



# ASSESSMENT

## **TRACK TB: A MIXED METHODS ASSESSMENT** **Strategies, Partnerships, Leverage Points and Learnings**

**OCTOBER 12, 2016**

This document was produced at the request of the QED Group LLC-implemented USAID/Uganda Monitoring, Evaluation and Learning Program under contract no. AID-617-C-13-00007. It was prepared by independent consultants Dr. Bruce Kirenga, Dr. Samuel Kasozi, Levi Mugenyi, and Dr. Beth Anne Pratt with support from QED Group LLC.

# **TRACK TB: A MIXED METHODS ASSESSMENT Strategies, Partnerships, Leverage Points and Learnings**

**October 12, 2016**

Contracted under AID–617-C-13-00007  
USAID/UGANDA MONITORING, EVALUATION AND LEARNING PROGRAM

Prepared for Phillip Green  
United States Agency for International Development/Uganda  
C/O American Embassy  
Plot 1577 Ggaba Road,  
P.O. Box 7007, Kampala, Uganda

## **DISCLAIMER**

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.

## TABLE OF CONTENTS

|                                                                                                            |     |
|------------------------------------------------------------------------------------------------------------|-----|
| List of Tables, Figures, and Maps                                                                          | 4   |
| Acknowledgements                                                                                           | 6   |
| List of Acronyms                                                                                           | 7   |
| Executive Summary                                                                                          | 9   |
| I. Introduction                                                                                            | 13  |
| Background                                                                                                 | 13  |
| Purpose of the Assessment                                                                                  | 14  |
| Assessment Methodology                                                                                     | 15  |
| Limitations                                                                                                | 16  |
| II. Context                                                                                                | 17  |
| Question 1: Changes in Key TB Indicators Over Time                                                         | 17  |
| Question 2: Key Systemic Bottlenecks to Sustainable TB Control                                             | 27  |
| III. Track TB implementation Theory and Approach                                                           | 39  |
| Theory and Approach                                                                                        | 39  |
| Question 3: Assumptions                                                                                    | 43  |
| Question 4: Enhancement of Leadership, Technical Capacity, and Quality Improvement (QI) for DOT and TB/HIV | 46  |
| Question 5: Successful Innovations for MDR TB and Urban DOT                                                | 50  |
| Question 6: Context's Role in Facilitating or Inhibiting TRACK TB                                          | 57  |
| Question 7: Support for Infection Control                                                                  | 61  |
| Question 8: Sustainability                                                                                 | 65  |
| IV. Looking Forward                                                                                        | 70  |
| Question 9: Partnerships and Relationships                                                                 | 70  |
| Question 10: Best Practices                                                                                | 72  |
| Question 11: Leverage Points, Strategies, and Tools                                                        | 77  |
| Question 12: Context Issues Looking Forward                                                                | 80  |
| Question 13: Data and Data Management                                                                      | 81  |
| V. Conclusion and Recommendations                                                                          | 87  |
| Annex 1: References                                                                                        | 93  |
| Annex 2: Scope of Work                                                                                     | 101 |
| Annex 3: Methods                                                                                           | 111 |
| Annex 4: Getting to Know Matrix                                                                            | 118 |
| Annex 5: Further Time Trends from National NTLP Data, 2008-2015                                            | 127 |

## LIST OF TABLES AND FIGURES

### Tables

|                                                                                                                 |    |
|-----------------------------------------------------------------------------------------------------------------|----|
| Table 1: Median % Change in Key TB and TB/HIV Collaborative Indicators, 2007-2015                               | 19 |
| Table 2: Summary of Recruitment Rates by Cadre                                                                  | 30 |
| Table 3: Government Health Expenditures (UGX) FY 2008/09-FY2011/12)                                             | 31 |
| Table 4: Active Global Fund Grants to the GoU                                                                   | 33 |
| Table 5: Ministry of Health Partnership and Coordination Structure                                              | 34 |
| Table 6: Examples of TRACK TB Interventions                                                                     | 41 |
| Table 7: Expected Targets and Results for Enhanced NTLP Leadership, Technical Capacity, and Quality Improvement | 48 |
| Table 8: Treatment Outcomes in TRACK TB <i>Direct</i> versus <i>Indirect</i> Supported Hospitals                | 52 |
| Table 9: TB Infection Control Implementation in 42 KCCA Health Facilities                                       | 62 |
| Table 10: Implementation of TB Infection Control at Assessment Facilities                                       | 63 |
| Table 11: Data Management Issues Reported by Districts/Divisions                                                | 83 |
| Table 12: Data Management Challenges                                                                            | 85 |

### Figures

|                                                                                                                       |    |
|-----------------------------------------------------------------------------------------------------------------------|----|
| Figure 1: Trends in Key TB Indicators, Uganda, 2007-2015                                                              | 18 |
| Figure 2: Trends in Key TB/HIV Collaborative Activity Indicators, Uganda, 2007-2015                                   | 19 |
| Figure 3: Trends in Notification and Treatment Outcomes by TB Forms/Types Notified, 2008-2015.                        | 20 |
| Figure 4: Trends in Cure, Treatment Success, Mortality, and Lost to Follow-Up Rates, All Types, 2008-2015             | 21 |
| Figure 5: MDR Cases Enrolled and MDR Indicator Trends, 2011-2015                                                      | 22 |
| Figure 6: TB Notification Rates (per 100,000) and MDR Cases (#) by Gender, 2008-2015                                  | 23 |
| Figure 7: Trends in TB Notifications by Age among Pediatric and Adult (BC+CD+EPTB) Cases Notified, 2014-2015          | 24 |
| Figure 8: Trends on MDR-TB Notifications by Age among Pediatric and Adult TB Cases, 2010-2015                         | 25 |
| Figure 9: Trends in TB Notification Rates by Zone/Region, 2008-2015                                                   | 25 |
| Figure 10: MDR Cases Notified on TRACK TB <i>Direct</i> Versus <i>Indirect</i> Treatment                              | 53 |
| Figure 11: Indicators Before and After Urban DOTS                                                                     | 56 |
| Figure 12: TB Notification Before and After Urban DOTS at Eight Diagnostic Treatment Units (DTUs) and Mulago Hospital | 56 |
| Figure 13: Percentage of Facilities Reporting Good Data Management Practices                                          | 82 |

## Maps

|                                                           |    |
|-----------------------------------------------------------|----|
| Map 1: TB Notification Rates and Urbanization Rates, 2014 | 26 |
|-----------------------------------------------------------|----|

## ANNEXES

### Tables

|                                                                                                                          |     |
|--------------------------------------------------------------------------------------------------------------------------|-----|
| Table A1: National TB indicators (2008 - 2015) Compared Between Regions/Zones Using the Kruskal Wallis test              | 130 |
| Table A2: Multi-Zone Comparisons for Notification Rates and TB Patients Testing HIV Positive                             | 131 |
| Table A3: Summary Statistics for the Number of Days Delayed before MDR-TB Patients Were Started on Second Line Treatment | 131 |

### Figures

|                                                                                                                                                                                                            |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Figure A1: Zonal Trends on Cure Rate and Treatment Success Rate by Regions/Zones among New TB Cases Notified, 2008 – 2015                                                                                  | 127 |
| Figure A2: Zonal Trends on Mortality Rates and Lost to Follow-up by Regions/Zones Among New TB Cases Notified, 2008 – 2015                                                                                 | 128 |
| Figure A3: Zonal/Regional Trends on Proportion of TB Patients Testing HIV Positive and Offered CPT (Co-Trimoxazole Preventative Therapy) and ART by Regions/Zones Among New TB Cases Notified, 2008 – 2015 | 129 |

## **ACKNOWLEDGEMENTS**

The authors would like to acknowledge the following individuals and institutions for their assistance and support over the course of this assessment: Frank Rwabinumi Mugabe, Eldard Mabumba, Stavia Turyahabwe, Alfred Etwom, George Upenyho, Claudio Marra, and the rest of the NTLP program management staff; Raymond Byaruhanga, Kenneth Mutesasira, Deus Lukoye, Aldo Burua, and the team at TRACK TB; John Kissa of the Ministry of Health's Resource Centre; Abel Nkolo and Giuliano Gargioni of WHO; Sheila Birungi of AIC; Paul Isiko and Paddy Busulwa of Uganda Stop TB Partnership; Alphonse Okwera of Mulago Hospital; Daniel Okello of KCCA; Jim Arinaitwe of Global Fund; Mukadi Ya Diul, May Mwaka, Estella Birabwa, Seyoum Dejene, and Richard Okello from USAID; Augustine Wandera, Charlotta Sandin, Edgar Agaba and the team at QED; and finally, the facility-level DOTS and MDR TB teams, CLFs, DTLs and DLFPs, implementing partner TB coordinators, and other stakeholders who graciously agreed to speak with us during the assessment. Lastly, the authors would like to thank our field support staff - Grace Nyakoojo, Thomas Kanooti, Alex Alidria Odama, and Grace Namuyiga – for their enthusiasm and hard work.

## LIST OF ACRONYMS

|        |                                           |
|--------|-------------------------------------------|
| ACP    | AIDS Control Programme                    |
| AHSPR  | Annual Health Sector Performance Report   |
| AIC    | AIDS Information Centre                   |
| ART    | Anti-Retroviral Therapy                   |
| BC     | Bacteriologically Confirmed               |
| CD     | Clinically Diagnosed                      |
| CDR    | Case Detection Rate                       |
| CHAI   | Clinton Health Access Initiative          |
| CLF    | Community Linkage Facilitators            |
| CME    | Continuous Medical Education              |
| CN     | Case Notification                         |
| CPT    | Co-trimoxazole Preventative Therapy       |
| CQI    | Continuous Quality Improvement            |
| DHIS   | District Health Information System        |
| DLFP   | District/Division Lab Focal Person        |
| DOT    | Directly Observed Treatment               |
| DQA    | Data Quality Assurance                    |
| DTLS   | District/Division TB/Leprosy Supervisor   |
| DTU    | Diagnostic and Treatment Unit             |
| EPTB   | Extra-pulmonary TB                        |
| FGD    | Focus Group Discussion                    |
| FIND   | Foundation for Innovative New Diagnostics |
| GoU    | Government of Uganda                      |
| HCT    | HIV Counseling and Testing                |
| HSSIP  | Health Sector Strategic Investment Plan   |
| HTA    | Health Technology Assessment              |
| IC     | Infection Control                         |
| ICF    | Intensified Case Finding                  |
| INH    | Isoniazid (i.e. Isonicotinylhydrazide)    |
| IP     | Implementing Partner                      |
| IPT    | Isoniazid Preventive Therapy              |
| KCCA   | Kampala Capital City Authority            |
| KI     | Key Informant                             |
| LG     | Local Government                          |
| M&E    | Monitoring and Evaluation                 |
| MDR TB | Multi-Drug Resistant TB                   |
| MoH    | Ministry of Health                        |
| NCC    | National Coordination Committee           |
| NMS    | National Medical Stores                   |
| NSP    | National Strategic Plan                   |
| NTLP   | National TB and Leprosy Programme         |

|        |                                                                         |
|--------|-------------------------------------------------------------------------|
| NTRL   | National TB Reference Laboratory                                        |
| OPD    | Out-Patient Department                                                  |
| PEPFAR | President's Emergency Plan for AIDS Relief                              |
| PFP    | Private-For-Profit                                                      |
| PMDT   | Programmatic Management of Drug Resistant TB                            |
| PNFP   | Private-Not-For-Profit                                                  |
| PPE    | Personal Protective Equipment                                           |
| PTB    | Pulmonary TB                                                            |
| QI     | Quality Improvement                                                     |
| RH     | Rifampicin Isoniazid                                                    |
| RRH    | Regional Referral Hospital                                              |
| RTLS   | Regional TB and Leprosy Supervisors (formerly <i>Zonal</i> , i.e. ZTLS) |
| SOP    | Standard Operating Procedures                                           |
| TASO   | The AIDS Support Organization                                           |
| TSR    | Treatment Success Rate                                                  |
| UCMB   | Uganda Catholic Medical Bureau                                          |
| UPMB   | Uganda Protestant Medical Bureau                                        |
| USTP   | Uganda Stop TB Partnership                                              |
| VHT    | Village Health Team                                                     |

## EXECUTIVE SUMMARY

Uganda was, until 2015, considered one of the “high burden” tuberculosis (TB) countries (HBC) that collectively accounted for 80% of the global TB burden. While WHO has recently reconsidered Uganda’s place on the HBC list, a recent TB prevalence survey suggests that incidence and prevalence rates in the country are far higher than previously believed (234/100,000 and 253/100,000 respectively), and that notification rates for drug-susceptible (DS) and multi-drug resistant (MDR) TB represent only a small proportion of actual cases. The Government of Uganda’s National TB and Leprosy Programme (NTLP) has encountered a number of challenges in implementing TB control activities in the country. In 2013, USAID/Uganda initiated TRACK TB, a five-year, \$12.5 million activity implemented by Management Sciences for Health (MSH), with sub-partners AIDS Information Centre (AIC), Makerere University School for Public Health (Mak-SPH), and University of San Francisco (UCSF), in order to support NTLP efforts to overcome such challenges.

### TRACK TB Objectives

1. Strengthen NTLP leadership and technical capacity to effectively manage TB control in Uganda
2. Expand community-based Directly Observed Therapy, Short Course (DOTS) in Kampala to reduce default rates
3. Scale up management of MDR TB in selected districts to prevent further MDR TB emergence
4. Provide technical assistance to, and improve coordination of, USAID-supported district-based implementing partners to align their activities with NTLP guides, policies, and targets

TRACK TB is now in its fourth year and is drawing to a close. Project stakeholders sought a deeper understanding of TRACK TB’s achievements and challenges so as to contribute to future programming for TB in Uganda. The NTLP, USAID/Uganda, TRACK TB, and the QED-implemented Monitoring, Evaluation and Learning Contract collaborated to create an assessment activity examining the epidemiology and context of both TB and TB control in Uganda, the health systems environment within which TB control is implemented, and TRACK TB’s achievements, challenges, innovations, and learnings in light of the new prevalence survey findings. This assessment - carried out by four external consultants with the involvement of the NTLP and the USAID TB team throughout - is not an evaluation. The purpose is not to measure outcomes against objectives, but rather to provide an understanding – through systematic collection of evidence and intensive, iterative engagement of stakeholders - of how TRACK TB has approached TB control and how this approach might inform TB control in Uganda looking forward.

### The assessment grouped its questions according to the following themes:

1. The context and background of TB in Uganda according to key indicators measured over time
2. TRACK TB’s implementation approach and its achievements in the key areas of national level leadership and capacity building, urban DOTS, MDR TB, TB/HIV integration, and infection control
3. The best practices, key leverage points, strategic partnerships, and necessary data

The assessment is divided into three parts corresponding to these three themes. The first part of the assessment analyzes key TB, TB/HIV collaborative activity, and MDR-TB indicators from 2008 to 2015 so as to understand trends across gender, age, and region. Notification, treatment success, and cure rates have remained relatively stable from 2008 to 2015, except for a sudden trough in 2012 that likely corresponds to a national stock out of TB medicines and a changeover in management both at NTLP and at some USAID regional implementing partners. The 2012 trough can also be seen when comparing rates between new, retreatment, and extra-pulmonary TB cases. The rate of patients not evaluated experienced a corresponding peak in 2012, directly corresponding to the collapse in notification rates, while TB mortality, not evaluated, and lost to follow-up rates have remained low. TB/HIV collaborative indicators have remained high and steady, and the percentage of patients taking up anti-retroviral therapy (ART) has increased rapidly since 2013. There has been an improvement in MDR-TB program performance since 2012, with increases seen in patients enrolled in care. The fluctuations and dips in treatment success, mortality, lost to follow-up, and delayed treatment rates among MDR-TB patients potentially relates to the NTLP's effort to save lives and curb transmission by rapidly initiating the backlog of patients on treatment during the program's initial phases, even though some treatment sites had not yet been fully prepared to manage MDR-TB cases. The assessment finds TB rates among men in Uganda to be higher than among women, as well as high notification rates among the 65+ age category and low notification rates among children, potentially pointing to poor case detection of pediatric TB. A number of regional differences also exist, leading the assessment to call for an improved understanding of the social and economic drivers of regional, age, and gender differences to inform TB program planning.

The first part of the assessment also examines these indicators within the national health systems context of TB control in Uganda, identifying serious bottlenecks at multiple levels of Uganda's health system. Inefficiencies in the national medical supply chain, the health human resources crisis, inadequate financing and political commitment to both TB and the health sector more generally, and dysfunctionalities in the culture of health sector partnership and coordination have impeded technical interventions aimed at the NTLP, and detracted from the overall sustainability of not only TRACK TB, but all national TB activities. Additionally, unaddressed issues related to stigma surrounding TB have affected treatment-seeking by patients and service delivery by health care workers unwilling to work with TB patients.

The second part of the assessment examines TRACK TB's implementation theory and approach and its contribution to NTLP leadership and technical capacity, urban DOTS, MDR-TB, TB/HIV collaborative activities, and infection control. It also looks at sustainability. TRACK TB was designed to address sustainability by targeting existing structures and systems, as well as by introducing sustainable planning tools; however, the assessment questions the degree to which these existing structures actually function independently of external support, as well as the extent to which the NTLP has bought into new planning tools (e.g. the MOST for TB tool). The assessment provides evidence that TRACK TB has made tremendous contributions both to the MDR-TB program and to urban DOTS, introducing and scaling up a number of innovations both in directly-supported sites and indirectly via regional implementing partners. Many of TRACK TB's contributions have had

measurable success, but even in instances in which success is difficult to quantify, stakeholders consistently cite many of TRACK TB's key interventions as valuable:

### **TRACK TB: KEY INTERVENTIONS**

- Staff secondment and incentivization to the NTLP and to MDR TB treatment sites
- Roll out of national and district MDR-TB cohort review meetings
- Facilitation of support supervision between the NTLP and facility health workers
- Peer-to-peer mentorship for health workers new to MDR TB wards
- National, regional, and district TB program performance review activities
- Mixed-model DOTS (home-based, with community and facility input)
- Provision of treatment enabling packages for MDR TB patients (food, transport)
- Utilization of community linkage facilitators (CLF) to enhance adherence, track lost to follow-up, improve retention in care, and trace the contacts of all TB patients
- Support to intra-facility tracking and referral mechanisms between TB and other departments
- Integrated TB/HIV service delivery (e.g. *One Stop Shop*)
- Facilitation of the supply chain (medical and laboratory)
- Roll out of MDR TB e-registers
- Printing and distribution of paper tools (TB registers, etc.)

These interventions, however, face persistent health systems barriers and there are concerns by most stakeholders relating to the ability of the NTLP to take up these interventions in the context of severe shortages of financial and human resources at central level. Additionally, infection control practices are not always implemented to high standard, which also points to system wide weaknesses.

The third part of the assessment addresses the national TB program looking forward, the partnerships, strategies, leverage points, and tools in which stakeholders' feel are worth investing in the future, the contextual barriers that might impede their successful implementation, and the quality of the data environment supporting evidence-based decision-making. These findings suggest that the Government of Uganda, USAID/Uganda, and other stakeholders should continue to support the key interventions listed above, including rapidly scaling up the urban DOTS model for drug susceptible TB to non-urban areas and continuing to roll out community linkage facilitation.

Based on this evidence, the assessment concludes with the following recommendations:

## **RECOMMENDATIONS**

### **FOR TB CONTROL PROGRAMMING**

1. Continue to roll out Quality Improvement (QI) approaches in TB control, especially those that build on existing structures and on-going QI efforts in the broader health sector. Support and scale up the MDR and urban DOTS packages.
2. Expand community linkage facilitation for both MDR-TB and urban DOTS to include drug susceptible TB outside of urban areas.
3. Commit to, and find long term financing solutions for, enabling packages (especially food) to improve MDR patient treatment adherence.
4. Prioritize measures that treat TB patients away from health facilities as much as possible

(e.g. ambulatory care services and mixed model DOTS for both susceptible and MDR TB, expansion of TB care to the Health Centre II level, daily DOT at MDR TB patients' homes).

5. Program for, and carry out, intensive, planned, evidence-driven high-level advocacy for TB and empower the Uganda Stop TB Partnership and NTLP to lead advocacy activities.
6. Support for the Government of Uganda's transition of TB information systems to electronic record keeping and the District Health Information System (DHIS-2).
7. Make TB stigma reduction among both patients and health workers a central component of programming.

#### **FOR HEALTH SYSTEMS STRENGTHENING**

1. Prioritize strengthening the *general* health system as much as vertical program silos; in particular, inefficiencies in the medical supply chain require urgent action.
2. Extend Quality Improvement approaches throughout the entire health system and beyond, with particular emphasis on local government performance.
3. Target health systems barriers that prevent adequate infection control procedures being implemented.
4. Urgently act to improve, and make more policy-relevant, the country's overall health information system.

#### **FOR DEVELOPMENT PRACTICE**

1. Rethink the development, operationalization, use, and monitoring of assumptions within USAID results frameworks
2. Achieve buy in by reconceiving "capacity building" not only in terms of "could be taken up by government" but in terms of "will be taken up by government."
3. Focus on those structures that actually deliver services, most notably local government.

## I. INTRODUCTION

### **Background**

Until 2015, Uganda was among the 22 high burden tuberculosis (TB) countries that collectively accounted for 80% of the global TB burden (Floyd et al, 2015). Among those countries, Uganda was one of nine that managed to meet all three of its TB-related Millennium Development Goals targets by 2015: the MDG 6c target of falling TB incidence rates, and the associated targets of halving the prevalence and mortality rates of TB compared to that of 1990 (WHO 2015). Uganda's achievements have meant that WHO has now reconsidered Uganda's place on the "high burden country" list (Floyd et al, 2015). Nevertheless, 46,171 new TB patients of all types were notified in 2014 (NTLP 2015). Additionally, the first national TB prevalence survey has recently demonstrated prevalence at rates vastly higher than previous modeling estimates. These new findings suggest that notified cases account for only half of estimated TB cases (87,000), and that TB incidence and prevalence in Uganda are far higher than previously believed, at 234/100,000 and 253/100,000 population respectively (NTLP 2016). The mortality rate from TB (excluding HIV positive TB) is estimated at 12/100,000 population, with unfavorable treatment outcomes persisting in over 20% of patients (NTLP 2015). Multidrug resistant TB (MDR TB) is also an emerging problem. Although drug resistance survey (DRS) prevalence estimates suggest that the country had up to 1,040 MDR TB cases in 2012, actual case finding is only around 200 cases per year (NTLP 2015). Thus, while Uganda has made tremendous progress, the country still faces a number of challenges as it works to achieve WHO's ambitious new global target of ending TB by 2035.

TB control in Uganda is the mandate of the Ministry of Health through its National TB and Leprosy Program (NTLP). The NTLP is charged with performing the national core function of TB and leprosy control through: 1) the establishment of countrywide quality diagnosis and treatment of TB and leprosy; 2) the coordination and supervision of the implementation of TB and leprosy prevention and care services; and 3) the prevention and management of leprosy-related disabilities. The NTLP conducts operations at national (central), regional (zonal), and district level (NTLP 2015). Uganda's *National Tuberculosis and Leprosy Control Programme Strategic Plan 2015/16-2019/20* has highlighted a number of challenges affecting the optimal and efficient realization of its primary objectives. These include gaps in programme management and systems, inadequate capacity for MDR TB, and inadequate TB/HIV integration (NTLP 2015). USAID/Uganda has sought to support the Government of Uganda in overcoming these challenges through well-coordinated targeted activities. One of these activities is TRACK TB.

In 2013, USAID/Uganda initiated TRACK TB, a five-year \$12.5 million activity implemented by Management Sciences for Health (MSH), with sub-partners AIDS Information Centre (AIC), Makerere University School for Public Health (Mak-SPH), and University of San Francisco (UCSF). The activity's goal was to increase TB case detection rates (CDR) and treatment success rates (TSR) in focus areas to meet national targets for reducing the burden of TB, MDR TB, and TB/HIV. TRACK TB was expected to strengthen the capacity of the NTLP by providing innovative TB control strategies in Kampala and in districts implementing existing USAID TB programs.

**TRACK TB had four objectives:**

1. Strengthen the NTLP's leadership and technical capacity to effectively manage TB control in Uganda
2. Expand community-based Directly Observed Therapy, Short-Course (DOTS) in Kampala to reduce the rate of patients defaulting on TB treatment
3. Scale up management of MDR TB in selected districts to prevent further MDR TB emergence
4. Provide technical assistance to, and improve coordination of, USAID-supported partners implementing district-based activities to ensure the alignment of their activities with national TB program guides, policies, and targets

**Purpose of the Assessment**

TRACK TB is now in its fourth project year, and the activity is drawing to a close. As new data from the national TB prevalence survey indicates that TB prevalence is higher than earlier estimates have suggested, a new paradigm for TB control is needed. The NTLP, USAID/Uganda, TRACK TB, and the QED-implemented Monitoring, Evaluation and Learning Contract partnered to commission a detailed assessment of the epidemiology and context of TB in Uganda, the health systems environment within which TB control is implemented, and TRACK TB's achievements, challenges, innovations, and learnings. The assessment was carried out by a team of four external consultants hired by QED on behalf of USAID, and involved a number of collaborative stakeholder engagement activities as well as substantive, iterative participation by NTLP representatives, the USAID/Uganda TB team, and other national-level TB stakeholders. The Scope of Work for the assessment is available in Annex 2. As TRACK TB has been carrying out performance monitoring since its inception, this assessment – using both quantitative and qualitative rapid assessment methodologies - is meant to provide an understanding of how TRACK TB has approached TB control, as well as how TB control should be approached in Uganda looking forward.

The purpose of the assessment is to help USAID, the Government of Uganda (GoU), and other stakeholders to understand the most critical interventions for stepping up and sustaining treatment of TB and, thereafter, its elimination in the short and medium term in Uganda. The Scope of Work, found in Annex 2, sought to answer the following questions:

**TRACK TB Assessment Key Questions:**

1. Which approaches have been more effective in contributing to the achievement of TRACK TB outcomes?
2. What sorts of new priorities and strategies are there for sustainably addressing the TB challenge in Uganda?
3. How has the TRACK TB project's collaborative work (partnerships, relationships, etc.) with the Government of Uganda, donors, and the private sector enhanced the achievement of its objectives?

This assessment is structured around **13** detailed questions provided to the assessment team and expanded upon in the Getting to Answers Matrix available in Annex 4. The matrix groups the 13 questions around three major themes:

#### **TRACK TB Assessment Themes:**

- 1. The context and background** of TB in Uganda according to key indicators measured over time
- 2. The implementation approach of TRACK TB**, and the project's achievements in key areas of national level leadership and capacity-building, urban DOTS, MDR TB, TB/HIV integration and infection control
- 3. The best practices, key leverage points, strategic partnerships, and necessary data and data systems required for TB control looking forward.**

The assessment follows these three broad themes throughout, each of which is assumed to be of equal importance. The assessment provides insights to support the NTLP and other TB partners in the on-going planning and implementation of TB control activities. It finds its justification within the country's National Development Plan and within new development cooperation strategies formulated by USAID and other development partners, all of which seek to contribute to, but also depend upon, a healthy population.

#### **Assessment Methodology**

A full description of the methods used for the assessment can be found in Annex 3. In brief, the assessment followed a mixed methods approach based on document and publication review, primary data extraction and analysis, secondary data analysis, as well as key informant interviews and focus group discussions. Additionally, continuous stakeholder engagement – including stakeholder review of, and commentary on, preliminary findings – was treated as both a stakeholder feedback and buy-in mechanism and a data collection tool. Sampling was done purposively based on three criteria. First, informants and focus group participants had to be professional and/or technical experts clearly cognizant of being a stakeholder in TRACK TB, either at management level, recipient level, or in the national TB control program. They had to provide informed oral consent following a short briefing of the nature and purpose of the assessment. Finally, they were only to be engaged solely as to their professional/technical experience with, opinion about, or expertise as to elements of either TRACK TB or TB control in Uganda. Interview transcripts were coded to ensure participant anonymity.

Vulnerable populations and those individuals not clearly cognizant of their relationship to either TRACK TB or the national TB program were excluded as an assessment population due to the legal restrictions and ethical implications surrounding human subjects' research in Uganda, since time and resource constraints meant the assessment was unable to pursue formal ethical clearance. As such, patient perspectives were not included in the assessment. The assessment team, however, strongly urges patient perspectives to be more fully researched and accounted for going forward, as TRACK TB was – in theory – meant to be a “patient-centered approach” to TB control in Uganda.

Fieldwork was conducted at five MDR TB sites: three *directly* supported by TRACK TB (Mulago National Referral Hospital, Mbarara Regional Referral Hospital, and Kitgum District Hospital) and two supported *indirectly* by TRACK TB through the implementing partner SUSTAIN (Masaka Regional Referral Hospital and Gulu Regional Hospital). Fieldwork was also conducted at ten TRACK TB supported urban DOTS facilities in Kampala: two Private-for-Profit (PFP), two Private Not-for-Profit (PNFP) and six public sector. Overall, 134 people participated in 23 key informant interviews and 18 focus group discussions. A list of these facilities, along with a discussion of how they were selected and how participants were identified and protected, can also be found in Annex 3, as can a table providing a detailed breakdown of categories and cadres of informants interviewed.

### **Limitations**

The SOW identified several limitations with the assessment. First, there was a concern that, given the limited time and resources available for this activity, the assessment would not be in depth and could not strive for representative samples. The sampling process is addressed fully in the methodology section outlined in Annex 3; however, in brief, the team addressed this limitation by, first, creating a systematic means of selecting facilities and districts within which to interview stakeholders, as well as by seeking to interview as many high level technical experts who were directly involved in TRACK TB implementation as possible.

The SOW also highlighted the possible “bias” resulting from the involvement of USAID and NTLP staff in data collection and analysis. The team, however, noted that the primary purpose of the assessment was not to “evaluate” or “measure” success, but rather to gain an understanding of TRACK TB and the national TB programme, harness the benefits of on-spot joint learning, identify areas for deeper investigation, and generate as many learnings as possible. Indeed, Phase III of the assessment involved conducting stakeholder workshops to verify findings and encourage the airing of multiple – often conflicting - perspectives. Therefore, while a “traditional evaluation” might seek to eliminate bias, an assessment such as this one is actually most valuable when conflicting perspectives and findings are acknowledged and discussed. This sort of assessment, therefore, treats “bias” as not a “limitation,” but as an opportunity for further inquiry and learning.

Poor availability of adequate, quality service delivery data in the District Health Information System (DHIS-2) and the NTLP databases was also seen as potentially posing limitations, especially in terms of the trend analysis of indicators. Although the capacity of local government and their partners to compile and make available routine health service delivery and use data has improved, completeness and accuracy of data is still problematic. Indeed, data completeness and accuracy was an ongoing problem throughout the assessment. The team sought to overcome this by using primary data where possible, and working directly with NTLP data sets. Still, overwhelming weaknesses within the national TB data system presented sometimes insurmountable obstacles to quantitative data analysis. One primary recommendation going forward is the strengthening of these systems.

\*\*\*

## II. CONTEXT

*Question 1: How have the following TB rates (notification, detection, default, treatment success, cure, and mortality) changed across different forms of TB, regions, and population groups in Uganda over the past 10 years?*

Data from the NTLP central archives were used to draw national trends and to compute changes over time. Non-parametric tests were used to test for similarities or dissimilarities in outcomes. NTLP data was only available for the period of 2008 to 2015, hence trends were generated covering an eight- instead of a ten-year period. The TB forms/types considered included: TB/HIV co-infected, bacteriologically confirmed (BC), and clinically diagnosed (CD) new and previously treated (retreated) TB cases, extra pulmonary TB (EPTB), and MDR TB. National trends were generated on notification, treatment success, cure, and mortality rates, the proportion of TB cases lost to follow-up, as well as on indicators of TB/HIV collaborative activities (proportion offered HIV counseling and testing (HCT), tested for HIV, and tested HIV positive). These rates were compared across the different forms of TB and by different regions/zones<sup>1</sup>, gender, and age groups (pediatric and adult). “Notification rate” was considered here instead of “case detection rate” due to the fact that, over different years, WHO provided different estimates for calculating the expected number of TB cases making it difficult to compare outcomes across different years. The current nomenclature of “lost to follow-up” was used instead of “default” throughout this analysis.

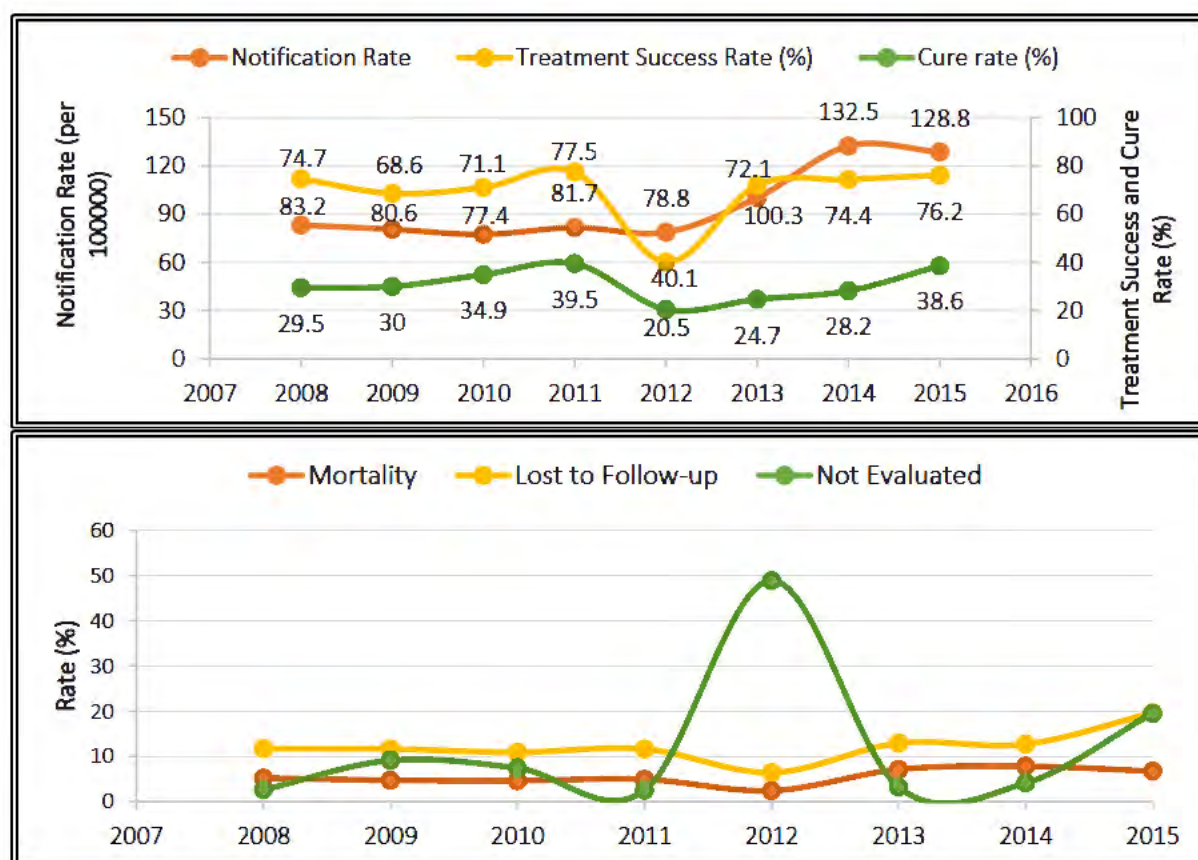
*National notification, treatment success, cure, mortality, lost to follow-up, not evaluated, and TB/HIV collaboration rates in 2008-2015*

Analysis of the eight year notification data show that notification rates remained relatively stable from 2008 to 2011, followed by a trough in 2012, after which there was a noticeable increase until 2014. After 2014, the TB notification rates started to decrease (Table 1). In 2012, treatment outcome indicators (treatment success and cure rates) dropped to their lowest levels but recovered to previous levels by 2013. Overall, the cure rate has remained very low (Figure 1) due a high proportion of TB patients being clinically diagnosed (Figure 3), as well as due to a large number of patients failing to have monitoring sputum smears done (e.g. a large number of cases complete TB treatment without confirmation of cure as can be seen by the wide gap between those successfully treated and cured in Figure 1). In 2012, the proportion of TB patients not evaluated peaked from about 0% to over 40%. Again, the inability to evaluate all registered patients in a given cohort has contributed to the size of unfavorable treatment outcomes. Mortality and the proportion of patients lost to follow-up have remained low. During key informant interviews, focus group discussions, and stakeholder engagement meetings, stakeholders attributed these findings – especially the outliers apparent in 2012 - to both national stock outs of TB drugs and to transitions in NTLP leadership and in implementing partner support for USAID funded projects that were occurring at the time. See details in Figure 1 below.

---

<sup>1</sup> Throughout this document, we use the term regions/zones, as there has been a change in terminology since 2013. What were previously referred to as zones are now called regions. As TRACK TB and NTLP strategic planning and annual program documentation utilized the term “zone” up until the point of terminology change, we keep both terms so as to avoid confusion.

**Figure 1: Trends in Key TB Indicators, Uganda, 2007-2015**



During the period 2008 to 2015, there was a steady improvement in TB/HIV collaborative activities. The proportion of patients tested for HIV increased from 63.8% in 2008 to 98.1% in 2015. The proportion of TB patients co-infected with HIV showed a small but steady decrease, from 51.8% in 2008 to 36.4% in 2015, with a brief peak of 46.4% in 2013; however, these decreases were not statistically significant. In addition, there was a significant increase in ART uptake from 14% in 2008 to 86.9% in 2015. Similarly, significant increases in co-trimoxazole preventative therapy (CPT) uptake were observed. The proportion of TB patients co-infected with HIV also showed a small but steady decrease, from 51.8% in 2008 to 36.4% in 2015, with a brief peak of 46.4% in 2014; however, these decreases were also not statistically significant (see details for trend data on TB/HIV collaborative indicators in Figure 2 and Table I).

**Figure 2: Trends in Key TB/HIV Collaborative Activity Indicators, Uganda, 2007-2015**

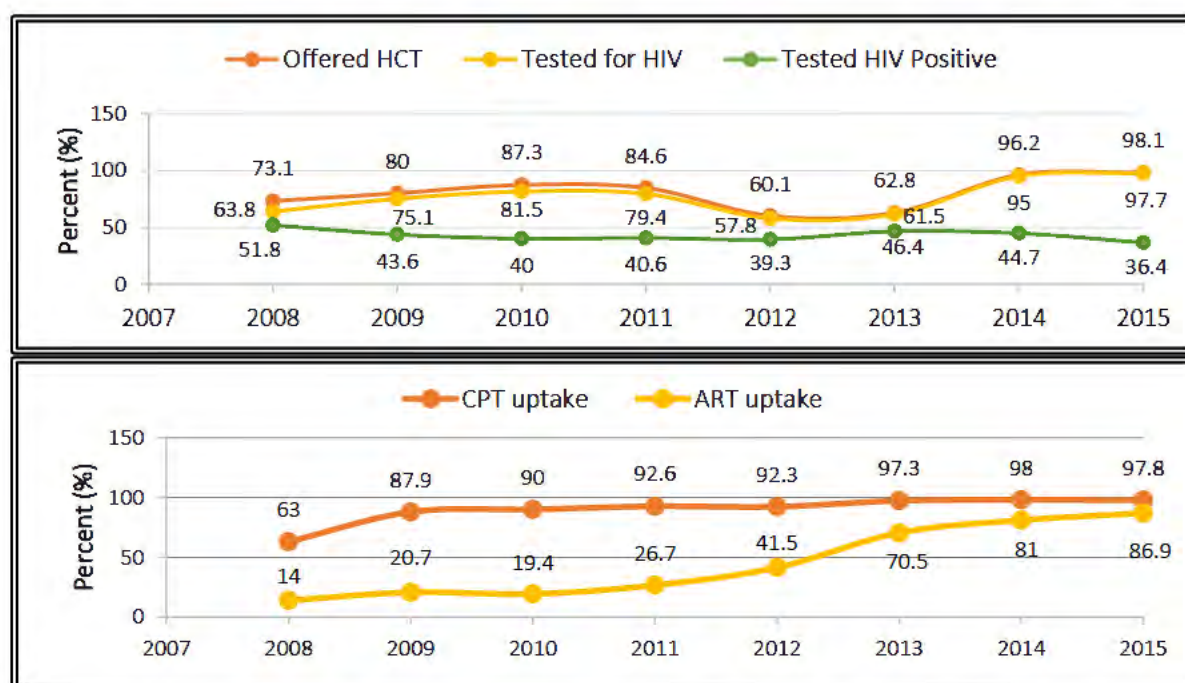


**Table 1: Median % Change in Key TB and TB/HIV Collaborative Indicators, 2007-2015**

| Rate                                           | Median*<br>% Change† | Non-Parametric<br>Trend Test:<br>P value |
|------------------------------------------------|----------------------|------------------------------------------|
| Notification                                   | -2.8                 | 0.101                                    |
| Treatment success                              | 3.2                  | 0.571                                    |
| Cure                                           | 14.2                 | 0.801                                    |
| TB mortality                                   | -2.1                 | 0.166                                    |
| Lost to follow-up                              | -0.9                 | 0.145                                    |
| TB patients offered HIV counseling and testing | 4.5                  | 0.313                                    |
| TB patients tested for HIV                     | -2.0                 | 0.089                                    |
| TB patients who tested HIV positive            | -3.7                 | 0.753                                    |
| HIV positive TB patients put on CPT            | 2.4                  | 0.012                                    |
| HIV positive TB patients put on ART            | 37.6                 | 0.010                                    |

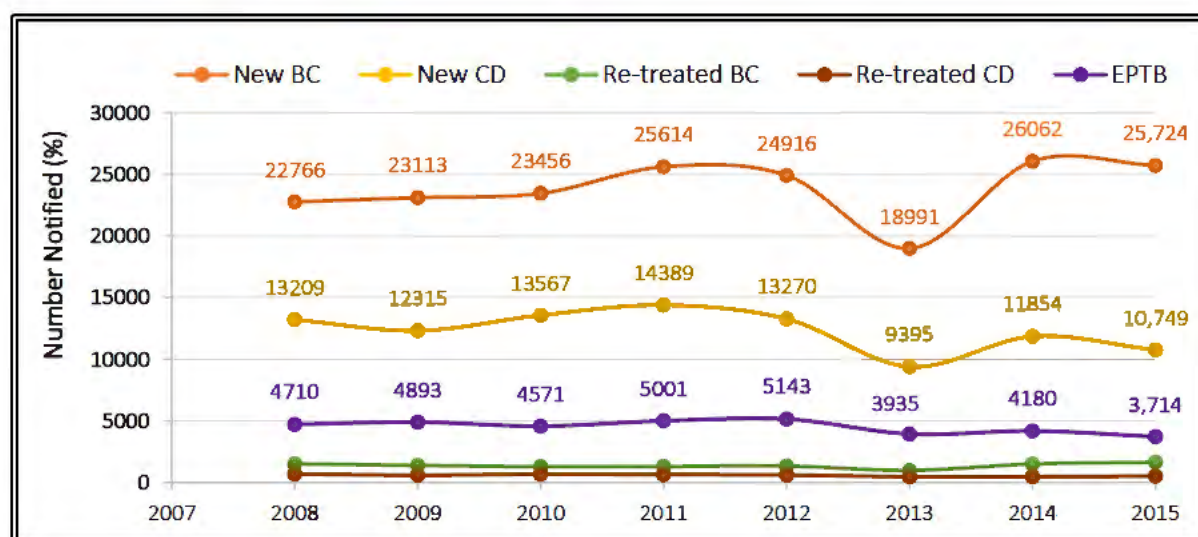
†A negative % change implies a decrease  
\*Median for annual % changes

*National TB trends in notification and treatment outcomes for the different TB forms/types notified in 2008-2015*

New pulmonary TB (PTB) cases consistently dominated notification rates, followed by extra pulmonary TB (EPTB) and retreatment (or previously treated) TB cases. New pulmonary TB cases include those that were bacteriologically confirmed (BC) as well as those that were clinically diagnosed (CD) (that is, diagnosed without a confirmatory lab test). The new

bacteriologically confirmed cases were consistently twice that of clinically diagnosed cases with an average ratio (BC/CD) of 1.95. It should also be noted that the number of extra pulmonary TB cases doubled in the year 2014 compared to 2013 (8,529 versus 3,935). Previously treated pulmonary TB cases remained low, with an average of 1,369 and 580 cases respectively. There were no significant changes in trends for TB forms, except for retreated clinically diagnosed cases which experienced a trough in 2013, likely corresponding to the drug stock out issues that occurred in 2012 as noted earlier. In 2015, the number of new TB cases went down but remained higher than 2013. The reasons for this are unknown and require further investigation (Figure 3).

