REPUBLIC OF RWANDA

MINISTRY OF HEALTH

Tuberculosis National Strategic Plan

(TB NSP)

July 2013- June 2018

RWANDA BIOMEDICAL CENTER

A Healthy People. A Wealthy Nation

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

Kigali, August 2014

Table of Contents

ABBREVIATIONS

ACSM	Advocacy, communication and social mobilization
ART	Antiretroviral therapy
CPT	Co-trimoxazole preventive therapy
DRS	Drug resistance survey
DST	Drug susceptibility testing
EQA	External quality assurance
GF	Global Fund against TB, AIDS-HIV and malaria (GFTAM)
HIV	Human immunodeficiency virus
HR	Human resources
HRD	Human resource development
IPT	Isoniazid preventive therapy
KAP	Key Affected Population
MDG	Millennium Development Goal
MDR-TB	Multidrug-resistant tuberculosis
MOH	Ministry of Health
NAP	National AIDS Programme
NGO	Non-governmental organization
PATLAB	Pacific TB Laboratory network
PLWH	People living with HIV
RHMIS	Rwanda Health information system.
R&R	Recording and reporting
TB	Tuberculosis
TB NSP	Tuberculosis National Strategic Plan
UNAIDS	Joint United Nations Programme on HIV/AIDS
WHO	World Health Organization
Xpert MTB/RIF	Rapid TB and MDR-TB diagnostic test based on nucleic acid amplification test

Executive Summary

The 2013-2018 TB National Strategic Plan (NSP) is a key instrument to guide TB control work in Rwanda in accordance with the most recent World Health Organization (WHO) international guidance. Rwanda is on track to reach the Millennium Development Goals target, i.e., that TB incidence should be falling by 2015; the Stop TB Partnership target of halving the 1990 mortality and prevalence rate by 2015; and the Stop TB Partnership Global Plan targets on improving treatment success to at least 90%, by 2015. It will likely not reach the Stop TB Partnership Global Plan target on case detection to at least 70%. According to WHO estimates, between 1990 and 2012, incidence and TB mortality rate fell by 70% and 73% respectively. Decreasing TB incidence and case notification rates are in favor of decreased TB transmission in Rwanda.
Over the past decade, Rwanda has demonstrated excellent treatment outcomes in sputum smear positive patients, almost reaching the Global Plan targets of 90% (88.3% in 2011 cohort). The percentage of patients dying from TB was often above 5% which may be due to late diagnosis.

Although TB control in Rwanda has made substantial progress over the last decade, there are still significant gaps to be addressed by proper strategic orientations, while maintaining interventions which have proven success.

It is clear that a significant number of prevalent TB cases are not diagnosed with the current TB screening (mainly cough of ≥2 weeks) and diagnosis (mainly Ziehl-Neelsen microscopy) strategy which is linked to insufficient capacity for early diagnosis and insufficient active TB case-finding among high risk groups (HRG) and key affected populations. While those approaches will continue to be applied for TB detection in the general population, new and more sensitive screening (cough of any duration and digital chest X-ray) and diagnosis (LED microscopy and Xpert) approaches will be expanded, with improved sample transportation system and focusing on defined TB disease risky group in priority.
The above new TB screening and diagnosis strategies are expected to allow an early TB diagnosis that will lead to an early TB treatment initiation and, finally to a reduced TB death rate, especially among forms of TB other than new SS+, where an elevated deaths rate is consistently reported. Continous availability of quality TB drugs at all levels of the health system, sustained involvement of motivated community health workers (CHWs) to bring early TB care close to affected people and other preventive measures (such as early ART initiation among PLHIV and HIV+ TB patients) are also expected to play a great role.

The last TB drug resistance survey was conducted in 2004-2005, followed by initiation of a successful MDR-TB management program. To know the current MDR-TB epidemiology, we will conduct the second drug resistance survey. In addition, to improve MDR-TB patients' treatment quality, a 9 months and less toxic treatment regimen will replace the lengthy and toxic 20-24 months regimen currently used.

For the matter of improving quality of TB data and patients management, an electronic TB surveillance system with individual data (electronic TB register) will be introduced and integrated with the R-HMIS, to replace the current paper-based TB surveillance system. Routine TB services and data quality auditing will continue to be strengthened through an integrated approach with other programs.

For TB prevention, our orientations are on expanding TB infection prevention and control measures in all types of health facilities and revising our education strategy to focus on key affected population, in addition to general population.

The estimated total budget for the 5 years plan is 69.3 million US$ and will help the TB control program in Rwanda to achieve its stated 2018 goals, namely 23% reduction of TB incidence rate from 86.0/100,000 to 67.0/100,000 population and 37% reduction of TB mortality rate from 10.0/100,000 to 6.3/100,000 population.

I. Introduction

The July 2013-June 2018 Tuberculosis (TB) National Strategic Plan (TB NSP) in Rwanda is a key instrument to guide, support and harmonize TB control work in accordance with the most recent WHO international guidance. It provides the vision and orientation to further develop national operational plans at the country level. The new strategy also has been informed by the latest information on health systems development, the on-going work at global level on the post MDGs TB strategy and recent innovations on rapid diagnosis and web based information systems.

The July 2013-June 2018 TB NSP is essentially the continuation of the previous one that ended in June 2013 (Stop Tuberculosis Strategic Plan 2009-2013). We have kept the same overarching vision on TB elimination, modifying the objectives framework and targets in line with the post-2015 Global strategy currently under discussion and progress achieved in the TB response during the last four years. The prevalence survey conducted in Rwanda in 2012 led to better TB estimates on prevalence, incidence and mortality with reduced confidence intervals. It showed lower prevalence than previously estimated which recall us for oriented strategy towards active-case finding among key population while maintaining passive detection among the general population with participation of the CHW. Awaiting publication of revised WHO estimated incidence, prevalence and mortality taking into consideration the prevalence survey results, the targets of this plan are based on current estimates published in the WHO 2013 Global report. Current estimates are expected to be close to the coming WHO revised estimates. This document gives a general vision of where Rwanda is now in terms of TB control, where we want to arrive by the end of this five year period and how we plan to get there. The chapter on situation analysis is providing us with the main elements of where we are, the policy environment, guiding principles and result framework give us indications of where we want to go, and the remainder of the document describes how we plan to get there (detailed intervention, M&E plan and costing and prioritization).

This strategy has been developed with active participation of all the main TB stakeholders (including civil society, national and international partners, and the Government of Rwanda) through a series of workshops and consultative meetings. The strategy has been developed under the lead of the TB & ORD Division, to respond to alignment with key national and international health strategies, guidelines and program evaluation recommendations.

The main strategic changes of the new strategic plan compared to the last one are a stronger focus on diagnosis and treatment for key affected populations, innovative diagnosis tools and diagnosis algorithm for TB, preventive TB control measures and the adjustment of costing estimates to the projected decrease in external funding, with prioritization on the most cost-effective interventions.

II. Current situation and response to the TB epidemic in Rwanda

II.1. Health sector context and 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 km^2 and is divided in five provinces which are divided in districts. Rwanda has 30 districts which are divided into 416 sectors, which are further divided into 2,148 cells then into 14,837 villages (Umudugudu).

A national census, conducted in August 2012 estimated the Rwanda population at 10,515,973 inhabitants[1], giving a population density of 416 inhabitants per km² and a population growth rate of 2.6% per year, compared to the 2002 census. The majority, 85% of the population lives in rural areas; 51.8% are women[2] and 48.2% are less than 15 years of age. The poverty rate has declined from 77.8% in 1994 to 44.9% in 2010-2011 fiscal year (FY)[3]. In 2011, the Gross domestic product per head was 595$, compared to 333$ in 2006[2].

II.1.2. Health policy environment

The larger vision for the Government of Rwanda (GoR) is to guarantee the well-being of the entire population by increasing production while decreasing poverty in the context of good governance. In this context, the mission of the health sector is to guarantee and improve the health status of the Rwandan population through the provision of good quality services in terms of prevention, rehabilitation and curative medicine in an efficient health system.

II.1.2.1. The Millenium development goals and TB

The GoR has committed itself to achieving the Millennium Development Goals (MDGs) by 2015. Five MDGs contain targets related to health [Eradicate extreme poverty and hunger (malnutrition), Reduce child mortality, Improve maternal health, Combat AIDS, malaria, TB and other diseases, Ensure environmental sustainability (safe water)]. The specific target on TB (Target 6C) stipulate to have halted by 2015 and begun to reverse the incidence of malaria and other major diseases including TB.

II.1.2.2. The post-15 global TB strategy

In May 2014 the World Health Assembly adopted the new post-15 global TB strategy and targets for tuberculosis prevention, care and control after 2015. Its bold vision is a world without tuberculosis, and its targets aim at ending the global tuberculosis epidemic by 2035 through a reduction in tuberculosis deaths by 95%, and in tuberculosis incidence by 90% (or less than 10 tuberculosis cases per 100 000 population), and elimination of associated catastrophic costs for tuberculosis-affected households.

II.1.2.3. The Africa Health Strategy 2007-2015

In April 2007 the African Union Conference of Ministers of Health adopted the Africa Health Strategy. It provides a strategic direction to Africa's efforts by creating better health for all and an overarching framework to enable coherence within and between countries, civil society and the international community. The strategy emphasizes the need to strengthen health systems, in order to reach the poor with services and contribute to equity. It also encourages Sector-wide approaches to guarantee alignment of donor funding with national plans.

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[1] *2012 Population and Housing Census,* **Population size, structure and distribution**, Novembe*r 2012*. 2012, National Institute of Statistics of Rwanda: Kigali-Rwanda.

[2] *2012 Population and Housing Census, Population size, structure and distribution, November 2012. 2012, National Institute of Statistics of Rwanda: Kigali-Rwanda.*

[3] *Rwanda Statistical Year Book, 2012 Edition, N.I.o.S.o. Rwanda, Editor. 2012, National Institute of Statistics of Rwanda: Kigali-Rwanda.*

II.1.2.4. The Rwanda 2020 Vision

Developed in 2000, the Rwanda Vision 2020 sets out the long term vision for the country in terms of goals and objectives 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 its aid dependency. It expects to reach these goals by means of 7 strategies/pillars, to be attained by decreasing population growth, increasing education and improving the health of people.

The GoR considers good health for its population a valuable asset in itself, contributing to greater general welfare, as well as a means to reduce poverty and increase economic productivity through a healthy workforce. Inversely, illness is related to poverty: illness and injuries can result in high health care costs, which can steep families in poverty. Also, poverty can prevent people from seeking necessary health care. Good health care services, provision of clean drinking water and good hygiene, effective waste disposal and sanitation systems are all important measures to attain health. Vision 2020 also pursues gender equity to be integrated into all development policies and strategies. The document serves as the basis for the national and sector plans for the medium term.

II.1.2.5. The Health Sector Strategic Plan III July 2012 – June 2018

The five overall priorities of HSSP III are[4]: achieve MDGs : 1 (nutrition), 4 (child), 5 (MCH) and 6 (Disease control) by 2015; Improve accessibility to health services (financial, geographical, community health); Improve quality of health provision (QA, training, medical equipment, supervision); Reinforce institutional strengthening (especially towards district health services); And Improve quantity and quality of Human Resources for Health (planning, quality, management). This HSSP III encourages also introduction of new laboratory technique and electronic health systems, including for TB. Identified main challenges that could impede the HSSP III are[5]: Still limited technical performance of the staff in health centers and district hospitals; less than 100% coverage of the health infrastructure; old equipment in the hospitals and HCs; limited maintenance facilities; challenge to sustain (external) funding; Implement the decentralization process, strengthen district planning, budgeting and reporting by DHU / DH[6].

II.1.2.6. The Extended (Interim) National Tuberculosis Control Strategic Plan July 2013 - June 2016

The interim TB NSP was a comprehensive plan designed to take over the previous 2009-2013 TB NSP. Its period of implementation was July 2013 to June 2016. However, to align with the national health sector strategic plan (HSSP III), we had to develop a full 5 years TB NSP plan, aimed at starting in July 2013 to end by June 2018, as per the HSSP III. The 2013-2016 and the 2013-2018 are not overlapping. In fact for the 1st three years (July 2013-June 2016) of the 2013-2018 TB NSP, activities are same as those planned in the interim TB NSP. Similarly, as activities are not duplicating, required funds are not duplicating.

Regarding difference in strategic orientations between the two plans, the interim NSP was more focused on pursuing the 2009-2013 activities (TB in general population), with slight introduction of more sensitive screening and diagnostic strategies in limited high risk groups. In this 2013-2018, while maintaining TB control activities in general population, new and more sensitive screening and diagnostic strategies are planned to be extended in a wide range of the population. In addition, extending targeted high risk groups and maintaining the level of involvement of community health workers will ensure equity in TB control activities.

II.2. TB epidemiological data in Rwanda

Estimated TB incidence rates in Rwanda are lower than the Global and AFRO Regional average, but remains high (86 incident TB cases -new and relapse- per 100,000 habitants in Rwanda in 2012 vs.

[4] Rwanda Health System Strategic Plan III.
[5] Rwanda Health System Strategic Plan III.
[6] Rwanda Health System Strategic Plan III.

122 and 255 respectively at global and AFRO Region level). The trend for TB notification rates per 100,000 population is decreasing since 2006 for all TB forms, as result of implementation of key TB control interventions like improved TB treatment success rate potentially limiting transmissions, community DOT and TB/HIV integration, etc. However, the notification rates remain lower than the incidence rates, probably due some TB cases undetected by current available strategies.

