REPUBLIC OF RWANDA

MINISTRY OF HEALTH

Tuberculosis and Lung Diseases National Strategic Plan Mid 2019 - mid 2024 Extended to June 2027.

RWANDA BIOMEDICAL CENTER
A Healthy People. A Wealthy Nation

INSTITUTE OF HIV/AIDS, DISEASE PREVENTION & CONTROL (IHDPC)
TUBERCULOSIS & OTHER RESPIRATORY COMMUNICABLE DISEASES DIVISION

Kigali, June 2023

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ABBREVIATIONS

ACF	Active Case Finding
ACSM	Advocacy, Communication and Social Mobilization
aDSM	active Drug Safety Management & Monitoring
ART	Antiretroviral Therapy
BCC	Behavior Change Communication
BMI	Body Mass Index
CAD	Computer Aided Diagnosis (for TB)
CBHIP	Community Based Health Insurance Program (Mutuelle de Santé)
CDT	Center of Diagnosis and Treatment of TB
CFR	Case Fatality Rate
CHU	Centre Hospitalier Universitaire
CHW	Community Health Worker
CNR	Case Notification Rate
CPDS	Coordinated procurement and distribution system
CSO	Civil Society Organization
CT	Center of Treatment of TB
CXR	Chest X-ray
DH	District Hospital
DHS	Demographic and Health Survey
DP	District Pharmacy
DQA	Data Quality Audit
DRS	Drug Resistance Survey
DR-TB	Drug-resistant TB
DS-TB	Drug-susceptible TB
DST	Drug Susceptibility Testing
ECSAHC	East, Central and Southern Africa Health Community
e-LMIS	Electronic Logistics Management Information System
e-TB	Electronic case-based TB register
EQA	External Quality Assurance
FLD	First Line TB Drugs
FNA	Fine Needle Aspiration
FY	Fiscal Year
GF	Global Fund to Fight AIDS, Tuberculosis and Malaria
GLC	Green Light Committee
GLI	Global Laboratory Initiative
GoR	Government of Rwanda
H	Isoniazid
HC	Health Center
HF	Health Facility
HFU	Health Financing Unit
HIV	Human Immunodeficiency Virus
HP	Isoniazid and Rifapentine
HR	Human Resources
HRG	High-Risk Group
HSSP	Health Sector Strategic Plan
ICCM	Integrated Community Case Management
IPC	Infection Prevention & Control
IHDPC	Institute of HIV/AIDS, Disease Prevention & Control
IMCI	Integrated Management of Children Illnesses
KAP	Knowledge, Attitude and Practices
KNCV	KNCV Tuberculosis Foundation
LIS	Laboratory Information System
LMIS	Laboratory management information system
LPA	Line Probe Assay
LQMS	Laboratory Quality Management System
LTBI	Latent TB Infection
MAF	Multisectoral Accountability Framework
MCH	Maternal and Child Health
MCCH	Mother Child and Community Health

MDG	Millennium Development Goal
MDR-TB	Multidrug-resistant Tuberculosis
M&E	Monitoring and Evaluation
MOH	Ministry of Health
MOTT	Mycobacteria Other Than Tuberculosis
MPPD	Medical Production and Procurement Division (RBC)
MTR	Mid-Term Review
MYICT	Ministry of Youth, Information & Communication
NCD	Non-Communicable Diseases
NGO	Non-Governmental Organization
NISR	National Institute of Statistics of Rwanda
NRL	National Referral Laboratory
NSP	National Strategic Plan
NST1	National Strategy for Transformation (2017-2024)
NTP	National Tuberculosis Program
OHT	One Health Tool
OPD	Outpatient Department
OSDV	On-site Data Verification
PAL	Practical Approach to Lung Health
PBF	Performance Based Financing
PCF	People Centered Framework
PCS	Patient Cost Survey
PEPFAR	President's Emergency Plan for AIDS Relief
PLHIV	People living with HIV
PMDT	Programmatic Management of Drug-resistant Tuberculosis
PMEBS	Planning, M&E, and Business Strategy / RBC
PPA	Patient Pathway Analysis
PTB	Pulmonary TB
QA	Quality Assurance
QC	Quality Control
QMS	Quality Management System
RBC	Rwanda Biomedical Center
RDB	Rwanda Development Board
RH	Referral Hospital
RHMIS	Rwanda Health Information System
RMNCAH	Reproductive, Maternal, Neonatal Child and Adolescent health
RRP+	Rwanda network of People living with HIV
RR-TB	Rifampicin resistant TB
R&R	Recording and Reporting
RSB	Rwanda Standards Board for drug quality assurance
RSQA	Rapid Service Quality Assessment
SDG	Sustainable Development Goal
SLD	Second Line TB Drugs
SOP	Standard Operating Procedures
SPH	School of Public Health
SPIU	Single Project Implementation Unit
SSM	Sputum Smear Microscopy
SWOT	Strengths, Weaknesses, Opportunities and Threats
TAT	Turnaround Time
TB	Tuberculosis
TBD	To be determined
TB&ORD Division	Tuberculosis and Other Respiratory Communicable Diseases Division
TeAM	Technical Assistance for Management
The Union	International Union against Tuberculosis and Lung Diseases
TPT	Tuberculosis Preventive Treatment
TWG	Technical Working Group
TSR	Treatment Success Rate
TST	Tuberculin Skin Test
UHC	Universal Health Coverage
UNAIDS	Joint United Nations Programme on HIV/AIDS
USG	United States Government

VA	Verbal Autopsy
VRS	Vital Registration System
WHO	World Health Organization
WRD	WHO-recommended Rapid Diagnostics
Xpert MTB/RIF	Rapid TB and MDR-TB diagnostic test based on nucleic acid amplification

FOREWORD

Rwanda has made remarkable strides in ensuring access to Tuberculosis (TB) prevention and care. In collaboration with partners, the Ministry of Health has updated the 2019-2024 Tuberculosis National Strategic Plan (TB-NSP) and extended it up to June 2027. This plan builds upon the 2019-2024 TB-NSP and incorporates recommendations from the NSP Mid-Term Review (MTR) and Epi-Review conducted in October 2022. It also aligns with the global End TB Strategy of the World Health Organization.

The TB-NSP 2019-2024 extended to June 2027 is a comprehensive and evidence-based approach designed to address the most critical challenges and their root causes. Extensive data from various sources, including Rwanda and beyond, has informed the development of this plan. A patient-centered framework has been utilized to make data-driven decisions throughout the care continuum and improve access to TB prevention and care for all individuals.

This strategic plan has been developed through the active participation of key stakeholders, partners, and civil society organizations involved in the fight against TB and HIV. By adopting the End TB strategy, TB-NSP 2019-2024 extended to June 2027 encompasses eight strategic objectives. These objectives aim to tackle the issue of missing TB cases by implementing molecular testing as the initial diagnostic method through the pooling approach. Additionally, the plan seeks to reduce mortality by providing Tuberculosis preventive therapy to People living with HIV and all individuals in contact with latent tuberculosis infection.

To achieve these goals, it is essential for the government and partners to demonstrate long-term commitment in terms of funding and implementation. Reaching the final milestone will require intensified efforts and additional resources. Therefore, it is crucial for us to continue joining forces and working together to eliminate TB in Rwanda

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Minister of Health

ACKNOWLEDGEMENTS

The Rwanda Biomedical Center extends its heartfelt gratitude to all individuals who contributed to the update of the Tuberculosis National Strategic Plan (TB-NSP) 2019-2024, now extended to June 2027. The achievement of this NSP is the result of collaborative workshops, consultations, thorough analysis, and valuable inputs from numerous stakeholders, all under the coordination of the Tuberculosis and Other Respiratory Disease Division.

We express our sincere appreciation to the Ministry of Health and Rwanda Biomedical Center leaders for their active participation and unwavering support throughout the entire process, under the guidance of the Ministry of Health. A special acknowledgment is extended to the dedicated staff of the Tuberculosis and Other Respiratory Disease Division for their tireless involvement in the development and editing of this document.
The completion of this document would not have been possible without the constant support of various stakeholders, including civil society, the Rwanda NGO Forum, RPP+, and international partners such as UNICEF, WHO, KNCV, and CDC.

We would like to recognize the significant contributions of Dr. Pierre Yves Norval from Team, who played a crucial role in leading the development and coordination of the writing of this NSP. We are also grateful to Erik from KNCV for leading the effort in ensuring that a patient-centered framework approach guided the evidence-based nature of the NSP. Additionally, we appreciate Avenir for Health's use of the TIME Impact and Economic approach to optimize the impact of interventions.

The Rwanda Biomedical Center wishes to express its deepest appreciation to the World Health Organization for their financial support, as well as the Bill and Melinda Gates Foundation through KNCV, which facilitated data consolidation, patient pathway analysis, and technical assistance. Their contributions have been instrumental in this endeavor.

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EXECUTIVE SUMMARY

Overview

The TB National Strategic Plan (TB-NSP) July 2019- June 2024 extended to June 2027 gives a detailed view of the current state of TB control in Rwanda. The plan illustrates the most pressing problems and their root causes, based on evidence and data gathered in Rwanda and elsewhere. The plan also describes what we, the National Tuberculosis Program (NTP) and stakeholders, want to achieve by mid-2027 and our strategic and technical process for addressing identified gaps. Assuming funding gaps will be likely. The financing scenario was developed up to June 2024 and for the extension period, no costing modelling was done, and cost was estimated using activities based costing. At international level, the most important policies providing guidance and direction to this NSP are the Sustainable Development Goals (SDGs), the End TB strategy and the Africa Health Strategy 2016-2030. Rwanda's vision is to end TB in 2035 attaining a reduction of the estimated TB incidence by 90% and mortality by 95% compared to 2015 levels. This plan aims to achieve the End TB milestones for 2027, including reduction of TB incidence by 33%, reducing TB deaths by 65% as compared to 2015 and ensuring reduction of TB affected families are facing catastrophic costs based on the result of the survey. The NTP intends to achieve the UNHLM and the TB Global plan targets of more than 90% treatment coverage and more than 90% treatment success rate (TSR) for all TB patients by June 2027, at the latest.

The problem

Estimated TB incidence in Rwanda remains high with 56 (42-72) new and relapse patients per 100,000 population in 2021 (vs. 134 and 212, at global and (Africa) regional level, respectively[1]). Incidence and mortality due to TB have steadily declined at an average rate of 4 and 5% per year, since 2010. In addition, during the 5 last years, Rwanda is focusing on TB screening among prioritized high-risk groups (PLHIV, contacts of index patients with pulmonary TB, prisoners, people aged ≥55 years and children aged <15 years) partnering with community health workers (CHWs) on community-level TB detection. As a result, the proportion of TB cases detected from these high-risk groups (HGRs) increased from 15% (in FY13[2]) to 51.2% (in 2021/22) with CHWs responsible for referring 56% of all presumptive TB patients during FY21. Despite the achievements mentioned above, the following challenges remain:

- People at risk of developing TB disease, asymptomatic and symptomatic patients who are missed by the healthcare system.
- TB diagnostics with higher sensitivity, to better identify patients.
- Treatment outcomes show higher death rates among those who are clinically diagnosed TB, TB/HIV patients, and those who are underweight (BMI <18.5).

Development process

Following the mid-term review and epi-review conducted in October 2022, the team from NTP and partners worked together to adjust the find from these review in the extended NSP and decided to maintain the four gaps identified in the current NSP. To identify the Gap in this current NSP 2019-2024, an external desk review was conducted

[1] World Health Organization. Global tuberculosis report 2019

[2] Fiscal Year (FY13 runs from July 2013 to June 2014)

at the end of May 2019 before a kick-off partners workshop with more than 30 international, national and local stakeholders to review the evidence for each planning step: (1) Problem Prioritization, (2) Root Cause Analysis and (3) Strategic Intervention optimization. The NTP established a national writing committee composed of the NTP central unit team, Rwanda Biomedical Center (RBC) divisions and partners. The TB-NSP was validated through a stakeholder meeting and a data consolidation exercise using the data entry and visualization tool of the People Centered Framework (PCF) for TB planning and programming[3].

Four priority gaps for action

Gap 1: TB treatment coverage

Around 31% of estimated incident infections are not detected, nor treated. This plan aims to close the diagnostic gap through more sensitive diagnosis with expanded use of Xpert as the initial diagnostic test for all persons with presumptive TB through the pooling method and chest X-ray (CXR) for screening. To reduce the estimated number of missing TB patients, individuals consulting to health facilities (HF)) with TB suggestive symptoms will be tested with Xpert as the initial diagnostic test through pooling method. Case finding targets using TIME modeling were set during the NSP development process. Systematic TB screening of people among HRG will make use of digital CXR and Computer Aided Diagnosis through TB software (CAD4 TB) followed by Xpert testing. CDTs will be equipped with digital X-ray and GeneXpert machines.

Gap 2. TB treatment success

TSR for all forms of TB is below 90% (88.8%) due to a high case fatality rate (CFR) among those clinically diagnosed (12.7%) and HIV+ TB patients (13%). This CFR could be partly explained by false positive TB patients; however, this needs further investigation. More importantly, closing the treatment success gap in this NSP includes the following priority activities:

- Provision of nutritional support, not only for drug-resistant TB (DR-TB), as currently implemented, but also for drug-susceptible TB (DS-TB) patients who are moderately or severely malnourished (BMI $\leq$18.5);
- Enhanced access to social protection.
- Strengthened aDSM among both DS-TB and DR-TB patients.
- Strengthened collaboration between TB and non-communicable disease (NCD) services for TB screening, especially bilateral screening of TB patients for diabetes mellitus (DM) and DM patients for TB.
- Use of X-pert testing for stool as the initial diagnostic test for children with presumptive TB and urine TB LAM (ALERE) or another more sensitive LAM test that will become available for eligible PLHIV.

Gap 3. TB preventive treatment

TB Preventive Treatment (TPT) has shown successful progress in initiating IPT/TPT household contacts aged <5 years of bacteriologically confirmed index patients as well as people living with HIV (PLHIV). However, further efforts are needed to expand TPT coverage among TB contacts above 5 years old.

This NSP presents an ambitious partnership with CHWs, for contact tracing among household contacts aged 5 years and above residing with TB bacteriologically positive

[3] WHO People centered framework User Guide. October 2019

patients. Shorter regimen (shorter Rifampicin and Isoniazid [RH] for three months or Rifapentine and Isoniazid [HP] based regimens for three and one month) are already used helping for a better adherence and observation.

Gap 4. TB funding

There is over-reliance on donor funding and uncertainty about future funding levels while expansion and scale-up of active case finding (ACF) interventions among high-risk groups, needed to find the missing patients, are more expensive. To sustain high-level performance in Rwanda's TB control, achieving the Sustainable Development Goals (SDGs) as well as the End TB strategy goals through Universal Health Coverage (UHC) requires implementation of innovative TB funding mechanisms for the progressive inclusion and scale-up of (new) TB services. Intervention packages implemented during the NSP timeline are essential including: TPT; systematic TB screening using CXR and CAD; scale-up of rapid WHO Recommended Diagnostics at initial diagnosis as well as pilot testing and uptake of new diagnostics; new treatment regimens for DR-TB; and differentiated care models in the community health insurance program (CHIP - Mutuelle de Santé). Also a Multisectoral Accountability Framework (MAF) on TB will be developed to monitor the availability and rational use of funds.

Vision, Goal, Milestones and Principles

The extended of the National strategic plan runs from July 2024 to June 2027

Vision	Rwanda free of tuberculosis – zero deaths, disease and suffering due to tuberculosis
Goal	End the tuberculosis epidemic in Rwanda by 2035 which means 10 incident cases per 100 000 population or less per year (new and relapses).
Milestones for 2027	65% reduction in TB deaths (compared with 2015) 33% reduction in TB incidence rate (compared with 2015) Reduction of TB-affected families facing catastrophic costs due to TB (to be determined (TBD) after the survey, end 2020)
Targets for 2035	95% reduction in TB deaths (compared with 2015) 90% reduction in TB incidence rate (less than 10 TB cases per 100 000 population) No affected families facing catastrophic costs due to tuberculosis
Principles	1. Government stewardship and accountability, with monitoring and evaluation 2. Strong coalition with civil society organizations and communities 3. Protection and promotion of human rights, ethics and equity 4. Adaptation of the strategy and targets at country level, with global collaboration

PILLAR ONE. PATIENT-CENTRED CARE

STRATEGIC OBJECTIVE 1: CONSIDERING THE PATIENT PATHWAY FOR TUBERCULOSIS

1.1 Accelerating early screening and appropriate diagnosis of TB
1.2 Quality of care and ensuring a cure, including aDSM and patient support
1.3 Promoting care seeking and prevention through community engagement

STRATEGIC OBJECTIVE 2: TARGETED APPROACHES FOR KEY DRIVERS OF TB EPIDEMIC AMONG SELECTED POPULATIONS

2.1 Enhancing Programmatic Management of Drug – Resistant Tuberculosis
2.2 Ensuring prevention, diagnosis and treatment of Childhood Tuberculosis
2.3 Strengthening management of TB / HIV and other co-morbidities
2.4 Ensuring diagnosis and management of lung diseases
2.5 Promote intensified screening and diagnosis among high-risk group (HRG) populations

PILLAR TWO. BOLD POLICIES AND SUPPORTIVE SYSTEMS

STRATEGIC OBJECTIVE 3: PROGRAMMATIC MANAGEMENT, MULTI-SECTORAL COLLABORATION & ENGAGING ALL CARE PROVIDERS

3.1 Political commitment with adequate resources for tuberculosis care and prevention
3.2 Management of TB care and prevention
3.3 Engagement of civil society organizations, and public and private care providers
3.4 Migrant and cross border
3.5 TB infection control

STRATEGIC OBJECTIVE 4: UNIVERSAL HEALTH COVERAGE, SOCIAL PROTECTION, HUMAN RIGHTS & NUTRITION

4.1 Universal Health Coverage
4.2 Human rights and gender
4.3 Social protection and nutrition

STRATEGIC OBJECTIVE 5: STABLE AND QUALITY ASSURED SUPPLY OF DRUGS, DIAGNOSTIC AND COMMODITIES

5.1 Supply chain management
5.2 Rational use of medicine

STRATEGIC OBJECTIVE 6: M&E AND DATA QUALITY SYSTEM (E-TB HEALTH INFORMATION SYSTEM)

6.1 Surveillance system including mortality registration.

PILLAR THREE. RESEARCH AND INNOVATION

STRATEGIC OBJECTIVE 7: DATA FOR PROGRAMMATIC, MONITORING, EVALUATION, LEARNING AND PLANNING

7.1 Evidence generation and use of electronic data systems

STRATEGIC OBJECTIVE 8: RESEARCH PRIORITIES

8.1 Research strengthening

I. EVIDENCE BASED APPROACH AND TB NSP DEVELOPMENT

This TB-NSP 2019 - 2024 lays out a strategic and technical path in order to achieve a Rwanda free of TB. It presents the full aspirations of the country, including outcome and impact targets that align with international goals, and a full portfolio of interventions needed to reach these goals. In acknowledgement of likely funding gaps, an evidence-based optimization of resource allocation using the WHO recommended PCF is presented alongside alternative impact targets given reduced funding scenarios.

At international level, the most important policies and commitments providing direction to this NSP are the SDGs, the End TB strategy and the Africa Health Strategy 2016-2030.

Rwanda's vision is to be free of TB and to attain the SDGs by reducing TB incidence and number of TB deaths by 80% and 90%, respectively, by 2030 (compared to 2015). This plan aims to achieve the 2025 End TB milestones of reducing TB incidence by 35% and the number of TB deaths by 55% (compared to 2015) and also to reduce catastrophic costs for TB affected patients and families based on the results of a patient cost survey (PCS) with a baseline scheduled for 2020. The NTP intends to reach the Stop TB Partnership's Global Plan to End TB targets of ensuring more than 90% treatment coverage and more than 90% treatment success rate for all TB patients by June 2024.

I.1. Evidence based approach and documentation

The TB-NSP 2019 - 2024 is guided by the Government's overall vision of development in the health sector, as set out in Rwanda's '7 Year Government Program (2017-2024): National strategy for transformation (NST1)' which was developed to achieve 'Vision 2020' and the 'Health Sector Strategic Plan (HSSP) IV July 2018 – June 2024'. The TB-NSP represents an evolution in the Government of Rwanda's response to the TB epidemic. New data is driving a targeted and prioritized approach. In addition, this NSP reflects a patient-centered approach to planning and evidence-based prioritization of programming and resource allocation to close identified gaps along the TB care continuum in order to achieve quality care. The activities embodied under this NSP a meant to address systemic and root causes of these gaps along the care continuum and will suggest complementary roles for districts and the National TB Program at central level, departments across the Ministry of Health, funding and implementing partners, civil society and other sectors, as well as Ministries, such as Finance and Local Administration.

The consolidated evidence used for this updated plan comes primarily from the results of the 2012 TB prevalence survey[4], the HMIS/DHIS2, the 2020 Patient Pathway Analysis (PPA)[5], finding from Rwanda DHS 2019/20 on TB knowledge[6] and relevant studies guiding the country in how to better reach all people with TB prevention and care by building a refined approach. Between 2016-2019, the NTP coordinated more

[4] The 1st national TB prevalence survey 2012 in Rwanda, Ministry of Health, Rwanda Biomedical Center (IHDPC), September 2015 http://ghdx.healthdata.org/record/rwanda-national-tuberculosis-prevalence-survey-2012

[5] Report PPA, 2020

[6] Rwanda national Demographic health survey 2019/20. NISR

than 12 studies with the goal of better understanding the experience(s) and preferences of TB patients, including how they experience systems-related barriers to quality TB care. During the development of the TB-NSP, this body of epidemiological, people- and systems-related evidence was applied along the TB care continuum to understand where people with TB may be missed or lost by the health system. Key findings from the TB prevalence survey include the following:

- For those not seeking care, 62% of people with TB symptoms including cough more than 2 weeks, did not seek care because they felt the symptoms were not serious and did not feel it was necessary to report them.
- The younger generation below 55 years were more reluctant to seek care than older age groups, 55 years and above.
- Of those who sought care, only 48% of people accessed a HF with TB diagnostic services (or specimen transportation).
- The survey also found that 57.2% of TB patients diagnosed through abnormal CXR would have been missed, if the survey would have applied the definition of a TB presumptive case as a person with cough for two weeks and more or any cough for PLHIV. As such, CXR was found to be a highly sensitive screening tool for identifying people with TB.
- Finding from DHS 2019/20 revealed that 60% of population with sign and symptoms related to TB didn't sought care.
- A study on risk factors for death associated with TB analysed high death rates among clinically confirmed TB and TB patients co-infected with HIV. It showed that patients with TB may die in the course of treatment due to several factors including delayed and/or missed diagnosis and other comorbidities. Comorbidities majorly affecting TB patients include HIV, diabetes, and malnutrition. This shows a gap in the nutrition support care cascade for TB patients.
- The findings of a TB death audit report[7] conducted by the NTP in Rwanda revealed that 62% of deaths occurred among underweight TB patients with a BMI of $\leq$18.5 and 65% had a high bacillary load (2+ and 3+). Hanrahan & al. found that BMI was a strong predictor of mortality. Incidence rates for mortality were 10.4/100 person-years among HIV-infected TB patients with a BMI of 18.5 or less compared to 3.6/100 person-years of those with a BMI of 18.6-25[8].
- According to 2018 WHO data, out of 7,300 (100%) estimated incident cases (CI: 5,600-9,200), 5,820 (80%) patients were notified and 80% started on effective TB treatment.
- According to 2018 WHO data, out of 180 (100%) Rifampicin-/multidrug-resistant TB (RR/MDR-TB) estimated incident cases (CI:130-240), 98 (54%) patients were notified, and all started on effective anti-TB treatment
- According to 2018 WHO data, out of 1,500 (100%) estimated incident cases (CI:1100-1,900), 1,192 (79%) patients were notified and 1,112 (74%) started antiretroviral treatment (ART).
- The 2020 Patient Pathway analysis indicated most people (79%) seek care for TB symptoms at public clinics where sample transportation is essential and available for diagnosis (71%). Men sought care more often in private facilities

[7] Report of Tuberculosis death audit analysis for death of TB cases registered from April 2016 up to June 2019, August 2019

[8] Body mass index and risk of tuberculosis and death. Colleen F. Hanrahan, AIDS. 2010 June 19; 24(10): 1501–1508. doi:10.1097/QAD.0b013e32833a2a4a
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3063388/pdf/nihms279591.pdf

than females (20% vs. 10%) where diagnostic capacity is lacking. Second line treatment initiation is provided at two facilities due to low prevalence but ambulatory second-line treatment can be provided in all public health care level one and level two facilities.

- The UNHLM indicative target[9] for 2018 on TPT initiation and LTBI treatment, for child contacts <5 years of age was 1,420, while the reported number of children <5 who were started on TPT was 1,423. As per national policy, children aged 5 years and above were not considered for TPT, therefore the UNHLM 2018 indicative target of 667 children initiated was not met.
- For PLHIV the 2018 UNHLM indicative target for TPT initiation was 8,125. However, the policy was only implemented in 2019, hence the reported number of PLHIV started on TPT in 2018 was 0.
- According to the 2018 UNHLM indicative targets $20.3 million was needed for the 2018 TB program budget. The actual available total budget was $7.4 million, leaving a gap of 63%. The total budget was derived from a combination of domestic funding $2,429,165 (32.7%), GF $4,634,363 (62.4%) and other donors $365,409 (4.9%).

Rwanda's experience demonstrates that it is possible to achieve rapid and successful implementation of many TB/HIV collaborative activities as part of the Stop TB Strategy[10], in particular, HIV testing and ART initiation among diagnosed TB patients. The second national TB Drug Resistance Survey (DRS)[11] took place in 2015. By using our surveillance system, we estimated the prevalence of drug-resistant TB among individuals with previous TB cases, declining from 10.7% to 4.9%[12]. however, no change in prevalence was observed among newly diagnosed TB cases. Also, a study on the impact of PMDT interventions diagnostic- and treatment delays, and the resulting genotypic clustering of MDR-TB over a decade in Rwanda was conducted in 2016[13]. A study of patient costs associated with seeking and receiving care for TB is planned in 2020. It will assess the proportion of DS-TB and DR-TB patients who experienced catastrophic expenditure. The study conducted in 2012[14] on knowledge, attitudes and practices (KAP) among TB patients suggested that comprehensive knowledge of TB improved from 40% in 2009 to 56% by the end 2012. Recent information on TB knowledge from the last Demographic and Health Survey (DHS) in 2014, found that the majority of participants heard about TB (99.4%) and knew that the disease is spread through the air while coughing or sneezing (72%). Finally, the Diagnostics for Multi-drug Resistant Tuberculosis in Africa (DIAMA) project, coordinated by Prof. Dissou Affolabi in Benin, in collaboration with the Antwerp Institute of Tropical

[9] http://www.stoptb.org/assets/documents/global/advocacy/unhlm/PTTargets_November_2019.pdf

[10] Bulletin of the World Health Organization Past issues Volume 85: 2007 Volume 85, Number 5, May 2007, 325-420 https://www.who.int/bulletin/volumes/85/5/06-036525/en/

[11] World Health Organization :Global tuberculosis report 2016. Page 192

[12] Continuous surveillance of drug-resistant TB burden in Rwanda: a retrospective cross-sectional study. https://doi.org/10.1093/inthealth/ihac039

[13] Studies on multidrug resistance tuberculosis in Rwanda: Turning off the tap. Ngabonziza, Semuto Jean-Claude https://pure.itg.be/en/projects/studies-on-multidrug-resistance-tuberculosis-in-rwanda-turning-off-the-tap(8edb716b-9b40-45aa-8794-d224d7ee6ad9).html

[14] National University of Rwanda, School of public health. Knowledge, Attitude and Practices study on TB in Rwanda

Medicine considered optimization of TB molecular drug susceptibility testing, patient follow-up, and novel diagnosis approaches. Results of the project highlighted some possible new changes in DST such as the use of Xpert Second Line testing.

Other source documents include the National Tuberculosis Epidemiological Review conducted in 2018; the External Program Reviews of the 2013-2018 National Strategic Plan for TB (TB-NSP) conducted in 2016 and 2019. Other data sources used in this plan include the monitoring report on Programmatic Management of Drug-Resistant TB (PMDT) in Rwanda conducted in 2018, and the Rwanda National Tuberculosis and Other Respiratory Communicable Diseases Annual Report 2017-2018. Most of the data used in the NSP come from the Rwanda Health Information System (RHMIS) using DHIS2 aggregated data, and the WHO Global TB Report 2018[15].

I.2. NSP development process

The 2019-2024 TB-NSP is the successor to the last 2013-2021 TB-NSP aimed at implementing recommendations of the 2016, 2017 and 2018 reviews and aligned to the End TB Strategy of the World Health Organization (WHO). It was developed with active participation of TB stakeholders including civil society, national and international partners and various Health departments of the Government of Rwanda/Ministry of Health (RBC/IHDPC, RBC/NRL, RBC/MPPD, RBC/HIV, RBC/ CS, RBC/SPIU, RBC/ NCD, RBC/PMEBS, DHs, CHUK , Rwanda NGO forum, RPP+, UNICEF, WHO, KNCV and CDC), through a series of events, workshops and consultative meetings led by the NTP using the national guide for health sector policy and strategic plan development issued by the Ministry of Health in April 2014[16].