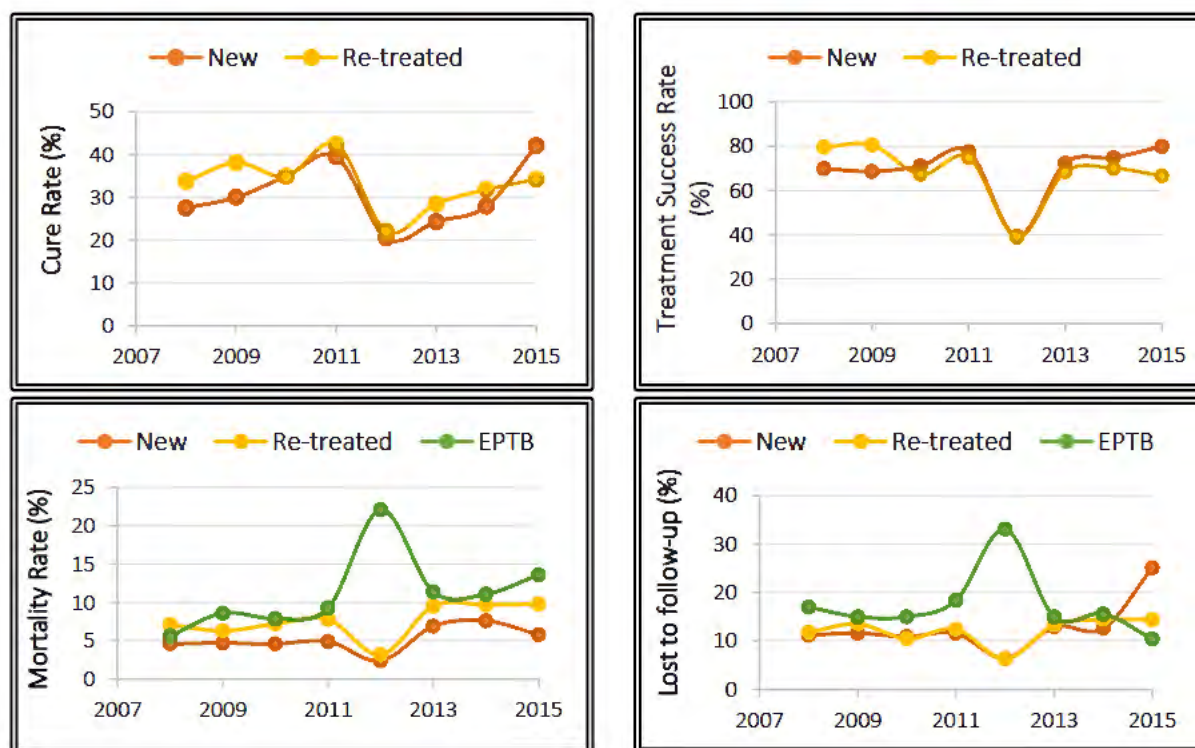
**Figure 3: Trends in Notification and Treatment Outcomes by TB Forms/Types Notified, 2008-2015**



The trends for cure, treatment success, mortality, and lost to follow-up rates by different TB forms are shown in Figure 4 below. A fall or rise in these rates did not differ between the new and the retreated cases. While there was a decline in all these rates in the outlier year of 2012 - both for the new and the retreated TB forms - mortality and lost to follow-up peaked in 2012 for extra-pulmonary TB. Cure and treatment success rates could not be obtained for extra-pulmonary TB as this data was missing for most years.

The trend data from 2012 illuminate the disastrous consequences that national stock out of TB medications – and, potentially, transitions in both leadership and programming – might have on health outcomes. This correlation between health system events and TB trend data warrants further research – both epidemiological and socio-economic - since initial findings suggest that the events of 2012 had catastrophic impact on TB patient morbidity and mortality (and, though no data presently exists, we might also presume on household productivity, income, employment, and other socio-economic indicators affected by chronic, untreated illness).

**Figure 4: Trends in Cure, Treatment Success, Mortality, and Lost to Follow-Up Rates, All Types, 2008-2015**

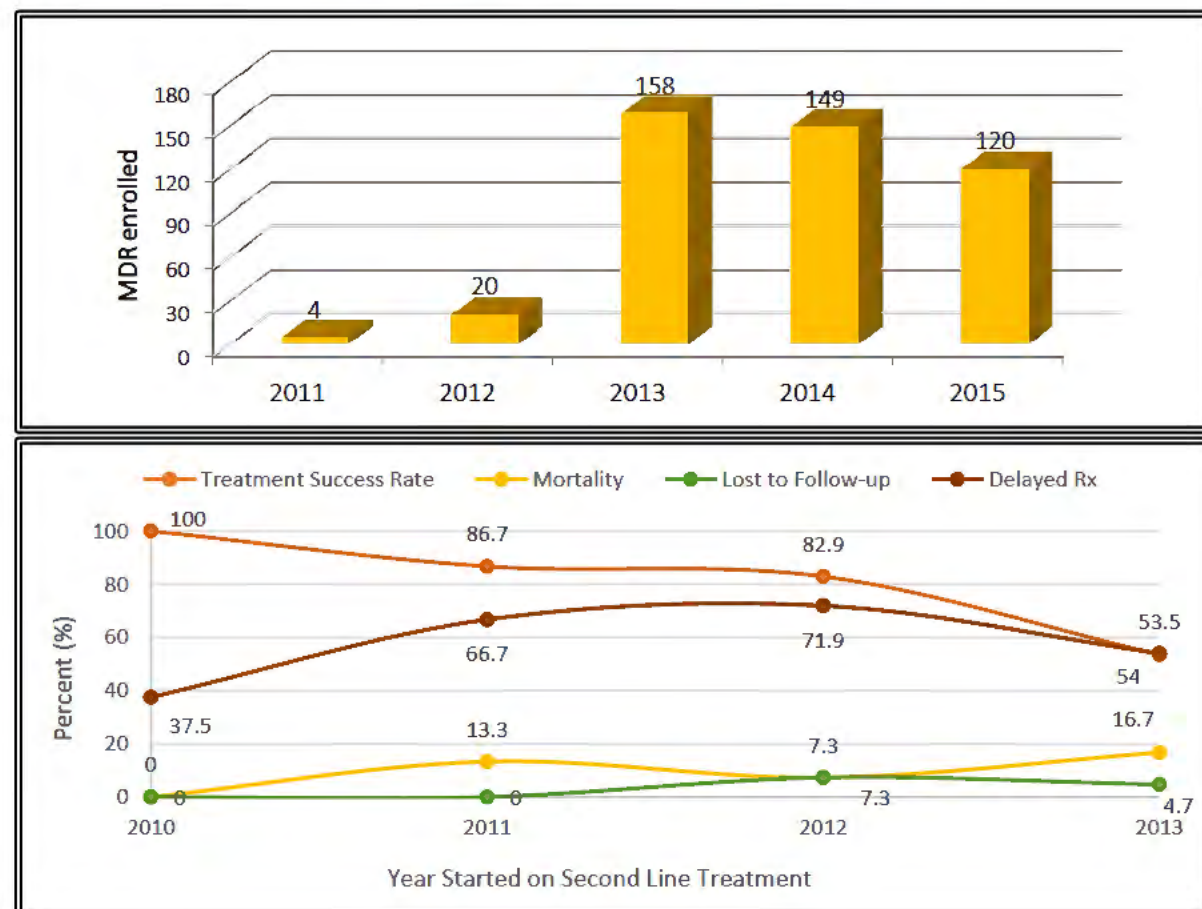


Overall, there was an improvement in MDR-TB program performance as can be seen by the increasing number of MDR-TB patients enrolled into care. From the start of the Government of Uganda's roll out of Programmatic Management of Drug-Resistant TB (PMDT) in 2012, the number of patients enrolled into care gradually increased from just four in 2011 to 158 in 2013. In both 2014 and 2015, a sizeable number of TB patients were notified among the economically-active aged group of >25 years, with the highest number of cases being among persons aged 65+ years, followed by 35-44 and 45-54 years (see Figures 7 and 8).

Among those enrolled on treatment, a large proportion of MDR-TB patients appear to have been delayed for treatment by more than a week between 2011 and 2012. This finding is attributable to the enrollment of MDR-TB patients on treatment who previously had been on a waiting list before the 2012 roll out of PMDT. Some patients on the waiting list had died, and others had waited for several years for treatment (see details on these delays in Table A3 in Annex 5). When treatment was eventually started, it is likely that the patients who were enrolled were already critically ill, which explains the significant decline in MDR treatment success from 100% in 2010 to 53.5% in 2013. Alternately, the decline in MDR treatment success could also be explained by poor case holding of the registered MDR-TB patients as a result of the rapid scale up of PMDT to inadequately facilitated, equipped, and staffed Regional Referral Hospital (RRH) MDR treatment sites as a means of saving lives and clearing patient backlog. For example, MDR mortality was above the acceptable 5% margin, increasing from 7% in 2012 to 16.7% in 2013. Initially, lost to follow-up was also above the acceptable 5% margin, reaching 7.3% in 2012. By 2013 lost to follow-up had declined to 4.7%, although no trend effect was detected (See Figure 5). It should also be noted that the

treatment success for the 2010 MDR-TB cohort (100%) may be due to the small size of the cohort and the fact that treatment was offered under well-resourced project settings (not programmatic settings).

**Figure 5: MDR Cases Enrolled and MDR Indicator Trends, 2011-2015**

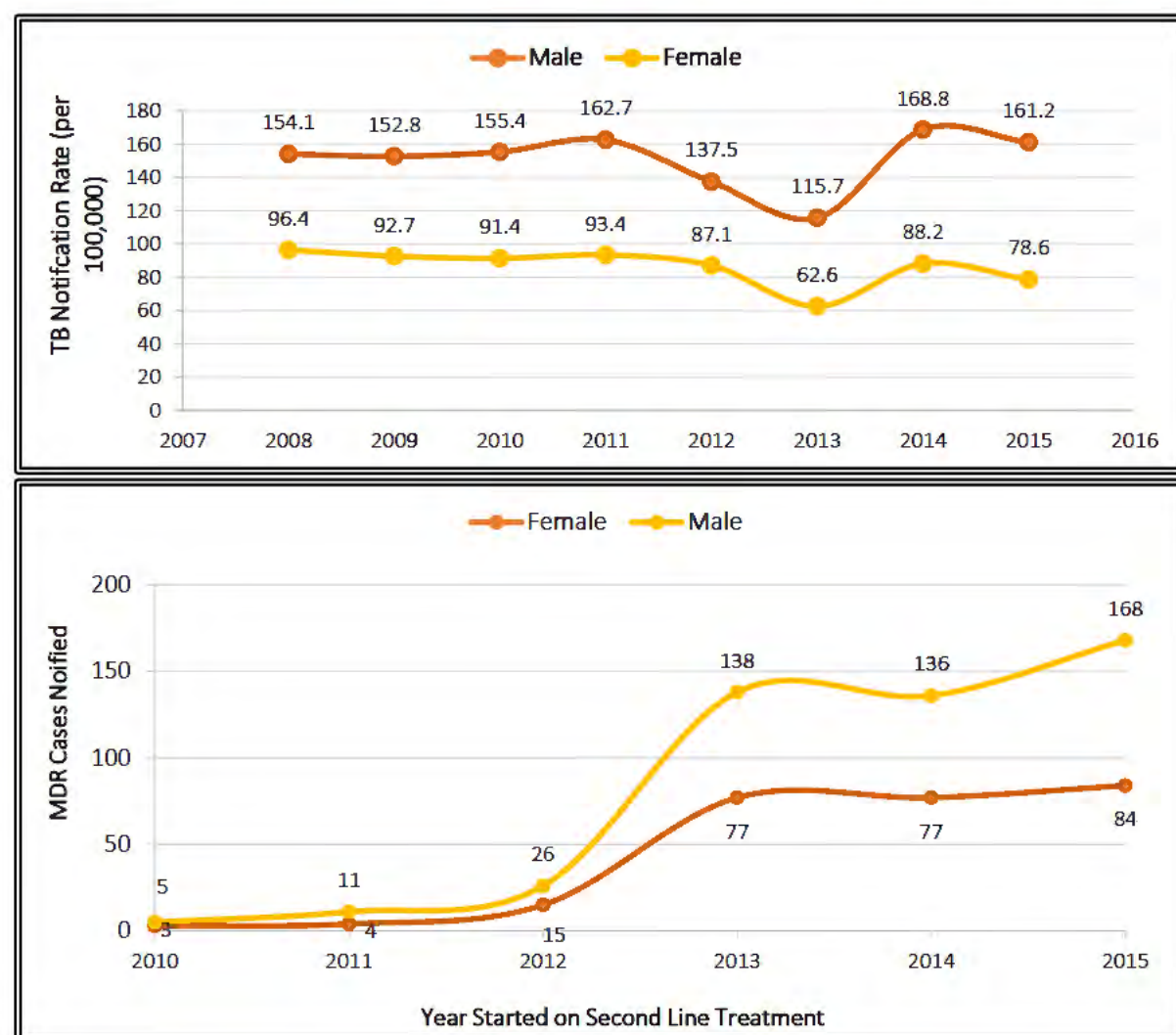


#### *National TB trends by gender and age groups among cases notified in 2008 – 2015*

Gender analysis shows that both susceptible and MDR TB cases are consistently higher among males than among females, a finding that echoes global trends on TB and gender (WHO 2015), although in Uganda, the gender gap in notification rates appears growing. For example, the assessment found, in 2008, that the notification rate was 154.1/100,000 among males compared to 96.4/100,000 among females while, in 2015, notification rates increased to 161.2/100,000 among males and decreased to 78.6/100,000 among females. A similar trend was seen in the TB prevalence survey which found prevalence rates of 734/100,000 among males compared to 178/100,000 among females (note: the national prevalence survey's findings suggest this gap to be unexpectedly and unusually large). The gender gap holds true for both susceptible TB and MDR TB, with the average TB and MDR male-to-female notification ratios being 1.75 and 1.95 respectively (i.e. TB notification among males was almost twice that of females, especially for MDR TB) (See Figures 6, 7, and 8). Moreover, like with previous trend data, the effects of the 2012 trough are evident when disaggregating by gender.

The divergent findings of the TRACK TB assessment (which was calculated using NTLP data) and the national prevalence survey in terms of both prevalence rate by gender and male-to-female notification ratio require further exploration; nevertheless, the TB gender gap – whatever its size - has implications for TB control programming. A better understanding of the gendered determinants of risk for TB is necessary to reduce the burden of TB among males and to increase TB health seeking behavior among females.

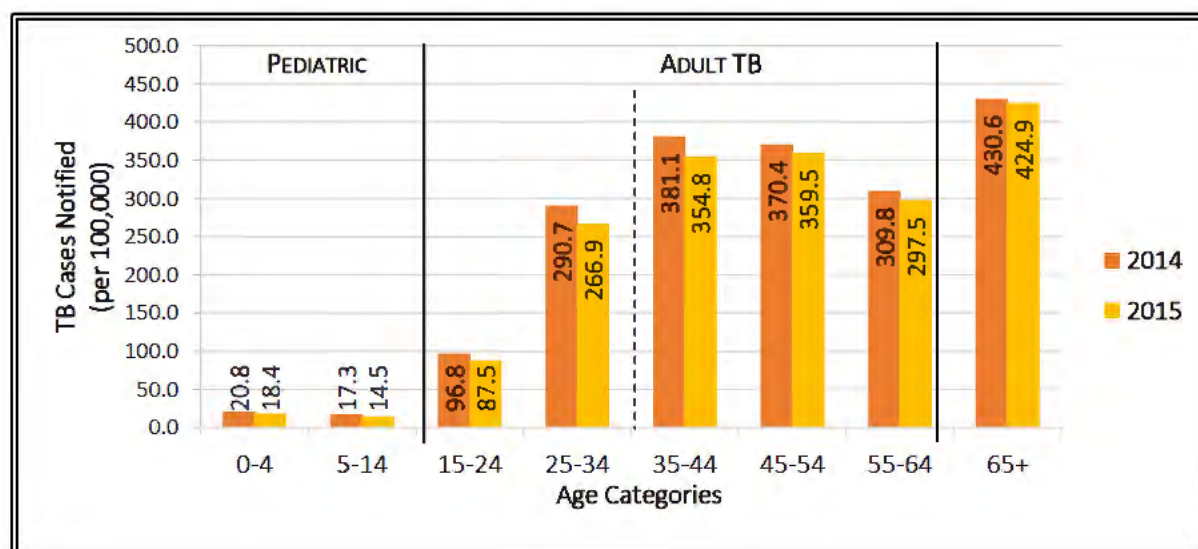
**Figure 6: TB Notification Rates (per 100,000) and MDR Cases by Gender, 2008-2015**



By age group, people of reproductive age and above were more likely to be notified for both TB and MDR TB, demonstrating an aging TB epidemic, with highest burden among the 65+ age group (See Figures 7 and 8). This finding corresponds with the national prevalence survey which also found the population of Ugandans aged 65+ as having surprisingly high prevalence of TB. This finding should take into account the possibility that pediatric cases are under-reported due to the many challenges surrounding the diagnosis of TB in children. There is a strong possibility that pediatric TB prevalence is much higher than NTLP or prevalence survey data suggests and an urgent need to focus on improved case finding and reporting of pediatric TB looking forward. The trends in TB data by age group also reflect

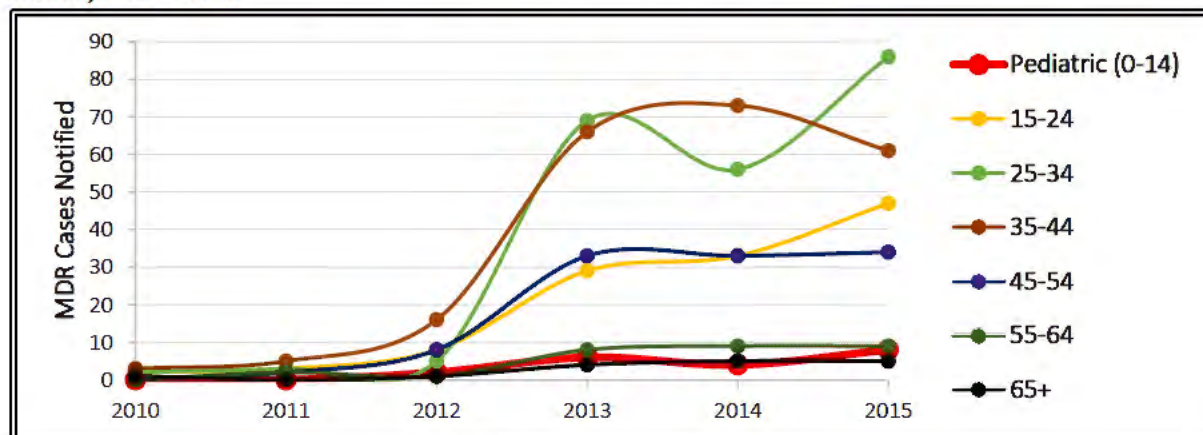
the catastrophic impact of events of 2012, as can be seen in the sudden surge in MDR cases by age group in 2013, suggesting that many TB patients in 2012 were not successfully treated for drug susceptible TB and subsequently developed drug resistance (Figure 8). While there was no increase in MDR notification among either pediatric patients or those in the upper two age strata (55-64 and 65+), this finding may reflect poor case finding and a lack of access to TB services than actual MDR prevalence in pediatric and elderly patients.

**Figure 7: Trends in TB Notifications by Age among Pediatric and Adult (BC+CD+EPTB)<sup>2</sup> Cases Notified in 2014 and 2015<sup>2</sup>**



<sup>2</sup> Stratified NTLP Program TB data by age categories was only available in 2014 and 2015 for BC = Bacteriologically Confirmed, CD = Clinically Diagnosed, EPTB = Extra Pulmonary TB. Note national TB data on age classifications was only available for 2014 and 2015.

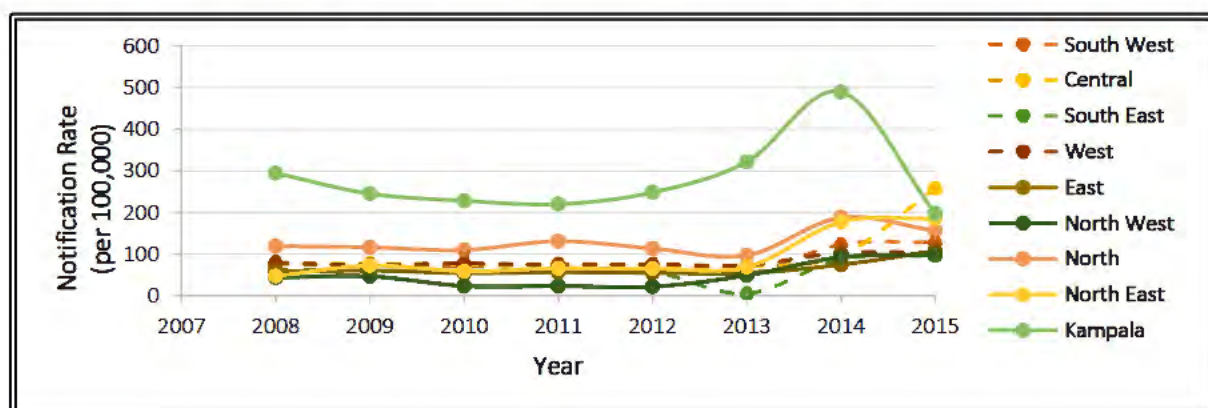
**Figure 8: Trends on MDR-TB Notifications by Age Among Pediatric and Adult TB Cases, 2010-2015**



*Regional/Zonal trend on notification rates by regions/zones among new TB cases notified in 2008 – 2015*

By region, TB notifications were consistently higher in Kampala followed by the north. The overall trend of falling notification rates over the last two years (2014-2015) was maintained. TB notification significantly differed between regions, for example between Kampala and the South East, East, North West, and North East. Also, the North was significantly different from South East, East, and North West (the other regions showed no statistically significant difference). While treatment success, cure, mortality and lost to follow-up rates significantly differed between regions, co-trimoxazole preventative therapy (CPT) and ART uptake did not significantly differ (See Figure 9).

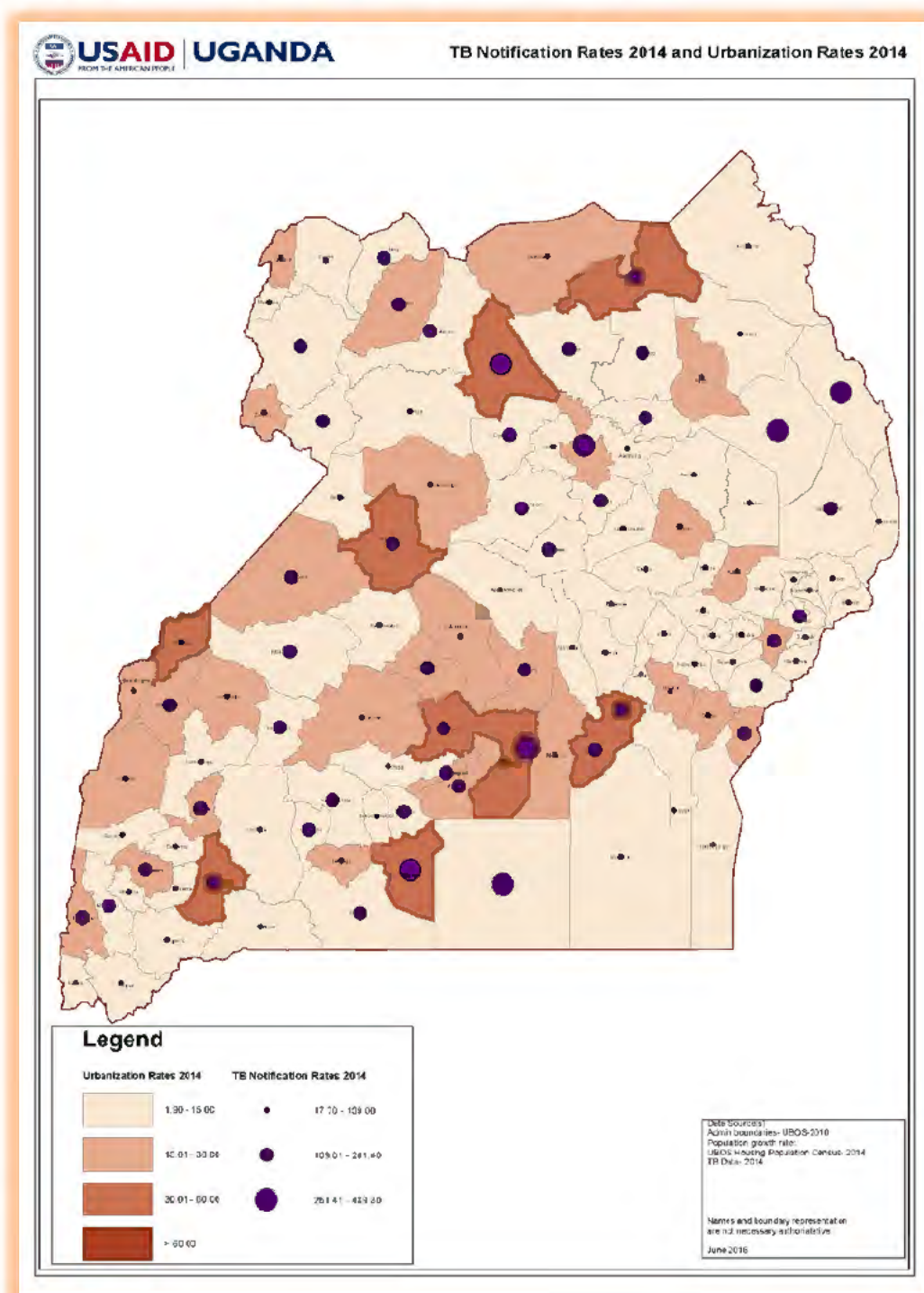
**Figure 9: Trends in TB Notification Rates by Region/Zone, 2008-2015**



All other indicators by region showed similar trends to the national trend (see Annex 5, Figures A2, A3, A4 and Tables 1A and 2A for details), but with occasional troughs and peaks unique to each region (e.g. the notification rates for Kampala and the North in 2014). This suggests an urgent need for TB control programs to begin understanding and factoring in regional and sub-regional contextual and epidemiological differences going forward. For example, when TB prevalence is mapped looking at urban growth rates (Map 1), it is apparent that the assumption that TB in Uganda is primarily an urban disease is not entirely

accurate (a finding that the national prevalence survey also found true). While higher TB prevalence is found in urban growth zones, it is also found in a few border districts and in Karamoja, along with higher prevalence in districts adjacent to districts with high urbanization. This sort of cross-comparison between TB and critical socio-economic data is needed going forward in order to better situate TB as a social problem, not just a medical one.

**Map 1: TB Notification Rates and Urbanization Rates, 2014**



\*\*\*

*Question 2: What are the key systemic bottlenecks to achieving sustainable TB control in Uganda? How can these bottlenecks be addressed in the future?*

Numerous bottlenecks to sustainable TB control exist in Uganda. These bottlenecks occur within the TB control program, but also overlap with the wider health system and the broader social, economic, and political context within which the health system sits. Here we review several bottlenecks raised as most pertinent to TB control in program documents, published literature, key informant interviews and focus group discussions. It should be noted that many other bottlenecks to sustainable TB control exist in Uganda, and these will be touched upon throughout the report; however, those we highlight here are notable in that they have been cited in program documents for years without any clear or sustained action being taken to facilitate change.

## *2a: Supply Chain*

Formerly, NTLP managed parallel procurement and supply chain systems. In 2011, the Government of Uganda elected to include TB commodities in the National Medical Stores' (NMS) Essential Medicines and Health Supplies (EMHS) list. The NTLP now works with the Ministry of Health's Quantification and Procurement Planning Unit (QPPU) for forecasting and quantification of anti-TB medicines and supplies, while order-taking, procurement, storage, and delivery to health facilities is done six cycles a year by the National Medical Stores. Supply chain to upper level facilities is based on a pull system in which demand informs supply, and to Health Centre (HC) IIs and IIIs based on a push system in which population catchment informs supply (GoU 2013). Progress has been made by both the Government of Uganda and the National Medical Stores with regard to availability of drugs and medical supplies; however, program documents, key informant interviews, and focus group discussions still suggest that commodity security is a major bottleneck not only to TB control in Uganda, but to the health system in general.

*MDR is becoming a challenge, especially with commodity security. There is stock out... We are often running out of drugs. Now imagine: buses with anyone on it are moving in and out. And tests are taken one day but not coming back for weeks. You are going to have a disaster. 8\_MBA\_IP\_27.5.16*

*A mess in TB medicines is criminal. Patients die. Then MDR becomes a problem. NMS decides orders even if different from what the district orders. 11\_GUL\_LG\_25.5.16*

*For drug stock outs, sometimes we get little of what we want. Or we get what we did not order for. And sometimes we get nothing at all. The hospital uses a drug and sundries plan drawn with NMS and the order is sent every two months. But they send little of what we want. At other times, they send things we don't need because the wage bill is still for a 350 bed capacity hospital. 1\_MBA\_HOSP\_24.5.16*

For example, the percentage of health facilities without stock outs of any of the six Essential Medicines and Health Supplies tracer medicines in the previous six months increased from 41% in 2009/10 to 64% in 2014/15, passing the Health Sector Strategic Investment Plan (HSSIP) 2010/11–2014/15 target of 60%, but nevertheless suggesting that 35% of facilities are still reporting stock outs (GoU 2015b; GoU 2015c). Stock out might otherwise imply problems with the capacity of health facility workers to manage drugs and medical supplies; however, over the same period, the percentage of facilities submitting medicine orders in a

timely manner also increased from 47% in 2010/11 to 94% in 2014/15 which suggests that many bottlenecks are not at facility level but at higher levels of supply chain management (GoU 2015c).

One bottleneck in the supply chain is health commodity financing. Between 2009/10 and 2014/15, there was an increase in funding available for health commodities from US \$92 million to US \$410 million, but 81% of this financing came from partners (GoU 2015c). Government per capita expenditure on Essential Medicines and Health Supplies was only US \$2.4, less than a quarter of the Health Sector Strategic Investment Plan target of \$12 (GoU 2015c). Donor funding and out-of-pocket expenditure by patients cover this gap – especially with regard to medicines for TB, HIV, and malaria – but this situation is both unsustainable in the long run and contributes to catastrophic health expenditures for households.

For TB, besides salaries, the biggest part of funding from the central government to the NTLP is used for the procurement of anti-TB medicines (GoU 2015a). There is no current data available on the proportion of the anti-TB medicines budget that is met by government, although in 2010 it was reported as 40% (GoU 2015a). Ninety percent of total Global Fund grants to Uganda are spent on procurement of medicines and health products that, for TB, are procured by the Stop TB Partnership's Global Drug Facility (GDF) (GF 2016).

Beyond financing, however, there are major issues with planning, procurement, and drug and lab stock delivery systems, so much so that Private Not-For-Profit facilities bypass the National Medical Stores system altogether by using the non-profit Joint Medical Stores (GoU 2013). Lack of availability of essential medicines is one of the primary reasons for patient dissatisfaction with the public health services, and why many patients seek health care in the private sector (GoU 2015c). The most recent Global Fund audit ranked Uganda's "ability of the supply chain to deliver and account for quality assured medicines and health products in a timely manner" as "Ineffective," stating that

*Seventy percent of the 50 health facilities visited during the audit reported stock-outs of at least one critical medicine...54% of the health facilities visited had accumulated expired medicines, partly funded by Global Fund (Global Fund 2016, p. 5).*

This included anti-TB medicines: 64% of the facilities visited during the Global Fund audit reported stock-outs of anti-TB medicines of between one week and three months, with stock outs of Isoniazid 100mg, Isoniazid 300mg, and Capreomycin highlighted in particular (GF 2016, p. 9). The NTLP's own assessment states that the percentage of health facilities reporting no stock outs of anti-TB medicines in the last three months before assessment was 76% (GoU 2016a).

Commodity security issues extend to laboratory supplies as well. The National TB Reference Laboratory (NTRL) cites irregular supplies for smear microscopy, supply chain issues related to GeneXpert cartridges, and shortages of request forms, falcon tubes, ziplock bags, and shipment containers (GoU 2016a), while the Joint External Monitoring Mission Review lists stock outs of smear stains and CD4 and HIV test kits, the latter two of which impact the TB control program since a positive HIV test is the main gateway to referral to GeneXpert (GoU 2013).

The National TB Strategic Plan 2015/16-2019/20, the Joint External Monitoring Mission Review, the Global Fund audit, and NTLP's Annual Report 2014-15 point to the following bottlenecks at multiple levels of the system:

#### Supply Chain Bottlenecks:

1. **Facility:** Delayed reporting of stock levels and ordering of supplies for both drugs and laboratory equipment
2. **District:** Poor monitoring and supervision of logistic management information systems and verification of stock data coming in from health facilities
3. **Partners:** Long procurement lead time and poor communication/coordination between partners and the NTLP vis-à-vis medicines procured via the Global Drug Facility and other non-National Medical Stores mechanisms
4. **NTLP:** Issues with coordination between NTLP, National Medical Stores, Quantification and Procurement Planning Unit (QPPU) and other government partners involved in Procurement and Supply Management (PSM) leading to TB stock levels not being shared and failing to feed into NTLP supervisory and performance activities

These findings were echoed in key informant interviews and focus group discussions. Stakeholders emphasized, moreover, that the consequences of supply chain bottlenecks are clearly evident in the growing MDR epidemic in the country. To manage MDR, they argued, it is critical for the TB program to operate within the context of a healthy supply chain.

#### 2b: Human Resources

Major challenges exist within Uganda's human resources system related to recruitment, motivation, and retention of staff. In 2014/15, only 70% of the approved health sector staffing posts were filled and staffing shortages were seen to be unequally distributed among cadres (Table 2) (GoU 2015c). Barriers to further recruitment of health workers include a limited wage bill and a lack of both performance-based and workload-based incentivization and remuneration, all of which serve to drive outmigration of health workers from rural to urban areas (or neighboring countries), and from public facilities to the private sector (Dolea et al 2010; GoU 2014b; GoU 2015c). The private sector now employs 48% of health workers in the country (12% at Private Not-For-Profits and 36% at Private For-Profits), but it is largely unregulated and unharmonized to government policy (GoU 2015c). At the same time, there has been a rapid increase in the number of health facilities constructed by districts under decentralization, leading to a massive gap between health infrastructure and health staffing levels (Matsiko & Kiwanuka 2003).

**Table 2: Summary of Recruitment Rates by Cadre**

| Cadre                                           | # Positions Advertised | # Positions Filled | % Filled |
|-------------------------------------------------|------------------------|--------------------|----------|
| <b>Nursing Officers (Nurses/Nurse Midwives)</b> | 2,895                  | 3,029              | 105%     |
| <b>Enrolled Nurse</b>                           | 6,961                  | 5,923              | 85%      |
| <b>Enrolled Midwives</b>                        | 4,918                  | 3,428              | 70%      |
| <b>Nursing Assistants</b>                       | 4,421                  | 4,659              | 105%     |
| <b>Medical Officers</b>                         | 849                    | 536                | 63%      |
| <b>Clinical Officers</b>                        | 2,538                  | 2,382              | 94%      |
| <b>Laboratory Technicians/Assistant</b>         | 2,444                  | 2,066              | 85%      |
| <b>Pharmacist/Dispensers</b>                    | 307                    | 115                | 37%      |
| <b>Anesthetic Officers and Assistants</b>       | 639                    | 148                | 23%      |
| <b>Radiographers</b>                            | 94                     | 33                 | 35%      |

Source: GoU. 2015. Annual Sector Performance Report, FY 2014/2016. Kampala: Ministry of Health

At the community level, there are similar human resources gaps. Only 75% of villages have trained Village Health Teams (VHTs) in place, a proportion unchanged since 2010, and although these Village Health Teams – essentially a community health worker cadre - initially received training and equipment, no refresher courses have since been offered, nor have their supplies ever been replenished (GoU 2015c).

The human resource crisis has had serious impact on Uganda's TB control programme. As of 2014, of the seven approved positions at the NTLP central unit, only three have been filled (43%), with additional staffing being met via temporary contracts supported by partners (GoU 2016a). The percentage of NTLP staff funded by government is basically unchanged since 2011 (9%-10%), and Global Fund noted that 50% of government-funded positions within both the national malaria and tuberculosis programs have actually been sitting vacant since 2012 (GoU 2012; GoU 2015a; GF 2016). Certain cadres are particularly hard hit. Among overall laboratory staff affiliated with the National TB Reference Laboratory (NTRL), only three out of 41 are supported by government and a number of retirees have never been replaced (GoU 2016a; GoU 2013). Of the 37 remaining, 17 work voluntarily and 20 are supported by partners (GoU 2016a). These staffing shortages are not always tied to a lack of financing, since a recent Global Fund audit found that:

*[K]ey positions budgeted for under the Global Fund Grants also remained vacant, for example 17 out of 43 pharmacists and HIV, TB and malaria focal points for the regional performance monitoring teams were not at post during the audit" (Global Fund 2016, p.13).*

Staff retention is even more of a problem at the facility level. Key informant interviews and focus group discussions repeatedly brought up health human resources as a major barrier to progress on sustainable TB control. Issues raised included low overall volumes of health workers, as well as outmigration. In the north, this was a particular problem, as both

hospitals – Gulu and Kitgum – experienced health workers leaving for more lucrative work in South Sudan. Additionally, low morale, low remuneration and benefits structures, and internal staff rotation - which meant that health workers with TB specialization ended up rotated off TB wards within two to three years of training - were also cited by stakeholders as major problems. Specialization was not rewarded either monetarily or via promotion to higher cadres, nor was incentivization provided to encourage trained nurses to stay in TB (even if they were provided a choice to stay).

Numerous internal and external assessments have repeatedly emphasized that quality data and service delivery for TB are primarily impeded by staff shortages and inadequate training, supervision, and retention of existing human resources, and that these problems are, to a great extent, rooted in dysfunctionalities within the broader health system (GoU 2013; GoU 2015a; GF 2016). Yet the human resources crisis continues to be addressed by both the NTLP and its partners via a vertical, technical, gap-filling approach.

## 2c: Financing and Political Commitment

Uganda's health system is mostly financed through the national budget; however, Government of Uganda investment in the health sector has stayed at around 8.5% of overall budget since 2013, in spite of a Health Sector Strategic Investment Plan (HSSIP) target of 10% and an African Union target of 15% (GoU 2015c; Okwero 2010). Much of the health sector budget comes from development partner funding via cash grants and general budgetary support, and translates into a government contribution to health of around US \$13.7 per capita, lower than the Health Sector Strategic Investment Plan target of US \$17 and far below the recommended WHO per capita contribution of US \$34 (GoU 2015c). The most recent assessment of household out-of-pocket expenditure (i.e. direct payments made by health service users at the time of the service being provided) as a percent of total health expenditure puts out-of-pocket expenditure at 37%, down from 42% in 2010, yet still excessively high (GoU 2015d; GoU 2015c). Recurrent expenditure was 52% of total expenditure, and 48% of this was development expenditure, of which 42% came from donor funding, signaling a high degree of dependency on donors (GoU 2015c)

**Table 3: Government Health Expenditures (UGX) FY 2008/09 - FY2011/12**

| Expenditure                                                                                                                                                       | Financial Year |         |         |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------|---------|---------|
|                                                                                                                                                                   | 2008/09        | 2009/10 | 2010/11 | 2011/12 |
| <b>Nominal Value (current), UGX (billion)</b>                                                                                                                     | 450            | 473     | 633     | 724     |
| <b>Total Government Expenditure, UGX (billion)</b>                                                                                                                | 4,949          | 6,318   | 8,972   | 9,273   |
| <b>Total Government Current Health Expenditure (per capita) \$</b>                                                                                                | 12.4           | 11.2    | 9.1     | 9       |
| <b>% of Total Government Expenditure</b>                                                                                                                          | 9%             | 7%      | 7%      | 8%      |
| Source: Government of Uganda. 2015e. <i>National Health Accounts: Key Messages (FY2010/11 &amp; 2011/12)</i> . NHA Secretariat. Kampala: MoH Planning Department. |                |         |         |         |

The lack of overall government investment in health should also be considered in light of the fact that, over a four-year period, government health expenditure increased in nominal value

while decreased in the real value; that is, due to the depreciation of currency, the value of the government's expenditure on health in 2011/12 was less than the value of what the government had spent in 2008/09 (Table 3) (GoU 2015e).

Additionally, health service delivery has been, to a large extent, the mandate of local government since the late 1990s. Local government receives funding from central government in the form of conditional grants (88%) and, to a lesser extent, unconditional (11%) and equalization (1%) grants (GoU 2015a). Local government also receives revenue from tax and non-tax ventures that can be allocated by local councils to various activities, although this equates to only around 2%-5% percent of district revenue (GoU 2015a). As such, local government spending on health – in spite of decentralization – is mostly locked into health spending based on grant levels set by central government that have remained largely unchanged in spite of significant increases in district populations, administrative units, and prices (GoU 2012). Local government has been assessed to have inadequate capacity in financial reporting, leadership, and financial management, and contributes only negligibly to overall district-level health financing (GoU 2012). As such, off budget development assistance is a primary means by which to finance district health service (GoU 2015a). This low level of health care financing not only affects implementation of district-level TB, MDR TB, and TB/HIV activities since funds for community TB and TB/HIV mobilization, case finding, and case holding may be inadequate or unavailable, but it also constrains *all* planned district activities leading to a loss of efficiency and effectiveness.

The NTLP also has a designated budget, which is part of the Ministry of Health budget; however, funding to the NTLP is affected by the overall low funding to the health sector and by the fact that the NTLP does not hold a vote within the Ministry of Health budget (GoU 2013). Thus, Ministry of Health budgetary allocations to the NTLP have not changed much since 2013 (GoU 2016a).