Figure 1 : Trends of TB incidence and notification rates per 100,000 population, 1990 to 2012 in Rwanda, AFRO Region and Globally

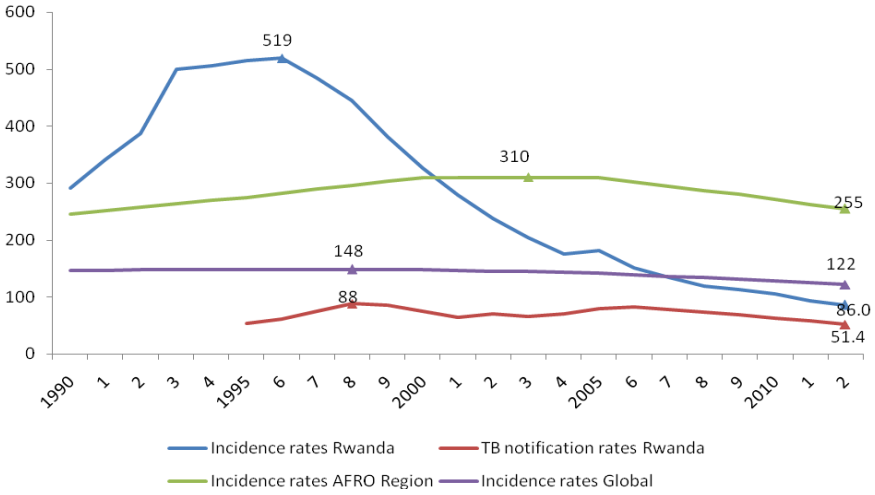
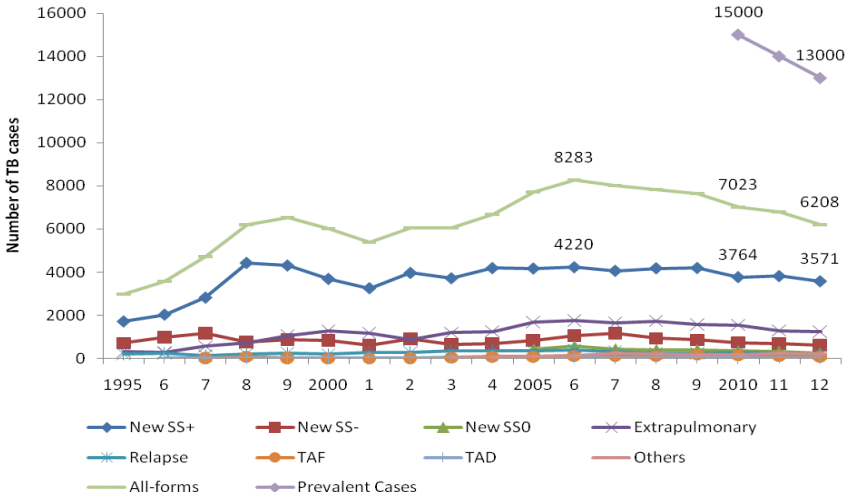


Figure 2 : Trends of numbers of TB cases notified in Rwanda TB surveillance system, 1995-2012, by case category, and comparison with WHO prevalence estimates



New SS+: new sputum smear positive. New SS-: new sputum smear negative. New SS0: new sputum smear not done. TAF: treatment after failure. TAD: treatment after default. Prevalent Cases: are WHO estimates.

Among the 22 high TB burden countries, 4 are situated in the east African region, with 3 directly neighboring Rwanda.

Table 1 : TB burden in countries neighbouring Rwanda, WHO data 2012[7].

	DRC	Uganda	Tanzania	Burundi	Kenya	Rwanda
Prevalence per 100,000	576	175	176	199	299	114
Incidence rate per 100,000	327	179	165	130	272	86
Notification All-forms Numbers	112,499	47,211	62178	7,016	99,149	6,208

[7] 2013 WHO TB Report

TB Mortality rate (HIV- TB cases) per 100,000	54	13	13	18	22	10
TB Mortality rate (HIV+ TB cases) per 100,000	9.7	25	15	8.6	18	6.5
Is the country among the 22 high burden countries?	Yes	Yes	Yes	No	Yes	No

Among the key groups for TB disease, people newly HIV diagnosed, and household TB contacts have 41 and 16 times higher risk of TB than in the general population respectively (table 2).

Table 2 : TB risk among some key affected populations compared to general population, 2012, Rwanda

Group	Population in 2012	#TB cases in 2012	TB notif rate per 100,000 inhabitants	Risk compared to general population*	Number needed to find 1 TB case¶
General Population	10,515,973	New & relap 6091	58	1	1,726
	10,515,973	SS+ 3811	36	0,6	2,759
PLWH newly diagnosed	13,369	314	2349	41	43
All PLWH	104,496	1,018	974	17	103
TB household contacts	21,858	202	924	16	108
PLWH enrolled > 6 months	91,127	704	773	13	129
Prisoners	60,000	All TB 177	295	5	339
	60,000	SS+ 106	177	5	566
High TB prevalence districts (Kigali City)	1,132,686	All TB 1,850	163	2,8	612
		SS+ 1,009	89	2,5	1,123
Prisoners upon entry	16,001	6	37	0,6	2,667
Children 0-14	4,311,549	394	9	0,2	10,943
People > 55 years	757,150	SS+ 462	61	1,1	1,639
Diabetics, health workers, refugees, in-patients, malnourished children	NA	NA	NA	NA	NA

* Ratio of TB notification rate in each risk group over the TB notification rate in general population
¶: Number TB cases over Population

II.3. TB impact and millennium development goals

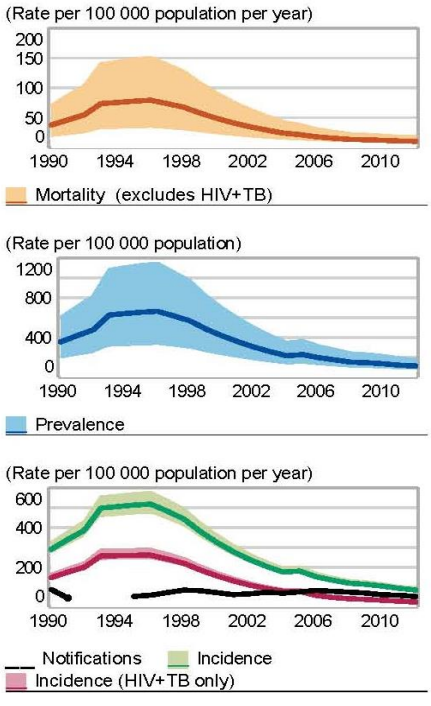


Figure 3 : Trends of WHO estimates of mortality, prevalence and incidence rates, 1990 to 2012 in Rwanda*

The impact of TB control interventions is measured by the trend and level in TB incidence, prevalence and mortality and through achievement of MDG and Stop TB Partnership goal and targets. According to WHO estimates, between 1990 and 2012, Rwanda reached in 1997 the Millennium Development Goal target that TB incidence should be falling by 2015 (86 TB new and relapse TB per 100,000 habitants in 2012 from 291 in 1990 with a pic at 519 in 1996). It reached in 2007 the Stop TB Partnership targets of halving 1990 mortality and prevalence rates by 2015 (114 TB new and relapse prevalence rate i2012 beyond the 2015 target of 168.5; 10 TB new and relapse mortality rate in 2012 beyond the 2015 target of 18.5). It will likely reach the Stop TB Partnership Global Plan targets on improving the treatment success to at least 90% by 2015 (89% in 2011 cohort).It will likely not reach the Stop TB Partnership Global Plan targets on improving case detection to at least 70%. *: Source=WHO Global Report 2013

II.4. Multi drug resistant Tuberculosis in Rwanda

Table 3 : MDR-TB WHO estimate and Rwanda notification 2005- 2012

MDR-TB estimates by WHO	New cases	Previously treated cases
Estimated number of MDR-TB cases among notified pulmonary TB cases in 2012	180 (120-270)	63 (51-76)

*Rwanda Country profile 2012. WHO.

MDR-TB notification	2005	2006	2007	2008	2009	2010	2011	2012
Notified TB	7,680	8283	8014	7841	7644	7065	6784	6208
Notified MDR-TB (numb)	35		102	79	78	90	76	57

557 MDR cases were diagnosed and started on 20 or 24 month TB second line drugs (SLD) treatment between 2005 and 2012 including 94% bacteriologically confirmed cases and 6% MDR-TB empiric treatment only.

II.5. National response: effectiveness

II.5.1. TB case finding

The National TB program (NTP) has invested a lot of interventions geared towards increasing TB case finding where TB suspects increased from 28,637 in 2005 to 165,864 in 2012, and community health workers (CHWs) have contributed for a third of TB smear positive cases.

394 pediatric TB cases (0-14 years old) were notified in 2012 representing 7% of the adult TB new cases (smear positive, smear negative/unknown, extra-pulmonary and relapse). The proportion of 0-4 years old pediatric TB out of pediatric TB was 42%. Both proportions are below the expected norms of 10% of total TB and 2/3 of pediatric case below 5 years in favor of low case finding among young children.

II.5.2. TB treatment outcome

Over the past 17 years, the NTP has demonstrated increasing success on treatment outcomes for smear positive, extra-pulmonary and retreatment reaching respectively 89%, 77% and 76% for the 2011 cohort. Excellent treatment outcomes have been noted especially for TB managed by CHWs reaching 94% smear positive TB success rate in 2011. Fatality proportion remains high at 10% for all-forms TB and may be due to late case finding and high HIV infection rate.

II.5.3. TB/HIV collaborative activities

Rwanda was one of the first African country implementing TB/HIV activities. The country rapidly reached impressive results on HIV testing among TB cases (99% in 2012), on CPT and ART among TB/HIV+ cases (respectively 99% and 81% in 2012).Rwanda started HIV testing among presumptive TB cases patients in 2009, counseling and testing 98% of TB suspects for HIV in 2012 with 4% of TB suspects HIV positive. Rwanda is far advanced on establishment of “one stop TB and ART services” now available in 93% of the CDT. TB screening among PLWH reached 98% in 2012 (121810 PLWH screened for TB in 2012)[8]

II.5.4. MDR-TB management

Rwanda is implementing the programmatic management of drug resistant TB using 20 month treatment regimen since July 2005. Patients are provided with psychological, nutritional and transportation supports during the treatment and weaning nutrition support after completion of the treatment to enhance the treatment adherence. Rwanda is also a WHO center of excellence for MDR TB training in Africa. Reliable MDR-TB diagnosis capacity is available in 3 reference laboratories in

[8]WHO Global TB report, http://www.who.int/tb/country/data/download/en/index.html

Rwanda (National Reference Laboratory, Kigali and Butare University Teaching Hospitals) which are providing Xpert, LPAs, culture (on solid and liquid media) and DST for all eligible patients. Effective and trained staff, proper equipment and facility, supra national laboratory control, external technical assistance and good sputum transport system across the country are available in Rwanda. Number of eligible groups for drug resistance test increased with inception of Xpert and includes all retreatment cases (failures, relapses, after interruption), contacts of MDR-TB, smear positive at month 2, HIV+ TB cases, smear positive TB among health staff, smear-positive TB in Kigali. At the end of the first quarter 2012, proportions of patients having a drug susceptibility test were 100% for late converters and respectively, 83%, 97% and 89% for retreated after failure, after default and for relapses. Treatment outcome are very high reaching 89% in 2010 cohort with low death rate due to early diagnosis.

II.5.5. TB monitoring and evaluation

During the past years, the following main activities have been implemented in the area of TB monitoring and evaluation, to ensure quality of TB surveillance data. Those are: development and update of TB M&E policies/guidelines/tools and SOPs (using standardized reporting tools and WHO definitions), related capacity building of concerned staff involved in TB data management at all levels of the health system, quarterly or biannual DQA and RSQA visits to intermediate and peripheral levels and regular evaluation meetings (quarterly and annual) with HFs and Districts to discuss TB program performance and TB program periodic reviews, and annual external evaluation (OSDV). In 2013, the WHO mandated a consultant to evaluate the TB surveillance system in Rwanda. The conclusion of that external evaluation was that "in general the TB surveillance system in Rwanda seems to accurately capture TB cases detected and TB control program efforts"[9].

II.5.5. Community management of TB

Community DOTS was initiated in 2005 and reached national coverage in 2010. The roles of CHWs are: a) sensitization of their communities on tuberculosis; b) identification and early orientation of people with cough to the HC; c) administration of DOT to patients; d) orientation of household contacts with cough to the HC; e) home visit and recuperation of TB patients who do not show for treatment. Currently, CHWs play a crucial role in TB programs where 45% of all presumptive TB cases are referred by CHWs to the Health Center. They contribute for 30% of all SS+ at national level, whereas 53% all TB patients are followed up (given TB drugs) in community by the CHWs. Respective achievements in 2010 were 10%, 20% and 34%.

II.5.6 TB prevention and infection control

Strong emphasis was put on TB infection control within the last NSP, the focus being on administrative, environmental and personnel protection measures. By end of June 2013, 91% of CDT were applying the minimum basic package of infection control measures. 40 laboratories and 28 TB wards were renovated to improve infrastructure for environmental and administrative measures in health facilities. The KAP study conducted in 2012 showed that comprehensive knowledge of TB improved from 40% in 2009 to 56% by end 2012. The Isoniazid preventive therapy for children under 5 years with contact of bacteriologically confirmed pulmonary TB was provided after excluding active TB.

II.5.7. TB control program coordination/management and financing in Rwanda

There is a longstanding history of partnership and support available to the TB Programme from international and national nongovernment organizations (INGOs and NGOs), bilateral and multilateral agencies, research institutes and universities for TB control 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

[9] 2013 Evaluation of the Rwanda TB surveillance system using the WHO Checklist for standards and benchmarks for tuberculosis surveillance and vital registration systems

priorities outlined in the National Strategic Plan. Indeed, activities of donors have since the initiation of the program been guided by the National Strategy, and the vast majority of aid for tuberculosis is channeled through the government account. In order to increase ownership over programs, Rwanda is using the performance based financing (PBF) mechanism aiming to improve the involvement of the health providers in implementation of the TB program at all levels of the health system. The past strategic plan was funded at a level of around 17.9 million annually. However, as it would be discussed later, the funding of the TB interventions is declining, which drive a very effective prioritization process of the interventions we have planned to carry in the new NSP to meet the resources that have projected to be available.

In line with MOH policy, the performance based financing scheme (PBF) for TB control activities was introduced in 2010. The system includes more than 20 TB-related indicators and it led to substantial improvements such as wide awareness on TB in community, increase easy access to TB services by involvement of CHWs (about a half of presumptive TB cases are brought by CHWs and half of TB cases managed through community DOT), better TB treatment success rate (especially for patients managed by CHWs). The TB suspicion, success rate and quality of services improved as a result of PBF towards 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 set in contract between the two parts.

Even if Rwanda has achieved goals towards MDGs, it is directly neighboring with 3 of the 22 high TB burden countries. If no initiatives are taken towards TB control at the regional level, country progresses may be impeded.

Capacity building by on the job trainings (refresher) for personnel involved in TB control activities has been one of the key interventions in the past NSP, in the context of changes in different policies and guidelines, as well as for the new enrolled staff (introductory TB course). Examples of training provided include TB and TB/HIV, MDR-TB, TB infection control, TB laboratory, TB data management, etc.

PAL was introduced during NSP 2009-2012 with the objective to increase TB detection and improve the quality of TB suspicion and diagnosis investigation by the 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, spirometers for all District hospitals, Oxygen concentrators for CDT) and products (Salbutamol and beclomethazone for all HF) have been procured and distributed. This approach is being implemented in some health facilities (59 health facilities and 37 district hospitals). The need is to ensure scale up of this strategy and track its outcome.

II.6. Current gaps in TB control activities in Rwanda

In this section, we will describe gaps and other programs bottlenecks as these were highlighted in different evaluations and program assessments, both internal and external, namely 2009-2013 TB NSP mid-term review, 2012 TB prevalence survey, 2013 Evaluation of TB surveillance system using Standard and Benchmark Checklist, 2012 TB KAP survey, 2012 and 2013 GLC Evaluations, Annual GLI evaluation of the laboratory network.

Although TB control in Rwanda has made substantial progress over the last decade, there are still gaps and significant challenges. There are also new opportunities to improve control. The main gaps are described in the following section.

