final report of the TB referral OR has been disseminated in 5 regions during regional review meetings

Key Results

M&E Support to the NTP

M&E, OR and Surveillance were priority areas for the Ghana TB CARE I project. This was because M&E was one of the key areas that the Ghana NTP planned to address under the GF R10 Grant. Weaknesses identified under TB CAP includes

- There was TB data inaccuracy and inconsistency at all levels of data generation and collection
- There was a considerable delay in submitting data from the lower levels to higher levels
- There was limited use of data collected at the peripheral level
- The NTP M&E frame work had not be finalized hence not disseminated to the regional level
- The quality of monitoring and technical supervision was of poor quality
- Routine data validation and review meetings were not systematically conducted properly
- Data dashboard and data quality assessment tools were not developed for the NTP. See figure 24 and 25 for the snap shot of the two tools developed for the NTP

Based on the above stated weaknesses TB CARE I strategically focused on improving the overall TB M&E and surveillance of the NTP. TB CARE I provided the first M&E STTA through Eveline Klinkenberg from KNCV and Claire Moodie from MSH focusing on M&E assessment at the national level. Following the recommendations of the STTA mission, TB CARE I worked strategically with the NTP M&E team to address M&E gaps by implementing the following

- TB CARE I helped NTP to analyze their routine quarterly TB data from all the 10 regions in Ghana. These analyses helped to identify regions and districts with poor performances.
- Locked all the formulae cells of the TB data collection tools at the national level to prevent accidentally destroying the formulae cells during data entry.
- Developed a TB database with a live graphical dashboard, which analyzes data automatically as data is entered. See figure 7 for the snap shot of the dashboard.
- To address the data inconsistencies at the various levels of data transfer, a WHO tool (RDQA) adopted by the two consultants, (Eveline Klinkenberg and Claire Moodie) was modify with live graphical dashboard and automatic analysis session. This was developed to be used to conduct monitoring and supervision visit at the national, regional and district levels as part of the NTP's data audit exercise. See figure 8 for the snap shot of the RDQA Tool.
- The project conducted various M&E trainings for the NTP at the national, regional district and facility levels to build the capacity of staff in data management.
- As part of our effort to scale up TB case detection activities, TB CARE I in collaboration with the NTP conducted a TB situation analysis throughout the 10 Regions in Ghana to determine the true DOTS coverage with particular focus in the public sector in 2012. The results show that out of the 3,663 health facilities (public, private and faith based), 1,432 facilities provide some form of TB DOTS services representing a 39% health facility DOTS coverage. Out of the 2,722 health facilities in the public sector 1,146 (42%) provide DOTS services. Furthermore, out of the 670 laboratories in the public and private sector 282 (42%) provide smear microscopy services. There are 332 medical laboratories in the public sector and 229 (70%) provide smear microscopy services. Three labs have the capacity to perform culture and DST and two of these laboratories are in one city (Accra).
- The project also adopted the Eastern Region as a model region to exhibit best practices on M&E and TB case detection to be rolled out nationwide.

- The project supported the NTP in conducting various regional and district monitoring and supervision visits using the RDQA tool.