Following several external reviews including the last epi-review and Green Light Committee (GLC) missions at the end of 2018, an external desk review with the NTP central team was conducted from 27 May-1st June 2019 before a kick off partners workshop in which more than 30 international, national and local stakeholders reviewed and discussed relevant study results applied to three unique planning steps: (1) Problem Prioritisation; (2) Root Cause Analysis; and (3), Strategic Intervention Optimisation. The process nurtured country-level planning that centered on asking the following questions: (1) What are our biggest problems? (2) Why are they happening? and (3), What should we do about them? The NTP established a national writing committee composed of the NTP central unit team and other divisions within the Rwanda Biomedical Center (RBC) as well as other partners

At the end of May 2019, a desk review was conducted by the NTP central unit and Pierre Yves Norval from TeAM, who served as the external consultant, to assess the challenges and achievements identified during the previous MTR in 2016 (see Annexes 1, 2). The review team carefully analyzed and prioritized the challenges and gaps in preparation for the development of the new NSP 2019-2024.
Among the 94 challenges identified in 2016, which led to recommendations and subsequent actions, the review team found that 55 challenges still remained, including 9 new challenges (refer to Annex 1). The reduction of challenges by 50% was attributed to commendable performance. However, the identification of these 9 new challenges

15 file:///C:/Users/PIERRE~1/AppData/Local/Temp/9789241565646-eng.pdf

16 http://moh.gov.rw/fileadmin/templates/Docs/National_guide_for_HSP___Strategic_Plan_dvlpmt_.pdf

(numbered as N° 1, 6, 15, 17, 23, 32, 36, 37, and 51) played a crucial role in guiding the prioritization process for new NSP 2019-2024

The plan was validated by national stakeholders during a national validation workshop and submitted to technical and funding partners for input and comments before finalizing the first version.

Lastly, in December-January 2020, the NTP central unit with assistance from KNCV consolidated core epidemiological and systems-related data which was then collated along the care continuum as described in the WHO People-Centered Framework for tuberculosis program planning and prioritization - User guide (2019) was organized using the KNCV data consolidation tool.

The TB-NSP July 2019- June 2024 gives a broad vision of where Rwanda is now in terms of TB control, what the biggest problems or gaps are including their root causes based on available evidence, and where the country wants to be by the end of this five-year plan and how it plans to get there.

The outline of the document is as follows: Chapter 1 presents the evidence-based methodology and source documents. Chapter 2 describes the situation analysis including the policy environment, guiding principles, epidemiological situation and national response. Chapter 3 presents the core TB NSP July 2019- June 2024 plan with a strategic framework of interventions answering gaps and problem analysis. This gives indications of where we want to go, and how we plan to get there. Chapter 4 details the M&E plan and targets. Chapter 5 presents the full cost of the TB-NSP and detailed cost by strategic intervention and detailed activities, which also acknowledges funding gaps and resource constraints. Mathematical modelling of impact by Avenir Health was applied in combination with cost evaluation models to consider the interventions through applying the One Health tool (OHT). A sub-set of interventions were selected to optimize the impact of available resources on the overall epidemic and for selected special populations, high risk groups (HRG) for TB, highlighting most cost-effective interventions. Impact targets for three different levels of effort are presented to develop a costing plan with evidence prioritization allocation scenarios.

Furthermore, the development of the TB NSP 2019-2024 extended to June 2027 was based on MTR and epi-review 2022 findings, that informed on key challenges and recommendations. The Rwanda Biomedical Center through the NTP with partners and Civil Societies Organizations, met in different workshops brainstorming on the strategies, interventions and activities that will address gaps so the country can be on good track to the END TB indicators targets.
The NTP with stakeholders through webinars meetings, a data consolidation using the data entry and visualization tool of the People Centered Framework (PCF) for TB, analysis were done for gaps identification, so then root cause exploration and gap priority setting were proposed.
These exercises came up with evidence-based gaps identified, strategies, interventions as well activities to be taken in account in the extended TB NSP 2024-2027.

II. SITUATION ANALYSIS

II.1. Context and Health Sector Policies

II.1.1. Demographic and politico-administrative environment

Rwanda is an East African country, bordered to the north by Uganda, to the south by Burundi, to the west by the Democratic Republic of Congo and to the east by Tanzania. Rwanda has a total surface area of 26,338 km² and is divided into five provinces which are sub-divided into 30 districts which are sub-divided again into 416 sectors and further divided into 2,148 cells with 14,837 villages (Umudugudu) designated.

Rwanda conducted a census in 2022 and the population was estimated 13,246,394 inhabitants [17] giving a population growth rate of 2.6% per year since the 2010 census. The poverty rate declined from 56.7% in 2005-2006 to 38.2% in the FY2016-2017[18] and extreme poverty reduced from 35.8% to 16% over the same period. In 2017, the Gross Domestic Product per head per US dollar was 774, compared to 700 in 2012[19]. Life expectancy increased from 46.4 years in 1978 to 69.6 years in 2022 according the 2022 census. Life expectancy in 2012 was 64.5 years.

II.1.2. Health policy environment

The overarching vision for the Government of Rwanda (GoR) is to guarantee the well-being of the entire population by increasing production, while decreasing poverty through good governance. In this context, the mission of the health sector is to provide and continually improve affordable, promotive, preventive, curative and rehabilitative health care services of the highest quality, thereby contributing to the reduction of poverty and enhancing the general well-being of the population[20].

II.1.2.1. End TB strategy

In May 2014, the 67th World Health Assembly adopted the End TB Strategy which aims to end the global TB epidemic by 2035. This means reducing estimated TB mortality and incidence to 95% and 90%, respectively, by 2035 (as compared with 2015). The End TB Strategy builds on and significantly expands the scope of efforts in terms of United Nations Sustainable Development Goal 3.3 which is to end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and to combat hepatitis, water-borne diseases and other communicable diseases by 2030.

The Global (WHO) End TB Strategy comprises three pillars, namely:

(1) Integrated, people-centered care and prevention – aimed at early and universal access to diagnosis and treatment of all forms of tuberculosis.

(2) Bold policies and supportive systems – aimed at strengthened government leadership, civil society and private sector engagement, as well as universal health coverage, social protection, poverty alleviation and action on the social determinants of TB;

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17 *5th Rwanda population household census 2022*, National Institute of Statistics of Rwanda: Kigali-Rwanda.

18 *The fifth integrated household living condition survey (EICV 5) 2016-2017 fiscal Year, December 2018, National Institute of statistics of Rwanda: Kigali-Rwanda*

19 *Rwanda Statistical YearBook 2018, December 2018, National Institute of Statistics of Rwanda (NISR)*

20 *Rwanda Ministry of Health: fourth health sector strategic plan. July 2018-June 2024.* http://moh.gov.rw/fileadmin/templates/Docs/FINALH_2-1.pdf

(3) Intensified research and innovation – aimed at accelerating discovery, development and rapid uptake of new tools, interventions and strategies.

The strategy has specific indicators, milestones and targets for 2020, 2025, 2030 and 2035.

II.1.2.2. The Sustainable Development goals and TB

The GoR has committed itself to achieving the Sustainable Development Goals (SDGs) by 2030, which were adopted in 2015 by the United Nations (UN). The SDGs[21] have set the target of ending the TB epidemic by 2030. They are fully aligned with the WHO End TB Strategy.

Ending the TB epidemic by 2030 is one of the targets under goal 3, which is to "ensure healthy lives and promote well-being for all at all ages". Other SDG targets related to health and/or social determinants of health, which have potential impact on TB include: End poverty in all its forms everywhere; End hunger (malnutrition); Reduce maternal mortality; End preventable deaths of newborns and children under 5 years of age; Reduce premature mortality from non-communicable diseases (diabetes); Achieve universal health coverage; in addition to, Reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination (household and ambient air pollution, unsafe water, unsafe sanitation and lack of hygiene).

II.1.2.3. The Africa Health Strategy 2016-2030

The goal of the Africa Health Strategy (AHS) 2016-2030 is to ensure healthy lives and promote well-being for all in Africa in the context of "Agenda 2063: The Africa We Want" and the Sustainable Development Goals. The overall objective is to strengthen health systems performance, increase investments in health, improve equity and address social determinants of health to reduce priority diseases by 2030.

II.1.2.4. The Rwanda 7 years government programme: National strategy for transformation (NST1)

In 2000, the Government of Rwanda developed "the Rwanda Vision 2020" that sets out a long-term vision for the country in terms of goals and objectives for development by the year 2020. The goal is for Rwanda to become a middle-income country, halving the percentage of people living in poverty, raising life expectancy to 55 years and reducing aid dependency.

Moreover, in 2017, the Government of Rwanda developed a National Strategy for Transformation (NST1) which comprises the Seven Year Government Programme (7YGP) 2018-2024. The NST1 will provide the foundation and act as the vehicle to reach Vision 2050 which aims to take Rwanda to higher living standards and higher-quality livelihoods. This strategy builds on previous plans to sustain growth and accelerate transformation towards achieving the 2050 vision. The NST1 also embraces the Sustainable Development Goals (SDGs), which consists of 17 Goals with 170 targets and indicators, across a range of economic, social, and environmental issues.

The National Strategy for Transformation is built on 3 pillars:

[21] Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators (E/CN.3/2016/2/Rev.1), Annex IV

- Economic Transformation which aims to accelerate inclusive economic growth and development founded on the Private Sector, knowledge and Rwanda's natural resources;
- Social Transformation which aims to develop Rwandans into capable and skilled people with quality standards of living and a stable and secure society. This pillar has five objectives and the second one is to ensure quality for a healthy population.
- Transformational Governance which aims to consolidate Good Governance and Justice as building blocks for equitable and sustainable National Development.

The second pillar of NST1 will ensure access to quality healthcare for all by:

- increasing the health workforce capable of addressing the challenges and consequences of the epidemiological transition towards ending TB,
- establish model health centers of excellence through partnerships with private investors,
- identify innovative sources of finance for the health sector including public private partnerships, public community partnerships for health financing and a sustainable model for community-based health insurance,
- strengthen disease prevention awareness and reduce communicable and non-communicable diseases.

To achieve the NST1 targets, will require strengthening collaboration and partnership among all stakeholders and enhancing ownership at all levels.

II.1.2.5. The Health Sector Strategic Plan IV July 2018 – June 2024

The fourth health sector strategic plan (HSSP4) highlights commitments and priorities for the coming 5 years and is aligned to National Strategic Plan (NST1) with the overall objective to ensure universal accessibility (in geographical and financial terms) of equitable and affordable quality health services (preventative, curative, rehabilitative and promotional services) for all Rwandans. To attain this overall objective, four strategic sub-objectives were set:

- Full implementation of the various disease programs (improve demand, access, coverage and quality)
- Strengthening various health system components (e.g. strengthen policies, resources and management)
- Strengthening all levels of service delivery (organise services effectively at all levels)
- Ensure effective governance of the sector (strengthen decentralization, partnership, coordination, aid effectiveness and financial management).

The HSSP4 identified priorities in four broad result areas: increasing coverage of interventions along the life course; scaling-up coverage of essential services to combat communicable and non-communicable diseases; strengthening support for the Rwandan system and building health security and resilient systems.

The second priority of HSSP4 under infectious diseases includes TB as a priority, ensuring early detection and effective treatment of TB and other respiratory & lung diseases. The strategic direction is to reduce TB incidence by 45% in 2024. To achieve these targets, the following strategies were proposed:

- Improve case detection by conducting active case finding among high risk groups and in hotspots;

- Improve TB diagnosis across the laboratory network and progressively adopt the use of more sensitive molecular tests as initial diagnostic tests.
- Strengthen TB surveillance by adopting the use of an electronic individual record system and develop a data driven policy.
- Ensure access of first- and second-line anti-TB drugs at all levels.
- Ensure early detection and effective treatment of leprosy cases.
- Strengthen TB/HIV collaboration activities at all levels.

The HSSP4 will continue to ensure that all persons in Rwanda have access to equitable and quality services by ensuring universal health coverage and that no one is left behind.

II.1.2.6. The National Tuberculosis Control Strategic Plan July 2013 - June 2018

With the 2013-2018 TB-NSP, Rwanda's TB control strategy was clearly reformulated. While maintaining TB control activities in the general population, new and more sensitive screening and diagnostic strategies were introduced to target prioritized high risk groups and maintaining involvement of community health workers to ensure equity in TB control activities. It has four objectives:

1) Provide early TB detection in the general population and intensify case-finding in prioritized high-risk groups so that the proportion of TB cases (all forms) identified among HRGs increases from 14% to at least 24% by mid-2018,

2) Increase the TSR from 88% to 90% for bacteriologically confirmed TB cases and maintain this rate at 87% for MDR-TB,

3) Improve TB prevention (TB infection control in health facilities, behavioural change in the general population and prevention through medication) so that the percentage of the population with adequate knowledge on TB increases from 56% to 75% by 2018,

4) Improve managerial capacities of the TB program; enhance monitoring and evaluation systems and operational research, by implementing and increasing the functionality* of an electronic TB register in all CDTs.

The NSP includes two impact indicators, seven outcome indicators, eight output indicators and four process indicators to monitor the achievement of the interventions. At the end of the last NSP, the program exceeded its targets in 6 (29%) of the 21 indicators, while 9 (43%) were achieved, 3 (14%) were on track, while only 2 (10%) are facing some challenges and 1 (5%) is not applicable because the KAP survey completed as of June 2018. Table 1 presents the performance of the key indicators for the TB NSP 2013-2018

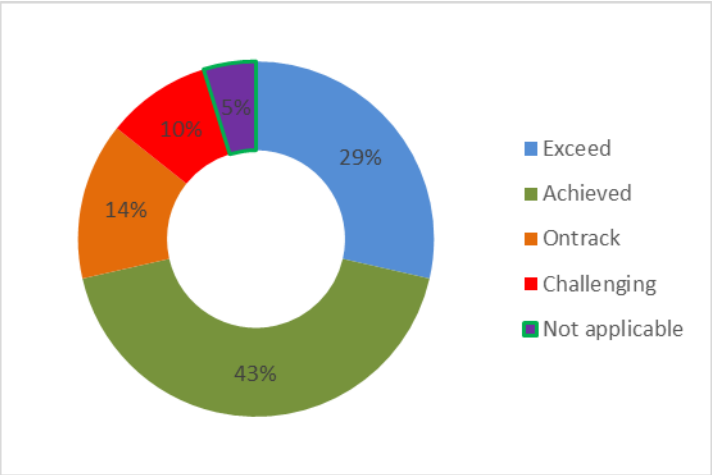

Figure 1. Achievement of NSP 2013-2018 indicators

Table 1. The TB 2013-2018 NSP targets versus achievements

No	**Indicators**	**Target**	**Result**	**Achievement**
	Reduce mortality rate	37.0%	46.6%	126%
	Reduce TB incidence	23.0%	21.0%	91%
1	Case Notification Rate (all forms)	50.1	48	96%
2	Case Notification Rate of TB Bac+	26.3	30.5	116%
3	% TB cases by CHWs	21.0%	19.3%	92%
4	% Labs with high performance in External Quality Assurance (EQA)	96.0%	84.5%	88%
5	% of TB Bac+ tested for DST	70.0%	85.6%	122%
6	% previously treated cases tested for DST	90.0%	85.9%	95%
7	% cases from HRGs	24.0%	47.1%	196%
8	TSR for TB Bac+ New & Relapse	90.0%	88.2%	98%
9	TSR for CD	79.0%	79.3%	100%
10	Cure rate TB Bac+ New & Relapse	84.0%	81.1%	97%
11	% TB cases tested for HIV	99.0%	99.9%	101%
12	Proportion of presumptive TB cases with a documented HIV test result	99.0%	99.1%	100%

13	% TB/HIV cases receiving ART during TB treatment	90.0%	92.2%	102%
14	TSR for TB cases by CHWs	95.0%	94.9%	100%
15	% RR/MDR-TB cases on 2nd line treatment	100.0%	98.8%	99%
16	TSR RR/MDR-TB	87.0%	83.0%	95%
17	Interim results at six months	91.0%	75.3%	83%
18	Timeliness of reporting	97.0%	84.0%	87%
19	KAP on tuberculosis completed	75%	No	

II.1.2.7. The National Tuberculosis Control Strategic Plan July 2019 - June 2024 Mid-term review

The Ministry of Health commissioned a mid-term review (MTR) of the country's National TB Strategic Plan 2019-2024 (TBNSP) midway into its implementation period. The review was conducted from 17th to 28th October 2022 by a multidisciplinary team of external and national experts led by the World Health Organization (WHO), the findings of which are reflected in this report.

The purpose of the MTR was:

- To assess the progress made in the implementation of the TB NSP July 2019-June 2024 mid-way.
- To provide information to guide and strengthen the program during the remaining period of the strategic plan.
- To help make necessary adjustments in program approaches, especially in the context of covid-19 pandemic.

The MTR specific objectives were to:

- Review achievements during the 1st half of the NSP implementation against the set targets.
- Assess the relevance of activities planned and targets set in the NSP against the latest international TB control goals and targets in Covid-19 context.
- Identify strengths, weaknesses, opportunities, threats, and constraints in the implementation process and propose corrective measures.
- Identify implementation gaps that might hinder the achievement of TB control targets including COVID-19 pandemic.

The review revealed evidence of successful NSP implementation and areas for improvement of the NSP mid-term targets and the key findings of the review by thematic area are as follows:

I. Governance, Programme management and multisectoral coordination, Health financing and social protection:

- High performance in the area of Transparency, Inclusiveness, Legal framework, and Process efficiency and effectiveness.
- Several mechanisms are in place to ensure adequate social protection of patients including persons with TB (laws and regulations, insurance schemes, income-generative activities, etc).
- Evidence of strong program management and political commitment, however, the long-term sustainability of Government funding in the era of high decrease of external funding and increase of community needs, is of concern.

II. Laboratory services:
    - Good progress has been made towards the transition to full SRL.
    - Early adoption of Xpert MTB/XDR (10 color) testing introduced in the network.
    - There is slow uptake of mWRD's for diagnosis.

III. Community engagement and private care partnership
    - The CHWs are involved in community screening program: education, tools filling, from the village to sector level.
    - Good coordination between the TB Focal person and Community Health Workers with a strong reporting system in health facilities by doing a weekly report for monitoring.
    - Low Partnership with private sector (only 3 clinics in Kigali city)

IV. TB/HIV integration and TB preventive therapy among PLHIV
    - Rwanda is far advanced on establishment of "one stop TB and ART services" currently implemented in all health facilities.
    - Low TB notification among HIV infected children
    - TPT provision among PLHIV is not implemented countrywide.

V. Management of DS and DR TB (include diagnostic, care and treatment)
    - Treatment initiation is generally prompt (within 1-3 days, including for MDR-TB)
    - All district hospitals have radiography services, most having digital equipment.
    - GeneXpert (a mWRD) coverage is suboptimal (not or all presumptive cases)

VI. Monitoring and evaluation, Surveillance and research
    - There is no interoperability between e-TB individual record management and HMIS aggregated data.
    - The data validation process at facility and hospital level is not automated.

VII. TB Medicine and TB commodities Supply chain management
    - Introduction of 3HP for TB contacts and People Living with HIV (PLWHIV) and all-oral treatment regimens for DR-TB patients.
    - No pharmacy professional in the RBC – NTP to coordinate TB PSM activities.
    - No focal point at NRL for supply chain for laboratory commodities

VIII. Childhood and adolescent TB
    - Low adherence to childhood TB screening and diagnosis algorithm by HCW
    - Staff in most facilities are not confident to conduct naso-gastric aspiration, sputum induction and fine needle aspiration.
    - Less invasive childhood TB sample collection methods such as stool is adopted but not implemented by the program.

IX. TB preventive therapy among contact and IPC measures

- The 3HP TPT implementation is being implemented in about 50% of district hospitals and needs to be upscaled nationally.
- 3HR TPT not used routinely by HCWs for children under 2 years, most HCWs stich to 6 months isoniazid therapy.

The main recommendations of the review are as follows:

- Strengthen the Public-Private Partnership to increase local funding for the NTP.
- Strengthen the country dialogue including communities and international development partners on ways to fund and sustain the gains achieved so far in the program.
- Strengthen possible strategies impacting implementation to full SRL candidature for the NRL.
- Conduct a laboratory diagnostic spatial analysis and network assessment to inform molecular diagnostic placements and fast track uptake of mWRDs for diagnosis.
- Enhance TB screening and diagnostic services in children living with HIV.
- Scale up TPT implementation in the remaining districts to improve coverage.
- Develop the partnership with private sector (hospitals, health post, traditional healers).
- Sensitize community on TB symptoms, conduct active case finding in hotspot of TB and the active contact tracing around TB index cases.
- Expand eligibility for Xpert MTB/RIF and further decentralizing access.
- Consider CAD installation and piloting CXR screening for PLHIV and high-risk groups.
- NTP to improve mentorship and supportive supervision to strengthen the quality of TB screening and adherence to child TB algorithm including gastric aspirate, sputum induction, fine needle aspirate and CXR reading.
- TB program to implement use of stool samples for TB diagnostic in children.
- MoH/RBC to expedite the process of recruitment of pharmacy professional at RBC TB division and assign at NRL a focal point for PSM of laboratory commodities.
- RMS to expedite procurement processes of TB laboratory commodities to avoid stock outs.
- Re-orient HCWs on the need to also use 3HR/TPT for children under 2 years. This regimen lasts for a shorter duration of 3 months and will promote adherence.
- Strengthen data validation process by automating data checks for health facility and hospital level users.
- Develop a dataset report for interoperability between e-TB individual records and HMIS.
- Engage a Health Finance Consultant in future NTP Reviews to evaluate the NSP expenditure.

II.2. TB epidemiology in Rwanda

WHO estimates of Rwanda TB burden were reduced in 2017 after the national TB prevalence survey of 2012 found a lower TB prevalence than previously estimated[22]. Estimated TB incidence rates in Rwanda are lower than the Global and AFRO Regional average but the 2021 incidence rate remains high with 56 (42-72) incident TB cases - new and relapse - per 100,000 habitants vs. 134 and 212, at global and AFRO Region level, respectively[23]. Rwanda achieved the Millennium Development Goal (MDG) target of halting TB incidence in 2006. Incidence is now on a steady decline at an average rate of 2.7% per year between 2010 and 2021 (Figure 2). However, the mortality rate (among those who are HIV-negative) decreased from 6.2 in 2010 to 4.9 in 2019 but increased in 2021 up to 7.3.

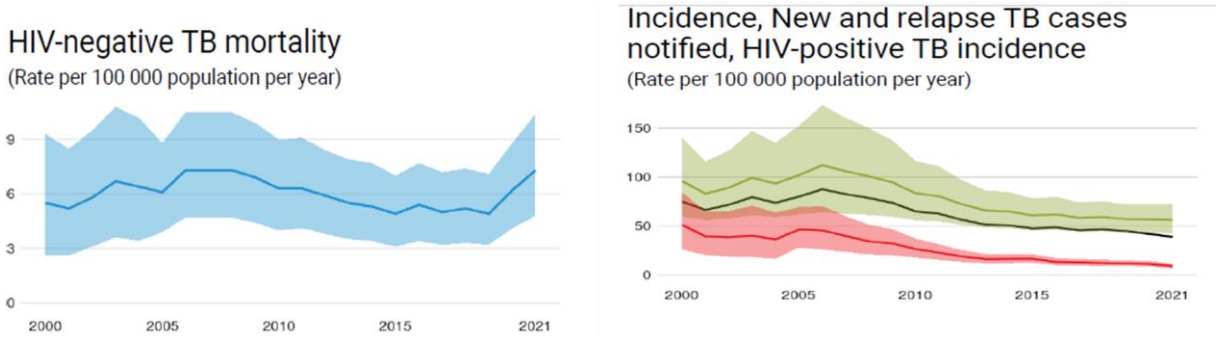

Figure 2. Trends of WHO estimates of mortality and incidence rates, 2000 to 2021 in Rwanda.
Source: WHO Global TB report 2022.

TB burden the countries neighbouring Rwanda is high, with 3 (DR Congo, Kenya and Tanzania) among the 30 highest TB burden countries (table 1).

Table 2. TB burden in Rwanda and neighboring countries, WHO Data 2021

	DRC	Uganda	Tanzania	Burundi	Kenya	Rwanda
Incidence rate per 100,000	318	199	208	100	251	56
Notification rate per 100,000	224	163	136	54	143	39
TB Mortality rate (HIV- and HIV+ TB cases) per 100,000	51.5	28	41	22.3	60	10

[22] The prevalence of all forms of TB in the total population of Rwanda was re-estimated by WHO to be 95 (95% CI 69-125) for 2012.
[23] World Health Organization. Global tuberculosis report 2019

Is the country among the 30 high burden countries?	Yes	yes	No	No	Yes	No

Source: WHO Global TB 2021.

The case notification rate (CNR) decreased between 2006 and 2013, and then increased slightly in 2015/16; with a CNR of 51 per 100,000 in 2014 (figure 3). This increase is attributed to increased screening activities, in part due to ACF.

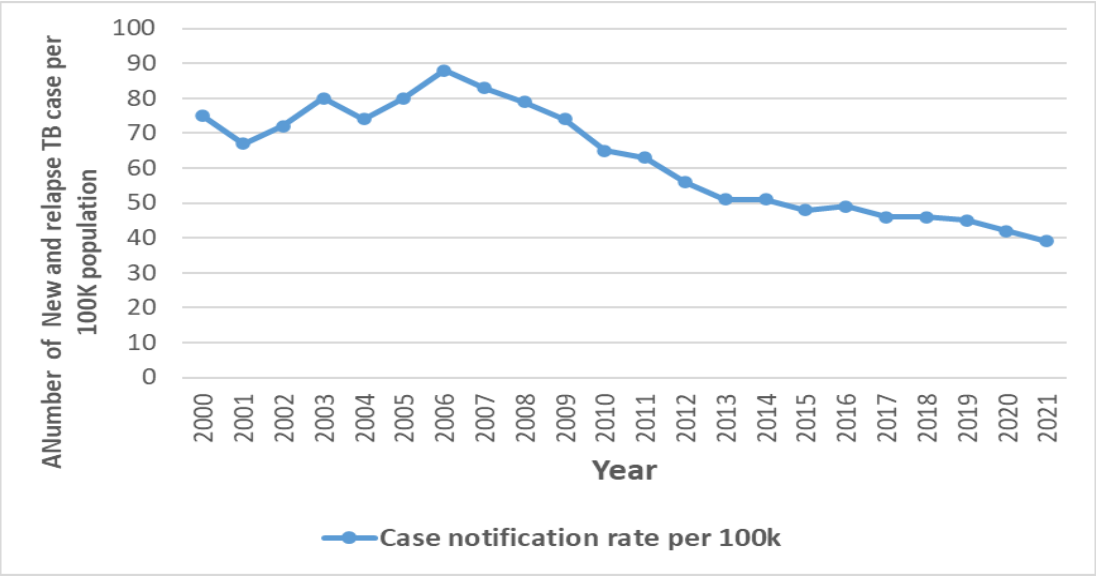

Figure 3. Trend of TB case notification rate, 1995-2021

In 2021/22, a total of 5,538 TB patients were notified, children represented 5% of total cases and 72.6% were male. The proportion of TB patients infected with HIV decreased each year from 21% in 2018/2019 to 14.4% in 2021/2022 Fiscal years 21-25%. This decrease can be due to the fact that Rwanda started the prevention of TB among People living with HIV since 2020/2021 fiscal year. Half of TB patients were aged between 25 and 44 (51%) years while children (<15) and elderly (> 55) represented 5% and 18%, respectively. The majority of known TB patients are male (male to female ratio of 2.6) (figure 4).

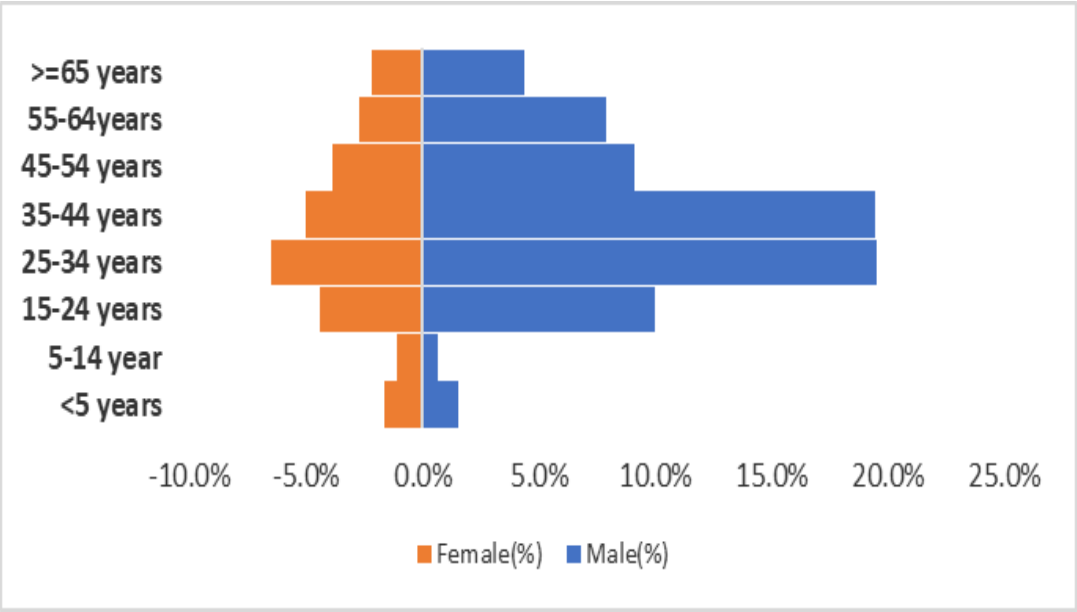

Figure 4. Age pyramid of TB cases all forms by sex, Rwanda, July 2021-June 2022. Source: TB&ORD annual report July 2021-2022

During the same FY, newly and relapse treated TB cases represented 98.5% (5455/5,538) and 1.5% (83/5,538) were other previously treated (relapse excluded). Overall, pulmonary localizations represented 81% (4505/5,538). As noted previously, TB was more commonly diagnosed among men. The male: female ratio for all-forms TB cases was 2.6. CHWs contributed to patient referrals for 27.7% (1,534/5,538) of TB diagnoses.