The annual required budget for TB Control in Uganda in 2014 was US \$24 million of which only 79% was funded, 69% from external sources and 10% domestically (GoU 2016a). The biggest part of the funding from the central government to the NTLP covers salaries of staff and procurement of anti-TB medicines, but TB activities themselves are largely funded by Global Fund, complemented by financing from other partners. These partners include US Government Global Health and PEPFAR funding, the International Union Against TB and Lung Disease's SPARK, TB Reach and DETECT TB programs, the German Leprosy and Tuberculosis Relief Association (GLRA), and FIND's TB Reach Wave 3. Other financing comes from UNICEF and the Clinton Health Access Initiative (CHAI) for pediatric TB, and

*Compare resources going to HIV with those going to TB. 90% might be going to HIV. We need a different formula to bring these together. Catalytic funding or implementation grants, because TB needs 50% of the funding. The issue of political commitment is a stumbling block and we need to deal with it. 25\_KAM\_DON\_30.5.16*

*There is a need for people to advocate for TB. To make it a daily problem to the politicians. Commit resources to TB....Build political commitment . 1\_MBA\_HOSP\_24.5.16*

*You can see low government commitment in the level of TB funding compared to the HIV program. 4\_KAM\_TRACK\_27.5.16*

*The effort put into malaria and HIV needs to be reflected in TB because the largest...killer of HIV patients is TB. It's a disease cutting across the society. The government has to prioritize TB. It has to declare it an emergency like other countries. 21\_KAM\_CGOV\_27.5.16*

Doctors for Africa (CUAMM) for MDR TB management. Additionally, Private Not-For-Profit providers – the Uganda Catholic Medical Bureau (UCMB) and Uganda Protestant Medical Bureau (UPMB) – have access to external financing for TB via the TB Reach and ACT projects respectively (GoU 2015a).

Donor dependency is itself a bottleneck since, in spite of partner commitments, aid effectiveness remains sub-optimal. Table 4, for example, shows undisbursed total active Global Fund grants as a percentage of signed grants per program (Global Fund 2016). Most funding has not been disbursed and, indeed, disbursement for TB remains far higher than for HIV or malaria. Still, grants for TB represent only 20% of what HIV receives, even though many HIV patients are co-infected with TB. Global Fund grants for broader health systems strengthening are almost entirely undisbursed.

**Table 4: Active Global Fund Grants to the GoU**

| Component    | Signed USD (million) | Committed USD (million) | Disbursed USD (million) | Undisbursed USD (million) | Undisbursed as a % of Signed |
|--------------|----------------------|-------------------------|-------------------------|---------------------------|------------------------------|
| HIV          | 183                  | 112                     | 22                      | 161                       | 83%                          |
| Malaria      | 149                  | 132                     | 16                      | 133                       | 89%                          |
| Tuberculosis | 37                   | 21                      | 17                      | 20                        | 54%                          |
| HSS          | 22                   | 15                      | 1                       | 21                        | 95%                          |
| <b>Total</b> | <b>391</b>           | <b>280</b>              | <b>56</b>               | <b>336</b>                | <b>86%</b>                   |

Source: Global Fund. 2016. Audit Report: Global Fund Grants to the Government of Uganda. Geneva: Global Fund.

Contributing to bottlenecks in aid effectiveness is the fact that, although partners participate in National Coordination Committee meetings, an inflexible and unharmonized financing environment still remains for TB. The NTLP Annual Report, for example, notes that:

*[W]hile Global Fund funds mainly commodities and other partners were expected to fund other activities, since January 2015 USAID implementers have been directed to support non central Ministry of Health activities. NTLP is therefore forced to explore alternatives for funding core activities since the directive came after the Global Fund grant negotiations had been concluded (GoU 2016a: vii).*

The limited and inefficient distribution of funding was a key theme in key informant interviews and focus group discussions, especially among stakeholders at the central level who expressed extreme frustration at - what they felt to be – the Government of Uganda’s overall lack of higher level political commitment for TB and a general weakness in upstream advocacy to ensure better political prioritization. The perception of a lack of government political – and corresponding financial – commitment to TB has been persistently noted for years, with the Joint External Monitoring Mission Review stating in 2013 that “lack of definite financial resource allocation regardless of its adequacy, makes planning difficult and drives the NTLP into crisis management as a routine condition” (GoU 2013).

Three years on the situation remains unchanged to the detriment of not only the NTLP, but the tens of thousands of Ugandan citizens currently stricken with tuberculosis.

## 2d: Coordination and Partnership

The TRACK TB technical application developed *Intermediate Result (IR) 4: Coordination and Implementation of DOTS, TB/HIV, and Community-Based MDR TB Interventions* around the following understanding:

*Human resources challenges and the limited leadership and management skills of NTLP staff, coordination of partners, and harmonization of practices have been major challenges.... Since most USAID TB and TB/HIV implementing partners are district based, they have had little interaction with the NTLP central unit. These issues have limited partners' participation in national-level program planning. TB targets set by partners...do not reflect the local context and individual partners' contribution to national strategic plan targets (MSH 2012a, p.26).*

Coordination issues have long been raised as bottlenecks not only to national TB control, but overall health systems effectiveness in Uganda. The Ministry of Health states that “improvement in coordination and management of the delivery of health and health related services is a key strategic deliverable” (GoU 2015b, p.60). A coordination and governance oversight structure has been put in place to, theoretically, guide relationships between programs such as the NTLP, the broader Ministry of Health, other ministries, development and implementing partners, health facilities, the private sector, and civil society organizations (CSOs) (Table 5).

**Table 5: Ministry of Health Partnership and Coordination Structure**

| Roles                               | Structure                              |                                 | Members                                                                                                                                                       |
|-------------------------------------|----------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategic Policy Direction</b>   | <b>Cabinet/Parliament</b>              |                                 | OPM, Minister of Health, Ministers of State, Parliamentary Committee on Health                                                                                |
|                                     | <b>Senior Top Management</b>           |                                 | Minister of Health, Ministers of State, PS, DGHS, Directors                                                                                                   |
| <b>Operational Policy Direction</b> | <b>Top Management Committee</b>        |                                 | Minister of Health, Ministers of State, PS, DGHS, Directors, HSC, Commissioners, Institutional Heads                                                          |
|                                     | <b>Senior Management Committee</b>     |                                 | DGHS, Directors, Commissioners, Asst. Commissioners, Program Managers, Unit Heads                                                                             |
| <b>Technical Direction</b>          |                                        | <b>Technical Working Groups</b> | Ministry of Health reps, HDP reps, civil society organizations, private sector reps                                                                           |
|                                     | <b>Regional Management Committee</b>   |                                 | Hospital Director, Regional Team Leader, DHOs                                                                                                                 |
| <b>Regional Technical Direction</b> | <b>District Health Management Team</b> |                                 | Secretary Health/Social Services, ACAO, District Health Team, HSD In-charges, Diocesan Health Coordinator, civil society organizations, implementing partners |
| <b>District Coordination</b>        | <b>HSD Management Team</b>             |                                 | HSD Team, Health Facility In-charges                                                                                                                          |
|                                     | <b>Health Facility Management Team</b> |                                 | Health Facility In-charges, Heads of Departments                                                                                                              |

Source: GoU. 2015b. *Health Sector Development Plan 2015/16-2019/20*. Kampala: MoH, p. 90.

Nevertheless, in spite of partners and government having been signatories to key compacts such as the Paris Declaration on Harmonization and Alignment and the International Health Partnerships (IHP+) compact, the most recent Health Sector Development Plan recognizes that partnership and coordination mechanisms require continual review and strengthening in order to achieve aid effectiveness (GoU 2015b, p.47).

The NTLP leverages coordination for TB through the Uganda Stop TB Partnership (USTP), as well as the National Coordinating Committee (NCC) for TB/HIV, the GeneXpert Implementers Coordination Committee, the Programmatic Management of DR-TB (PMDT) Committee, and the National Pediatric Committee. Within the Uganda Stop TB Partnership, there are three working groups: DOTS Expansion, Advocacy, Communication and Social Mobilization (ACSM), and TB/HIV. These committees and working groups – facilitated by partners such as TRACK TB – have greatly improved standardization and harmonization and contributed to the improved uptake of services. However, they do not meet as regularly as intended, and a number of partners – such as civil society organizations (CSOs) – have not been actively engaged (GoU 2016a). The Uganda Stop TB Partnership, the secretariat for which is financed by the Global Fund, is made up of over 60 members, yet there is the perception that it is not being used optimally. The NTLP Annual Report recommends that the NTLP and partners work to:

*...strengthen the USTP board so that USTP embarks on high level advocacy for TB and resource mobilization similar to that of Uganda AIDS Commission. The USTP Secretariat needs to realign itself to the mandate of resource mobilization for TB control and of coordination in support of the national program. (GoU 2016a, p.23)*

The sub-optimal use of the Uganda Stop TB Partnership, however, is only one barrier to coordination. The NTLP Annual Report also points to a “*competing nature*” of some partners that serves to undermine coordination efforts, and speaks to larger concerns about the capacity of leadership within the NTLP and the broader culture of development assistance in Uganda (GoU 2016a, p.iv).

Most notably, a lack of harmonization of implementing partners has impeded efficiency and flexibility of funding for TB control activities. The report notes:

*The USG has guided the implementing partners receiving USAID/CDC funds to direct their support to non-Ministry of Health Central Government Officers, Districts, Regions and sites leaving the NTLP to look for funds for its few core staff...This action has not only slowed down implementation but it has also negatively impacted on leadership and ownership. In addition, it has forced NTLP to explore alternative means of funding core activities at a time when the Global Fund grant application negotiations had already been concluded...leaving the program operationally disabled till either government, Global Fund or USG reviews this decision. This calls for a review of the USAID decision or renegotiation between Government, Global Fund and USAID so as to clearly delineate which critical activities are supported by which partner. (GoU 2016a, p. 21)*

Coordination is best achieved through strong central leadership, yet even after three years of TRACK TB assistance to NTLP for leadership and capacity building, coordination is still a struggle. While it would be easy to attribute these bottlenecks to problems within the NTLP itself, in fact they are pervasive throughout Uganda’s health system. For example, the

recent Global Fund audit found ineffective coordination across all three funded programs – AIDS, TB and malaria - and attributed this to the Ministry of Health not having embedded structures to support the implementation of funded programs and not having sufficiently supported, strengthened, and bought into critical coordination bodies such as regional performance monitoring teams (Global Fund 2016). The audit, therefore, ranked governance, oversight, and management of the whole system (i.e. not just specific programs) as *Ineffective* (p.5). This included coordination between the Ministry of Health, the Ministry of Finance, the Global Fund Country Coordinating Mechanism (CCM), development and implementing partners, and the National Medical Stores (p. 9). The impact of weak coordination can be seen in everything from a lack of timely implementation of projects, to a poor capacity to absorb partner funding, to irrational procurement and distribution arrangements for drugs and other medical supplies (Global Fund 2016).

At lower levels of the health system, coordination bottlenecks also exist. The Mission Review noted that district health program managers - in particular District/Division TB/Leprosy Supervisors (DTLS) - are often forced into prioritizing financially incentivized (and often short notice) implementing partner activities over district systems strengthening (GoU 2013). Within the TRACK TB assessment, key informant interviews and focus group discussions note that the regional implementing partners supporting district-level activities are often HIV-focused, working on TB primarily in the context of TB/HIV co-infection. SUSTAIN - the main implementing partner supporting Uganda's regional referral hospitals (RRH) – does work on TB issues, but does not always link effectively to the lower level facilities from which patients are referred (i.e. these lower level facilities are the mandate of *other* implementing partners). TRACK TB works in regional referral hospitals, but only on MDR TB. Thus, susceptible TB patients at lower level health facilities – a large proportion of which are sero-negative – fall between the cracks. As one stakeholder said:

*TB/HIV collaboration is not a problem. What is a problem is coordination. There is a gap. [The regional implementing partner] does coaching and mentorship with TB and TB/HIV, but no MDR TB, while TRACK TB has no answer for anything other than MDR TB. (Interview with I4\_KIT\_HOSP\_24.5.16)*

Other stakeholders, in particular those in the north, spoke of major disruptions to program management and service provision created by the three-months gap between one regional implementing partner being pulled by USAID and another coming in to take its place.

## 2e: Stigma

In 2015, Dr. Jane Aceng, the then-Director General of Uganda's Health Services, noted in the forward of the National Strategic Plan that among the main challenges to effective TB control in Uganda was “the increasing stigma towards those with TB disease” (GoU 2015a, p.7). Within the National Strategic Plan, a SWOT analysis included “*poor advocacy, stigma and discrimination against people with TB*” among its threats (p. 47), while “*low awareness in communities, and stigma both in communities and in HCWs result(ing) in low care seeking behaviour*” (p. 64) was listed as a critical challenge in the document's gap analysis. The NTLP's Annual Report 2014-15, moreover, cited “*stigma associated with TB/MDR TB leading to denial, and loss to follow-up*” as one of its eight major challenges (GoU 2016a, p.14).

The role of stigma as a barrier to both TB service delivery and utilization (both with and without its association with HIV), has been described in countries such as Ghana (Lawn 2000; Dodor and Kelly 2010), Ethiopia (Abebe et al 2010; Tadesse 2016), Kenya (Liefoghe R et al 1997), Malawi (Zolowere et al 2008; Somme et al 2008), Tanzania (Munseri et al 2008), and Zambia (Chileshe and Bond 2010; Cremers et al. 2015). In South Africa, stigma has been cited as a major impediment to enacting a national research agenda on tuberculosis, the authors arguing that “*felt and enacted TB stigma and the related HIV-TB stigma impaired our ability to collect the necessary data for a full portrait of TB-infected persons and their lived conditions*” (Macdonald et al 2016).

In Uganda, the limited published literature makes clear that stigma is a bottleneck to both TB service utilization and service delivery. A study of 360 individuals in Kabarole district found that, while 26% of respondents had stigmatizing attitudes towards people living with HIV, 47% had stigmatizing attitudes toward people with TB. TB was seen as a signifier of HIV and respondents voiced stigma-based fear as a major barrier to seeking treatment for TB (Wynne et al 2014). Elsewhere, a qualitative study of Ugandan women with smear-positive TB who had delayed consulting healthcare services for  $\geq 30$  days found that, besides low knowledge of symptoms of TB, the association of TB with HIV and the belief that TB negates HIV tests led to fear of following up diagnosis with treatment (MacFarlane and Newell 2012). Qualitative research in Kiboga, Mubende, Iganga, and Mayunge also reported TB/HIV related stigma as an important factor in patients’ perceptions of treatment regimens (Katamba et al 2005; Buregyeya et al 2011). Finally, Cattamanchi et al (2015) conducted qualitative interviews of staff at six district-level Health Center IVs across Uganda. The authors found that stigma was a contributing factor to patient delay in both TB evaluation and treatment initiation. Stigma was seen to affect patients seeking care, due to fear of becoming socially isolated or being associated with HIV. Stigma was also seen as affecting health worker willingness to treat patients. This, in turn, impacted quality service delivery and led to patients dropping out of treatment. The authors recommended peer support activities, leadership training, job aids, performance feedback, and recognition and incentivization strategies to help overcome stigma, all of which have been strategies employed by the TRACK TB approach to improve human resources performance.

The TRACK TB assessment’s key informant interviews and focus group discussions also found a concern with the role of stigma and its impact on susceptible TB, MDR TB, and TB/HIV service delivery and utilization. Many respondents spoke of the role that stigma played in treatment seeking and adherence by patients, in particular MDR and TB/HIV patients, as well as those TB patients who are afraid of the association of TB with HIV. Community linkage facilitators (CLFs) and staff from follow up facilities found stigma to be a

*HIV has no identifier. TB has the mask.*  
12\_GUL\_IP\_25.5.16

*Some married couples don’t want their partners to know they have TB so they don’t want any health worker or community linkage facilitator to visit them at home. There is stigma and fear among couples that, if a partner comes to know, there will be domestic violence .* 64\_KAM\_PHF\_2.6.16

*When you have HIV and TB, you can’t live with your fellows in the community....Everyone gets notified. Then the whole family is stigmatized.*  
10\_GUL\_HF\_25.5.16

*Some of these patients are maids in other people’s homes and so they don’t want the household members to know they have TB in fear of losing their jobs, so it becomes hard to visit the patients or trace them.*  
48\_KAM\_HOSP\_31.5.16

significant challenge when working with patients in the community. For instance, many urban TB patients rely upon temporary labor as taxi or boda boda drivers, domestic workers, and other provisional, insecure forms of employment. Many also are forced to shift frequently between short-term rental housing. Such patients fear that, if employers or landlords found out that they had TB, they would lose their jobs or homes. Additionally, health care workers recounted that TB-related stigma affected quality of care and retention of nurses on TB wards, including nurses with MDR specialization. Ultimately, 11 out of the 18 focus group discussions brought up stigma among patients, community members, and health care workers as a major barrier to key elements of TB control, including case finding, contact tracing, disclosure, and treatment adherence.

The importance of stigma is echoed in national program documents. The Joint External Monitoring Mission Review cited stigma as one of the main barriers to patient progress and treatment monitoring, and a major contributing factor to both high loss to follow-up and low MDR TB case finding. The Review went further to state that the “*real causes of unacceptably high rates of loss to follow-up have not been properly assessed. Stigma was cited as a potential reason, but no measures have been put in place to support stigma reduction*” (GoU 2013, p. 36). As one of its four recommendations for long-term sustainability of the MDR program management, the Review recommended that low MDR TB case finding should be addressed by “*reduc[ing] fear and stigma in the care and management of MDR TB, [via] key Programmatic Management of MDR TB (PMDT) awareness messages ... added to current Advocacy, Communication and Social Mobilization (ACSM), public-private mix (PPM), and HIV/TB integration awareness plans or campaigns*” (p. 39). The present National Strategic Plan and most recent Annual Report, however, only mention stigma as a challenge or gap without tying it to action points or sets of interventions.

If stigma does play the role that interviews, documents, and published literature suggests it does, then not only does it have implications for the national TB control strategy, but it also serves to validate a number of TRACK TB’s existing implementation modalities (as described below), especially those that seek to enhance health worker incentives, patient support structures, and community sensitization. It also suggests that, looking forward, stigma associated with TB – regardless of the kind of TB it is – should be considered as a key driver of TB outcomes and a key factor in successful TB control programming.

\*\*\*

## KEY MESSAGES: CONTEXT

- Notification, treatment success, and cure rates have remained relatively stable from 2008 - 2015; however, there was a notable trough in these rates (and a corresponding peak in the not evaluated rate) in 2012. This likely corresponds to a national stock out of TB medicines and, potentially, to a changeover in both NTLP and implementing partner management. The consequences of these various events on TB patient outcomes were potentially catastrophic and further research is needed to understand what happened in 2012.
- TB/HIV collaborative indicators have remained high and steady, and the percentage of patients taking up ART has increased rapidly since 2013. There has been an

improvement MDR-TB program performance since 2012, with increases seen in patients enrolled in care.

- A number of gender, age, and regional disparities also exist, leading the assessment to call for an improved understanding of the social and economic drivers of regional, age, and gender differences to inform TB program planning.
- Broader health systems bottlenecks represent fundamental barriers to sustainable progress on TB control in Uganda. These bottlenecks include supply chain, human resources, health financing, political commitment, and coordination.
- Higher level political and financial commitment to TB control in the country falls painfully short, especially in light of the TB prevalence survey findings and the seriousness of the disease.
- Stigma is a key driver of poor treatment seeking, poor quality TB service delivery, and poor treatment outcomes.

\*\*\*

### III. TRACK TB IMPLEMENTATION THEORY AND APPROACH

#### *Theory and Approach of TRACK TB*

In 2012, USAID/Uganda – noting that low case detection rates and treatment success rates, poor access to quality health services, shortage of human resources, weak information and supply chain systems, barriers in NTLP leadership and capacity, and domestic and external financing shortfalls were contributing to an increasing burden of TB in the country – issued the TRACK TB technical document. TRACK TB, situated under USAID’s *Development Objective 3: Improved Health and Nutritional*

*Support to Focus Areas and Populations (DO3)*, sought to award a five year \$12.5 million program to a qualified implementing organization (USAID 2012). TRACK TB was awarded to Management Sciences for Health (MSH), with preparatory work beginning in January 2013 (MSH 2013b). TRACK TB was intended to be results-oriented and patient-centered, with a focus on quality improvement, coordination, partnership, capacity-building, improved data systems, innovation, and sustainability at all levels, and an emphasis on decentralization and integration of services at the facility and community levels (MSH 2012a).

#### **The TRACK TB Approach**

- Patient-centered
- Quality-, performance-, and results-oriented
- Prioritizing partnership coordination, integration, and sustainability
- Focused on capacity-building, systems strengthening, and improved data management and use
- Connecting central, regional, district/division, facility, community, and patient levels

Together, MSH and its partners—the Makerere University School of Public Health (MakSPH), AIDS Information Centre (AIC), and the University of California San Francisco Curry International Tuberculosis Center (UCSF/CITC)—drew upon their successful experience

working on TB control in both Uganda and other countries to support the NTLP in scaling up high-quality TB control activities. As its target, TRACK TB sought first to build the leadership and technical capacity of the NTLP to increase the case detection rate to 70% within 18–24 months in USAID-supported districts. Then, in Project Years 3 through 5, TRACK TB set out to maintain or exceed a 70% case detection rate, while also achieving a treatment success rate of 85% in Kampala and other USAID-supported districts (MSH 2014b).

TRACK TB's implementation approach was four-fold: 1) enhance *leadership* and build capacity at the central NTLP, and between the NTLP and regional-, district/divisional- and Kampala Capital City Authority (KCCA)-level structures by strengthening existing systems; 2) *directly* implement quality urban DOTS in both public and private health centers and hospitals in Kampala; 3) *directly* implement quality MDR TB activities, first in Mbarara, Kitgum, and Mulago hospitals, then extending to Lira, Hoima, and Soroti in subsequent years; 4) *indirectly* provide technical and logistical assistance related to DOTS, TB/HIV, and MDR TB to USAID implementing partners – some of which changed over the duration of the project - in four regions (Eastern, East Central, South Western, and Mid-North), including hospitals in Fort Portal, Gulu, Arua, Masaka, Mbale, Iganga, Kabale, Mubende and Matany.

TRACK TB activities were focused on strengthening the *systems* that connect the NTLP to the Ministry of Health, regional structures, district and divisional structures, implementing partners, and health facilities. This included facilitating the coordination and governance structures that allow the NTLP to make decisions, meet with and coordinate partners, and harmonize and standardize activities across all levels of the health system (e.g. the National Coordination Committee, the GeneXpert, MDR and TB/HIV coordination committees, and quarterly performance review meetings). It also included strengthening quality improvement/quality assurance mechanisms for MDR, TB/HIV, urban DOTS, and TB laboratory services by enabling mentorship, supervision, and performance review activities to take place according to standardized processes, and introducing cohort review and peer-to-peer mentorship for MDR patients and model clinics for TB/HIV integration.

Alongside facilitating these coordination, governance, and quality improvement mechanisms, TRACK TB sought to support the development, review, printing, and dissemination of planning and implementation documents, tools, and guidelines, including strategic and implementation plans, M&E frameworks, isoniazid preventive therapy (IPT), TB/HIV, MDR and contact tracing plans and guidelines, and reporting templates. It also sought to improve financing systems by trying to ensure the implementation of Global Fund-supported activities.

Data management systems were intended to be strengthened as well. TRACK TB supported the roll out of e-Registers, facilitated mentorship on Data Quality Assurance (DQA) and other data quality assurance activities, and supported the integration of TB data into the District Health Information System (DHIS-2). Logistical support to data systems in the form of computers and internet also was provided, and data harmonization activities were assisted across facilities, and between facilities, districts/divisions, and the NTLP. Data management extended to supporting supply chain management systems – both at facility and National Medical Stores levels - for TB and MDR TB drugs and laboratory supplies, building

capacity for quantification, pipeline monitoring and stock and equipment management (especially for GeneXpert cartridges and isoniazid preventative therapy), and providing buffer stock and medicine transfer.

**Table 6: Examples of TRACK TB Interventions**

| TRACK TB Systems Support |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Area                     | Examples of TRACK TB Activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Governance               | <ul style="list-style-type: none"> <li>Facilitation of Plans, Tools, Guidelines, e.g. national strategic plan, implementation plan, M&amp;E framework; Kampala City TB Task Force (KCTF) work plans; finalization and dissemination of isoniazid preventative therapy (IPT), integrated TB/HIV One Stop Shop, and MDR plans/standard operating procedures/guidelines</li> <li>Facilitation of Coordination Mechanisms, e.g. NTLP biweekly coordination meetings, TB/HIV, National Coordination Committee, GeneXpert, and MDR coordination meetings; Central Unit PMDT coordination team and steering committee</li> <li>Information Exchange, e.g. between implementing partners, districts, Uganda Stop TB Partnership, NTLP; NTLP/TRACK/zonal supervisors; NTLP networking trips; partner reporting mechanisms and updates</li> </ul> |
| Quality Improvement (QI) | <ul style="list-style-type: none"> <li>Supervision and Mentorship, e.g. supportive supervision by NTLP to regions/districts; inter/intra-facility-based peer-to-peer supervision and mentorship; national and regional cohort review; guideline dissemination</li> <li>Performance Review, e.g. quarterly and annual performance review meetings, including at Kampala City Task Force and districts; annual progress reports; QI mentorship and coaching; performance review dashboards</li> <li>Reward Mechanisms, e.g. high performers reward mechanisms (e.g. TB/HIV model clinic); exchange visits between underperforming and high performing facilities; documentation of best practices</li> </ul>                                                                                                                              |
| Human Resources          | <ul style="list-style-type: none"> <li>Seconding Staff, e.g. seconding coordinators (i.e. MDR TB, data, TB infection) at NTLP level, and CO/nursing/data/community linkage facilitators incl. MDR and urban DOTS staff at facility level</li> <li>Capacity Building, e.g. creation of job descriptions/staffing structures; capacity building of MDR TB health workers and implementing partners (esp. SUSTAIN) to build MDR teams and MDR packages (incl. audiometry) at supported facilities</li> </ul>                                                                                                                                                                                                                                                                                                                               |
| Advocacy                 | <ul style="list-style-type: none"> <li>Awareness Raising, e.g. World TB Day activities</li> <li>Lobbying, e.g. advocating for reduction of fees for TB and sputum analysis in private clinics</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Information Systems      | <ul style="list-style-type: none"> <li>Data Integration and Reporting, e.g. rolling out e-Registers to MDR treatment initiation sites; reporting/integrating TB data with the District Health Information System (DHIS-2); improving timeliness of facility, district, central level quarterly/annual reporting; filing systems</li> <li>Data Quality, e.g. ongoing DQA; mentorship on data management and analysis</li> <li>Infrastructure, e.g. GIS, computer procurement, internet, provision of paper registers</li> <li>Data use, e.g. provision of evidence to support decision making at meetings</li> </ul>                                                                                                                                                                                                                     |
| Financing                | <ul style="list-style-type: none"> <li>Aid Effectiveness, e.g. implementation of Global Fund supported activities so as to ensure sustainable funding for NTLP</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Supply                   | <ul style="list-style-type: none"> <li>Stock Information Systems, e.g. improved quantification, pipeline monitoring,</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

|                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chain                                                                                                           | <p>stock and equipment management procedures including GeneXpert and isoniazid preventative therapy (IPT); mentoring on timely ordering, stock status reporting; SMS reminder system</p> <ul style="list-style-type: none"> <li>• Drug and Equipment Provision, e.g. provision of buffer stock; medicines transfer</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>• Service Delivery: MDR TB</li> </ul>                                    | <ul style="list-style-type: none"> <li>• MDR TB Best Practices, e.g. clean up of MDR TB wait list and national register; monitoring and supervision visits and data harmonization; training and supervision of MDR teams/panels, including contact screening, sample collection, transport to GeneXpert, cascade monitoring; personal protective equipment (PPE)/standard operating procedures for MDR infection control; linking panels to health workers at ambulatory care facilities; logistical and infrastructure support (drinking water, equipment, furniture, facility upgrades); enabling packages for patients (mobile money for food/transport); incentivization of MDR teams for mentorship visits/home visits/contact tracing (airtime); patient transfer and tracking</li> </ul>                                          |
| <ul style="list-style-type: none"> <li>• Service Delivery: Urban DOTS &amp; TB/HIV</li> </ul>                   | <ul style="list-style-type: none"> <li>• Urban DOTS and TB-HIV Best Practices, e.g. supporting implementation of integrated TB/HIV One Stop Shops, including isoniazid preventative therapy (IPT); continuous medical education and mentoring for public, Private Not-for-Profit, Private For-Profit facilities on DOTS, TB/HIV and infection control; intradepartmental linkages for TB screening in diagnostic cascades; training/mentoring health unit/community linkage facilitator teams for supervised initiation on DOT, including home visits, sample collection, contact tracing, records keeping, appointment register/adherence cards, treatment supporter identification and follow up visits; engaging former patients as peer supporters; community outreach to TB Hot Spots for intensified case finding (ICF)</li> </ul> |
| <ul style="list-style-type: none"> <li>• Service Delivery: Indirect Support to Implementing Partners</li> </ul> | <ul style="list-style-type: none"> <li>• Indirect implementing partner Support, e.g. providing technical assistance to implementing partners on GeneXpert usage, integration with other services (e.g. HIV/AIDS, family planning, maternal and child health, gender and youth), District Health Information System (DHIS-2) reporting, contact tracing, and Quality Improvement (QI); information-sharing through implementing partner reporting template; building NTLP capacity to map partner distribution and documentation of performance</li> </ul>                                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>• Service Delivery: Lab Services</li> </ul>                              | <ul style="list-style-type: none"> <li>• Lab Services Support, e.g. facilitate hub rider and sputum sample referral to diagnostic sites; support District Lab Focal Person supervisory and External Quality Assessment (EQA) activities; training for EQA and targeted supervisory visits to GeneXpert sites; maintenance of MGIT equipment; dissemination of algorithms; installation of 3 GeneXpert machines</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                |

Gaps in the human resources system were addressed by directly seconding staff at both the NTLP and at facilities. At the facility level, these included medical/clinical officers and nurses, as well as community linkage facilitators via TRACK TB's sub-prime partner, the AIDS Information Centre (AIC). At MDR sites supported by other implementing partners, human resources were indirectly supported via mentorships and trainings for regional MDR teams. TRACK TB also worked with the NTLP to improve job descriptions and staffing structures.

Finally, TRACK TB was involved in both directly supporting provision of quality, mixed model MDR and urban DOTS packages of services – including laboratory services - and providing indirect technical support to implementing partners working via other facilities. For MDR, this meant a) the training and incentivization (airtime, allowances) of

MDR teams/panels in all aspects of ambulatory MDR care (treatment initiation, facility linkage, patient transfer and follow up, infection control, contact tracing and home visits); b) the provision of enabling packages to MDR patients (mobile money transfers for food and transport); c) infrastructure maintenance and other material support (upgrading of wards, provision of equipment, furniture, and drinking water). It also included clearing up MDR waiting lists, registering those MDR patients previously lost to follow-up, and improving MDR service delivery to special populations such as prisoners and children.

For urban DOTS and TB/HIV, TRACK TB worked with public, Private Not-for-Profit and Private For-Profit facilities, and supported training, continuous medical education (CME) and mentorship of health facility teams (including community linkage facilitators). Teams were supported in a) providing supervised initiation of patients on home-based DOT; b) linking patients to facilities nearest their homes; c) identifying treatment supporters; d) carrying out regular home visits to monitor and counsel patients, trace contacts and, if necessary, collect sputum samples. TRACK TB also was involved in mentoring and facilitating teams to improve quality assurance and record keeping, ensure infection control, maintain appointment registers and adherence cards, distribute tools (standard operating procedures, guidelines and algorithms) and create intradepartmental linkages for TB screening within the diagnostic cascades of other departments. Health facility teams were also supported to create integrated TB/HIV *One Stop Shops* (including isoniazid preventative therapy), carry out intensified case finding (ICF), and community outreach to TB hot spots, and to conduct cohort monitoring.

Lab systems were also targeted. TRACK TB supported contact screening, sample collection and referral to GeneXpert, hub riders, cascade monitoring and dissemination of algorithms, standard operating procedures, maps, and charts. It also helped with the installation and maintenance of GeneXperts and other TB diagnostics in select facilities and facilitated District Lab Focal Person supervisory and External Quality Assessment (EQA) activities. Examples of how TRACK TB's implementation approach was operationalized can be found in Table 6.

The rest of this section will describe how and to what extent TRACK TB sought to achieve its objectives, as well as the contextual and implementation barriers it encountered along the way.

\*\*\*

### *Question 3: To what extent have TRACK TB project assumptions<sup>3</sup> held true?*

The SOW for the assessment asked the consultants to address the question of whether or not the project assumptions held true; however, from the beginning of the assessment, it was difficult to even identify these assumptions. The assessment team eventually located them at the bottom of the table for the TRACK TB Monitoring and Evaluation Results Framework in the project's Performance Monitoring and Management Plan (MSH 2013a). The assumptions did not appear to have been monitored or measured (or requested to be

---

<sup>3</sup> According to the SOW, assumptions are external conditions that are necessary for the success of a project/program, but over which the project or program implementers have little or no control.

measured), nor was there evidence provided to suggest that these assumptions were, in fact, correct. The team could not locate them in any other TRACK TB document, either by MSH or by USAID, including the technical document (USAID 2012). Moreover, when the assumptions were addressed in the first stakeholder engagement activity, a number of key stakeholders asked the assessment team how they had come up with this particular list of assumptions, and the team had to clarify that the assumptions came from TRACK TB itself.

The analytical assumptions behind the TRACK TB approach, according to the Monitoring and Evaluation Results Framework, were seven-fold (MSH 2013a):

**TRACK TB Project Assumptions:**

1. TB remains a health priority for the Ministry of Health and USAID.
2. Political support for TB control
3. Availability of technical human resources for TB
4. Community support for TB control
5. Presence and cooperation of USAID implementing partners
6. Good governance
7. Availability of funds

Source: MSH. 2013b. *Performance Monitoring and Management Plan 2013-2017*. June 2013. p. 10

As outlined in Question 2 - and as will be reiterated in later sections of the assessment - there is ample evidence that major systems bottlenecks exist at both central and district levels in terms of both human resources and financing and political commitment for TB. There is a broad consensus within program literature and among stakeholders that TB is not a major health priority in Uganda, and that there is insufficient political, technical, financial, and other resources for TB control (although the ability to precisely measure the lack of prioritization of TB is impeded by an absence of accessible, centralized data on TB, as well as on other programs against which TB might potentially be compared). While there are structures and mechanisms for TB control (coordinating committees, performance review committees), TB advocacy (the Uganda Stop TB Partnership), and community linkages (existing Village Health Teams and community-based volunteers at facilities focusing on health issues other than TB), TRACK TB's brief was actually to *build* and *strengthen* these structures with the understanding that they were weak. As such, the assumptions themselves were contradicted by what TRACK TB was tasked to do.

Indeed, problems with governance, cooperation, and political commitment and financing were already present in the national TB program long before TRACK TB began implementing activities. For example, a 2012 report by MSF noted that “a reduced TB budget of US\$20 million has been presented, of which only 31% (US\$ 6 million) is expected to be funded. The percentage of the Global Fund's contribution has been reduced to 56%, whereas the available funds from domestic resources has increased to 5%” (MSF 2012: p. 34). The Joint External Monitoring Mission Review additionally noted that:

*The Ministry of Health staff establishment within the NTLP is not enough to adequately manage all components of TB control currently implemented, particularly at the level of the NTLP Central Unit...As a result, some essential operations of the Central Unit are not adequately carried out...The financial commitment to TB control is not commensurate to the burden of TB disease in the country and has led to the NTLP's high donor dependence.*

*Because of the perception of significant...external support to control the TB epidemic, several District Administrations...make available a very limited (if any) budget for TB-related activities, resulting mainly in poor support to the field community work required by the community care model (GoU 2013, p. 18).*

Additionally, while there is the presence and cooperation of USAID implementing partners, coordination between these partners was highlighted throughout discussions with stakeholders to be a major challenge to effective implementation of TB control activities, particularly regional activities for susceptible TB which often “fall between the cracks” of partner mandates for MDR TB and TB/HIV. There is also the larger issue of how to measure the extent to which USAID implementing partners cooperate and what, ideally, cooperation should mean (See Question 2 on context).

The USAID 2012 technical note on logical frameworks states that project assumptions exist to clarify “those factors necessary for achieving the project Outputs, Purpose and Goal that are outside the Mission’s manageable interest” and represent one of the “critical factors in the success of the development project” (USAID 2012, p. 6). They must be both specific and measurable, and their validity should be verified before beginning the project and monitored regularly over its duration (USAID 2012).

There is little indication that this happened over the course of TRACK TB, although the project was - as this assessment will show - in many ways successful. That said, the lack of awareness and monitoring of the project assumptions at various levels of project management – both by TRACK TB and by USAID – as well as the assumptions’ lack of validity, suggests a far bigger issue with how assumptions are developed and utilized by USAID in the process of developing implementing partner activities.

With regard to TRACK TB, the assumptions did not hold true, not only over the evolution of the project, but from the very start. Still others (e.g. financing) were not treated as preconditions for success, but were addressed in the actual work plan as outputs (e.g. Year 2, Intermediate Result 1, Activity 1.3: *Support timely implementation of Global Fund supported activities so as to ensure sustainable funding for NTLF*; Year 3, Intermediate Result 1, Activity 1.3: *Provide technical support in implementation of Global Fund-funded activities to ensure continued availability of funding to the TB control activities*). This suggests a blurring of lines between assumptions – preconditions theoretically beyond the control of the project – and outputs that the project attempted to actively manage.

The correct question, then, is not whether or not the assumptions held true, but whether the assumptions were useful ones for this particular project. Political priority, availability of human and financial resources, accountability, civil society engagement and coordination – all of these factors need to be measured before their status can be assumed.

\*\*\*

*Question 4: How did TRACK TB's technical approach contribute to enhancing NTLP leadership, technical capacity, and quality improvement of DOTS and TB/HIV care?*

In 2012, MSH's TRACK TB technical application noted inadequate numbers and insufficient capacity of staff at central NTLP and zonal/regional levels. At the NTLP, MDR TB, HIV, and Monitoring and Evaluation did not yet have program focal persons, and only five out of nine regions had TB supervisors in place (MSH 2012a). The Government of Uganda had, at the time, frozen recruitment and this - along with high staff turnover in the regions and districts - meant that staffing shortfalls could only be met by supporting the NTLP with seconded staff, in particular a Capacity Building Advisor, an MDR TB Technical Advisor, a Quality Assurance Advisor, and a Data Specialist. Some of these positions were intended to be taken up by the Ministry of Health over the duration of the project although, to date, none have been.

In addition to staff secondment, TRACK TB proposed three key innovative tools to enhance NTLP technical capacity and quality improvement. These were: 1) Leadership and Management Development Plus Program; 2) Management and Organizational Sustainability Tool for TB (MOST for TB); 3) Supervision, Performance, Assessment, and Recognition Strategy (SPARS) (MSH 2012a). TRACK TB was also to build NTLP's capacity in operations research and support the transfer of sustainable approaches and skills to NTLP leadership, including capacity building for advocacy for TB (MSH 2012). Targets for these activities are listed in Table 7.

In order to assess the degree to which TRACK TB strengthened NTLP management and capacity, the assessment focused on the targets set out by the MOST for TB tool planning activity. TRACK TB introduced and implemented the MOST for TB tool at the central level and regionally among Regional TB Leprosy Supervisors (RTLs) and implementing partners in 2013 (MSH 2013a). The MOST for TB tool was then utilized in national and regional workshops to create TB Action Plans in 2014 and 2015 (MSH 2014a; MSH 2015a). Using the MOST for TB tool, leadership and technical capacity was reviewed in six areas: strategic planning, monitoring and evaluation, supply chain management, human resources, advocacy, communication and social mobilization, and supervision. With regard to strengthened management and capacity, TRACK TB has contributed to a number of NTLP's achievements.

| <b>TRACK TB Achievements</b>                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Supporting completion and dissemination of the National Strategic Plan 2015/16-2019/20, Annual Operational Plan for 2015/16, and TB Communications Strategy |
| 2. Facilitating regular program reviews and monitoring activities                                                                                              |
| 3. Ensuring the availability of various plans, standard operating procedures, tools and forms (e.g. facility stock order and reporting form)                   |
| 4. Sharing quarterly facility stock status reports for anti-TB medicines at 15 MDR TB sites with the NTLP                                                      |
| 5. Placement of an Advocacy, Communication and Social Mobilization (ACSM) focal person                                                                         |
| 6. Training District TB Leprosy Supervisors (DTLS) in TB management and performance improvement                                                                |
| 7. Capacity assessment of NTLP central unit staff and assignment of coordination roles                                                                         |

In addition, there is currently on-going stakeholder orientation on tools and performance improvement, strengthening of data management processes (including for stock data), district-level performance supervision visits, advocacy, and harmonization of human resources policies (MSH 2014a; MSH 2015b; MSH 2016). Both NTLP and implementing partners have especially appreciated TRACK TB's facilitation of regular coordination meetings by NTLP, Ministry of Health, and other partners (e.g. the National Coordination Committee and the TB implementers forum), as well as the technical assistance TRACK TB has provided toward the review and dissemination of tools and materials, technical policies, and strategic plans (Interviews with 2\_KAM\_TRACK\_27.5.16, 4\_KAM\_TRACK\_27.5.16, 26\_KAM\_IP\_27.5.16, 21\_KAM\_CGOV\_27.5.16, 76\_KAM\_CGOV\_10.6.16, 12\_GUL\_IP\_25.5.16, 8\_MBA\_IP\_27.5.16, 11\_MBA\_IP\_24.5.16).

In terms of the other areas of engagement, TRACK TB's contribution is more difficult to assess and can only be inferred from stakeholder interviews. For example, in terms of implementation of Quality Improvement approaches, stakeholders at both central and district levels (in particular, Mbarara, and Kitgum) indicated that support supervision activities improved and became more regular

*QI is the way to go. We are proud of this approach. We think the government needs to increase it a bit, however, so its not donor-led.*  
1\_KIT\_LG\_24.5.16

*QI approach has been helpful. Even with a high workload, districts can sustain some aspects of performance.* 17\_KIT\_TRACK\_24.5.16

and standardized following TRACK TB's introduction of a Quality Improvement guide and its facilitation of supervisory activities by central and regional teams (Interviews with 2\_KAM\_TRACK\_27.5.16, 4\_KAM\_TRACK\_27.5.16, 1\_KIT\_LG\_24.5.16, 11\_MBA\_IP\_24.5.16). Indeed, TB support supervision was taking place in Northern Region during the period of fieldwork, leading to both the District TB Leprosy Supervisor for Kitgum and the Regional TB Leprosy Supervisor/TRACK TB Coordinator for Gulu Hospital being unavailable for interviews.