II.7.1. Significant number of undiagnosed cases, linked to insufficient capacity for early diagnosis and to insufficient active TB case-finding among high risk groups

The performance of the current diagnosis approach is low according to WHO estimates and preliminary results of the 2012 TB prevalence survey in Rwanda. A significant proportion of cases is

not detected by using the screening strategy of a cough of at least two weeks duration and microscopy sputum examination. This approach would have detected only 41% of the bacteriologically confirmed cases of the prevalent cases. The missing TB cases may be detected using cough of any duration and chest X-ray as screening strategy, and sputum culture for all presumptive TB cases. LED microscopy is implemented in only 25% of CDTs. On the other hand its use may have been limited by frequent turnover of laboratory staff. Xpert machines have been introduced in 16 sites by the end of 2013, covering about 30% of district hospitals. Sample transportation from health facilities to XPert sites is still an area of improvement. The quality assurance system in place for microscopy shows some errors. Diagnosis capacity is weak for extrapulmonary TB (EPTB), smear negative TB and childhood TB. Complementary investigations like fine needle aspiration-FNA, gastric aspirate, sputum induction, etc, are not sufficient and/or not used at their optimum. Capacity for chest X ray is facing challenges such as frequent breakdowns, insufficient maintenance of equipment, low capacity of clinicians for chest X-ray reading, and a very reduced number of radiologists in the country.

Up to now, high-risk groups (HRG) are not sufficiently targeted with systematic and regular screening case-finding in prisons is limited to routine screening upon entry and periodic sensitization of staff and inmates, but there is no active case-finding campaigns. Until recently the TB screening questionnaire used for PLHIV had low sensitivity. TB screening strategy among TB contacts is not used at its optimum, to cover the whole incubation period. There are no specific surveillance system for TB burden among other HRG such as refugees in camps, diabetics, military, health workers, elderly people, hospitalized patients and undernourished patients allowing to define priorities and the diagnosis approach per risk group.

II.7.2. Insufficient TB treatment success rate for all forms of TB and high overall fatality rate.

Although there is a very good treatment success rate for smear-positive TB patients, this indicator is not yet reaching targets for all forms of TB. This is due to the high fatality rate among extrapulmonary (EP), smear negative (SS-) and HIV+ TB cases (17%).

These deaths may be a result of true TB disease, linked to late diagnosis (due to use of less sensitive screening and diagnosis strategies) and leading to late treatment initiation. Late diagnosis is associated to the low awareness on TB and HIV, low health, limited access to radiography, insufficient human resources' capacity for chest X-ray interpretation and limited access to XPert test. On the other hand, some of those deaths may be due to other comorbidities, malnutrition, and factors not linked with TB disease, as there is no vital registration or TB deaths audit system to inform the TB program on such factors.

II.7.3. Gaps related to the management of drug resistant TB

The first gap is the lack of updated data on the prevalence of drug resistant TB. The last TB drug resistance survey (DRS) was conducted in 2004-2005. Systematic routine DST was implemented among TB patients at higher risk for MDR-TB, starting with retreatment cases and MDR-TB contacts; and progressively including more categories of patients such as late converters (smear positive at 2 or 3 months), TB patients in prisons and in 2011, all new SS+ detected in Kigali. However the number of MDR-TB confirmed cases is continuously declining since 2011, which may be associated to excellent treatment success rate and suggests that the prevalence of MDR-TB is decreasing. A second DRS is necessary to assess to which level the prevalence has been reduced.

The second gap is the length and toxicity of the current MDR-TB treatment. Despite of the excellent results outcomes achieved, a less toxic and shorter treatment would be highly beneficial for the patients, for the TB program (less cost) and for the services (less workload).

II.7.4. Monitoring and Evaluation (M&E) system and operational research not yet meeting all program information needs

Monitoring and evaluation is a strong component of the TB program. However there are still gaps in this areas, in particular the lack of an electronic TB register to improve the quality of TB data and use for case management. There is need to continuously improve integration of TB data in the HMIS (Health Management Information System), the need to better understand causes of deaths, and need to monitor and evaluate the implementation of new interventions.

II.7.5. Challenges related to prevention and infection

Despite the good evolution of comprehensive knowledge on TB, the health seeking behavior (HSB) may follow a different pattern. Indeed, the 2012 TB prevalence survey, revealed a poor HSB among community with ¾ of participants not sought care when experiencing symptoms suggestive of TB, the reason being that they not consider those symptoms as important. The gap to be addressed for infection control is to improve visibility of IC measures and also monitoring of TB notification among healthcare providers in HF. Some health infrastructure need to be renovated to meet IC standards The risk assessment study for TB infection conducted in 2010 showed that health care workers are 2.7 times at risk for TB infection compared to control group and non-differences were noted by department and occupancy within a facility. This calls for the extended IC measures in all health facilities departments.

II.7.6. Gaps related to TB Program coordination and financial capacity

The financial support for the TB program in Rwanda is declining whereas the achievements in TB control need to be maintained and even scaled up with innovative interventions.

As Rwanda is directly neighboring with 3 of the 22 high TB burden countries, we will participate in regional initiatives aimed at improving/harmonizing regional TB control and to ensure sustainability of country achievements.

While capacity building for personnel involved in TB control activities has been strengthened, we still face two main challenges in this area. Those are the turnover of trained personnel (calling for repetitive refresher) and the need for integrated training (for cost-effectiveness).

Rwanda will face the challenge of maintaining a complex strategy at lower cost with sufficient skilled human resources. Although the new technology such as Xpert and digital Xray has proven to be cost effective, it often increase the unit cost of TB case, calling for better synergies between programmes and with the Health system.

Current challenges in implementation of the performance based financing scheme (PBF) for TB control activities are:

- To ensure PBF sustainability
- To create mechanisms to prevent potential adverse effects linked to PBF such potential false presumptive TB patients. This will be addressed by revising PBF indicators and linking quality aspects to quantity aspects.
- To redefine PBF indicators considering achieved targets and indicators in need of being improved.

The PAL strategy introduced during the past NSP will need to be scaled up in remaining health facilities, and track of its outcome improved.

III. The July 2013 to June-2018 Tuberculosis National Strategic Plan in Rwanda

III.1. VISION

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

III.2. MISSION

- To reduce the global TB epidemic, by promoting universal and equitable access to quality diagnosis and appropriate treatment of TB, MDR-TB, and TB/HIV patients and by enhancing prevention of the disease.

III.3. GOALS FOR 2018

In line with the post-15 global TB strategy, this NSP aims to achieve:

- 23% reduction of TB incidence rate from 86.0/100,000 to 67.0/100,000 population
- 37% reduction of TB mortality rate from 10.0/100,000 to 6.3/100,000 population

III.4. GUIDING PRINCIPLES

- Governance stewardship and accountability with adequate resources use.
- Community and civil society strong involvement
- Health system strengthening
- Promotion of human rights, ethics, gender equality, equity and social protection among high-risk groups such as prisoners, refugees, household contacts of TB cases, PLHIV, and people in congregate settings.

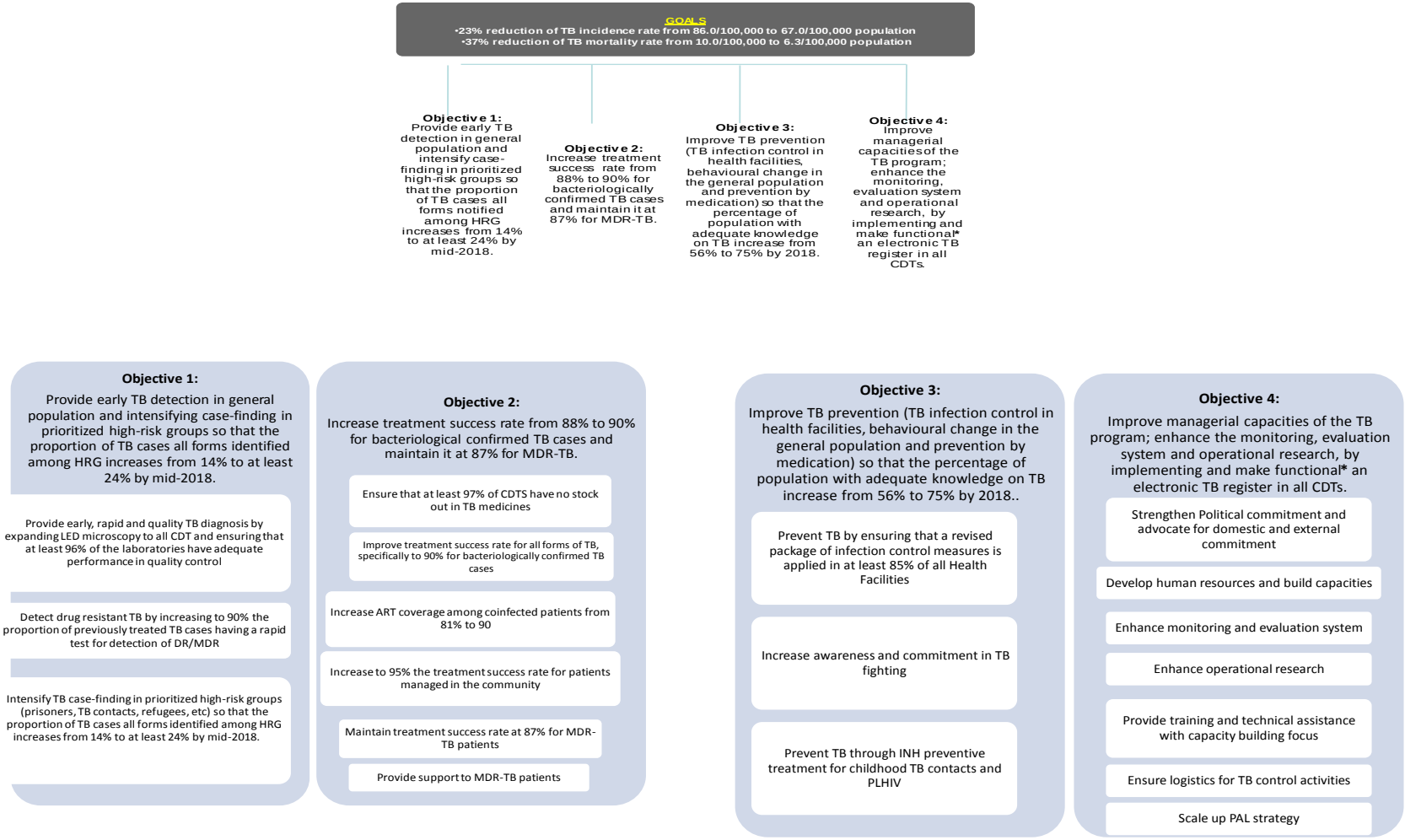
III.5. OBJECTIVES AND TARGETS FOR 2018

- **Objective 1:** Provide early TB detection in general population and intensify case-finding in prioritized high-risk groups so that the proportion of TB cases all forms identified among HRG increases from 14% to at least 24% by mid-2018.
- **Objective 2:** Increase treatment success rate from 88% to 90% for bacteriologically confirmed TB cases and maintain it at 87% for MDR-TB.
- **Objective 3:** Improve TB prevention (TB infection control in health facilities, behavioral change in the general population and prevention by medication) so that the percentage of population with adequate knowledge on TB increase from 56% to 75% by 2018.
- **Objective 4:** Improve managerial capacities of the TB program; enhance the monitoring, evaluation system and operational research, by implementing and make functional***** an electronic TB register in all CDTs.

*****functional=regular on, with proof of its use (data analysis reports and decisions making)

III.6. THE 2013-2018 TB CONTROL STRATEGY IN RWANDA

Figure 4 : The 2013-2018 TB NSP in a logical framework: targets, objectives and strategic interventions



III.6.1. Objective 1. Provide early TB detection in general population and intensify case-finding in prioritized high-risk groups so that the proportion of TB cases all forms identified among HRG increases from 14% to at least 24% by mid-2018.

The first objective focuses on intensifying and improving early case finding to detect as many cases of TB as possible, as early as possible. This will require a comprehensive set of activities that begin with improving the quality of screening at peripheral level, ensuring the availability of basic quality TB diagnosis services, expanding access to rapid tests and intensify case finding in high risk groups and key affected populations.

III.6.1.1. Provide early rapid and quality diagnosis for TB, MDR-TB, and TB/HIV

TB screening in the general population will continue to use a symptom screening approach, based on cough of ≥ 2weeks, fever, night sweats and weight loss. However, in order to bring early screening close to community, CHWs will continue to play the role in identification and referring potential presumptive TB cases to health centers. This activity will continue to be remunerated through the PBF scheme.

Sputum smear microscopy will remain the main method to identify bacteriology confirmed TB cases.

Direct fluorescent microscopy using light-emitted diodes (LED) has been proven to more sensitive to direct light microscopy because it is simple, inexpensive, and faster and it has higher sensitivity. Therefore this technique is currently available in 50 CDT. In this plan, fluorescence technique will be extended to all CDTs. Spare parts and quality auramine stain will be provided and sufficient training will be ensured for the laboratory technicians.

Access to Xpert, culture and DST: Rwanda is implementing Xpert technique since 2012. Currently 16 Xpert machines are installed in 13 districts. In order to increase the coverage and accessibility of Xpert technique, in the upcoming 5 years, the TB & ORD Division will expand the Xpert technique in to all district hospitals. T**ransportation** will be strengthened to facilitate samples transportation from Health Facilities to Xpert sites. The NRL will be provided with sequencing machine which will help in genotyping of Mycobacteria strains, and Mycobacteria other than tuberculosis (MOTT) and resolving discrepancies arising from Hain test and conventional DST. Surveillance of resistance will be enhanced among previously treated cases but also among new cases.

Ensuring the quality of technical services at all levels of the TB laboratory network is challenging for NRL and requires continuous monitoring of the different laboratory activities and an adequate quality assurance system. Considering the increasing workload at NRL, some quality assurance activities will be decentralized to the intermediate level and to University Teaching Hospitals (UTHs). For the microscopy EQA, the NRL will perform blind rechecking on quarterly basis, and prepare and distribute twice per year panel testing (PT) for microscopy to district hospitals and to two CDTs sampled within each DH area. For health centers, DH will perform blind rechecking on quarterly basis. EQA Proficiency Panels for Xpert will be prepared in collaboration with the expertise from EXPAND-TB and will be sent to the Xpert sites twice a year. For the international EQA, the NRL will receive slides smears for microscopy three times per year and panels for culture and DST twice a year from Supranational Reference Laboratory (SRL).

The TB & ORD Division will strive to improve diagnosis capacity for extrapulmonary TB, sputum smear-negative pulmonary TB and childhood TB by developing standard operating procedures (SOP) for techniques as FNA; PPD; gastric aspiration and sputum induction method. Practical training on these techniques will be conducted by both UTHs. Training on childhood TB guidelines will also be organized for medical doctors.

III.6.1.2. Enhance TB case finding in selected and prioritized high risk groups.