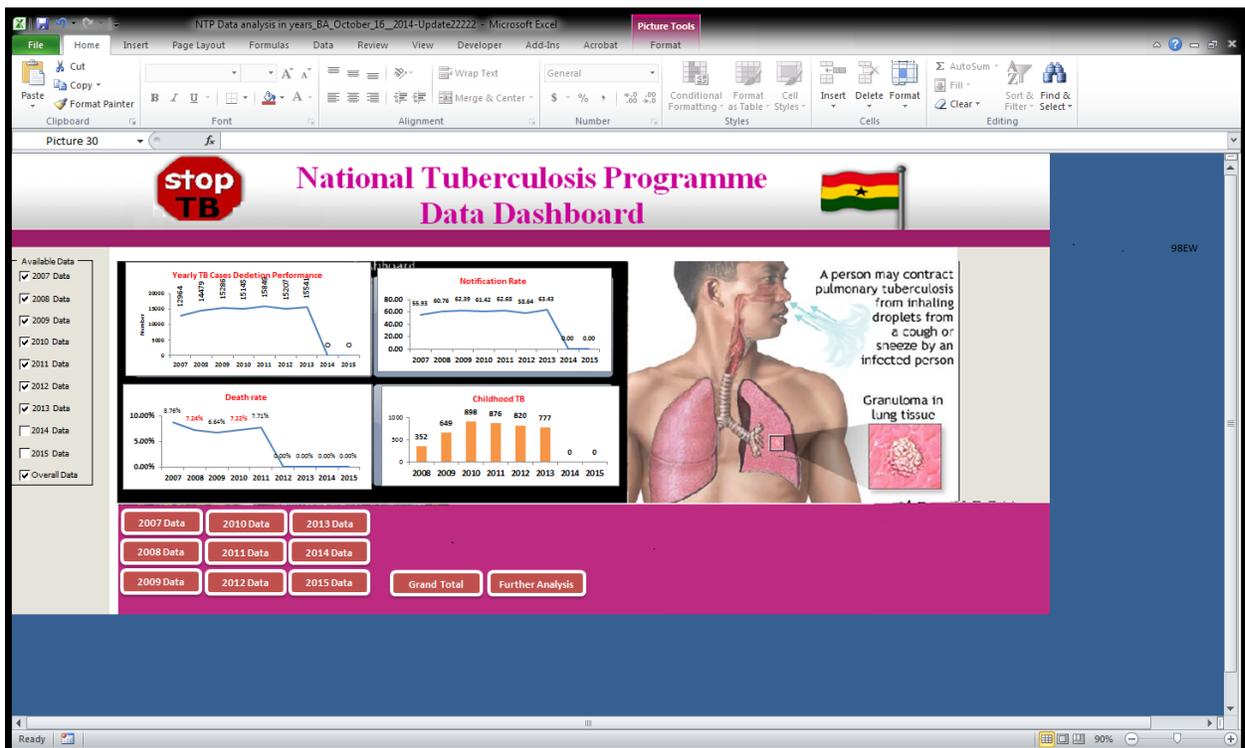


Figure 7: Screen Shot of the TB data dashboard developed for the NTP

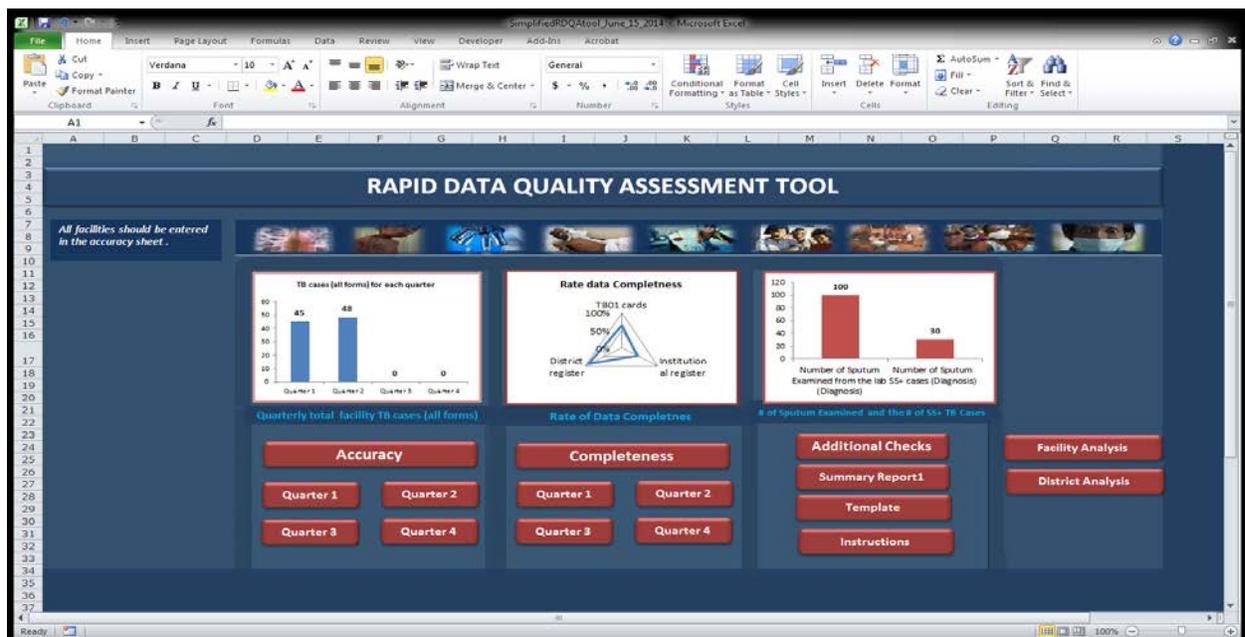


Figure 8: Screen shot of the RDQA tool developed for the NTP to conduct data validation

Development of TB research priority agenda for the NTP CN and the NSP:

As part of USAID TB CARE I's substantial support to the development of the NSP Dr. Eveline Klinkenberg provided TA to the NTP in June 2014, to develop a research road map for inclusion in the new NSP. As per the guidance by the NTP manager, the focus was on implementation research and impact evaluation. Following the consultative process with various stakeholders, including the Ghana Health Service Research Unit, a total of 60 research topics were developed.