Table 3. Registration of TB cases by Case category, Site and Treatment History, 2021/22

	All forms	Bacteriological confirmed	Clinically Diagnosed	Previously treated(relapse excluded)	N&R	Pulmonary	Bact+(New and Relapse)	TB/HIV co-infection	started 1st line treatment	Cases brought by CHWs
N	5,538	4,049	1,489	83	5455	4,505	3,976	796	5,422	1,534
%		73.10%	26.90%	1.50%	98.50%	81.30%	71.80%	14.40%	98.70%	27.70%

Source: TB&ORD annual report July 2021-June 22

For 2021/2022, 126,294 presumptive TB persons were and among them 50,174 performed Xpert; the positivity rate was 3.2%,s year. The City of Kigali accounted one third of TB cases countrywide with also the highest TB case notification (Figure 5).

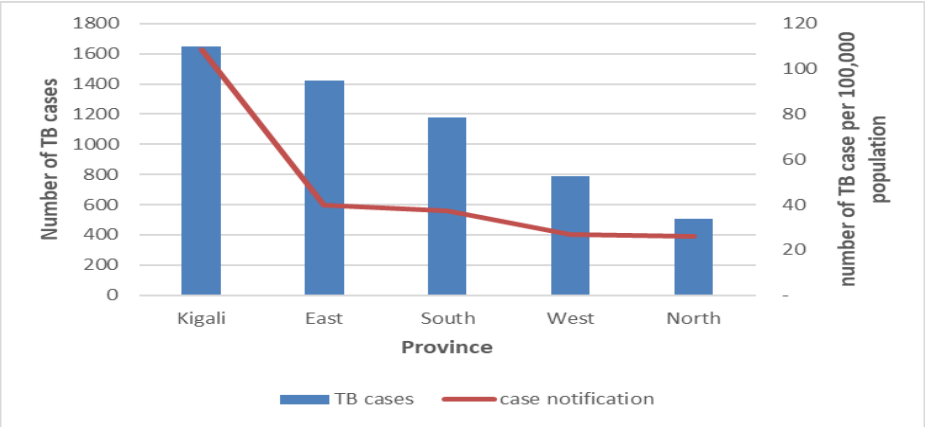

Figure 5. TB case and case notification rate by province, FY 2021-2022. Rwanda

TB treatment success has been improving in Rwanda since more than a decade, which has likely contributed to the reduction of TB incidence. For all TB cases, the treatment success rate increased from 85% to 89% for the cohort of TB patient notified in 2015-2016 and 2020-2021 fiscal ears respectively. During the same period, death rate and treatment failure slight decreased from 9% and 1.6% to 7,8% and 0.5% respectively and lost to follow-up remained at 2%.

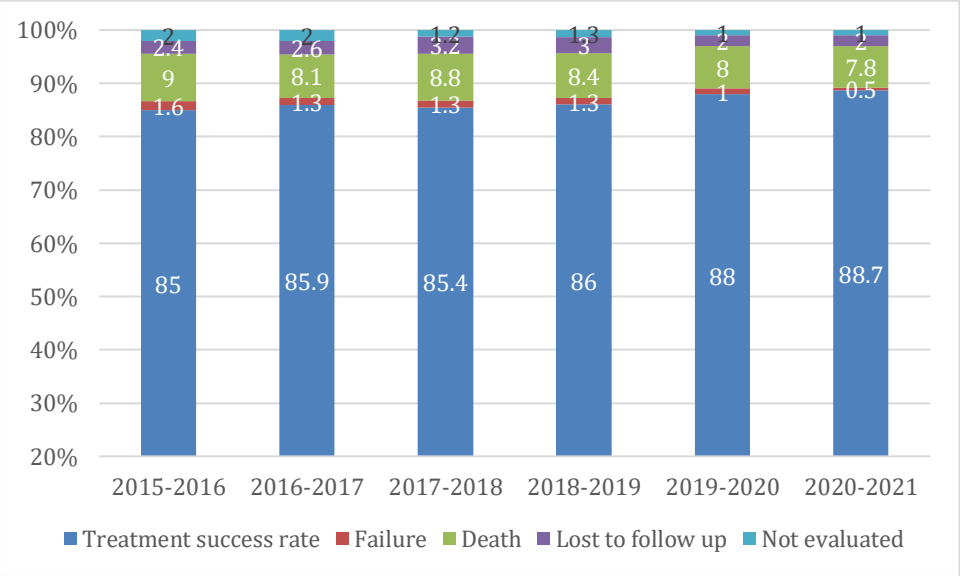

Figure 6. Treatment outcome for drug susceptible TB, FYs from July 2015 up to June 2021 in Rwanda

II.3. Drug-resistant Tuberculosis in Rwanda

Rwanda has a relatively low MDR-TB burden. The main factor driving MDR-TB appears to be transmission by infected individuals not yet detected. Findings from the TB Drug Resistance Survey conducted in 2019/2020 using our surveillance data

revealed low levels of drug resistance to first line drugs (1.4% in new cases; 4.9% in previously treated cases) and one case of resistance to injectable and 5 cases of resistance to ethionamide.. (ref: Continuous surveillance of drug-resistant TB burden in Rwanda: a retrospective cross-sectional study was published in International Health 2022; 0: 1–8 https://doi.org/10.1093/inthealth/ihac039.). This prevalence is reduced compared to the result of a survey conducted in 2015/2016 specially among previous TB treated cases which was 10.7% and remains stable among new cases (1.5%). However, two patients were diagnosed with resistance to fluoroquinolone in 2018 and 2021.

In 2021, Rwanda notified 34 laboratory-confirmed RR/MDR-TB patients compared to the 120 (95% CI 82-160) estimated by WHO in the same reporting period. Out of the 109 patients notified in 2018/19, 105 (98%) were initiated on the shorter 9-month MDR-TB treatment[24] while two were initiated on the longer standard 18-month regimen because they were previously treated for MDR/RR-TB .

The number of MDR TB cases has decreased since 2020 mainly due to the change in the algorithm of genexpert. There was a study conducted which revealed that 47% of RR TB diagnosed with classic xpert cartridges were false positive. (Ref: PMID: 35544156)

In addition to that, during the COVID-19 pandemic majority of xpert modules were nonfunctional which also contributed to low detection as genexpert is the most tools used to diagnose RR. There have been consistently less than 100 patients notified countrywide on an annual basis over the last 15 years. The gap between DR-TB notification and WHO estimated number of RR-TB (absolute number) in general population of Rwanda c was gradually increasing from 48% in 2015 to 72% in 2021.

[24] In July 2014, Rwanda participated in the multi-country study led by the UNION with the aim to evaluate the "effectiveness and tolerance to a short course MDR-TB treatment". Study results revealed higher cure rate with the shorter (9 month) regimen compared to the conventional one (20-24 months). Based on these findings, WHO recommends the use of this regimen under specific conditions and in 2016 Rwanda has adopted the shorter treatment regimen under programmatic conditions.

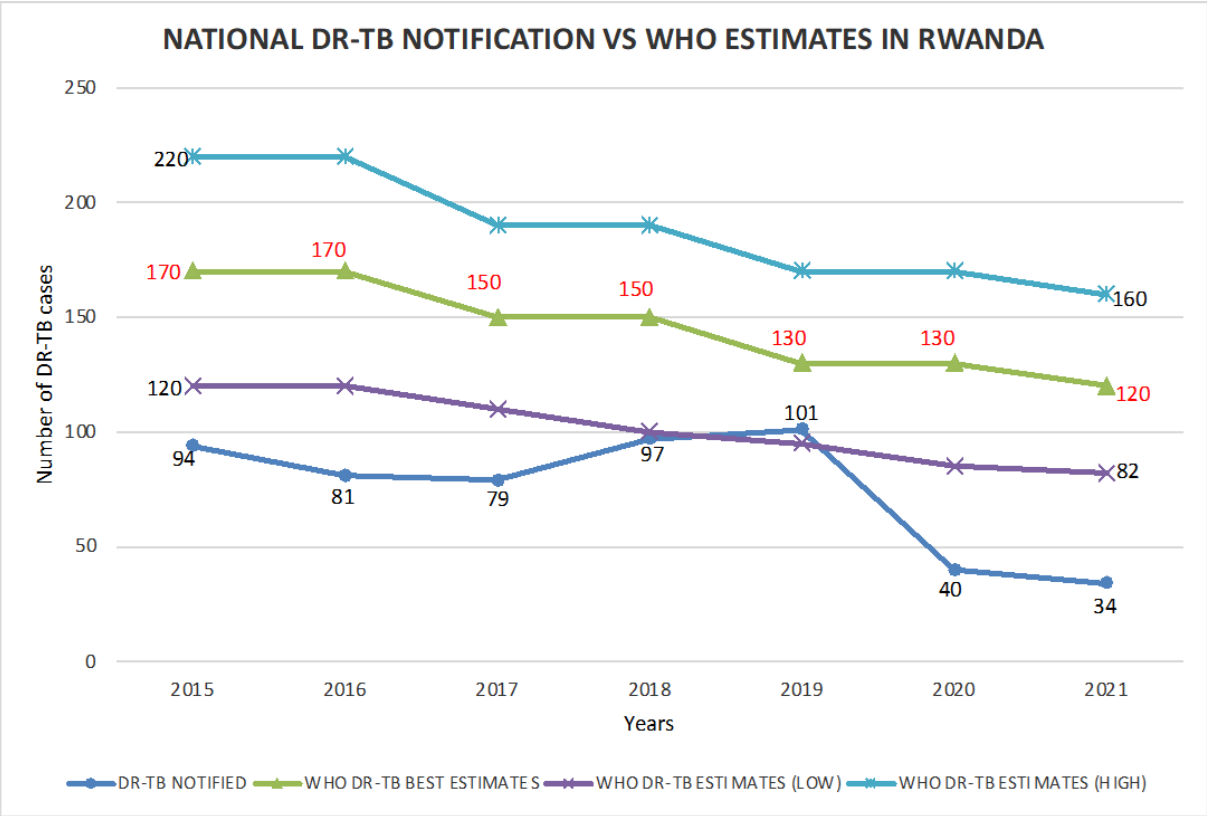

Figure 7. DR-TB estimates and notification, FYs from 2015-2021

Source. WHO GTB report 2022.

Rwanda initiated the short-course injectable MDR TB regimen in July 2014 and provide in-patient care at two facilities for the intensive phase. But since July 2021, Rwanda adopted the use of full oral treatment regimen for MDR TB patients. From 2015 to 2019 years, treatment success for MDR TB were higher than 90% and higher than treatment success for patients on treatment for drug-susceptible TB except in 2017, when treatment success fell to 81%.

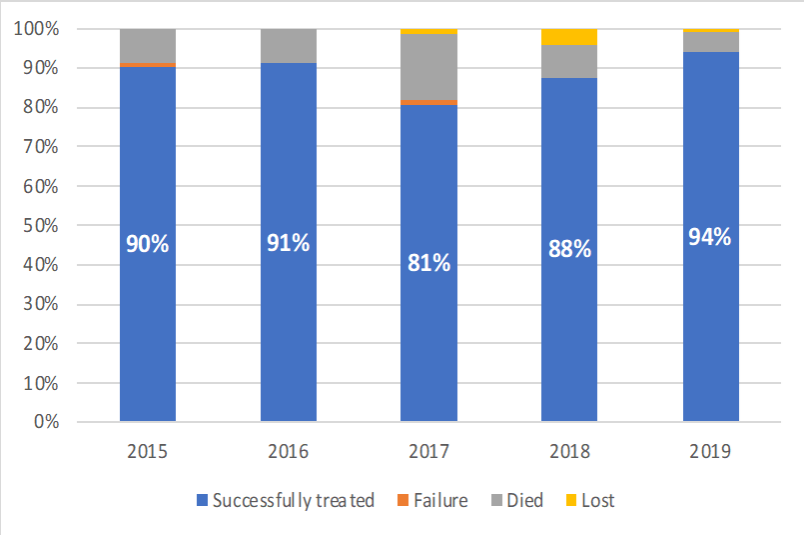

Figure 8. DR-TB treatment outcomes 2015-2019

II.4. National response

II.4.1. TB case finding

The NTP has invested in a lot of interventions towards increasing early and accurate TB case finding among prioritized HRGs including active case finding among prisoners, intensification of TB screening among PLHIV, at the beginning and end of treatment of the index patient, as well as screening of children and elderly patients presenting at the health facilities. Two screening approaches were used: a) symptom screening followed by X-pert MTB/RIF for those presenting any of the 5 symptoms screened (cough for two weeks, fever for more than 4 weeks, weight loss, night sweats) plus known contact with a TB case; b) CXR and symptom screening followed by X-pert MTB/RIF for those who have a CXR with abnormalities suggestive of TB and/or symptoms suggestive of TB.

Most of the HRGs received the screening and diagnostic algorithm a) symptoms followed by Xpert, such as PLHIV-in care during follow-up visits in pre-ART and ART cohorts, all children under fifteen years of age, especially malnourished and HIV infected children, at any visit at the health facility, new prison inmates entering prisons, every six months after sensitization in prison and at discharge, all elderly with ≥55 years in the community during household visits and at any visit at health facility. For some risk groups the other screening and diagnostic algorithm was used b) CXR and symptom screening followed by-Xpert, such as new PLHIV at enrollment, active campaigns in prisons. Other HRG such as people living with diabetes mellitus (PLDM) and underground miners, have not yet been systematically targeted in TB case finding interventions.

The active case finding using chest x-ray is mainly conducted in prisons and other congregated setting like new refugee coming in country or transit center. However, the policy recommends also to systematically screen TB to all people categorized as high risk attending health facilities for any reason.

The NTP interventions increased TB case finding and presumptive TB persons identified from 28,637 in 2005 to 199,384 in 2018, of whom community health workers (CHWs) have contributed in identifying 111,665 (56%) of all presumptive TB persons. The TB diagnostic algorithm for passive case finding among the general population was revised to include Xpert MTB/RIF in addition to microscopy for all smear positive TB cases. The capacity for WHO recommended rapid molecular diagnostic tests expanded and by the end of 2018, Xpert was accessible in 47 hospitals and 12 health centers with high TB notification rates. In 2018/19, 53.4% out of 5,949 TB cases were bacteriologically confirmed, of whom 3,174 were detected among HRGs. The proportion of children is below the expected norm of 10%, which may be a reflection of low detection levels for childhood TB. In order to improve TB detection and management in children, the NTP in collaboration with stakeholders developed childhood TB guidelines and a TB diagnostic algorithm specific to children including Xpert MTB/RIF as initial diagnostic test for all children presumptive for TB. Systematic TB screening is also incorporated into Integrated Management Childhood Illness and Integrated Community Childhood Management tools and guidelines. The NTP in collaboration with Rwanda Pediatric Association conducted mentorship on the management of childhood TB at health facilities using a checklist developed by pediatricians.

II.4.2. TB treatment outcomes

This treatment success rate reports cohort from July 2020 to June 2021. For all susceptible TB, the treatment success rate was 88.8% (4,838/5,455). However, the TSR for patients followed by CHW was 93.9% (2,174/2,314). For clinically diagnosed (CD) and TB/HIV coinfected patients, the treatment success rate was 84.4% (1,132/1,341) and 81,6% (804/985) respectively.
The main unfavorable TB treatment outcome was "death" representing 7.8% of all susceptible TB patients (427/5,455), 12.7% (170/1,341) in clinically diagnosed cases and 13% (128/985) in TB/HIV coinfected patients.
Co-infected TB/HIV persons notified during the 2020-2021 FY were 993; among them 985 were susceptible to TB and 95% (943/985) started ART before the end of TB treatment. We observed an increase in the treatment success rate among PLHIV when compared to the treatment success rate reached during the FY 2020-2021.

II.4.3. TB/HIV collaborative activities

Rwanda was one of the first African countries implementing TB/HIV collaborative activities. The country rapidly reached impressive results on HIV testing. More than 99% of presumptive and TB patients were tested for HIV and 21% (1,245/5,924) among those tested were identified as HIV infected 2018/19. Since 2010, a decrease in HIV positivity among TB patients has been observed. For the cohort of HIV+ TB patients registered during July 2017 to June 2018, the proportion of HIV+ TB patients on antiretroviral therapy (ART) by the end of TB treatment reached 94.7%. According to 2017 WHO data, out of 1,500 (100%) estimated incident cases (CI:980-2,200), 1,207 (80%) patients were notified and 1,186 (79%) started on effective anti TB treatment and antiretroviral treatment (ART) and 904 (60%) were successfully treated. Integrated care and treatment are offered in all 561 CDT and CTs through the "One-stop TB/HIV service" approach. Since July 2016, Rwanda implemented the "Treat all" policy, meaning that all PLHIV are enrolled on ART whatever their CD4 count or clinical stage in less than two weeks of testing. This policy is expected to introduce early treatment to healthier individuals and further reduce TB morbidity and mortality associated with TB/HIV coinfection.

Since 2011, Rwanda selected 3 health facilities to start a TB Preventive Therapy (TPT) program as piloting sites. In 2016, the TB/HIV TWG meeting decided to stop new enrolment on TPT due to low sensitivity of the 5 questions used in routine screening. In addition, the group determined that current TB diagnostic tools are sensitive enough and available at all hospitals as the impact of TPT in high-risk groups after six months of treatment was not clear. Recently, the TB/HIV TWG held in September 2018, recommended to re-implement the TPT program among recently diagnosed PLHIV starting with small scale (implementation in 5 hospitals with their 73 HCs). This program will help to evaluate the workload and potential geographical access barriers for the clients who will be transferred to the hospital for CXR.

The NTP decided to resume progressively the implementation of management of latent TB among PLHIV. In November 2019, 5 district hospitals and all health centers in their respective catchment area, were enrolled and only newly tested PLHIV were eligible.

Starting in July 2020, the scale up of TPT was extended to all PLHIV based on the available TPT drugs. In May 2020, new the TB NSP 2019-2024 was released and adopted the expansion of TPT to all PLHIV. The cumulative number of PLHIV initiated on TPT since its implementation is 136,598 which represented 63.8% (136,598/214,073) of all PLHIV enrolled in Rwanda's HIV Programs end June 2022. The completion rate for the cohort of PLHIV initiated on TPT from July 2020 up to June 2021 was 95.9% (59,061/61,579).

II.4.4. Management of Drug Resistant TB

Rwanda started PMDT using the 20 month-treatment regimens in July 2005. Nine years later, starting in July 2014, a shorter treatment regimen was introduced and successfully implemented under coordination of The Union's study on evaluation of the shorter nine-months regimen for rifampicin resistant tuberculosis in nine African countries. A health facility centred treatment mode was used, hospitalizing all RR/MDR-TB patients to initiate treatment in one of the two MDR-TB centers (Kabutare and Kibagabaga) until they converted to culture negative. Once clinically stable, patients were sent back for ambulatory follow up and daily supervised treatment administration, ensured by nurses from a health facility near the patients' residence. Patients received psychological, nutritional and transportation support during their treatment.

New and repurposed TB drugs, including Bedaquiline, Delamanid, Linezolid and Clofazimine, are being used in DR-TB management in Rwanda and treatment regimens are designed according to the WHO guidelines. In order to strengthen DR-TB management, the DR-TB program is annually assessed by WHO through the Green Light Committee (GLC) evaluation missions.

The number of patient categories to be tested for TB drug resistance increased with the introduction of Xpert MTB/Rif and includes all retreatment cases (failures, relapses, return to treatment after interruption, etc.), contacts of MDR-TB, any smear positive diagnosed TB patients and smear positive during treatment follow up of susceptible TB patents. In 2018, 64% of new and 76% of previously treated TB patients had a drug susceptibility test (Xpert MTB/Rif, Line Probe Assay (LPA) and/or phenotypic test for the first line treatment), which reach the TB program target (90%) for DST coverage among previously treated TB patients. In addition to the three reference laboratories in Rwanda (National Reference Laboratory (NRL), Kigali and Butare University Teaching Hospitals) which are providing Xpert MTB/Rif, LPA 1st line in all and 2nd line only at the NRL, culture on solid and liquid media and phenotypic DST, Xpert MTB/Rif is performed in all 48 public hospitals countrywide and in some 18 health centers for all eligible patients. One case with resistance to fluoroquinolones was detected in 2017 and linked to an individualized DR-TB treatment regimen.
All patients diagnosed with RR/MDR-TB are linked to care; no waiting list exists. Treatment success has consistently been high, at 91% for RR/MDR TB cases registered in 2016.

II.4.5. TB monitoring, evaluation and learning

During the past years, the following main activities were implemented in the area of TB monitoring and evaluation, to ensure the quality of TB surveillance data. These include:

- Developing and update of TB M&E policies/guidelines/tools and SOPs (using standardized reporting tools and WHO definitions);
- Capacity building of concerned staff involved in TB data management at all levels of the health system,
- quarterly or biannual Data Quality Audit (DQA),
- Rapid Service Quality Audit (RSQA) visits at intermediate and peripheral levels,
- Regular evaluation meetings (quarterly and annual) with HFs and Districts to discuss TB program performance,
- Periodic TB program reviews (WHO surveillance checklist and Epi-assessment); and
- Annual data verification by the Local Fund Agent of Global Fund.

The TB Epidemiological review conducted in September 2018 revealed that Rwanda has a well-established TB program with a surveillance system that houses high quality data and facilitates effective monitoring of HIV-TB co-infection and DR-TB. The external evaluation concluded that the TB surveillance system in Rwanda seems to accurately capture TB cases detected and TB control program efforts" [25,26,27] and could reach the WHO certification if the following standards are met:

- Establishing TB notification as a legal requirement,
- Developing a functioning vital registration system; and
- Conduct inventory study/studies to determine whether there's possibly under-reporting of TB.

In 2013, the Rwanda TB surveillance system (i.e. aggregated data entered in RHMIS is considered the formal system) met 6 of the 13 standards of the TB Standards & Benchmarks Checklist, partially met 4 and did not meet 2. In 2018, 8 standards were met, 2 partially met and 2 not met (see Annex 4 for more detail).

Significant progress was made in monitoring and evaluation since the development of the 2013-2018 TB NSP. The country is progressively transitioning from paper to a case-based electronic surveillance system. Since January 2014, all HFs are reporting quarterly aggregated data into RHMIS. The electronic web based individual patient registration named eTB is an extension of the aggregated DHIS2 using DHIS2 tracker application. ETB is already incorporated in RHMIS and reached 70% coverage of confirmed TB cases notified in the aggregated DHIS2. The NTP has identified and fixed bugs/unfavorable setups in the electronic reporting systems in eTB. The lack of interoperability between several electronic health information systems (e.g. eTB, the laboratory information systems, Data-To-Care, CRVS and LMIS) is a new challenge to address. The Civil Registration and Vital Statistics systems (CRVS) has increasing coverage of hospital/health facility deaths and a new system is being piloted to capture community deaths. Finally, the TB&ORD publishes an annual report on National Strategic Plan progress and the TB epidemiology situation including notification,

[25] 2013 Evaluation of the Rwanda TB surveillance system using the WHO Checklist for standards and benchmarks for tuberculosis surveillance and vital registration systems

[26] Eveline Klinkenberg. Epidemiological review and impact analysis of tuberculosis in Rwanda. Rwanda 21-25 July 2014

[27] National tuberculosis epidemiological review, Rwanda. September 2018

prevention and treatment based on data from eTB and RHMIS. In addition to epidemiological data, the annual report will also include people-centered and systems-related data generated, consolidated and mapped along the TB care continuum per the People Centered Framework.

II.4.6. Community engagement

Community DOTS was initiated in 2005 and reached national coverage in 2010. The role of CHWs includes:
a) Community sensitization for awareness of tuberculosis disease;
b) Identification and early referral of people with cough to the HC;
c) Administration of DOT to patients;
d) Referral of household contacts with cough to the HC;
e) Home visit and recuperation of TB patients who do not adhere to treatment regimen.

Currently, CHWs play a crucial role in bringing TB care close to the people. In 2018/19, CHWs contributed to referral of 56% of all presumptive patients and to 25.2% of all TB patients. The TSR for patients receiving community DOT is excellent at 95%.

With the latest data of CHWs contribution in TB detection during the FY 2021-2022, among all TB cases all forms, 27.6% were brought by the CHWs.

II.4.7 Engagement of the private sector

The private sector is composed of formal and informal health service providers. Formal private providers include not-for-profit institutions such as faith-based organizations (FBOs) and non-governmental organizations (NGOs) as well as for-profit providers including private self-financing institutions, individual private providers, retail pharmacies, chemists, laboratories, corporate and non-qualified or informal providers. Private institutions, which mainly serve the affluent or those covered under corporate insurance, mostly provide tertiary health care services.
The engaged private facilities in TB control, i.e. the private CDT clinics are limited to 3 CDT in Kigali. They use national policies and guidelines, monitoring and evaluation tools, and the NTP provides medicines and other essential commodities for diagnosis and treatment.
Orientation and referral of presumptive TB persons to the nearest CDT from a private facility is not reported in routine paper-based registers. The TB prevalence survey revealed that for those who sought care for chronic cough, 16% consulted informal private providers and 84 consulted formal private facilities[28] A study to assess the number of (presumptive) TB patients seeking care from the private health sector is needed.
In 2017, the 3 engaged private diagnostic and treatment centers (CDT) contributed only 0.6% of the national TB case notification numbers. The National TB Prevalence Survey showed that none of the prevalent TB cases were treated in the private sector. Private sector health facilities, other than the three mentioned above, once they have a suspicion of TB, they refer patients to public health facilities or the three private CDTs.

[28] 2012 TB prevalence Survey report

If a clinically TB diagnosis is made, they also transfer the patient to their nearest public health facility for treatment initiation.
Treatment outcomes as well as data on TB/HIV outcome indicators in the engaged CDTs from the private sector are similar to the national average.

II.4.8 TB prevention and TB infection prevention & control

Strong emphasis was put on TB infection prevention & control (IPC) within the last NSP, the focus included administrative, environmental and personnel protection measures. A minimum package of six basic measures for TB IPC was defined which includes: the existence of the IPC plan; appointment of the TB focal point; health workers trained on TB; cough triage system and separation of coughers; health education on cough hygiene; and, optimization of natural ventilation by maintaining opened doors and windows in all services. According to the 2018/19 annual report, 82.7% (465/562) of health facilities are applying all six basic measures.
Surveillance of TB disease among health care workers (HCWs) and CHWs, was initiated in July 2015 and July 2017, respectively. This surveillance is conducted once a year. A specific register was developed and distributed to all health facilities. Twenty-three thousand five hundred and sixty-eight (23,568) HCWs were sensitized on the importance of annual TB screening in 2018/19. Among them 18,601 (78.9%) were screened, 351 presumptive TB patients were identified and 10 were diagnosed with active TB (all forms) (NNS: 1,860; 54 TB cases per 100,000). Regarding TB surveillance among CHWs, 50,276 were sensitized and among them 42,465 (84.5%) were screened, 924 presumptive TB patients found and 8 were confirmed with active TB (NNS: 5,147; 19 TB cases pour 100,000).
With regard to Isoniazid Preventive Therapy (IPT), in 2018/19 fiscal year, 99% (1,429/1,443) of all children under 5 years who were contacts of bacteriologically confirmed TB cases were screened for TB. Of these 10.5% (150/1,429) were identified with presumptive TB and 18.6% (28/150) were diagnosed with active TB (all forms). Among the 1,415 children who screened negative, 97.7% (1,383/1,415) were enrolled on IPT. As explained above (in section II.4.3 on TB/HIV collaborative activities) IPT for PLHIV was piloted in 3 HIV clinics during the previous NSP period but stopped in August 2016. This intervention is planned for restart per this NSP.

As per the latest TPT status in Rwanda, during the FY 2021-2022, IPT/TPT coverage in under 5 years TB contacts was 90.7% (1,047/1,154) who initiated tuberculosis preventive treatment. Among TB contacts above 5 years, 19% of those assumed eligible on TPT were initiated on prevention while the target being 30%. We have to consider that only 50% of DHs were trained for the implementation of TPT among TB contacts 5 years and above. Furthermore, tuberculosis preventive treatment among PLHIV, 63.8%(136,598/214.173) were already initiated on TPT since its implementation in 2019.

II.4.9. Knowledge and health seeking behavior

The KAP study on TB literacy and health seeking behaviour conducted in 2012[29] showed that comprehensive knowledge of TB improved from 40% in 2009 to 56% by the end 2012.
Recent information on TB knowledge from a secondary analysis of the last DHS (2014), suggests that the majority of participants heard about TB (99.4%) and know that TB spreads through air while coughing or sneezing (72%). Only 5% of participants did not have any idea on how TB is transmitted.
The TB prevalence survey revealed that health seeking behaviour was poor. Only 40% of the survey participants reporting cough >2 weeks sought care. Among them, only 48% were asked to provide a sputum sample while 15% were referred for CXR. Although men are more prone to TB, women showed greater health seeking behavior. A previous study[30] suggests that late health seeking behaviour might be due to stigma or self- stigmatisation since TB is perceived as an HIV-related disease.

The National Institute of Statistics of Rwanda conducted the demographic health survey (DHS 2019-20), revealed that comprehensive knowledge on TB transmission was 68%. The participants who responded having at the moment of interview at least one of TB suggestive symptoms and who consulted, were only 40%.