This plan will strongly orient screening efforts on key groups most at risk of developing TB.

Key interventions for each high risk group are as follows:

- **People living with HIV:** HIV infection is the major risk of developing active tuberculosis and TB is the major cause of mortality among HIV infected patients. Early detection of TB in PLHIV is key in reducing the dual burden. Key interventions will include:
  - Systematic TB screening among HIV infected patients at enrollment and during follow-up visits in pre-ART and ART clinics using the five questions (cough, night sweats, fever, loss of weigh, TB contact) regardless of duration of symptoms and then Xpert as initial test for those screened positive.
  - X-ray for patients with persistent of clinical symptoms after negative Xpert test or if patient is enable to provide sputum.
  - Screening and Xpert test will be systematic before ART and IPT initiation, with a strong surveillance of this intervention to make final decision on its effectiveness during next mid-term review.
  - FNA, Xpert , X-ray, ultrasound, for patients suspected of extra pulmonary TB.
- **TB contacts:** Tuberculosis contacts are people who have close contact with patients with infectious TB. In this NSP 2013-2018, the country will emphasize on contact tracing as one the high risk group, key interventions will be:
  - Contact tracing in families with TB bacteriologically confirmed case, at the beginning and at the end of TB treatment of the index case.
  - HIV test for all presumptive TB cases
  - Screening of TB contacts by investigating for the presence of cough for 2 weeks or more; Xpert is done as an initial test for all contacts who are suspected of TB.
  - X-ray for patients with persistence of clinical symptoms after negative Xpert test or if patient is enable to provide sputum.
  - FNA, Xpert, X-ray (if required) in patients suspected of extra pulmonary TB.
- **Prisoners:** The risk of development of TB disease is high in prisons due the overcrowding, and high risk of transmission due to close contact with TB smear positive cases. During the implementation period of NSP, we will focus on the following interventions to reduce the burden of TB in prisoners:
  - Active TB screening for cough $\geq$ 2 weeks at the entry, every six months (combined with mass sensitization), and for contacts of newly diagnosed infectious cases and at discharge from prison.
  - Routine passive case finding at the OPD,
  - Xpert as an initial test for those screened positive or X-ray for those who are screened positive but who can't generate sputum.
  - Active case finding using systematic mobile digital chest X-ray and clinical symptoms (any cough), once every 2 years and then Xpert test for those with X-ray abnormalities and/or cough.
  - FNA, XPert, X-ray (if required) for patients suspected of extra-pulmonary TB.
  - HIV testing for all presumptive TB.
- **Elderly (> 55 years).** Elderly are also at higher risk of developing TB compared to the general population. To reduce the burden of TB in this group, we will focus on the following key interventions during the implementation of NSP.
  - Active TB screening among all people over 55 years at the OPD by investigating for the presence of cough for 2 weeks or more whatever the reason of consultation
  - Xpert as an initial test for those who are suspected of TB
  - Chest radiography for those who can't provide sputum.

- FNA, XPert, , X-ray (if required) for extra pulmonary TB.
- HIV testing for all presumptive TB

- **Children**: Childhood TB often goes undiagnosed as health care workers are unprepared to recognize the signs and symptoms of TB in this age group and they have difficulties in establishing a definitive diagnosis (no gold standard). In order to improve TB detection and management in children, the national TB program in collaboration with the Rwanda pediatric association, developed a childhood TB guidelines and a TB diagnostic algorithm specific to children. These tools have been updated to include Gene Xpert as an initial test for all children suspected of TB. More screening efforts will target malnourished and HIV infected children. In these coming five years, the program will focus on:
  - Establish a childhood TB TWG with clear terms of reference
  - Integrate systematic TB screening into RMNCH guidelines, training module and M&E tools; with particular focus on HIV-positive and malnourished children.
  - Reinforce the use of the pediatric diagnosis algorithm at low levels
  - Promote gastric aspiration and sputum induction technique to get sputum for Xpert test, produce SOP and organize practical training.

III.6.2. Objective 2: To increase treatment success rate from 88% to 90% for bacteriologically confirmed TB cases and to maintain it at 87% for MDR-TB patients

In Rwanda TB treatment is available in all health facilities under direct observation by health staff or community health workers. High success rates in both sensitive and drug resistant TB have been achieved. This has been a result from joint efforts from both central, decentralized and community levels. Priorities for this NSP are to maintain an efficient drug management system, to improve treatment outcome for all patients, to reduce the mortality rate, especially in HIV-infected TB patients, and to switch to a short second-line treatment regimen for MDR-TB patients.

III.6.2.1. Ensure that at least 97% of CDTS have no stock out in TB medicines

Ensuring an uninterrupted supply of high-quality and affordable, first and second-line anti-TB drugs is critical for sustaining treatment success and prevention of resistances. In Rwanda, there is a policy and a legal framework including registration and limiting use/sale of TB drugs only by approved TB programs, which is in place since 1990.The management of the drug information system is computer-based at central level (MPPD) but paper based in district pharmacies (DP).

Strengthening skills of DP in accurate stock forecasting and supporting appropriate stock management tools are core needs calling for training and on-site supervision of staff. Although each DP has received a vehicle, there are needs to support the implementation of active distribution to CDT (shared contribution with other MOH programs), and renovations of DP.

III.6.2.2. Improve treatment success rate for all forms of TB, specifically to 90% for bacteriologically confirmed TB cases

This plan will focus on strengthening the quality of treatment follow-up and of TB-HIV integration and linkages with the HIV services for better HIV follow-up of patients during TB treatment and continuation of care and treatment after completing TB treatment. Priorities are to reduce the death rate, especially in HIV-positive patients, and to increase the cure rate in bacteriologically confirmed TB cases and the treatment success rate in all patients. This will be addressed through training (theoretical and practical), supervision, and mentorship. Health providers will be sensitized on comorbidities that increase the risk of death (diabetes, malnutrition, etc) and require referral to the upper level for their adequate management. Note that during this plan, the TB & ORD Division will introduce WHO new cases definitions and an electronic TB register (objective 4), which are other challenges for the TB services and for the TB program.

III.6.2.3. Increase ART coverage among coinfected patients from 81% to 90%.

Mortality reduction among HIV-infected TB patients requires to early diagnose TB related to HIV, to improve the accuracy of the diagnosis, to increase the proportion of patients adequately treated for both diseases in an integrated way and with a patient centered approach. Early initiation of ART for all coinfected TB patients is crucial to reduce the high fatality rate in this group and the overall TB case fatality which is one of NSP goals. This requires to strengthen the collaboration between TB and HIV programs and services as well as holding regular meetings of the TB-HIV technical working group for planning, monitoring and evaluation purposes.

III.6.2.4. Increase to 95% the treatment success rate for patients managed in the community.

This plan will maintain the community PBF for CHWs. Capacity building of CWHs will continue to be strengthened through trainings/refresher and supervisions by health centres. Coordination meetings with MOH/CHD, and NGOs supervising CHWs cooperatives and District supervisors will continue to happen, biannually, to review performance of TB indicators, including the indicator related to TB treatment success.

III.6.2. 5. Maintain treatment success rate at 87% for MDR-TB patients

Short course treatment regimen (9 months) for MDR-TB patients will be introduced through a multi-country study led by the UNION, which will evaluate the effectiveness and tolerance of this regimen within field conditions. Short regimen has potential of higher acceptability and lower toxicity for patients, less workload at facility level with potential cost savings at programmatic level. Participation to this study is crucial to support the decision of changing the treatment regimen and demonstrate that the shorter treatment has at least similar effectiveness than the current regimen. Equipment for audiogram and electrocardiogram will be purchased for the study sites. Specific follow-up tests will be performed in order to adhere to study protocol requirements. Post-treatment follow-up will be ensured during 24 months in order to detect potential relapses. Based on the results of this evaluation, treatment guidelines will be revised. Hospitalisation for treatment initiation will be maintained because it ensures close follow-up and adequate management of potential adverse effects as well as nutritional rehabilitation. Additional Xpert machines, coupled with improved sample transportation system are expected to increase the number of MDR-TB cases as it is observed in other countries.

III.6.2.6. Provide support to key affected patients

Strengthening adherence to treatment is challenging for all TB programs, especially for MDR-TB patients who have to take treatment during a long period of time. During this plan, the TB & ORD Division will continue providing support to MDR-TB patients (nutritional support during the whole duration of treatment; transportation fees during ambulatory treatment and for post-treatment appointments).

III.6.3. Objective 3. Improve TB prevention (TB infection control in health facilities, behavioural change in the general population and prevention by medication) so that the percentage of population with adequate knowledge on TB increase from 56% to 75% by 2018.

III.6.3.1. Prevent TB by ensuring that a revised package of infection control measures is applied in at least 85% of all Health Facilities.

During NSP 2009-2012, TB infection control policy and guidelines were developed and a basic package of IC measures was implemented in 97% of the CDT, including administrative measures and enhanced natural ventilation.

Current priorities in this component are to strengthen good IC practices in all CDTs and to scale up the application of the basic IC package to all HF. An external evaluation of IC implementation is necessary to help the TB & ORD Division to define new and priority interventions. It is also needed to

produce an IC procedure manual (SOP) including M&E procedures and to revise the basic package of IC measures to include only objectively verifiable information. Regarding renovations, the TB & ORD Division will work with the MOH department in charge of infrastructures to ensure that design, construction and renovation of HF are appropriate and meet international biosafety standards on space and ventilation.

In addition, the TB & ORD Division will reinforce the surveillance of TB disease among health workers. Biannual TB screening of health staff using a clinical symptoms checklist will be introduced under the responsibility of the head of HC or DH director. TB presumptive cases among health workers will be investigated with microscopy, XPert and radiography. All health workers will be encouraged to know their HIV status and to request an assignment in lower risk settings in case of HIV infection. Respiratory protection will be provided to staff highly exposed to TB and MDR-TB infection and fit test will be used to verify their adequate use.

III.6.3.2. Increase awareness and commitment in TB fighting

More guidance is necessary within the TB program to revise and implement the National Advocacy Communication and Social Mobilization (ACSM) strategic plan. Therefore a team in charge of communication and awareness will be strengthened. They will advocate for sustained political commitment at all levels and foster resources for TB control. A Stop-TB partnership will be created to gather all implementers and partners.

Outreach activities for mobilization aiming to change behaviour will be conducted during Umuganda (Community popular work) with collaboration of all local authorities and civil society associations (CSOs) will be emphasized., On the other hand, collaboration will be emphasized with other institutions and RBC divisions for using integrate messages to reach community. A new strategy should be developed to raise awareness on the need to seek care when experiencing TB symptoms.

III.6.3.3. Prevent TB through medication (Isoniazide or ART)

Administration of the INH preventive therapy will be enhanced among under 5 years contacts of infectious TB cases.

In 2010, IPT among adult PLHIV was implemented in 3 HIV clinics. Although adherence to IPT was satisfactory (85%) and the occurrence of side effects was low, IPT was not scaled up as initially planned. Preliminary results of some active case finding activities, using sensitive screening and diagnosis strategies (Xpert), showed that several HIV+ persons may be put on IPT, while having active TB. Therefore this strategy will continue to be implemented in the 3 initial sites, while strengthening its monitoring and program evaluation, for further decisions.

The country is expanding universal access to ART for all PLHIV with less than 500 CD4. This intervention is expected to be the best prevention of TB and TB deaths.

III.6.4. Objective 4. Improve managerial capacities of the TB program; enhance the monitoring, evaluation system and operational research by implementing and make functional an electronic TB register in all CDTs.

This objective contributes to health system strengthening for all core TB managerial functions. Main strategic interventions for this objective are as follow:

III.6.4.1. TB control program coordination, management and health financing

Integrated approaches will continue to be enhanced, for rational use of resources. This will concern areas like drug management, sample transportation, supervision, and data reporting and human resource management. Drugs and consumables procurement and distribution to Districts Pharmacies will be under the responsibility of RBC/MPDD. Districts Pharmacies will distribute to Health Facilities. While we will need to improve the sample transportation system between health facilities and Xpert sites, the routine existing system between CTs and CDTs will continue, being integrated with

transportation of other types of samples (like HIV samples). Some samples from districts hospitals need to be processed at central laboratories (NRL, University Teaching Hospitals), their transportation will also be integrated.

Supervisions, aimed at improving quality of TB services and TB data, will be conducted at different levels of the health system, including the central, intermediate and peripheral levels. At central level, they will be integrated and conducted under coordination of the RBC/PME Division. At intermediate and peripheral level, district hospitals will supervise health centers (HCs) and the latter will supervise the community level, using the integrated approach. Even though, depending on specific issues identified, specific supervisions may be conducted. TB data will be collected and introduced into the R-HMIS, where a TB reporting tool will be integrated. For human capacity building, trainings will be integrated when refreshing (trainees are not new in the job) or when topic allows (like when there are new/minor guidelines). In some circumstances, TB trainings will be integrated with HIV trainings.

Financial management of TB control activities includes monitoring resource allocation and purchasing of services related to TB. It is under the responsibility of RBC, in collaboration with different MOH departments including SPIU, MPPD, HFU, CHD, etc. The main intervention will be for advocating for domestic and external financial support, implementation of activities, accountability and transparency. The aim is to accomplish the efficient and effective management of funds to reach our targets.

III.6.4.2. Enhance the monitoring and evaluation system

Considering achievements and current challenges in TB surveillance system in Rwanda, the following new interventions will have to be implemented, to enhance the quality of TB data management and allow to make evidence-based decisions for program management and improvement of policy formulation.

- Introduce WHO new TB case definitions on disease notification and treatment outcome, to standardize recording and reporting,
- Introduce an electronic registration and reporting system with an e-register (patient web based system), for improvement of quality of TB data and better patients management,
- Ensure quality of data at central and peripheral level in line with MOH policy which includes data reporting to RHMIS, routine data quality audit (RDQA), rapid service quality assessment (RSQA) and integrated supervision by levels.
- Conduct evaluations of program components implementation and results at different levels, for decision making and feed-back to all stakeholders and implementers.
- Strengthen TB surveillance among HRG in order to assess the effectiveness of intensified case finding strategy used in each group and make decision for further planning.
- One priority is to get better estimations on TB incidence and mortality in order to measure if TB indicators are on track with MDGs and TB impact targets. This will be done through periodic assessment of the TB surveillance system (at mid and end of the plan) to reach WHO certification. Mortality data will be obtained through mortality audit in community and systematic death audit among TB cases, this will help in better ascertainment of causes of TB deaths and how to address them. The TB & ORD Division will also advocate to the MOH for improving of the vital registration system.