**Table 7: Expected Targets and Results for Enhanced NTLP Leadership, Technical Capacity and Quality Improvement (QI)**

|   | Major Illustrative Activities                                                                                                                                                                                                                                                                                                           | Expected Results and Targets                                                                                                                                                                                                                                                                                                                                         |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <ul style="list-style-type: none"> <li>• Train NTLP staff on leadership, management, and governance; provide mentoring support</li> <li>• Conduct MOST for TB</li> <li>• Support NTLP to finalize TB strategic plan and develop joint annual NTLP implementation plans</li> </ul>                                                       | <p>Expected Result</p> <ul style="list-style-type: none"> <li>• NTLP management and planning capacity strengthened</li> </ul> <p>Target</p> <ul style="list-style-type: none"> <li>• NTLP supported to develop and disseminate joint annual plan, annual report and three other documents every year</li> </ul>                                                      |
| 2 | <ul style="list-style-type: none"> <li>• Develop TB quality improvement approach</li> <li>• Train NTLP staff on quality improvement</li> <li>• Incorporate quality improvement in NTLP implementation</li> <li>• Quality data available for each planning cycle</li> <li>• Support NTLP supervision of regions and districts</li> </ul> | <p>Expected Result</p> <ul style="list-style-type: none"> <li>• TB quality improvement program implemented</li> </ul> <p>Targets</p> <ul style="list-style-type: none"> <li>• All 112 districts implement TB quality improvement</li> <li>• All 112 districts submit TB reports on time</li> <li>• Quality NTLP supervision of each NTLP region conducted</li> </ul> |
| 3 | <ul style="list-style-type: none"> <li>• Support NTLP to develop operational research agenda</li> <li>• Conduct operational research with collaboration of NTLP and local partners</li> <li>• Support dissemination of research findings</li> </ul>                                                                                     | <p>Expected Result</p> <ul style="list-style-type: none"> <li>• NTLP capacity built for operational research and dissemination of findings</li> </ul> <p>Target</p> <ul style="list-style-type: none"> <li>• At least one operational research study conducted annually</li> </ul>                                                                                   |
| 4 | <ul style="list-style-type: none"> <li>• Hire and second capacity building officer to NTLP</li> <li>• Support advocacy to improve political commitment</li> <li>• Provide technical assistance through TRACK TB/MSH Uganda team and regional and international networks</li> </ul>                                                      | <p>Expected Result</p> <ul style="list-style-type: none"> <li>• Sustainable approaches and skills in TB control transferred</li> </ul> <p>Target</p> <ul style="list-style-type: none"> <li>• TRACK TB supported post (Capacity Building Officer) taken up by NTLP/Ministry of Health by Year 3</li> </ul>                                                           |

Source: MSH. 2012. TRACK TB Technical Proposal. 13 September 2012. Kampala: MSH

TRACK TB was also appreciated for its contribution to Kampala Capital City Authority (KCCA), and its support for strategic planning and for District TB Leprosy Supervisors (DTLS) within KCCA to become more active in supervising health facility diagnostic and treatment units (Interviews with 76\_KAM\_CGOV\_10.6.16, 27\_KAM\_LG\_1.6.16). Helping to establish the multi-sectoral Kampala City TB Task Force (KCTF) – though less active now because of re-zoning – also contributed to harmonized leadership, technical capacity, and quality improvement between the KCCA and NTLP (Interviews with 76\_KAM\_CGOV\_10.6.16, 27\_KAM\_LG\_1.6.16).

No data was available as to whether or not all districts in Uganda are implementing Quality Improvement plans. Also, although the NTLP does record the dates of when districts submit their performance reports, this information is not summarized in a way that allowed for the assessment to ascertain whether reports are being submitted in a timely manner. Moreover, trend analysis (see Question 1 of the assessment) demonstrates that core indicators (e.g. treatment success, cure, and notification rates) were improving nationwide from 2012 to 2014, even in areas where TRACK TB did not directly support implementation (indeed, in Kampala, from 2014 to 2015, notification rates actually decreased). However, even if Quality Improvement and strengthened leadership and capacity are not immediately reflected in core indicators, capacity building is necessary to strengthen overall management and administrative systems.

*TRACK TB withdrew support for research and it destabilized everything...I've wanted to do research...but I can't get funding. We have never sat with a patient, for example, and said 'Apart from drugs and recording, do you have anything to tell us? Do you feel something can be done differently?' And we assume even when sitting here, we are still thinking and planning on behalf of patients. I am appealing to TRACK TB: Please restore money for operational research. 21\_KAM\_CGOV\_27.5.16*

*The other issue is human resources... seconded staff was shared with TRACK TB. There were no clear reporting responsibilities. If you second to a program, then leave them to the program. The project pulled their legs, and I pulled their arms. In this sort of situation, you can't hold them fully accountable. You say, 'I need you here.' They say, 'The COP needs us there.' And the COP owns their salary. 76\_KAM\_CGOV\_10.6.16*

Finally, in terms of building the NTLP's capacity in operational research and in transferring approaches and skills in TB control, TRACK TB's contribution was mixed. The mandate for operational research was given to Makerere School for Public Health (Mak-SPH) - one of TRACK TB's three sub-prime partners - rather than directly to the NTLP. This sub-prime did not perform as contracted and, thus, the NTLP was left unable to implement meaningful operational research,

leading to frustration by programme staff who felt that rare opportunities for research had been promised and then taken away (Interviews with 21\_KAM\_CGOV\_27.5.16, 76\_KAM\_CGOV\_10.6.16). In terms of seconding staff, the Data Specialist continues on at the NTLP with Global Fund funding, but the remaining seconded staff remain under TRACK TB. Moreover, the seconding of TRACK TB staff to the NTLP – while valued – was also a source of frustration in that “ownership” of these staff was not clarified, and seconded staff often had dual lines of reporting that conflicted with the NTLP (Interviews with 21\_KAM\_CGOV\_27.5.16, 76\_KAM\_CGOV\_10.6.16). This theme will be returned to later in the assessment (see Question 6).

Finally, while the MOST for TB tool has clearly contributed to important higher level target-setting by the NTLP, the degree to which the tool itself is owned by the government or driven by TRACK TB is a question. During an focus group discussion with TRACK TB stakeholders, the MOST for TB tool was repeatedly mentioned as a critical innovation, as it was within TRACK TB program documents; however, the MOST for TB tool was never brought up by key informants and in focus group discussions with NTLP stakeholders. The extent to which the MOST for TB tool will continue to be implemented going forward without external facilitation remains to be seen.

\*\*\*

*Question 5: What successful innovations did TRACK TB initiate during the implementing and scaling up of the national model for MDR TB care and urban DOTS that can be considered in future TB programming/implementation?*

MSH's TRACK TB technical application cited several innovations it sought to introduce within *IR 2: Urban DOTS Model for Kampala Implemented* and *IR 3: Quality Program for the Management of MDR TB Implemented*, in particular “m-health and e-health approaches for patient-centered TB care” for urban DOTS and an “e-TB Manager” for management of MDR TB (MSH 2012a). Rather than focusing on these two particular innovations, however, the assessment looks at the broader approaches applied to MDR TB and urban DOTS in Kampala by TRACK TB. It does so because – with the exception of the roll out of e-Registers, which have been a critical and valued intervention for MDR TB – other m-health and e-health approaches were not mentioned by stakeholders as useful/successful. Additionally, singling out e-Registers in the absence of a discussion of TRACK TB's facilitation of a multifaceted integrated approach to both MDR and urban DOTS would not be as meaningful. For Question 5, then, we assess each approach holistically.

#### 5a. Innovations for MDR TB care and treatment

Ambulatory, community-based care for MDR TB has long been found to be both effective and cost-effective in Uganda and in other settings (Mitnick et al 2003; Shin et al 2004; Nathanson et al 2006; Heller et al 2010; Smart 2010; Furin et al 2011; Luyirika et al 2012; Fitzpatrick & Floyd 2012; Yin et al 2016). In particular, a number of studies have found that the input-intensive MDR model originally developed by Médecins Sans Frontières (MSF) in partnership with the NTLP – and first implemented at Kitgum's Madi Opei Health Centre IV and associated follow up health facilities between 2009 - 2012 – was particularly successful (Luyirika et al 2012; Horter et al 2014).

#### **MDR TB: Key Activities**

- Mixed-model home/community/facility-based care
- Seconded staff specifically dedicated to MDR TB at *directly* supported MDR sites
- Clean up of MDR register of those patients lost to follow-up
- Hospital-based supervisory team carrying out monthly supervision and incentivization of follow up facility staff
- Quarterly cohort reviews
- Monthly clinics for MDR patients
- Provision of patient enabling packages (via mobile money)

In its entirety, the MSF model was difficult to sustain at scale in that it included providing patients with mosquito nets, radios, reading material, and fortnightly food parcels, as well as providing large cadres of Village Health Teams with bicycles, raincoats, boots, and other items (MSF 2012; Interview with I7\_KIT\_TRACK\_24.5.16). Nevertheless, the NTLP's 2012 proposed strategy for MDR TB closely mirrors this model, and both *direct* and *indirect* TRACK TB approaches have built on lessons learned from Madi Opei with regard to a) keeping hospital stays short; b) relying on ambulatory care managed by follow up health facility workers, Village Health Teams, and identified treatment supporters; c) incentivization of both patients and health workers; d) training in infection control; e) reverse contact tracing; f) sensitization of the community.



Photo: MDR TB Ward, Mbarara Regional Referral Hospital

TRACK TB has supported the following modifications to the model. First, in those hospitals where it serves as a *direct* implementer, TRACK TB seconded staff to serve on MDR teams. Depending on the hospital, teams might include medical officers serving as TRACK TB focal

points, clinical officers, MDR nurse in-charges and MDR TB focal points, data managers, and counselors. TRACK TB has also played an implementing partner role by facilitating both referral to GeneXpert via hub riders and the supply chain through stock transfer and, occasionally, locating buffer stock.

In both *directly* and *indirectly* supported MDR sites, TRACK TB has also involved follow up facility workers more closely in patient care, whereas in the MSF model, DOT for MDR TB was handled mainly by Village Health Teams. Second, TRACK TB supports monthly supervisory visits by hospital-based MDR teams to better link the hospital to the community so as to ensure that a) drug delivery and patient record keeping are harmonized across facilities; b) sputum is routinely collected; c) treatment enablers and incentives are handed out to patient, either in mobile money form to cover transport, food, and airtime costs; d) health facility workers and treatment supporters are provided with facilitation (airtime, transport reimbursement, and in-kind refreshment). Monthly supervisory visits also allow for contact tracing, as well as routine mentoring and supervision to be conducted among Village Health Teams and health workers and sensitization to take place within the patient's community. *Directly* supervised teams include seconded staff. *Indirectly* supervised teams include staff at SUSTAIN-supported facilities helped with small allowances, transport, and airtime to conduct follow up visits.

*[Cohort] reviews are very helpful because we [TRACK TB, STAR SW, MJAP, HCs, Regional Officers] have the opportunity to review patients and issues affecting patients and identify gaps in technical and financial support.*  
8\_MBA\_IP\_27.5.16

*TRACK TB also introduced cohort review activities. These are really supposed to be quarterly activities where all hospitals come together. They review the patients who have gone through the program, and they have learning points....it has now been established as the easiest way to build capacity.* 17\_KIT\_TRACK\_24.5.16

Additionally, several innovations have recently taken place – introduced by TRACK TB, and supported by Global Fund, SUSTAIN, and other partners - that have further built on the ambulatory care model. First, monthly clinics have been introduced in lieu of supervisory visits at both *directly* and *indirectly* supported MDR sites. Monthly clinics enable more efficient collection of patients' lab work and pay out of incentives, as well as provide MDR patients the opportunity to receive the psychosocial peer support that they were previously lacking. Second, cohort reviews

were introduced – with technical assistance from the TRACK TB sub-prime partner, Curry International Tuberculosis Center (CITC), San Francisco – so that individual MDR patient records can be reviewed at national and regional levels. This has allowed for patient-centered learnings to be widely shared among key stakeholders involved in the management and care of MDR TB patients. Cohort review was highlighted at central level, at regional and implementing partner level, and at facility level as an important means of identifying technical and financial gaps in patient care. Third, e-Registers have been introduced across all MDR sites.

Taken together, when the TRACK TB model has involved *directly* supported MDR units at hospitals, it has had more cumulative success compared to when it has provided *indirect* support to implementing partners (Table 8). The larger question, however, is how much of this is due to the creation of hospital-based MDR teams via seconding staff, as many of the other innovations – such as cohort review, monthly clinics and e-Registers – have also been carried out by implementing partners such as SUSTAIN, albeit in the absence of a seconded MDR team beyond a TRACK TB MDR TB coordinator.

**Table 8: Treatment outcomes in TRACK TB *directly* versus *indirectly* supported hospitals**

| Treatment outcome | TRACK TB Direct* Support<br>N (%) | TRACK TB Indirect** Support<br>N (%) | Total<br>N (%) |
|-------------------|-----------------------------------|--------------------------------------|----------------|
| Number notified   | 262                               | 152                                  | 414            |
| Treatment Success | 147 (56.1)                        | 53 (34.9)                            | 200 (48.3)     |
| Died              | 47 (17.9)                         | 19 (12.5)                            | 66 (15.9)      |
| Lost to Follow-up | 12 (4.6)                          | 4 (2.6)                              | 16 (3.9)       |
| Other outcomes†   | 14 (5.3)                          | 2 (1.3)                              | 16 (3.9)       |
| Not evaluated     | 42 (16.0)                         | 74 (48.7)                            | 116 (28.0)     |

\*Facilities receiving direct support from TRACK TB (Mulago, Kitgum and Mbarara)

\*\*Facilities receiving support from TRACK TB+SUSTAIN (Kabarole (Fort Portal), Gulu, Iganga, Arua, Kabale, Mbale, Masaka, Mubende, Soroti, Matany (Napak))

†Including Failure, PRE-XDR, Pre-XDRm Returned to Cat1, Returned to Cat2, Transferred Out and Completed

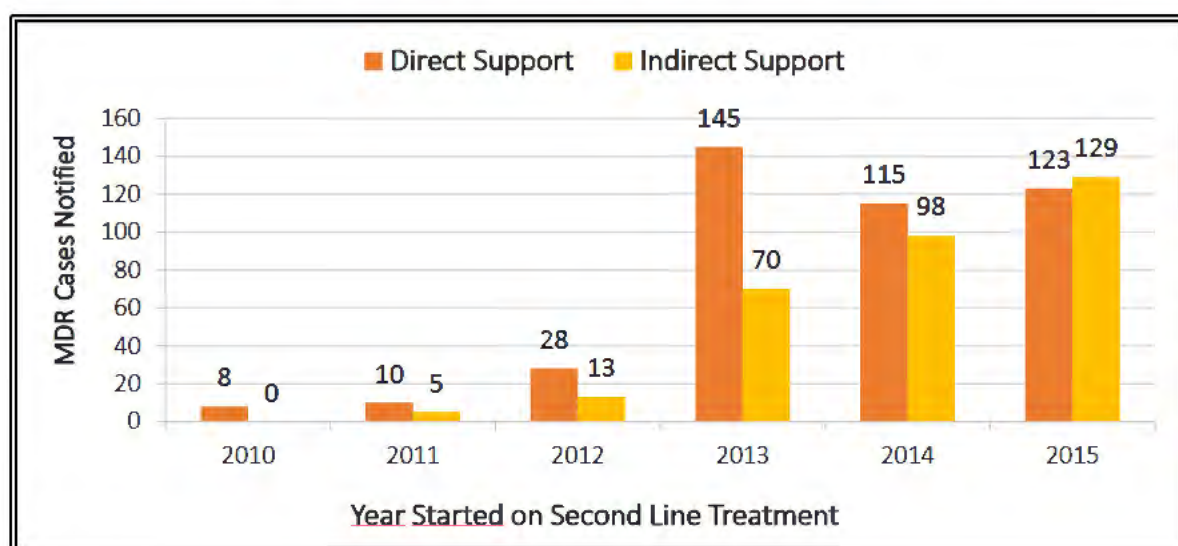
For example, if we look at trends across at least one key indicator – MDR cases notified (Figure 10) – the cumulative benefit of *direct* support becomes less clear. Here, we see the benefits of *direct* support slowly leveling out over time. This suggests that the potential overall benefits of *direct*- (i.e. seconded staff) versus *indirect*- (i.e. working through regional implementing partners, in particular SUSTAIN) support may no longer be significant when it comes to progress on MDR.

There may be a lot of reasons for this. First, partnership coordination may have started to improve between regional stakeholders – Regional Performance Monitoring Teams (RPMTs), RRHs, SUSTAIN, TRACK TB, and other implementing partners working at district level – due to improved support for, and participation in, quarterly performance review meetings and other coordination bodies (also a key area of TRACK TB capacity building). Second, the leveling out may represent a scenario in which TB teams at *indirectly* supported hospitals have had to build their expertise in MDR case finding/notification over time,

whereas at TRACK TB *directly* supported facilities the critical mass of MDR technical experts was introduced at a single go.

Third, it may also relate to the increased accessibility of GeneXpert at *indirectly* supported hospitals throughout the country, the installation of which was also supported by TRACK TB. The earliest MDR sites – Kitgum, Mbarara, and Mulago – were, simultaneously, *directly* supported sites, and were early recipients of GeneXpert. At this point, it is too early to tell whether this leveling of progress between *directly* and *indirectly* supported MDR sites will continue. That said, if progress on MDR does not prove to be dependent on the presence of MDR teams made up of seconded staff, then this may indicate an element of sustainability to the model (although, as this assessment will make clear, sustainability depends on many factors above and beyond a well-designed model).

**Figure 10: MDR Cases Notified on TRACK TB Direct versus Indirect Treatment**



### 5b. Innovations for urban DOTS

Ambulatory care for MDR TB has its precedent in both community-based and home-based DOTS for susceptible TB patients, models that have a history of mixed evidence on clinical outcomes. Nevertheless, many studies have found both community- and home-based DOTS to be at least equivalent to, if not better than, hospital- or facility-based DOTS with regard to treatment success, treatment completion, default rates, patient satisfaction, and cost-effectiveness (Volmink & Garner 2007; Munro et al 2007; Toczek et al 2013; Karumbi & Garner 2015; Zhang et al 2016).

Likewise, studies have shown that home-based DOTS (i.e. family member-observed) versus community-based DOTS (i.e. community health volunteer-observed) have few significant differences in outcomes (Kalmoratanakul et al 1999; Wright et al 2004; Newell et al 2006; Zvavamwe & Ehlers 2009). In urban areas, home-based care models for chronically ill TB patients - including those who are HIV positive - have long been demonstrated to be more affordable and cost-effective than hospital-based programs (Moalosi et al 2003; Dudley et al

2003; Floyd et al 2003; Singh et al 2004; Wandwalo et al 2004; Clarke et al 2005; Calvacante et al 2007).

#### Urban DOTS: Key Activities

- Mixed model patient-centered approach
- Integrated TB/HIV *One Stop Shop* (e.g. ART & CPT for TB/HIV patients and IPT for HIV patients)
- Community linkage facilitators identified from volunteers attached to health facilities
- Contact-tracing and intradepartmental linkages for case detection
- Intensified case finding (ICF) approach
- Follow up of treatment interrupters
- Multisectoral Kampala City Task Force (KCTF for TB)
- Strengthening lab capacity and performance
- Stock management support

In Uganda, community-based DOTS for susceptible TB was first piloted in Kiboga district in 1998 and adopted within national policy in 2001 as the best strategy to control TB in the country. In the past, community-based DOTS has had mixed outcomes in Uganda; however, the Kiboga pilot demonstrated similar cost-effectiveness findings as the global literature. Cost per patient treated for new smear positive patients under community-based DOTS was \$289 compared with \$510 under the traditional hospital-based strategy. The cost per patient successfully treated was \$391 compared to \$911 with the hospital-based strategy. Length of hospital stay moreover fell from 60 to 19 days (Okello et al 2003). This early model involved linking sub-county health workers

to community nominated volunteers who – following training - were provided medicines twice weekly by the health worker in order to deliver DOT daily to the patient. The patient went to the health facility at two, five, and eight months post-initiation for sputum monitoring (Okello et al 2003).

#### Community Linkage Facilitators' Responsibilities:

1. Following up patients initiated on DOT during an initial home visit
2. Helping patients identify a treatment supporter in the home
3. Carrying out contact tracing and, when mobilized, intensified case finding (ICF)
4. Educating and counseling patients, families and community members on TB treatment and infection control (IC) practices
5. Phoning patients to remind them of their appointment date at the health facility
6. Referring patients to the facility for sputum samples at two, five and six months
7. Following up by phone those patients who fail to collect drugs from facilities
8. Tracing treatment interrupters via first, phone, and then a home visit

TRACK TB's urban DOTS model modifies community-based DOTS by using a patient-centered mixed approach in which patients are responsible for taking DOT while observed by a family member or another member of the household. At the same time, they are closely linked to a facility near their home and followed up regularly during home visits by community linkage facilitators. Community linkage facilitators are employed by TRACK TB's sub-prime partner, AIC, to carry out community activities, and supervised by five divisional supervisors. They have a number of responsibilities assigned to them.

Meanwhile, TRACK TB also supports health facility workers at ambulatory facilities close to the patient's home. These health workers are responsible for treatment initiation, building intra-facility linkages for improved screening and active case finding and referral. They also monitor patient progress on DOT and ART, supervise community linkage facilitators, and manage data and stock information systems. This includes working with community linkage facilitators to ensure facility TB registers are complete, up-to-date, reconciled, available to the District TB Leprosy Supervisor, and transferred to the national health information system (whether at the NTLP or the District Health Information System (DHIS-2)). Most of these facilities were simultaneously supported by TRACK TB to create integrated TB/HIV One Stop Shops and accredited Diagnostic and Treatment Units (DTUs).

*When diagnosed with TB, we take the patients to the TB shed and ask for drugs. Then they sit under the tent and get health education, are put in the register and given their first dose at the health unit. Then they make appointment for follow up. 56\_KAM\_HF\_31.5.16*

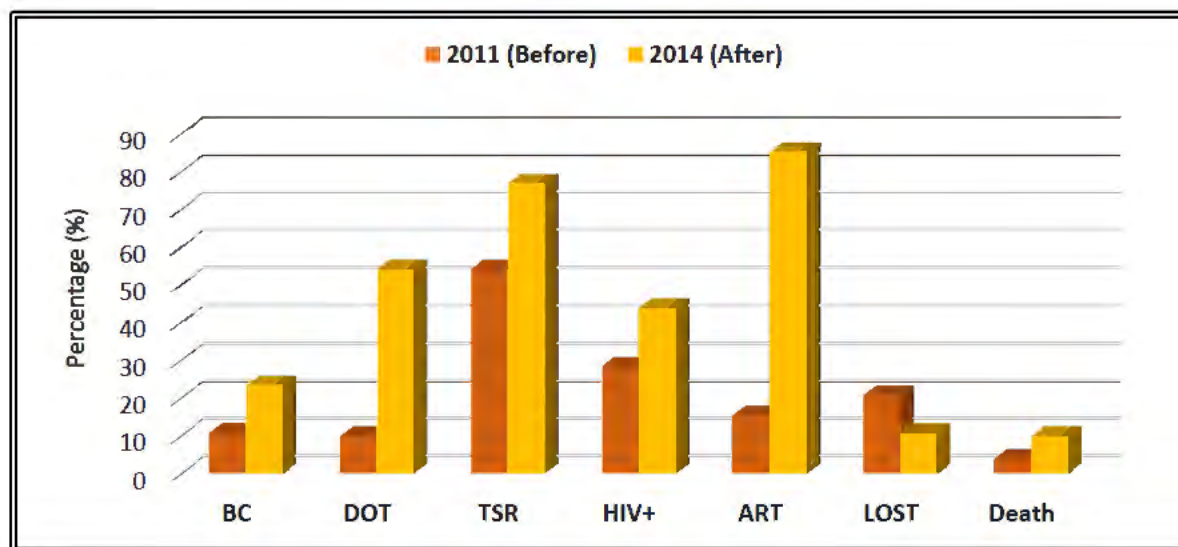
*First of all, we provide them with masks. We teach them how to open windows every morning.... in homes where it is applicable, we teach them: 'Ok let us separate the patient and give him his own room, cup, plate, for at least a period of two months.' We also are teaching them coughing etiquette: 'When you cough, don't go spitting all over.' 44\_KAM\_HF\_31.5.16*

*When the patient is given the drugs, he/she goes home. On any first visit to that patient's home, I identify a treatment supporter, one who ensure that the patient is swallowing the drugs. I would keep in touch with the treatment supporter as well to ensure the patient is adhering to the treatment. So how will I know? I will check on the treatment card whereby the card should show that it's ticked properly. There I will know that the patient is adhering. 45\_KAM\_HF\_31.5.16*

Urban DOTS is correlated with positive outcomes across all indicators in all facilities targeted by the assessment except notification rates. The drop in notification rates may mean that intra-facility linkages to support intensified case finding should be further strengthened, but does not necessarily reflect negatively on the validity of the patient-centered mixed model (Figure 11). Additionally, by the end of Project Year 3, there were 97 accredited Diagnostic and Treatment Units – public, Private Not-For-Profit and Private For-Profit – within Kampala Capital

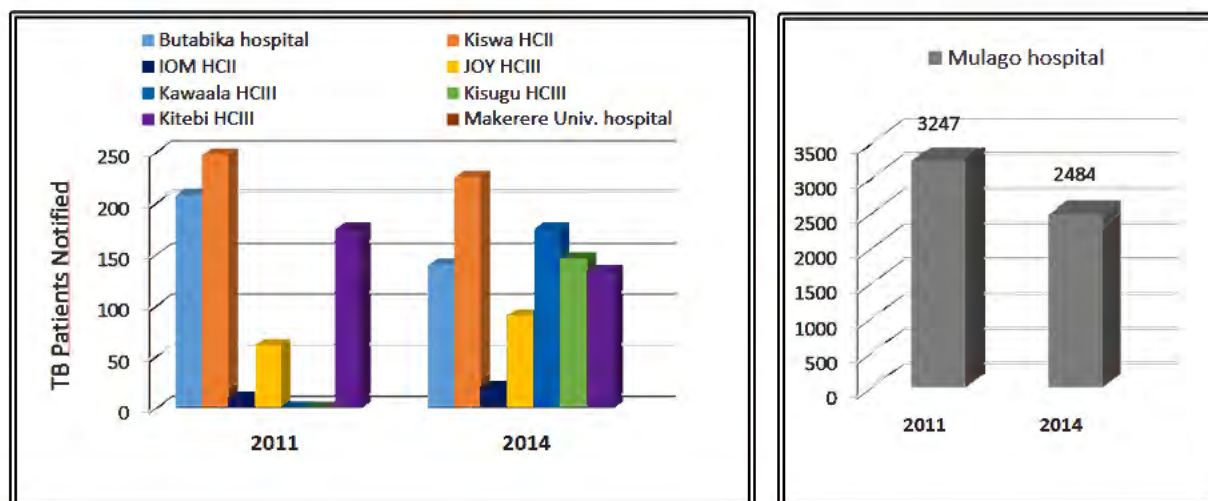
City Authority (KCCA) directly supported by TRACK TB, up from 38 at baseline, and TRACK TB also contributed to External Quality Assessment (EQA) activities conducted by the National TB Reference Laboratory and divisional health teams at 107 laboratories in Kampala (MSH 2016). The percentage of patients under DOTS in KCCA facilities increased from 6% to 86%, and over 1,500 home visits had been conducted by community linkage facilitators for new and continuing TB patients, thus enabling community linkage facilitators to screen over 3,700 contacts of new and continuing patients (MSH 2016).

**Figure 11: Performance of Sampled Health Facilities on Key TB Control Indicators Before and After Start of Track TB Support**



Key: BC = Bacteriologically Confirmed; DOT = Directly Observed Therapy; TSR = Treatment Success Rate; HIV+ = HIV Positive; ART = Antiretroviral Therapy; Lost = Lost to Follow-up; Death = Patient Died

**Figure 12: TB Notification Before and After Track TB Urban DOT at Eight DTUs and Mulago Hospital**



The urban DOTS activity targets those health workers closest to the patient - community linkage facilitators and health workers in facilities closest to patients' homes – and seeks to integrate the clinical management of patient DOT with improvements to surveillance and service delivery. The question is to what extent this patient-centered model is sustainable after TRACK TB ends. Once TB/HIV *One Stop Shops* are fully rolled out, this intervention is, theoretically, sustainable as it piggy-backs on, and improves, existing TB management at the facility level. Similarly, improving TB screening processes across all departments is simply good practice. That said, delivery of DOT – whether home-, community-, or hospital-based – requires reliable drug and medical supply chains, information systems and lab referral networks (see Question 2 on context and Question 8 on sustainability). As described

throughout this assessment, TRACK TB has attempted to strengthen these for TB control, but many bottlenecks within the general health system undermine their efforts.

Additionally, community linkage facilitators are financed entirely by the project. Many of them were already volunteers at health facilities working in other departments, receiving small facilitation payments from other projects. They are not, however, formally incorporated into the public service and the ability to continue to incentivize them is in question. When motivated and active, a cadre of community health workers linking patients to facilities (whether via urban DOTS or the MDR package described earlier) is one of the most critical components of a functional referral system whether for TB or any other health issue (see Question 10 on best practices). As many community linkage facilitators have worn “multiple hats” and worked for other projects in other departments, they could play a key role in integrating services down to the community level. Their sustainability, however, is an issue.

\*\*\*

*Question 6: How did context facilitate or inhibit TRACK TB’s project performance and how did the project adapt to these changes?*

#### *6a: Human Resources*

Human resources issues have impeded TRACK TB throughout the duration of its implementation both at central and facility levels (MSH 2013a; MSH 2014a; MSH 2015a). At the central level, as mentioned in Question 4, secondment of staff to the NTLP is a practice frequently employed by implementing partners in order to support implementation of projects within government systems, as well as to achieve “buy in.” In TRACK TB’s case, seconded staff sometimes have

*Human resources are not enough due to funding obligations. The pay is small and thus you cannot attract human resources through a competitive process. 23\_KAM\_PIP\_6.6.16*

*Human resources gaps are there. The staff that actually work on TB management do not have good morale or motivation. They are reluctant to go for training. 65\_KAM\_PHF\_30.5.16*

*Where partners assist programs, they have human resources in place. But then you find policy makers having to make decisions about these resources at the highest level, and this takes long. Because if partners have helped programs with human resources, then the Ministry of Health should be talking to the Ministry of Finance and the PS to have resources in place to take the staff. There should be a discussion regionally as well so there is no crash landing. 21\_KAM\_CGOV\_27.5.16*

had dual roles, thus creating tension between the NTLP and TRACK TB as to what activities the seconded staff should prioritize, and delaying national program activities in order for project deliverables to be met (MSH 2014a; Interview with 76\_KAM\_CGOV\_10.6.16). Additionally, inefficiencies in the Ministry of Health and public services’ processes of reviewing, amending, and approving new staffing structures and replacing staff also proved a challenge for TRACK TB. A revised NTLP staffing structure was one of the first *IR I Strengthening NTLP Leadership and Technical Capacity* activities undertaken by TRACK TB, yet by Project Year 3, it still had not been implemented (MSH 2014a; MSH 2015a; Interviews with 17\_KIT\_TRACK\_24.5.16, 4\_KAM\_TRACK\_27.5.16). The project also encountered bottlenecks resulting from delays in replacing dedicated NTLP staff (MSH 2014a; MSH 2015a).

High turnover of staff at all levels of the health system was also frequently cited as impeding program implementation, both in program documents and during key informant interviews and focus group discussions with TRACK TB, the NTLP, and all the hospitals visited during the assessment (MSH 2013a; MSH 2014a; MSH 2015a). High turnover was due to internal rotations and outmigration of health workers. Stakeholders reported losing staff due to outmigration to the Private Not-For-Profit or Private For-Profit sectors, and to other countries (for example, stakeholders in the North reported losing trained clinical officers and laboratory technicians to South Sudan). This affected not only quality service delivery but resulted in a waste of resources as health workers had to be continually retrained, not only on clinical management of TB/HIV and MDR TB patients but, as importantly, on essential systems-related skills such as Quality Improvement (QI) and data and stock management (MSH 2015a; Interviews with I7\_KIT\_TRACK\_24.5.16, 76\_KAM\_CGOV\_10.6.16).

TRACK TB attempted to overcome some of these bottlenecks by strengthening regional and intra-facility mentorship networks to build capacity and improve motivation of staff. Cohort reviews (which were already planned) and peer-to-peer mentorship were encouraged, as was continuous Quality Improvement (QI) (MSH 2014a; MSH 2015a). All of these strategies were mentioned repeatedly in interviews and focus group discussions as valuable strategies for building health worker capacity and improving morale (including by facility workers at *indirectly* supported facilities). Additionally, introducing community linkage facilitators (again, an intervention that was already planned) had the added benefit of reducing workload for facility staff.

#### *6b: Supply Chain*

TRACK TB implementation was impeded from the very start by wider health systems barriers related to the medical supply chain (MSH 2013a; MSH 2014a; MSH 2015a). These have included long lead times on requested procurements, stock deliveries not tied to orders, and frequent stock out of medicines such as Levofloxacin and Kanamycin, Isoniazid, and formulations for pediatric TB, as well as laboratory materials such as sputum mugs and personal protective equipment (PPE). Multiple stakeholders have attempted to work with the National Medical Stores (NMS) to remedy these bottlenecks, however, TRACK TB reports that “*high level engagement of this issue has not yielded a satisfactory response from NMS*” (MSH 2014a, p.17). Additionally, there have been no effective equipment maintenance mechanisms, in particular district-level service contracts, for lab equipment (including microscopes and GeneXpert) which has led to prolonged delays in service provision (MSH 2014a; MSH 2015a).

These issues were also raised repeatedly in interviews not only by central level stakeholders, but by facility workers from Health Centre IIs on up. TRACK TB, like other implementing partners, has attempted to remedy this situation with provision of buffer stocks and quasi-formal stock transfer from overstocked to under-stocked facilities. In Project Year 2, it seconded a Commodity Security Officer to the NTLP to improve flow of information, as well as to ensure continuous communication with MDR TB sites and Regional TB Leprosy Supervisors/District TB Leprosy Supervisors and to prompt facilities to place timely orders (MSH 2014a). Additionally, the NTLP and its partners have sought

procurement through the Stop TB Partnership's Global Drug Facility (GDF) (for Levofloxacin in particular), so as to help harmonize GDF and National Medical Stores procurement plans through regular quarterly meetings and to better monitor how National Medical Stores handles GDF procured shipments (MSH 2014a). However, these are not permanent solutions but rather a means of functioning in the context of an inefficient and dysfunctional national supply chain system. The national system continues to remain weak.

#### *6c: Service Delivery*

Inefficiencies and systems barriers in service delivery also impeded TRACK TB's implementation. Patient volume especially at lower level health facilities and at Mulago meant that patient-centered care, while the goal, was often not achievable in practice (MSH 2014a). Continuous Quality Improvement and data-related activities were often seen as adding additional workload to health workers with already busy schedules so, while valued, Quality Improvement was not necessarily "owned" by facilities (MSH 2014a). Fee-for-service within a number of labs, especially within the private sector, meant that some presumptive TB patients were lost due to being unable to afford sputum examination (MSH 2013a; MSH 2014a). Problems with intra- and inter-facility tracking of presumptive TB patients between TB clinics, ART clinics, and other departments within health facilities also contributed to a loss of presumptive TB patients during the initial years of the project (MSH 2014a). The implementing partner-supported hub system used for transferring sputum samples, as well as the TB Specimen Referral System via the postal service - while ideally the best possible means of transporting sputum from lower level facilities - did not always work efficiently and was dependent on both hub riders and back up riders being in place, and fuel for the motorcycles being available (MSH 2014a).

TRACK TB's implementation modalities have sought, from the beginning, to overcome some of these barriers. Home-based care, community linkage facilitators, and private sector engagement have been used as a means of reducing patient volume at some wards. TB/HIV and other integrative activities have been implemented to support case finding at multiple facility entry points. Meanwhile, TRACK TB actively facilitates hub riders at *directly* supported facilities, supports data harmonization exercises to improve patient tracking, and has introduced e-Registers for MDR TB patients to improve lab service delivery and patient information management.

#### *6d: Leadership and Coordination*

TRACK TB also encountered numerous bottlenecks in operations, governance, and coordination at the central level. Most notably, Ministry of Health procurement division bottlenecks mean that Global Fund financing for food (in the form of food vouchers) for MDR-patients has been delayed for over three years, alongside financing for critical laboratory investigations (thyroid function) (MSH 2013a; MSH 2014a; MSH 2015a; Interviews with 12\_KAM\_TRACK\_27.5.16, 25\_KAM\_DON\_30.5.16, 19\_KAM\_CGOV\_27.5.16, 20\_KAM\_CGOV\_27.5.16). This has impeded TRACK TB's *IR 3: Implementation of Quality Program for the Management of MDR*, which requires MDR patients to have access to food to support treatment adherence, as well as *IR 1: Enhanced NTLP Leadership and Technical Capacity*, which prioritizes building NTLP capacity to implement

Global Fund-funded activities. NTLP's inability to absorb Global Fund financing due to these procedural and operational barriers had a negative overall effect on the program, as other development partners were not flexible enough to reallocate budgets toward something that was already covered under an existing financing mechanism (GoU 2016a, p.iv). Elsewhere, Ministry of Health Infrastructure Division bottlenecks held up key infrastructure activities such as remodeling the central unit and various hospital MDR wards (MSH 2013a). TRACK TB participates on a steering committee to advocate at ministerial level for Global Fund financing to be released. However, even if Global Fund financing for food is eventually discharged, it does not solve the problem of overall inefficiencies in procurement and other Ministry of Health systems, nor does it improve general responsiveness by the Ministry of Health to TB issues in the country.

Lastly, coordination continued to be a problem over the duration of TRACK TB. The NTLP central unit had competing priorities throughout, including ensuring the completion of the Global Fund Phase II Proposal, the National TB Prevalence Survey, the most recent National Strategic Plan, and other key program activities. This affected the NTLP's ability to participate fully in TRACK TB-supported SPARS and joint supervision activities promoting prioritization of interventions and harmonization of partners, as well as – at earlier stages of the project - MDR TB activities (MSH 2013a; MSH 2014a). Additionally, there were ongoing issues related to coordinating implementing partners in planning priority interventions, and in achieving buy in and engagement of the NTLP in partner-supported activities. According to TRACK TB:

*Consensus is often not reached on a number of important issues and there is difficulty in establishing priority interventions, for instance, the dissemination of guidelines, implementation of TB/HIV collaborative activities, GeneXpert implementation, etc. (MSH. 2015a. TRACK TB Project Year 3 Annual Report, p.37)*

This points not only to issues with NTLP buy-in, but also to long-standing concerns about the culture of technical assistance in Uganda and the degree to which central government feels it “owns” partner-supported activities – even when the activities are aimed at strengthening the capacity of government structures. With TRACK TB, there was a sense by some at the central unit that the NTLP had lost control over what was happening within their own department:

*For us, we expected much more support at the national level and this didn't happen. They read the document about what was to happen and for the first few years it did, then the context of implementation changed. The plan for the first two years was different than the next two years. They had a strong component of NTLP leadership which got lost. Partner coordination was weak. We lost the grip on the partnership that we had. We had to struggle to have a grip on USAID and other partners. 76\_KAM\_CGOV\_10.6.16*

This led to a divergence in perspectives between central level recipients and TRACK TB itself, which saw as one of its key mandates and primary achievements the improvement of coordination structures and the strengthening of government processes. Indeed, as outlined in Question 4, TRACK TB *did* bring critical innovations to the NTLP to improve coordination, planning, and functionality. The question, however, is how these achievements will be sustained if some stakeholders within the NTLP continue to see activities as externally-driven.

\*\*\*

*Question 7: How did TRACK TB support implementation/operationalization of TB Infection Control (IC) measures/guidelines in the health facilities and workplace?*

Nosocomial transmission of TB, especially from unrecognized TB patients to health workers, patients, and health facility visitors, is still a serious barrier to effective TB control globally (Nardell, 2010; Bates et al 2012; Nardell, 2016), and especially in sub-Saharan Africa (Alonso-Echanove et al 2001; Kassim et al 2000; Joshi et al 2006; O'Donnell et al. 2010). WHO cites infection control as one of the sub-components of the updated End TB Strategy, one of "Three I's for TB/HIV" [Intensified case finding (ICF), Infection Control (IC) and Isoniazid Preventive Therapy (IPT)], and one of the twelve Collaborative TB/HIV activities that should be in place to reduce TB morbidity and mortality among people living with HIV/AIDS (WHO 2004; WHO 2012; WHO 2014).

### Infection Control: Key Activities

- Remodeling of MDR TB facilities
- Provision of tents to serve as waiting areas/separation points
- Providing N95 respirators and surgical masks
- Training health workers on infection control
- Quality Improvement (QI) supervisions and mentorships of facility health workers
- Intensified case finding (ICF) approach
- CLF training for outreach to patients' families
- Facilitation of ambulatory care

| No. | Activity                                                                   | Responsibility                         | Duration  |
|-----|----------------------------------------------------------------------------|----------------------------------------|-----------|
| 1   | Educate patients about TB transmission and control                         | TB focal person                        | Everyday  |
| 2   | Assess all patients for TB using Intensified TB Case finding form          | On duty nurse                          | Everyday  |
| 3   | Separate presumptive TB patients in a separate waiting area                | Triage nurse                           | Everyday  |
| 4   | Provide face masks to all patients with presumptive TB                     | Triage nurse                           | Everyday  |
| 5   | Provide faster health services to patients with presumptive TB             | Triage nurse                           | Everyday  |
| 6   | Provide positive TB results immediately to clinician to initiate treatment | Laboratory in-charge                   | Everyday  |
| 7   | Initiate TB treatment immediately upon TB diagnosis                        | Clinician                              | Everyday  |
| 8   | Provide respirators to all medical workers in high risk wards              | Facility in-charge                     | Bi-weekly |
| 9   | Open windows and doors at all times                                        | Ward in-charge and TB focal person     | Everyday  |
| 10  | Display IEC materials on TB transmission control & cough etiquette         | Facility in-charge and TB focal person | Everyday  |

Adapted from the Uganda National Guidelines for TB infection control in Health Care facilities, congregate settings and Households

**Facility Plan for TB Infection Control, Kinoni HC IV**

In Uganda, in spite of the presence and implementation of TB infection control guidelines since 2006, TB infection control at the facility level has remained sub-optimal (GoU 2015a). Buregyeya et al (2013), for example, found that among 51 health facilities in Wakiso and Mukono Districts, only 16 had TB infection control plans in place.

Only five were screening patients for cough, and only two were providing masks to coughers. Waiting room ventilation was a problem in 22 facilities and no facility possessed N95 respirators. A similar situation was found in the 42 Kampala Capital City Authority (KCCA) health facilities studied during the 2012 TRACK TB baseline assessment (See Table 9). Only 50% of facilities regularly provided masks and/or tissues to patients presumed to have TB, 10% had stand-alone infection committees, 17% had TB infection control plans, and 67% had a designated area away from health workers and other patients for sputum production (Table 9) (MSH 2012b).

**Table 9: TB Infection Control implementation in 42 KCCA health facilities**

| Strategy                                                           | N=42 | %   |
|--------------------------------------------------------------------|------|-----|
| Infection control management committee                             | 17   | 40  |
| Stand-alone infection control committee                            | 4    | 10  |
| No infection control committee                                     | 21   | 50  |
| Availability of TB infection control focal person                  | 30   | 71  |
| TB infection control plan exists for the facility                  | 7    | 17  |
| Windows in out-patient department (OPD) fully open                 | 42   | 100 |
| Coughing patients are separated or given priority                  | 42   | 100 |
| Patients suspected of having TB are given masks and tissues        | 21   | 50  |
| Designated area away from patients and staff for sputum production | 28   | 67  |

Source: MSH. 2012. *TRACK TB Baseline Assessment*. Kampala: MSH

This situation is echoed throughout the country. The NTLP *Annual Report for 2014/2015*, states that, out of 72 health facilities supervised that year by the NTLP, only 39 provided information on TB infection control and only 23 were implementing infection control practices appropriately. Low TB case finding added to infection control challenges: out of 38,677,709 patients reported as “new outpatient attendees” in 2014-15, only 0.5% of them were identified as presumptive TB cases. Health workers were not being routinely evaluated for TB and there was an irregular supply of TB infection control commodities, inadequate number of fit testing equipment, and inappropriate facility design. Not surprisingly, 56 health workers were documented to have developed TB (including one with MDR TB) during the year (GoU 2015a, p. 10).