II.4.10. TB control program coordination/management and financing in Rwanda

The country's vision includes ending priority SDG targeted diseases using well-established and focused structures to coordinate an integrated national response.
There is a long-standing history of partnership and support available for TB control from international and national non-governmental organizations (INGOs and NGOs), bilateral and multilateral agencies, research institutes and universities in Rwanda. This collaboration includes financial assistance, technical assistance, materials in- kind, diagnostic and treatment services, research, and management support. External partners firmly line up their aid behind the priorities outlined in the National Strategic Plan. Indeed, activities of donors, since the initiation of the program, are guided by the National Strategy Plan, and the vast majority of aid for tuberculosis is channeled through the government account.
A number of mechanisms exist for health sector coordination of partners in Rwanda. These include the MoH/Health Sector Working Group (HSWG) whose members comprise MoH, Development Partners (DP) and other Ministries and Civil society representatives. Under the leadership of the Permanent Secretary, the HSWG meets quarterly to discuss the implementation of the HSSP IV, topical sector issues and to share information. As policies and strategies are usually discussed, TB control implementation is discussed to understand progress and suggest remedies to improve performance.
Also, at the central level is the Country Coordination Mechanism (CCM) which covers all disease conditions, including TB. The members include the Permanent Secretary

[29] National University of Rwanda, School of public health. Knowledge, Attitude and Practices study on Tuberculosis in Rwanda

[30] Ngang, P. N., Ntaganira, J., Kalk, a, Wolter, S. & Ecks, S. Perceptions and beliefs about cough and tuberculosis and implications for TB control in rural Rwanda. Int. J. Tuberc. Lung Dis. 11, 1108–13 (2007).

and program heads, District Pharmacies (DPs) and NGOs. The CCM plays a leadership role, effectively participating in discussions around the NSP such as its development and performance. It participates in and coordinates the development and submission of national proposals for GF grants, oversees implementation of the approved grant and submits requests for continued funding as well as approving any reprogramming and submission of requests for continued funding.

At the peripheral levels there is the Joint Action Development Forum (Health Commission) in each of the 30 Districts and 416 Sectors. The Forum is used for planning and monitoring, promoting cooperation between the private sector, civil society and the public sector to advance development at the local level. The health component includes TB control. As integration is the preferred option for service delivery in Rwanda, there is limited scope for vertical program coordination including TB.

In order to increase ownership over programs, Rwanda is using the PBF mechanism to improve the involvement of health providers in the implementation of the TB program at all levels of the health system. Funding for TB interventions is declining, which drives a very effective prioritization and optimization process for interventions planned in this NSP, in order to maximise (epidemiological and economical) impact with limited resources.

In line with the MOH policy, the PBF for TB control activities was introduced in 2010. The system includes more than 20 TB-related indicators and led to substantial improvements such as broad awareness on TB at community-level, increasing easy access to TB services through involvement of CHWs (about 40% of all presumptive TB persons are brought by CHWs and half of TB patients are managed through community DOT) as well as improved TB TSR for patients managed by CHWs. TB case finding and the quality of TB services improved as a result of implementation of the PBF among HFs. The PBF scheme is also applied as a part of salary and as policy of MoH, aiming at improving staff performance; its payment is based on achievement of fixed targets and ratified in contracts between the two parties.

Capacity building for personnel involved in TB control activities has been one of the key interventions to strengthen policies and guidelines, as well as training for newly enrolled staff (e.g. an introductory TB course). Examples of training provided include TB and TB/HIV, MDR-TB, TB infection control, TB laboratory, TB data management, and CXR interpretation for MDs and radiology technicians.

PAL was introduced during the 2009-2012 NSP with the objective to increase TB detection and improve the quality of TB case finding and diagnosis by health services, in particular follow-up of sputum smear-negative HIV-positive TB presumptive cases; and to improve the management of patients with chronic respiratory diseases. Guidelines for the practical approach to lung health (PAL) were developed both for health centers and district hospitals. PAL materials (peak flow meters for all health centers, pulse oximeters, handheld portable spirometers for all district hospitals and oxygen concentrators for some hospitals) and products (Salbutamol and beclomethasone for all HF) are procured and distributed. This approach was implemented in all health facilities. The TB and ORD Division continued to expand the PAL strategy through training, mentorship to strengthen health care provider capacity, procurement of essential equipment, advocating for availability of medicine related to chronic respiratory conditions vis a vis to the use of current guidelines. and printing information material for health care staff. An assessment to evaluate the relevance, effectiveness, efficiency, and sustainability of the PAL approach at PHC level was carried out respectively in 2017 and in 2021.

In Rwanda, there is a policy and a legal framework including registration and limiting use/sale of TB drugs only by approved TB programs, in place since 1990. The procurement system for TB drugs, consumables and laboratory reagents is centralized where the Rwanda Medical Supply Limited (RMS) conducts all health commodity procurement through WHO pre-qualified suppliers. The RMS is responsible for storage and distribution of health commodities to all health facilities through the RMS branches. A robust drug management system through paper based and an Electronic Logistics Management Information System (e-LMIS) has been implemented at different levels of the supply chain. Currently, the management of the drug information system is fully computer-based at the central level. RMS Branches and health facilities (HF) are using e-LMIS mostly for ordering and distribution, but warehouse management is still using a paper-based system in RMS branches and HFs.

III. PRIORITY GAPS IN TB CONTROL IN RWANDA FOR THE TB NSP 2019-2024 AND EXTENDED PERIOD 2024-2027

Challenges and achievements from the last MTR 2016 were reviewed at the end of May 2019 through a desk review performed by the central NTP unit and an external consultant (see Annexes 2 and 3). The review team analyzed and prioritized challenges and gaps with an eye towards preparation of the new NSP 2019-2024. From 94 challenges identified in 2016, which led to recommendations and actions, the 2019 review team identified a remaining 55 challenges including 9 new challenges guiding the prioritization of the new NSP 2019-2024.

Although TB control in Rwanda has made substantial progress over the last decade, there are still priority gaps and significant challenges to the program. Nonetheless, there are also new opportunities to improve control and to move progressively towards ending TB. The priority gaps are described in the following section.

With the 2019-2024 TB NSP, TB control strategies will be reformulated: while maintaining TB control activities in the general population, new and more sensitive screening and diagnostic strategies will be introduced to target prioritized high risk groups and maintain the level of involvement of community health workers to ensure equity in TB control activities. **This NSP addresses 4 priorities gaps and 10 other gaps** identified by partners, through ambitious new operational policies.

III.1. Priority gap 1: TB treatment coverage

TB treatment coverage is not at desired level (about 20% of the estimated incident cases are not detected or treated) despite ongoing efforts to increase TB detection among HRGs and to increase diagnostic capacities.

According to the WHO Global Report 2022, treatment coverage[31] in 2021 was 69% meaning that about 2,382 active TB cases were not diagnosed. TB treatment coverage among children is even lower and estimated at 62% (367/590) below the 82% (5226/6400) coverage among adults. The epi-review in 2018, the desk review in 2019 and the 2016 mid-term review of the 2013-2018 TB NSP highlighted several weaknesses that may lead to under-detection of TB cases. These include the following: a) sub-optimal quality of TB screening and inadequate screening tools that do not capture all the 5 screening symptoms and do not allow analysis of this step of the cascade of care; b) under-utilization of Xpert and CXR in the diagnostic process; c) constraints related to the patient transport for CXR and sample transportation systems for Xpert; d) delayed transmission of culture/Xpert results back to the requesting HF due to limited connectivity systems; e) insufficient awareness on TB and patient delay due to poor health seeking behavior was also highlighted through the national TB prevalence survey conducted in 2012; and f) and insufficient on-site support through supervision and mentorship

[31] Treatment coverage is the proportion of notified cases among the estimated incident cases

Possible low detection of children with TB may be due to limited health care worker knowledge, skills, and confidence to establish clinical diagnosis; compounded by the low quality and infrequent childhood of mentorship and high staff turnover. Sample collection techniques (sputum induction, naso-gastric aspiration, fine needle aspiration [FNA] are not routinely used which may be limiting bacteriological confirmation of diagnosis in children. For Naso-pharyngeal aspiration is not yet implemented and Xpert testing on stools (as a painless alternative) is implemented only in 4 pilote hospitals . . There are missed opportunities such as using a family-centered approach and limited inter-program collaboration. Closing the diagnostic gap in this NSP is to operationalize new national policies in support of appropriate and timely diagnosis, namely: 1) expanded use of CXR for screening for TB or as a triage tool; 2) X-pert as the initial confirmatory test for all TB presumptive cases; 3) increasing additional high risk groups to cover more of the high risk population for TB and 4) all bacteriologically confirmed TB patients to receive drug- sensitivity testing (DST). Additionally, encouraging health seeking behavior among high-risk groups by a patient-centered approach or enhancing efforts to attract them to seek care will also assist in answering this priority gap. Furthermore, this NSP will generate additional data for a more detailed cascade analysis and a repeat PPA is foreseen to also provide evidence on initial TB care seeking and possible subnational variations.

III.2. Priority gap 2. TB treatment success

The TSR for all forms of TB is at 86.5%, below the 90% global target; no aDSM system is in place for both drug-susceptible and drug-resistant TB cases; and no support is provided to vulnerable drug-susceptible patients (especially those malnourished, diabetics, and hospitalized)

The TSR for bacteriologically confirmed TB patients reached 88%[32]. However, the treatment success rate for all forms at 85.9% is associated with a high case fatality rate among those clinically diagnosed (16%) and HIV+ TB patients (15%). These deaths analyzed in a death audit are attributed firstly to malnutrition as demonstrated in a study conducted in Taiwan/Taipei during 2011 to 2012.[33] The study indicated that TB patients with a BMI below 18.5 have a higher death rate than TB patients with a higher BMI. Malnutrition among TB patients should be considered as the main risk factor of death as its role on immunity impacts logically health recovery. Other death factors are late diagnosis due to use of less sensitive screening and diagnostic strategies, low TB awareness among the general population to seek care earlier, low skills among health facility staff to investigate patients with TB symptoms for TB and limited access to Xpert testing and chest radiography, low skills among health facility staff to investigate TB patients for other diseases/ comorbidities, such as diabetes etc.

Drug-susceptible patients do not receive nutritional support, even if they are hospitalized, which may impede or slow recovery. Payment is required for the management of co-morbidities like diabetes and others; therefore, these comorbidities may not be treated and hamper TB cure. TB treatment education materials and

[32] The last report 2017-2018

[33] Yen et al. Association of Body Mass Index With Tuberculosis Mortality A Population-Based Follow-Up Study. Medicine _ Volume 95, Number 1, January 2016. DOI: 10.1097/MD.0000000000002300

pamphlets for the patient and their families are not available to foster adherence, regular control and general awareness during treatment.

Closing the treatment gap in this NSP is to operationalize new national policies in support of nutrition for Drug Sensitive TB cases with BMI of ≤ 18.5 identified as death risk factor together with early diagnosis addressed in priority gap 1.

III.3. Priority gap 3: TB preventive treatment

TB preventive treatment (TPT) for eligible PLHIV and children needs to meet the ambitious indicative 2022 UNHLM targets for Rwanda. New WHO Guidelines on TPT must be adopted and rolled out rapidly introducing shorter TPT courses and the new drug Rifapentine that will replace the six months of Isoniazid and considering other people at risk with lowered immunity or living in crowded settings.

According to the 2019 desk review, the 2018 epi-review and Mid Term Review (MTR) of the TB NSP 2013-2018, inception of TB Preventive Therapy (TPT before TB patients and TB infected persons seek care is considered a priority. TPT was successful in the previous NSP for contacts of 0-5 years reaching 90% coverage with good adherence and completion, however TPT is far from satisfactory among PLHIV after its discontinuation and recent restart.

Closing the prevention gap represents an ambitious new policy in this NSP. Identifying people with TB infection and disease before they seek care to reduce the risk of developing TB disease, scaling-up of contact tracing for TB screening and LTBI management among all close contacts of bacteriologically positive index patients regardless of age, and all PLHIV will be the main intervention in this NSP. Moreover, this NSP embraces the piloting and the adoption of new, shorter preventive regimens such as weekly Rifapentine and Isoniazid for three months (3HP), for the treatment of latent TB infection. It presents an ambitious partnership with community health volunteers and large companies, to enable contact tracing of household and workplace contacts of TB bacteriologically positive index patients, as well as among PLHIV. Other eligible groups per the latest WHO Guidelines on TPT[34] released on 24 March 2020 will be considered in the future for operational research such as other people at risk with lowered immunity (PLDM) or living in crowded settings (prisoners).

The MTR 2022 findings highlighted TB preventions gaps, showing that 50% of district hospitals not yet covered by TB preventive treatment among TB contacts above 5 years old. and needs to be upscaled nationally. In addition, 3HR TPT is not used routinely by HCWs for children under 2 years, most HCWs switch to 6 months isoniazid therapy. The recommendations suggested were to scale up TPT countrywide as well providing TPT shorter regimen; Rifapentine and Isoniazid for three months (3HP), Rifampicin and Isoniazid for three months (3HR) in under five years old household contacts.

Based on the MTR 2022 findings and recommendations, on the time of the evaluation we had not yet covered all DHs of the country in terms of capacity building on Tuberculin Skin Test (TST) and TPT among TB household contacts above 5 years old.

[34] https://www.who.int/publications-detail/who-consolidated-guidelines-on-tuberculosis-module-1-prevention-tuberculosis-preventive-treatment

III.4. Priority Gap 4: TB funding

Over-reliance on donor funding and uncertainty around funding in the near future are limitations. More funding is necessary to find the missing cases which is expected to be more expensive.

To sustain the good achievement of TB control in Rwanda in the future and to ensure achieving the SDGs and the relevant milestones of 2025 for the priority diseases such as TB, innovative funding mechanisms are needed.

Closing the funding gap to ensure complete national funding for TB is not possible during the timeline of this NSP, however progressively including all elements of TB care in the Rwanda 'Mutuelle de Santé' should urgently start during this NSP. The TB care and prevention package should include a TB diagnostic package that covers CXR, CAD and WHO recommended rapid diagnostic (WRD) tests, patient and nutrition support, contact investigation and new (preventive) drugs and regimens as the way forward to ensuring UHC for TB, achieving the SDG milestones and mobilizing increased domestic funds for TB control.

III.5. Other Gaps to end TB

Other managerial gaps identified during previous reviews (epi-review and desk review) and data consolidation per the WHO recommended People Centered Framework (PCF) are also addressed in this NSP, such as:

1. Weaknesses of the current M&E system which include a) insufficient coverage of TB patient monitoring with eTB (on DHIS2 tracker), b) absence of interoperability between relevant web-based platforms on laboratory, drug management, HIV and other diseases, c) paper-based registration system which needs to transition to a fully electronic case-based registration, and lastly d) the absence of reliable data to analyze causes of death because the vital registration system implementation is still at an early stage;
2. Delays in conducting operational research on catastrophic costs did not take place, due to a funding gap in the previous NSP, and an anthropological study on obstacles for seeking care complementing the PPA conducted as part of the NSP development process;
3. Delay in upgrading the NRL into an accredited Supranational TB Laboratory (SNRL) previously discussed and planned by 2019. However, this process needs intense mentorship, technical assistance and a comprehensive roadmap with budgeted activities and timelines for accreditation.
4. Rwanda faces a challenge of maintaining sufficiently skilled human resources. While capacity building for personnel involved in TB control activities has been strengthened, the NTP still faces high turnover of trained personnel calling for repetitive refresher trainings, the need for integrated training for cost-effectiveness and the lack of an online interactive training system using WHO recommended online training materials based on latest global guidelines.
5. There is particular threat to community-based TB care due to potential demotivation of CHWs resulting from the reduction of the CHW stipend in the

last 2 years. This is coupled with gaps in their TB knowledge which are not addressed since there was no refresher training nor sensitization for CHWs in recent years. As a consequence, it is difficult to maintain the high quality of community-based care standards.

6. Only three private clinics are currently engaged in TB diagnosis and treatment; there is no guidance to assist NGOs/CSOs to gradually scale up engagement of the private sector in TB care and prevention.
7. The PAL strategy introduced during the past NSP needs to be strengthened in all health facilities and tracking of its outcomes improved. Standardized M&E indicators and tools are not yet defined. A program evaluation is necessary to identify bottlenecks in the implementation process as well as results. This PAL strategy follow up could further strengthen collaboration between the NTP, NCD Division and other health partners with regards to respiratory diseases.
8. The data consolidation exercise that was conducted with technical assistance by KNCV as part of the NSP development process, revealed the following additional (evidence) gaps that need to be addressed through research activities under Pillar 3: a) a series of inventory studies to validate subnational RHMIS data and look for different drivers at subnational level; b) refinement of the RHMIS to monitor and analyse why and where exactly losses take place in the TB care cascade; c) need to conduct LTBI test surveys to estimate the proportion of eligible individuals in at-risk sub-populations (per national guidelines) tested for TB infection.

III.6. Principle of the prioritization: 3 scenarios developed using the One Health Tool

The NSP describes to what extent the 4 priority gaps and other gaps will be addressed by 3 intervention scenarios for three funding levels and their respective impact.

There are 3 main factors influencing the 3 intervention scenarios namely:

- The application of different more sensitive case finding approaches (diagnostic algorithms) in the general population and targeted high-risk groups is the main factor influencing cost and impact of the 3 scenarios,
- The treatment outcomes resulting from the introduction and scale-up of different diagnostic algorithms influencing early case detection and universal drug susceptibility testing, as well as coverage of nutrition support for DR-TB and DS- TB
- The different aspired levels of population coverage for TB preventive treatment and introduction and use of (child-friendly) new drugs and preventive regimens.

These 3 factors are presented in this NSP with their respective projected cost and impact using mathematical modelling for the 3 following intervention scenarios: the continuation of the current intervention package and approaches as well as coverage (scenario 0), the ambitious but realistic scenario 1 and a very ambitious scenario 2 with increased coverage and accelerated uptake and use of more sensitive diagnostics and patient support.

The One Health Tool was used to cost the TB NSP in alignment with the health sector strategic plan budget and other disease programs that are using this tool in Rwanda.

The One Health Tool is also compatible with and used for TB impact modelling and evaluation (TIME) and economic evaluation (TIME ECON) and also includes health systems related programmatic costs for commodities and health products and human resources.

To take into account the funding uncertainty on the national budget for TB, the support from Mutuelle de santé on TB services and the external funding sources (mainly from the Global Fund), several activities are classified in priority 1 and 2 leaving the possibility to adjust the NSP budget costing to available funding along the timeline of this plan.

IV. THE NATIONAL STRATEGIC PLAN 2019-2024 EXTENDED TO JUNE 2027 IN RWANDA

Vision	**Rwanda free of tuberculosis – zero deaths, disease and suffering due to tuberculosis**
Goal	End the tuberculosis epidemic in Rwanda by 2035 which means 10 incident cases per 100 000 population or less per year (new and relapses).
Milestones for 2027	65 % reduction in TB deaths (compared with 2015) 33 % reduction in TB incidence rate (compared with 2015) Reduction of TB-affected families facing catastrophic costs due to TB (to be determined (TBD) after the survey, end 2020)
Targets for 2035	95% reduction in TB deaths (compared with 2015) 90% reduction in TB incidence rate (less than 10 TB cases per 100 000 population) No affected families facing catastrophic costs due to tuberculosis
Principles	1. Government stewardship and accountability, with monitoring and evaluation 2. Strong coalition with civil society organizations and communities 3. Protection and promotion of human rights, ethics and equity 4. Adaptation of the strategy and targets at country level, with global collaboration
PILLAR ONE. PATIENT-CENTRED CARE **STRATEGIC OBJECTIVE 1: CONSIDERING THE PATIENT PATHWAY FOR TUBERCULOSIS** 1.4 Accelerating early screening and appropriate diagnosis of TB 1.5 Quality of care and ensuring a cure, including aDSM and patient support 1.6 Promoting care seeking and prevention through community engagement **STRATEGIC OBJECTIVE 2: TARGETED APPROACHES FOR KEY DRIVERS OF TB EPIDEMIC AMONG SELECTED POPULATIONS** 2.6 Enhancing Programmatic Management of Drug – Resistant Tuberculosis 2.7 Ensuring prevention, diagnosis and treatment of Childhood Tuberculosis 2.8 Strengthening management of TB / HIV and other co-morbidities 2.9 Ensuring diagnosis and management of lung diseases	

2.10 Promote intensified screening and diagnosis among high-risk group (HRG) populations

PILLAR TWO. BOLD POLICIES AND SUPPORTIVE SYSTEMS

STRATEGIC OBJECTIVE 3: PROGRAMMATIC MANAGEMENT, MULTI-SECTORAL COLLABORATION & ENGAGING ALL CARE PROVIDERS

3.6 Political commitment with adequate resources for tuberculosis care and prevention
3.7 Management of TB care and prevention
3.8 Engagement of civil society organizations, and public and private care providers
3.9 Migrant and cross border
3.10 TB infection control

STRATEGIC OBJECTIVE 4: UNIVERSAL HEALTH COVERAGE, SOCIAL PROTECTION, HUMAN RIGHTS & NUTRITION

4.4 Universal Health Coverage
4.5 Human rights and gender
4.6 Social protection and nutrition

STRATEGIC OBJECTIVE 5: STABLE AND QUALITY ASSURED SUPPLY OF DRUGS, DIAGNOSTIC AND COMMODITIES

5.3 Supply chain management
5.4 Rational use of medicine

STRATEGIC OBJECTIVE 6: M&E AND DATA QUALITY SYSTEM (E-TB HEALTH INFORMATION SYSTEM)

6.2 Surveillance system including mortality registration

PILLAR THREE. RESEARCH AND INNOVATION

STRATEGIC OBJECTIVE 7: DATA FOR PROGRAMMATIC, MONITORING, EVALUATION, LEARNING AND PLANNING

7.2 Evidence generation and use of electronic data systems

STRATEGIC OBJECTIVE 8: RESEARCH PRIORITIES

8.1 Research strengthening

IV.1. Vision- Mission, Goals and Guiding Principles

IV.1.1 VISION

Rwanda free of tuberculosis, with zero deaths, disease and suffering due to TB.

IV.1.2. MISSION

To contribute to ending the global tuberculosis epidemic by promoting universal and equitable access to quality diagnosis and effective treatment of TB, MDR-TB, and TB/HIV for patients and by enhancing prevention of the disease.

IV.1.3. GOALS

The NTP goal is to end the TB epidemic in Rwanda by 2035 (10 or less incident cases per 100 000 population per year - new and relapses).

The following targets are set for mid-2027 as compared to 2015:

- 33% reduction of the TB incidence rate
- 65% reduction of the TB death rate
- Reduction of TB-affected families facing catastrophic costs to TB

IV.1.4. GUIDING PRINCIPLES

- Governance stewardship and accountability with adequate resources use as well as monitoring and evaluation.
- Strong coalitions with civil society organizations and communities
- Protection and promotion of human rights, ethics, equity and gender equality
- Adaptation of the strategy and targets tailored to the Rwanda context, with global collaboration.

IV.2 Comprehensive Strategic Framework

This chapter describes the gaps, the available evidence and corresponding strategic interventions. It also describes the main activities to close these gaps, as well as expected outcomes and outputs to achieve results.

IV.2.1. Pillar 1: patient-centered care

The first pillar aims to find people with TB disease or latent TB infection, as early as possible and treat them. This would contribute to addressing priority gap 1 on TB treatment coverage, priority gap 2 on TB treatment success and priority gap 3 on TB preventive treatment and requires comprehensive intervention packages.

IV.2.1.1. STRATEGIC OBJECTIVE 1: Considering the Patient Pathway for Tuberculosis

IV.2.1.1.1 KEY INTERVENTION 1.1.: Accelerating early screening and appropriate diagnosis

Addressing Priority gap 1 - of this NSP is to detect more people with TB and thus close the case finding gap and to increase the DST coverage to improve DR-TB notification. Out of all TB notifications, 57% are identified through passive case finding and diagnosis among symptomatic persons self-presenting at health care facilities. Passive TB case finding therefore remains an important source of TB patients diagnosed. However, systematic TB screening among people with TB infection and/ or higher risk of progressing to TB diseases is one of the main strategies to accelerate early detection and initiation of treatment of people with active TB as presented in chapter 1.2.5. Early detection of active TB and initiation of effective treatment also reduces transmission, the risk of poor treatment outcomes, health sequelae post-TB treatment, and adverse social and economic consequences of TB; and last but not least, reduces future incidence.

The MTR 2022 findings highlights new gaps in terms of early screening and appropriate diagnosis:

- Slow uptake of new technologies for diagnosis as recommended by WHO. There is a partial implementation of the universal access to screening using WHO (rWRD) with Xpert MTB/Rif, with only 68 machines in the entire network covering all tiers of health care delivery,
- TB diagnostic network connectivity in place but lack of data analysis to inform performance and signal interventions where needed. This led to malfunctioning of some machines due to delayed calibration and module replacements, impacting on patient care,
- Stool-based TB screening and diagnosis in children using Xpert MTB/Rif technology not yet implemented. The technique is less invasive compared to gastric aspiration and requires minimal infrastructure and equipment as well as minimal biosafety measures,
- Slow expanding access to chest x-ray for TB screening and diagnosis, one of NSP 2019-2024 strategies set to minimize the diagnostic gap in term of TB notification and treatment coverage.

Challenges

- symptom screening often misses TB patients, while CXR is a useful tool for TB screening due to higher sensitivity; +-
- Limited knowledge on TB symptoms and lack of seeking care by the community.
- Low access to CXR and WHO recommended rapid molecular tests at time of diagnosis.
- Sub-optimal use of molecular techniques such GeneXpert MTB/RIF GeneXpert MTB/XDR, TrueNat, TB Lamp, TB Lam,…);
- Inadequate human resource capacity with regards to regular TB training, mentoring, monitoring and supervision.
- Inadequate quality assurance of TB diagnostics
- Limited use of CXR for TB screening and diagnosis.

- Insufficient engagement of private laboratories in TB care.

Systematic screening not being consistently carried out in OPD, inpatient settings or among contacts.

Evidence.

- 20% of TB cases remain undetected and untreated.
- The secondary analysis on R-DHS found that only 35% of participants with symptoms suggestive of TB sought care. Of them, 92% consulted health facilities[35] (unpublished).
- Only 40% of people with cough for more than 2 weeks sought care.
- The Patient Pathway Analysis (see Annex 5) showed 81% of the persons seeking care for TB symptoms accessed facilities with TB diagnostic services (25%) or specimen transport in place (56%).
- 45% of all TB presumptive persons were tested using rapid molecular test recommended by WHO during 2018/19
- 11% of health facilities have a molecular diagnostic platform available
- 60% of People experiencing TB symptoms do not seek care (DHS2019-2020)
- 32% of people do not have comprehensive knowledge on TB(DHS2019-2020)

Main activities and sub-activities

- **Increase early identification and screening of TB in the general population**
  - Outreach activities in slums, hotspots where HRGs congregate (Prisons, Rehabilitation and transit centers,…)
  - Conduct contact tracing of TB index cases
  - Strengthen cough triage in OPD
  - Build capacity of healthcare providers working in OPD on TB detection
  - Avail M&E tools for screening and diagnostic

- **Improve TB diagnosis and ensure universal DST coverage for a bacteriologically positive TB patients**
  - Use molecular test as initial TB diagnostic test for ALL adults and children according to the local situation, cost and funding availability.
  - Conduct spatial analysis and diagnostic network assessment
  - Establish placement requirements for molecular diagnostics (eg: Xpert MTB/RIF, Xpert MTB/XDR, TB Lamp, TrueNat, IGRA, Urine LAM,…) in the network.
  - Update and disseminate new diagnostic algorithm
  - Train laboratory and clinical staff on newly introduced techniques .
  - Implement e-learning courses for refresher training of existing TB Lab diagnostic techniques (Online theories and face to face for practical sessions).
  - Optimize the GeneXpert platform for TB specimens by adding HIV viral load testing, HIV Qual testing for early infant diagnosis (EID) and viral Hepatitis tests in settings where sample referral across diseases is cost-effective and presents an added value compared with maintaining separate transport

[35] Assessment of TB related knowledge and care seeking behavior among Rwandan Population: Secondary Analysis of Rwanda DHS, 2019-2020.

systems and separate equipment.
- Develop mapping of current Xpert machines to optimize use, access and turnaround times. This optimization will probably be most applicable in peripheral districts.
- Use WHO endorsed rapid DST tools such as the Line Probe Assay for 2nd line DST and Xpert XDR for all rifampicin resistant TB patients failing or relapsing from 1st line TB treatment.
- Use liquid culture for isolation of TB bacilli and its confirmation by ZN microscopy for drug resistance surveillance and implement targeted gene sequencing at the NRL-TB laboratory for rapid identification of mycobacteria including non-tuberculous and detection of drug resistance conferring mutations.
- Strengthen primary culture decentralization at CHUs and implement LPA first line at CHUB.
- Establish drug susceptibility testing at the NRL for first line and new second line drugs such as Bedaquiline, Delamanid, Linezolid, etc…
- Establish the measurement of Minimal Inhibitory Concentration to be interpreted together with specific drug plasmatic level (therapeutic drug monitoring).
- Ensure procurement of laboratory equipment and supplies
- Ensure appropriate Human Resource with regular training on CXR reading and laboratory skills as well as adequate mentoring, and supervision.
- Enhance public private partnership with large clinics including HF with more paediatric cases (activities developed in pillar 2, chapter 2.1.2)
- Support the NRL –TB laboratory to serve as SRL for TB and MDR-TB in the AFRO sub-region including as a support NRL particularly for francophone countries,
- Train NTRL/SRL staff on PT items production.
- Purchase raw materials for PT production and packaging,
- Distribute the PT products in the Rwanda Laboratory network and NTRL supported by Rwanda SRL
- Support the NRL–TB laboratory unit to sustain ISO 15189 acquired from KENAS and needs continuous support of the QMS laboratory requirement.
- Conduct baseline assessment for other countries (Burundi, Republic Central Africa, DRC, Congo Brazzaville etc…)
- Conduct technical support including mentorship on LQMS for 6 NTRLs from French speaking countries,
- Train Rwanda NRL staff on LQMS for capacity building to support other NTRLs on LQMS (Training of Lab auditors, Lab mentors, IATA certification, etc…)
- Train NTRLs staff supported by Rwanda SRL on new laboratory diagnostic technologies,
- Train 2 NRL staff on new molecular tests including sequencing and DST,
- Hire Rwanda SRL Coordinator (1), TB Quality Specialist (1), PT scheme Specialist (1), Training and logistic specialist (1), Laboratory supervisor (3), Data & ME Senior officer (1), Laboratory auditors [Lab Technologist] (6) and Laboratory mentors [Lab Technologist] (6) and Lab Clerk officer (1).
- Support the NRL –TB laboratory for piloting and scaling up innovative molecular diagnostic techniques currently studied in the DIAMA, InnoR3 studies such as FluoroType MTBDR, TrueNat TB tests, GeneXpert SLD,

GeneXpert for follow up, and target deep sequencing (Deeplex-MycTB) as alternative for culture-based DST, particularly for rifampicin resistant and difficult cases with recurrent tuberculosis. Pilot novel diagnostics tools such as Abbot's m2000 molecular platform.
- Implement urine TB LAM Ag for TB diagnosis among severely sick HIV positive patients with suspicion of disseminated and or extra pulmonary TB
- Enhance GeneXpert connectivity and interoperability with other databases (LIS, eTB, DataToCare etc..) to monitor KPI for the sample referral system and to reduce the turnaround time (TAT) for treatment and Preventive Therapy.
- Increase number of private clinics involving in TB diagnostic.