The consultant provided another TA in August 2014, to review and provide inputs to the M&E and operational research sections of the draft NSP and provide suggestive recommendations by ensuring the new NSP is robust and has taken into consideration the epidemiological analysis

Data Validation through Review Meetings:

Quarterly TB review meetings are essential elements of a well-functioning NTP. The traditional method of conducting Regional TB Quarterly Review meeting were power point presentations of district performances without any practical session to permit for validation of data presented. In an effort to address the data inaccuracies and inconsistencies in data validation review meetings, TB CARE I demonstrated a systematic approach for conducting Regional TB Quarterly review meetings, different from the traditional way of conducting review meeting. This innovative approach involved TB Treatment Registers swap among Districts TB Coordinators thus permitting for District TB Coordinators review and validate each other's data. This was also aimed at building capacity of the regions and districts in TB Data management at peripheral level.

TB CARE I started this initiative in the Eastern Region in 2012 and extended to Ashanti Region, Northern Region, Western Region, Brong Ahafo Region, and Upper West Region.

The method exposed some differences between the number of TB cases compiled through Register swaps and the figures already submitted to the regional level. There were issues of over reporting and under reporting of TB data to the regions.

This approach also revealed that most of District TB Coordinators have limited knowledge on the basic principles of TB control. In most instances TB patients with initial sputum smear results were declared cured despite sputum results not done at the end of TB treatment and non-adherence to the national policy guidelines as many sputum smear positive TB patients did not have follow up smears at 2, 5 months and at the end of TB treatment. Most differences were in TB-HIV data such as number of TB patients offered CPT and ART. These findings highly suggest the need for the NTP and TB CARE I to urgently finalize the development of the national TB guidelines and ensure that they are disseminated across the country. The NTP Central Unit has now made it a policy that all the 10 regions should adopt this approach of conducting regional TB quarterly Review meetings.

The project also supported the NTP to conduct a mid-year review meeting focusing on M&E for the purpose of assessing the progress of implementing the NTP work plan during the first 6 months of 2011 and review activities to be implemented during the remaining months of the year. The meeting also offered the opportunity for the NTP Central Unit to guide the regions on how to develop implementation plans that will utilize resources from the Global Fund Round 10 Grant.

Below are some of the results of the analysis after the register swap exercise from some regions (figure 9&10).

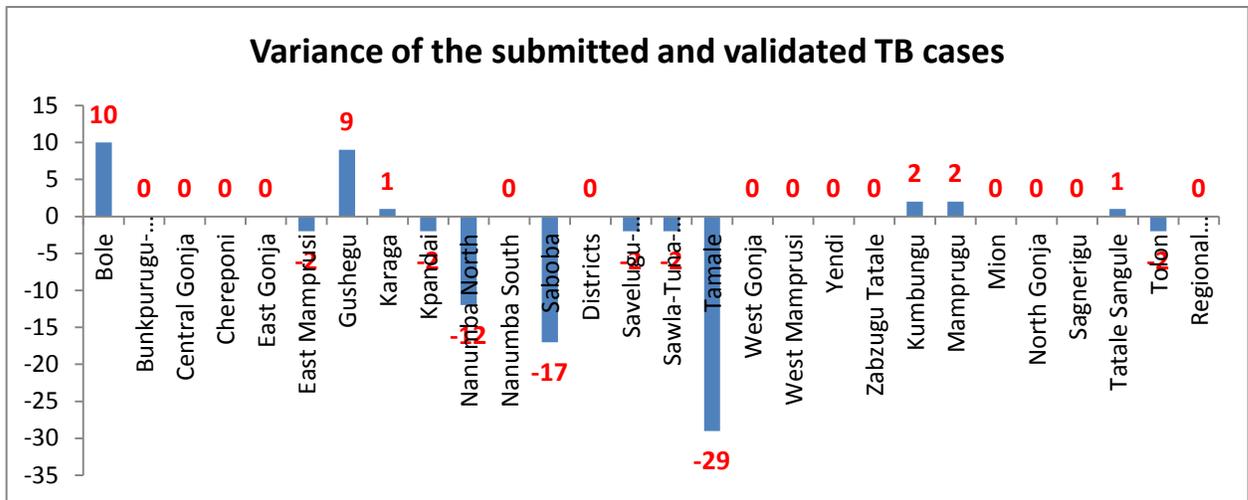


Figure 9: Variance of the submitted and validated TB cases of the Northern Region Review meeting