The WHO TB Infection Control Framework provides guidance on planning, implementing, and scaling-up TB infection control activities at country, facility, and community levels. The NTLP and Ministry of Health developed the country’s TB infection control guidelines based on the WHO guidelines and implementation framework. The 2016 Draft NTLP TB Manual and TB Infection Control Guidelines list four recommended levels of TB infection control measures at health facilities. First, managerial activities include identifying and strengthening TB infection control coordinating teams, carrying out facility assessment of space and infrastructure needs to inform and develop time bound and budgeted TB infection control plans, creating policies and procedures for effective implementation and monitoring of infection control measures, carrying out surveillance of TB and HIV in health care workers, and providing ART and isoniazid preventative therapy (IPT) to HIV positive staff and redeploying them to lower risk departments. Administrative controls prevent the release of droplet nuclei into the air so as to reduce the exposure of health workers, patients, and visitors to TB. This includes prompt identification and isolation in a well-ventilated space of TB (and presumptive TB) patients, fast-tracking of both sputum for lab tests and TB patients for initiation of treatment, educating TB patients on cough hygiene, providing face masks and tissues to coughers, setting up a coughers’ corner, following proper sputum disposal practices, limiting bed distances in TB risk areas, and designating a staff member as infection control focal point. Environmental controls reduce concentration of droplet nuclei in the air by ensuring sufficient air exchange via various mechanical and natural ventilation, filtration, irradiation, and fans, and controlling the direction of airflow based on available and appropriate technology and resources. Lastly, personal protective measures should be taken

to protect individuals from releasing or inhaling the droplet nuclei, including providing and fitting health workers in TB wards with N95 masks, and giving surgical masks to diagnosed and presumptive TB patients (GoU 2016c).

TRACK TB sought to build infection control capacity and promote best practices in these areas in *directly* and *indirectly* supported facility sites so as to prevent nosocomial transmission of both susceptible and MDR TB. Nevertheless, the assessment team found a number of weaknesses in existing infection control procedures at both targeted MDR sites and urban DOTS facilities. To assess implementation of TB infection control at supported health facilities, the team collected both qualitative and quantitative data through observation, checklists, key informant interviews, and focus group discussions.

Of the ten health facilities assessed, only 20% had signage for cough etiquette present in the clinic, 30% had supplies for coughing patients (tissues, cloths, masks, and trash bins), 40% had trained staff on proper fit of respirators, and 60% monitored natural and/or mechanical airflow daily. Facilities did better in other areas: 70% separated coughing patients and “fast tracked” them to caregivers, as well as had a written TB infection control plan (although the majority of these plans were pre-drawn and distributed by the TRACK TB project), N95/FFP2 respirators, infection control-trained staff, and a cough monitor who provided cough etiquette guidance and assisted in triage. Additionally, 80% of facilities had a designated area for sputum collection away from other health workers and patients (Table 10).

**Table 10: Implementation of TB Infection Control at Assessment Facilities**

| <b>TB Infection Control Best Practices (N=10)</b>                                       | <b>No.</b> | <b>%</b> |
|-----------------------------------------------------------------------------------------|------------|----------|
| A written infection control plan                                                        | 7          | 70%      |
| TB infection control training for all staff                                             | 7          | 70%      |
| Patients routinely asked about cough upon entering facility                             | 7          | 70%      |
| A “Cough Monitor” gives cough etiquette guidance and assists with triage                | 7          | 70%      |
| Signage for cough etiquette is present in the clinic                                    | 2          | 20%      |
| Sputum samples are collected in a designated area and away from others                  | 8          | 80%      |
| Patients that are coughing are separated from others and “fast tracked” to caregiver    | 7          | 70%      |
| Natural and/or mechanical air flow is monitored daily by staff                          | 6          | 60%      |
| N-95 or FFP2 respirators are readily available for staff                                | 7          | 70%      |
| Staff trained on proper fit of respirators                                              | 4          | 40%      |
| Supplies are available for coughing patients (tissues, cloths, masks, trash bins, etc.) | 3          | 30%      |

Source: TRACK TB Assessment Primary Data (27 May – 1 June, 2016)

Thus, TB infection control was not uniformly implemented and implementation was often sub-optimal. TRACK TB pre-drawn TB infection control plans had not been customized based on specific facility assessments, and some staff were not trained at all, especially at *indirectly* supported MDR TB follow up facilities, nor were TB infection control activities always implemented in sites providing integrated TB/HIV *One Stop Shop* services. There was

no evidence that surveillance of TB and HIV among health workers had been conducted at assessment sites. Moreover, space to permit effective patient separation at all points of care was a major challenge due to high patient volumes. TB infection control was also less well observed at *indirectly* compared to *directly* supported sites, and very minimal or nonexistent at *indirectly* supported MDR follow up facilities.

While infection control was not necessarily being observed consistently across all facilities, there were indications from stakeholders that they understood the importance of infection control. At one hospital that was not operating a *One Stop Shop*, TB ward nurses walked down to the ART clinic to pick up medicines for their TB/HIV patients so as to ensure non-TB HIV patients would not be exposed. Community linkage facilitators in interviews emphasized that educating patients and their family members on home-based infection control was part of their duties. In many Kampala Capital City Authority (KCCA) facilities and hospitals operating weekly or monthly TB clinics, TB patients were observed to be wearing masks. Nevertheless, it is clear that TB infection control still has a long way to go, in spite of TRACK TB's best efforts.

*Infection control is not well observed. We don't have those masks we are supposed to use. Those respirators, we don't have them. NMS or projects should bring but they don't. 48\_KAM\_HOSP\_31.5.16*

*[The private hospital I worked at] is far ahead of the government hospital. They know how to handle patients. They take susceptible patients and make sure they are in a separate cubicle. They keep new and old patients separate. Infection control is high. The new patients are at the back of the ward, and the soon to be discharged are moved forward. The sputum cups are washed with Jik. Here at [name of RRH], susceptible TB patients on initial and continuation phases of treatment are combined, and new with previously treated. 6\_GUL\_HOSP\_25.5.16*

Other examples from Uganda demonstrate that adequate TB infection control can be implemented successfully in resource limited settings provided there is leadership supporting change. For example, Manafwa District in Eastern Uganda reported 125 TB cases in 2008/2009. With support from the Union/TB CAP, the district conducted a needs assessment showing most patients, attendants, and staff to be at high risk of being exposed to TB infection at health facilities. Patients, including TB suspects, mingled freely in waiting areas, ventilation in consulting rooms and laboratories was poor, most of the staff were not aware of recommended TB infection control measures, and TB suspects waited for long hours in queues with other patients. Based on this finding, health workers at 105 facilities in Manafwa and 11 other districts were trained in all aspects of TB infection control over the course of one year. Healthcare facilities put in place interventions such as triage, moved TB suspects to the front of the line, created separate waiting areas, appointed one staff member to ensure that windows were opened at the start of each day's activities, assisted health facilities to develop TB infection control plans, created radio programs to enhance community awareness, and renovated laboratories in order to improve ventilation. At the end of this training, a review of TB infection control measures showed 70% of targeted facilities had TB infection control plans, 95% had a TB infection control officer, 85% were separating coughers, 81% were conducting health education on cough etiquette, and 90% were using the intensified case finding (ICF) tools for TB assessment of people living with HIV in the facilities (TBTCA 2009). It may be worth identifying the similarities and differences between this particular intervention and TRACK TB, as well as assessing whether or not the progress made by the Manafwa project was sustained over time.

*Question 8: To what extent are TRACK TB's interventions of TB/HIV service delivery in Uganda sustainable?*

Within the assessment's Scope of Work, sustainability for TRACK TB was defined as:

1. Embedding implementation and reporting structures within currently existing ones at national, district, and community levels
2. Working with existing community-based organizations (CBOs), networks, and groups to improve TB services
3. Building local capacity to plan, design, implement, monitor and maintain TB, TB/HIV, and MDR TB activities through technical and organizational capacity building at the NTLP
4. Progressively increasing the responsibility for the planning, funding, and implementing of program activities by the NTLP. (Source: TRACK TB Assessment Scope of Work).

This section focuses on sustainability in these four areas based on TRACK TB's implementation approach to TB and TB/HIV service delivery.

*8a: Embedding implementation and reporting structures within currently existing ones*

TRACK TB worked to strengthen existing implementing and reporting structures, as well as to facilitate the review and development of new structures (MSH 2013a; MSH 2014a; MSH 2015a). With the exception of the MOST for TB tool and SPARS (discussed in Question 4), TRACK TB worked with existing structures already embedded within the NTLP and Ministry of Health system.

#### Existing Implementation and Reporting Structures

- **Meetings:** e.g. National Coordination Committee meetings; biweekly NTLP coordination meetings; quarterly performance review meetings; annual "MOST for TB tool" workshops; quarterly SPARS activities; routine Data Quality Assurance (DQA) assessments at facility level
- **Activities:** e.g. facilitating the completion and dissemination of quarterly and annual district/division and NTLP reports; NTLP quarterly online reporting to the District Health Information System (DHIS-2); integrating "3 I's" into routine reporting; quarterly TB stock reports
- **Tools:** e.g. disseminating existing NTLP data/reporting templates, including district and facility registers, to both health facilities and divisions; supporting the development of MDR analysis template; supporting the development of an implementing partner reporting template

On one hand, embedding activities within existing structures suggests that many of TRACK TB's activities are sustainable, since many of these implementation and reporting structures supported by TRACK TB pre-date it. The existence of these structures, however, has not necessarily translated into sustainable implementation. TRACK TB and other partners facilitate meetings, activities, and reporting tools with the assumption that, if these mechanisms were not facilitated, meetings would not happen and tools would not be distributed. This suggests that these sorts of interventions – while meant to promote sustainability – are not sustainable in the current environment. Indeed, TRACK TB is

intervening in this area *precisely* because of problems with sustainability. The sustainability issue extends to the utilization of the MOST for TB and SPARS tools, the high level buy-in for which was already queried in Question 4.

*8b: Working with existing community-based organizations, networks, and groups to improve TB services*

TRACK TB worked through existing organizations, networks, and groups, although the extent to which it worked with community-based organizations is more difficult to assess, as – with the exception of the sub-prime partner AIC, which supports TRACK-TB with recruitment and management of community linkage facilitators – the number of community-based organizations that see TB (as opposed to primarily HIV) as their mandate is not numerous. Still, TRACK TB worked with and through the main TB stakeholders in the country, most notably the Uganda Stop TB Partnership (made up of more than 45 member organizations) and regional implementing partners, as well as some important NGO providers such as TASO, SAS, and faith-based facilities via urban DOTS.

Elsewhere, TRACK TB built networks (e.g. MDR site facility teams linked to follow up facilities, communities, treatment supporters, and patients, and urban DOTS teams made up of initiating facilities, community linkage facilitators, communities, and patients). They also supported regional supervisory teams made up of groups of regional stakeholders, and helped to create the Kampala City TB Task Force (KCTF), a partnership established by the Kampala Capital City Authority (KCCA) to plan and implement a multisectoral response to TB in Kampala. Many of the nodes within these networks represent people, positions, and organizations already in place within Uganda's health system. There are, for example, already TB wards/departments made up of specialized health workers in hospitals and in many high volume health centers, especially in municipalities. Community structures, like Village Health Teams, exist, even if only on paper, and treatment supporters can be found among family members or neighbors.

As with embedded structures, TRACK TB's approach to existing organizations, networks, and groups is sustainable in theory. Yet – as with coordination, implementation and reporting structures – some of these groups and networks (e.g. regional performance monitoring teams, MDR site facility teams, Uganda Stop TB Partnership) have little capacity to function independently of external facilitation. The Uganda Stop TB Partnership, for example, has suffered in the past from a lack of financing for its Secretariat leading to, what the Joint External Monitoring Mission Review called, a "*loss of momentum*" among partners (GoU 2013, p. 21). Others, like community linkage facilitators, exist outside of the government system and, for now, must remain a service contracted out to an NGO. Without high level advocacy ensuring that the government takes them into public service, community linkage facilitators are not sustainable. Still others, like health facility in-charges, are often overworked, underpaid, and have extremely low morale. Will their TB control efforts be sustained without incentives such as airtime, transport, and refreshment, let alone the salary benefits that come with secondment? Likewise, the Kampala City TB Task Force, while initially functional, was negatively affected by the re-zoning of Kampala's municipality (Interview with 27\_KAM\_LG\_1.6.16). These wider systems bottlenecks have undermined the sustainability that would otherwise result from working with local community-based organizations, networks, and groups.

*8c: Building local (i.e. NTLP) capacity to plan, design, implement, and monitor TB, TB/HIV, and MDR/TB activities*

The steps taken by TRACK TB to build NTLP capacity to design, implement, and monitor TB activities in Uganda were described in Question 4, along with the issue of their sustainability. In summary, TRACK TB's approach was to build those structures that would ensure capacity, including enabling coordination and supervisory activities to take place and introducing tools such as MOST for TB and SPARS to aid the NTLP in planning quality assured, performance-focused TB control activities. As Question 4 suggests, there remains the question of whether or not NTLP buy-in exists to continue to implement these structures in the absence of external facilitation.

*8d: Increasing NTLP responsibility for planning, funding, and implementing the program's activities*

The NTLP, thus far, has not taken on either the funding of TRACK TB activities or of seconded staff (although one TRACK TB seconded staff member, the data specialist, is now having his salary met by Global Fund financing). There are a number of reasons for this. First, almost all NTLP funding, with the exception of staff salaries, comes from the Global Fund. As has already been described in Question 2 on coordination, there are programmatic obstacles that prevent the reallocation of funding from an already allocated grant source to activities funded from another source (GoU 2016a, p.21). The current culture of development partner coordination makes it difficult for the NTLP to take up the funding of TRACK TB activities since the NTLP has little flexibility or independence in how it spends its money. Moreover, with low levels of political prioritization of both the NTLP and the health sector in general, the NTLP is unlikely to be able to fund activities from what little core funding it has. For now, the NTLP is almost entirely donor dependent, a state of affairs that national program staff find extremely frustrating.

Second, as described earlier, a number of the higher level planning and implementing activities that TRACK TB supports are *already* NTLP responsibilities. Supervisory activities, the creation of guidelines and standard operating procedures, advocacy, and coordination: the NTLP was tasked with these activities long before TRACK TB began its work. However, due to a lack of both political prioritization and human and financial resources, NTLP has been unable to fulfill many of these responsibilities. Indeed, TRACK TB helped *enabled* the NTLP to fulfill its responsibilities. For this reason, the definition of "sustainability" as a progressive transfer of responsibility to the national program – at least in the case of TRACK TB - is not entirely applicable.

Finally, many – if not most – of the service delivery activities implemented by TRACK TB were not actually run through the NTLP at all, but through health facilities, implementing partners, and regional coordination structures. While the NTLP plays a supervisory role in supporting regions, districts, and facilities in developing their TB control program, the mandate for implementation – in a decentralized health system - should be local government. This speaks to the larger issue of the role of the NTLP and whether it should be conceived of as an implementation body or a multisectoral coordination body. It also redirects the issue of sustainability downstream, to the implementation structures closest to the patients: the district, the facility, and the community. Neither TRACK TB nor the NTLP

can ensure the sustainability of local government structures, nor will TRACK TB's activities, once transferred to the NTLP, be sustainable if those local government structures remain weak. For this reason, TRACK TB's efforts to strengthen Kampala Capital City Authority (KCCA) have been important, even if not entirely optimal. KCCA implements TB service delivery. The question, then, should not only be: Is the NTLP able to sustain TRACK TB activities? It should also be: Will local government be able to sustain TRACK TB activities? This answer requires a review of decentralized service provision.

#### *8e: Sustainable TB service delivery*

During the assessment, a major theme of both key informant interviews and focus group discussions was that sustainable TB service delivery – whether supported by TRACK TB or by other partners – is often related to factors above and beyond the control of any particular technical program or intervention. For example, in order to roll out national TB/HIV collaborative efforts, TRACK TB has supported the implementation of the integrated TB/HIV *One Stop Shop* model in which TB and TB/HIV care is offered under one roof until an HIV patient is free of TB and can be referred back to the ART clinic. *One Stop Shop* protects non-TB HIV patients against nosocomial infection by serving them at the facility's ART clinic, while TB/HIV co-infected patients are nevertheless able to receive both ART and TB services at a single TB care point. *One Stop Shop* also involves extending co-trimoxazole preventative therapy (CPT), PMTCT, and other HIV-related services to TB/HIV co-infected patients.

At its simplest, *One Stop Shop* involves rearranging service delivery so that TB/HIV patients are sent directly to the TB care point rather than having to attend, receive drugs, and have their files kept at two separate clinics (i.e. one for ART and one for HIV). It should, therefore, be sustainable as it only involves reorganizing pre-existing facilities, health workers, and processes. However, there are number of implications for human resources, coordination structures, and supply chain management in doing so.

First, *One Stop Shop* requires, first, health workers affiliated with the TB clinic to have the capacity to manage HIV patients and ART and, second, ART clinic, out-patient department, and non-TB affiliated health workers to have the capacity to suspect and screen patients for TB, as well as follow proper TB infection control procedures. On-going continuous medical education, supervision, and peer-to-peer mentorship is needed for *all* health workers in ART, TB, infection control, data management, and a whole host of other skills, especially as nurses are frequently rotated in and out of departments. *One Stop Shop* also necessitates broader systems recognition and incentivization of specialized nurses and other health workers, and an investment in additional data specialists at the facility level. This, in turn, requires not just leadership skills and technical capacity, but also political will to be generated across multiple levels of the health system, from the Ministry of Health, to the NTLP, to the district/division, to the facility so that the necessary investments in human resources are made.

Secondly, *One Stop Shop* implies that when clients reach the shop, they will find medical commodities on the shelf. Without these commodities, there is no “shop.” Pervasive dysfunction of the national supply chain, as outlined in Question 2, serves as one of the biggest barriers to the sustainability of TB/HIV integrated service delivery, as TB/HIV

services depend on a consistent supply of anti-TB medicines, ART, co-trimoxazole preventative therapy (CPT), isoniazid preventative therapy (IPT), rapid diagnostic tests (RDTs) for HIV, reagents for laboratory tests, masks and respirators, sputum mugs, and other drugs and supplies. Ultimately, TRACK TB activities, achievements, and best practices – of which there have been many - will be difficult to sustain in the absence of high level advocacy, political commitment, and a strengthened overall national health system.

\*\*\*

## KEY MESSAGES: TRACK TB IMPLEMENTATION THEORY AND APPROACH

- A number of TRACK TB project assumptions were not specific, measureable, indicator-driven, or verifiable. Most of the assumptions represent, in themselves, significant barriers to sustaining both TRACK TB achievements and sustainable progress on TB control in Uganda.
- TRACK TB has contributed to leadership, technical capacity, and quality improvement at the NTLP, but sustainability is a major issue going forward as coordination, performance review, and planning (e.g. the MOST for TB tool) activities – while highly valued – are facilitated for now by external parties.
- Stakeholders highly value a number of TRACK TB's MDR and urban DOTS innovations, and these innovations should continue to be supported and scaled up as many have had measurable positive outcomes. At the same time, these innovations represent components of a package, not one-off innovations, and are also partly dependent on the broader health system. In some instances, TRACK TB was able to use implementation modalities to bypass emerging health systems bottlenecks, especially if these were at the facility-level. However, at the central level, systems bottlenecks were far more pervasive, disruptive, and harder to overcome, with political buy-in still not optimal.
- While *directly* supporting MDR sites with seconded staff has shown large cumulative gains, trend analysis may point to the possibility that the package itself has become as powerful as the placement of project-salaried human resources. However, different implementing partners should not be assumed to be equal in their capacity to address MDR. Previous experience with MDR should be gauged, learning curves accommodated and carefully tracked, and systems that play a role in successful outcomes supported.
- Enabling packages for MDR patients – in particular food - are essential and there needs to be long-term financing solutions - including multisectoral engagement of both public and private sector actors - for sustainable provision of social welfare.
- In spite of supporting best practices in TB control, infection control remains sub-optimal in both *directly*- and *indirectly*-supported facilities visited during the assessment. While some of these weaknesses are due to inconsistently implemented TB infection control procedures, others point to systems-wide supply chain, human resources, and service delivery bottlenecks that cannot be sustainably addressed by only targeting the TB program silo.

- There are pervasive sustainability issues with interventions related to TB/HIV service delivery, many of which are systems-related and beyond not only the control of TRACK TB, but also the NTLP.

\*\*\*

## IV. LOOKING FORWARD

*Question 9: Based on new evidence on TB prevalence, which partnerships and relationships are most critical to control TB?*

Several key findings related to partnerships emerged from the TB prevalence survey. First, prevalence of TB in all forms was found to be much higher than previously estimated. Next, while confidence intervals were quite high across a number of population groups, TB was nevertheless found to be more prevalent among rural populations and people over the age of 65 than previously thought. TB prevalence was also found to be higher than expected in men compared to women. TB among HIV positive people was found to be lower than expected compared to HIV sero-negatives. Lastly, the survey indicated low levels of treatment seeking and screening for TB among patients with cough. These findings have a number of implications looking forward:

- Community-level partners – civil society organizations (CSOs), Village Health Teams (VHTs), community linkage facilitators – need be prioritized in order to better reach both rural and other disadvantaged communities (including older people who are more likely to face restrictions in mobility) via improved advocacy, communication, and social mobilization for community sensitization and active case finding.
- If TB is indeed becoming more prevalent in rural communities, then there needs to be a rethink of hospitals and Health Centre (HC) IVs as primary TB delivery partners. Primary health facilities (Health Centre IIs, IIIs) - and with these District Health Teams - need to be engaged to improve case finding and provision of DOT for both susceptible and MDR cases in rural areas. Regional performance monitoring teams as supervisory structures are also important here.
- If prevalence of TB among men is really as large as the survey suggests, the gender gap also needs to be better understood. If TB is clustering around, for example, traditional categories of male employment or recreation (taxi parks, mining, day laborers) then multisectoral partnerships need to be made with private sector actors and associations affiliated with these occupational groups.
- Finally, the strategy of channeling TB control through partners with primarily an HIV mandate may need to be rethought, either by bringing in new partners willing to work on TB-only (not TB/HIV) activities, or by helping HIV partners actively rebrand/restructure themselves to incorporate TB. Better yet, partners should be engaged to improve the diagnostic cascade for TB at all entry points into the health system, not just via HIV. This may mean reaching out to non-traditional TB partners,

such as those working in maternal health, child health, or chronic disease (such as diabetes).

TRACK TB itself also prioritized multiple partners. With regard to leadership and capacity building at the NTLP, key partners have been the National TB Reference Laboratory (NTRL), Global Fund, Uganda Stop TB Partnership, German Leprosy Relief Association (GLRA), Kampala Capital City Authority (KCCA), Regional/Zonal TB and Leprosy Supervisors (RTLS), the National AIDS Control Program (ACP), the Ministry of Health's Resource Center, the Union, and WHO. In the case of MDR TB, it included partnerships with regional implementing partners (e.g. USAID-funded regional programs such as SUSTAIN, RHITES, MJAP, ASSIST and, in the past, STAR-SW and NU-HITES), regional performance monitoring teams, KCCA, public and private sector hospitals and follow-up facility staff, Village Health Teams, and patients themselves, as well as with Curry International Tuberculosis Center (CITC) from San Francisco. In the case of urban DOTS and TB/HIV integration, it included the AIDS Information Center (AIC), KCCA, district and divisional health teams (District TB Leprosy Supervisors/District Lab Focal Persons/biostatisticians), and facility staff at public, Private Not-for-Profit (both NGO and faith-based), and Private For-Profit facilities. Additionally, existing partner coordinating bodies were strengthened (e.g. the National Coordinating Committee for TB, the PMDT steering committees, and various performance review structures) and the Kampala City TB Task Force (KCTF) was established. These partnerships were highlighted repeatedly by respondents in the key informant interviews, many of who valued the opportunity for coordination and information sharing. The findings from the TRACK TB assessment – reviewed in light of the TB prevalence survey - also have a number of implications for partnerships looking forward.

- Since implementing partners play a major role in supporting TB/HIV activities at lower level facilities - and since the survey has suggested that primary- and community-level stakeholders are key partners if TB prevalence is higher in rural and older populations than previously thought - improved coordination with implementing partners working at district-level and in lower level health facilities (as opposed to regional referral hospitals) is essential. In particular, making sure that these partners have a stronger non-HIV TB mandate, and a broader health systems focus is critical moving forward.
- AIC has been an instrumental sub-prime partner in ensuring progress on susceptible TB in urban Kampala, and continued partnership with both AIC and other civil society organizations with proven track records in community engagement and service linkage is also essential.
- Program documents, key informant interviews, and focus group discussions have suggested that a) political prioritization is a major barrier to sustainable TB control; b) there are numerous barriers to treatment seeking, including low levels of awareness and high stigma at both community and facility level. Therefore, the primary TB advocacy body in the country - the Uganda Stop TB Partnership – should be strengthened and engaged more effectively for both downstream advocacy to communities, and upstream advocacy to key political actors looking forward.

- Evidence shows that, in Kampala, most people seek their health care in the private sector. Scale up of private sector involvement in TB control is necessary, as are partnerships with Private Not-for-Profit and Private For-Profit service providers, as well as with the umbrella organizations and professional bodies that represent them.
- Both the findings of the prevalence survey and of the TRACK TB assessment have served to highlight the social dimensions of the TB epidemic and make the case that lessons learned from multisectoral efforts to control HIV should be extended to TB. A process for multisectoral engagement should be mapped, and partnerships established with stakeholders outside the health sector.
- Partnership coordination bodies are valued by stakeholders. Building their capacity is critical to TB control looking forward.

\*\*\*

*Question 10: What are the best practices from TRACK TB implementation that should be consolidated to improve TB/HIV service delivery in Uganda?*

During key informant interviews and focus group discussions, respondents were asked to mention what they considered to be promising approaches and best practices in the delivery of TB and TB/HIV services. Promising approaches and best practices that were mentioned multiple times are included here. While MDR TB is a specific program area, in instances in which stakeholders emphasized particularly valued approaches to MDR TB (e.g. cohort review, enabling packages), or in which the approach taken with MDR TB overlapped with best practices in TB service delivery (e.g. community linkage), the TRACK TB MDR model will also be discussed.

The promising approaches described here may not necessarily be associated at present with significant measurable outcomes, either because they have only recently been launched (isoniazid preventative therapy (IPT) roll out) or because they have had implementation challenges and/or are partly dependent on broader systems strengthening (in and outside of the health sector) that has not yet materialized. Where we can refer to measurable outcomes (most of which are presented elsewhere in the assessment), we do. Otherwise, we briefly describe how these approaches can contribute to TB control should the context of implementation improve, as well as why stakeholders view them as valuable.

### *Best Practice 1: Integrated TB/HIV “One Stop Shop” Service Delivery*

HIV treatment sites globally report low and variable implementation of TB intensified case finding (ICF), isoniazid preventative therapy (IPT), infection control (IC), and TB/HIV integrated service delivery (Charles et al 2016). Nevertheless, evidence from a number of countries suggests that integrated service provision can increase uptake, reduce service delay and, in some instances, improve TB outcomes (Kerschberger et al 2012; Owiti et al 2015; Davey et al 2016). Integrated TB/HIV services have long had global support from key TB partners such as USAID, Global Fund, and MSF. One study from the ART clinic of the Infectious Disease Institute (IDI) in Kampala demonstrated that integration of TB and HIV led to TB treatment, cure, or completion increasing from 62% to 68%, death or default

decreasing from 33% to 25%, patients started on ART during TB treatment increasing from 78% to 94%, and patients initiated during intensive phase increasing from 23% to 60% (Hermans et al 2012). Integrated TB/HIV service delivery has since been supported by the Government of Uganda and a number of partners, including TRACK TB and IDI.

For those facilities implementing *One Stop Shop*, this has proven a critical intervention enabling TB patients to receive all their ART and anti-TB medicines, HIV and TB lab work, and other services in one place, thereby improving efficiency of service

delivery and sparing patients the need to return to the facility on a different day for ART clinic. It also gives patients a chance to meet other patients who are co-infected, and helps support infection control by keeping patients with TB away from immuno-compromised non-TB HIV patients at the ART clinic. Once TB treatment is completed, the HIV patient can be internally referred back to the ART clinic.

*They get everything from here. It's a One Stop Centre. For HIV positives, we do give ART at this same point and anti-TBs, and if there is an ante-natal clinic (ANC) mother she will come here. Early infant diagnosis (EID) too. All will come here if they have TB. 44\_KAM\_HF\_31.5.16*

*The One Stop model has been very innovative and sustainable. The more specialized you become, the more you have health workers who can focus. 22\_KAM\_TECH\_30.5.16*

*We learnt that TB/HIV services must be offered under one roof. When TB treatment is completed, they should be transferred to ART clinic for continuity of care. 74\_KAM\_HF\_1.6.16*

## **Best Practice 2: Community Linkage**

As described in Question 5, the involvement of cadres of community health workers in DOTS has the potential to be both effective and cost-effective. The most recent Uganda-based study of the cost implications of managing DOTS in the community was carried out in 1998, and both the financing and broader health systems landscape has changed considerably since then, as have costs (Okello et al 2003). Furthermore, TRACK TB's DOTS approach for susceptible TB does not follow a traditional community-based DOTS model, but rather a mixed model involving a four-way relationship between lower level health facility staff, community linkage facilitators and/or Village Health Teams, treatment supporters (usually family members), and patients. With MDR TB, the model is again modified, as patients travel to lower level facilities near their homes on a daily basis to get injections and receive encouragement, reminders, and sometimes direct assistance from treatment supporters, community members, and health facility staff.

Nevertheless, both urban DOTS and MDR TB place strong emphasis on linking patients to treatment supporters in the home and to community linkage facilitators (whether AIC-employed community linkage facilitators in Kampala or Village Health Teams in the case of ambulatory MDR care), as well as to lower level health facilities close to patients' residences. In the case of MDR TB, a hospital-based MDR-Team formed a further link in this chain of care, as did regional and national managers and practitioners involved in the cohort review process. These links were critical not only for ensuring that the patient received their package of services, but also could be leveraged for reverse contract tracing, active case finding, and tracking down those patients lost to follow-up.

As Question 5 showed, there is indication that the MDR and urban DOTS models - which treat patients as close to home as possible while, at the same time, link them to teams across various levels of the health system – have had positive outcomes on TB and MDR TB indicators. Even without these outcomes, however, community linkage is a best practice in TB/HIV service delivery for three reasons. First, it places the patient and his or her needs at the center of care and treatment. Second, it strengthens chains of referral across the health system, from the community to the primary facility to the hospital to the higher-level program. Third, community linkage can be used to deliver sets of integrated activities, both for, and beyond, TB control.

### *Best Practice 3: Enabling Packages*

The socio-economic, cultural, and political barriers constraining patient access and adherence to TB treatment have long been described in the literature (Hudelson 1996; Farmer 1999; Ogden et al 1999; Hargreaves et al 2011; Chileshe & Bond 2010; Rasanathan et al 2011; Saidu et al 2014; Bishwajit et al. 2014). Elsewhere, food and other socio-economic enablers have been provided to patients - in both developed and resource-limited settings - to improve tolerance to medication, incentivize adherence, and provide a buffer to the economic shocks that occur within households when critically ill TB and MDR TB patients are unable to farm or work for a wage (Bock et al 2001; Filho 2009; Martins 2009; Jahnvi & Sudha 2010; Amo-Adjei & Awusabo-Asare 2013; Claros et al 2014; de Pee et al 2014). In the case of food assistance, a recent narrative review concludes that “food provision is not only a biological, but also a behavioural intervention, and...unresolved food insecurity can be an impediment to treatment adherence and consequently to good treatment outcomes” (de Pee et al 2014).

*We go to their homes and they ask ‘Musawo! Have you brought for me something?’ Remember: we tell them to adhere, and the drugs bring appetite. So the patients tell you, “I can’t take the drugs because I have no food to eat.” So we are also challenged.*

44\_KAM\_HF\_31.5.16

*When we go for contact tracing, they expect a lot from us. They assume we have money. They dodge treatment because of the feedings. So if they can be supported in terms of nutrition... [since] most of them don’t adhere because they cannot afford food. They earn so little, or they don’t earn at all.*

24\_KAM\_PIP\_31.5.16

*Since he is being supported, he is getting money for feeding. He was too weak to dig for a while but the food has helped. We also counseled him on drinking and his behaviour*

10\_GUL\_HF\_25.5.16

The NTLP’s National Strategic Plan states that a primary barrier to continuation of MDR TB treatment is that “social support in terms of transport and nutritional support is not given at present, making adherence to the long treatment even more difficult” (GoU 2015a, p. 51). Likewise, the NTLP Annual Report includes “inadequate provision of adherence enablers in the form of food and transport refund” as one of its eight challenges to TB control in Uganda, with provision of enabling mechanisms cited as a primary strategy going forward, especially in relation to programmatic management of MDR TB (PMDT) (GoU 2016a, p.14). In the meantime, the Joint External Monitoring Mission Review listed “socio-economic support to patients” as a critical strategic intervention for PMDT but noted that:

*Incentives or enablers to assist in overcoming socio-economic barriers to adherence were not available in most settings (except in limited partner supported cases). Treatment*

*success relies on appropriate regimens, which include nutritional support as a key part of treatment, as well as the means to support the patient in overcoming socio-economic barriers to adherence (enablers/incentives). Support for these issues is included in the national guidelines and operational guidance plans, but to date they are not fully supported with resources for implementation. Every effort should be made to find appropriate resources for basic key nutritional and socio-economic support (ex. transport costs) to aid treatment success and adherence. (GoU 2016, p.52)*

The issue with enabling packages was also raised repeatedly in the qualitative research, and has been something that many stakeholders believe has challenged TRACK TB's urban DOTS approach for drug susceptible TB, while simultaneously served to facilitate its MDR TB efforts in supported districts. It was highlighted in almost every key informant interview and focus group discussion with providers, as well as at national level with respect to the procurement barriers on Global Fund money earmarked for food purchases. While there will always be operational challenges to providing enabling packages to patients (e.g. Lutge et al 2014), they still represent a best practice in TB/HIV control.

#### **Best Practice 4: Intra-Facility Linkage**

Studies of TB treatment delay in Uganda demonstrate that a number of patients who might otherwise be classified as having presumptive TB are missed in both the private and the public health system, including the national referral hospital, Mulago (Kiwuwa et al 2005; Sendagire et al 2010; Kansiime et al 2013; Buregyeya et al 2014; Shete et al 2015). As Figure 12 (p. 44) showed, notification rates at facilities targeted by the TRACK TB assessment actually went down between 2011 (pre-TRACK TB) and 2014 (post-TRACK TB), yet the prevalence survey has indicated much higher prevalence rates of TB than expected. This suggests that those TRACK TB TB/HIV activities that improve health worker capacity to screen for TB at multiple entry points, especially at points in which patients are diagnosed with and treated for HIV, is critical. Improved case finding at the facility level also helps reduce opportunities for nosocomial infection as patients with cough are screened early, and presumptive TB patients can be immediately separated from non-infected patients.

Different training models exist, but only a few have been evaluated in the Uganda context. For example, Weaver et al (2012) compared Integrated Management of Infectious Disease Training versus on-site support, while Manabe et al (2015) looked at a bundled laboratory and on-site training intervention. This best practice, therefore, should be further refined in order to understand what type of training or continuous medical education is most effective and cost-effective for improving intra-facility linkage. Still, building health workers' capacity to suspect and diagnose TB in every department within the health facility should be a component of TB programming going forward.

#### **Best Practice 5: Quality Improvement (QI) Approaches**

Inadequate quality of care and poor responsiveness to patient preferences, concerns, and needs are cited in multiple studies as major barriers to access to TB services, adherence to treatment, and TB patient satisfaction in Uganda (Amuha et al 2009; Babikako et al 2011; Elbireer et al 2011; Weaver et al 2012; Buregyeya et al 2013; Cattamanchi et al 2015).

*I think...Quality Improvement will be the way of life in terms of service delivery at all levels....And that will be great, because we won't do things without evidence. You get to know why you are doing things, not just doing them routinely. The worst thing to do is to continue to parade as if everything is okay. But here you are able to provide automatic checks: whether we are moving, whether the changes we have introduced are worth it or not. I think everybody will be motivated. That's the way we are trying to move. 1\_KIT\_LG\_24.5.16*

Quality issues have also been seen as primary barriers to TB lab service delivery (Manabe et al 2014).

Quality Improvement (QI) has been central to TRACK TB's strategy both at the national level (as described in Question 4 on TRACK TB's contribution to NTLP leadership, technical capacity, and quality improvement) and within its work on MDR TB, urban DOTS and TB/HIV collaborative activities (described in Question 5). Quality Improvement activities implemented by TRACK TB include the roll out of tools such as

MOST for TB and SPARS at the central level, facilitation of support supervision and cohort review at central and regional levels, and support for training, supervision, and peer-to-peer mentorship at the facility level. TRACK TB also helped to facilitate External Quality Assessment (EQA) and Data Quality Assurance (DQA) for the laboratory and data systems respectively.

Quality Improvement approaches – *if full buy-in is achieved* – are sustainable mechanisms for ensuring improved quality program management and service provision. Elements of Quality Improvement were highlighted throughout the key informant interviews and focus group discussions at central, district, and facility levels as best practices by stakeholders (whether brought directly by TRACK TB or by other partners).

#### **Best Practice 6: Isoniazid Preventative Therapy (IPT) Roll Out**

Isoniazid preventative therapy only started to be implemented in Uganda during Project Year 3 of TRACK TB, although TRACK TB along with other partners played an integral role in NTLP's process of developing, printing, and disseminating guidelines and creating training curricula. TRACK TB facilitated training of 19 sites in anticipation of IPT roll out and, along with other partners, supported a quantification exercise in order to begin prioritizing sites for IPT implementation (MSH 2014a; MSH 2015a). IPT is a key component of WHO's "Three I's" strategy for TB/HIV, and while Uganda's roll out is not yet underway long enough to be fully assessed, it must nevertheless be highlighted as a best practice.

#### **Best Practice 7: Engaging the Private Sector**

The pathway to TB care in Uganda for many patients is via private sector facilities, both Private Not-For-Profit and Private For-Profit. Studies in Uganda have shown that TB is routinely missed in this sector, and patients with chronic cough are not being evaluated for TB during initial visits due to low capacity among private health providers to suspect TB, as well as due to an absence of TB diagnostic services at many private facilities

*Private sector is important because, for MDR patients, it is difficult for them to go in public for their injections. But there are costs associated with gloves, cotton, etc. You have to spend money to support these patients. In the end, it doesn't matter where they get care. How can we get a PPP by contracting out? How do you contract out? How do we make it attractive for the private sector to take on these patients? 27\_KAM\_LG\_1.6.16*

(Buregyeya et al 2014; Shete et al 2015).

TRACK TB has made engagement with the private sector a priority in its approach to urban DOTS roll out. This has included providing private providers with tools, training, and mentorship, helping them access drugs (as Private-For-Profits do not have access to the National Medical Stores), offering them seats at the table within the Kampala City TB Task Force, as well as lobbying them for a reduction of fees (especially for TB laboratory tests). There have been mixed outcomes, mainly because – as noted by some private providers (especially Private-For-Profits) – private facilities still have to struggle with accreditation and recognition by the Ministry of Health, as well as with a regressive tax climate that serves as a disincentive to partner with government - but these are systems barriers and do not diminish the need to engage the private sector.

### *Other Best Practices*

TRACK TB has strengthened a) the data system through facilitating the introduction of e-Registers, and b) health service delivery by strengthening infection control. Both of these approaches are covered in Question 13 and Question 7 respectively. While the assessment shows that the outcomes of these activities have been mixed, we highlight strengthening both data systems and infection control systems as best practices in TB control. First, the data system continues to be extremely weak, and stronger information systems and better evidence for decision-making were persistently highlighted by stakeholders and within program documents as critical for TB control looking forward. Infection control is – like isoniazid preventative therapy (IPT) and intensified case finding (ICF) – one of WHO’s “3 I’s” for TB/HIV control and an important element in preventing TB infection in both facility and home settings so must be included as a best practice, even if implementation remains a challenge.

\*\*\*

*Question 11: What key leverage points, strategies and tools are necessary for responding to the higher than previously estimated TB prevalence?*

As described in Question 2, the TB prevalence survey showed higher than expected general TB prevalence, and higher than expected prevalence among men, older people, and rural people. It also showed high levels of problematic treatment-seeking behaviour. This suggests several areas of emphasis looking forward:

1. Improved case finding to identify those TB cases in populations heretofore missed
2. Social mobilization and stigma reduction to reach these populations
3. Shifting the approach to TB in Uganda from a primarily medicalized one, to one that takes into account the social dimensions of disease given that that these populations have been more clearly delineated

### *Leverage points*

While TB in Uganda, like in other countries, is still predominantly an urban disease, and one that primarily affects adults in the prime of their lives, the prevalence survey pointed to far

higher prevalence among rural and older Ugandans than previously believed. Additionally, rural Uganda hosts a larger older population than urban areas (GoU 2011). Older people are less likely to be mobile, thus more likely to be primarily reached at household level. Targeting rural and older populations (which overlap) calls for leveraging existing linkages between districts, facilities, and communities. District Health Teams, Village Health Teams, and facility volunteers already carry out campaigns and community awareness-raising for HIV and other health problems. Leveraging community structures for community awareness raising, reverse contact tracing (using index cases that clearly identify “age over 55 years” and “living in a house with a TB patient” as a key risk combination), stigma reduction, and initiatives to improve health seeking behaviour by rural populations and the elderly is critical going forward. Secondly, there is already a wealth of experience within HIV programming to advise TB control programs on how to better target populations outside of the health sector. Existing knowledge on HIV multisectoral engagement can be leveraged to inform TB programming and reach populations not traditionally targeted for TB control.

## Strategies

### Health Technology Assessment (HTA)

To improve case finding, a review and costing of Uganda’s diagnostic arsenal (including GeneXpert and chest x-ray) would be useful. Health Technology Assessment of existing diagnostics and other technologies in light of the prevalence survey findings would help program managers to understand whether or not the country is leveraging the right mix of technologies toward intensified case finding (ICF) or whether a different mix should be used.

### Gender-Based Analysis (GBA or GBA+)

The finding that prevalence among men may be far higher than previously assumed suggests an urgent need for a Gender-Based Analysis (GBA or GBA+) of TB in order to understand the critical factors influencing the epidemic among men. It may be that HIV (which was far less prevalent among TB patients than previously thought) is less of a factor among men than among women (i.e. in the survey, slightly more female TB patients tested positive for HIV than men). Other factors, such as occupation, may play a larger role. As of now, the gender dynamics of TB in Uganda are poorly understood, yet the implications for progress on TB control are vast.