- **Enhance the use of CXR as screening tool and foster diagnostic techniques for EP**
  - Increase the uptake of digital chest radiography with telemedicine for reading,
  - Purchase digital x-ray machines,
  - Procure CAD4TB software,
  - Procure mobile diagnostic units with digital X-ray and CAD4TB
  - Enhance human resource capacity building on CXR reading,
  - Implement a quality control system for digital CXR through re-reading similar to smear examination re-reading sampling techniques,
  - Increase the uptake of FNA and abdominal ultra-sound for diagnosis of extra-pulmonary TB through mentorship and trainings,
  - Increase the use of Xpert for EP samples (lymph nodes aspirate, pleural fluids, and others body fluids except blood,
  - Build capacity of Health care Providers on use of TB-LAM

Intervention indicators, baselines and targets

Indicator	**Baseline**	**Target**
Proportion of newly notified TB patients tested using WHO-recommended rapid molecular test at the time of diagnosis	43.3%	80%
DST coverage for TB patients.	61.8%	≥85%
Proportion of diagnostic sites achieving a passing score in EQA for smear microscopy	60.4%	97%
Proportion of diagnostic sites achieving a passing score in EQA for Xpert MTB/RIF	30.9%	90%

IV.2.1.1.2 KEY INTERVENTION 1.2: Quality of care and ensuring cure and patient support

In order to close Priority gap 2 of this NSP we must improve treatment outcomes for TB (all forms) by reducing the death rate, especially in HIV-positive TB patients and clinically diagnosed TB patients. Analysis of death audit data helps to identify specific interventions that are likely to reduce causal factors of high death rates. Among these, malnutrition is likely to contribute significantly to deaths since it impedes the absorption of drugs. This plan foresees, the provision of nutritional support, for drug resistant TB and also drug susceptible TB patients who are moderately or severely malnourished (activities in chapters 1.1.2 and 2.2.3).

Challenges

- root causes that affect the quality of TB care and loss to follow-up are malnutrition and death during treatment; adverse drug reactions; self- stigma; inadequate patient-centered care; probable high transportation costs; time for seeking care which interferes with source of income; and long duration of TB treatment.
- Key information is not consistently transmitted to patients, such as the need of sputum tests during treatment, information on when patients stop spreading TB to others and side effects.
- Inadequate TB patient knowledge may also impact early care seeking when symptoms appear.
- Suboptimal patient-centered care is described in urban settings, with many patients from the lower economic bracket. This means that hours spent seeking care translate to lost income. Tuberculosis care is mostly provided during daytime working hours with poor flexibility to cater for those seeking care outside the specified hours.
- Although NCD services are available in all health facilities, collaboration between TB and NCD services or staff are found insufficient to properly address NCD among TB (and TB/HIV) presumptive and notified patients.
- Patients with TB may die during treatment due to several factors including delayed or missed diagnosis and comorbidities. Comorbidities and drivers majorly affecting TB patients include HIV, diabetes, and malnutrition.
- Currently used M&E tools do not capture minimum information regarding aDSM implementation.

- Delay of TB treatment initiation in some health facilities for the cases diagnosed during the weekends.

- High mortality rate among TB clinically diagnosed.
- Currently used M&E tools do not have enough space to collect required information about aDSM implementation,

Evidence

- Prevalence of undernourishment (% of Population) for Rwanda was estimated at 37% by the World Bank in 2017. [We are waiting for the report on food security & vulnerability]. Rwanda's Fifth Integrated Household Living

conditions survey conducted in November 201 8 shows that the poverty in the general population was estimated at 38.2%.

The report on the Tuberculosis death audit (August 2019) for TB cases registered from April 2016 up to June 2019, showed that comorbidities are often behind TB deaths, e.g. 43% and 62% of TB death were identified as having HIV and malnutrition, respectively.

Main activity and sub-activities

- **Improve quality of care to reduce poor outcome of tuberculosis.**
  - Ensure nutritional support to DS TB patients with BMI of ≤ 18.5 and all DR TB for the entire duration of treatment (purchase & distribute)
  - Develop an electronic pharmacovigilance monitoring system (aDSM)
  - Revise, print and distribute updated M&E tools for pharmacovigilance monitoring system (aDSM)
  - Train health facilities on the use of electronic pharmacovigilance monitoring systems
  - Ensure mentorship / supervision to HFs on the implementation of electronic pharmacovigilance monitoring systems,
  - Establish a collaborative aDSM TWG gathering FDA, RBC and RMS to discuss any issues for the effective implementation of aDSM in the management of TB patients in Rwanda TB program.
  - Promote the use of digital adherence technologies,
  - Ensure uninterrupted supply of quality TB medicine and related commodities at all levels,
  - Conduct quantification sessions through integrated coordinated procurement and distribution system (CPDS)
  - Ensure management fees related to TB drugs and commodities (e.g. importation license, clearance, warehousing, distribution, etc…)
  - Ensure mentorship/supervision from CHUs to health facilities for quality TB care management (TB and comorbidities)
  - Conduct TB mortality audits in all district hospitals
  - Conduct mentorship on TB death audit in hospitals in collaboration with Senior internists from hospitals,
  - Train the HCPs on the use of DAT

Intervention indicator, baseline and target

Indicator	Baseline	Target
Treatment success rate for all forms of TB cases (DS & DR-TB cases)	88.8%	≥90%

IV.2.1.1.3 KEY INTERVENTION 1.3: Promote care seeking and TB prevention through community engagement.

TPT for eligible people with TB infection is considered as the third priority gap of this NSP. Closing the preventive gap represents an ambitious new policy. The approach is partnership with community health volunteers and large companies, to enable contact tracing for household contacts and workplace contacts of TB bacteriologically positive

patients regardless of age, as well as among people with HIV and possibly other people at risk (e.g. those with lowered immune response or living in crowded settings). Operational research activities will be considered to pilot new, shorter regimen (Rifapentine and Isoniazid for three months and in the future most likely for 1 month) for the treatment of TB infection. TPT should be prioritized for TB contacts with additional risk factors such as low BMI, PLHIV with no suppression of their Viral Load, and contacts with positive TST or IGRA.

In the line of End TB especially on the intervention of TB prevention, in addition to the household contacts of TB patients considered at risk of having LTBI, we added other groups at risk like prisoners and potentials TB contacts through social network with TB confirmed patients (persons sharing same office with the TB patients, school rooms, praying groups). A contact tracing will consider these additional groups so the TST will be done for confirming LTBI then provide TPT when TST positive.

The community health program constitutes a workforce that intervene in TB awareness, screening, referring TB presumptive patients at the HFs and provide DOTs. Since 2021, MOH through the RBC- MCCH designed a new approach of polyvalent model and integrated training module tool, one single package where community health workers are equipped to provide all community health services, TB package included. So far, 18 Districts are covered, in terms of building capacity of CHWs, and training is ongoing to cover the whole country.

Challenges

- Limited TB awareness and updated information levels in communities,
- Lack of differentiated advocacy and communication,
- TB symptoms not perceived as serious,
- Lack of information about TB related stigma,
- Inadequate community health worker engagement after reduction of stipends and increasing workload,
- Inadequate implementation of TPT provision to PLHIV, and contacts of bacteriological confirmed TB patients aged 5 years and above,
- There is no routine mechanism to measure TB knowledge among communities,
- Lack of refresher trainings for old and new CHWs or sensitization on TB new CHWs. As a consequence, CHWs have gaps in their basic knowledge of TB and it is difficult to ascertain the quality of messages they are transmitting to the community. Inadequate IEC/BCC materials to improve TB awareness for families, close contacts, and TB patients themselves.
- Although strategic documents acknowledge the importance of public-private partnership, there is no guidance to assist NGOs/CSOs in engaging the corporate sector for scale-up of TB prevention, treatment and care to the workplace.

New challenges raised by MTR 2022

- Hard-to-reach areas are difficult to access, in the mountains of some regions the, for the supervision of CHWs by the Community Environmental Health Officer (CEHO)
- Traditional healers still keep patients at home giving herbal treatment who are

possibly presumptive TB cases, thereby delaying their diagnosis and linkages-to-proper care.

Evidence

- The reduction in CHW stipends in the last 2 years appears to be a major factor in indicator results which show a plateau in patients diagnosed with TB after CHW referral (20.3% in 2016-2017 FY, 19.3% in 2017-2018 FY and 27.6% in 2021-2022 FY, while the target was >25%).
- TPT initiation among child contacts of BC index TB patients aged <5 was 90% in 2018, ., and 90.7% in 2021-22 FY
- TPT coverage among PLHIV end June 2022: 63.8% while the target was 80%

Main activities and sub-activities

- **Improve TB knowledge in general population:**
  - Ensure communication to the general population about TB through mass media platforms: radio talk shows, TV talk shows, documentary films, newspaper articles,
  - Develop TB Behavior Change Communication strategies,
  - Train existing CHW (45,516) and HIV Peer Educators on TB prevention, care and treatment through e-learning,
  - Develop digital application on TB key messages relating to screening, prevention and treatment – adherence,
  - Produce radio, TV spot - documentaries/film,
  - Empower community actors and stakeholders: create champions of former TB patients to increase community TB awareness,
  - Ensure availability of posters and brochures on TB awareness and prevention at workplace,
  - Conduct outreach activities through existing community forums (Umuganda, Itorero),
  - Commemorate WTBD at national, regional and district levels,
  - Integrate into the MCCH existing digital tool the TB screening and referral of TB presumptive patients,
  - Ensure airing of TB awareness messages in bus park stations and markets for increasing TB knowledge in the general population in Rwanda,
  - Conduct supervision in the community in the HC catchment area.

- **Strengthen engagement of community and stakeholders in the control of tuberculosis**

  - Ensure community supervision by CSOs to monitor engagement of the community,
  - Provide financial and technical support for activities for TB survivors to sensitize the population on TB care and prevention,
  - Organize quarterly coordination meetings with fora of TB survivors,
  - Enhance the commitment of CHWs in management of TB: Increase the incentive (for PBF) of CHWs,
  - Data sharing with CHWs to share results on their efforts,

- Develop a mentorship approach to improve the knowledge of HCWs,
- Develop and avail online training apps and training materials for CHWs in Kinyarwanda,
- Build capacity for mass media (journalists) to disseminate TB and TB/HIV messages,
- Provide support to national TB advocates to champion TB issues,
- Mobilize community and civil society to undertake community outreach through contracts with NGOs and civil society,
- Create forum of TB survivors/TB former patients per DH catchment area,
- Conduct a biannual meeting with traditional healers' representative on TB presumptive patients and their referral to HFs/Meeting coordinated by CSOs.

- **Strengthen management of latent TB infection for household contacts (5 years and above) of pulmonary bacteriologically confirmed TB index patients.**
  - Develop and update the guidelines on latent TB infection management,
  - Print and distribute updated TPT guidelines in all health facilities,
  - Adopt the recently released WHO Guidelines on TPT and update the national guidelines accordingly,
  - Train health facility staff on the updated TPT guidelines,
  - Purchase and distribute TPT drugs to all health facilities and prisons,
  - Mentor the implementation of the TPT guidelines,
  - Add TPT completion as care cascade indicator in the RHMIS recording and reporting tools,
  - Recruit temporally 2 nurses by prison who will be screening the LTBI among inmates,

Intervention indicators, baselines and targets

Indicator	**Baseline**	**Target**
Proportion of people with TB referred by community health volunteers	27.6 %	>25%
Contact investigation coverage	98.4%	≥95%
Proportion of eligible household contacts under 5 years who are contacts of bacteriologically confirmed index patients, who are started on TB preventive therapy	90.7%	93%
Proportion of eligible household contacts 5 years and older who are contacts of bacteriologically confirmed index patients, who are started on TB preventive therapy	18.8%	85%

IV.2.1.2. STRATEGIC OBJECTIVE 2 : Targeted approaches for key drivers of TB epidemic and selected populations

IV.2.1.2.1. KEY INTERVENTION 2.1: Enhancing Programmatic Management of Drug – Resistant Tuberculosis

The duration of the DR-TB treatment, the number of pills to swallow and/or the development of adverse events may humper the treatment adherence, thus reducing the treatment success rate. An emphasis will be put on the improvement of the active drug safety monitoring and management by providing health facilities with required updated M&E tools and staff training on aDSM implementation. In addition, to reduce socioeconomic impact of mandatory hospitalization and health facility-based DOT on affected individuals and their families while keeping good adherence on DR-TB treatment Rwanda, Rwanda NTP is planning to reduce the admission period, to introduce an even shorter all-oral WHO-recommended treatment regimen and the use of digital adherence technologies (DAT) in the DR-TB and DS-TB patients follow-up during ambulatory treatment phase. Digital adherence technology (DAT) will be an additional treatment adherence option to improve treatment outcomes.

Challenges

- The program helps patients to access the health insurance scheme for their families. One main barrier is the requirement to pay 10% of all costs for the management of comorbidities such as diabetes,
- TB treatment materials and pamphlets for patients and their families are not available;
- Insufficient motivation among medical doctors and nurses and high turnover;
- Lack of knowledge to identify and manage (serious) adverse events of SLD and poor reporting of aDSM, specifically for ambulatory patients;
- Insufficient funds to support MDR- TB patients during the ambulatory phase

New challenges from MTR report:

- Sub-optimal DST coverage with unknown INH resistance prevalence.
- The only decentralized and available DST technique, the Xpert MTB-RIF, is doing susceptibility testing on rifampicin only.

Evidence

- 36% of new TB cases and 24% of previously treated TB cases are not tested for first line DST.
- 46% of MDR-TB cases are not notified.

Main activity and sub-activities

- **Improve the quality of care of MDR TB patient management**
  - Train clinicians to improve skills on DR-TB management with emphasis on DR-TB among children (expert training on pediatric DR-TB)

- Rehabilitate MDR-TB clinic to improve infection control measures and patient friendly conditions (including leisure and entertainment options during admission)
- Introduction and implementation of new WHO-recommended DR-TB guidelines and treatment regimens
- Increase skills of clinicians and nurses on management of MDR-TB particularly for ambulatory patients through trainings and mentorship
- Reinforce best practice of aDSM within MDR-TB clinics and for ambulatory treatment
- Adopt new technologies (Text messaging, Pillbox, VOT, etc.) to use in ambulatory patient follow up
- Develop a practical handbook on pharmacovigilance of TB medicines
- Train health facilities staff on use of pharmacovigilance M&E tools
- Post treatment follow up program to improve quality of life of patients and ensure early detection of TB recurrence.
- Avail TB treatment materials and pamphlets for patients and their families
- Identify and equip sentinel sites for DR-TB surveillance with required testing capacity for continuous DR-TB surveillance.

Intervention indicators, baselines and targets

Indicator	Baseline	Target
Proportion of notified patients with rifampicin resistant (RR) or MDR who receive second line DST	86.8%	100%

IV.2.1.2.2. KEY INTERVENTION 2.2: Ensuring prevention, diagnosis and treatment of Childhood Tuberculosis

In this plan, the NTP has set up an ambitious target related to childhood TB detection answering priority gap 1 of this NSP on closing the case finding gap especially among children. Increasing the coverage and the sensitivity of screening among TB contacts, as mentioned in intervention IV.1.1.1, is essential to ensure early identification of childhood TB. In addition, the NTP will put strong effort on all activities aimed at building knowledge, skills and confidence of health workers to screen and diagnose TB in children.

Challenges

- The WHO estimates that 10 to 15 percent of notified TB cases should be children. In 2018, children aged 0-14 years comprised 6% of notified TB cases in Rwanda. Childhood treatment coverage is low compared to adults, however, the ratio 0-5 yr/6-10 yr ratio is high (60%).
- Naso Gastric Aspirate (NGA) is not broadly implemented because the procedure is invasive and not child-friendly; Naso Pharyngeal Aspirate (NPA) is not yet implemented in Rwanda,
- Pediatric CXR not properly interpreted,
- Treatment of latent TB among 5 to 14 not yet implemented,

- Insufficient of knowledge and skills of health care providers to diagnose among children,
- Low TB notification among children in Kigali City compared to other provinces.
- The program has not developed a partnership with Rwanda Pediatric Association and pediatricians working in Private clinics.

New challenges from MTR report:

- Low adherence to childhood TB screening and diagnosis algorithm
- Less invasive childhood TB sample collection methods such as stool not yet implemented,
- Low quality and infrequent childhood TB mentorship for staff
- Lack of Adolescent TB strategies
- Insufficient nutrition support for children and adolescent with TB
- No capacity building for CHW in childhood TB – contact tracing

Evidence

- 61% of estimated children under five years of age who are household contacts of bacteriological TB cases, started TPT in 2018 according to the 2019 GTB report.
- Current childhood treatment coverage is at 59% (391/660) compared to 82.2% (5431/6600) in adults (new & relapse) according to the GTB report 2019.

Main activities and sub-activities

- **Enhance and scale up latent TB management among children:**

  - Integrate TB contact tracing into CHW guidelines and tools,
  - Build capacity of CHW in childhood TB contact tracing,
  - Provide support on CXR as a TB screening tool among TB contacts
  - Purchase WHO recommended latent TB diagnostic tests,
  - Engage CHWs and mothers/care givers in TB screening among children through awareness raising,
  - Develop an electronic tool for contact screening to be used by CHWs (hiring, training, etc…)

- **Strengthen TB diagnosis, treatment in children:**

  - Update training materials, job aids and algorithms on childhood TB diagnosis,
  - Ensure trainings & mentorship of HCW in public and private facilities in collaboration with the Rwanda Pediatric Association including training on the use of alternative, less invasive specimens for diagnosis of TB in children; gastric aspirate, sputum induction, FNA, abdominal ultrasound and clinical diagnosis using symptoms,
  - Build capacity of clinicians on pediatric CXR reading,
  - Ensure nutrition support for malnourished children with TB,
  - Build capacity of CHW in childhood TB and contact tracing
  - Collaborate with the HIV program, private sector, medical institutions, CBO/NGOs, community leaders and CHW antenatal care (ANC), EPI and schools on childhood TB,

- Collaborate with the society of pediatricians to reinforce the capacity of HCWs on prevention of TB among children and on diagnosis and treatment of TB among children through a mentorship approach,
- Organize twice per year childhood TB Technical working Group,
- Organize annually meeting with pediatricians working in private clinics on childhood TB management,
- Enhance TB screening and diagnostic services among Children living with HIV through mentorship by Clinical mentors,
- Develop collaborative mechanism with pediatric private clinics to improve management of childhood TB (e.g. meetings, sessions to develop tools, etc.)
- Integrate childhood TB screening in Early Childhood Development Program (ECDP) tool,
- Train healthcare providers working in TB service on adolescent development, communication, and confidentiality to create a safe and supportive environment,
- Conduct targeted education and awareness campaigns in schools, community centers, and youth-friendly spaces to improve knowledge about TB among adolescents.
- Develop and produce youth-friendly and interactive educational materials, such as videos, social media, to engage and inform adolescents.
- Conduct screenings in schools, youth corners and other community settings to identify active TB cases among adolescent,
- Collect and analyze data specifically focused on TB among adolescents to better understand the epidemiology, treatment outcomes, and challenges in this population.

Intervention indicators, baselines and targets

Indicator	Baseline	Target
Proportion of children 0-14 years notified among TB cases	5%	8%
Proportion of children with TB successful treated	92.8%	≥90%
Proportion of eligible children aged 0 to 4 years who are contacts of bacteriologically confirmed index patients started on TB preventive treatment (treatment for LTBI) who completed TPT	93.8%	≥90%

IV.2.1.2.3 KEY INTERVENTION 2.3: Strengthening management of TB / HIV and other co-morbidities

Rwanda has made substantial and remarkable progress towards implementing TB/HIV collaborative activities in a relatively short period of time. Rwanda is quite advanced in establishing “One stop TB and ART services.” Even though results are

pending on the implementation of TB/HIV collaborative activities, more efforts are needed to reach all WHO targets. In the coming five years, we will continue to maintain our gains/successes focusing on early detection in order to reduce TB/HIV related mortality and the implementation of tuberculosis preventive therapy.

Diabetes triples the risk of developing TB and its burden is likely increasing with Rwanda's economic growth. The current prevalence among the population aged 15-64 is estimated at 3%.[36] During this NSP, the NTP plans to develop a TB-diabetes collaborative framework in collaboration with the RBC/NCD Division and implement systematic TB screening among diabetics in a limited number of HFs with proper monitoring to evaluate the yield of the strategy before scale-up.

In addition to diabetes, several other medical conditions are risk factors for TB and for poor TB treatment results, while TB can complicate the course of some diseases. It is therefore important to identify these comorbidities in people diagnosed with TB in order to ensure early diagnosis and improve co-management.

This NSP represents a shift in TB/HIV programming following operationalization of new national TB policy that recommends progressive reintroduction and scale up of TPT among PLHIV with shorter TPT regimen and development of a strong monitoring tool to measure the cascade. In addition, the focus will be on the integration of TB with other co-morbidities and drivers.

Challenges

- Delayed publishing of the updated TB/HIV guiding policy and restarting TPT. This may affect the quality-of-service delivery in the course of implementing the new global guidance,
- Though the scope of the HIV clinical mentorship program at district level has been expanded to integrate TB and malaria, the coverage of TB activities is inadequate and not consistent.
- There are still significant gaps in TB/HIV capacity building for frontline health care workers, especially due to the turnover of staff.
- Provision of HIV preventive services among TB patients and their household members was sub-optimal.
- Absence of a joint TB/HIV research agenda as envisaged by the NSP.
- Lack of information and management of TB with other comorbidities than HIV
- Case fatality rate of co-infected TB/HIV is high compared to TB all forms,

Use of TB symptom screening only among PLHIV has an impact on TB diagnosis due to low sensitivity. This was also shown during ACF conducted by NTP.

Evidence

- 15% of co-infected TB/HIV among cohort notified 2017/18 died while the death rate among TB all forms was 9% in the same cohort.
- 4.8% of PLHIV screened were presumptive TB based on symptom screening only while 9.3% and 9.6% were presumptive based on CXR only and both (symptom and CXR), respectively.

[36] Rwanda STEPS Survey 2012, 2013. RBC

Main activities and sub-activities

- **Enhance the implementation of case finding and provision of Tuberculosis preventive therapy (TPT) among PLHIV**

  - Use of Chest X-ray as screening tool for PLHIV
  - Introduce the use of LAM testing among PLHIV,
  - Ensure mentorship of HCW at all levels (health facilities and communities)
  - Develop TB/HIV courses/webinars and share twice a year,
  - Build capacity of health care providers using video conference approaches
  - Ensure scale up Tuberculosis Preventive Therapy (TPT) nationwide.
  - Involve peer-educators in TB/HIV case finding to improve linkages between communities and health systems,
  - Update guideline and tools on TPT implementation
  - Build capacity of health care providers on TPT implementation
  - Ensure provision of TPT drugs
  - Develop TPT data elements within existing e-TB platforms,
  - Strengthen TB-HIV coordination bodies to support TB-HIV interventions (TWG),
  - Organize a technical working group for TB/HIV
  - Organize an annual coordination meeting with clinical mentors and DH trainers on management of TB-HIV.

  New challenge from MTR

  - Conduct joint HIV/TB supportive supervision at all levels.

- **Enhance the collaboration of TB and other co-morbidities/ diseases.**

  - Integrate TB screening in existing NCDs tools on management and evaluation,
  - Ensure joint supervision on TB Diabetes activities,
  - Strengthen TB and NCDs coordination bodies to support TB-NCDs interventions (TWG),
  - Build capacity of Nurses working in NCDs services on TB and other co-morbidities diseases
  - Initiate operational research on TB-Diabetics in collaboration with CHUs as teaching hospitals.

Intervention indicators, baselines and targets

Indicator	Baseline	Target
Treatment success rate among HIV positive TB cases	81.4%	90%
LTBI treatment coverage among PLHIV	63.8%	≥95%

Percentage of HIV positive new and relapse TB patient on ART during TB treatment	94.9%	≥96%
Proportion of diabetes patients screened for TB	NA	TBD

IV.2.1.2.4. KEY INTERVENTION 2.4: Ensuring diagnosis and management of Lung health diseases.

The practical approach to lung health diseases (PAL) is a **syndromic approach** to the management of patients who attend primary health care (PHC) services for respiratory symptoms. The Practical Approach to Lung Health (PAL) strategy was adopted in order to improve the quality of diagnosis and treatment of common respiratory illnesses, harmonize the management of respiratory conditions and enhance referral system in primary health care settings. The strategy focuses on four priorities respiratory diseases: tuberculosis, chronic diseases (Asthma, COPD) and acute respiratory infections with emphasis on pneumonia. Keys population are patients aged 5 years or more, as IMCI handles under five patients.

The Tuberculosis Division and partners have adopted the PAL strategy to address lung health issues comprehensively and to improve the case management of TB, especially at the primary health care level. The PAL strategy is also expected to contribute to health system strengthening for TB and lung health. The primary role of health center is to screen the individuals presumed of having chronic respiratory illness, namely suspects of Asthma, ensuring reference system to the hospital catchment areas, whereas the role of hospital is to confirm a case of asthma with clear categorization as per guideline, which correspond to appropriate treatment. The stable patient case managed at hospitals is reported in Open MRS, then send back to health center for further follow-up (rendez-vous) and education about self-prevention However, this NSP will emphasize on the management of respiratory chronic diseases (asthma and COPD) in close collaboration with NCDs Division with the purpose to ensure quality of care management and TB screening among these groups while we are expecting to scale up or shift progressively to other groups of respiratory conditions.

Challenges

- Incomplete coverage of PAL training, knowledge gaps on management of respiratory conditions among healthcare workers,
- There is no proper standardized monitoring tool and no indicators on PAL in DHIS2.
- Lack of mentorship and supervision for integrated diagnostic and management algorithms for respiratory diseases, (lower respiratory tract infections in adults, asthma and chronic obstructive pulmonary diseases [COPD]).
- An evaluation of PAL implementation has been conducted and revealed:
  - Lack of skills among HCWs to use spirometers at hospital and peak flow meters at health facilities,
  - Management of asthma and pneumonia was not completed as per guidelines.

- The national team was not sufficiently trained on PAL to support the roll-out of the strategy,
- There is an inadequate supply of essential commodities to support diagnosis and treatment at the health facilities.
- PAL guidelines not up to date,

Evidence

The implementation of PAL at health facilities was assessed in 20% of health facilities in December 2017 which represented 113 health facilities in total (26 Hospitals and 87 health center)36. The following observations were made:

- Among 113 health facilities visited, the assessment showed that 69% (18/26) of visited hospitals have at least one medical doctor trained on PAL, while 80% (70/87) of health centers visited have one nurse trained.
- Of 87 health centers only 12(13.8%) have all three pieces of equipment required at this level. And all 26 hospitals visited do not have a spirometer (0%) and 22 (84%) do not have a peak flow meter,
- Ability of health care providers to use equipment for treatment of respiratory diseases at HCs was assessed at 10.3% (9/87) for peak flow meter and 37.9% (33/87) for Oxymeter At hospitals, 11.5% (3/26) for peak flow meter and 0% for Oxymeter.
- The proper management of asthma and pneumonia was assessed. 13.01% (35/123) of asthma patients and 28.46% (16/123) of pneumonia patients were well managed at hospital level, while this was only 6.6% (18/428) and 9.12% (29/318) at HCs, respectively, for asthma and pneumonia.

Main activity and sub-activities

- **Strengthen coordination mechanisms and scale up implementation of PAL:**
  - Review and adopt lung health guidelines in the context of PAL implementation approach, disease focus and training materials including diagnostic and management algorithms for lung health.
  - Ensure technical assistance for elaboration of PAL guidelines and tools for recording and reporting for respiratory conditions.
  - Conduct training of trainers (TOT) on PAL management
  - Facilitate the TOTs to conduct regular health facility based on-the-job training,
  - Ensuring a re-supply of essential equipment and commodities at health facilities for PAL that help in management of respiratory conditions,
  - Ensure that the PAL diseases are properly recorded in HMIS.
  - Organize TWG meeting to advise on management, recording and reporting of PAL diseases,
  - Conduct an assessment to monitor PAL implementation at health facilities Conduct mentorship to strengthen implementation of PAL management at level of District hospital to health center and reporting,
  - Ensure the quality of PAL implementation through RSQA/DQA.
  - Integrate the TB symptom screening in existing chronic disease tools (Asthma, COPD)

- Organize tele-mentorship on PAL case management in favor of healthcare providers,
- Enhance the capacity building of healthcare providers on management of respiratory illness (Pneumonia & Asthma) through e-learning and tuberculosis QEM activities.

Intervention indicator, baseline and target

Indicator	Baseline	Target
Proportion of first level health facilities that have at least one staff trained to provide PAL services	94%	≥ 95%

IV.2.1.2.5. KEY INTERVENTION 2.5: Promote intensified screening and diagnosis of high-risk group (HRG) populations

As part of priority gap 1, key populations are people who are disadvantaged compared to others mainly due to limited access to medical services or because of underlying determinants of health. Evidence from routine national TB surveillance data and from the National TB Prevalence Survey (2012) identified the following key populations: persons living with HIV (PLHIV), contacts of TB patients, prisoners including people in transit or rehabilitation centers, the elderly over 55 years, children below 15 years, health care workers and CHWs, diabetics, miner workers, People Who injected Drugs (PWIDs) and refugees. These groups pose a challenge for TB control due to their vulnerability and their underserved situations.