III.6.4.4. Enhance research

This NSP encourages programme-based operational research as a core component to improve programme implementation locally through the identification of problems, evaluation of interventions and monitoring of activities, in order to adjust policy along evidence-based recommendations. During the first two years, studies that have been initiated and for which data were collected, will be finalized during this NSP. These include: TB infection risk assessment among HCW, TB Risk factors of death during TB treatment. For the same period, some new projects will be

initiated, including the second national drug resistance prevalence survey, the Long term outcomes of MDR-TB treatment and the effectiveness and tolerance of a short course MDR-TB treatment (9 months). The latter is part of a multi-country study led by The UNION (2014). Later during the NSP, feasibility and implementation of the following research questions will be prioritized. Those are a KAP study; a study on the characteristics of presumptive TB cases confirmed as TB cases; a study on Risk factors of TB disease among men in Rwanda and a cost-effectiveness study on active TB case finding activities in prisons (the OR agenda is detailed in section VII.5). Research capacity at different levels of NTP will be developed and technical assistance may also be needed in many of those steps to carry out better research for better strategy.

III.6.4.5. Provide Training and Technical Assistance

For the matter of cost-effectiveness, future TB training of health providers will be organized in cascade including training of trainers of national and district levels and secondly, training of peripheral staff by districts trainers. On the other hand, some specific TB related documents and modules of trainings will be uploaded to R-HMIS website for use by health providers.

Training needs are related to:

- national scale-up of new interventions such as Xpert, infection control, Xray reading, data management (e-register), new TB case definitions, operational research, IPT, etc.
- national dissemination of updates on new guidance (new diagnosis algorithm among risk groups, updated treatment regimen of MDR-TB, childhood TB)
- Initial training of new staff, focusing on practical competencies
- training in health institutes targeting final year students

Trainings related to TB control activities will be compiled in a comprehensive database in order to evaluate the training coverage among key TB staff and to determine training needs.

Capacities of the TB & ORD Division at central level will be strengthened, through short courses on specific topics or during technical assistance missions or attendance in national, regional and international conferences.

III.6.4.6. Performance based financing system (PBF)

The PBF scheme will continue to be applied as a part of salary and as policy of MoH, and will aim at improving staff performance; its payment will continue to be based on achievement of fixed targets set in contract between the two parts. To respond to current challenges in implementation of the performance based financing scheme (PBF) for TB control activities, following main activities will be implemented:

- To ensure PBF sustainability: income generating activities will be improved through the Federation of CHWs cooperatives Union
- PBF indicators will be reviewed and revised if needed to link quality aspects to quantity aspects

III.6.4.7. Practical approach for lung diseases (PAL)

Current priorities in this intervention area are:

- To scale up PAL strategy in all HFs
- To develop and implement M&E procedures and tools
- To conduct a program evaluation of PAL focusing on the implementation process, scale-up and early results.
- To strengthen collaboration between the TB & ORD Division and NCD in regards to respiratory diseases.

The PAL strategy will improve the integrated management of patients with chronic respiratory symptoms, the TB being one of them.

IV. THE MONITORING AND EVALUATION PLAN FOR THE 2013-2018 TB NSP IN RWANDA

IV.1. Process of development of the 2013-2018 TB NSP M&E Plan

This M&E plan has been developed to measure progress made in the implementation of activities of the 2013-2018 TB NSP, as well as to measure progress made to achieve the intended goal(s), objectives and targets.

For each indicator, the following elements must be 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 entity to which the results of the analysis need to be disseminated;
- The values of the indicator at the baseline and expected values at the end of each fiscal year covered by the NSP.

In this monitoring and evaluation plan, the number of indicators has been limited to 20 indicators, representing the goals and objectives of the plan. These indicators assess the goals (impact) and operational objectives (outcome), as defined in the core plan, and evaluating all the strategic interventions (output) of this TB NSP. The process indicators need to be considered only for the most important activities. Including too many indicators in the monitoring and evaluation plan could be onerous and may result in collecting low quality information.

This M&E Plan has been developed according to international WHO Guidelines as provided in the 'Planning toolkit Final V12 August 14-SO input 18 August 2013'

IV.2. The 2013-2018 TB NSP M&E system

IV.2.1. M&E Coordination

The TB control M&E system is fully integrated in the national M&E system. The TB & ORD Division 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.

IV.1.2. Data flow, validation and use

The reporting system is organized from community level, to health centers, compiled for hospital catchment area and for national level. This includes public and private health facilities (CTs and CDTs). Data are and will continue to be entered from health centers and hospitals (for their own patients), compiled for Hospitals catchment area, and then for the district and the national level[10].

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

[10] 2013 Procedural Manual for M&E of TB in Rwanda

In the upcoming 5 years, the TB & ORD Division will replace the paper-based TB surveillance system by an electronic system, under HMIS, with the purpose of better data quality, easy availability, use and feedback. The 1st step, this will concern the reporting system, where the aggregated paper report will be replaced an aggregated electronic report, to be completed health facilities. The system will allow aggregation of reports for all level of the health system (DHs, Districts and National)[11]. The 2nd step will transform the paper-based register in a web-based electronic register with individual data. This electronic register will have two objectives, to improve data quality and to improve quality of case management. The latter will involve a reminders system (SMS) towards TB patients, to recall on among others treatment compliance (avoid lost to follow up patients, tracking transferred patients, decrease in number of doses not taken on time) and better identification of patients requiring special management, such as HIV-positive TB patients, eligibility to special lab techniques, etc.. In this electronic register, presumptive TB cases will be recorded, including their lab results. If confirmed TB case, the patient will be recorded in a new module of TB cases management. Data will be entered at health facilities level (by the data manager in collaboration with the TB Focal Point) and visible at top reporting entity, in real time. The transitioning from paper based register to electronic will take 1 year period as piloting, where both system will be running, the paper-based being the reference. The system will capture and report information on: TB notification, TB/HIV, TB laboratory, TB in HRG, TB treatment outcome, MDR-TB and TB infection control[12].

The system will contains validation rules, which will allow to measure timeliness (fixed on 05th of each month following the evaluated quarter). The system is also designed to not permit any submission of incomplete report.

Each quarter, Evaluation and performance assessment (quarterly evaluation meetings) are held at district hospital (DH) level. Before these assessments, health facilities will upload their report in the system. During evaluation meetings, the last quarter's TB data will be reviewed and cross-checked with the data from source documents and agreed upon in case of discrepancies. Then after feedback is provided, through data analysis and interpretation for selected indicators, using a standardized tool. The validated national report will be uploaded into the system as part of the feedback.

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

TB data will be archived in the National Data Center.

IV.3. NSP Reviews

A mid-term (April-June 2016) and end-of-term (April-June 2018) TB NSP reviews will be conducted. However specific programs evaluations will also be conducted.

IV.4. M&E plan

Assumptions:

Impact targets are expected to continue declining, by 5% annually for TB incidence (faster than the global trend) and by 9% annually for TB mortality, as a result of good program design and implementation of all key recommended TB activities with high performance levels and synergistic efforts in HIV control.

As regard TB notification (all forms), active case-finding in HRG will detect additional cases. Their number will not be sufficient to invert the declining overall notification but the total number of cases is expected to decline with a slower pace (approximately by 2.7% per year against 4.4% in recent years).

[11] 2014 Policy of TB electronic surveillance system
[12] 2014 Policy of TB electronic surveillance system

	Indicators	Purpose	Calculation	Source of information	Periodicity	Who will collect the information	Level of information collection	Baseline Jul.2012/2013	Jul 2013/ June 2014	Jul 2014/ June 2015	Jul 2015/ June 2016	jul 2016/ June 2017	Jul 2017 / June 2018
GOALS : • 23% reduction of TB incidence rate from 86.0/100,000 to 67.0/100,000 population • 37% reduction of TB mortality rate from 10/100,000 to 6.3/100,000 population.													
Goal	Prevalence (per 100,000 hab)	**Impact**	Measured by special surveys or by WHO estimations by modeling	TB Prevalence Survey as baseline and then WHO annual TB Report	Annually	TB&ORD / WHO	Community	114	105	96	89	82	75
									8% annual decrease				
	Incidence (per 100,000 hab)	**Impact**	Measured by WHO estimations by modeling	WHO annual TB Report	Annually	WHO		86.0	82	78	74	70	67
									5% annual decrease				
Goal	Mortality (per 100,000 hab)	**Impact**	Measured by WHO estimations by modeling	WHO annual TB Report	Annually	WHO		10	9.1	8.3	7.5	6.9	6.3
									9% annual decrease				
Objective 1: Provide early TB detection in general population by intensifying case-finding in prioritized high-risk groups so that the proportion of TB cases all forms identified among HRG increases from 14% to at least 24% by mid-2018.													
1.	**1. Notification rate of all TB cases (all forms)**	**Outcome**	**Numerator**: Total number of TB cases (all forms) notified during the specified year Denominator: Population/100,000	**RHMIS report**	**Annually**	**TB&ORD Division**	**National level**	Nbr: 5,977	5,979	5,895	5,784	5,565	5,363
								Rate: 56.8	55.4	53.3	50.9	47.8	44.9
	2. **Notification rate of new pulmonary bacteriologically confirmed TB cases**	Outcome	Numerator: New pulmonary bacteriologically confirmed TB cases detected (ieXpert, smear- or culture positive) Denominator: Population/100,000	RHMIS report	Annually	TB&ORD Division	National level	Nbr: 3,571	3,554	3,504	3,438	3,308	3,188
								Rate: 33.4	32.9	31.7	30.3	28.4	26.7
Strategic intervention 1.1. Provide early, rapid and quality TB diagnosis by expanding LED MC to all CDT and ensuring that at least 96% of the laboratories have adequate performance in EQA													
1.1.1.	3. Proportion of TB cases (all forms) referred by CHW 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).	Laboratory Register	Quarterly, Annually	TB&ORD Division	Health facilities	19.8% (1182/5977)	19%	20%	20%	21%	21%

	Indicators	Purpose	Calculation	Source of information	Periodicity	Who will collect the information	Level of information collection	Baseline Jul.2012/2013	Jul 2013/ June 2014	Jul 2014/ June 2015	Jul 2015/ June 2016	jul 2016/ June 2017	Jul 2017 / June 2018
1.1.2	4.Laboratories showing adequate performance in external quality assurance for smear microscopy among the total number of laboratories that undertake smear microscopy during the reporting period	Output	Numerator: Laboratories showing adequate performance in external quality assurance for smear microscopy (No major error in at least 3 controls) Denominator: Total number of TB microscopy laboratories (number and percentage)	NRL EQA reports	Annually	NRL-Division	National level	91.2%	91.4%	94%	96%	96%	96%
Strategic intervention 1.2. Detect drug resistant TB by increasing to 90% the proportion of previously treated TB cases having a rapid test for detection of RR/MDR													
1.2.1.	5. Proportion of new bacteriologically confirmed TB cases tested for TB drugs susceptibility	Process To enhance drug resistance surveillance and for early MDR-TB detection	Numerator Number of new bacteriologically confirmed TB cases tested for TB drug susceptibility Denominator Number of new bacteriologically confirmed TB cases	NRL data base MDR-TB register	Quarterly, Annually	MDR-TB unit / TB Division	National	NA	50%	60%	65%	70%	70%
1.2.2	6. Proportion of previously treated TB cases with result of a test for detection of resistance to rifampicin or rifampicin and isoniazid	Process To enhance drug resistance detection in the most at risk people of MDR-TB	Numerator Previously treated TB cases with result of a test for detection of resistance Denominator All previously treated TB cases (first-line treatment failures, relapses and defaulters) registered during the period of assessment	**RHMIS**	**Quarterly, Annually**	**MDR-TB unit / TB Division**	**National, DH and CDT**	85%	86%	87%	88%	89%	90%
Strategic intervention 1.3. Enhance TB case finding in selected and prioritized high risk groups.													
1.3.1	7.Proportion of TB cases notified among high-risk groups (Number and Percentage)	Process To increase TB detection efforts among the most at risk people	Numerator: Number of TB notified in HRG Denominator Total number of TB cases notified during the period of assessment	RHMIS	Quarterly, Annually	TB&ORD Division	National level	Num: 843 Denom: 5,977 14%	895 5,979 15%	1047 5,895 18%	1207 5,784 21%	1245 5,565 22%	1284 5,363 24%
Objective 2: Increase treatment success rate from 88% to 90% for bacteriologically confirmed TB cases and to maintain it at 87% for MDR-TB													

	Indicators	Purpose	Calculation	Source of information	Periodicity	Who will collect the information	Level of information collection	Baseline Jul.2012/2013	Jul 2013/ June 2014	Jul 2014/ June 2015	Jul 2015/ June 2016	jul 2016/ June 2017	Jul 2017 / June 2018
Strategic intervention 2.2: Improve treatment success rate for all forms of TB, specifically to 90% for bacteriologically confirmed TB cases													
2.2.1.	8. Treatment success rate for bacteriologically confirmed new and relapse TB cases	Outcome	Numerator: Bacteriologically confirmed new and relapse TB cases successfully treated (cured plus completed treatment) Denominator: total number of bacteriologically confirmed new and relapse TB cases registered during the year of assessment	RHMIS report,	Quarterly and	TB&ORD Division	National District Hospital CDT	85%	86%	87%	88%	89%	90%
	9. Treatment success rate for clinically diagnosed TB cases (SS-, EPTB and others)	Outcome To know if treatment success improved for forms other than bacterio confirmed	Numerator: number of clinically diagnosed TB case with completed treatment during the year of assessment Numerator: number of clinically diagnosed TB case during the year of assessment	RHMIS report,	Quarterly and	TB&ORD Division	National District Hospital CDT	75%	76%	76%	77%	78%	79%
2.2.3.	10. Cure rate bacteriologically confirmed new and relapse TB cases	Outcome	Numerator: Bacteriologically confirmed pulmonary TB cases who were smear- or culture-negative in the last month of treatment and on at least one previous occasion Denominator: All pulmonary bacteriologically confirmed TB patients registered the evaluated period of time.	RHMIS	Quarterly, Annually	TB&ORD Division	National, District CDT	79%	80%	81%	82%	83%	84%
2.2.4.	11. Proportion of diagnosed TB cases tested for HIV infection	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 and TB register	Quarterly and annually	TB&ORD Division	National, District Hospital, CDT	99%	99%	99%	99%	99%	99%
2.2.5.	12. Proportion of presumptive TB cases tested for HIV infection	Output	Numerator: Number of presumptive TB cases who had an HIV test result recorded in the TB register Denominator: Total number of	RHMIS and laboratory register	Quarterly and annually	TB&ORD Division	National, District Hospital, CDT	92%	94%	95%	96%	97%	99%