### Multisectoral Approach

If occupation is a key driver of TB prevalence among men, then this suggests that a multisectoral approach, as has been implemented for HIV over the last two decades, is required going forward. The WHO (2013) *Engage TB Approach* outlines a number of strategies for a multisectoral approach to TB, and TRACK TB, Uganda Stop TB Partnership, and the Kampala City TB Task Force have also made initial strides in supporting multisectoral TB efforts. However, far more needs to be done, including establishing linkages to professional bodies that might open doors to male occupational groups (drivers, miners, etc.). Additionally, the prevalence survey suggests that there is poor treatment seeking behaviour for cough, especially among men, including an overuse of private drug shops for self-treatment. This points to a need for partnerships with pharmaceutical

associations and drug regulatory bodies to help discourage pharmacists from supplying over-the-counter antibiotics for respiratory symptoms and encourage referral of coughs to facilities. A multisectoral approach could also target non-health sectors – agriculture, education, transport - to raise awareness of the relationship between cough and TB.

### Community and Household-Focused Strategies

The gender divide also reinforces TRACK TB, NTLP, and other partners' prioritization of improved contact tracing and identification of TB hot spots. In turn, this requires innovative strategies for community engagement and linkage. While some of these have also been outlined in the WHO *Engage TB Approach* (WHO 2013), looking forward, it is vital that TB stakeholders in Uganda look outside the traditional TB program silo for creative community strategies employed by other programs (such as HIV or child health) that have had success. With older people, who may be less likely to leave the house, strategies supporting home-based infection control focused on older or less-mobile household members will also be key. The prevalence survey also suggests that poor health seeking behaviour for cough could benefit from improved stigma reduction, advocacy, and community sensitization for TB.

### One Stop Shop

If TB proves to be as much a rural disease as an urban disease in Uganda, then ensuring the ability of rural ART-accredited health facilities to provide One Stop Shop services to TB patients is essential, as is strengthening TB diagnostics, sample referral, and drug delivery mechanisms (including access to isoniazid preventative therapy (IPT)) at lower level facilities. Improved case finding also must involve strengthening intra-facility linkages to ensure TB is screened for at different entry points to the health facility. TRACK TB is already involved in many of these activities in urban Kampala, but urban areas throughout Uganda - as well as rural districts along international borders or adjacent to districts with high population growth - also show high prevalence. Therefore, these strategies must be implemented at scale and not simply within the KCCA or as part of a limited MDR program.

### Continuous Quality Improvement (QI)

Additionally, the survey showed that many patients seen for cough were not screened at the health facility for TB, simply given medication. TRACK TB's approach of building the capacity of both private and public health workers to suspect and diagnose TB is a critical strategy going forward, and needs to be strengthened in both pre-service and in-service training.

### **Tools**

Improved intensified case finding (ICF) would also require better dissemination, uptake, and consistent and monitored use of ICF tools such as ICF forms and presumptive TB registers.

The prevalence survey has also provisionally identified TB hot spots/clusters around Kampala; however, mapping of hot spots and targeted screening outreach should be expanded, as well as tied to other pertinent data/mapping exercises related to potential socio-economic determinants of TB, in order to better capture regional and demographic

differences. TRACK TB has already supported GIS roll out for contact tracing purposes, and GIS can also be used to fully map TB hot spots, not only in Kampala, but nationwide

A higher prevalence of TB will require better uptake and implementation of existing tools for quantification, ordering, procurement, and delivery of TB drug stock and diagnostic supplies. TRACK TB has supported stock management to some extent; however, key strategies moving forward would include facilitating the revision of the Procurement Supplies Management Plan (PSM) for TB in order to begin addressing larger numbers of patients, leveraging the Ministry of Health's Quantification and Procurement Planning Unit, Pharmacy Division, and Commodity Security Group to prioritize TB medication and supplies, better engaging the Stop TB Partnership's Global Drug Facility (GDF), and reviewing tools such as QuanTB 3.0 for TB.

Finally, in order to better ensure that prevalence is more closely tracked looking forward, it is essential for the data management system to be sorted out. Buy-in for routine Data Quality Assurance (DQA) and the tools used to implement this activity are essential.

While the findings of the prevalence survey pointed toward these sorts of strategies and tools, it is also the case that the survey raised a number of other questions that need to be answered. For example, the survey has not described how TB prevalence, knowledge, and treatment seeking differs across education levels, socio-economic groups, occupational groups, or types of residence. This information could provide important insight into leverage points, strategies, and tools looking forward. This assessment, then, recommends further analysis of data on TB prevalence in the country so a comprehensive picture of the demographics informing the disease can feed into future control efforts.

\*\*\*

*Question 12: What key context issues and other assumptions around TB prevention should be considered in future programming?*

The assessment has repeatedly shown that there are key contextual barriers to TB prevention and control in Uganda, one of which is political commitment and prioritization of TB. Partner support towards TB prevention and control in Uganda can no longer assume that TB is a priority for the Government of Uganda. A purely technical approach not tied to intensive high level advocacy and multisectoral outreach and engagement will not achieve sustainable results. Better analysis and utilization of data are key here. Partners seeking to support the national TB program should draw lessons from HIV going forward and seek a paradigm change in terms of the way in which TB is approached looking forward.

The issue of political commitment extends to ensuring buy-in and ownership by the national program of partner-supported activities. Quality improvement and performance monitoring activities are critical interventions for improving leadership and technical capacity of managers and administrators at central, regional, and district levels. However, if these activities continue to be perceived as partner developed, led, and owned, then their sustainability is questionable. At the heart of this issue is coordination and harmonization between partners and the NTLP.

Systemic weaknesses and dysfunctionalities within the broader health system, especially in terms of supply chain management, human resources, and— as will be shown in Question 13 – data and information systems, have not only impeded TRACK TB, but the national program as a whole. A systems approach is urgently needed, and should be considered as part of an overall paradigm shift that moves TB prevention and control away from vertical, TB-specific, targeted technical/medical interventions towards an approach that situates TB within the larger health system. The wider national health system needs to be strengthened concomitant to TB prevention and control interventions.

Community mobilization and engagement were cited during key informant interviews and focus group discussions, as well as within NTLP reports, as a major gap in TB control. Poor community engagement affects levels of knowledge and health seeking behaviour for the general community, causing delays in diagnosis of TB and continued TB transmission and poor treatment outcomes. Therefore, community mobilization and engagement needs to be at center stage of TB control efforts looking forward.

Lastly, stigma was repeatedly cited in both published literature and program documents and mentioned by stakeholders in key informant interviews and focus group discussions. Stigma also drives poor treatment seeking, and impedes quality TB service provision. As such, it should no longer be listed as a “challenge” or a “weakness” within a SWOT analysis, but be tied to action points. Stigma reduction needs to be a central component of future programming, as it is with HIV.

\*\*\*

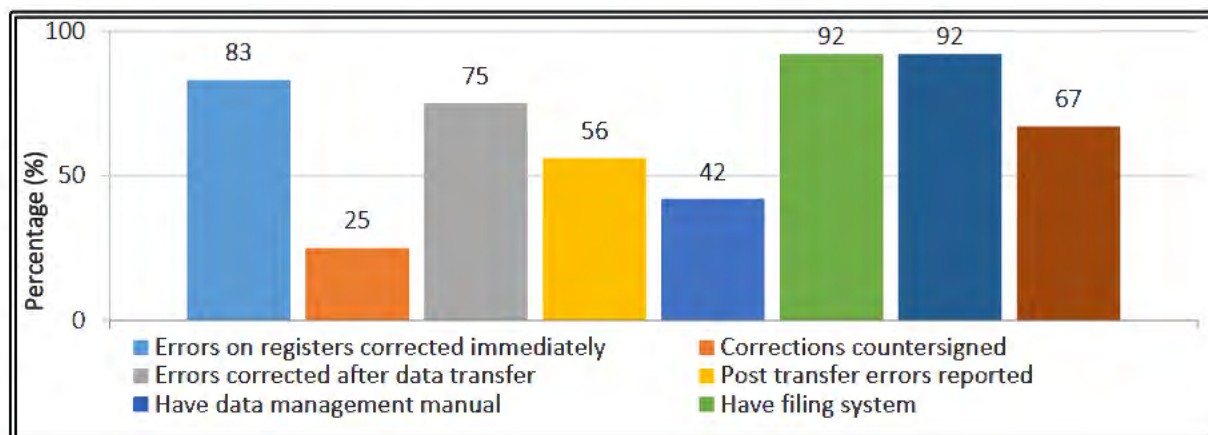
*Question 13: How should TB data collection, management, information sharing, and dissemination be organized/structured in the future to adequately support TB implementation? What data and information gaps and challenges exist and how can they be addressed?*

Data collection for TB happens at both diagnostic and treatment units. For susceptible TB, the District TB Leprosy Supervisor in each district or division collects and reports TB data from these units using paper-based quarterly reports. MDR TB data, by contrast, is sent electronically to the regional level where it is aggregated before being sent to national level by Regional Performance Monitoring Teams (RPMTs). Due to data gaps, there are efforts to migrate TB data to Uganda’s District Health Information System (DHIS-2) – managed by the Ministry of Health’s Resource Center - which serves as an electronic health information system in order to capture and report all TB data in a single database.

To identify TB data practices and data gaps, the assessment looked at data collection, management, and utilization practices at twelve facilities (urban DOTS = 7 and MDR = 5). All facilities assessed still manage TB and TB/HIV data entirely on paper, except for the MDR data now collected at facility-level and sent to the national level electronically using TRACK TB supported e-Registers. In the words of one manager: “TB is still so much a paper-based story” (Interview with 13\_KAM\_TRACK\_27.5.16). The reliance on a paper-based TB data management system has created a number of bottlenecks in data collection, management, and utilization.

All twelve facilities from which the assessment collected information on data management had at least one member trained and certified in data collection and management procedures; however, only 42% had a data management manual and 25% were countersigning and dating corrections made on registers. Other issues involving error rates can be seen in Figure 13.

**Figure 13: Percentage of Facilities Reporting Good Data Management Practices**



#### *District/divisional level data collection and management*

Aggregated TB data from the facilities to the districts/divisions was sent mainly on a monthly basis. Of the seven districts/divisions visited, 86% of District TB Leprosy Supervisors (DTLS) collected aggregated data from the facilities every month. Data from the districts/divisions was also sent to the national level largely on a quarterly basis (86%), although a few districts/divisions sent additional reports on a monthly basis (43%). Only 29% of facilities sent annual reports to the national level. Although TB data was mostly received at the district/division and sent to the national level in a timely manner (71%), the quality of this data is generally seen to be lacking as is evident from the errors found by the assessment team in registers and reporting. Poor data quality has affected NTLP program management as well as implementing partner planning and prioritization. As one implementing partner said: “Documentation is the biggest challenge. A person does the test, but forgets to write it in the register. There are huge discrepancies in the data” (Interview with 67\_KAM\_PHF\_30.5.16).

For example, although 86% of districts/divisions were managing electronic data for susceptible TB (within facility specific databases), none ensured a double data entry system, which is key to ensuring quality data. One district biostatistician did not feel it was necessary, stating: “We don’t enter data at the district. It is not needed” (Interview with 3\_GUL\_LG\_25.5.16). Additionally, a proportion (29%) of the district/division data managers did not apply data completeness and validation checks. Among managers, 43% acknowledged instances of data loss, with 67% mentioning that data loss happens at all levels (facility, district and national). Management systems weaknesses were coupled with lack of resources available for information systems at the district level. As one district stakeholder said:

*The role of the health information system department has become very critical if we are supposed to talk about standardized service delivery, and that means we need to prioritize support to it. Because without that data you cannot talk about quality services. But when*

*you look at our budget and support to this department, it's almost not there. It's very little. The job is so big, the role is very important. It should go with the necessary resources. (Interview with I\_KIT\_LG\_24.5.16)*

Table 11 describes the types of data management issues reported by districts/divisions during the assessment. As is evident, even though all facilities have a standard procedure for data flow as well as a filing system, for almost half of the facilities assessed, this has not translated into a reduction in delays, data loss, and error rates, or improved timeliness of data transfer and data completeness. Additionally, even though all facilities reported a recognized filing system, two of the seven facilities were not keeping these files via either box files or a filing cabinet.

**Table 11: Data Management Issues Reported by Districts/Divisions**

| <b>Data management issues, district/division level</b> | <b>n/N</b> | <b>Percentage</b> |
|--------------------------------------------------------|------------|-------------------|
| Ever experienced delays in data transfer               | 5/7        | 71.4%             |
| Ever experienced data loss                             | 3/7        | 42.9%             |
| No third party to cross check data                     | 3/7        | 42.9%             |
| Data transfer is in a timely manner                    | 5/7        | 71.4%             |
| Have a standard procedure for data flow                | 7/7        | 100%              |
| Have electronic data system                            | 6/7        | 85.7%             |
| Apply a double entry system                            | 0/7        | 0%                |
| Apply data completeness checks                         | 5/7        | 71.4%             |
| Have a recognized filing system                        | 7/7        | 100%              |
| Use a filing cabinet to keep paper records             | 5/7        | 71.4%             |
| Use box files to keep paper records                    | 5/7        | 71.4%             |
| Data errors corrected after transfer to national level | 4/7        | 57.1%             |
| Corrected data errors communicated to national level   | 2/4        | 50.0%             |

During the assessment, two national level sources were visited: the NTLP and the Ministry of Health's Resource Centre (RC). The NTLP receives data in both paper (TB and TB/HIV data) and electronic (MDR data) form. The Resource Centre receives and manages all its data electronically via a web-based District Health Information System (DHIS-2). The NTLP and the Resource Centre are currently running parallel data systems. This has led to frustration by NTLP stakeholders because, on one hand, the DHIS-2 TB data is acknowledged as being poor quality. On the other hand, the NTLP is hampered by a failure to implement an electronic system for all of its TB data (not just MDR) and by the slowness with which it has made efforts to integrate with DHIS-2. As one manager said:

*There are data issues. Data is collected manually and in a parallel way. There is a struggle to be digital. Data collection is also affected by systems. So many cases are missed. This is an issue of data. (Interview with 20\_KAM\_CGOV\_27.5.16)*

When asked why they are not using an integrated system, the data manager at NTLP said the current system is necessary at present for validation purposes (Interview with 13\_KAM\_TRACK\_27.5.16). Though both the NTLP and the Resource Centre have their electronic data validated to avoid possible errors on entry, neither runs a double entry system nor keeps an audit trail to record changes made to the data. In addition, while the Resource Centre is running a web-based system, hence backup is guaranteed, the NTLP

does not have a data backup plan. The latter three data management practices are crucial for data quality, and yet human resources (among other) constraints prevent such a system from being implemented.

### *Data Utilization and Dissemination*

All the facilities visited stated they had a reporting plan to monitor facility TB. Of the facilities, 92% disseminated this report to concerned stakeholders, 75% reported receiving agencies such as organizations or students requesting the data for their own interests (e.g. students' theses), and 75% perceived their data as optimally utilized. A larger question is, of course, what facilities view as "optimal utilization" as health workers at facilities have been reported as having a "lack of understanding about the value of daily reporting" (MSH 2012b: p. 22) and there were reports within TRACK TB itself as to the burden health workers felt collecting data as part of continuous Quality Improvement (QI) (MSH 2015a).

At the district level, 71% had a reporting plan to monitor TB, 57% disseminated their TB monitoring reports, 86% reported that their TB data was often requested and utilized by either organizations or individuals, and 57% perceived their TB data as optimally used. Both the two national level sources (NTLP and Resource Centre) maintained a reporting and dissemination plan to monitor national TB data. Though both NTLP and Resource Centre often receive TB data requests by organizations and individual researchers, the data manager at NTLP did not perceive this data as optimally utilized. As one stakeholder from the NTLP said:

*We have a lot of data but the data has not been well used... For us, data is underutilized and we need human resources. We need systems, internet, and help analyzing...our challenge is how to use data to inform discussion. (Interview with 76\_KAM\_CGOV\_10.6.16)*

In addition, stakeholders reported a basic shortage of supplies, registers, filing equipment, stationary, computers, and internet.

### *Data Gaps and Challenges*

Data gaps and challenges exist at all levels of the TB data system (see Table 12). Facilities, districts, and central unit shared bottlenecks such as a shortage of supplies for data management, a shortfall of data specialists, and poor capacity of existing human resources to handle data collection, management, and utilization. This led to poor documentation in the TB registers, data incompleteness or poor quality, single data entry, lack of backups (including the reliance on paper hard copies without a designated space to keep long-term records), and a low understanding of/priority for data utilization for effective decision making.

At facility level, this was exacerbated by TB registers being too long and of poor quality, a high turnover of trained staff that forced continuous reorientation on proper data management, lack of filing and data management space, and lack of internet. At the district level, further bottlenecks included late reporting by facilities, lack of facilitation for targeted

supervision of facilities, and a lack of record harmonization between the TB and HIV clinics from which the district supervisors were tasked with collecting data.

**Table 12: Data Management Challenges**

| Facility                                                                                                                                                                                                                                                                                                                                             | District/Division                                                                                                                                                                | Cross-Cutting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• TB register too long and of poor quality</li> <li>• High turnover of staff</li> <li>• Filing and data management space</li> <li>• Some patients are too weak to give information</li> <li>• Tracing patients is sometimes impossible</li> <li>• Lack of internet to manage and transfer MDR data</li> </ul> | <ul style="list-style-type: none"> <li>• Late reporting</li> <li>• No facilitation for targeted supervision</li> <li>• No collaboration with other TB and HIV clinics</li> </ul> | <ul style="list-style-type: none"> <li>• Shortage of supplies (e.g. registers, stationary and computers)</li> <li>• Data incompleteness/data quality</li> <li>• Low utilization of TB data</li> <li>• Shortage and lack of capacity of human resources</li> <li>• TB data system is paper-based</li> <li>• Single data entry and lack of backups</li> <li>• Coordination gaps between partners</li> <li>• Poor documentation in TB registers</li> <li>• Less priority put on managing TB data</li> </ul> |

Data collection, management, and utilization issues related to the national TB control program have long been described. Indeed, the Joint External Monitoring Mission Review (2013) recommended that the NTLP “urgently strengthen NTLP [Monitoring and Evaluation] data management and analytical capacity” (p.8) and that “strengthening and remediation in this area is critical to quality care” (p. 9). The review further found that there was a general lack of data verification at district level by District TB Leprosy Supervisors (DTLS), that accuracy of data at all levels was questionable, and that discrepancies were often found when data was cross-checked. Data problems, moreover, were found to extend not only to patient registers and district reporting, but also to surveillance activities and stock keeping. Most notably, the Review found that problems with data management meant that TB data in Uganda was often not useable at central level for performance monitoring (p. 23).

TRACK TB has made strengthening the TB information system a central part of its mandate. It has supported the printing and distribution of data collection tools, the move to e-Registers, the recording and reporting of GeneXpert data using the GxAlert system, capacity building in data management for health facility workers, secondment of data managers at both facility and NTLP level, Data Quality Assurance (DQA) activities at directly supported sites, and the use of evidence for decision making through continuous Quality Improvement (QI) activities at all levels of the health system. Yet the system still clearly falls short of recording, collecting, managing, and analyzing TB data from facility level up to the central NTLP and Resource Centre.

This suggests that addressing bottlenecks in data management and utilization primarily through the lens of TB control may not be sufficient to solve overarching, pervasive weaknesses related to the implementation of health information systems in Uganda and its' culture of data utilization. Poor data utilization not only affects the NTLP's ability to plan and manage staff, services, and stock, but greatly impacts the ability of the program to create political prioritization for TB at the highest most levels of government:

*We need a paradigm shift, a program within the program to be able to generate data to feed to politicians and financiers. Earlier, we were able to show the community the impact of HIV. The head of government became the team leader and HIV gained prominence. In the prevalence survey, the results showed that 40,000 people are missed. But the NTLP still cannot generate high level interest. It needs to demand by showing community impact, TB burden etc. (Interview with 25\_KAM\_DON\_30.5.16)*

\*\*\*

## KEY MESSAGES: LOOKING FORWARD

- Both the prevalence survey and the TRACK TB approach support the necessity of engaging a broad range of partners for effective, sustainable TB control looking forward especially a) partners situated closest to the patient and b) partners most able to be leveraged for a multisectoral response.
- Best practices include *One Stop Shop*, community linkage, enabling packages, intra-facility linkage, Quality Improvement (QI) approaches, isoniazid preventative therapy (IPT), private sector engagement, infection control, and strengthening the data system, all of which have been demonstrated to be effective in both Uganda and in the published literature.
- Strategies and tools that address higher than expected TB prevalence in men, rural communities, and the elderly are urgently needed, as are strategies that improve case finding, including pediatric cases (e.g. interventions that encourage treatment seeking for cough, boost health workers capacity to suspect and diagnose TB, trace contacts of susceptible and MDR TB patients, and better identify TB hot spots/population clusters).
- Key contextual issues to be considered in future programming are political commitment and prioritization, ownership and coordination, health systems weaknesses, community engagement, and stigma as a driver of poor treatment seeking and quality service provision.
- The TB data system still remains critically weak. Data gaps and errors are still major problems, as are the lack of supplies for proper data management, an absence of standard processes for correcting errors, poor reporting practices, lack of capacity for data analysis, and an over-reliance on paper. Even if data management systems were strengthened, data is not being used optimally for decision making.

## V. RECOMMENDATIONS AND CONCLUSIONS

This mixed methods assessment sought to situate TRACK TB's accomplishments (and its struggles) in the context of Uganda's national TB control program, emerging data on national TB indicators, and the country's wider TB control, health, and development systems. The assessment sought to build an evidence-based story - using TRACK TB and existing NTLP program documentation, primary and secondary data, key informant interviews and focus group discussions, and published literature on TB control in Uganda and globally - both to assemble a set of compelling learnings, and to make a data-driven case for strategies, approaches, and best practices looking forward.

Based on this evidence, the assessment concludes with the following recommendations:

### TB CONTROL TECHNICAL INTERVENTIONS

1. **Roll out of Quality Improvement (QI) approaches in TB control**, especially those that build on existing structures and on-going QI efforts across the broader health sector. These include support supervision, performance review, facility league tables, peer-to-peer mentorship, cohort review, and other activities that serve to improve quality service delivery. The NTLP can provide QI oversight and technical support, as well as lead monitoring and evaluation and QI policy creation, while USAID, implementing partners, and technical partners (e.g. WHO) can provide financial and technical facilitation, as well as continue to introduce and help adapt innovative QI tools. Ideally, District Health Teams and Regional Performance Monitoring Teams should assume leadership of QI processes, since QI should feed into not just the NTLP, but overall local government performance monitoring (i.e. QI for TB and the health sector more broadly should – if possible – be linked to, and integrated with, any district-level cross-sectoral quality improvement efforts). Implementing partners can also play an important role in facilitating QI activities that require higher-level coordination.
2. **Expansion of community linkage facilitation for both MDR-TB and urban DOTS to include drug susceptible TB outside of urban areas.** This includes leveraging existing Village Health Team structures at community level and existing facility-based volunteers. USAID and its implementing partners can provide critical financial and technical support for this process; however, civil society organizations active at community level – in particular, those already supporting either community- or facility-based volunteers – should be engaged in helping to scale up such a cadre of health workers. At the same time, the primary responsibility for community linkage facilitation ultimately rests with the Ministry of Health, as community health workers as a cadre have not yet been taken up within the public service. The Uganda Stop TB Partnership and the NTLP must be proactively strengthened and supported in order to serve as the key advocates for human resources reform. Dialogue with other health program areas is vital in order to explore how to horizontally integrate services so that community linkage facilitators are not simply TB-focused. Regional Performance Monitoring Teams, as well as local government - from district LC V down to LC I - should be engaged in this process, as these structures will ultimately bear the most

immediate responsibility for such health workers.

3. **Support and scale up the MDR and urban DOTS packages**, with careful monitoring of trends between *directly* and *indirectly* supported sites to see whether or not seconding staff is necessary, or whether progress can continue through more sustainable facilitation mechanisms. Scale up of MDR and urban DOTS packages – along with policy and tool development in support of these packages – is the responsibility of the Ministry of Health so capacity within the NTLP to more effectively plan, oversee, and monitor these efforts should continue to be built. USAID and its implementing partners can contribute to this monitoring effort, and provide targeted financial and technical assistance to both the NTLP and those facilities that need support. This includes building NTLP and Uganda Stop TB Partnership capacity to advocate for the absorption of implementing partner-seconded staff with pre-existing MDR TB management skills into public service, and supporting and advocating for their incentivization to remain as specialized providers. As the major sub-national stakeholders in TB service provision in Uganda, District Health Teams and Regional Performance Monitoring Teams must be actively engaged to lead the roll out of such packages and, alongside regional implementing partners, determine degree of readiness of different facilities, identify and fill gaps in capacity, and ensure the timely, consistent, and comprehensive collection of necessary data. Finally, both the National Medical Stores – and those implementing partners engaged in supporting it – must be targeted by all stakeholders to ensure improved efficiency.
4. **Enabling packages for MDR patients on treatment – in particular food – to ensure adherence.** While money exists from the Global Fund for this to take place in the medium term, USAID, Global Fund, NTLP, the Uganda Stop TB Partnership, and the broader Ministry of Health must work toward a long-term financing solution, including multisectoral engagement with both public and private sector actors for sustainable provision of a social welfare package to MDR TB patients.
5. **Prioritization of measures which treat TB patients away from health facilities as much as possible**, including instituting ambulatory care services and mixed model DOTS for both susceptible and MDR TB, expanding TB care to the Health Centre II level, and facilitating daily DOT at MDR TB patients' homes. The NTLP should be supported to clearly prioritize ambulatory care, provide technical support to sub-national partners, and track ambulatory patients. District Health Teams and Regional Performance Monitoring Teams should be engaged to lead this process in partnership with hospitals and primary health facilities, with technical and monitoring and evaluation support from NTLP. USAID and its implementing partners should support the Government of Uganda in these measures and in scaling up *One Stop Shop* and other integrated TB/HIV activities throughout Uganda. Stakeholders in HIV/AIDS – such as the AIDS Control Programme (ACP) – are key partners in *One Stop Shop* and in TB/HIV integration more generally, and technical partners (e.g. WHO) and research organizations (e.g. IDI) can provide evidence-based advice.
6. **Intensive, planned, evidence-driven high-level advocacy on behalf of TB control built into programming.** This sort of advocacy is the role of the Uganda Stop TB Partnership in partnership with NTLP and resources must be made available to

ensure that it is optimally engaged and has the capacity to effectively advocate to central government. USAID should ensure implementing partners include budget lines for advocacy to central government in project proposals so as to increase both political prioritization and health expenditure for TB, as well as overall expenditure targeting recruitment, training, retention, remuneration, incentivization, and compensation for occupational hazards of general health human resources. Existing structures (e.g. the National Coordinating Committee for TB/HIV) should be used to disseminate TB and TB/HIV information for upstream advocacy and incentivize government to increase political will and prioritize TB. WHO and other technical partners (e.g. the German Leprosy and TB Relief Association, The Union) can contribute critical evidence.

7. **Support for the Government of Uganda's transition of TB information systems to the District Health Information System (DHIS-2) and electronic record keeping.** NTLP should plan, lead, and monitor this process, while USAID and its implementing partners can provide financial and technical support to those systems that ensure adequate and timely supply of registers and improve overall TB Data Quality Assurance (DQA) activities (e.g. NTLP data monitoring visits to facilities, training and one-to-one mentoring of health worker staff to improve registers, and harmonization of reporting, and improved participation of District TB Leprosy Supervisors (DTLS) and biostatisticians in performance review). District Health Teams (in particular, DTLs and District Data Managers), and Regional Performance Monitoring Teams - both as primary beneficiaries of such data and as monitoring structures closest to the facilities from which data is generated – must be engaged as implementation partners.
8. **Stigma reduction.** All partners should immediately make TB stigma reduction among both patients and health workers a central component of programming, as they already do with HIV/AIDS. NTLP can lead this process by operationalizing stigma reduction within future strategic plans and by including stigma as a measurable indicator. The Uganda Stop TB Partnership can be strengthened to make stigma reduction a key pillar in its advocacy and communication work. USAID, implementing partners, and technical partners like WHO can ensure that program technical documents include stigma reduction as a key objective while – along with the AIDS Control Programme – draw upon their wealth of experience with stigma reduction for HIV/AIDS to suggest innovative strategies, tools, and activities.

## **BROADER HEALTH SYSTEMS INTERVENTIONS**

1. **Prioritize the strengthening of general health systems.** Supply chain, service delivery referral networks, and human resources should be a target for USAID intervention beyond vertical program silos. In particular, the overall medical supply chain requires urgent intervention since continually bypassing the system in order to achieve results only serves to weaken it further. This requires engaging and facilitating the Ministry of Health's health systems strengthening activities at central level. The National Medical Stores, Central Public Health Laboratory, various procurement bodies, Ministry of Public Service, and Ministry of Finance must be primary targets of, and partners in, this effort, alongside the implementing partners presently supporting these institutions. At the same time, Local Government systems should be prioritized, as Districts and Divisions oversee the actual delivery of services. Stakeholders working to strengthen

health systems, then, should actively partner with programs and initiatives seeking to strengthen Local Government as a whole, even if those programs and initiatives sit outside the health sector.

2. **Extend Quality Improvement (QI) approaches throughout the health system.** This includes support to supervisory, continuous medical education, and mentoring structures – especially peer-to-peer mentoring – as these help overcome weaknesses in human resources systems that impede sustainability (e.g. internal rotation and outmigration of staff). Government ownership of Quality Improvement (QI), External Quality Assessment (EQA), and other quality assurance mechanisms must also be a first priority. Sustainability is about leadership and political will, so ensuring buy in – both at central and facility levels - for supervision and mentorship activities is critical. This effort should be led by the Ministry of Health, with financial and technical support from USAID, its implementing partners, and technical partners (e.g. WHO).
3. **Target health systems barriers that prevent adequate overall infection control procedures being implemented,** including measures to decongest health facilities and the use of TB infection control measures to build general infection control capacity among all staff at all sites (such as proper fitting of respirators and other personal protective equipment). This effort should be led by the Ministry of Health, with financial and technical support from USAID, its implementing partners involved in general health systems strengthening, and technical partners with experience in infection control (e.g. WHO). Again, the District Health Teams and hospital directors who oversee service provision are key implementing partners.
4. **Urgently act to improve the Ministry of Health’s overall health information system.** This includes supporting the placement and uptake of designated data managers skilled in electronic data management, building health systems infrastructure for proper data management (filing rooms, computers, modems) and building the overall capacity of both disease-specific programs and the Ministry of Health for evidence-based decision-making, planning, budgeting, and advocacy. The Resource Centre should be both the key recipient and key leader of health information system strengthening activities. USAID and its implementing partners should provide financial and technical support to existing efforts, including those of technical partners already engaged in work on Uganda’s health information system (e.g. UNICEF).

## **DEVELOPMENT PRACTICE RECOMMENDATIONS**

1. **Rethink the development, operationalization, use, and monitoring of how assumptions are used within results frameworks in the health sector.** Many of these assumptions (such as political prioritization) are not only critical for success, but also might be more appropriately treated as outputs for intervention (e.g. upstream advocacy to high level stakeholders). Rethinking of assumptions is the role of USAID, both its technical teams and those engaged in program development. Implementing partners should be aware of, and have a plan in place for, monitoring assumptions from the start of an activity, including baselines.
2. **Achieve buy in by reconceiving “building capacity” not only in terms of**

**“could be taken up by government” but also in terms of “will be taken up by government.”** Planning and management tools and coordination structures are important means by which to ensure leadership, technical capacity, and central-level quality improvement. However, full and clearly articulated buy-in and ownership should be assured before moving forward for sustainability. This requires leadership capacity to be built at Ministry of Health and other line ministries so that they can better hold development partners accountable to international development compacts, such as the Paris Declaration and IHP+. It also requires development partners, such as USAID, to hold implementing partners accountable to such compacts.

- 3. Focus support on those structures that actually implement service delivery, most notably local or district government to improve sustainability.** Ultimately, even the very best, most well-designed initiatives will struggle to withstand weak local government and, those that do, will be difficult to sustain over time if district, divisional, or regional management capacity remains underdeveloped. Moreover, simply working with specific offices or departments within local government (e.g. health) without addressing the system as a whole is also unsustainable, since well-performing, high-quality health services will be over-burdened if environmental, social, and economic drivers of ill-health are not simultaneously addressed. The Ministry of Local Government and Local Councils - from District LC Vs down to LC Is - should be primary partners and targets in every initiative planned by respective line ministries and facilitated by USAID and implementing partners.

## CONCLUSIONS

The assessment found that the TRACK TB approach had measurable outcomes in a number of areas, most notably in MDR-TB, urban DOTS and TB-HIV. In areas where outcomes have been mixed - such as efforts to strengthen NTLP leadership and technical capacity - the assessment argues that this was less due to the activities undertaken (e.g. support for Quality Improvement (QI) strategies and existing coordination and implementation structures) than to on-going issues related to national and programmatic buy-in, partner coordination, and larger health systems barriers. A similar case can be made for those activities related to infection control and data management, which faced related challenges. This assessment has, therefore, sought to reiterate the message that the most pervasive bottlenecks to implementation and sustainability faced by TRACK TB have not been related specifically to the validity of its approach, but to systems-wide bottlenecks.

In this respect, the assessment has taken a broader perspective on TB control in Uganda where, traditionally, the disease has often been viewed and managed through a primarily technical, disease-based lens. This is not to say that there is no place for a vertical approach to TB control; however, we do argue that a vertical approach alone – one that does not address issues of political and financial prioritization, wider human resources and medical supply chain dysfunctionalities, the culture of aid and partner coordination, and social issues related to stigma, treatment-seeking, and community relationships – may produce short term progress, but at the expense of sustainability.

These findings, it should be said, are not completely new. They have been repeated in program literature ranging from the NTLP's own Strategic Plan and Annual Reports, to the Joint External Monitoring Mission Review Report overseen by WHO, to TRACK TB's own technical document and baseline report. That this assessment has found much of the same barriers to sustainable TB control (two, three, four years on) hopefully will serve as a kick-start for those designing TB control programs in partnership with the Government of Uganda to begin tackling such issues head on.

This assessment has recommended a number of best practices looking forward. A few of these are highly technical (e.g. isoniazid preventative therapy (IPT) roll out), but most speak to big picture issues such as service integration and health systems strengthening (e.g. integrated TB/HIV *One Stop Shop*, intra-facility linkage, community linkage, continuous Quality Improvement (QI), data management, infection control). At the same time, the assessment emphasizes that these best practices do not exist in a bubble. If national systems for managing health human resources and medical supply chain are not repaired, if aid effectiveness is not improved, if TB is not seen as a major health priority for government, and if people are not placed at the very center of both TB control and health care more generally, then these best practices cannot survive in the long run. Since 2013, the TRACK TB approach has attempted to address – in a context of relatively limited resources - all of these issues. To address them sustainably, however, requires a paradigm change.

## ANNEX I: REFERENCES

- Abebe G et al. 2010. Knowledge, health seeking behavior and perceived stigma towards tuberculosis among tuberculosis suspects in a rural community in southwest Ethiopia. *PLoS ONE*. 5(10):e13339. doi: 10.1371/journal.pone.0013339.
- Adewole OO et al. 2015. A randomized controlled study comparing community-based with health facility based direct treatment models on patients' satisfaction and TB treatment outcomes. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 109(12):783-92.
- Alonso-Echanove J et al. 2001. Occupational transmission of *Mycobacterium tuberculosis* to health care workers in university hospitals in Lima, Peru. *Clinical Infectious Disease*. 33:589-596.
- Amo-Adjei J, Awusabo-Asare K. 2013. Reflections on tuberculosis diagnosis and treatment outcomes in Ghana. *Archives of Public Health*. 71:22.
- Amuha MG et al. 2009. Non-adherence to anti-TB drugs among TB/HIV co-infected patients in Mbarara Hospital Uganda: Prevalence and associated factors. *African Health Sciences*. 9 (Special Issue 1): S8-S15.
- Atun, R et al. 2010. Health-system Strengthening and Tuberculosis Control. *The Lancet*. 375: 2169-78.
- Bishwajit G, Zhaohui C, Zhifei H. 2014. Understanding the social determinants of TB and HIV in South Asia. *International Scholarly Research Notices*. <http://dx.doi.org/10.1155/2014/135243>
- Bock NN et al. 2001. A spoonful of sugar...: Improving adherence to tuberculosis treatment using financial incentives. *International Journal of Tuberculosis and Lung Disease*. 5(1):96-8.
- Bulletin of the World Health Organization. 2007. *Special Theme: Tuberculosis Control*. 85(5): 325-420.
- Buregyeya E et al. 2011. Tuberculosis knowledge, attitudes and health-seeking behaviour in rural Uganda. *International Journal of Tuberculosis and Lung Disease*. 15(7):938-42. Doi: 10.5588/ijtld.10.01211
- Buregyeya E et al. 2012. Utilization of HIV and tuberculosis services by health care workers in Uganda: implications of occupational health policies and implementation. *PLoS ONE*: 7(10):e46069. doi: 10.1271/journal.pone.0046069.
- Buregyeya E et al. 2013. Implementation of tuberculosis infection control in health facilities in Mukono and Wakiso districts, Uganda. *BMC Infectious Diseases*. 13:360.
- Buregyeya E et al. 2014. Delays in diagnosis and treatment of pulmonary tuberculosis in Wakiso and Mukono districts, Uganda. *BMC Public Health*. 14:586.
- Burtscher D et al. 2016. "My favorite day is Sunday": Community perceptions of (drug-resistant) tuberculosis and ambulatory tuberculosis care in Kara Suu District, Osh Province, Kyrgyzstan. *PLoS ONE*. 28;11(3):e0152283. doi: 10.1371/journal.pone.0152283.
- Cavalcante SC et al. 2007. Community DOT for tuberculosis in a Brazilian favela: comparison with a clinic model. *International Journal of Tuberculosis and Lung Disease*. 11:544-9
- Cattamanchi A et al. 2015. Health worker perspectives on barriers to delivery of routine tuberculosis diagnostic evaluation services in Uganda: a qualitative study to guide clinic-based interventions. *BMC Health Services Research*. 15:10. doi: 10.1186/s12913-014-0668-0.

- Charles MK et al. 2016. Implementation of Tuberculosis Intensive Case Finding, Isoniazid Preventive Therapy, and Infection Control ("Three I's") and HIV-Tuberculosis Service Integration in Lower Income Countries. *PLoS ONE*. 11(4):e0153243. doi: 10.1371/journal.pone.0153243.
- Chileshe M, Bond VA. Barriers and outcomes: TB patients co-infected with HIV accessing antiretroviral therapy in rural Zambia. *AIDS Care*. 22 Suppl 1:51-9. doi: 10.1080/09540121003617372.
- Clarke M et al. 2005. Lay health worker intervention with choice of DOT superior to standard TB care for farm dwellers in South Africa: a cluster randomized control trial. *International Journal of Tuberculosis and Lung Disease*. 9:673-9.
- Claros J, de Pee S, Bloem MW. 2014. Adherence to HIV and TB care and treatment: the role of food security and nutrition. *AIDS and Behaviour*. 18:S459-S464.
- Cremers AL et al. 2015. Assessing the consequences of stigma for tuberculosis patients in urban Zambia. *PLoS ONE*. 10(3):e0119861. doi: 10.1371/journal.pone.0119861.
- De Pee S et al. 2014. The enabling effect of food assistance in improving adherence and/or treatment completion for antiviral therapy and tuberculosis treatment: A literature review. *AIDS and Behaviour*. 18:S531-S541.
- Dodor EA, Kelly SJ. 2010. Manifestations of tuberculosis stigma within the healthcare system: the case of Sekondi-Takoradi Metropolitan district in Ghana. *Health Policy*, 98(2-3):195-202. doi: 10.1016/j.healthpol.2010.06.017.
- Dolea C, Stormont L, Braichet JM. 2010. Evaluated strategies to increase attraction and retention of health workers in remote and rural areas. *Bulletin of the World Health Organization*. 88(5): 379-85.
- Dudley L et al. 2003. Evaluation of community contribution to tuberculosis control in Cape Town, South Africa. *International Journal of Tuberculosis and Lung Disease* 7 (9 Suppl 1): S48-55.
- Ergo, A. et al. 2011. Strengthening Health Systems to Improve Maternal, Neonatal, and Child Health Outcomes: A Framework. Washington, DC: USAID.
- Farmer P. 1999. *Infections and Inequalities: The Modern Plagues*. Los Angeles: University of California Press.
- Filho JPC. 2009. Food baskets given to tuberculosis patients at a primary health care clinic in the city of Duque de Caxias, Brazil: Effect on treatment outcomes. *Journal de Brasilia Pneumologie*. 35(10):992-7
- Floyd K et al. 2003. Cost and cost-effectiveness of increased community and primary care facility involvement in tuberculosis care in Lilongwe District, Malawi. . *International Journal of Tuberculosis and Lung Disease*. Suppl 1:S29-37.
- Floyd K et al. 2015. *Use of high burden country lists for TB by WHO in the post-2015 era*. Discussion paper for the WHO's Strategic and Technical Advisory Group for TB (STAG-TB). June 2015. [http://www.who.int/tb/publications/global\\_report/high\\_tb\\_burdencountrylists2016-2020.pdf](http://www.who.int/tb/publications/global_report/high_tb_burdencountrylists2016-2020.pdf). Accessed October 12, 2016.
- Furin J et al. 2011. Programmatic management of multi-drug-resistant tuberculosis: models from three countries. *International Journal of Tuberculosis and Lung Disease*. 15(10):1294-1300.