On the other hand, urban districts are continuously reporting high case notification and high positivity among presumptive cases. The NTP is willing to map all these cases in order to identify high prevalence TB' where active case finding activities will be conducted.

Diagnostic algorithm priority (option 1) is given to systematic CXR screening followed by Xpert testing for persons with an abnormal CXR (suggestive for TB) based on higher sensitivity of CXR over GX to detect early TB. The alternative diagnostic algorithm (option 2) is to screen for symptoms, followed by Xpert for those identified with presumptive TB.

The use of CXR for HRGs or presumptive symptomatic persons is conditioned upon access to digital CXR and limited by the full utilization capacity of existing X-ray equipment, the limited geographic access of HRG to CXR, the cost of CXR examination for patients and the cost of transport for the person going for CXR or for the mobile team going to the HRG.

The criteria to prioritize the five HRGs in the TB NSP were based on the analysis of routine data and the findings of the TB prevalence survey. By the end of June 2019, 53.4% of all TB cases were from HRGs. This NSP will continue to focus on these five HRGs and add other people at high risk to develop TB like PLDM, miners, people who inject drugs (PWID) and refugees. All are presented in table 5. Apart from elderly and PLHIV that contribute more than 16% of all notified TB cases countrywide, other groups such as close contacts of bacteriologically confirmed TB patients and prisoners should be kept as risk groups even if the contribution to TB notification is lower due to

a smaller population size of the HRG or a lower proportion who could reached for screening.
Depending on the availability of funds three scenarios are developed with maintaining the current effort as S0, an ambitious scenario S1 and very ambitious scenario S2 with higher funding levels to scale up systematic screening, including more sensitive screening and diagnostic tools and including additional HRG (see Annex 6)

Challenges

- No policy and guidelines to support regular screening of all key populations: Current outreach screening approach does not cover all defined key populations, except for PLHIV, prisoners and child contacts under five years. For example, the screening of HCWs by CXR is not done regularly as planned (every 6 months).
- Limited resources to expand systematic screening for TB to other HRG.
- Limited access to (digital) X-ray at community and HC level due to financial barriers and the availability of equipment.
- Limited human resources and skills in CXR reading and interpretation.
- No current use of AI / CAD4TB software.
- Operational factors that hinder access to diagnosis and treatment for instance transportation cost and indirect cost supported by the person at risk such as unfriendly working hours at service delivery points.
- Legal factors that exacerbate discrimination against key and vulnerable populations hindering their access to TB services (e.g. PWIDs).
- Limited involvement of key populations in TB programming and the coordinating committee.
- TB surveillance data does not capture all key population and specific TB risks.

Evidence

Table 4. Contribution of HRG to TB notifications through systematic screening for TB

Risk groups	Est pop (x1000)	Screened in 2018-19 FY *	Presumptive TB	TB cases	% total TB	NNS**	Access (1:easy; 3 difficult)***
1 Prisonners	67,786	163,523	12,679	477	8%	142	1
2. Contacts Bact+	13,002	13,920	3,626	206	3%	68	2
3. PLHIV+	216,000	567,826	16,959	997	17%	217	2
4. < 15 years	4,721,587	1,704,073	19,030	439	7%	3,882	1 to 3
5. ≥55 years	992,874	1,270,984	50,507	1,055	18%	1,205	1 to 3
Total HRG	**6,011,249**	**3,720,326**	**102,801**	**3,174**	53%	1,031	
General population	**6,363,149**		**85,066**	**2,775**	47%		1
Country	**12,374,398**		**187,867**	**5,949**	100%		

*Number Needed to Screen (NNS) was calculated based on the estimate population as denominator (and not on the actual number screened) For prisoners and PLHIV because they were screened several times in 2018/19
Number Needed to Screen (NNS) to find 1 TB case*Easy access for persons coming to HF graded as 1, more difficult to go to these persons who are not coming to HF

Main activity and sub-activities

- **Strengthen the active case finding in HRG**
  - Create demand for TB services among TB HRG populations and presumptive TB screening through targeted messages (IEC).
  - Ensure transport voucher for targeted persons living more than 2 kms from health facilities with (digital) Xray,
  - Develop guidelines and SOPs for screening of TB HRG.
  - Ensure fuel for mobile diagnostic units,
  - Ensure payment of maintenance fee for mobile diagnostic units
  - Conduct outreach screening activities in setting correctional facilities (Prisons), transit/rehabilitation centers, slums, hot spots, mining sites, refugee camps,
  - Develop SOPs of screening and diagnosis among HRG.

Intervention indicator, baseline and target

Indicator	**Baseline**	**Target**
Proportion of TB cases notified among high-risk groups (disaggregated per HRG)	51.2%	≥55

IV.2.2. Pillar 2: Bold policies and supportive systems

Priority gap 4 of this NSP is related to over-reliance on external funding. To sustain the positive achievements of TB control in Rwanda, in the future, and to reach the SDGs and the End TB strategy goals within UHC, implementing innovative TB funding mechanisms starting with progressive inclusion of TB in Community Based Health Insurance (Mutuelle de Santé) during the timeline of this NSP is essential. (Activities in chapter 2.2.1 on UHC and social protection).
Political commitment, governance and coordination with partners (chapter 2.1.1) and NTP management capacity (chapter 2.1.2) constitute the backbone of the system to close the priority gap 4 on sustainable funding.
The NSP through this pillar strengthens coordination across MoH divisions and other government ministries as well as the collaboration with communities, civil society, private care providers and local administration so that zero TB-affected families are facing catastrophic costs[37] due to TB.

IV.2.2.1. STRATEGIC OBJECTIVE 3: Programme management, multi-Sectoral collaboration & engaging all care providers.

IV.2.2.1.1. KEY INTERVENTION 3.1: Political commitment with adequate resources (human, financial, equipment and infrastructure) for tuberculosis care and prevention

This NSP advocates for increased government investment in TB control to close the gap created by reduced donor funding contribution and increased domestic funding to cover gaps in human resource development, renovation of infrastructures and strengthening community-based initiatives. Effective implementation of the End TB Strategy requires effective government stewardship, high-level political commitment, and enhanced resources. Active coordination across government ministries as well as engagement and collaboration with communities, civil society and all public and private care providers are essential.

Inter-ministerial social cluster groups allow different ministries to align priorities and closely work together towards a common goal. The RBC also brings together different disease areas and national programs under a single umbrella to allow for a shared vision and mission in terms of service provision for health to all Rwandans.

Challenges

- Uncertainty around the funding landscape; given that TB funding is mostly

[37] The operational definition of "catastrophic costs" refers to medical and non-medical out-of-pocket payments and indirect costs exceeding a given threshold (i.e. 20%) of the household's income.

received through external sources. Priority diseases such as TB are not included in the Community Based Health Insurance (CBHI) (activities in chapter 2.2.1 UHC and social protection);
- TB benefits from approximately 10% of total funds allocated for GF Performance Based Financing which is below the suggested GF allocation ratio per disease,
- Threats to community-based TB care due to decreased funding. This could negatively impact the motivation of CHWs, while the community package is progressively increasing.

New challenges from MTR:

- Lack of collaboration with private companies to support TB intervention.

Evidence

- Around 10% of total funds from GF support is allocated to Performance Based Financing
- 67% of TB funding during 2018/19 came from external sources.

Main activity and sub-activities

- **Advocate for increasing domestic funds of TB Program**

  - Organize annual joint session with the MINECOFIN to discuss / review GOR contribution to TB programs.
  - Advocate for a single strategic plan for infectious disease favouring partnered interventions to provide services,
  - Advocate to health insurance scheme to cover all TB services,
  - Undertake financial monitoring of resource allocation and purchasing of services related to TB under the responsibility of RBC, in collaboration with different MOH departments including, MPPD, HFU (health financing unit), CHD, etc.
  - Continue the PBF scheme as an MoH policy, to be applied as a part of an individual's salary, in order to improve staff performance. Payment will continue to be based on achievement of fixed targets agreed upon between the two entities. PBF indicators will be reviewed and revised periodically to boost achievement of new interventions or those with suboptimal results.
  - Develop a Multisectoral Accountability Framework (MAF) on TB to support the involvement of the government ministries, the private sector and stakeholders. The framework will be developed to ensure high-level government stewardship and effective coordination of stakeholders in TB control.
  - Track and Advocate for increasing domestic resources allocated for TB Program by Rwanda NGOs Forum

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Intervention indicator, baseline and target

Indicator	Baseline	Target
Household health expenditure for TB	TBD	TBD

IV.2.2.1.2 KEY INTERVENTION 3.2: Management of tuberculosis care and prevention

Strengths of the NTP include a well-established program with solid leadership structures, skilled human resources, availability of infrastructure including office space and equipment (computers, furniture, vehicles), technical support from partners and stakeholders including technical working groups and support to the districts. Other advantages include the availability of policy documents and guidelines for TB control that are consistent with global guidance; close collaborative networks with other government departments like the HIV control program, disease surveillance, neglected diseases and universities. Strong networks with districts in the implementation of TB activities e.g. isolation facilities, IPC, staff, infrastructure; and mechanisms for internal audit control that ensures financial controls in place.

During the development of the TB NSP 2019-24, some challenges related to the turnover and knowledge gaps among health care workers were observed and this impacted on the quality of TB services delivery.
Responding to these challenges, given that others clinical services were as well concerned, the ministry of health through the Human Resources for Health Program introduced the retention policy, initiatives intending to increase public sector retention such as; revision of remuneration scheme, non-financial retention incentives, capacity building of the health workforce, effective deployment and distribution of healthcare workers.

Challenges

- High turnover of healthcare staff particularly medical doctors,
- No strategy to address knowledge gaps among health care workers in the field as a result of reduced training activities,
- Successive training without clear planning. Key questions include - how to define a balance between online training and/or face-to-face? Also, how to conduct efficient online training,
- Insufficient coverage of TB under the Infectious Disease mentoring initiative at the district level.
- Issues in terms of M&E and drug management and supply, which are part of program management capacity, are presented separately in chapters 2.3 and 2.4

Evidence

- From 2012 to 2016, the average turnover rate of medical doctors was 21.8%, which was three times higher compared to the turnover of nurses (7.6%)[38].

Main activity and sub-activities

- **Improve human resource capacity at all levels:**
  - Organize training on updated guidelines to support national scale-up of new interventions,
  - Develop multimedia and interactive training opportunities. Seek the support of partners to develop interactive online or blended training modules.
  - Establish a comprehensive NTP training database in order to evaluate training coverage among key TB staff and to determine training needs.
  - Develop plan for attendance at the international conference on TB and other respiratory condition diseases.
  - Develop plan for participation in short courses on TB.
  - Technical assistance with a capacity building focus will be required for program evaluation (NSP end review), for periodic evaluation of defined program component (such as the laboratory network, MDR-TB, M&E, PAL), for special surveys (catastrophic costs, inventory studies, subnational TB estimation, subnational patient pathway analyses, sensitivity analyses, stigma assessment) and for the SNRL.
  - Purchase IT Equipment to facilitate training.
  - Conduct supportive supervision and mentorship at all levels.
  - Organize webinar courses to update health facility staff on TB guidelines.
  - Introduce use of video conference for short courses, meetings, clinical case discussions, etc.
  - Organize every three years a workshop with participation of national and international experts within TB to share new knowledge on TB management and update guidelines if needed.

Intervention indicator, baseline and target

Indicator	Baseline	Target
Proportion of public health facilities where at least one staff has participated in training on TB	100%	100%

[38] Health labor analysis market report. Ministry of Health Rwanda, 2019, Page 36

IV.2.2.1.3. KEY INTERVENTION 3.3: Engagement of communities, civil society organizations, and public and private care providers

As described earlier, there is excellent engagement of CHWs in TB control contributing to more than half of TB notification. However, their participation is highly dependent on the external funding (activities in pillar 1, chapter 1.1.3)

Acknowledgement the role of communities against tuberculosis including CSO engaged in the sensitization and peer education on TB response toward sensitization, reference of TB cases to Health facilities in TB high groups, especially among HIV key populations.

Challenges

- Suboptimal engagement of private sector care providers especially private-for - profit and the informal private sector. Small standalone formal and informal private providers are not engaged. These include chemistries or pharmacies, individual clinics, private laboratories, and private imaging centers. Other informal providers mainly consist of traditional healers, and traditional birth attendants among others.
- Absence of guidance for Public Private Mix on TB care and control
- Limited engagement of the corporate sector and workplaces such as mines, factories and other industries in order to accelerate finding missing people with TB.
- Inadequate capacity to diagnose and manage TB patients in the private sector: knowledge gap among private providers in all areas of TB care and prevention.
- The capacity gaps are due to inadequate inclusion during training or updates on new guidelines and treatment recommendations, high staff turnover also makes it difficult to retain even trained staff and to manage competing activities.
- Low coverage of Public Private Mix DOTS and lack of linkages between private and public clinics: Only 3 of the total private clinics are engaged in TB diagnosis and treatment. Referring patients from private facilities to the public facilities without a clear referral system may delay TB diagnosis,
- Limited mobilization/peer education of the community on TB,
- No coordination meetings between TB and ORDs and CSOs at national and decentralized levels,
- CSOs do not have IEC materials and referral/counter referral tools of presumptive TB cases to health facilities,
- Limited capacity of CSOs and peer educators on TB control and prevention. Lack of supportive supervision by CSOs and peer educators,

Evidence:

- The 2020 PPA indicated that 10% of patients sought initial TB care at private level 0 (8%) and level 1 (2%) facilities.
- Only 1% of private level 1 facilities provide diagnostic TB services and TB treatment services.
- Access to diagnosis and treatment services at place of care seeking was lower for males (74%) compared to females (85%), as a larger proportion of males seek care at private level 0 facilities (15% vs. 4%) .

Main activity and sub-activities

- **Strengthen and expand Public – Private Partnerships for TB prevention and care:**
  - Develop guidelines on the framework of Public Private Partnership on TB prevention and care.
  - Conduct a high-level meeting with TB stakeholders aimed at enhancing participation of the private sector in the fight against TB and regulation on mandatory notification of TB treated in the private sector.
  - Organize a coordination meeting for CSOs and the Private Sector to increase active participation in fighting TB.
  - Build the capacity of health care workers in the private sector to provide quality TB care services.
  - Map and identify the private HFs to be accredited in TB management and control.
  - Develop strategy to engage the corporate sector and workplaces on TB prevention and care,
  - Develop policy for occupational TB prevention and lung health.
  - Conduct active case finding in workplaces (mines, factories and industries).
  - Organize TB Awareness campaigns at high-risk workplaces.
  - Conduct workshops for health professionals of private pharmacies to contribute in TB prevention and increase awareness to seek care at HFs.
  - Provide diagnostic equipment including fluorescent microscopes.
  - Build capacity of CSOs and Peer Educators on TB prevention and control (contact tracing and transportation, treatment follow-up, stigma reduction) to support in community mobilization, education through SBCC, linkages for TB suspects from the community and TB high risk groups and reduction of stigma and discrimination faced by People affected by TB,
  - Support CSOs to conduct awareness campaigns on TB symptoms and to enable targeted communities and TB high risk groups (HRGs) access TB services to ensure early access to quality diagnosis, treatment support/adherence,
  - Conduct outreach services by CSOs and Peer Educators on Infection prevention and control (contact tracing and transportation, treatment follow-up, stigma reduction) with aim to improve the linkage and referral

system,
- Establish community-led monitoring to strengthen peer support systems in different communities and TB high risk groups of interest might help reduce Stigma and discrimination limiting access, uptake and retention in TB services,
- Organize a strategic high-level stakeholder.

Intervention indicators, baselines and targets

Indicator	Baseline	Target
Proportion (Number) of private clinics engaged to provide comprehensive TB services	3	15
Proportion of TB notifications contribution by private clinics	0.2%	3%

IV.2.2.1.4. KEY INTERVENTION 3.4: Migrant and cross border

As per the 2019 WHO Global Tuberculosis Report, 30 countries are considered as TB high burden countries, of which 3 are regional and neighboring countries (Kenya, DR Congo and Tanzania). The TB incidence rate for Rwanda is estimated at 59/100,000 population. All neighboring countries have a higher TB incidence rate than Rwanda. Given forced displacement due to new and ongoing political conflicts within the region forcing people to flee their countries as well as increased movements across borders due to the liberalization of economic policies, there is need for a regional policy, guidelines, tools and TB referral system to make sure that different categories of people e.g refugees and migrants are captured in the national plan.

Challenges

- Lack of cross border policy regarding TB control and regional collaboration in fight to end TB epidemic.

Evidence:

- For DRC the TB incidence rate is estimated at 321/100,000 population, for Kenya at 292/100,000 population, for Tanzania at 253/100,000 population, for Uganda at 200/100,000 population and for Burundi at 111/100,000 population.

Main activity and sub-activities

- **Improve cross border TB control:**

  - Advocate for EAC for cross boarder policies regarding TB prevention, care and control.
  - Conduct regional consultative meetings through the existing regional collaborative framework (EAC ICGR).
  - Conduct early TB screening among new immigrants.
  - Conduct education outreach and screening of immigrants in refugee camps.

IV.2.2.1.5. KEY INTERVENTION 3.5: TB infection prevention & control (IPC)

TB infection control measures are recognized as priority interventions particularly in health care settings. The implementation and application of basic measures for TB IC in Rwanda health care settings, are on a good track and only have to be strengthened and maintained. The package of six basic measures includes: the existence of the IC plan, appointment of the TB focal point, health workers trained on TB, cough triage system and separation of coughers, health education on cough hygiene, and optimization of natural ventilation by maintaining opened doors and windows in all services.

Challenges

- Lack of guideline and SOPs on infection prevention & control in most facilities.
- Some health facilities have infrastructure limitations hindering effective administrative and environmental TB IPC measures.
- HIV clinic waiting bays are often enclosed, poorly ventilated and pose a moderate to high risk of TB transmission.
- Cough triage in the health facilities is not routine practice.
- No policy of TB screening among HCWs

New challenges from MTR 2022 report:

- Lack of mechanical ventilation for environmental control measures in some health facilities.

Evidence:

- A study[39] among 1,131 HCWs and 381 enrolled school workers showed that LTBI was more prevalent among HCWs (62%) than SWs (39%). Adjusted odds of a positive TST result were 2.71 (95% CI 2.01–3.67) times greater among HCWs than SWs. Among the HCWs, there was no detectable difference between prevalence of LTBI according to facility type, work setting, or occupation.

[39] Rutanga C, Lowrance DW, Oeltmann JE, Mutembayire G, Willis M, Uwizeye CB, et al. (2015). Latent Tuberculosis Infection and Associated Factors among Health Care Workers in Kigali, Rwanda. PLoS ONE 10(4)

Main activity and sub-activities

- **Strengthen TB IPC measures and prevention in high-risk occupations:**
  - Rehabilitate waiting areas to meet IPC standards.
  - Develop and disseminate guidelines on TB IPC.
  - Train the focal point of health facilities on IPC guidelines and development of appropriate IPC Plans.
  - Ensure TB surveillance and routine TB screening among health care workers at risk.
  - Develop a checklist for assessing the status environmental measures at the HF in collaboration in collaboration with MoH IPC team,
  - Conduct need assessment of environmental measures at HF level by DH IPC officer
  - Conduct a workshop to integrate TB IC measures on accreditation checklist.

Intervention indicators, baselines and targets

Indicator	Baseline	Target
Proportion of HCWs screened for TB	85.6%	87%
Proportion of health facilities applying basic TB IPC measures	88.5%	90%

IV.2.2.2. STRATEGIC OBJECTIVE 4: Universal Health Coverage, social protection, human rights & gender, nutrition

IV.2.2.2.1. KEY INTERVENTION4.1: Universal Health Coverage and social protection,

Universal Health Coverage (UHC) is defined as ensuring that all people have access to needed health services of sufficient quality, while also ensuring that the use of these services does not expose them to financial hardships.
The second pillar of NST1 aims to ensure access to quality health for all by identifying innovative sources of finance for the health sector including public-private partnerships, public community partnership for health financing and a sustainable model for community-based health insurance.

Rwanda's community-based health insurance program (Mutuelle de Santé) which has been reformed into a comprehensive insurance scheme through an enactment in mid-2011m transformed Mutuelle de Santé to a system of tiered premiums to make it more financially progressive and sustainable. Moreover, health insurance is mandatory to all people living in Rwanda.

A wealth categorisation program (Ubudehe) which was originally developed as a basic community target scheme, was modified after the 1994 genocide to enroll the most vulnerable citizens into national social protection programs.

Challenges

- Uncertainty around the funding landscape; given that TB funding is mostly received through external sources. Priority diseases such as TB services are not included in Mutuelle de santé. Inclusion of the TB budget in the Mutuelle de santé is one of the most important gaps but also the most promising strategy in the context of the UHC 2030 in Rwanda.
- No baseline for catastrophic costs
- Some patients are not able to pay the health insurance, and therefore do not seek treatment swiftly enough. In addition, patients often have difficulties to renew community health insurance when they do not have enough physical capacity to work during treatment,
- TB services and medicines are free; however, patients have to pay for co-morbidities through their community health insurance,

- Social(job) protection for TB receiving long-duration treatment (MDR-TB) is weak as the labor law limits the duration of sick leave to 6 months.

EVIDENCE

- The national Mutuelle de Santé is documented to have ever covered more than 90% of the population, and currently covers above 80% and consequently reduced out-of-pocket spending for health from 28% to 12% of total health expenditure, and increased service utilization to 1·8 contacts per year.

Main activity and sub-activities

- **Advocate for policies and plan to include TB patients and cost in social protection scheme.**

    - Ensure more sustainable funding for priority programs such as TB, to eliminate catastrophic costs for TB patients and their families, and monitor progress towards the high-level End TB Strategy target to achieve zero catastrophic costs by 2020.
    - Engagement and participation of the NTP in all Social Protection platforms (health insurances company and the Mutuelle de santé) to ensure that TB patients and their families who meet the inclusion criteria are well covered.

- Conduct a patient cost survey on catastrophic costs encountered by TB affected families to set the baseline and targets.
- Advocate for the inclusion of all elements of TB care and prevention in the insurance scheme.
- Participate in the annual meeting with health insurers to update the packages and tariffs,
- Organize quarterly coordination and advocacy meetings with Local leaders on linkage of TB Patients with social protection initiatives and inclusion of TB activities in the action plan.
- Organize Social cluster meetings at central level to discuss on TB issues and evaluate the implementation of TB activities at different levels of social cluster,
- Advocate for the inclusion of TB as a special case for the invalidity pension.

Intervention indicator, baseline and target

Indicator	Baseline	Target
Proportion of households affected by TB facing catastrophic costs	TBD	<20%

IV.2.2.2.2. KEY INTERVENTION 4.2: Human right and gender

The gender inequalities can impact health risks, health seeking behavior, access to care and responses from health systems, which lead to poorer outcomes.
The fourth Health Sector Strategic Plan 2018-2024 (HSSP IV) acknowledges that women and men have specific health needs at all stages of life that are related to both physiological differences and societal roles. The health sector in Rwanda has recorded tremendous achievement including improved access to health care, life expectancy and decline of the infant, child and maternal mortality rates.

The HSSP IV has been developed using a people-centred, inclusive, and social cohesion-driven approach. In Rwanda, this is modeled around a human rights-based approach to health with practical policies, programmes and strategies to address and rectify inequalities, which include gender inequalities causing inequitable health outcomes for poor or marginalized parts of the population. Poverty is recognized as a risk factor for acquiring TB, in our bid to reduce TB incidence and mortality in Rwanda, an all-inclusive model is paramount with strategies aimed at the poorest and the most vulnerable. According to the WHO, TB is the third leading cause of death for women worldwide. This TB NSP recognises that and takes into account the need for gender equity and the removal of any gender based barriers in the fight to eliminate TB as a major cause of morbidity and mortality in women.

Challenges

- A rights-based approach is yet to be realized in the management, treatment, care and support of TB patients. Empowerment and education of patients on rights and about TB is largely left to community based, civil society and partner organizations,
- There is no data showing about TB stigma in Rwanda,
- No available TB services for the blind and the deaf.

Evidence

- The National Gender statistics report in Rwanda[40], 2016-2017 showed that 74.5% and 73.4% of females and males were covered by health insurance.
- 83% of women participate in making decisions about their own health care, only 23% of them decide solely about their own health care.

Main activities and sub-activities

- **Advocate for rights- and gender-based approaches in TB care and prevention:**

  - Conduct a gender and human rights assessment in TB program with aim to strengthen the capacity of Rwanda and partners to implement a sound and gendered TB response,
  - Sensitize communities and TB patients on their rights and needs towards quality access of TB services at community and health facility levels with respect to gender approach,
  - Strengthen the capacities of Healthcare Providers and CSOs on the rights and needs of people affected by TB to access quality TB services at the community and health facility level with aim to improve early TB diagnostic and TB treatment with respect to gender approach,
  - Conduct quarterly advocacy meetings with stakeholders including National and decentralized and local authorities on the rights and needs of people affected by TB towards accessing quality TB services at the community and health facility level with respect to gender approach,
  - Sensitize health care provider's knowledge about their own rights to health.
  - Reduce stigmatizing attitudes in health care settings by providing necessary skills and tools to ensure patients' rights.
  - Facilitate discussions and negotiations among TB service providers, those who access services and police to address law enforcement practices that impede prevention of TB treatment, care and support efforts.
  - Conduct know your rights campaigns to improve legal and human rights literacy of people infected and affected by TB.

[40] National Gender Statistics Report, 2019, NISR, page 10

- **Implement rights- and gender-based approaches in TB care and prevention.**

  - Integrate a data element into TB surveillance system to capture the disabilities (deaf and blind)
  - Align TB services into Reproductive Maternal and Child Health (RMNCH) related health services to facilitate access by women and girls.
  - Train prison personnel regarding prevention, health care needs and human rights of detainees infected with or at risk of TB in the workplace programs for law makers and enforcers.
  - Produce and distribute TB communications materials for individuals who are blind and deaf.
  - Train HCWs on Sign language.
  - Protect the privacy of people with TB.
  - Train HCWs on TB stigma reduction.

Intervention indicators, baselines and targets

Indicator	Baseline	Target
Percentage of people diagnosed with TB who report stigma in health care settings that inhibited them from seeking and accessing TB services	N/A	TBD
Percentage of people diagnosed with TB who report stigma in community settings that inhibited them from seeking and accessing TB services	N/A	TBD

IV.2.2.2.3. KEY INTERVENTION 4.3: Social Protection and Nutrition

Malnutrition is a risk factor for the progression of TB infection to TB disease and is a predictor for increased risk of death, and TB relapse[41]. While malnutrition results in a weakened immune system, TB disease results in poor appetite, malabsorption, wasting and further deterioration of the immune system. This results in a vicious cycle of disease and malnutrition[42].
Additionally, studies indicate that malnourished TB patients have delayed recovery and higher mortality rates than well-nourished patients. The nutritional status of patients also improves during TB treatment[43] Nutritional assessment is therefore an essential prerequisite to the provision of nutritional care.

[41] World Health Organization. (2013) Nutritional care and support for patients with tuberculosis. Geneva: World Health Organization; Retrieved from *http:// www.who.int/nutrition/publications/en/*

[42] Food and Nutrition Technical Assistance (2014). Why Good Nutrition Is Important in the Treatment of TB. Retrieved from *https://www.fantaproject.org/ news-and-events/why-good-nutrition-important-treatment-tb*

[43] Gupta, K. B., Gupta, R., Atreja, A., Verma, M., & Vishvkarma, S. (2009). Tuberculosis and nutrition. *Lung India: official organ of Indian Chest Society*, *26*(1), 9-16.

Poor nutritional status and poverty are common features of TB patients; patients face difficulties in taking TB drugs when they haven't enough to eat; no nutritional support is available for drug-susceptible TB patients.

Challenges

- Nutrition support is only provided to DR-TB patients; DS-TB patients with malnutrition are not covered.
- Lack of information about malnutrition levels in the general population and specifically in TB patients.

Evidence

- TB fatality is high among malnourished patients: around 62% of died TB patients were underweight (BMI ≤18.5)
- In 2018 stunting in children (6 to 59 months) was at 35% and the prevalence of children who are underweight was at 12.6%.44

Main activity and sub-activities

- **Improve TB patients nutrition status by providing nutrition supplements to TB patients with low BMI:**
  - Procure and distribute Nutrition commodities for TB Patients in two lower categories in the Rwanda socio-economic classification system which correspond to Category D&E in the upcoming categorization.
  - Purchase and distribute nutritional support to DS TB cases with BMI of ≤ 18.5,
  - Ensure DOT of TB patients with BMI of ≤ 18.5 at HP, HC or Hospital to ensure close clinical follow up and management of malnutrition,
  - Introduce data collection on patient's nutrition status in the regular TB program report.
  - Develop and distribute a nutrition guidelines tool about nutrition and TB patients.
  - Print the new nutrition guidelines tool about nutrition and TB patients.
  - Conduct regular supportive supervisions to health facilities on the implementation of the new nutrition guidelines tool about nutrition and TB patients.

Intervention indicators, baselines and targets

Indicator	Baseline	Target
Proportion of TB patients who are evaluated for nutritional support	99.8%	100%

44 Rwanda 2018: Comprehensive food security and vulnerability analysis CFSVA, NISR 2019.

Proportion of eligible malnourished TB patients (BMI<18.5) who have accessed nutrition support	41.5%	>95%

IV.2.2.3. STRATEGIC OBJECTIVE 5: Stable and quality assured supply of drugs, diagnostics, and commodities

Ensuring an uninterrupted supply of high-quality and affordable, first and second-line anti-TB drugs for all people with TB, is critical for sustaining treatment success and prevention of TB and drug resistance.