	Indicators	Purpose	Calculation	Source of information	Periodicity	Who will collect the information	Level of information collection	Baseline Jul.2012/2013	Jul 2013/ June 2014	Jul 2014/ June 2015	Jul 2015/ June 2016	jul 2016/ June 2017	Jul 2017 / June 2018
			presumptive TB cases examined during the period of assessment whose HIV status is unknown.										
	13. Proportion of HIV-positive TB cases given 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 and laboratory register	Quarterly and annually	TB&ORD Division	National, District Hospital, CDT	81.2%	87%	88%	89%	90%	90%
Strategic intervention 2.4. Increase to 95% the treatment success rate for TB patients managed in the community													
2.4.1.	14. 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	TB register	TB&ORD Division	Data managers	CDT	94% (2011 cohort)	94%	94%	94%	95%	95%
Strategic intervention 2.5. Ensure treatment of MDR-TB with patient support													
2.5.1	15. Proportion of confirmed RR/MDR-TB cases enrolled on second-line treatment (number and percentage)	Output	Numerator: Number of bacteriologically confirmed RR/MDR-TB cases enrolled on second-line anti-TB treatment Denominator Number of bacteriologically confirmed RR/MDR-TB cases during the period of assessment (excluding those dead before treatment)	MDR-TB register	Quarterly, Annually	MDR-TB unit TB&ORD Division	National, District CDT	58/58 (100%)	100%	100%	100%	100%	100%
2.2.2.	16. 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 during the year of assessment	RHMIS and TB/MRD register	Quarterly and annually	TB&ORD Division	National	87%	87%	87%	87%	87%	87%
2.5.2	17. Interim results: culture conversion at	Output	Numerator: Bacteriologically confirmed RR/MDR-TB cases	MDR-TB register	Annually	MDR-TB unit	National	91%	91%	91%	91%	91%	91%

	Indicators	Purpose	Calculation	Source of information	Periodicity	Who will collect the information	Level of information collection	Baseline Jul.2012/2013	Jul 2013/ June 2014	Jul 2014/ June 2015	Jul 2015/ June 2016	jul 2016/ June 2017	Jul 2017 / June 2018
	six months		who have a negative culture at the end of six month Denominator: Total number of RR/MDR-TB cases initiated on a second-line anti-TB treatment during the period of assessment.			TB&ORD Division							
Objective 3: Improve TB prevention (TB infection control in HF, behavior change and prevention by medication) so that the percentage of population with adequate knowledge on TB increase from 56% to 75% by 2018.													
Obj 3	18. Percentage of population with adequate knowledge* on TB symptoms, transmission and prevention	Outcome	Numerator:: People with adequate knowledge*** on TB symptoms, transmission and prevention Denominator: sample of the population	KAP Survey	-	TB&ORD Division	-	56%	NA	60%	NA	NA	75%
Objective 4: Improve managerial capacities of the TB program; enhance the monitoring, evaluation system and operational research by implementing and make functional* an electronic TB register in all CDTs.													
Strategic intervention 4.3: Enhance the monitoring and evaluation system													
4.3.4	19. Timeliness of routine reporting	Process	Numerator: Reporting units (CDT and CT) submitting timely reports to RHMIS by the 5th day following the end of the evaluated quarter Denominator: Total number of reporting units (CDT and CT)	RHMIS	Quarterly	TB&ORD Division	National, District Hospital, CDT	85% (OSDV report)	90%	90%	90%	95%	97%
4.3.5	24. Number of completed operational studies		Number of completed operational studies (report disseminated)	Study report dissemination	annual	TB&ORD Division	1	1	1	1	1	1	1

* Indicator 18. **Adequate comprehensive knowledge on TB**:

- At least one airborne transmission mode: coughing, sneezing, or talking
- At least one of 2 important prevention ways (cover mouth when coughing or sneezing, open windows)
- At least 3 risk factors of TB disease: HIV infection, being in contact with an TB infectious patient and any other risk factor
- TB most important sign: cough $\geq$ 2 weeks
- Where patients go for health care seeking (HF)
- Curability of TB

- The KAP survey will include questions on knowledge on TB and on behavioral changes

V. ESTIMATED BUDGET COST FOR THE 2013-2018 TB NSP IN RWANDA

V.1. Costing methodology

The conventional excel methodology was used for costing. The format used (but adjusted) was previously used for several TB control programs costing exercises in Rwanda, like the 2009-2013 TB NSP and the 2013-2016 Interim TB NSP. The choice was also guided by the fact that the current version of the UN One-health tool tool is not yet validated for Tuberculosis, and so could not be used as it is currently. One of disavantages of the conventional excel methodology was that it could not generate impact scenarios (impact gains) according to different budget estimates. To ensure that we have choosen the most important strategies that may lead to impacts, decisions were taken after consultations with experts in each domain. On the other hand, users were more conversant with the conventional excel methodology, for having used it previously.

After many consultations/discussions/workshops with different TB control activities implementers/partners and decision-makers, and after having consulted the post 2015 WHO TB strategy, we have determined goals and objectives of TB control in Rwanda for Jul2013-Jun2018. From these objectives, we have generated strategic interventions, for which we have then defined activities. Those new objectives, strategic interventions and their specific activities were then transferred in the excel sheet for costing. In this excel sheet, we have determined in addition, for each activity, quantities by quarter, unit cost per year and frequency per year, and then the total budget per year. This exercise has been done for each year and for each activity, and then we calculated the total budget for the lifespan (5years) of this NSP, for each activity. At the end we calculated the total detailed budget for the entire NSP, by NSP objectives and by NSP cost categories. To determine unit costs (UCs), many approaches were used. Some of UCs were already available in the excel sheet used previously (used while costing the third National Health Sector Strategic plan) and have been already assessed and approved by the GFTAM-LFA in 2010. For new activities not previously in the excel sheet, we used available information from partners/funders who planned same activity.

V.2. Costing results

The estimated 5 years budget is presented below by 4 objectives and SDA. It does include the cost of governement of Rwanda contribution. The cost by objective shows that objective 4 on programme management represent one third of the total. This is due to inclusion of human ressources and capacity building, health products, equipments and logistics, community interventions and PBF in this objective. The financing of this budget will be based on available funding and coordinated prioritization exercise. It is expected that most of the HR will be supported by domestic funding in the future. Intervention and budget prioritization are presented in detailed budget.

Figure 5: Costing results by outcome and strategies

Objective / SDA	Total Y1	Total Y2	Total Y3	Total Y4	Total Y5	Total Y1-Y5
Objective 1: Provide early TB detection in general population and intensify case-finding in prioritized high-risk groups						
1.1. Provide early, rapid and quality TB diagnosis	3 216 356,97	2 842 918,54	2 021 710,01	1 826 231,02	1 497 953,10	11 405 170
1.2. Detect drug resistant TB	308 189,66	320 989,66	369 382,28	343 111,28	343 111,80	1 684 785
1.3. Intensify TB case-finding in prioritized HRG and children	1 303 282,06	1 574 831,98	2 736 649,48	3 310 258,57	2 003 181,78	10 928 204
Sub Total 1	**4 827 829**	**4 738 740**	**5 127 742**	**5 479 601**	**3 844 247**	**24 018 158**
Objective 2: Increase treatment success rate						
2.1. Ensure that at least 97% of CDTS have no stock out in TB medicines	189 738,46	262 996,04	487 449,61	335 081,11	339 928,06	1 615 193,28
2.2. Improve treatment success rate for all forms of TB	369 488,00	385 276,56	1 136 752,33	1 163 396,00	1 201 345,00	4 256 257,89
2.4. Increase to 95% the TSR for patients managed in the community	2 107 246,53	2 034 963,50	887 850,50	786 549,26	792 850,50	6 609 460,29
2.5. Maintain treatment success rate at 87% for MDR-TB patients	335 134,71	285 599,35	307 925,07	375 762,43	367 759,35	1 672 180,90
2.6. Provide support to MDR-TB patients	373 888,11	182 190,21	146 559,44	146 559,44	146 559,44	995 756,64
Sub Total 2	**3 375 496**	**3 151 026**	**2 966 537**	**2 807 348**	**2 848 442**	**15 148 849**
Objective 3: Improve TB prevention						
3.1. Prevent TB by ensuring infection control measures	859 870,44	629 785,53	888 560,15	2 186 302,53	1 313 156,27	5 877 674,91
3.2. Increase awareness and commitment in TB fighting	1 299 929,83	933 559,15	814 743,17	605 743,17	809 543,17	4 463 518,49
3.3. Prevent TB through medication (Isoniazide or ARTs)	9 106,55	17 279,89	14 878,46	23 848,58	16 010,30	81 123,77
Sub Total 3	**2 168 907**	**1 580 625**	**1 718 182**	**2 815 894**	**2 138 710**	**10 422 317**
Objective 4: Improve managerial capacities of the TB program; enhance the monitoring, evaluation system and operational research						
4.1. Strengthen Political commitment and advocate f	83 325,00	23 745,00	51 372,50	33 205,00	51 372,50	243 020,00
4.2. Develop human resources and build capacities	1 917 098,53	1 914 932,67	1 959 654,53	2 088 297,05	2 235 407,45	10 115 390,24
4.3. Enhance monitoring and evaluation system	549 568,31	413 638,52	1 029 460,78	971 233,05	965 183,05	3 929 083,71
4.4. Enhance operational research	348 575,00	121 500,00	77 700,00	121 500,00	24 450,00	693 725,00
focus	92 760,00	73 920,00	148 720,00	160 960,00	136 760,00	613 120,00
4.6. Ensure logistics for TB control activities	597 460,58	607 460,58	791 578,90	768 092,81	724 120,90	3 488 713,77
4.7. Scale up PAL strategy	522 241,60	20 340,00	24 921,60	59 940,00	17 940,00	645 383,20
Sub Total 4	**4 111 029**	**3 175 537**	**4 083 408**	**4 203 228**	**4 155 234**	**19 728 436**
TOTAL	**14 483 260**	**12 645 927**	**13 895 869**	**15 306 071**	**12 986 633**	**69 317 760**

V.3. Funding estimates and gap analysis

Three main funding sources were considered in the forecast calculations: Government of Rwanda, Global Fund and USG. The funding estimation is based, for the first 2 years on the current commitments, while for the remaining part has been estimated according to historical data and an exponential regression analysis.

Figure 6 presents the results of this analysis. As shown, future funding for TB in Rwanda would decrease at around 16 percent a year until 2017, and Rwanda would receive a total of US$ 57 million during those five years.

This forecast is meant to provide high level guidance to the development of realistic scenarios; however, it shouldn't be considered a fully accurate picture of future funding, for three reasons: (i) past funding levels are not always indicative of what future funding levels will look like, (ii) the regression analysis was done with limited historical data.

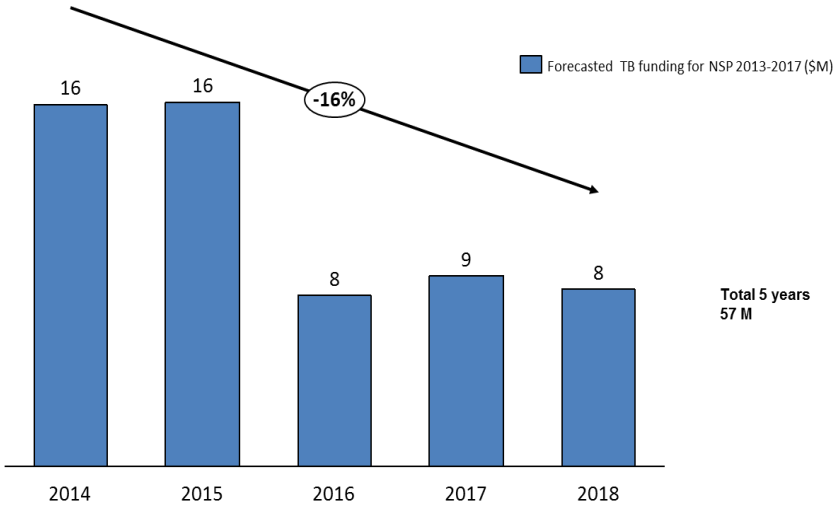


Figure 6: Forecasted TB funding for NSP 2013-2018

V.3.1. Role of government and sustainable TB financing

Donor funding has been essential in supporting the Government of Rwanda to scale up its TB response and will continue to be needed. Historically, financing for TB from government and funding from donors have been complementary – donors, in particular, have had an important role in funding key TB interventions. In past years, MoH has allocated domestic resources to key interventions aimed at strengthening the health system such as infrastructure, human resources, and recurrent facility costs.

The need to decrease the dependency on external funds is critical and extends beyond the TB response. Innovative financing mechanisms and additional sources of domestic funding have been defined for the whole health system in a national health financing strategy. TB financing aligns to the national strategy and priorities. Equity and access to treatment for all plays an important role in defining the allocative policy of MoH. In the short and medium term, though decreasing, external funding will continue to play a significant role in supporting the country's response to TB and other diseases.

A stronger alignment to national priorities of all funds, domestic and external, the reduction in wastage and inefficiencies both at the strategic and implementation level, sector-wide and unified mechanisms to monitor and evaluate funds allocation and use, are among the necessary elements to support the transition for MoH towards a more financially sustainable and independent position.

That commitment to a sustainable TB response is a priority for Rwanda. The contribution and annual increase by the Government of Rwanda to the health sector budget from 8.2 percent in 2005 to 11.5 percent in 2011, is evidence of this commitment. Rwanda is positioned to meet the Abuja target of allocating 15 percent of the government's budget to health in 2017-2018.

V.4. Scenario development

The key guiding idea for the scenario development was to identify the most cost-effective interventions and "achieve the best outcomes given what is available". Three scenarios were developed according to the following criteria:

- A first scenario reaching the TB epidemiological targets with a full costed plan (total cost of US$ 70 million);
- A second scenario with a minimum level of funding to maintain the current achievements.
- A third scenario representing a middle point in term of impact and cost between the first and the second scenario.

All the scenarios assume that all proposed strategic interventions will be implemented although with different level of effort. For example, which high risk group are screening could be different according the scenarios or the new laboratory technologies might not be rolled out countrywide (Xpert, LED).

The health system costs budgeted in the TB NSP (infrastructure, human resource, health financing) included in the highest scenario are contributing to around 2% of the total health system costs. According to programmatic analysis this percentage reflects the optimal contribution to provide an appropriate service. A lower level of funding will decrease the TB support in the overall health system which will have an impact on the readiness and quality of services and potentially on TB mortality.

VI. Coordination and Implementation of the 2013-2018 TB NSP

VI.1. Coordination of TB control activities by the central level

At central, the TB and other respiratory communicable diseases Division (TB & ORD =Rwanda NTP), under the IHDPC/RBC/MoH, will be responsible for coordinating all partners activities of the NSP. This will include strategic and operational planning, advocacy, fund mobilization, policies, guidelines and curricula development and their dissemination, trainings of trainers, monitoring of implementation and reporting of national level information.The National Referral Laboratory (NRL) together with TB & ORD Division determine all TB laboratory related activities and policies. The NRL will also ensure the quantification of laboratory products, training of laboratory technicians and conduct laboratory quality control activities at DH level and in some selected HCs. In collaboration with medical procurement and Production Division (MPPD) of RBC, TB&ORD Division ensure quantification of TB medicines and health equipment according to the targets described in the performance framework. Procurement of all medicines, reagents, consumables and health equipment are endorsed by MPPD. Second line medicines are procured from GDF, first line medicines are procured from prequalified manufacturers. For the procurement method for other products, MPPD is using an international open tender. To reduce long administrative procedures and mitigate external factors affecting procurement of TB medicine, MPPD signed contract framework for two years with suppliers. The distribution of TB medicines is based on number of TB cases and stock on hand reported in the requisition forms from district pharmacies with validation of TB&ORD Division. MPPD is ensuring transport of all medicines from central level to district pharmacies.