Photo 20: Participants in a group photograph in one of the review meetings

Monitoring and Supervision Visit support

TB CARE I supported 7 out of the 10 regions (Ashanti, Eastern, Brong Ahafo, Greater Accra, Central, Northern and Upper East) on technical support supervision in all the districts of these regions using the RDQA tool.

This tool was adopted from WHO and later modified by TB CARE I to strengthen the overall NTP M&E system. It has the potential of detecting transcription error, checking data inconsistency, misclassification, data incompleteness, data integrity, data validity and to improve data quality during monitoring and supervision visit.

Some of the findings that were uncovered during these support supervision visits were the issue of over reporting and underreporting. Some districts were found to have reported less or more to the region, rather than what was found during the visits. All these identified challenges were addressed during debriefing and our review meeting to improve the situation.

OR Conducted

To improve the quality of TB services, TB CARE I conducted a number TB OR studies especially in the Eastern Region, where the project worked to demonstrate best practices. In addition to the number OR conducted, the project also conducted research capacity building for HCWs of NTP, Eastern Region and other parts of the country. The six main operational research studies that were conducted were

1. *Data Quality assessment to assess quality of data R&R and to identify key sources and causes of data discrepancies occurring from facility level, to district level and to the national level*

1. Brief Results

Key findings of the assessment included: Incorrect use of district TB number, differences in number of TB cases recorded between each administrative level (facility-district-region-national) of the same cohort and misclassification of smear positive and smear negative. There was also misclassification of TB treatment categories. For example TB patients who had smear positive results at month five were still on category one (CAT I) treatment regime though in principle they were supposed to be put on retreatment regimen (CAT II).

2. *Assess provider delay in 21 districts in Eastern Region*

2. Brief Results

The assessment showed that treatment delay (i.e. time from the date of the sputum examination to start of TB treatment) ranged from 5-31 days which was above the accepted treatment delay of 4 days. Participants were also taught the first steps of developing operational research protocols. This process also permitted for assessment of completeness of data recorded in the TB treatment registers

3. *Are TB patients referred to other facilities reach their destination?*

3. Brief Results

The database consisted of 116 TB patients' records. 98 TB patients were referred to health facilities within the district and 18 patients were referred to health facilities outside the district. 85 had records that they had reached their destinations. 10 had incorrect dates of starting TB treatment. 31(27%) out of the 116 referred TB patients did not reach their destinations. These are likely initial defaulters.

Table 12: TB patients who did not reach their destinations by TB type

TB type	Number
Smear Positive	14
Smear Negative	12
Extra Pulmonary TB	2
Missing Records	3
Total	31

4. *The impact of early TB case detection and treatment to the number and proportion of TB patients who die during treatment*

4. Brief Results

After the implementation of the SOPs for TB case detection in the six facilities, TB death successively reduced as seen in table 14. Further analyses shows that TB-smear negative HIV positive patients were dying earlier (from the time of diagnosis to the time of deaths) than TB-smear positive HIV positive patients. This can be seen in tables 15 and 16 below.

Table 13: TB deaths from the six health facilities in the Eastern Region (Jan. 2011- Sept. 2014)

Year/quarter	Number TB cases detected	Number TB patients died	% of TB death
2011 (baseline)	338	87	25.7%
2012 (intervention)	519	64	12.3%
2013 (intervention)	569	45	7.9%
2014 (Jan-September Intervention)	420	11	2.6%
Total	1697	203	12.0%

Table 14: Analysis of TB deaths from the six health facilities in the Eastern Region, 2012