Management of TB commodities is ensured by MPPD at central and intermediate level, and the whole supply chain is supported by the NTP. This plan will contribute to strengthening skills of district pharmacies (DP) in accurate stock forecasting and appropriate use of the electronic logistic management information system (e-LMIS) for stock management through training and on-site supervision of staff. Rwanda has a plan to switch fully to e-LMIS and phase out the paper-based system nationwide for management of health commodities. This requires strong capacity building of users, mentorship and strengthening internet capacity by availing 4G internet in remote areas with network problems, which goes beyond funding available for this NSP.

Rwanda implemented the CPDS as a Government mechanism to coordinate and efficiently manage available resources, with the aim of achieving the streamlined integration and harmonization of programme supply chain practices and improved quantification, procurement and supply plan monitoring of public health commodities, including TB.

In order to make procurement processes more flexible, the government of Rwanda created a State-owned company named Rwanda Medical supply Limited (RMS). In addition to procurement, RMS conducts the storage and distribution of medicines through the country in an integrated manner. RMS has its headquarter and central warehouse in Kigali and branches in all districts which distribute medicines and other health products to the last mile.

RMS ltd objective is to ensure availability of medicines, medical supplies and consumables in the right quantity, with the acceptable quality, to the right place and customers, at the right time and with optimum cost to the Rwandan population.

IV.2.2.3.1. KEY INTERVENTION 5.1: Supply chain management

Challenges

- The public laws in Rwanda are conflicting with the Global Drugs Facility (GDF), which is the UN entity to supply affordable TB drugs and commodities. GDF

mechanism requires 100% pre-payment before shipment while the Rwanda Public Procurement laws warns against this.
- Inaccurate recording of consumption data and stocks in e-LMIS.
- Insufficient number of pharmacists at the TB&ORD Division due to heavy workload.
- Limited internet access hindering proper use of e-LMIS in some health facilities'
- Insufficient skills and knowledge on use of e-LMIS at decentralized level.
- No focal point at NRL for supply chain for laboratory commodities

New challenges from MTR report:
- Inadequate storage space to store all the health products at levels of the supply chain (RMS HQ, RMS branches and health facilities)
- Insufficient pharmacy professionals at RMS and hospitals or pharmacy technicians in the structure of health centers. Nurses are assigned to work in the pharmacy.
- No regular capacity building and refresher training for pharmacy staff when new TB treatment regimens and protocols introduced,
- Fluctuation in DR-TB and pediatrics DS-TB cases affects forecasting and supply planning.
- Stock out of TB laboratory commodities at health facilities (Sputum container and Microscopy slides) and the central level reported stock out of Hain and BD products
- Issues in reporting of e-LMIS data including use of different codes for the same medicines, lack of alerting system to warn users, and lack of dashboard for more visibility of different indicators.

Evidence

Two months (April and May) of GeneXpert cartridges stockout in 2019.

Main activities and sub-activities

- **Improve the availability of quality TB drugs and commodities:**
  - Request cabinet brief regulating procurement of tuberculosis commodities through the global drug facility mechanism and 100% pre-payment.
  - Engage in restructuring of medical procurement and production division to ensure the documents guiding procurement processes of the new institution are flexible to comply with requirements of the global drug facility.
  - Install air conditioners in the health facilities to maintain the quality of medicines in stock.
  - Conduct quality control of all new batches and sampled batches at MPPD and decentralized level.
  - To organize the training /refresher for the staff involved in the supply chain management of TB commodities,

- Purchase digital thermo-hygrometer in Health facilities,
- To advocate to MOH to improve the health facility commodities storage room.
- To strengthen mentorship /Supervision of health facilities on drug management and reporting
- To monitor monthly the supply plan implementation

- **Strengthen the supply chain, stock management and efficient use of e-LMIS**
  - Harmonize coding of medicines to prevent duplications in reports.
  - Conduct workshops to develop a harmonized code of medicines, validate new codes and ensure old codes are totally replaced.
  - Train store manager on new channels for requisition of TB medicines.
  - Allow all health facilities including CT to request medicines from DPs.
  - Revise the SOPs on recording of consumption data in e-LMIS.
  - Conduct workshop to revise SOPs on consumption data integrating quantity dispensed by CHW.
  - Conduct mentorship of HCW to ensure quality of data and timely reporting in e-LMIS.
  - Conduct every quarter data analysis of consumption data recorded in e-LMIS.
  - To train data quality officer from RMS Branches and HQ on TB surveillance system
  - Conduct annual workshop with RMS (branches Directors & HQ) and hospital pharmacist on TB Reporting, requisition and management of TB commodities.

Intervention indicators, baselines and targets

Indicator	**Baseline**	**Target**
Percentage of CDT with no stock out of FL tracers (RHZE and RH ad) drugs of experienced in the last 12 months	94.6%	100%
Percentage of MDR TB centers with no stock out of SLD in the last 12 months	99.5%	99.5%

IV.2.2.3.2. KEY INTERVENTION 5.2: Rational use of medicine

Use of TB medicines in Rwanda is controlled and TB medicines cannot be sold in private pharmacies. To increase access to patients TB medicines are dispensed free of charge. The quality of medicines is controlled through the procurement of medicines from WHO prequalified manufacturers and are verified by GDF and by RBC through the accredited WHO laboratory.

The Passive TB drug safety monitoring and management has been implemented in Rwanda TB program since the introduction of the shorter injectable-based DR-TB treatment regimen in July 2014. Later, in July 2019 an active TB drug safety monitoring and management has (aDSM) progressively started with a specific stage on notification of adverse events on patient's files and it has been integrated in the individual electronic TB case surveillance system for both DS and DR-TB patients management. For improvement on aDSM implementation, we are planning to revise the M&E tools to capture more information on adverse events for recording and reporting, extend training on aDSM to the health facilities staff and intensify education of the patients. A collaborative aDSM TWG gathering FDA, RBC and RMS will also be established to discuss any issues for the effective implementation of aDSM in the management of TB patients in Rwanda TB program.

Challenges

- We still report a number of treatment failures on TB first-line medicines, which are not resistant to TB and if they are retreated, they get cured. This can be due to suboptimal plasma concentration of medicines that can be caused by individual particularities. Therefore, the plasma concentration needs to be measured in order to adjust patient's drug dose for cases with control positive results on microscopy even though they are sensitive to TB medicines.
- In addition to the rational use of medicines, adverse drug reactions are poorly reported (already covered in the chapter on MDR-TB).
- Fluoroquinolone medicines which are in the same family with some medicines being used in treatment regimens of DR TB cases are sold in pharmacies and this can lead to resistance if close collaboration with private clinics and private pharmacies is not strengthened.
- Currently used M&E tools do not capture minimum information regarding aDSM implementation.
- Lack of integration of reporting tools (aDSM and PViMS) and e-TB to avoid parallel reporting systems.
- Lack of information about Rwanda FDA reporting form to collect Adverse Drug Reaction (ADR) data.

Evidence

- The current quarterly reporting system is not collecting the information on aDSM. However, the new patient file version is evaluating adverse events monthly.

Main activities and sub-activities

- **Implement TB Therapeutic Drug Monitoring:**
  - Purchase toxicology lab reagents for NRL for TB therapeutic drug monitoring (TDM).
  - Train staff on TB TDM and interpretation of lab results.
  - Conduct mentorship in collaboration with College of Medicine and Health Sciences on the implementation of the TB TDM.
  - Develop SOP on use of TDM.
  - Work with Rwanda Food and Drugs Authority to restrict use of fluoroquinolones.

- **Improve aDSM system:**
  - Strengthen capacity of health providers to use audiometer, ECG, etc.
  - Develop protocols and conduct active surveillance of medical products used in TB program.
  - Educate and inform patients on the importance of reporting adverse drug events.
  - To build capacity of TB&ORD staff on pharmacovigilance to support reporting of ADR and agree on ADR reporting forms responding to the needs of both institutions and have an integrated reporting system (aDSM, PViMS and e-TB tools) to avoid parallel reporting systems and duplication of efforts
  - Revise, print and distribute updated M&E tools for pharmacovigilance monitoring system (aDSM)
  - Establish a collaborative aDSM TWG gathering FDA, RBC and RMS to discuss any issues for the effective implementation of aDSM in the management of TB patients in Rwanda TB program.

Intervention indicator, baseline and target

Indicator	**Baseline**	**Target**
Proportion of TB treatment cards where aDSM section is completed	99.4%	>95%

IV.2.2.4. STRATEGIC OBJECTIVE 6: M&E and data quality system (e-TB, health information system, Civil registration and vital statistics (CRVS) system

IV.2.2.4.1. KEY INTERVENTION 6.1: Surveillance system including mortality registration.

Proper data management associated with strong monitoring and evaluation are needed to help improve program interventions, achieve goals, and sustain funding. Significant progress is evident since the implementation of an electronic recording and reporting system. Considering current achievements and challenges, the NTP will continue developing and consolidating the system, in particular, core data along the continuum of TB care that are currently not included and enhance the quality of TB data management.

The GoR needs reliable mortality data to monitor the impact of investments in disease control. The TB program and other health programs are likely having a remarkable impact on reducing mortality among children and adults. Therefore, the investment in building systematic mortality surveillance systems which comply with global standards for the reporting of deaths and causes of death are considerably important to contribute in strengthening health systems and CRVS system. Mortality is a key measurable indicator of the Sustainable Development Goals (SDGs) used as measurement for 5 goals and 15 mortality related indicators.

Therefore, the GoR embarked on the formal process for measurement and monitoring of levels of mortality and distribution of causes of death (COD) at population level to improve the CRVS system.

Mortality data from the civil registration system permits the production of mortality statistics on a continuous basis and contributes to an understanding of the burden of disease at national and local geographic levels. Given the huge importance of a well-functioning civil registration system in the production of complete, accurate, relevant, and timely mortality statistics, the GoR has published amended law No 001/2020 of 02/02/2020, thereby replacing law No 32/2016 of Family and Persons to improve birth and death registration coverage, completeness and causes of death reported to ensure both continuity and consistency of the system.

Complete and accurate data related to cause of death is critical to both the fields of medicine and public health policy and planning. Death certificates are significant tools to ascertain population-based mortality and other vital statistics information to be used to monitor disease incidence, prevalence, and mortality in a community. However, incomplete, and inaccurate death certificate information can significantly impair the precision of a national health information database.

The GoR started building the system for generating and reporting ICD- coded mortality

information as part of routine health information including a hospital coded module in the HMIS Mortality module, from January 2018. However, the quality of COD reported at health facilities remains a challenge. Rwanda has instigated an ongoing strategy to sustain its progress in diminishing premature deaths through strengthening its civil registration and vital statistics systems. Thus, the country started implementing a major intervention to improve the quality of COD data, namely, the introduction of verbal autopsy to gain a better understanding of the patterns of COD when people die outside the health facility where there is no physician to certify death.

The Mid-term review revealed that in the visited health center and Hospitals, at least 2 staff members per facility had been trained on CRVS (civil registration), and these facilities visited have a well-defined and documented system in place for recording and reporting births and deaths. In addition, the sites have staff who have been trained on how to conduct death audits. Committees have been instituted within the sites to meet and carry out an audit in the event of death. These committees have the capacity to code and attribute deaths to tuberculosis. Among the strategy to improve the coverage of death rate notification at the level of health facility and community, this NSP intends to provide incentives through PBF to each death occurred and well certified according to MCCOD principles. Thus, the CVRS reporting will be respected, and data will be systematically analyzed to inform the public health policy decision-making.

Challenges

- Low coverage and production of high, quality COD data for deaths occurring in the primary settings and community health care system.
- The registration of death is very low because only deaths occurring in the district hospital are captured while most deaths occur in the community.
- The TB staff members have limited knowledge on certification of cause of deaths principles and guidelines that could help them to get insight on TB deaths,
- The new law designates powers to health officers to register birth and death at HFs and the executive secretary of a cell (administrative community) to conduct verbal autopsy for community death has been enforced, so that civil registration system is functional in the health facilities to monitor deaths and causes of death, but there is a need of improvement.
- Data completeness into e-register (e-TB) not yet reached. This will allow to transition from aggregated quarterly reports (RHMIS) to case-based data and phase out the aggregating reporting (activities included in chapter 3.1).
- Non-interoperability or interface connectivity of e-TB and RHMIS with other electronic health systems (laboratory information system (LIS), CRVS, HIV case-based database, eLMS, OpenMRS, among other relevant systems so that TB surveillance is optimized, data are available in real time, data entry workload is reduced, and quality of data increases (activities included in chapter 3.1)

New challenge from MTR report

- Inexistence of annual checking for internet and hardware (audits) carried out to establish gaps in facilities and prioritize replacement and issuing of hardware where applicable.

Evidence

- Over 50% of ICD-coded causes of death are unusable data for policy action (HMIS,2019).
- 30% of deaths occur in health facilities while 70% occur in the community (NISR,2019). Since most deaths occur outside health facilities, there is a great need for establishing a community death surveillance system that provides high quality COD using recommended WHO verbal autopsy instruments.

Main activities and sub-activities

- **Advocate for legal framework for TB case notification and vital registration:**
  - Collaborate with the MoH for the implementation of the public health law which captures TB notification as a requirement.
  - Regulatory frameworks for vital registration.
  - Collaborate with relevant institutions on implementation of Medical Certification of Cause of Death (MCCOD) to determine underlying cause of deaths.
  - Collaborate with relevant stakeholders to integrate e-TB with other health and administrative systems (HIV, LIS, OpenMRS, DataToCare, LIMS, NIDA, CVRS, etc).
  - Train and mentor Health professionals on sustainable quality improvement of medical certification of cause of death.

- **Strengthen Community-based mortality surveillance established, scaled, and quality-assured, using WHO standard verbal autopsy (VA) tools for deaths occurring outside health facilities.**

  - Conduct supervision, on-the-job coaching and mentorship on mortality reporting for community deaths using VA.
  - Contribute to the procurement of internet data bundles of VA interviewers to transmit VA into ODK server in HMIS/DHIS2 and CRVS system.
  - Purchase android tablets for VA supervisors to check the quality of causes of death reported in HMIS/DHIS2 and CRVS system.
  - Contribute to the interoperability process of VA ODK aggregate and NCI-CRVS system with the national identification number (NIN) to improve the

quality of causes of death reported.
- Workshop for VA technical team to develop incremental VA scale up strategy to achieve nationally representative COD data for deaths outside health facilities.
- Collaborate with the Ministry of Health for the elaboration of public health law which capture TB notification as a requirement.
- Collaborate with relevant institutions to integrate e-TB with other health and administrative systems (HIV, LIS, OpenMRS, DataToCare, LIMS, NIDA, CVRS, etc).
- Train TB staff members and TB medical Doctor on MCCOD principles

- **Strengthen the monitoring and evaluation of the TB surveillance system.**
  - Develop/update job aides on procedures of TB data recording, validation, reporting and use.
  - Conduct trainings/inductions/regular mentorships at all levels, using developed/updated job aides on procedures of TB data recording, validation, reporting and use.
  - Hold quarterly evaluation meetings with facilities to cross-check, analyze and use TB data and strengthen health providers' knowledge on TB indicators as defined in the M&E plan,
  - A new assessment of the TB surveillance system will be conducted by the end 2027 to reach WHO certification and measure if TB indicators are on track with NSP targets and END-TB strategy milestones for 2027.
  - Develop / update the SOPs and reporting format tool.

Intervention indicator, baseline and target

Indicator	**Baseline**	**Target**
e-TB coverage in CDT and CT as proxy of Timeliness of routine reporting	100%	≥95%

IV.2.3. Pillar 3: Research and innovation

This NSP encourages program based operational research as core component to improve program implementation locally through the identification of problem, evaluation of intervention component. The operational research improves program implementation and inform for policy adjustment along evidence-based findings, recommendations for quality health care delivery for Tuberculosis Patients.

IV.2.3.1. STRATEGIC OBJECTIVE 7: Data for programmatic monitoring, evaluation, learning and planning.

IV.2.3.1.1. KEY INTERVENTION 7.1: Evidence generation and use of electronic data systems

Challenges

- Issue of data completeness into e-register (e-TB) which will not allow transition from aggregated quarterly reports (RHMIS) to case-based data and phase out the aggregating reporting. Transition from paper-based reporting to case-based electronic surveillance,
- Insufficient M&E capacity of the TB&ORD division to record, analyze and use TB data at national and subnational level with the new e-TB system. Additional staff with fully dedicated time to e-TB will be required for training, data cleaning, data management, and supervision for a fast and smooth implementation.
- The data quality assessment SOP for the new e-TB should be updated.
- Low reporting in e-TB due to high workload to report presumptive TB patients in the system including difficulties to report presumptive TB without ID.
- Insufficient M&E capacity of the TB&ORD division to record, analyze and use TB data at national and subnational level with the new e-TB system. Additional staff with fully dedicated time to e-TB will be required for training, data cleaning, data management, and supervision for a fast and smooth implementation.
- The data quality assessment SOP for the new e-TB should be updated.

Evidence

- In 2022, based on the WHO standards and benchmarks, a National Epidemiological Review was conducted in Rwanda, 8 were met , 5 were partially met (B1.8, B1.9, B2.3, B3.1, B4.1), 1 standard were not met (B1.10) and 1/15 (B1.4) were not applicable.

Main activities and sub-activities

- **Strengthen evidence-based program monitoring and evaluation.**

  - Re-design TB case-based surveillance to be user-friendly.
  - Train central level, facility clinical staff and data managers on the use of new TB case-based surveillance (data entry, data management, analysis and use).
  - Hire dedicated staff at central level to manage a TB case-based surveillance system.
  - Avail fund for increased capacity of central servers to host the TB case-based surveillance system.
  - Organize a workshop for developing job aides/SOPs on data quality, analysis and use of case-based surveillance system.
  - Conduct bi-annual reviews/evaluation of the system.

- **Conduct special surveys and program-wide reviews.**
  - Conduct repeat patient pathway analysis using data from the 2020 DHS and comparing provinces.
  - Conduct mid-term review of TB NSP
  - Conduct end term review of TB NSP
  - Conduct epidemiological review using WHO standards & benchmarks.
  - Implement and update a dashboard using the table of core TB data along the continuum of care to monitor performance of the TB program according to the people-centered framework for planning and programming.
  - Conduct annual evaluation meetings with stakeholders on TB annual performances.

IV.2.3.2. STRATEGIC OBJECTIVE 8: Research priorities

IV.2.3.2.1. KEY INTERVENTION 8.1: Research strengthening.

The NTP research capacity will be strengthened at different levels and the research team will be created to work on identified research topics. The research team shall include people from different institutions. Moreover, technical assistance might be needed to carry out cutting-edge research towards refining and/or developing better strategy.

Challenges

- Lack of dedicated funds for research activities,
- Inadequate capacity to conduct research among staff at all levels,
- Lack of multidisciplinary collaboration including academia for operational research,
- Lack of framework program to support budget for research to be conducted by

students, decentralized level, CHUs, health facilities and monitor their implementation,

- There is a gap in capacity building of Medical Doctors, students, Province officers, Facility M&E Officers, Data managers and TB focal persons on operations research, while the program has data that can be subjected to scientific analysis and research in order to develop new knowledge for management of TB in Rwanda.

Evidence

- Some research topics like KAP study on health seeking behavior in current NSP were not conducted.

Main activities and sub-activities

- Develop and implement the prioritized research agenda

  - Conduct LTBI prevalence survey
  - Progmatic clinical trial on the short treatment regimen for rifampicin-sensitive TB
  - Preventing Acquired Resistance: Strengthen TB treatment by adding Amikacin in the first treatment week of multidrug-resistant tuberculosis (Stake)
  - Conduct and implement isoniazid resistance surveillance among DS patients
  - Genetic diversity of MTB complex, drug resistance and mixed infections in Rwanda
  - Adherence surveys: Uptake of digital solutions and effect on patient follow up and adherence
  - Drug Resistance Survey: to determine the burden of drug resistant TB
  - TB Inventory study to assess the potential underreporting,
  - Conduct stigma assessment using Stop TB Partnership assessment tool.

V. ESTIMATED BUDGET COST FOR THE EXTENDED TB NSP 2024-2027 IN RWANDA

Following the mid-term Review of the Rwanda TB NSP 2019-2024 with the objective to take stock it was requested to also revisit the program cost for adjusting Cost to new strategic objectives and program interventions. Moreover, the Revised NSP based on the MTR recommendations will be extended to the period of 2024-2027. Given that the costing of these two NSPs (2023-2024 as well as the extended 2024-2027) are built on the NSP 2019-2024, it is therefore important to highlight the costing approaches used in the initial costing (TB NSP 2019-2024). Then, introduce the costing approach used in these two NSPs including the TB NSP-2023-2024 as well as the extended TB NSP 2024-2027. These estimates are expected to facilitate the prioritization of planned investments and ensure that appropriate measures to finance the emerging resource gaps are articulated.

The objectives of the costing assignment as per the Term of References

- Costing the Extended NSP 2024-2027
- Producing a pager of how the TB program should include efficiencies- both technical and allocative efficiencies.

V.1. Costing methodology

V.1.2. TB NSP 2019-2024

To cost the TB NSP Cost estimates of the Rwanda 2019-2024, the UN One Health Tool (OHT) was used. OHT is a unified costing template that estimates the cost of health services and systems input required to achieve desired health outcomes and impacts.

Estimating all costs, including system and service expenses, associated with providing the package of TB interventions listed in the Rwanda 2019–2024 TB NSP was part of the costing study. Modelled TB impacts (mortality, incidence, and notification) under various policy scenarios of the plan are among the process' additional outputs. For further information on the OHT tool, please visit the NSP 2019-2024

V.1.2. Reviewed NSP 2023-2024 and the extended NSP 2024-2027

Data for costing the NSPs were collected in different phases. The phase one involved several consultations to reach out the costing outputs. First, we reach out to TB program units to agree on strategies and activities that were retained after the National Strategic Plan midterm review. Then, series of workshops were organized with different stakeholders to agree on the NSP strategic orientations and interventions

along with different proposed activities by the program. A final workshop to clean activities and align with recommendations from the consultative meeting. The costing of the NSP did not do the prioritization and hence forth, it has cost all the activities in form of a wish lists as proposed by the TB program implementation units.

V.1.3. Costing assumptions

Most of the costing assumptions were provided by the units all the divisions under the supervision of the consultant team to assure that the provision are realistic.

Concerning the setup of the unit cost, financial data for non-pharmaceutical commodities, encompassing procurement, logistics, and finance were collected form the finance unit in the single project implementation unit (SPIU) in the Rwanda Biomedical Center (RBC). Regarding the cost of the medical and pharmaceutical commodities, we used the prices that were applied in the quantification units from different divisions. These price medical, pharmaceutical and non-medical devices are provided or forecast after the agreement among the Ministry of Health, Rwanda Biomedical center, Rwanda Medical Supply.

To determine the unit cost for each activity, a set of well-defined assumptions will be developed. These assumptions will encompass various inputs, their frequency of occurrence, and specific prices associated with them. Official procurement processes will guide the consideration of prices, ensuring that they are derived from reliable and transparent sources. The Corporate Service Division within the Rwanda Biomedical Center (RBC) will provide the prices for non-pharmaceutical commodities, encompassing procurement, logistics, and finance. For pharmaceutical and medical commodities, Rwanda Medical Supply Ltd (RMS) will serve as the primary source of pricing information.

For costing the Rwanda NSP 2023-2024 as per the MTR and the extended TB NSP 2024-2027, we used the Activity Based Costing approach to generate the estimated cost of both NSPs. A detailed costing template that estimates the cost of each activities form different perspectives including delivering TB services such as prevention, Care and Treatment, MDR, supply chain. Furthermore, We computed other cost that aims at strengthen health systems to deliver the TB services such as the M$E and I&C costs.

V.2. Costing result

Table 5. TB total Cost by NSP Programs

NSP PROGRAM	FY23/24 (USD)	%	FY24/25 (USD)	%	FY25/26 (USD)	%	FY26/27 (USD)	%	Total 3 yrs (USD)	%
C&T	1,750,005	19%	2,746,651	24%	1,057,835	11%	1,530,958	16%	5,335,445	17%
HSS	603,839	6%	2,225,631	20%	2,134,558	22%	2,281,806	24%	6,641,995	22%
I&C	1,272,320	13%	1,645,325	15%	1,707,228	18%	1,577,987	16%	4,930,540	16%
M&E	876,715	9%	852,137	8%	837,935	9%	672,876	7%	2,362,948	8%
MDR	551,329	6%	465,772	4%	424,502	4%	427,927	4%	1,318,201	4%
NRL	619,919	7%	613,402	5%	251,286	3%	235,106	2%	1,099,794	4%
ORD	110,028	1%	86,011	1%	110,028	1%	31,067	0%	227,107	1%
Supply Chain	3,641,104	39%	2,580,227	23%	3,173,796	33%	2,866,483	30%	8,620,507	28%
Grand Total	**9,425,259**		**11,215,157**		**9,697,168**		**9,624,211**		**30,536,536**	

Table 6 suggests that in the FY 2023-2024, TB NSP program in the three years is dominated by 4 programs (Modules) representing more than 80% of the all the TB NSP Cost. These include the Supply chain (39%), C&T (19%) followed by the I&C (13%) and M&E (9%). The two other important cost centers are the NRL (7%) and the MDR and HSS of which represent a share of (6%) each. The cost of the ORD represents a meager percentage of the TN NSP (1%). However, when consider the total extended NSP Cost at the end of the three coming years, the cost are mostly dominated by the supply chain (28%), followed by the HSS (22%), C&T (17%) and the I&C (16%). The other NSP components represent less than 20% of the total NSP. These are the M&E (8%), MDR and NRL share each (4%) and the ORD remains at (1%).

Table 6. TB total Cost by NSP Strategic objectives

Strategy	FY23/24 (USD)	%	FY24/25 (USD)	%	FY25/26 (USD)	%	FY26/27 (USD)	%	Total 3 yrs (USD)	%
2.1.2Targeted approaches for key drivers of TB epidemic and selected populations	-	0%	20,696	0%	-	0%	-	0%	20,696	0%
2.1.1. Considering the Patient Pathway for Tuberculosis	6,110,991	65%	6,114,547	55%	5,099,848	53%	5,462,912	57%	16,677,307	55%
2.1.2. Targeted approaches for key drivers of TB epidemic and selected populations	1,350,851	14%	1,369,255	12%	1,156,139	12%	988,821	10%	3,514,216	12%
2.2.1. Programme management, multi-Sectoral collaboration & engaging all care providers	587,550	6%	2,423,044	22%	2,298,716	24%	2,559,317	27%	7,281,077	24%
2.2.2. Universal Health Coverage, social protection, human rights & gender, nutrition	157,081	2%	156,517	1%	155,179	2%	145,094	2%	456,790	1%
2.2.3. Stable and quality assured supply of drugs, diagnostics, and commodities	3,560	0%	24,064	0%	240,860	2%	8,527	0%	273,450	1%
2.2.4. M&E and data quality system (e-TB, health information system, Civil registration and vital statistics (CRVS) system	274,622	3%	610,541	5%	504,537	5%	253,719	3%	1,368,797	4%
2.3.1. Data for programmatic monitoring, evaluation, learning and planning	52,660	1%	55,764	0%	88,503	1%	85,234	1%	229,502	1%
2.3.1. Data for programmatic monitoring, evaluation, learning and planning and research	467,505	5%	20,696	0%	6,416	0%	9,520	0%	36,632	0%
2.3.2. Research Priorities	420,441	4%	420,032	4%	146,970	2%	111,066	1%	678,068	2%
Grand Total	**9,425,259**		**11,215,157**		**9,697,168**		**9,624,211**		**30,536,536**	

Table 7 reports the Costing by strategi for both the NSP 2023-2024 and the extended TB NSP 2024-2027. For instance, in the FY 2023-2024, two strategies (strategy 1and 2) share a proportion of almost 80% of the total program cost while other strategies shared the remaining 20%. However, in the extended TB NSP 2024-2027, three strategies consume the bulks of the costs including strategy 1(55%) and strategy 3 (24%) and the strategy 2 (12%). The other strategies share the remaining 9% of the budget.

V.3. Funding Landscape

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
WHO	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.09	0.07	0.05	0.11
Government of Rwanda/OB	0.23	2.92	3.11	1.71	1.61	1.54	1.63	1.55	1.52	1.49	1.10	2.95	2.70	2.89
ITM											0.35	0.35	0.00	0.00
GF	10.56	8.48	9.55	5.32	6.71	4.88	6.22	4.55	4.79	4.85	6.29	4.35	4.34	4.16
ECSA-HC											0.01	0.00	0.00	0.00
USG/PEPFAR/CDC/COAG	0.21	0.24	0.3	0.25	0.25	0.23	0.23	0.20	0.18	0.16	0.54	0.30	0.32	0.23
Gap											1.04	3.18	2.30	2.22

Figure 9. Funding landscape

Figure 10 states the funding landscape of the two NSPs (2023-2024 and 2024-2027) along with an historical funding reports since 2013-2014. This figure pinpoints that the main TB Program funders are the Global Fund to Fight HIV, TB and Malaria (GF) and the Government of Rwanda with the consistency funding of the World Health organization (WHO).

Despite that the government of Rwanda had increased its share of funding on TB program overs time, It is obvious that TB Program will experience important funding gap of 1.04 Million in the FY 2023-2024 which will increase to be 3.18M (FY 2024-2025), and 2.30M in the FY (2025-2026) and then a gap of 2.22M in 2026-2027. These funding gaps suggest a huge resource mobilization mainly those that are domestic to insure effective tracking of effort to end TB as per the SDG commitment and sustainability of the TB Program achievement in the future.

VI. MONITORING AND EVALUATION PLAN FOR THE EXTENDED 2024 -2027 TB NSP IN RWANDA

VI.1. Process of development of the 2024-2027 TB NSP M&E Plan

This M&E plan has been developed to measure progress made in the implementation of activities of the 2024-2027 TB NSP, as well as to measure progress made to achieve the intended goal(s), objectives, and targets.