Supervisions of TB services and TB data will be performed on an integrated approach in coordination with other MoH departments, specifically the Division of Planning and M&E of RBC. Since January 2013, TB & ORD Division initiated the integration of reports to electronic reporting through R-HMIS. In 2013, both paper-based and electronic reporting were used, as a pilot of feasibility of this electronic reporting, while performing different relevant adjustments to reporting format. Starting January 2014, quarterly reporting of TB surveillance aggregated data is done only through R-HMIS (hmis.moh.gov.rw/hmis). Concomitantly, in 2013 we have started to develop an electronic TB register, with individual data, to be hosted on R-HMIS and, the latter will provide technical assistance to central level and decentralized for trainings and data management.

The Community Health Desk of MoH will ensure organization of CHWs and set Community DOT related indicators and verifications of indicators to be remunerated.

The Health Financing Unit of the MoH will coordinate verifications process of indicators to be paid to Health Facilities and trainings on income generating activities (IGAs) management, and coordination of specific activities related to Community health workers (CHWs) cooperatives.

Collaboration with MOH/RMNCH will be establish in order develop guidance and integrate childhood TB into IMCI (Integrated Management of Children Illnesses) and TB in antenatal care.

The Rwanda Health Communication Centre will coordinate development and dissemination of IEC/BCC messages and policies/guidelines/tools related to TB awareness and BCC.

TB/HIV integration: At the central level, the TB/HIV technical working group (TWG) includes partners and implementers involved in TB/HIV activities, and meet quarterly to discuss related issues. Their main mission is to coordinate TB/HIV activities and develop policies/guidelines/tools related.

The RBC Medical Research Center (MRC) will intervene in TB OR protocols, scientific reviews and in capacity building.

The University of Rwanda School of Public Health (SPH) hosts the Centre of MDR-TB programmatic management of drug resistant TB (PMDT). The latter will, in collaboration with TB & ORD Division, play a role of a regional (eastern and southern Africa) centre for capacity building in MDR-TB program management. In addition, they will collaborate in research activities (training in operational research and collaboration in implementation of TB related surveys/operational research).

TB&ORD Division is fully integrated in health sector using the existing infrastructure. Renovation is done for some health facilities which don't meet with standards required for infection control.

VI.2. TB control activities by the decentralized level

The number of CDT (centres for TB diagnosis and Treatment) is now 200, including 47 hospitals CDTs, 142 health centres CDTs, with CDT, 8 prisons CDTs and 3 private clinics CDTs. Remaining health centres (entitled CT or TB treatment centres) don't perform TB microscopy but will participate in TB case finding through the following activities: identification of presumptive TB cases, sputum collection, smear preparation, slide transmission to the nearest CDT for staining and reading and DOT (Directly observed treatment), and perform HIV infection testing for both presumptive and TB cases. In addition to above responsibilities, CDTs will perform microscopy of sputum samples and they will register TB cases, as unit of surveillance. Some of CDTs are hospitals; the latter will provide supervision, mentorship and quality control of all TB technical work done at health centers (laboratory related activities at CDT/CT and quality of TB case management as well as quality of surveillance data).

For each health facilities, there is a focal point for tuberculosis and in some HF, staff like laboratory technician, IT specialist and doctors are recruited to meet increasing demand for high quality care. To build the capacity of staff and institution, training and on job training for laboratory technician, radiography chest x-ray, TB HIV, infection control and others specific subjects are conducted at national and districts level to improve knowledge and skills of health providers and civil society with aim to strengthen organizational and institutional capacities and ensure continuity of service in spite of the frequent problem of turnover of staff.

CHWs will play role in mass sensitizations, searching of potential presumptive TB cases in villages and giving TB drugs through the community DOT. Health centers will oversee activities of CHWs of their catchment area (quality of TB case finding and management). TB/HIV integration at health facilities level is ensured through the "One stop TB/HIV services", where HIV+ TB patients initiate their TB treatment, receive CPT/ARTs and HIV related exams. HIV Mentors are in charge of mentoring of TB integration into HIV services (like regular TB screening among PLHIV, etc).

Supply chain of TB medicines at decentralized level is fully integrated within health sector by using an electronic logistic management information system for reporting, requisition and monitoring of medicines at all levels. The electronic system has alert mechanism to notify risk of stock out or expiry of medicines. District pharmacies ensure transport of medicines at health facilities of its catchment area.

VI.3. TB/HIV collaborative activities

Rwanda has made substantial and remarkable progress in implementing TB/HIV collaborative activities in relatively short period of time. In February 2005, the Ministry of Health developed a

national policy for TB/HIV collaborative activities in the line of WHO recommendations. In addition at the central level a technical working group for TB/HIV collaborative activities was initiated. The TB/HIV policy was implemented and translated into operational activities at health services delivery. One stop TB center was put in place in all CDT and CT health facilities. This consisted of integrating HIV activities (HIV testing, provision of cotrimoxazole preventive therapy (CPT), ART for TB/HIV co-infected patients) within TB services to avoid lost to follow up and for infection control purpose. On the side of HIV services, TB screening and diagnosis were systematically conducted among HIV patients. HIV patients diagnosed with TB are referred to TB services for TB treatment in accordance with infection control measures and they are again referred to HIV services after successful completion of TB treatment. This integration was successful achieved by the availability of TB and HIV services respectively in 100% and 93% of the total health facilities. This integration lead to impressive results with 99% of TB patients tested for HIV in 2012 (26% of HIV prevalence among TB patients). In the same year, the provision of CPT and ART among co-infected patients was at 99% and 81% respectively. Furthermore Rwanda initiated HIV testing among presumptive TB cases since 2009 and in 2012 98% of TB presumptive cases were tested for HIV with 4% of HIV prevalence. TB screening among the total number of PLWH reached 98% in 2012 (121,810 PLWH screened for TB in 2012). Even though results have been outstanding, the implementation of TB/HIV collaborative activities still face challenges: TB case finding in HIV patients is very low due to low sensitivity of the 5 five screening questions and high proportion of smear negative on microscopy among HIV patients with active TB. There is a need to introduce and expend new diagnostic technologies with high sensitivity (LED microscopy, Digital radiography and Gen Xpert machines) in order to reduce TB/HIV related mortality.

VI.3.1. Summary of TB/HIV collaborative activities for the 2013-2018 TB NSP

- TB/HIV policy and guidelines will be regularly updated based on new scientific evidences and WHO recommendations.
- Coordination of TB and HIV programs will be strengthened at all levels by expanding the scope of the technical working group and reinforcing the infectious disease clinical mentorship program in all district hospitals to improve the quality of TB/HIV services.
- A joint planning for TB and HIV programs will be reinforced to avoid duplication and overlapping costs of activities. In each program there will be a focal person for HIV/TB activities to ensure integration and scale up of new initiatives. The TB and HIV programs will develop a joint TB/HIV concept note to be submitted to the Global Fund in August 2014.
- In 2013, the HIV guideline has been updated and suggest providing ART to all TB/HIV co-infected patients irrespective of CD4 cells count. In addition PLHIV will initiate ART at CD4 < 500 cell/ml that will lead to a reduction of TB related mortality.
- Intensified TB case finding will be expanded among PLHIV by improving diagnostic techniques using Gene-Xpert, FNA and digital X-ray machines. Those new strategies will enable early TB detection and decrease significantly the TB/HIV related mortality.
- Isoniazid preventive therapy will be provided country wide to all PLWHIV after exclusion of active TB by using very sensitive diagnostic technologies. In Rwanda IPT is implemented in three pilot sites; the scale up was slowed down after seeing a relative high proportion of HIV infected patients developing TB diseases after initiation of IPT. This was due to diagnostic tools (screening with the five questions and microscopy) used to exclude TB which were not adequate for PLWHIV. This was demonstrated by a high number of HIV infected patients who were TB positive at Gene-Xpert while smear negative.
- TB infection control will be reinforced by maintaining the one stop TB/HIV service that keeps HIV/TB co-infected patients out HIV clinics.
- Maintained HIV testing to patients with presumptive and diagnosed TB and ensure that all HIV positive are enrolled into HIV care and treatment services.

- HIV preventive methods in patients with presumptive and diagnosed TB will be strengthened and particularly among high risk group.
- Maintain CPT preventive therapy for patients living with HIV:
- HIV prevention, treatment and care for TB/HIV co-patients will be promoted with screening of other co-infections including Cryptococcus (CD4<200), HBV, HCV through one stop TB/HIV center.
- All TB/HIV co-infected patients are eligible to ART regardless of CD4 cells count. Rifabutine will be introduced to replace Rifampicine in HIV/TB co-infected patients on ART second line containing Atazanavir.
- A joint monitoring and evaluation system will be implemented for both TB and HIV programs with defined set of indicators. During the upcoming five years, there will be a phase out of vertical reporting systems for both TB (paper based) and HIV programs (TRACnet) to integrated Rwanda Health Management Information System (RHIMS). All TB/HIV data will be reported through RHMIS. A joint TB/HIV integrated supervision will be strengthened with regular data audits. Operational research will be promoted focusing on TB and HIV in high risk groups.
- Health system strengthening is paramount to achieve the above mentioned objectives and include:
  - Supply chain management of both HIV and TB drugs and commodities
  - Maintenance of diagnostic equipment
  - Capacity building of health care workers at all levels.
  - Integrated sample transportation system for both HIV and TB programs (CD4 count, Viral load, GeneXpert, Culture)

VI.4. What will be the role of the civil society in TB control activities?

Community health workers will actively participate in community DOTS, through BCC and social mobilization, referral of chronic coughing patients, and support to patients on treatment.

Almost one third of CDT and CTs are property of faith-based and private organizations. They will play the same role as for other CDT and CTs.

Some activities related to mass sensitizations in specific groups will be conducted by national organizations (NGOs/CSOs) in charge of those groups and in collaboration with national and decentralized levels. This may include organizations of PLHIV, etc. These organizations will also continue to support in coordination of CHWs cooperatives management.

VI.5. Partnership for the 2013-2018 TB NSP

The Rwanda MoH/RBC will advocate for maintaining partnership that have been established during previous NSP and, will of course work to involve new partners (from national, regional and international). Some of current partners in TB control efforts are: The Government of Rwanda, the Damien Foundation, the World Health Organization (WHO), the GFTAM, the PEPFAR, the UNION, the KNCV, 5% initiative of the French Embassy. All provide technical and financial support. The Union provide technical support for laboratory activities quality control.

VII. Annexes

VII.1. The 2009-2010 TB NSP costing

	In US $	2009/10	2010/11	2011/12	2012/13
Governmt (NTP Budget only)	Drugs	100,000	100,000	100,000	100,000
	Salaries	288,000	304,000	320,000	336,000
	Others	220,000	242,000	266,200	292,820
	Sub total	608,000	646,000	686,200	728,820
		(3% tot)	(3% tot)	(5% tot)	(5% tot)
Partners	GDF	5,000			
	Damien	275,000	275,000	275,000	275,000
	WHO	167,000	9,000	58,800	60,000
	USG/CDC-ICAP	110,000	110,000	897,982	702,939
	Global Fund	19,811,536	19,610,152	11,658,162	12,719,105
		93% tot	93% tot	83% tot	85% tot
	Sub total	20,368,536	20,004,152	12,889,944	13,757,044
Beneficiaries		399,300	439,230	483,153	531,468
Total US$		21,375,836	21,089,382	14,059,297	15,017,332

NTP: National TB Program (TB & ORD Division of RBC/MoH)

VII.2. Situation analysis: Strengths, weaknesses, opportunities and threats

Internal Factors	**Strengths** • Strong political commitment • Appropriate capacities at central level • Decreasing incidence and notification rates of TB despite of sustained C/F efforts, in favor of decreasing transmission. • Preliminary results of the prevalence survey informing on TB burden in Rwanda. • Diagnosis capacities have been strengthened • Adequate management and availability of medicines and lab supplies • Excellent treatment success rate for new smear positive TB cases. • TB-HIV detection, CPT and ART targets are fully reached. • Good PMDT with patient support • Improvement of the routine surveillance system (M&E) with the development of an electronic TB register (case-based) • Efficient community DOTS in the whole country • Application of infection control measures in health facilities dealing with TB and MDR-TB patients	**Weaknesses** • Significant number of undiagnosed cases according to the WHO estimates. • Sub-optimal efficiency and quality of the overall laboratory network (sample transportation system, LED implementation, EQA, XPert) • Insufficient diagnosis capacities for extrapulmonary and smear-negative TB forms • Low detection of childhood TB • Treatment outcomes not yet reaching targets for all TB patients • Elevated fatality rate among TB-HIV patients and in general for all TB patients (need to analyse causes) • Overall quality of supervision needs to be improved • Limited capacities for research
External Factors	**Opportunities:** **a) national** • Devolution at district level of health interventions • Existence of a national electronic surveillance system including TB • High national coverage of health insurance. • High political committment to poverty reduction and fighting against malnutrition. **b) international** • Innovative diagnostics • New drugs and vaccine in pipeline	**Threats** • Higher TB burden in neighbouring countries • High dependance on external fundings in a context of international economic constrain. • Decentralization process of program support activities may result in lower quality of services and reduction of achievements • Lack of vital registration system