2012 TB Deaths					
Indicators		Number	Percentage	Median of the number of days from the date of start TB Rx to Date of Death	IQR of the number of days from the date of start TB Rx to Date of Death
Sex	Male	30	56%	30	(15 - 88)
	Female	24	44%	28	(15 - 79)
HIV Status	HIV Positive	34	63%	59	(18 - 107)
	HIV Negative	13	24%	19	(11 - 30)
	Not one /Unknown	7	13%	18	(12 - 133)
Disease Classification	SS positive	16	30%	61	(16 - 132)
	SS negative	32	59%	29	(17 - 74)
	EP	4	7%	45	(24 - 155)
	Not Indicated	2	4%	16	(14 - 17)
Age Group	0-14 years	2	4%	46	(32 - 59)
	15-24 years	4	7%	74	(63 - 105)
	25-49 years	28	52%	22	(14 - 96)
	50-70 years	14	26%	32	(7 - 124)
	> 70 years	6	11%	21	(19 - 28)

Table 15: Analysis of TB deaths from the six health facilities in the Eastern Region, 2013

2013 TB Deaths					
Indicators		Number	Percentage	Median of the number of days from the date of start TB Rx to Date of Death	IQR of the number of days from the date of start TB Rx to Date of Death
Sex	Male	27	60%	24	(10 - 71)
	Female	18	40%	30	(17 - 51)
HIV Status	HIV Positive	22	49%	33	(14 - 77)
	HIV Negative	16	36%	27	(15 - 49)
	ND/Unknown	7	16%	17	(8 - 57)
Disease Classification	SS +Ve	16	36%	53	(27 - 92)
	SS -ve	27	60%	21	(14 - 38)
	Not Indicated	2	4%	20	(11 - 30)
Age Group	0-14 years	2	4%	4	(3 - 6)
	15-24 years	8	18%	48	(37 - 60)
	25-49 years	25	56%	37	(21 - 86)
	50-70 years	8	18%	11	(7 - 16)

Lessons Learned and Recommendations

Reflecting on TB CARE I results through the lenses of the US Government TB strategy and the Post-2015 Global TB Strategy, 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 are summarized below, which can inform future work and investment in the country.

Universal Access

Strong support from district and hospital management teams and motivation of HCWs helped to improve TB case detection and overall TB control services.

Intensifying OPD Screening and Contact tracing could increase TB cases.

Using SOPs for TB case detection, in combination with monthly staff monitoring and supervision visits, as well as on-job training, is a low-cost intervention that has the potential to significantly increase TB case notification in Ghana, if implemented at all health facilities countrywide.

Laboratories

Monitoring and Support visits should be regularly conducted at the Xpert Sites to provide support to sustain the monitoring and supervisory regime to continuously guarantee its robustness. Besides, facility personnel need to be constantly trained to operate and maintain the Xpert machines.

Infection Control

Undergo OR to look at the barriers to implementing TB infection control in health care facilities (DOTS corners, DT-TB and ART centers, prisons) (Ministry of Health). Continue to support and expand TB IC messages and control measures and supplies to communities and homes with DR TB patients under the ambulatory care model of care.

PMDT

The NTP should consider using the DHIS 2 patient tracker component to be able to track and effectively monitor all MDR TB patients in the country. This will also assist the NTP to get patient based data and aggregated data on all MDR-TB patients for proper planning and implementation.

TB/HIV

The TB/HIV collaboration should be strengthened at the facility level for all TB patients to be screened for HIV and vice versa.

HSS

There should be regular refresher trainings for HCWs in the implementation of the hospital based TB case detection due the high staff turnover and staff attrition in the Ghana Health Service.

M&E, OR, and Surveillance

M&E should be strengthened at the facility level to coach the people on the job. The capacity of districts and facility TB coordinators should be built to analyze TB data at the district and facility levels. TB CARE I should continue to empower the district in using their routine data to conduct OR studies and scientific papers.

Annex I: Knowledge Exchange

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

Technical Tools:

- Rapid Data Quality Assessment tool for data validation
- TB data dashboard for the NTP

Scientific Publications or presentations:

1. Oral Presentation of the successes of the implementation of the Hospital Based TB Case detection intervention at the Union Conference in 2013 in Malaysia, Kuala Lumpur
2. Oral Presentation of the of the initial evaluation of the Xpert in 4 sites in Ghana at the Union Conference in 2014 in Barcelona
3. Poster presentation on Initiating an innovative external quality assurance program for Xpert M instrument in Ghana (Pilot Phase)
4. Oral Improving TB case detection in big hospitals and referral and teaching hospitals in Ghana 2013 in France, Paris at the UNION Conference

Educational materials:

1. SOPs for TB case detection
2. Development and printing of Ghana Health Service M&E plan
3. Development and printing and printing of Algorithm for diagnosing PLHIV