The way we proceeded updating the targets, was through brainstorming by TB&ORD central level staff, with RBC and Partners representatives. The targets were set based on following considerations:

- The global End TB Strategy targets 2035 of the World Health Organization,
- Historical data and TB program target indicators achievement,
- Some targets indicators were reviewed based on the RDHS population census.

For each indicator, the following elements have been specified:

- The purpose of the indicator (impact, outcome, output or process);
- The procedure of calculation (absolute figure, proportion, ratio, rate, index, others),
- The source(s) of information that will be used; if it is a rate, ratio or proportion, the sources of information of the numerator and denominator need to be specified,
- The periodicity (and timeliness) of data collection,
- The entity that will collect the information,
- The levels where the information will be collected, compiled and analyzed,
- The values of the indicator at the baseline and expected values at the end of each fiscal year covered by the NSP.

This monitoring and evaluation plan contains 32 indicators, representing the goals and objectives of the plan as well as the Top-ten indicators of the End TB strategy. These indicators assess the goals (impact), strategic objectives (outcomes) and key interventions (outputs), as defined in the core plan. The process indicators need to be considered only for the most important activities.

VI.2. M&E Coordination

The TB control M&E system is fully integrated into the national RHMIS system. The NTP will coordinate all stakeholders involved in TB control activities at national and decentralized levels, to ensure optimum utilization of available M&E resources. This

coordinating structure will oversee resources mobilization for M&E, capacity development, data quality assurance and data analysis, reporting and archiving.

VI.3. Data flow, validation and use

The reporting system is organized from community level to health centers and is compiled by hospital catchment area, district and national level. This includes public and private health facilities (CTs and CDTs). Data are entered from health centers and hospitals (for their own patients), aggregated in R-HMIS by hospital in catchment area, and then for the district and the national level[45].

For data from the community, a transfer form is used when transferring a presumptive TB case to health center for diagnosis, the patient is then recorded in the health center (HC) TB laboratory register if the HC has confirmed the "presumptive TB" status. For TB cases managed by CHWs in community DOT (cDOT), a specific treatment card for cDOT is used, and is brought to the health center each month, where its data are recorded on the TB treatment card and TB cases register of the health center.

Since the TB case-based surveillance system started to be used as a single source of information for TB notification in July 2019, the users have enjoyed the benefits of this system but still facing challenges when it comes to analyzing data and data quality.

The Rwanda National TB Program is using a case-based surveillance system (e-TB) to collect routine data on TB cases under DHIS2/Tracker program. The substitution of the aggregated TB surveillance system by an electronic case-based system has three objectives: (1) to improve data quality, (2) availability of data in real time and (3) to improve quality of case management. The latter will involve a reminders system (SMS) fors TB patient to improve treatment compliance. Only confirmed TB cases are recorded in the case-based surveillance system and data is entered by the TB Focal Point at health facility level and each health facility records cases regardless of if the health facility is a CDT or CT. The e-TB collects information on TB notification, TB/HIV, TB laboratory, TB in HRGs, TB treatment outcomes, MDR-TB and TB PPC [1].

The electronic reporting system contains program rules and validation rules that help to simplify the data entry process and minimize recording errors. The system is also designed to not permit any submission of incomplete data.

Each quarter, an evaluation and performance assessment (quarterly evaluation meetings) are held at district hospital (DH) level. Before these assessments, health facilities have to conduct auto-evaluation to check completeness and accuracy of their data. During evaluation meetings, the TB data are reviewed and cross-checked with the source documents and agreed upon in case of discrepancies; then the R-HMIS TB data is updated accordingly. The feedback is provided through data analysis and interpretation for selected indicators, using a standardized tool.

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45 2013 Procedural Manual for M&E of TB in Rwanda

During this new TB NSP 2023-2027, the TB & ORD Division in collaboration with stakeholders will continue to increase the performance of the TB Case-based surveillance system in terms of data analysis and data quality to respond to the program's needs.

The National level will conduct data quality assurance in selected health facilities and on selected indicators. Supervisions oriented to quality of TB services are conducted, with community level being supervised by health centers and health centers by district hospitals. Districts hospitals are supervised by the national level through an integrated approach.

The electronic TB data in the HMIS and e-TB is hosted in the National Data Center.

VI.4. Evidence generation and Data consolidation along the TB continuum of care

As per the WHO People Centered Framework User Guide, a dashboard of pre-populated core data and automated visualizations on epidemiology, patient care seeking and health system capacities along the care continuum will be reviewed annually, to monitor performance of the TB program with the purpose to ensure desired progress in addressing service gaps and losses of patients in the TB care cascades for TB, RR/MDR-TB and TB/HIV.

VI.5. NSP Reviews

An end-of-term TB NSP review will be conducted (July-September 2026) with the purpose of evaluating NSP achievements, implementation gaps and to provide recommendations which will serve for the next strategy and plan. A TB epidemiological review including TB surveillance checklist review will be conducted in partnership with WHO and other partners in the FY 2026-2027. However, specific program evaluations will also be conducted during the implementation period of this extended TB NSP.

VI.6. M&E plan

Assumptions:

Impact targets are based on current estimates published in the WHO 2022 Global TB report and are expected to continually decline in line with the End TB strategy milestones for 2030, by about 5% annually for TB incidence and by a range of 15%-26%annual decline for TB mortality from 2024-2027, as a result of program design and implementation of all key recommended TB activities with high performance levels and synergistic efforts in HIV control.

In regard to TB notification (all forms), active case-finding in HRGs should detect additional cases so that treatment coverage is expected to increase from 80% in 2015 up to more than 90% by mid-2027. The number of additional cases will not be sufficient

to invert the declining overall notification, but the total number of cases is expected to decline approximately by 4% per year during the NSP period.

The top-10 indicators of the End TB strategy were incorporated in the M&E plan and new targets set for all indicators based on recent achievements (2021/22). Most of these will be collected through the routine surveillance but some will still rely on WHO estimates such as the treatment coverage and the case fatality rate. In addition, the target for catastrophic cost will be updated after the completion of the catastrophic cost survey that is in progress of completion and report writing. The LTBI coverage indicator has been expanded to other groups such as all PLHIV and contacts with a bacteriologically confirmed TB patient.

VI.7. Performance framework

GOALS for 2024 as compared to 2015:

☐ 33% reduction of TB incidence rate
☐ 65% reduction of TB deaths
☐ Reduction of TB-affected families facing catastrophic costs due to TB (to be determined after the survey).

	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/24	2024/25	2025/26	2026/27
Goal	1. Percentage of reduction of TB Incidence rate (per 100,000 hab)	**Impact**	Measured by WHO estimations by modeling	WHO annual TB Report	Annually Cumulative	WHO		Reduction: 8.2% (Y2021) Incidence: 56	15%	19%	24%	28%	33%
Goal	2. Percentage of reduction of TB Deaths rate	**Impact**	Measured by WHO estimations by modeling	WHO annual TB Report	Annually Cumulative	WHO		Increase of 20.5% (Y2021) Mortality: 10	8%	22%	37%	51%	65%
Goal	3. Percentage of TB-affected families facing catastrophic costs due to TB ***(End TB Top-ten indicator N°3)***	**Impact**	Numerator: Proportion of TB patients (and their households) who incur catastrophic costs Denominator: all patients treated	Survey results				N/A	TBD	TBD	TBD	TBD	TBD
o	4. Proportion of first level health facilities that have at least one staff trained to provide PAL services		Numerator: Number of first level health facilities that have at least one staff trained on PAL approach Denominator: Total number first level health facilities	Report assessment	Annually	NTP		94%	90.0%	90.0%	94.5%	94.5%	≥ 95%

GOALS for 2024 as compared to 2015:

☐ 33% reduction of TB incidence rate
☐ 65% reduction of TB deaths
☐ Reduction of TB-affected families facing catastrophic costs due to TB (to be determined after the survey).

	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/ 24	2024/ 25	2025/26	2026/ 27
1	5. TB notification rate new and relapses (per 100,000)	Outcome	Numerator: Number of TB cases notified (new and relapses) Denominator: Population/100,000	RHMIS report	Annually	NTP	National level	41.6/100k (5,447/ 13,104,021)	52	49	46	44	41
	6. TB treatment coverage ***(End TB Top-ten indicator N° 1)***	Outcome	Numerator: Number of new and relapses cases that were notified and treated Denominator: estimated number of incident cases in the same year (%)	RHMIS report WHO incidence estimates	Annually	WHO	National level	71.6% (5371/7500)	90%	93%	95%	95%	95%
1.1.	7. Contact investigation coverage ***(End TB Top-Ten N°6)***	Coverage	Numerator: Number of contacts of bacteriologically confirmed TB cases who were investigated for TB Denominator: Number of contacts of bacteriologically confirmed TB cases	RHMIS report	Annually	NTP	National level	98.4% (22,186/ 22,585)	≥95%	≥95%	≥95%	≥95%	≥95%
1.1.	8. Proportion of TB cases notified among high-risk groups (HRGs (Number and Percentage)	Process	Numerator: Number of TB cases (new & relapses) notified in HRGs Denominator: Total number of TB cases notified during the period of assessment.	RHMIS	Quarterly and annually	NTP	National	51,2% (2790/5446)	52%	53%	54%	55%	≥55%
	9.Proportion of eligible malnourished DS TB patients	Coverage	Numerator: Number of DS TB cases who receive nutrition support	RHMIS report	Annually	NTP	National level	41.5% (1090/2624)	80%	≥80%	>85%	>90%	>95%

GOALS for 2024 as compared to 2015:

☐ 33% reduction of TB incidence rate
☐ 65% reduction of TB deaths
☐ Reduction of TB-affected families facing catastrophic costs due to TB (to be determined after the survey).

	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/ 24	2024/ 25	2025/26	2026/ 27
	(BMI<18.5) who have accessed appropriate nutrition support		Denominator: Total number of DS TB cases with BMI≤ 18.5 notified during the period of assessment										
1.2.	10. Proportion of children 0-14 years notified among TB cases new and relapse		Denominator: Total number of TB cases notified during the period of assessment Number of TB cases aged 0-14 (new & relapses) Denominator: Total number of TB cases notified (new and relapses)				District HF	5.0% (272/5447)	9.5%	6.5%	7.0%	7.5%	8.0%
1.3.	11. Proportion of newly notified patients diagnosed using WHO recommended rapid tests ***(End TB Top-Ten N°4)***	Output	Numerator: Number of all newly notified TB patient diagnosed with WHO recommended rapid tests Denominator: All number of newly notified TB patients	RHMIS	Annually	NTP	National District HF	43.3% (2178/5030)	60%	65%	70%	75%	80%
	12. DST Coverage for TB patients	Coverage	Numerator: Number of TB patients with a drug susceptibility result for at least Rifampicin	RHMIS	Annually	NTP	All	61.8% (3418/5530)	83.0%	≥85%	≥85%	≥85%	≥85%

GOALS for 2024 as compared to 2015:

☐ 33% reduction of TB incidence rate
☐ 65% reduction of TB deaths
☐ Reduction of TB-affected families facing catastrophic costs due to TB (to be determined after the survey).

	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/ 24	2024/ 25	2025/26	2026/ 27
	(End TB Top-Ten indicator N° 7)		(Xpert MTB/RIF or phenotypic DST) Denominator: Number of all notified cases in the same year. Disaggregation for New TPB+ and previously treated cases										
1.3.	13. Proportion of notified patients with rifampicin resistant (RR) or MDR who receive second line DST		Numerator: Number of TB notified patients with rifampicin resistant (RR) or MDR who receive second line DST (LPA or phenotypic DST) Denominator: Number of all notified patients with rifampicin resistant (RR) or MDR in the same year.	RHMIS	Annually	NTP	MDR-TB centers	86.8%(333/38)	100%	100%	100%	100%	100%
1.4.	14.a. Proportion of diagnostic sites scoring pass in EQA for smear microscopy		Numerator: Laboratories sites scoring pass in EQA for smear microscopy (once per year) Denominator: Total number of laboratories with smear microscopy (number and percentage)	NRL EQA reports	Annually	NRL-Division	National level	60.4% (124/205)	80%	90%	95%	96%	97%

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	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/ 24	2024/ 25	2025/26	2026/ 27
	14. b Proportion of diagnostic sites scoring pass in EQA for Xpert MTB/RIF		Numerator: Laboratories sites scoring pass in EQA for Xpert MTB/RIF (once per year) Denominator: Total number of laboratories with Xpert MTB/RIF (number and percentage)	NRL EQA reports	Annually	NRL-Division	National level	30.9% (21/68)	75%	80%	85%	88%	90%
2	15. Treatment success rate (TSR) for all forms(Bacteriological and clinically diagnosed) of TB cases (New and relapse) ***(End TB Top-ten 2)***	Outcome	Numerator: TB cases all(Bacteriological and clinically diagnosed) successfully treated (cured plus completed treatment) among new and Relapse Denominator: total number of TB cases all(Bacteriological and clinically diagnosed among new and relapse registered during the year	RHMIS	Annually	NTP	National District CDT	88.8% (4873/5490)	≥88%	≥89%	89.5%	90%	≥90%
2.1.	16. Percentage of CDT with no stock out of FL tracers (RHZE and RH ad) drugs of experienced in the last 12 months	coverage	Numerator: Percentage of CDT with no stock out of First-Line TB tracer drugs (R150H75ZE&R150H75) Denominator Total number of CDT	eLMIS reports	Annually	NTP	CDT	94.6%(194/205)	100%	100%	100%	100%	100%

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	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/24	2024/25	2025/26	2026/27
2.1.	17. Percentage of MDR TB centers with no stock out of SLD in the last 12 months	Coverage	Numerator: Number of MDR TB centers with no stock out of SLD in the last 12 months Denominator Total number of MDR TB centers	Supervision reports of MDR-TB centers to CDT giving ambulatory DOT	Annually	NTP	MDR-TB centers and CDT giving ambulatory DOT	100% (1/1)	99.5%	99.5%	99.5%	99.5%	99.5%
	18. Proportion of eligible PLHIV initiated on TPT	Coverage	Numerator: Number of eligible PLHIV initiated on TPT Denominator Total number of eligible PLHIV	RHMIS	Annually	NTP	National	63.8% (136598/214073)	≥90%	90%	92%	94%	≥95%
2.3	19. Treatment success rate, confirmed RR/MDR-TB	Outcome	Numerator: Rifampicin resistant (RR)/MDR-TB cases successfully treated (cured plus completed treatment) Denominator: RR/MDR-TB cases enrolled on second-line anti-TB treatment (shorter regimen: patients enrolled in the previous 12 to 24 months; conventional regimen; patients enrolled in the previous 24 to 36 months)	RHMIS	Annually	NTP	National	97.5% (39/40)	91%	92%	92.5%	93%	≥93%

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	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/ 24	2024/ 25	2025/26	2026/ 27
2.3	20. Treatment coverage new drugs ***(End TB Top-ten indicator N°8)***	Coverage	Numerator: Number of TB patients treated with regimens that include new TB drugs Denominator: Number of notified TB patients eligible for treatment with new drugs	RHMIS	Annually	MDR-TB unit NTP	National	100% (38/38)	≥95%	≥95%	100%	100%	100%
2.5.	21. Proportion of TB treatment cards where ADSM section is completed	Output	Numerator: Number of TB patients whose TB treatment card section on AE was completed adequately (every month for MDR-TB and for DS-TB); to reported at the end of TB treatment. Denominator: Total number of registered TB cases during the period of assessment; to reported at the end of TB treatment.	RHMIS (variable to be added)	Quarterly and annually	NTP	National, District Hospital, CDT	99.4% (5370/5401)	60%	85%	90%	95%	>95%
2.5.	22. Proportion of diagnosed TB cases tested for HIV infection ***(End TB Top-ten indicator N°9)***	Output	Numerator: Number of TB patients who had an HIV test result recorded in the TB register Denominator: Total number of registered TB cases during the period of assessment.	RHMIS	Quarterly and annually	NTP	National, District Hospital, CDT	99.9% (5531/5538)	100%	≥95%	≥97%	≥98%	≥99%

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	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/ 24	2024/ 25	2025/26	2026/ 27
2.5.	23.a. Parcentage of HIV positive new and relapse TB patient on antiretroviral therapy during TB treatment	Output	Numerator: number of HIV-positive TB cases given antiretroviral therapy during TB treatment Denominator: number of HIV-positive TB cases registered during the evaluated period	RHMIS	Quarterly and annually	NTP	National, District Hospital, CDT	94.9% (943/985)	95%	95.0%	95.5%	96.0%	≥96%
2.5.	23. b. Treatment success rate among HIV positive TB cases	Output	Numerator: number of HIV-positive TB cases successifully treated (cured plus completed treatment) Denominator: number of HIV-positive TB cases registered during the evaluated period	RHMIS	Quarterly and annually	NTP	National, District Hospital, CDT	81,4% (804/985)	82%	84%	86%	88%	90%
2.6.	24. Treatment success rate for TB patients (all forms) receiving DOT through community health workers (CHW)	Outcome	Numerator: TB patients receiving DOT by CHW who were successfully treated Denominator: all TB patients receiving DOT by CHW during the evaluated period	RHMIS	Quarterly and annually	NTP	CDT	93.9% (2174/2314)	94%	≥96%	≥96%	≥96%	≥96%

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	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/24	2024/25	2025/26	2026/27
3.1.	25. Percentage of Health providers screened for TB at least once during the year. (health facility workers)	Coverage	Numerator: number of Health providers screened for TB at least once during the year. Denominator: number of health providers	RHMIS	annually	NTP	All HF	85.6% (22817/26651)	86%	≥80%	83%	85%	87%
3.2	26.a LTBI treatment coverage among contacts < 5 years ***(End TB Top-ten indicator N°5)***	Coverage	Numerator: number of children who are contacts of TB cases started on LTBI treatment Denominator: number of children eligible for LTBI treatment	RHMIS	Annually	NTP	National, District Hospital, HF	90.7% (1047/1154)	≥90%	≥90%	≥90%	≥90%	≥90%
	26.b LTBI treatment coverage among contacts > 5 years	Coverage	Numerator: number of people of > 5 years who are contacts of TB cases started on LTBI treatment Denominator: number of people of > 5 years eligible for LTBI treatment	RHMIS	Annually	NTP	National, District Hospital, HF	18.8% (427/2260)	67%	75%	80%	83%	85%
1.6.	27. Percentage of population with adequate knowledge* on TB symptoms, transmission and prevention	Outcome	Numerator: Number of people with adequate knowledge* on TB symptoms, transmission and prevention	Survey (integrated in RDHS)	Once during the extended NSP	NTP	National level	NA			>85%		

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	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/24	2024/25	2025/26	2026/27
			Denominator: Number of people interviewed through the survey.										
1.6.	28. Proportion of TB cases (all forms) referred by community health volunteers during the evaluated year.	Output	Numerator Number of TB cases (all forms) referred by CHW during the evaluated period Denominator: The total number of notified TB cases (all forms).	RHMIS	Quarterly, Annually	NTP	Health facilities	27.6% (1529/5530)	>25%	>25%	>25%	>25%	>25%
4.1.	29.eTB coverage in CDT and CT roxyoxi of Timeliness of routine reporting	Process	Numerator: Number of cases reported in eTB during the evaluated period by RSQA Denominator: Total Number of cases reported in all sources documents (eTB + and register) during the evaluated period by RSQA	eTB and RSQA	At least once a year	NTP	National, District HF	100%	44%	60%	70%	80%	90%
	30. Case fatality ratio (CFR) ***(End TB Top-ten indicator N° 10)***	Outcome	Numerator: Number of TB deaths (from VR system) Denominator: estimated number of incident cases in the same year	Numerator: VR system Denominator : WHO	annually	NTP WHO	National		N/A	N/A	N/A	N/A	N/A
4.5	31. Household health expenditure for TB			TB catastrophic cost survey	1 every 4 years	NTP	National	NA	NA	NA	NA	NA	NA

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	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/24	2024/25	2025/26	2026/27
4.6	32. Proportion of public health facilities where at least one staff has participated in training on TB		Numerator: Number of public health facilities where at least one staff has participated in training on TB Denominator: Number of public health facilities in Rwanda			NTP	National	100% (In 2020/21)	100%	100%	100%	100%	100%
4.8	33. Percentage of people diagnosed with TB who report stigma in health care settings that inhibited them from seeking and accessing TB services		To be reported from the survey on stigma of TB patients	Survey on stigma of TB patients		NTP	National	NA	TBD	TBD	TBD	TBD	TBD
4.9	34. Percentage of people diagnosed with TB who report stigma in community settings that inhibited them from seeking and accessing TB services		To be reported from the survey on stigma of TB patients	Survey on stigma of TB patients	After the survey	NTP	National	NA	TBD	TBD	TBD	TBD	TBD
	35. Contribution of DAT in national TSR.		Numerator: Successfully treated through DAT Denominator: All successfully treated TB cases	RHMIS	Quarterly, Annually	NTP	HFs	NA	TBD	5%	25%	30%	35%
	36. Proportion of TB cases bacteriologically confirmed diagnosed		Numerator: Number of TB cases bacteriologically confirmed diagnosed trough	RHMIS	Quarterly, Annually	NTP	HFs	NA	47%	60%	73%	86%	99%

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	Indicator		Detail	source	freq	Who collect	Level	2021/22 (Baseline)	2022/23	2023/ 24	2024/ 25	2025/26	2026/ 27
	trough DataTocare (DTC)		DataTocare (DTC) during the evaluated period Denominator: Number of TB cases bacteriologically confirmed diagnosed during the evaluated period										
	37. Proportion of newly notified patient diagnosed using mWRD		Numerator: Number of newly notified patient diagnosed using mWRD Denominator: Proportion of newly notified patient diagnosed using mWRD	RHMIS	Quarterly, Annually	NTP	HFs	43.3% (2178/5030)	75%	80%	82%	84%	≥85%

VII. ANNEXES

Annex 1: Document reviewed and international guidance

DIAGNOSIS

1) Guide for providing technical support to TB laboratories in low- and middle-income countries. GLI / STOP TB partnership
2) WHO/HTM/TB/2015.11. Implementing tuberculosis diagnostics. Policy framework.
3) WHO/HTM/TB/2016.18. Framework of indicators and targets for laboratory strengthening under the End TB Strategy.
4) WHO_HTM_TB_2007.379. Improving the diagnosis and treatment of smear-negative pulmonary and extrapulmonary tuberculosis among adults and adolescents. Recommendations for HIV-prevalent and resource-constrained settings. World Health Organization 2007
5) WHO/HTM/TB/2011.4 Policy statement: Automated real-time nucleic acid amplification technology for rapid and simultaneous detection of tuberculosis and rifampicin resistance: Xpert MTB/RIF system
6) WHO/HTM/TB/2011.2 Rapid implementation of the Xpert MTB/RIF diagnostic test. Technical and operational 'How-to'. Practical consideration
7) Heidi Albert and al. Development, roll-out and impact of Xpert MTB/RIF for tuberculosis: what lessons have we learnt and how can we do better? ERJ Express. Published on July 13, 2016
8) Zachary D et al. Changes in tuberculosis notifications and treatment delay in Zambia when introducing a digital X-ray service, IUATLD VOL 2 NO 3 PUBLISHED 21 SEPTEMBER 2012
9) Dye C, Williams B. Eliminating human tuberculosis in the twenty-first century. Journal of the Royal Society Interface, 2008, 5:653–662.

DS-TB and DR-TB TREATMENT

1) WHO/HTM/TB/2016.04. WHO treatment guidelines for drug-resistant tuberculosis. 2016 update.
2) WHO/HTM/TB/2014.23, WHO interim guidance on the use of delamanid in the treatment of multidrug-resistant tuberculosis. Geneva, WHO, 2014
3) WHO/HTM/TB/2013.6. The use of bedaquiline in the treatment of multidrug-resistant tuberculosis: interim policy guidance.
4) WHO/HTM/TB/2015.13. Guidelines for the surveillance of drug-resistance in tuberculosis.2015
5) WHO/HTM/TB/2011.3 Towards universal access to diagnosis and treatment of multidrug-resistant and extensively drug-resistant tuberculosis by 2015. WHO progress report 2011
6) WHO/HTM/TB/2011.6 Guidelines for the programmatic management of drug-resistant tuberculosis - 2011 update
7) WHO/HTM/TB/2015.28 Active tuberculosis drug-safety monitoring and management (aDSM): Framework for implementation

HIGH-RISK GROUPS

1) Systematic screening for active tuberculosis: principles and recommendations (WHO/HTM/2013.4)
2) Systematic screening for active tuberculosis: an operational guideline (WHO/HTM/TB/2015.16)
3) WHO. Chest radiography in tuberculosis detection (WHO/HTM/TB/2016.20)
4) Recommendations for investigating contacts of persons with infectious tuberculosis in low- and middle-income countries. Geneva, World Health Organization, 2012 (WHO/HTM/2012.9)
5) Guidelines for control of tuberculosis in prisons. January 2009. USAID. TBCTA. ICRC
6) Guidelines for the control of tuberculosis in prisons. Geneva, World Health Organization, 1998 (WHO/TB/98.250).
7) WHO. Guideline: Nutritional care and support for patients with tuberculosis. Geneva: World Health Organization; 2013.
8) WHO/HTM/STB/PSI/2011.21 Early detection of tuberculosis: An overview of approaches, guidelines and tools
9) WHO Collaborative framework for care and control of Tuberculosis and Diabetes.
10) Lönnroth K et al. Drivers of tuberculosis epidemics: the role of risk factors and social determinants. Social Science & Medicine, 2009.
11) Tuberculosis care and control in refugee and displaced populations. Geneva, World Health Organization, 2007 (WHO/HTM/TB/2007.377).
12) Shah NS et al. Population-based chest X-ray screening for pulmonary tuberculosis in people living with HIV/AIDS, An Giang, Vietnam. International Journal of Tuberculosis and Lung Disease, 2008, 12:404–410.

CHILDHOOD TB

1) WHO HTM TB 2014.03 Guidance for NTP on management of TB in children. 2d edition.
2) WHO/HTM/TB/2013.12. Roadmap for childhood tuberculosis: towards zero deaths.
3) New fixed - dose combinations for the treatment of TB in children. World Health Organization. December 2016

TB/HIV

1) WHO/HTM/TB/2015.02. A guide to monitoring and evaluation for collaborative TB/HIV activities - 2015 revision.
2) WHO/HTM/TB/2012.1 WHO policy on collaborative TB/HIV activities: guidelines for national programmes and other stakeholders
3) WHO/HTM/TB/2011.11 Guidelines for intensified tuberculosis case-finding and isoniazid preventive therapy for people living with HIV in resource-constrained settings

4) WHO/HTM/TB/2012.3 Working together with businesses: Guidance on TB and TB/HIV prevention, diagnosis,treatment and care in the workplace
5) Kenneth Turinawe et al. Operating Characteristics of a Tuberculosis Screening Tool for People Living with HIV in Out-Patient HIV Care and Treatment Services, Rwanda. PLOS ONE. September 29, 2016

M&E

1) WHO/HTM/TB/2015.21. Digital health for the End TB strategy.
2) WHO/HTM/TB/2013.2 Definitions and reporting framework for TB - 2013 revision
3) WHO/HTM/TB/2011.22 Electronic reporting and recording for tuberculosis care and control.

Human resources development

1) WHO/HTM/TB/2008.407. Planning the development of human resources for health for implementation of the Stop TB Strategy
2) http://www.theunion.org/what-we-do/courses/online-and-multimedia-training

Community DOTS

1) ENGAGE-TB. Integrating Community-based tuberculosis activities into the work of nongovernmental and other civil society organizations. Operational guidance
2) ENGAGE-TB. Integrating Community-based tuberculosis activities into the work of nongovernmental and other civil society organizations. Implementation manual.

Planning

1) Global Plan to End TB.2015. Stop TB Partnership
2) Implementing the end TB strategy: the essentials. WHO. 2015
3) Toolkit to Develop National Strategic Plan for TB Control
4) WHO People-centered framework for tuberculosis program planning and prioritization - User guide (2019)

Annex 2 : Summary of WHO TB standards and Benchmarks from the Epi-reviews 2013, 2018 & 2022

Standard		2013	2018	2022
Data quality	B 1.1: case definitions are consistent with WHO guidelines	Met	Met	Met
	B 1.2: the TB surveillance system captures a minimum set of variables for all reported TB cases	Met	Met	Met
	B 1.3: all scheduled periodic data submissions are received and processed at the national level	Met	Met	Met
	B 1.4: data in quarterly reports are accurate, complete and internally consistent	Partially Met	Met	NA
	B 1.5: data in national database are accurate, complete, internally consistent, and free of duplicates (*electronic case-based or patient-based systems only*)	NA	NA	Met
	B 1.6: TB surveillance data are externally consistent	Met	Met	Met
	B 1.7: TB surveillance data are internally consistent	Partially Met	Met	Met
System coverage	B 1.8: All diagnosed cases of TB are reported	Partially Met	Partially Met	Partially Met
	B 1.9: Population has good access to health care	Partially Met	Partially Met	Partially Met

Vital registration	B 1.10: Vital registration system has high national coverage and quality	Not Met	Not Met	Partially Met
Special sub populations	B 2.1: surveillance data provide a direct measure of drug resistant TB in new cases	Met	Met	Met
	B 2.2: surveillance data provide a direct measure of the prevalence of HIV infection in TB cases	Met	Met	Met
	B 2.3: surveillance data for children reported with TB are reliable and accurate, and all diagnosed childhood TB cases are reported	Not Met	Not Met	Partially Met
Part 3	B3.1 Reporting of TB treatment outcomes are accurate, complete and consistent	NA	NA	Partially Met
Part 4	B4.1 Data for Programme Management of TB Preventive Therapy (PMTPT) are accurate, complete and consistent	NA	NA	Partially Met