- Global Fund. 2016. *Audit Report: Global Fund Grants to the Republic of Uganda*. Geneva: Global Fund.
- Government of Uganda. 2006. *National Policy Guidelines for TB/HIV Collaborative Activities in Uganda*. Kampala: MoH.
- Government of Uganda. 2011. *Uganda National Household Survey Report 2009/10*. Kampala: UBOS.
- Government of Uganda. 2012. *Annual Health Sector Performance Report, FY 2012 / 2013*. Kampala. MoH.
- Government of Uganda. 2013. *Report of the Joint External Monitoring Mission Review of the National Tuberculosis Control Program*. 5-14 September 2013. Kampala: NTLP.
- Government of Uganda. 2014. *The HIV and AIDS Uganda Country Progress Report*. June 15, 2015. Kampala. Ministry of Health
- Government of Uganda. 2014b. *National Population and Housing Census 2014: Provisional Results*. November 2014. Kampala: UBOS.
- Government of Uganda. 2015a. *Uganda National TB and Leprosy Control Programme: Strategic Plan 2015/16-2019/20*. June 2015. Kampala: NTLP.
- Government of Uganda. 2015b. *Health Sector Development Plan: 2015/16 - 2019/20*. Kampala: Ministry of Health.
- Government of Uganda. 2015c. *Annual Health Sector Performance Report, FY 2014/15*. Kampala: MoH
- Government of Uganda. 2015d. *National Medicines Policy*. Kampala: MoH.
- Government of Uganda. 2015e. *National Health Accounts: Key Messages (FY2010/11 & 2011/12)*. NHA Secretariat. Kampala: MoH Planning Department.
- Government of Uganda. 2016a. *NTLP Annual Report 2014-2015*. Kampala: NTLP
- Government of Uganda. 2016b. *National TB Prevalence Survey*. Kampala: NTLP.
- Government of Uganda. 2016c. *DRAFT National TB Manual and TB IC Guidelines*. Kampala: NTLP.
- Hargreaves J et al. 2011. The social determinants of tuberculosis: From evidence to action. *American Journal of Public Health*. 101(4):654-662.
- Hermans SM et al. 2012. Integration of HIV and TB services results in improved TB treatment outcomes and earlier, prioritized ART initiation in a large urban HIV clinic in Uganda. *Journal of Acquired Immune Deficiency Syndrome*. 60(2):e29-235. doi:10.1097/QAI.0b013e38251aeb4.
- Heller T et al. 2010. Community-based treatment for multi-drug resistant tuberculosis in rural KwaZulu-Natal, South Africa. *International Journal of Tuberculosis and Lung Disease* 14:420-426.
- Horter S et al. 2014. "Home is where the patient is": A qualitative analysis of a patient-centered model of care for multi-drug resistant tuberculosis. *BMC Health Services Research* 14:81.
- Hudelson P. 1996. Gender differentials in tuberculosis: the role of socio-economic and cultural factors. *Tuberculosis and Lung Disease*. 77(5):391-400.
- Jahnavi G, Sudha CH. 2010. Randomised controlled trial of food supplements in patients with newly diagnosed tuberculosis and wasting. *Singapore Medical Journal*. 51(12):957-62.
- Javed H et al. 2016. A cross-sectional study about knowledge and attitudes toward multidrug-resistant and extensively drug-resistant tuberculosis in a high-burden drug-resistant

- country. *International Journal of Mycobacteriology*. 5(2):128-34. doi: 10.1016/j.ijmyco.2015.12.004.
- Joseph Davey D et al. 2016. Integrating human immunodeficiency virus and reproductive, maternal and child and tuberculosis health services within national health systems. *Current HIV/AIDS Reports* 13(3):170-6.
- Joshi R et al. 2006. Tuberculosis among health care workers in low-and middle-income countries: A systematic review. *PLoS Medicine* 3:e494. doi: 10.1371/journal.pmed.0030494.
- Kamolratanakul P et al. 1999. Randomized controlled trial of directly observed treatment (DOT) for patients with pulmonary tuberculosis in Thailand. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 93:552–7
- Karim F et al. 2007. Stigma, Gender, and their Impact on Patients with Tuberculosis in Rural Bangladesh. *Anthropology of Medicine*. 14(2):139-51. doi: 10.1080/13648470701381440.
- Karumbi J, Garner P. 2015. Directly observed therapy for treating tuberculosis. *Cochrane Database Systematic Reviews*. May 29. (5)CD003343.
- Kassem S et al. 2000. Tuberculin skin testing to assess the occupational risk of *Mycobacterium tuberculosis* infection among health care workers in Abidjan, Cote d'Ivoire. *International Journal of Tuberculosis and Lung Disease*. 4:321-326.
- Katamba A et al. 2005. Patients perceived stigma associated with community-based directly observed therapy in Uganda. *East African Medical Journal*. 82(7): 337-42.
- Kerschberger B et al. 2012. The effect of complete Integration of HIV and TB services on time to initiation of antiretroviral therapy: A before-after study. *PLoS ONE*. 7(10): e46988. doi:10.1371/journal.pone.0046988
- Kiwuwa MS, Karamagi K, Mayanja Kizza H. 2005. Patient and health service delay in pulmonary tuberculosis patients attending a referral hospital: A cross-sectional study. *BMC Public Health*. 5:122.
- Kok M.C. et al. 2015. How Does Context Influence Performance of Community Health Workers in Low- and Middle-Income Countries? Evidence from the Literature. *Health Research Policy and Systems*. Doi: 10.1186/s12961-015-0001-3.
- Lawn SD. 2000. Tuberculosis in Ghana: social stigma and compliance with treatment. *International Journal of Tuberculosis and Lung Disease*. 4(12):1190-1.
- Liefooghe R et al. 1997. From their own perspective. A Kenyan community's perception of tuberculosis. *Tropical Medicine and International Health*. 2(8): 809-21.
- Lutge E, Lewin S, Volmink J. 2014. Economic support to improve tuberculosis treatment outcomes in South Africa: A qualitative process evaluation of a cluster randomized controlled trial. *Trials*. 15:236.
- Luyirika E. 2012. A home-based approach in managing multi-drug resistant tuberculosis in Uganda: A case report. *AIDS Research and Therapy*. 9:12
- Macdonald H et al. 2016. Challenges in Exploratory methods for tuberculosis research in South Africa. *Qualitative Health Research*. 26(8):1123-36. doi: 10.1177/1049732315606065.

- Macfarlane L and Newell JN. A qualitative study exploring delayed diagnosis and stigmatization of tuberculosis amongst women in Uganda. *International Health*. 4(2):142-147.
- Manabe YC et al. 2015. Rapid implementation in passive tuberculosis case detection and tuberculosis treatment outcomes after implementation of a bundled laboratory diagnostic and on-site training intervention targeting mid-level providers. *Open Forum Infectious Disease*. doi: 10.1093/ofid/ofv030.
- Martins N, Morris P, Kelly PM. 2009. Food incentives to improve completion of tuberculosis treatment: Randomized controlled trial in Dili, Timor Leste. *BMJ*. 339:b4248.
- Matsiko CW, Kiwanuka J. 2003. A review of human resource for health in Uganda. *Health Policy and Development*. 1(1): 15-20.
- Mitnick C et al. 2003. Community-based therapy for multidrug-resistant tuberculosis in Lima, Peru. *New England Journal of Medicine* 348:119-128.
- MSF. 2012. *From the Ground Up: Building a Drug-Resistant TB Programme in Uganda*. March 2012. /www.msfacecess.org/content/ground-building-drug-resistant-tb-programme-uganda
- MSH. 2012a. *TRACK TB: Technical Application*. 13 September 2012. Cambridge, MA: MSH.
- MSH. 2012b. *TRACK TB Baseline Assessment*. Kampala: MSH.
- MSH. 2013a. *TRACK TB Project Year 1 Annual Performance Report: January – September 2013*. Kampala: MSH
- MSH. 2013a. *M&E Results Framework. Performance Monitoring and Management Plan 2013-2017*. June 2013. p. 10
- MSH. 2013b. *TRACK TB Annual Work Plan PY1 (January 2, 2013 – September 30, 2013)*. Kampala, MSH
- MSH. 2013c. *TRACK TB Annual Work Plan PY2 (October 2013 – September 2014)*. Kampala: MSH
- MSH. 2014a. *TRACK TB Project Year 2 Annual Report: October 2013-September 2014*. Kampala: MSH
- MSH. 2014b. *TRACK TB Annual Work Plan PY3 (October 2014 – September 2015)*. Kampala: MSH
- MSH. 2015a. *TRACK TB Project Year 3 Annual Report: October 2014-September 2015*. Kampala: MSH
- MSH. 2015b. *TRACK TB Annual Work Plan PY4 (October 2015 – September 2016)*. Kampala: MSH
- MSH. 2016. *TRACK TB PY IV Quarter II Progress Report (January-March 2016)*. Kampala: MSH
- Moalosi G et al. 2003. Cost-effectiveness of home-based care versus hospital care for chronically ill tuberculosis patients, Francistown, Botswana. *International Journal of Tuberculosis and Lung Disease*. 7(9 Suppl 1):S80-5.
- Munro SA et al. 2007. Patient adherence to tuberculosis treatment: A systematic review of qualitative research. *PLoS Medicine*. 4(7):e238.
- Munseri PJ et al. 2008. Completion of isoniazid preventive therapy among HIV-infected patients in Tanzania. *International Journal of Tuberculosis and Lung Disease*. 12(9): 1037-41.
- Nabyonga Orem J. 2012. Do guidelines influence the implementation of health programs? - Uganda's experience. *Implementation Science*. 7:98.
- Nahid P et al. 2016. Official American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America clinical practice guidelines: Treatment of drug-susceptible tuberculosis. *Clinical Infectious Disease*. 65(32).

- Nathanson E et al. 2006. Multidrug-resistant tuberculosis management in resource-limited settings. *Emerging Infectious Disease* 12:1389-1367.
- Newell JN. 2006. Family-member DOTS and community DOTS for tuberculosis control in Nepal: cluster-randomized controlled trial. *Lancet*. 367:903–9.
- O'Donnell MR et al. 2010. High incidence of hospital admissions with multidrug-resistant and extensively drug resistant tuberculosis among South African health care workers. *Annals of Internal Medicine*. 153:516-522.
- Ogden J et al. Shifting the paradigm in tuberculosis control: Illustrations from India. *International Journal of Tuberculosis and Lung Disease*. 3(10):855-61.
- Okello D et al. 2003. Cost and cost-effectiveness of community-based care for tuberculosis patients in rural Uganda. *International Journal of Tuberculosis and Lung Disease*. 7(9):S72-S79.
- Owiti P et al. 2015. Integrating tuberculosis and HIV services in rural Kenya: Uptake and outcomes. *Public Health Action*. 5(1):36-44.
- Rasanathan K et al. 2011. The social determinants of health: key to global tuberculosis control. *International Journal of Tuberculosis and Lung Disease* 13(6): 530-536.
- Sagili KD et al. 2016. Is Knowledge Regarding Tuberculosis Associated with Stigmatizing and Discriminating Attitudes of General Population towards Tuberculosis Patients? Findings from a Community Based Survey in 30 Districts of India. *PLoS ONE*. 11(2):e0147274. doi: 10.1371/journal.pone.0147274.
- Saidu IA, Nasir Z, Gani BW. 2014. Social determinants of tuberculosis in sub-Saharan Africa: A systematic review. *Global Journal of Medicine and Public Health*. 3(4).
- Sekadde MP et al. 2013. Evaluation of the GeneXpert MTB/RIF test for the diagnosis of childhood pulmonary tuberculosis in Uganda: a cross-sectional diagnostic study. *BMC Infectious Diseases*. 13:133. doi:10.1186/1471-2334-13-133.
- Shakarishvili G. 2009. Building on Health Systems Frameworks for Developing a Common Approach to Health Systems Strengthening. Prepared for the World Bank, the Global Fund and the GAVI Alliance Technical Workshop on Health Systems Strengthening. Washington, DC. June 25-27, 2009.
- Shete PB et al. 2015. Pathways and costs of care for patients with tuberculosis symptoms in rural Uganda. *International Journal of Tuberculosis and Lung Disease*. 19(8):912-917.
- Shin S et al. 2004. Community-based treatment of multidrug-resistant tuberculosis in Lima, Peru: 7 years of experience. *Social Science Medicine*. 59(7):1529-39.
- Shringarpure KS. 2016. “When treatment is more challenging than the disease: a qualitative study of MDR TB patient retention. *PLoS ONE*. 11(3): e0150849. doi: 10.1371/journal.pone.0150849.
- Singh AA et al. 2004. Effectiveness of urban community volunteers in directly observed treatment of tuberculosis patients: a field report from Haryana, North India. *International Journal of Tuberculosis and Lung Disease*. 8(6):800-2.
- Smart T. 2010. Decentralized, patient-centered models of delivering treatment and palliative care for people with M/XDR-TB. *HATP* 166:2-9.

- Somma D et al. 2008. Gender and socio-cultural determinants of TB-related stigma in Bangladesh, India, Malawi and Colombia. *International Journal of Tuberculosis and Lung Disease*. 12(7): 856-66.
- Tadesse S. 2016. Stigma against Tuberculosis Patients in Addis Ababa, Ethiopia. *PLoS ONE*. 11(4):e0152900. doi: 10.1371/journal.pone.0152900.
- Toczek A et al. 2013. Strategies for reducing treatment default in drug-resistant tuberculosis: systematic review and meta-analysis. *International Journal of Tuberculosis and Lung Disease* 17: 299–307.
- Tuberculosis Coalition for Technical Assistance. 2009. *Implementing the WHO Policy on TB Infection Control in Health-Care Facilities, Congregate Settings and Households: A Framework to Plan Implement and Scale-up TB Infection Control Activities at Country, Facility and Community Level*. Washington, DC: USAID.
- USAID. 2012. Program Description: TRACK TB. Kampala: USAID.
- USAID. 2013. Documentation of Lessons Learnt: TB CARE I Uganda Project. Washington, DC: USAID
- van Olmen, J. et al. 2010. Analyzing Health Systems to Make Them Stronger. *Studies in Health Services Organizations & Policy*. 27: 5-98.
- van Olmen, J. et al. 2012. Health Systems Frameworks in Their Political Context: Framing Divergent Agendas.
- Volmink J, Garner P (2007) Directly observed therapy for treating tuberculosis. *Cochrane Database Systematic Reviews*. (4):CD003343
- Wandwalo E, Robberstand B, Morkve O. 2005. Cost and cost-effectiveness of community based and health facility based directly observed treatment of tuberculosis in Dar es Salaam, Tanzania. *Cost Effective Resource Allocation*. 3:6.
- Weaver MR et al. 2012. Capacity-building and clinical competence in infectious disease in Uganda: A mixed-design study with pre/post and cluster-randomized trial components. *PLoS ONE* 7(12):e51319.
- WHO. 2004. *Interim Policy on Collaborative TB-HIV Activities*. Geneva: WHO.
- WHO. 2009. *A guide to monitoring and evaluation for collaborative TB/HIV activities*. Geneva: WHO.
- WHO. 2012. *WHO policy on collaborative TB/HIV activities: Guidelines for national programmes and other stakeholders*. Geneva: WHO
- WHO. 2013. *Integrating community-based tuberculosis activities into the work of nongovernmental and other civil society organizations: Implementation manual*. Geneva: WHO
- WHO. 2014. *Guideline for HIV Surveillance among Tuberculosis Patients*. Geneva: WHO.
- WHO. 2015. *Global Tuberculosis Report: 2015*. Geneva: WHO.
- World Bank. 2016. World Governance Indicators: Uganda  
<http://info.worldbank.org/governance/wgi/pdf/c225.pdf>.
- Wright CM et al. 2015. Community-based directly observed therapy (DOT) versus clinic DOT for tuberculosis: a systematic review and meta-analysis of comparative effectiveness. *BMC Infectious Disease*. 15:210. doi:10.1186/s12879-015-0945-5.
- Wynne A et al. 2014. Tuberculosis and human immunodeficiency virus: exploring stigma in a community in western Uganda. *AIDS Care*. 26(8). 10.1080/09540121.2014.882488

- Yin et al. 2016. Association between directly observed therapy and treatment outcomes in multi-drug resistant tuberculosis: A systematic review and meta-analysis. *PLoS ONE* 11(3):e0150511.
- Zhang H et al. 2016. Impact of community-based DOT on tuberculosis treatment outcomes: A systematic review and meta-analysis. *PLoS ONE*. 11(2):e0147744.
- Zolowere D et al. 2008. Experiences of self-disclosure among tuberculosis patients in rural Southern Malawi. *Rural Remote Health*. 8(4): 1037.
- Zvavamwe Z, Ehlers VJ. 2009. Experiences of a community-based tuberculosis treatment programme in Namibia: A comparative cohort study. *International Journal of Nursing Studies*. 46(3):302-309.

## ANNEX 2: SCOPE OF WORK

### I. Introduction

TRACK TB is a USAID/Uganda five-year, \$12.5 million activity implemented by Management Sciences for Health (MSH). The activity's goal is to increase Tuberculosis (TB) case detection rate (CDR) and treatment success rate (TSR) in focus areas to meet national targets for reducing the burden of TB; MDR TB and TB/HIV. The project is scheduled to close on December 17, 2017.

The activity supports Development Objective 3; Improved Health and Nutritional Status in focus areas and populations through provision of technical assistance to the National Tuberculosis and Leprosy Control Program (NTLP). TRACK TB is expected to strengthen the capacity of Uganda's National TB and Leprosy Program, by providing innovative TB control strategies in Kampala and districts with existing USAID/Uganda TB programs through

1. Strengthen the NTLP's leadership and technical capacity to effectively manage TB control in Uganda
2. Expand community based DOTS in Kampala to reduce the rate of patients' defaulting TB treatment in the Kampala
3. Scaling up management of MDR TB in selected districts to prevent further MDR TB emergence
4. Technical assistance to, and improved coordination of USAID supported partners implementing district based activities to ensure the alignment of their activities with national TB program guides, policies and targets

#### Development Hypothesis:

Improved TB, TB/HIV, and MDR case detection and treatment success rates, if sustained over a longer period (five years), will result in reduced TB prevalence and mortality in supported districts. Building NTLP capacity for effective leadership and resource mobilization; support for improved TB activity implementation in Kampala and focus districts; and early detection and treatment of MDR TB if well-coordinated, will lead to increased treatment success and case detection rates in selected districts and will result in reduced TB prevalence and mortality in these focus areas.

The activity was expected to closely collaborate and leverage efforts of NTLP, USAID's district based TB/HIV and systems strengthening projects, CDC supported efforts for national TB control. TRACK TB is implemented in Kampala, with specific support to the NTLP and provides direct support/ direct service delivery for MDR TB services at selected Regional Referral Hospitals (RRH and other indirect support including training, mentorships and cohort reviews to selected sites supported by other USAID implementing partners. The activity is expected to complement and not displace efforts of Government of Uganda (GOU)-MOH, other donors, and Global Fund for AIDS, TB and Malaria (GFATM).

The recently completed first national TB prevalence survey of 2016 showed prevalence was three times previous estimates that had been based on models. This means that there will be more cases to notice and put on treatment than previously estimated, this has downward

implications on the ability of systems cope with in terms of supply of commodities, health service, staffing, and other resources etc.

As the TRACK TB project comes to a close, alongside the generation of the National Development Plan, new cooperation development strategies within USAID and other development partners; it becomes more important to understand the most critical interventions for stepping up and sustaining treatment of TB and therefore its elimination in the short and medium term in Uganda.

## **2. Purpose of the Assessment**

The purpose of the assessment is to establish the following:

- i) Which approaches have been more effective in contributing to the achievement of TRACK TB outcomes;
- ii) Identify what new priorities and strategies for sustainably addressing the TB challenge in Uganda;
- iii) Appraise TRACK TB project's collaborative work (partnerships, relationships etc.) with the Government of Uganda (GOU), donors and private sector have enhanced achievement of its objectives.

## **3. Audience**

The primary audience of the assessment findings includes Government of Uganda (MOH NTLP), USAID/Uganda Mission and development partners (CDC, GFTAM, WHO, STOP TB, CSOs, Local governments, and health facility) and civil society, to inform planning and programming of TB.

## **4. Assessment Questions**

The assessment will address the following specific questions:

*Context:*

- 1) How have the following TB rates (notification, detection, default, treatment success, cure and mortality) changed across different forms<sup>4</sup> of TB, regions and population groups in Uganda over the past 10 years?
- 2) What are key systemic bottlenecks to achieving sustainable TB control in Uganda? How can these bottlenecks be addressed in the future?

*Track TB Implementation Theory and Approach:*

- 3) To what extent have TRACK TB project's assumptions<sup>5</sup> held true?
- 4) How did TRACK TB's technical approach contribute to: *enhancing NTLP leadership, technical capacity and quality improvement for DOTS and; Tb and TB/HIV care?*

---

<sup>4</sup> TB forms include but not limited to TB/HIV co-infection, MDR, infant TB etc.

<sup>5</sup> Assumptions are external conditions that are necessary for success of project/program, but over which the project or program implementers have little or no control at all. Assumptions are provided in the program design document.

- 5) What successful innovations did TRACK TB initiate during the implementing and scaling up of the national model of care for *MDR TB*<sup>6</sup> and *urban DOTS*? Which of the innovations can be considered in future TB programming and implementation?
- 6) How did context<sup>7</sup> *facilitate or inhibit* TRACK TB project's *performance* and how did the project adapt to these changes?
- 7) How did TRACK TB support implementation/operationalization of TB infection control measures/guidelines in the health facilities and workplace?
- 8) To what extent are TRACK TB's interventions of TB and TB/HIV services delivery sustainable<sup>8</sup>?

*Looking forward:*

- 9) Based on new evidence on TB prevalence, which partnerships<sup>9</sup> and relationships are most critical to control TB?
- 10) What are the best practices from TRACK TB implementation that should be consolidated to improve TB/HIV service delivery in Uganda?
- 11) What key leverage points<sup>10</sup>, strategies and tools necessary for responding to the higher than previously estimated TB prevalence?
- 12) What key context issues and other assumptions around TB prevention should be considered in future programming?
- 13) How should TB data, management and; information sharing and dissemination be organized/structured in the future to adequately support TB implementation? What data and information gaps and challenges exist and how can they be addressed?

## **5. Assessment Design and Methodology**

### **5.1 Assessment Design**

The assessment will be conducted over three phases. The first phase will focus on literature review, secondary data analysis and Phase 2 field data collection scoping by a local Ugandan team in collaboration with a team from USAID Washington. The second phase will focus on field work to collect real time data and perspectives on TRACK TB performance and other issues affecting the reduction of TB, TB/HIV and MDR TB jointly led by the in country team including consultants, USAID Uganda staff and a team from Washington. A final phase will

---

<sup>6</sup> The MDR TB care model in Uganda is such that treatment is initiated at the RRH and thereafter, patients are referred to a lower level health facility closest to their homes to continue treatment

<sup>7</sup> Context refers to the environment in which project or program is implemented in, the context may have bearing on the outcome of the project or program. The environment could include, political, economic, social, management, and cultural environment and the opportunities or constraints it presents.

<sup>8</sup> Sustainability for TRACK TB was defined as one, embedding implementation and reporting structures within currently existing ones at national, district and community level, including working with existing community based organizations, networks and groups to improve TB services. Building local capacity to plan, design, implement monitor and maintain TB, TB/HIV and MDR TB activities through technical and organizational capacity building at the NTLP. Secondly, sustainability was also defined as progressively increasing the responsibility for planning, funding and implementing of program's activities by NTLP.

<sup>9</sup> Partnerships should include GFATM and PEPFAR

<sup>10</sup> These include systematic points, partnerships and relationships

involve a facilitated stakeholder engagement to validate findings of the assessment and prioritize key interventions going forward.

The assessment team is expected to use both qualitative and quantitative techniques to provide answers to assessment questions and use sound analysis approaches.

*Phase 1: Literature Review and Scoping (May 2016, 3 weeks LOE)*

This Phase will consist of desk work and virtual coordination with USAID Washington team

- Review of project documents and related literature: The team will review several project related documents including solicitation documents, annual work plans, performance management plans (PMPs), progress reports including quarterly review meetings and cohort reviews. The team will also review other district and health sector plans, strategies particularly the National TB Strategy, National TB Prevalence Study, as well as other strategy policy and performance documents. USAID will also share documents on other relevant sector analyses including the Political Economy Analysis and other health systems.
- Analysis of secondary data: the team may analyze service delivery data from DHIS-2, MEEPP, NTLP data and national TB prevalence survey data.
- Interviews: Initial interviews, planning and consultations with USAID, TRACK TB, and other relevant groups by phone/Skype (for U.S.-based team members) and/or in person (for Ugandan team members).
- Designing the methodology, tools and schedule for the field work.

By close of Phase 1, the assessment team will have the following **key outputs** to feed into Phase 2 as agreed on by both USAID TB team and USAID Washington team

- Inception Report
- Synthesis of literature review and secondary data analysis
- Compilation of reference materials
- Field data collection plan including sample selection for RRH and health facilities to be visited, lists of key informants and focus group discussion participants; data collection tools, field schedule.
- Stakeholder engagement strategy and plan for Phase 3.
- Final report outline.
- AAR (after action review) report, for Phase 1

*Phase 2: Field Data collection (May 2016, 2 weeks LOE)*

This Phase will consist of field work and continued data analysis by the in country team and specialists from USAID Washington. It will specifically involve

- **Team Planning meeting** upon arrival to review available data, finalize tools and form data collection teams

- **Site/health facility visits** to a purposive sample of RRH and health facilities that have directly or indirectly benefited from the activity to gain a better understanding of project activities and operating context. TRACK TB provides direct support/ direct service delivery for MDR TB services at Soroti Regional Referral Hospital (RRH), Lira RRH, Hoima RRH, Mbarara RRH, Kitgum Hospital, Mulago National Referral Hospital (NRH). TRACK TB provides technical assistance (TA)/indirect support (indirect support includes training, mentorships and cohort reviews) to the following sites supported by other USAID implementing partners: Mbale RRH, Fort Portal RRH, Kabale RRH, Mubende RRH, Masaka RRH, Gulu RRH, Arua RRH, Iganga RRH, and Matanyi Hospital.
- **Key Informant Interviews (KII):** KIIs will be used to capture experiences, views and perspectives of key stakeholders about the project and overall TB sector performance. This includes staff from USAID, WHO, STOP TB Partnership, MOH, local government, non-government stakeholders, staff of RRHs, health facility managers and service providers
- **Focus Group Discussions (FGD):** FGDs may be used to collect data from stakeholders. These may include staff from local governments, partner organizations, TB patients and mentors in Kampala, CSOs, RRHs, health facilities and clients who have utilized TRACK TB services.
- **Discussions with communities and community structures (e.g. Village Health Team, local leadership):** discussions with community structures like Village Health Teams, local leadership in understanding their roles and responsibilities in TB implementation.
- **Document review** and other secondary data analysis as necessary to be carried forward from Phase I.
- **Synthesis** of the data collected

By close of Phase 2, the assessment team will have the following key outputs to feed into Phase 3

- PowerPoint presentation to be used for a debriefing at an internal USAID group and broader stakeholder group. The debriefing will include a discussion of findings, emerging conclusion, lessons learnt as well as any recommendations the team has for possible future designs and implementation.
- AAR (after action review) report, building on the AAR of Phase I
- A debrief meeting with representative of key stakeholders i.e. CDC, WHO, GFTAM, Stop TB program and NTLP

Phase 3: *Stakeholder engagement and validation (June 2016, 2 weeks LOE)*

During this phase, the assessment team including USAID staff will engage with targeted stakeholders to share and verify preliminary findings; foster dialogue; and generate agreement on promising practices, current gaps, and recommendations for the future. These may occur at a national as well as regional/district level. This will include

- Multi-stakeholder debrief workshop targeting both the Kampala and regional representatives to validate findings and prioritize key areas of action. These will include USAID, CDC, WHO, GFTAM, Stop TB program, NTLP, district representatives, CSOs and other relevant persons.
- Stakeholder engagement could take a number of forms i.e.
  - Short debrief meetings with stakeholders after each phase
  - Creative in-person meetings.

By close of Phase 3, the assessment team will have the following **key outputs**

- **Stakeholder engagement meeting / workshop report** documenting key inputs, feedback, recommendations and additional areas for analysis as communicated by the stakeholders.
- **AAR (after action review) report**, building on the AARs of Phase I &2  
**PowerPoint presentation and Draft Assessment Report:** The team will submit a power point and report to the Learning Contract for review and provide feedback prior to submission to USAID Uganda. QED will be responsible for submitting the draft power point and report. The consultants should be available to present the findings. The content of the draft report should cover all the main elements of a report including major findings, conclusions, lessons learned, recommendations and relevant annexes. Input from the stakeholder engagement sessions should also be incorporated in the draft report. USAID TB team in Kampala and Washington, and other key stakeholders as identified will provide comments on the first draft report within two weeks of submission. The first draft report should be 15-25 pages excluding the executive summary and the annexes.
- **Final Draft Report and power point presentation:** A final report and a power point presentation presented in the agreed-upon format after incorporating comments from USAID TB team and the Learning Contract. The written report should clearly describe findings, conclusions, and recommendations. USAID TB team will provide comments on the final report within one weeks of submission.
- **Final Report:** The team leader will submit a final report to the Learning Contract within one week of receiving final comments from USAID TB team including those from other stakeholders. The final report should be 15-25 pages excluding the executive summary and the annexes. The format will include an executive summary, table of contents, methodology, findings, and recommendations. The report will be submitted electronically in both word and pdf versions.
- **Cleaned labeled and ready to use electronic copies of datasets** collected through assessment must be separately delivered to the Learning Contract for onward delivery to USAID.

### 5.3 Potential Limitations

- Given the limited time available for this activity, the assessment will not be as in depth in certain areas and will not strive for representative samples.

- Likely bias as a result of involvement of USAID and NTLP staff among others in data collection and analysis. The major purpose of this assessment is to gain an understanding on what is working or not and not make a determination on success. The teams and methods have been chosen with on spot joint learning as the primary purpose. Stakeholder workshops will be helpful in validating some of these findings and identifying areas for deeper investigation where necessary.
- Availability of quality and adequate service delivery data in the District Health Information System (DHIS-2) and the NTLP database will pose limitations during this assessment especial trend analysis of indicators. Though capacity of local governments and their partners to compile and make available routine health services and use data has improved, completeness and accuracy of data is not guaranteed. The assessment team will provide recommendations on how they will address these limitations.

## 6. Anticipated Level of Effort (LOE) Required

The assignment is estimated to begin early May 2016 and be completed no later than June 2016. The anticipated major tasks below are not necessarily presented in the order of execution. Contract may provide for protracted timeline outside the performance time to provide for billing and closure.

| Anticipated Major Tasks                                                  | Assessment Team | USAID TB Team | USAID/ Washington | Expected LOE (Days) |
|--------------------------------------------------------------------------|-----------------|---------------|-------------------|---------------------|
| Review of literature and program documents                               |                 |               |                   | 4                   |
| Team Planning Meeting                                                    |                 |               |                   | 6                   |
| Inception Report (including presentation)                                |                 |               |                   | 1                   |
| Field work (data collection)                                             |                 |               |                   | 14                  |
| Data Analysis                                                            |                 |               |                   | 7                   |
| Preparation for stakeholder workshop/synthesized report and presentation |                 |               |                   | 2                   |
| Stakeholder engagement workshop                                          |                 |               |                   | 1                   |
| Draft Report writing                                                     |                 |               |                   | 5                   |
| Debriefing                                                               |                 |               |                   | 1                   |
| Final Draft Report                                                       |                 |               |                   | 4                   |
| <b>Total Days</b>                                                        |                 |               |                   | <b>45</b>           |

## 7. Team Composition

The assessment will be conducted by an assessment team, consisting of Ugandan experts. The assessment team must include a team leader (TB expert) and two senior experts and may include research assistants/middle level consultants as need be. The following are the key assessment team members:

1. Team Leader /TB Epidemiologist (DOTs, MDR TB)
2. TB/HIV Expert
3. Health System Expert
4. Biostatistician /Data analyst

1. Team Leader /TB Epidemiologist shall have:
  - o A minimum of a Master's degree in human medicine or health sciences or public health, applied research or related fields.
  - o Significant expertise in DOTs, MDR TB, TB/HIV-3I, TB/MNCH and epidemiology with a minimum of five years' experience in implementing TB interventions in Uganda.
  - o Skills in health systems, quantitative and qualitative methods.
  - o Skills in efficiency analysis and report writing
2. TB and TB/HIV expert shall have:
  - o A minimum of a Master's degree in human medicine or health sciences or public health, applied research or related fields.
  - o Significant expertise in TB/HIV-3I and TB/MNCH with a minimum of five years' experience in implementing TB interventions in Uganda.
  - o Skills in health systems, quantitative and qualitative methods.
3. Health System expert/writer shall have:
  - o A minimum of a Master's degree in human medicine or health sciences or public health, applied research or related fields.
  - o Significant expertise in health systems with a minimum of five years' experience in analysis, assessing, functioning of system in Uganda.
  - o Skills in health systems, quantitative and qualitative methods.
  - o Skills in report writing
4. Biostatistician/ Data analyst shall have:
  - o A minimum of a Master's degree in medical statistics, biostatistics or applied statistics.
  - o Significant expertise in analyzing large bio/medical datasets including TB data, health datasets like the District Health Information System (DHIS-2).
  - o Experience working with health facility data and records
  - o Should have experience in biostatistics on a minimum of five years with at least one relating to TB intervention of a similar scale
  - o Skills in quantitative data analysis (including large datasets) and report writing.

## **8. Expected Deliverables from Team Members**

The assessment team members will among others be responsible for the following deliverables:

1. Team Leader /TB Epidemiologist deliverables:
  - a) Provide technical leadership to the team i.e. review all deliverables from the team to sure they meet agreed quality
  - b) Provide TB epidemiology literature review
  - c) Lead and contribute to the inception report
  - d) Provide TB epidemiology specific questions from the general questions in the SOW
  - e) Lead the team in agreeing on the investigation units to be included in the assessment
  - f) Lead the team in developing the assessment schedule (detailed timelines)
  - g) Participate in fieldwork (data collection)
  - h) Analysis and interpretation of TB epidemiology data
  - i) Draft TB epidemiology sections of the report using (h) above
  - j) Lead presentation of results and all stakeholder engagements
  - k) Support report writing
  
2. TB and TB/HIV expert deliverables:
  - a) Provide TB and TB/HIV literature review
  - b) Contribute to the inception report
  - c) Provide TB and TB/HIV specific questions from the general questions in the SOW
  - d) Participate in agreeing on the investigation units to be included in the assessment
  - e) Participate in developing the assessment schedule (detailed timelines)
  - f) Participate in fieldwork (data collection)
  - g) Analysis and interpretation of TB and TB/HIV data
  - h) Draft TB and TB/HIV sections of the report using (g) above
  - i) Participate in presentation of results and all stakeholder engagements
  - j) Support report writing
  
3. Health System expert/Writer deliverables:
  - a) Provide TB/health system literature review
  - b) Write the inception report
  - c) Provide TB/health system specific questions from the general questions in the SOW
  - d) Participate in agreeing on the investigation units to be included in the assessment
  - e) Participate in developing the assessment schedule (detailed timelines)
  - f) Participate in fieldwork (data collection)
  - g) Analysis and interpretation of TB/health system issues
  - h) Draft TB/health system sections of the report using (g) above
  - i) Participate in presentation of results and all stakeholder engagements
  - j) Write the draft and final report using inputs from all team members
  
4. Biostatistician/ Data Analyst deliverables:
  - a) Compile TB and TB/HIV data from reports
  - b) Compile TB and TB/HIV from DHIS-2, MEEPP, NTLP data and national TB prevalence data as needed.
  - c) Contribute to the inception report, specifically the methodology aspects

- d) Participate in agreeing on the investigation units to be included in the assessment
- e) Participate in developing the assessment schedule (detailed timelines)
- f) Participate in fieldwork (data collection)
- g) Support all team members in analysis and interpretation of data
- h) Develop charts and tables using (g) above
- i) Participate in presentation of results and all stakeholder engagements

## **9. Assessment Management**

*The Learning Contract has overall responsibility for the coordination and management of this assessment. This will include:*

- Day-to-day management of the assessment team,
- Logistical support i.e. responsible for making transport and other logistical/management arrangements and will also cover all relevant facilitation for assessment team members and government staff members, if and when necessary
- Primary responsibility in coordinating necessary inputs
- Quality assurance and submission of relevant deliverables to USAID TB Team
- Organize relevant stakeholder in briefs and de-briefs and
- overall ensuring that the key requirements of the SOW are being met.

*USAID TB team will have a primary responsibility to:*

- Review and clearance of assessment products in line with the requirements and standards established in the SOW.
- Take part in field data collection, analysis and stakeholder engagement
- Formal communication with all key TB stakeholders which includes stakeholder engagement

*Ministry of Health/NTLP*

- The Ministry of Health/NTLP may nominate a senior staff member(s) to join the assessment team and participate in critical field data collection activities, analysis and reporting.

## **10. Logistical Support**

The Learning Contract (QED) will provide equipment necessary for performance of this activity including transport hire (within Kampala and upcountry), office supplies, communication costs,

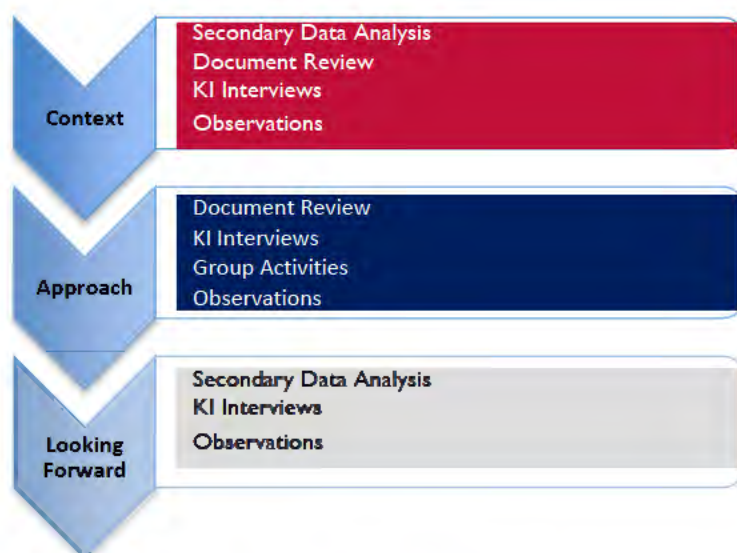
## **11. Performance Period**

The assessment is scheduled to begin in May and end in June 2016. The end of the performance period will be coordinated with USAID TB team.

## ANNEX 3: METHODOLOGY OF THE ASSESSMENT

### *Assessment Design*

This assessment utilized a mixed method methodology focused on a) quantitative data generated and analysis of data from secondary data sources; b) qualitative and quantitative information found in program and project documents and other relevant literature; c) key informant interviews; and d) focus group discussions. For certain assessment questions such as those on TB infection control procedures, site visits and observations were also used. Additionally, the assessment used stakeholder engagement activities *both* as a means of stakeholder dissemination of the findings from the assessment and as a way to iteratively return to findings and refine and supplement data collected.



### **Assessment Theoretical Framework**

#### *Literature Review*

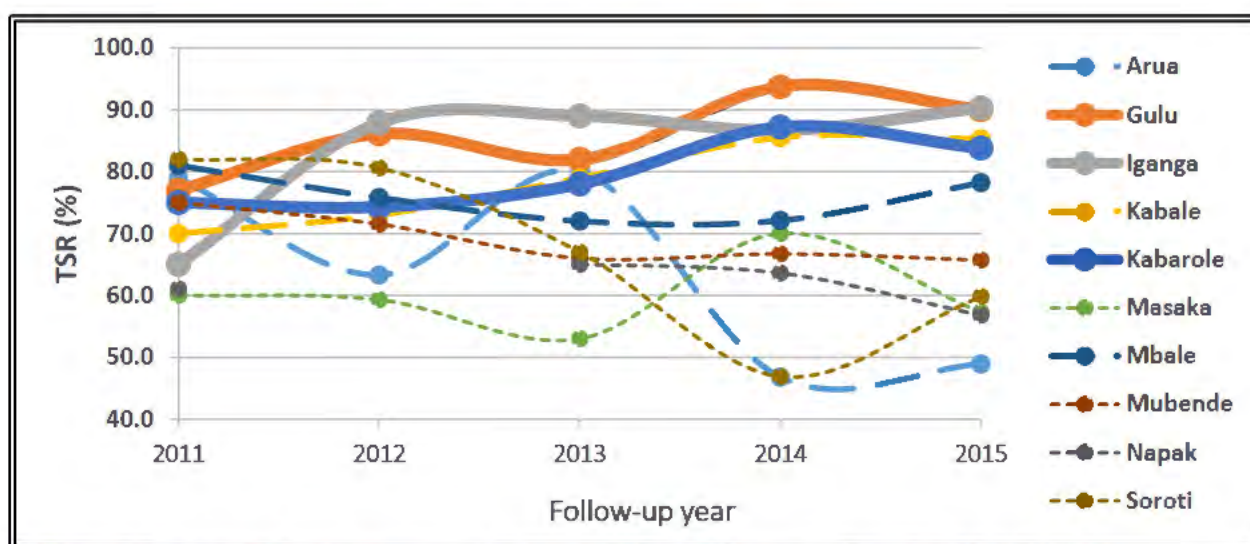
A two-part literature review was performed a) purposive collection of relevant program documents based on i) recommendation from key TRACK TB and TB control stakeholders; ii) accessibility; b) a semi-structured narrative review utilizing agreed upon MeSH search strings within relevant databases.

#### *Secondary Data Analysis*

8-year program susceptible TB data was obtained from electronic databases of the NTLP and analyzed. This time frame was based on the start date of the NTLP database since, prior to this 2008, data on TB is not readily available in electronic form. For MDR TB we obtained data from the start of the PMDT in the country and analyzed it. To validate secondary data, primary data from a small sample of data generation points were collected. This data was collected in a sample of 10 urban DOTS facilities and 5 MDR TB sites. In the case of MDR TB sites, selection

of facilities was carried out via a purposive sampling procedure leading to the selection of 5 facilities among the 13 supported by TRACK TB from start of the start of activity in 2013 (i.e. other facilities have been added since this time). Of these, 3 (including Mulago National Referral Hospital, Mbarara Regional Referral Hospital (RRH), and Kitgum Hospital) have been entirely TRACK TB supported. Mulago, Mbarara and Kitgum also represent three historic sites for MDR TB control in Uganda. The other 10 facilities have received support from both TRACK TB and SUSTAIN. These 10 jointly-supported facilities include Arua RRH, Gulu RRH, Matany Hospital (Napak district) Soroti RRH, Mbale RRH, Iganga Hospital, Mubende RRH, Fort Portal RRH (Kabarole district), Masaka RRH and Kabale RRH. The sample then includes the original 3 TRACK TB-only supported facilities, and two others selected from the other 10 facilities.

Purposive sampling was determined by extracting TB treatment success rates (TSR) for the 10 facilities from the facility league tables for five years (2011-2015) found in the Ministry of Health's Annual Health Sector Performance Reports (see Figure 1). A median score was obtained based on each facility's TSR across the five years.



**TSR by Year and Performance (indicated by thickness of line), TRACK TB Intervention Districts**

This median allowed for the ten facilities to be divided into tertiles and grouped as in Table 6 below:

| High performance | Medium performance | Low performance |
|------------------|--------------------|-----------------|
| Gulu             | Arua               | Masaka          |
| Iganga           | Kabale             | Mubende         |
| Kabarole         | Mbale              | Napak           |
|                  |                    | Soroti          |

**TRACK TB District TSR Performance Rankings**

Napak was then excluded due to the logistical difficulties of reaching Matany Hospital, as well as because there were some years for which data on Matany was not available.

As the team was already going to Kitgum and Mbarara Hospitals, it was then possible to select districts directly en route to both those districts, one from a high TSR performing district (Gulu, en route to Kitgum), another from a low TSR performing district (Masaka en route to Mbarara).

In the case of Urban DOT program performance, selection was carried out via a purposive sampling procedure of KCCA TRACK TB-supported facilities at which both the TB focal point at the facility and the community linkage facilitator - a community health worker supported by TRACK TB – were interviewed. The sample was chosen in a similar to the way in which the RRHs/districts were chosen, except that with KCCA facilities, the DOT coverage (instead of TSR) was used to group the KCCA facilities as low or high performance. Ten facilities (out of 67, that is 15%) were selected taking 5 from low and 5 from high performance groups. Among the 5 in each group, we considered 3 from government, 1 NGO, and 1 private facility. More government facilities were considered (compared to NGOs and private) due to the fact that the availability and willingness of the stakeholders in government facilities to cooperate would enable greater output. The DOT coverage data of January – March 2016 (provided by TRACK TB team) was considered.

#### *Key Informant (KI) Interviews and Focus Group Discussions*

The population targeted for interviews was defined as including those individuals who:

- Had technical expertise in the TRACK TB activity, including activities carried out by activity sub-primes
- Could be identified, or self-identify, as professional experts with regard to TB control who are clearly cognizant of having been a stakeholder in TRACK TB activities
- Were willing to provide informed oral consent following a short briefing of the nature and purpose of the assessment.

The reasons for these criteria are explained in the section on *Ethical Considerations* below.

As the assessment questions deal with different populations of stakeholders, different methods of sampling were required. There were several broad categories of KIs: a) those who were involved directly in TRACK TB at the management, and technical partnership levels; b) key national TB control stakeholders; c) central-level NTLP- and facility-level recipients of TRACK TB interventions; d) district-level NTLP and facility level recipients of TRACK TB. The first two categories were limited in scope and the second two categories were necessarily opportunistic as they depended on which stakeholders were available on the day of the interview. Sampling was thus necessarily purposive.

We originally planned to conduct 48 KI interviews for central level and Kampala and 37 KI interviews for district level persons; however, this number rapidly increased during fieldwork. Ultimately, we spoke to 134 people total, 23 in KI interviews and the remainder in 18 FGDs.

During FGDs, each individual was assigned a unique number and their contributions were logged accordingly. We were therefore able to clearly identify individuals speaking within the transcript. The majority of respondents we spoke to were health workers in hospitals (n=58) and public sector health centres (n=24). Among these, the vast majority were nurses (n=38). Tallies of the categories of respondent are available below, as are tallies of the cadre of health workers.

| Category               | Kampala   | Kitgum    | Gulu      | Mbarara   | Masaka    | TOTALS     |
|------------------------|-----------|-----------|-----------|-----------|-----------|------------|
| MoH                    | 10        | -         | -         | -         | -         | 10         |
| Local Gov              | 1         | 2         | 3         | -         | 1         | 7          |
| Hospital               | 17        | 14        | 6         | 7         | 14        | 58         |
| HF - Public            | 18        | -         | 2         | 2         | 2         | 24         |
| HF - Private           | 11        | -         | -         | -         | -         | 11         |
| TRACK TB               | 13        | -         | -         | -         | -         | 13         |
| AIC                    | 3         | -         | -         | -         | -         | 3          |
| Implementation Partner | 1         | 1         | 1         | 2         | -         | 5          |
| Tech Partner           | 2         | -         | -         | -         | -         | 2          |
| Donor                  | 1         | -         | -         | -         | -         | 1          |
| <b>Totals</b>          | <b>77</b> | <b>17</b> | <b>12</b> | <b>11</b> | <b>17</b> | <b>134</b> |

| Cadre                                                                                                              | Total     |
|--------------------------------------------------------------------------------------------------------------------|-----------|
| Nurses (various cadres)                                                                                            | 38        |
| Community Linkage Facilitators                                                                                     | 15        |
| Counselors/Social Workers                                                                                          | 6         |
| Lab Personnel                                                                                                      | 4         |
| Hospital Directors (Deputies/Acting)                                                                               | 4         |
| Facility Data Personnel                                                                                            | 6         |
| Medical or Clinical Officers/Doctors                                                                               | 13        |
| Administrator                                                                                                      | 2         |
| Dispenser                                                                                                          | 1         |
| Undetermined*                                                                                                      | 4         |
| <b>Total</b>                                                                                                       | <b>93</b> |
| * Individuals who didn't clearly specify their names on the FGD attendance lists, or whose job title was illegible |           |

### Data Analysis

### Literature reviews

Three separate literature reviews were independently produced: TB epidemiology, TB/HIV,

and Health Systems. Once these were ready, they were used in the answering the assessment questions and fed into the main assessment report. These, however, can be made available independently on request.

### Quantitative

Extracted secondary data (susceptible TB and MDR TB) were cleaned in Excel then in Stata version 12. Data was then analyzed for TB indicators. Analyzed indicators included notification, case detection, loss to follow-up, treatment success, cure and mortality. For TB/HIV, analyzed included proportions counseled, tested, HIV positive, started on co-trimoxazole preventative therapy (CPT) and ART. Primary collected data was analyzed in the same way.

Percentage change in rates over a period of 10 years (2006 - 2015) were computed and changes over time compared between TB types, age groups (focus on 65+ years), sex, regions/zones, districts and facilities. Also, rates for the selected TRACK TB facilities were compared to those where TRACK TB did not operate (control facilities) to assess the contribution of TRACK TB towards TB control. Tables and figures were used to show trends, and a non-parametric trend test or a parametric regression model will be used to test for change in rates over time (and between groups).

### Qualitative

Transcripts from interview data were analyzed thematically via Nvivo Qualitative Data Analysis software. Transcripts were uploaded into Nvivo. The team then collaboratively generated themes after review of the existing transcripts. The health systems expert carried out semi-systematic searches using agreed upon thematic categories, with broad inclusion criteria decided upon beforehand (e.g. issues that only appear once across the entire body of transcripts will only be included as “evidence” if a substantive learning point has been suggested, with the understanding that the learning point will be highlighted in footnotes as requiring follow up). Documents from the literature review were analyzed manually using the same thematic categories. Data generated in group activities was also be recorded and thematically coded, as well as used for the creation of mini-case studies, visual timelines, and analytical maps.

### Stakeholder Engagement

Two separate stakeholder engagement activities were held in order to ensure collaborative analysis of data and to achieve buy-in. The first, on 2 June, was held at the NTLP and included a broad range of central level respondents in order to validate qualitative findings and to generate feedback and critique. The second, on 14 June, was a broad stakeholder engagement involving both Q&A and feedback from participants, and then participatory roundtable discussions organized by USAID’s project development office to feed into the development of new TB program planning at the USAID/Uganda Mission. Information generated at both stakeholder engagements fed into the final assessment report.

## *Ethical Considerations*

Because of the limited time and resources available, the team had no opportunity to pass this assessment through traditional ethical review channels. The primary review mechanism was the review of the inception report by the USAID TB team in Uganda. As the assessment involves interviews with human subjects, however, some restrictions on the fieldwork and on the categories of interview subject apply.

First, KIs must be professional and/or technical experts who are clearly cognizant of being a stakeholder in TRACK TB, either at management level or at recipient level, or in the national TB control program. Second, they must be able and willing to provide informed oral consent following a short briefing of the nature and purpose of the assessment. Third, the assessment must engage them solely regarding their professional/technical experience with, opinion about, or expertise vis-à-vis elements of either TRACK TB or TB control in Uganda more generally.

Vulnerable populations and those individuals not clearly cognizant of their relationship to either the TRACK TB activity or the national TB program were excluded as an assessment population due to the legal restrictions and ethical implications surrounding human subjects' research in Uganda. These excluded groups included TB patients. Interviews with lower level facility workers and "communities" were considered carefully in order to ensure that the team did not breach national ethics standards.

As one of the primary data collection instruments for the assessment involves KI interviews and FGDs in which each individual's contribution was uniquely logged, we ensured confidentiality by allocating a unique code to each respondent, then labeled the KI and FGD transcripts with relevant codes. A separate document was kept linking the transcript code to the respondent's identifying information (subjects' names, place of work). Only the assessment team was allowed access to the document containing identifying information, as well as to the transcripts. Following the completion of dissemination documents, all copies of transcripts will be turned over to QED, where they be securely held for a period of three years, at which point they will be destroyed. The document containing identifying information will be held separately by the assessment team, and destroyed as well.

Within dissemination documents (reports, presentations), quotes or information provided by subjects were identified by the code on the transcript, and potentially by a general professional category (e.g. implementing partner, central government, district government, facility) if their perspectives were clearly informed by their professional position. However, no additional information (such as name, title, or name of the office, facility, or district in which the subject works) was attached to quotes, in order to ensure that the respondent cannot be identified.

By avoiding targeting vulnerable populations and by interviewing professional people as to their expertise, experiences, and insights specifically in relation to the TRACK TB activity, and TB control in Uganda more generally, the assessment sought to minimize risk and maximize benefit for participants.

### *Quality Control*

Because of the limited time and resources which were available for this assessment, more extensive quality control measures (such as pre-testing or participatory generation of information units and evidence types) were not possible for this activity. In order to improve consistency, validity, and replicability of findings, the assessment took the following steps.

- Developed and used an assessment matrix Annex 4, created and filled in with review and input from key stakeholders at QED and USAID
- Carried out iterative review of the matrix by assessment team members and key stakeholders across all three phases of the assessment with a view to further refinement or extension
- Developed and used collaboratively developed standardized interview protocols, interview guidelines, and other data collection tools specific to stakeholder groups and to health system levels (national, regional, facility, etc.).
- Share transcripts and meeting notes for collaborative editing and cross-checking of accuracy
- Implemented stakeholder engagement meetings/workshops for inputs, feedback, and cross-checking
- Disseminated of Draft Assessment Report for further input.

## ANNEX 4: GETTING TO KNOW MATRIX

| Question # | Section | Assessment Question                                                                                                                                                                                                                                                                                                                                                          | Sub-Questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Type of Answer Needed                               | Data Collection Method(s)                                                                       | Data Source(s)                                                                                                                                  | Sampling/ Selection Criteria | Data Analysis Methods                                                                                                               | Data Gaps/Issues                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Q1         |         | How have the following TB rates (notification, detection, loss to follow up, treatment success, cure and mortality) changed across different types (TB/HIV, MDR, infant, general, new cases, previously treated, above 65, and common indicators for TB/HIV collaborative activities across districts, regions/zones and population groups in Uganda over the past 10 years? | <ol style="list-style-type: none"> <li>1. Do these numbers and rates significantly differ between the TB types?</li> <li>2. How have trends in these rates changed over time, over gender, over age?</li> <li>3. How have trends changed across regions/zones?</li> <li>4. What changes to other relevant health and social development indicators have taken place alongside changes in TB indicators (e.g. HIV prevalence, ART coverage, etc.)?</li> <li>5. What findings from other parts of this assessment might inform an understanding of the emerging data?</li> <li>6. How might this data be mapped against findings from other parts of the assessment?</li> </ol> | Trend, Comparison, Explanation, Description Mapping | Secondary data extraction; Document review                                                      | NTLP reporting documents (e.g. Annual and Quarterly Reports); DHIS 2; WHO TB data and reports; other NTLP and MoH policy and strategy documents | Purposive selection          | Trend analysis; Chi square for trend test; Mapping of trend data against program and external events, inputs, activities, processes | <ol style="list-style-type: none"> <li>1. If you are going to look at data over time between regions/zones is a problem, because regions/zones in the past were different and may only partially overlap with regions in the present;</li> <li>2. MDR data did not start being collected until 2012, so will have to go to facilities where there may be gaps;</li> <li>3. Age data will be adjusted b/c there are emerging groups we need to include;</li> <li>4. Availability of data for 10 years may not be on a single PC, or even a single office (i.e. TB data before <b>2008</b> was collected by WHO).</li> </ol> |
| Q2         |         | What are the key systemic bottlenecks to achieving sustainable TB control in Uganda? How can these bottlenecks be addressed in the future?                                                                                                                                                                                                                                   | <ol style="list-style-type: none"> <li>1. What elements make up a TB system and how do these tie to the broader health system?</li> <li>2. How do TB control systems link to the broader health system?</li> <li>3. Where in both Uganda's TB and overall health systems do bottlenecks occur? Why?</li> <li>5. What has been done in the past in Uganda to overcome</li> </ol>                                                                                                                                                                                                                                                                                               | Description                                         | Literature and document review; Interviews; Review of secondary data on key systems indicators. | NTLP and MoH policy and strategy documents; Interviews with KIs, (tech experts, program managers,                                               | Not required                 | Thematic analysis, Systems Mapping, Semi-systematic narrative literature review                                                     | <ol style="list-style-type: none"> <li>1. Existing academic literature on TB in Uganda is primarily biomedical or epidemiological and does not focus on health systems;</li> <li>2. Existing program documentation is overly focused on technical issues and not systems;</li> <li>3. The overall body of</li> </ol>                                                                                                                                                                                                                                                                                                       |

|    |  |                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                               |             |                                                                                              |                                                                                                                                                                                                                                                         |                                                                              |                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                         |
|----|--|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |  |                                                                                                                                                       | <p>bottlenecks?</p> <p>6. Have these efforts worked?</p> <p>7. How can TB systems - and the elements of the health system that affect TB - be facilitated working in the future?</p>                                                                                                                                                                                          |             |                                                                                              | IPs); Grey and published literature on health/TB systems                                                                                                                                                                                                |                                                                              |                                                                               | academic and grey literature on health systems in Uganda is not extensive.                                                                                                                                                                                                                                                                                                                              |
| Q3 |  | To what extent have the TRACK TB project assumptions held true?                                                                                       | <p>1. Has TB remained a health priority for government?</p> <p>2. Is there political support for TB?</p> <p>3. Are there technical human resources for TB?</p> <p>4. Is there community support for TB control?</p> <p>5. Is there presence and cooperation of USAID implementing partners?</p> <p>6. Is there good governance?</p> <p>7. Is there availability of funds?</p> | Explanation | Document review and analysis; Review of statistics on outcomes.                              | Ministerial statements; National and health policy, strategy, and budget documents; NTLP strategy and policy documents; USAID Uganda development cooperation strategy documents; Global Fund data on financing sources; Governance indices (IIAG, WGI). | Not required                                                                 | Checklist against common indicators for political priority and commitment ??? | <p>I. Measurement of these issues is always by proxy (i.e. Is TB in the national development plan? Has TB been mentioned in ministerial or parliamentary statements? What is the proportion of health budget dedicated to pharmaceuticals and supplies? What are the stocking levels of tracer drugs at NMS and at facility? What proportion of various health worker cadres positions are filled?)</p> |
| Q4 |  | How did TRACK TB's technical approach contribute to: <i>enhancing NTLP leadership, technical capacity and quality improvement for DOTS and TB/HIV</i> | <p>1. What sorts of activities were planned under "enhanced leadership", "technical capacity" and "quality improvement"?</p> <p>2. What activities were carried out (outputs)?</p> <p>3. Per outcomes, did enhanced leadership and NTLP built capacity</p>                                                                                                                    | Description | Document review; KI Interviews; Primary data collection; Secondary data analysis Stakeholder | Interview transcripts, TRACK TB performance indicators and outcomes, TRACK TB                                                                                                                                                                           | Purposive selection of KIs in Kampala. Up country, three TRACK TB and MDR TB | Thematic analysis, Baseline against performance outcomes                      | <p>I. No data gaps, but bias toward perspectives and opinions of KIs</p>                                                                                                                                                                                                                                                                                                                                |

|  |  |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |          |                                 |                                                                                                                                                                                                                                                                                                                     |  |  |
|--|--|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  |  | care? | <p>bring about development of joint strategic/operational plans, holding of regular quarterly program review meetings, conduction of regular joint support supervision to zones/districts, and improved TB data quality and conduction of operation research?</p> <p>4. Did NTLP quality improvement campaigns bring about improvement in DOT coverage and TB HIV collaborative activities, such as the presence of a coordinating body and TB/HIV focal persons at national level, TB/HIV enabling policies, joint TB/HIV plans, TB IC and IPT guidelines, integrated TB/HIV M&amp;E tools, surveillance of TB/HIV among HCWs?</p> <p>5. Has there been increased availability and application of TB IC facility plans, availability and use of N95 respirators in MDR TB facilities, Intensified Case Finding tools (ICF form), TB Presumptive registers</p> <p>6. Has there been an improvement in common indicators to achieve TB/HIV integration?</p> <p>7. What factors did stakeholders feel influenced implementation and outcomes?</p> <p>8. How did stakeholders respond to these factors?</p> <p>9. Did stakeholders value the approach/es?</p> <p>10. How do stakeholders perceive</p> | meetings | program docs<br>Meeting minutes | <p>sites automatically included (Mulago, Kitgum, Mbarara); Ten TRACK/SUSTAIN sites categorized into tertiles based on mean TSR over five years (project start year, plus 2 years pre- and post-). One high performing and one low performing selected from list based on routing and logistical considerations.</p> |  |  |
|--|--|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|

|    |  |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                                                            |                                                                                                                                                                                                  |                     |                                                               |                                                                                |
|----|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------|
|    |  |                                                                                                                                                                                                                                          | the sustainability of what was carried out?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                            |                                                                                                                                                                                                  |                     |                                                               |                                                                                |
| Q5 |  | What successful innovations did TRACK TB initiate during the implementing and scaling up of the national model of care for MDR TB and Urban DOTS? Which of the innovations can be considered in future TB programming and implementation | <ol style="list-style-type: none"> <li>1. What innovations were carried out by TRACK TB in MDR TB model?</li> <li>2. What innovations were carried out in Urban DOTS?</li> <li>3. Why were these considered innovations?</li> <li>4. Why did stakeholders view them as successful?</li> <li>5. How does this "view of success" compare to outcome measures? Is it sustainable?</li> <li>6. Which innovations are relevant in the future</li> </ol>                                                                                                                                                                                                                              | Description | Document review; KI Interviews; Primary data collection; Secondary data analysis Stakeholder meetings                      | TRACK TB project documents; KI interview transcripts; TRACK TB team group learning exercise; TRACK TB performance review data                                                                    | Purposive selection | Thematic analysis; Comparison of baseline, outcomes, targets. | I. No data gaps, but bias toward perspectives and opinions of KIs will be bias |
| Q6 |  | How did context facilitate or inhibit TRACK TB project's performance and how did the project adapt to these changes?                                                                                                                     | <ol style="list-style-type: none"> <li>1. What sorts of contextual factors influenced TRACK TB's performance (TB prevalence, programmatic, environmental, economic, etc.)?</li> <li>2. At what level have these various contextual influences been most felt (central, district, facility; planning, managerial, implementation, sustainability)?</li> <li>3. Were these contextual factors anticipated by the TRACK TB team?</li> <li>4. Were the contextual barriers or facilitating factors unique to TRACK TB or Uganda? If so, why?</li> <li>5. What adaptations were made by the program to respond to context and at what level? What was their contribution?</li> </ol> | Explanation | KI interviews; Group learning exercise; Published and grey literature review; Secondary data analysis Stakeholder meetings | TRACK TB project documents, KI interview transcripts; TRACK TB group learning exercise; TB prevalence survey; NTLP and MoH documents; Literature on TB control program implementation in Uganda. | Not required        | Thematic analysis; Mini-case study; Timelining                | I. No data gaps, but bias toward perspectives and opinions of KIs will be bias |

|    |                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            |                                                                                              |                                                                                                                                                   |              |                                                                         |                                                                                                                                                                                                                                                                                                                                                  |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Q7 | How did TRACK TB support implementation/ operationalization of TB infection control measures/ guidelines in the health facilities and workplace? | <p>1. What training programs were carried out for occupational health?</p> <p>2. What proportion of facilities trained now have infection control plans?</p> <p>3. What is in these guidelines (what do they say)?</p> <p>4. What was done to implement guidelines?</p> <p>5. What is the proportion of MDR sites with N95 respirators from baseline?</p> <p>6. What is the proportion of trained facilities triaging presumptive TB patients from baseline?</p> <p>7. How many HWs have contacted TB at trained facilities over the last three years since the project started in 2013, compared with the three years before 2013?</p> <p>8. If facilities/trained HWs are not following OH guidelines and trainings, why not? What are the barriers?</p> | Description and Comparison | Secondary data analysis; Primary data collection; Site visits and observation; KI Interviews | Interview transcripts; Review of TRACK TB performance monitoring data on OH; Observation (inspection control plan on a wall, guidelines on site). | Not required | Thematic analysis; Checklist; Comparison of baseline, outcomes, targets | <p>1. There will be bias as this data will only be collected at sample sites.</p> <p>2. There is a question as to whether some of these questions will have a baseline from which to compare.</p> <p>3. Measures of performance are only proxies and it is impossible to know if guidelines, etc., are carried out consistently in practice.</p> |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|    |  |                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |                                |                                                                      |  |                           |                                                               |
|----|--|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------|----------------------------------------------------------------------|--|---------------------------|---------------------------------------------------------------|
| Q8 |  | To what extent are TRACK TB's interventions of TB/HIV service delivery in Uganda sustainable? | <p>1. To what extent do national guidelines and strategies include TB/HIV?</p> <p>2. How many programs within the NTLP include TB/HIV collaborative activities;</p> <p>3. How many districts and their IPs are working on TB/HIV collaborative activities?</p> <p>4. Are tools being produced either at national level or by IPs capture TB/HIV?</p> <p>5. How does TB/HIV integration compare at a national institutional level (between ACP/NTLP, within the NCC, TWGs) .</p> <p>6. What sort of institutional and logistical capacity exists at district and facility level to plan/implement collaborative activities?</p> <p>7. How much of the program activities related to planning, funding and implementing TB/HIV have been transferred to the central NTLP, RRHs, and DHOs?</p> <p>8. Is there evidence of knowledge transfer post-training?</p> <p>9. To what extent have activities originating from TRACK TB been taken on within NTLP's committed budget?</p> <p>10. To what extent are TB/HIV drugs available at facility level?</p> | Explanation | Document Review; KI interviews | Interview transcripts; TRACK TB performance indicators and documents |  | Checklist against targets | 1. Answers depend on monitoring of sustainability indicators. |
|----|--|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------|----------------------------------------------------------------------|--|---------------------------|---------------------------------------------------------------|

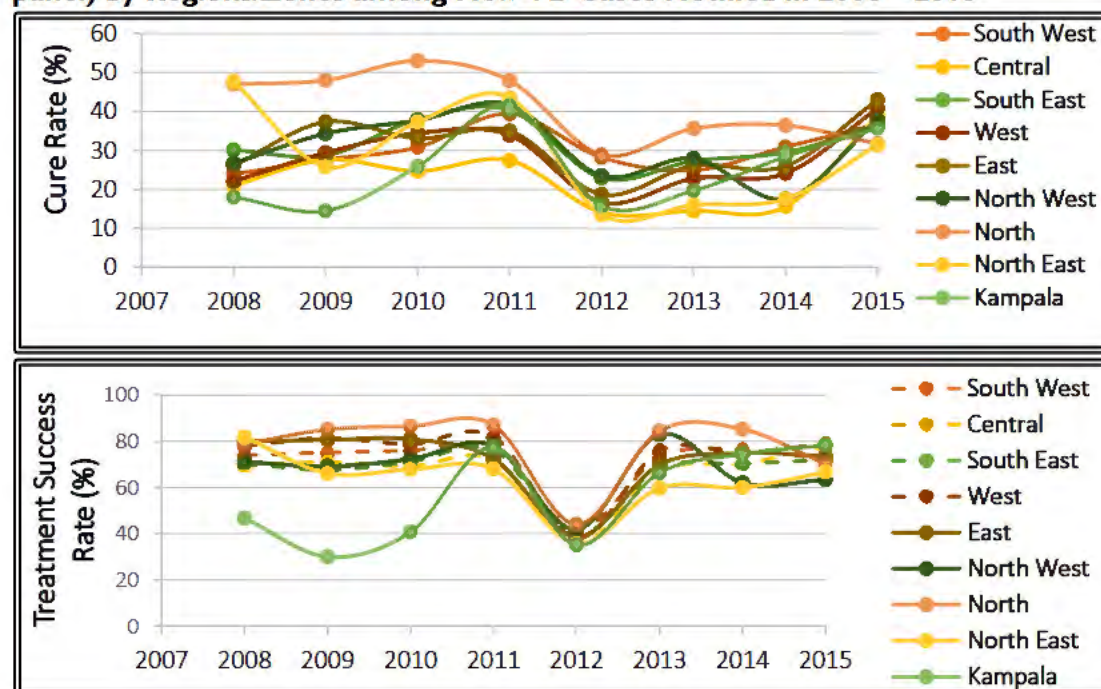
|     |                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                 |                                                                                                                                                                           |              |                                                                           |                                                                                                                                                                                                                                 |
|-----|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Q9  | Based on new evidence on TB prevalence, which partnerships and relationships are most critical to control TB? Why?                       | <p>1. What are the existing partnerships and relationships for various elements of TB control in Uganda and what stake do these actors have in these relationships?</p> <p>2. Which of these partnerships and relationships might contribute to TB control based solely on review of the current TB prevalence survey findings?</p> <p>3. Which partnerships, by contrast, do stakeholders themselves view as the "most critical"? Why?</p> <p>4. What do key stakeholders see as preventing key partnerships from operating optimally?</p> | Explanation | KI Interviews; Document review and analysis                     | TB Prevalence Survey; NHSP; TB Strategy; Interview transcripts; USAID and other TB technical partner program documents; Membership lists of relevant TWGs and committees. | Not required | Thematic analysis; Stakeholder mapping                                    | 1. Data will be mainly descriptive and narrative, but won't reveal important information on power, position, and influence of stakeholders. There won't be time to collect this information in a systematic and structured way. |
| Q10 | What are the promising approaches from TRACK TB implementation that should be consolidated to improve TB/HIV service delivery in Uganda? | <p>1. How do stakeholders determine which are promising and which are not?</p> <p>2. Why were these selected?</p> <p>3. Are these necessarily linked to outcomes?</p> <p>4. What approaches were not promising and why?</p> <p>5. How do these promising approaches relate to the findings of the TB prevalence survey?</p>                                                                                                                                                                                                                 | Description | KI interviews; Group learning exercise; Secondary data analysis | Interview transcripts; TRACK TB performance indicators and outcomes; TRACK TB program docs; Material produced in group learning exercise.                                 | Not required | Thematic analysis; Baseline against performance outcomes; Mini-case study | 1. No data gaps, but bias toward perspectives and opinions of KIs                                                                                                                                                               |

|     |                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                                                     |                                                                                                                                                                                                              |              |                                                                                                 |                                                                                                                                                                         |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Q11 | What are key leverage points (systemic points, partnerships and relationships), strategies and tools that are necessary for responding to the higher than previously estimated TB prevalence? | <p>1. Based on the TB prevalence survey, what are the key leverage points, strategies and tools (What do we see them to be? What do stakeholders see them to be?)?</p> <p>2. Are current guidelines, tools, strategies adequate to act on the findings of the TB prevalence survey?</p> <p>3. At what point are tools and strategies deployed most optimally?</p>                                                          | Explanation | <p>KI interviews;</p> <p>Secondary data analysis;</p> <p>Group learning exercise.</p>                               | <p>TB Prevalence Survey Interview transcripts;</p> <p>TRACK TB performance indicators and outcomes;</p> <p>TRACK TB program docs;</p> <p>Material documentation produced in the group learning exercise.</p> | Not required | <p>Thematic analysis;</p> <p>Comparison baseline to outcomes and targets;</p> <p>Timelining</p> | <p>1. No data gaps, but bias toward perspectives and opinions of KIs</p>                                                                                                |
| Q12 | What key context issues and other assumptions around TB prevention should be considered in future programming?                                                                                | <p>1. What further information will the TRACK TB, USAID, and other TB partners need to address these?</p> <p>2. What information from/relationships with other sectors need to be in place to address these questions?</p> <p>3. What new areas for learning should be considered?</p> <p>4. What learning agenda items have already been advanced by TRACK TB, and what learning approaches worked particularly well?</p> | Description | <p>KI interviews;</p> <p>Document review and analysis;</p> <p>Secondary data analysis;</p> <p>Literature review</p> | <p>Interview transcripts;</p> <p>TB prevalence survey; TB Strategy and other NTLP documents;</p> <p>USAID political economy study;</p> <p>Published and grey literature on TB and health system in</p>       | Not required | <p>Thematic analysis</p>                                                                        | <p>1. Lack of comprehensive studies on all aspects of context in Uganda;</p> <p>2. Data gaps will exist in that we rely on the opinions of KIs so there may be bias</p> |

|     |  |                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                      |                                                                                              |              |                                                                           |                                                                                                                                             |
|-----|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
|     |  |                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                      | Uganda                                                                                       |              |                                                                           |                                                                                                                                             |
| Q13 |  | How should TB data collection, management and information sharing and dissemination be organized/structured in the future to adequately support TB implementation? What data and information gaps and challenges exist, and how can they be addressed? | 1. How did the data manager manage data?<br>2. How is the database designed?<br>3. How is data collected?<br>4. How is data entered?<br>5. How is data and filed and retained?<br>6. How do data back ups happen?<br>7. How much is missing?<br>8. How is data transferred?<br>9. How complete are reporting forms at the program facilities sampled?<br>10. How is data used at facilities, districts, and at national level and is data perceived to being used optimally?<br>11. Where do stakeholders perceive the gaps? | Explanation | KI interviews; Manual review of data system; Primary data collection | Interview transcripts; Data management manual; Data management standards; Data system itself | Not required | Description of system; Thematic Analysis; Checklist against best practice | 1. Because the assessment is not comprehensive, we will not get a comprehensive understanding of data gaps. We may not capture all of them. |

## Annex 5: Further Time Trends from National NTLP Data, 2008-2015

**Figure A1: Zonal Trends on Cure Rate (top panel) and Treatment Success Rate (bottom panel) by Regions/Zones among New TB Cases Notified in 2008 – 2015**



### Notes from Figure A2:

1. A fall in both cure and treatment success rate in 2012 in all regions/zones (national effect). Possible explanations for the dip in 2012 could be drug stock outs and transitions in management of TB

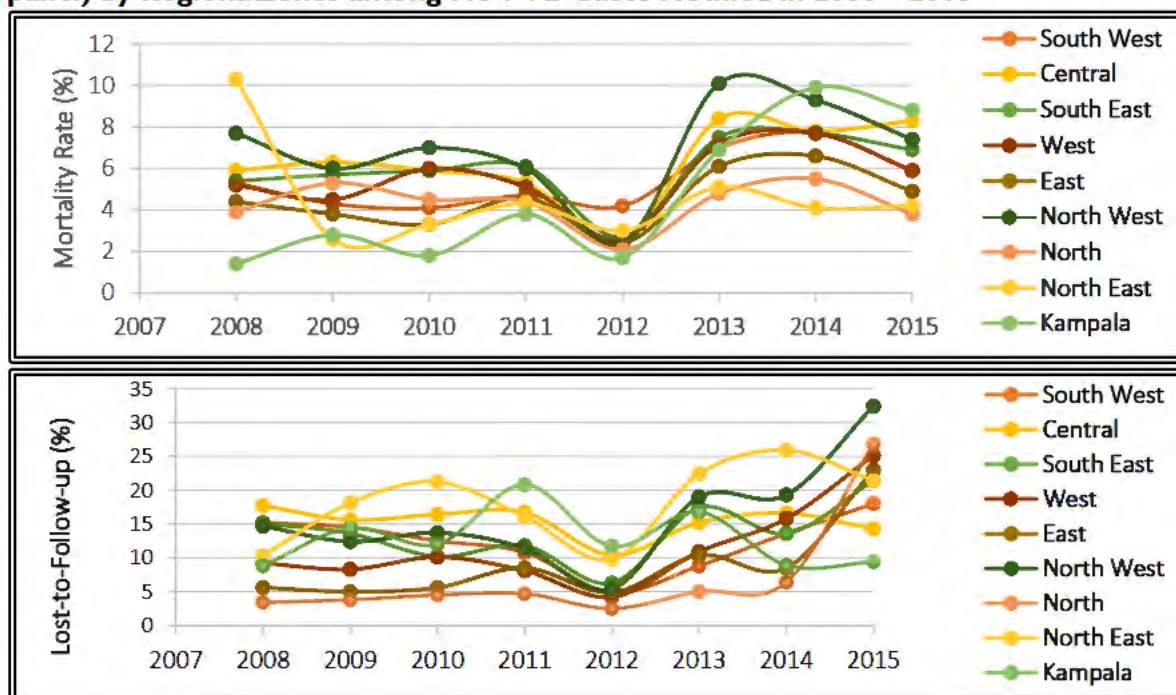
#### Comparing treatment success rate between regions

2. At least two regions/zones were significantly different ( $P = 0.009$ )
3. North vs. Kampala ( $P = 0.044$ )
4. North vs. North East ( $P = 0.021$ )
5. All the other comparisons were not significant

#### Comparing Cure rate between regions/zones

1. There was a significant difference in cure rate between some two regions/zones ( $P=0.039$ )
2. North vs. Central ( $P=0.007$ )
3. North vs. Kampala ( $P=0.039$ )
4. All the other comparisons were not significant

**Figure A2: Zonal Trends on Mortality Rate (top panel) and Lost to Follow-up (bottom panel) by Regions/Zones among New TB Cases Notified in 2008 – 2015**



**Notes from Figure A2:**

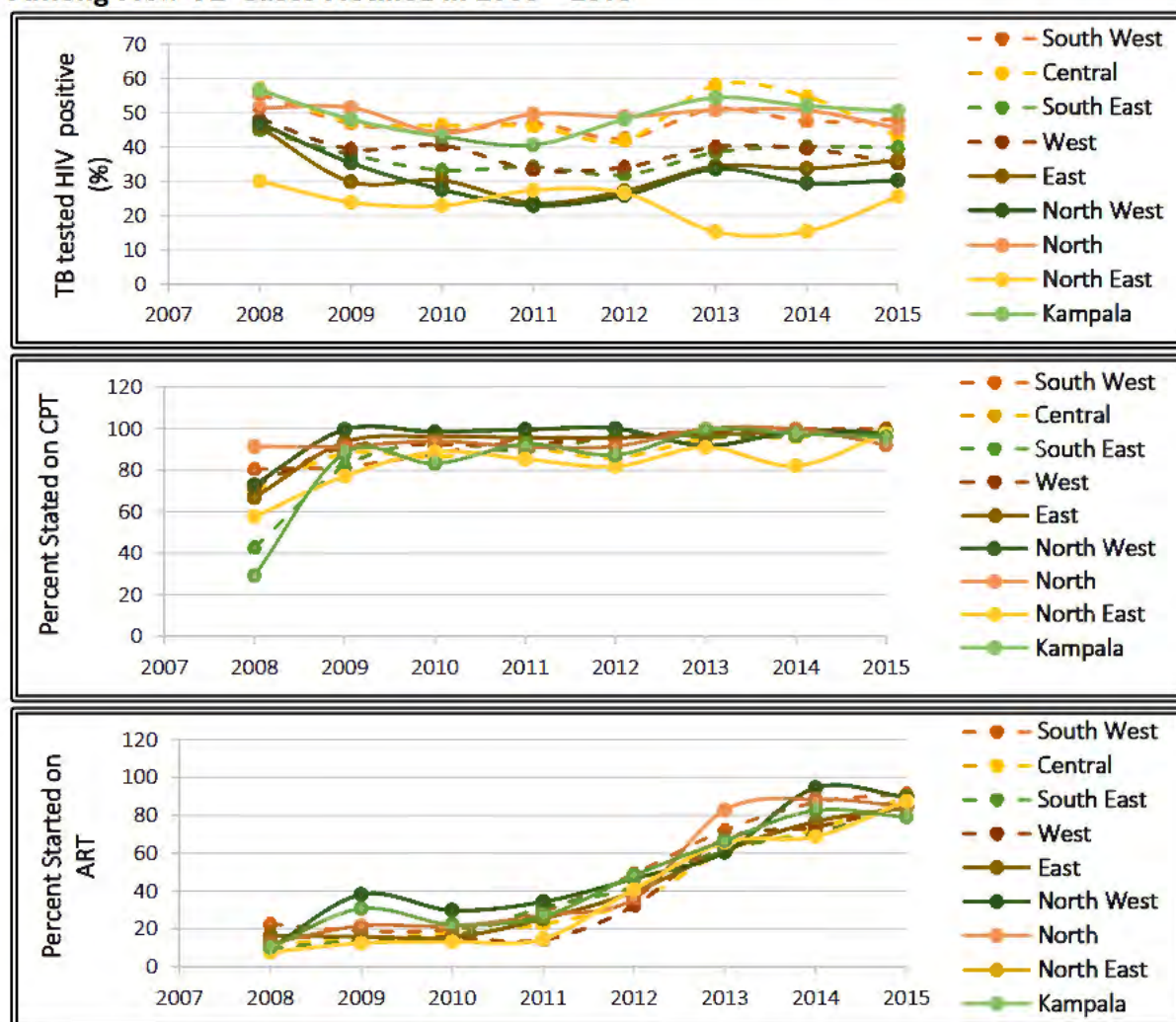
**Comparing mortality rate between regions/zones**

1. Based on Kruskal Wallis test, there was a borderline significance in difference in mortality rate between some two regions/zones ( $P=0.046$ )
2. However, based on Dunn's Pairwise Comparison, mortality did not significantly differ between any two regions/zones

**Comparing Lost to follow-up between regions/zones**

1. There was a significant difference in Lost to follow-up rate between some two regions/zones ( $P=0.002$ )
2. North vs. Central ( $P=0.016$ )
3. North vs. North East ( $P=0.003$ )
4. East vs. North East ( $P=0.042$ )
5. All the other comparisons were not significant

**Figure A3: Zonal Trends on Proportion of TB Patient Testing HIV Positive (top panel) and Offered Co-Trimoxazole Preventative Therapy & ART (bottom panels) by Regions/Zones Among New TB Cases Notified in 2008 – 2015**



**Notes from Figure A3:**

**PROPORTION OF TB PATIENT TESTED HIV POSITIVE:**

1. Proportion of TB patient tested HIV positive seems to vary between regions/zones and within regions/zones
2. Proportion of TB patient tested HIV positive is consistently higher in North, Kampala, Central and South west
3. Proportion of TB patient tested HIV positive is consistently lower in North East, North West and East
4. Central was significantly different from East ( $P=0.023$ ), North West ( $P=0.012$ ) and North East ( $P<0.001$ )
5. East was significantly different from North ( $P=0.010$ ) and Kampala ( $P=0.013$ )

6. North West was significantly different from North ( $P=0.005$ ) and Kampala ( $P=0.007$ )
7. North was significantly different from North East ( $P<0.001$ )
8. Kampala was significantly different from North East ( $P<0.001$ )
9. The rest of the comparisons were not significant
10. Question: What are the underlying factors for the difference in regions/zones? (urbanization?)

#### **CPT UPTAKE:**

1. Percentage started on co-trimoxazole preventative therapy (CPT) is quite high (close to 100%)
2. A peak in 2009 in all regions/zones
3. There seems no difference in proportion started on CPT across regions/zones
4. CPT uptake did not significantly differ between any two regions/zones (0.114)

#### **ART UPTAKE:**

1. We observe an exponential increase in proportion started on ART
2. A significant time effect (trend effect)
3. Possibly no significant difference between regions/zones
4. ART uptake did not significantly differ between any two regions/zones (0.952)

The test results comparing notification rate, TSR, HIV prevalence, CPT and ART uptake rates between regions/zones are given in the appendix - Table A1 for global test using Kruskal Wallis test and Table A2 for Non-parametric multiple comparison test using the so called “Dunn’s test” (Alex Dinno, 2015) with Bonferroni adjustments. The TSR significantly differed between North and North East ( $P=0.021$ ) and between Kampala and North ( $P=0.044$ ) but not between all the other regions/zones. Table A3 (in the Appendix) shows P values for multi-zone comparisons for notification rate (lower diagonal) and HIV prevalence (upper diagonal)

**Table A1: National TB indicators (2008 - 2015) compared between regions/zones using a non-parametric test (Kruskal Wallis test)**

| Region                        | Median notification rate (per 100,000 persons) | Median TSR (%) | Median Cure Rate (%) | Median Death Rate (%) | Median Lost to follow up (%) | Median TB tested HIV+ (%) | Median Offered CPT (%) | Median Offered ART (%) |
|-------------------------------|------------------------------------------------|----------------|----------------------|-----------------------|------------------------------|---------------------------|------------------------|------------------------|
| South West                    | 74.3                                           | 74.6           | 29.5                 | 5                     | 13.1                         | 47.2                      | 95.6                   | 39.2                   |
| Central                       | 75.7                                           | 69.8           | 22.9                 | 6.1                   | 16                           | 46.8                      | 89.2                   | 28.5                   |
| South East                    | 61.6                                           | 70.4           | 29.8                 | 6                     | 13.6                         | 38.1                      | 94.7                   | 36.7                   |
| West                          | 76.5                                           | 78.4           | 26.8                 | 5.6                   | 9.7                          | 39.5                      | 94.1                   | 24.4                   |
| East                          | 56.7                                           | 74.2           | 29.6                 | 4.5                   | 7.1                          | 32                        | 95.9                   | 32.5                   |
| North West                    | 44.8                                           | 70.1           | 31.1                 | 7.2                   | 14.2                         | 29.9                      | 91.8                   | 42.4                   |
| North                         | 117.6                                          | 84.8           | 41.7                 | 4.5                   | 4.6                          | 50.2                      | 91.8                   | 31.6                   |
| North East                    | 67.1                                           | 66.4           | 28.6                 | 4.2                   | 19.7                         | 24.8                      | 83.7                   | 27.8                   |
| Kampala                       | 246.6                                          | 56.5           | 22.8                 | 3.3                   | 11.9                         | 49.3                      | 90.4                   | 39.5                   |
| Kruskal Wallis test (P value) | <0.001                                         | 0.009          | 0.039                | 0.046                 | 0.002                        | <0.001                    | 0.114                  | 0.952                  |

Table A1 indicates that notification rate, TSR and TB tested positive significantly differ between at least two regions/zones, but not CPT and ART uptake rate.

**Table A2: Multi-zone comparisons for notification rate (blue, lower diagonal) and TB tested HIV positive (red, upper diagonal). The numbers given in the Table are the P values, significant differences are indicated by P-values with a star (\*).**

|            | South West | Central | South East | West   | East    | North West | North  | North East | Kampala |
|------------|------------|---------|------------|--------|---------|------------|--------|------------|---------|
| South West |            | >0.999  | 0.431      | 0.953  | 0.043   | 0.024      | >0.999 | <0.001*    | >0.999  |
| Central    | >0.999     |         | 0.262      | 0.611  | 0.023   | 0.012      | >0.999 | <0.001*    | >0.999  |
| South East | >0.999     | >0.999  |            | >0.999 | >0.999  | >0.999     | 0.134  | 0.611      | 0.163   |
| West       | >0.999     | >0.999  | >0.999     |        | >0.999  | >0.999     | 0.335  | 0.262      | 0.399   |
| East       | >0.999     | >0.999  | >0.999     | >0.999 |         | >0.999     | 0.010  | >0.999     | 0.013   |
| North West | 0.889      | 0.387   | >0.999     | 0.304  | >0.999  |            | 0.005  | >0.999     | 0.007   |
| North      | 0.994      | >0.999  | 0.030*     | >0.999 | 0.014*  | 0.002*     |        | <0.001*    | >0.999  |
| North East | >0.999     | >0.999  | >0.999     | >0.999 | >0.999  | >0.999     | 0.276  |            | <0.001* |
| Kampala    | 0.039*     | 0.114   | <0.001*    | 0.149  | <0.001* | <0.001*    | >0.999 | 0.006*     |         |

\*Significant

**Table A3: Summary Statistics for the Number Days Delayed before the MDR-TB Patients were Started on Second Line Treatment**

| Year started on second line treatment | N   | Median number of days delayed on treatment (IQR) | Range for number of days delayed on treatment (Min; Max) |
|---------------------------------------|-----|--------------------------------------------------|----------------------------------------------------------|
| 2010                                  | 3   | 33.0 (24.0 – 38.0)                               | 24; 38                                                   |
| 2011                                  | 8   | 67.5 (31 – 111.5)                                | 8; 166                                                   |
| 2012                                  | 23  | 60.0 (30.0 – 150.0)                              | 15; 365                                                  |
| 2013                                  | 103 | 35.0 (30.0 – 90.0)                               | 8; 840                                                   |
| 2014                                  | 41  | 26.0 (16.0 – 40.0)                               | 8; 168                                                   |
| Total                                 | 178 | 35.0 (26.0 – 89.0)                               | 8; 840                                                   |