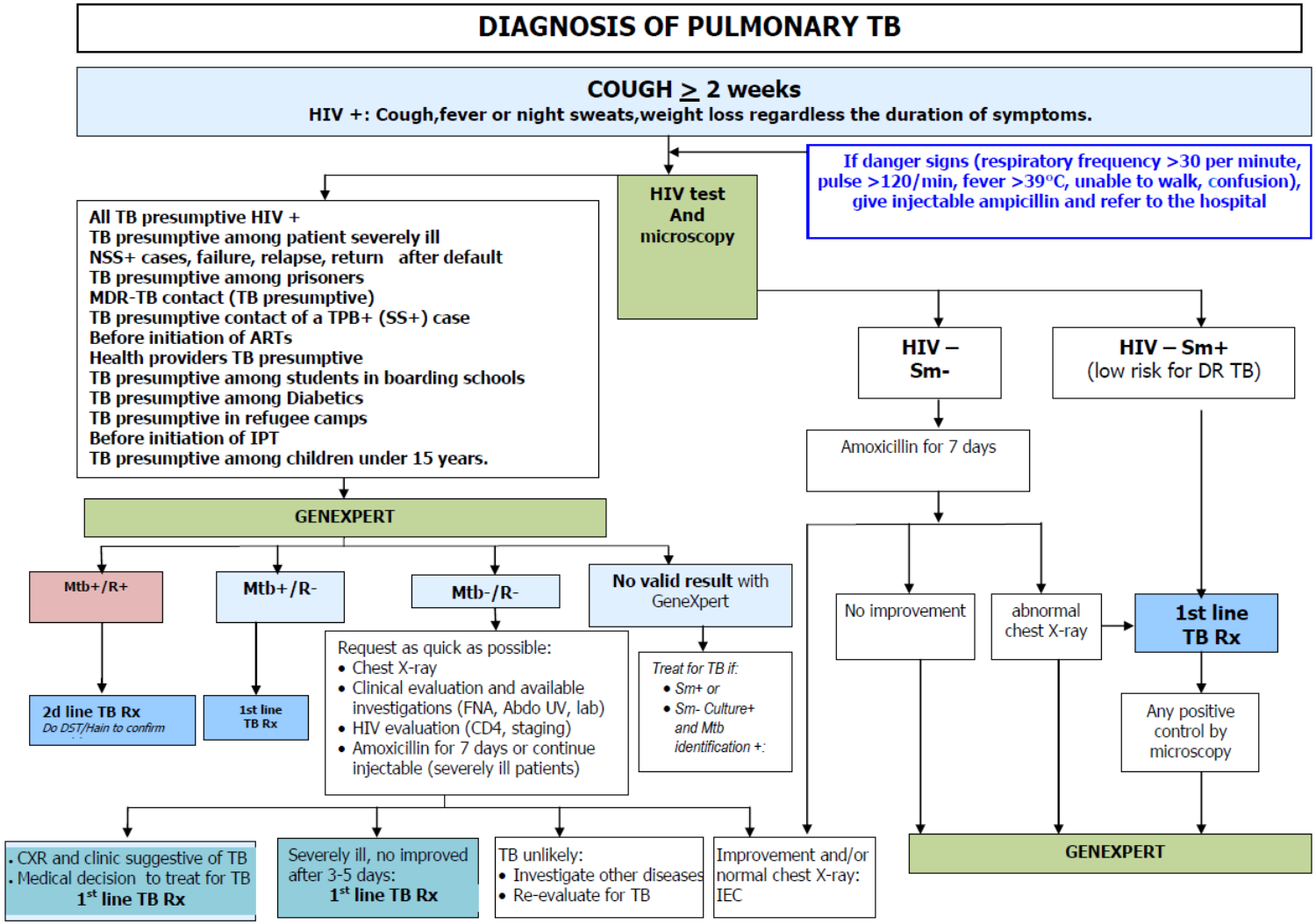
VII.3. The 2013-2018 TB NSP Log framework

Objective 1: Provide early TB detection in general population and intensify case-finding in prioritized high-risk groups so that the proportion the proportion of TB cases all forms identified among HRG increases from 14% to at least 24% by mid-2018.	
Strategic interventions	**Activities**
1.1. Provide early, rapid and quality TB diagnosis by expanding LED microscopy to all CDT, Xpert and digital X-ray machines in all hospitals	**1.1.1.** Develop/update and distribute TB policy/guidelines and tools **1.1.2.** Increase access to high sensitive TB diagnostics (LED expansion) **1.1.3.** Maintain access to routine TB diagnostics (reagents and consumables for microscopy, sample transportation) **1.1.4.** Improve TB program coordination, integration and management (maintenance of equipment, waste management) **1.1.5.** Improve TB diagnostic capacity of health providers **1.1.6.** Ensure quality of all diagnostic tests
1.2. Detect drug resistant TB by increasing to 90% the proportion of previously treated TB cases having a rapid test for detection of RR/MDR	**1.2.1.** Maintain access to routine drug resistant TB diagnostics **1.2.2.** Improve access to TB atypical species diagnostics **1.2.3.** Improve TB diagnostic capacity of health providers **1.2.4.** Ensure quality of DST tests
1.3. Intensify TB case-finding in prioritized high-risk groups (HRG) and key populations (children) so that the proportion of TB cases identified among HRG increase from 14% to at least 24% by mid-2018.	**1.3.1.** Increase access to high sensitive diagnosis techniques (XPert, transportation, active-case finding (C/F) in prisons) **1.3.2.** Increase X-ray capacity **1.3.3.** Improve TB diagnostics capacity of health providers on new algorithms for HRG **1.3.4.** Develop/update and distribute TB policy/guidelines and tools on screening strategy among HRG and key affected populations **1.3.5.** Improve awareness on TB among HRG **1.3.6.** Improve monitoring of TB among HRG
Objective 2: Increase treatment success rate from 88% to 90% for bacteriologically confirmed TB cases and maintain it at 87% for MDR-TB	
Strategic interventions	**Activities**
2.1. Ensure that at least 97% of CDTS have no stock out in TB medicines	2.1.1. Ensure availability of first line TB drugs 2.1.2. Ensure efficient drug management 2.1.3. Ensure quality assurance of medicines
2.2. Improve treatment success rate for all forms of TB, specifically to 90% for bacteriologically confirmed TB cases	2.2.1. Develop/update and distribute TB policy/guidelines and tools 2.2.2. Improve TB management capacity of health providers (training of MD, nurses, private, etc. on TB treatment and follow up of patients) 2.2.3. Routine service quality assessment (RSQA)
2.3. Increase ART coverage among coinfected patients from 81% to 90%.	2.3.1. Strengthen collaboration between TB and HIV programs 2.3.2. Ensure high quality integrated TB/HIV treatment (early initiation of ART for all TB-HIV patients)
2.4. Increase to 95% the treatment success rate for TB patients managed in the community	2.4.1. Develop/update and distribute TB policy/guidelines and tools 2.4.2. Build capacities of CHWs and steering committees 2.4.3. Improve TB program coordination, integration and management (PBF, running costs of CHD and and steering committees. 2.4.4. Improve monitoring of CHW by health care providers
2.5. Maintain treatment success rate at 87% for MDR-TB patients	2.5.1. Ensure availability of second line TB drugs 2.5.2. Ensure follow up of MDR-TB patients (complementary exams and ancillary drugs, including post-treatment follow-up 2.5.3. Improve TB management capacity of health providers 2.5.4. Provide support to MDR-TB patients (nutritional support and transportation fees, health insurance)

Objective 3. Improve TB prevention (TB infection control in HF, behavior change in general population and prevention by medication)	
Strategic interventions	**Activities**
3.1. Prevent TB by ensuring that a revised package of infection control measures is applied in at least 85% of all Health Facilities.	3.1.1. Periodic Review and planning of TB program 3.1.2. Develop/update and distribute TB policy/guidelines and tools (TB IC SOPs, tools and M&E tools, extend TB IC measures to CT) 3.1.3. Prevent TB transmission in health facilities (respirators, renovation
3.2. Increase awareness and commitment in TB fighting	3.2.1. Partnership with NGOs/CSOs 3.2.2. Develop/update and distribute TB policy/guidelines and ACSM tools 3.2.3. Build capacities of CHWs and steering committees
3.3. Prevent TB through medication (Isoniazide or ARTs)	3.3.1. Prevent TB through INH preventive treatment in <5 years children and PLHIV 3.3.2. Prevent TB through early initiation of antiretroviral therapy for PLHIV. 3.3.3. Prevent TB through early antiretroviral therapy for PLHIV. 3.3.4. Strengthening the IPT M&E system in the current three pilot sites 3.3.5. Consider to carry out an operational study on different screening approaches among PLHIV
Objective 4. Improve managerial capacities of the TB program; enhance the monitoring, evaluation system and operational research by implementing and make functional* an electronic TB register in all CDTs.	
Strategic interventions	**Activities**
4.1. Strengthen Political commitment and advocate for domestic and external commitment	4.1.1. Ensure adequate resources for TB control 4.1.2. Advocate for the inclusion of TB in policies and legal regulatory frameworks 4.1.3. Produce/update policies and guidelines
4.2. Develop human resources and build capacities	4.2.1. Ensure adequate staffing for TB control at all levels 4.2.2. Update job description for staff in place 4.2.3. Build capacity of national staff related to TB management/ guidance, ensure trainings/mentorship for central and decentralized staff 4.2.4. Maintain the PBF of health facilities 4.2.5. Participate at international conferences, short courses/ workshops.
4.3. Enhance monitoring and evaluation system	4.3.1. Implement WHO new TB case definitions and treatment outcomes 4.3.2. Implement a web-based recording and reporting system (e-TB register) 4.3.3. Implement Xpert alert software 4.3.4. Ensure periodic TB program evaluations 4.3.5. Ensure supportive and integrated supervision 4.3.6. Conduct process evaluation of different interventions
4.4. Enhance operational research	4.4.1. Create environment allowing research 4.4.2. Build research capacity for central, decentralized staff and stakeholders involved in TB fighting 4.4.3. Develop an operational research plan 4.4.4. Conduct studies
4.5. Provide training and technical assistance with capacity building focus	4.5.1. Develop the training plan 4.5.2. Train staff at intermediate and peripheral level through a TOT approach 4.5.3. Implement a training database 4.5.4. Strengthen capacities of the TB & ORD Division at central level 4.5.5. Provide TA (program planning and evaluation, surveys, M&E, MDR-TB, PAL, IC, laboratory) 4.5.6. Mobilize resources and partners
4.6. Ensure logistics for TB control activities	4.6.1. Purchase necessary medical and non-medical equipment 4.6.2. Ensure supplies related to medical equipment at central and peripheral level 4.6.3. Ensure maintenance of medical and non-medical equipment at central and peripheral level 4.6.4. Strengthen the TB sample transportation system (TB Division, NRL, moto for HF and DH)

	4.6.5. Ensure logistics related to office space, stationary, furniture and equipment including IT , communication 4.6.6. Provide running costs to (TB Division, laboratory, management and care services, NGOs, etc) 4.6.7. Renovations (for laboratory, management and care services)
4.7. Scale up PAL strategy	4.7.1. Prepare an extension plan for PAL implementation 4.7.2. Ensure implementation of PAL strategy (training) 4.7.3. Procure and distribute PAL equipment 4.7.4. Procure and distribute anti-asthma drugs 4.7.5. Implement M&E activities (RSQA) 4.7.6. Conduct a program evaluation of PAL focusing on the implementation process, scale-up and early results.

VII.4. The Xpert algorithm



VII.5. The 2013-2018 TB NSP Operational Research Agenda

NSP Objective	Title	Rationale	Purpose/Objectives	Proposed methods	Timeline and possible partnership
Objective 1	TB screening: Characteristics of presumptive TB cases confirmed as TB cases	• Many presumptive TB cases are identified • However few are confirmed as TB cases • This may led to irrational use of resources	To better prioritize presumptive TB cases potentially expected to be confirmed TB cases	In selected HFs, some data maybe collected from the TB Lab register and some additional questions asked during consultation Will compare characteristics of presumptive TB cases confirmed as TB cases and those not confirmed as TB cases	2015-2016 RBC
Objective 1	TB notification : Risk factors of TB disease among men in Rwanda	• From the 2012 TB prevalence survey, men have 5x times higher TB than women • Routine Surveillance data shows that men have 2x times higher TB than women • Some known risk factors like tobacco, alcohol consumption, social contacts, etc not necessary applicable for Rwanda	This calls for men to be priority with upcoming sensitive screening and diagnostics approaches We however need to prioritize them, by determining RF of their TB disease	In selected HFs, some data maybe collected from the TB registers and some additional questions asked during consultation Will compare characteristics of men TB cases and those of women TB cases	2015-2016 RBC
Objective 3	TB Prevention: TB knowledge, attitude and practices (KAP) survey	• According to some literature knowledge and good practices of population regarding disease tend to decrease with time (ex DHS05 and DHS10) • It is not known if it is the case for TB • In addition, the 2012 TB prevalence survey demonstrated a low level of health seeking behavior among participants with symptoms suggestive of TB, to the effect that knowledge doesn't mean change of behavior	To know if knowledge of the general population has improved in comparison with 2012 and the level of health seeking behavior among patients with symptoms suggestive of TB	Survey in general population for knowledge Attitude/practices questions for those with symptoms suggestive of TB Questions to be included in the mini-DHS	2016 - 2017 RBC/UR SPH

Objective 4	TB program management and financing : Cost-effectiveness of a TB active case finding program in high risk group (**prison**)	• During the upcoming years active case finding (ACF) will be the focus, • One of the most ambitious is systematic annual screening by digital X-ray for all prisoners, with Xpert diagnostic for all X-ray presumptive TB cases,	Measure the program costs and direct outcomes (additional TB cases notified) Measure the cost-effectiveness of this program	To calculate costs for pre-existing equipment, medical supplies, trainings/sensitizations costs, monitoring costs, salaries/perdiems, administration costs The health effect of interest will be additional bacteriological confirmed cases, as compared to passive detection ICER (incremental cost-effectiveness ratio) to compare ACF and passive case finding (PCF)	2015-2016 RBC/UR SPH/KNCV
Objective 4	TB program impact evaluation: Molecular Epidemiology of *Mycobacterium tuberculosis* in Rwanda: Assessing the Impact of program's interventions to increase case detection	• Although with a treatment success rate of 85%, the case detection rate still below 70% • The implementation of new TB diagnostics to increasing the case detection and hence for reversing the active transmission. • There is need of operational studies to demonstrate epidemiological impact of new tools • By Molecular epidemiology, it is known that when the transmission is high the clustering rate of *M. tuberculosis* strains using genotyping methods increases	Hence the transmission of *Mycobacterium tuberculosis* in a given population could be estimated with genotyping, which could subsequently be used to assess the impact of new tools for rapid diagnosis of TB /MDR TB and to calculate clustering rate as an indicator of transmission.	A longitudinal prospective cohort study by genotyping the *Mycobacterium tuberculosis* isolates obtained from AFB-smear positive patients to calculate the clustering rate. The prospective cohort will be obtained by recruitment of all consecutive new and previously treated smear positive patients during 3 years in all five provinces.	2015-2017 RBC/UR/ITM Antwerp

VII.6. Document reviewed and international guidance

VII.6.1. Diagnosis

1) 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
2) WHO/HTM/TB/2011.6 Guidelines for the programmatic management of drug-resistant tuberculosis - 2011 update
3) 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
4) WHO/HTM/TB/2011.2 Rapid implementation of the Xpert MTB/RIF diagnostic test. Technical and operational 'How-to'. Practical consideration
5) 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
6) Dye C, Williams B. Eliminating human tuberculosis in the twenty-first century. Journal of the Royal Society Interface, 2008, 5:653–662.
7) Lönnroth K et al. Drivers of tuberculosis epidemics: the role of risk factors and social determinants. Social Science & Medicine, 2009.Tuberculosis care and control in refugee and displaced populations. Geneva, World Health Organization, 2007 (WHO/HTM/TB/2007.377).
8) 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.

VII.6.2. High risk groups

1) Systematic screening for active tuberculosis: principles and recommendations(WHO/HTM/2013.4)
2) Recommendations for investigating contacts of persons with infectious tuberculosis in low- and middle-income countries. Geneva, World Health Organization, 2012 (WHO/HTM/2012.9)
3) Guidelines for the control of tuberculosis in prisons. Geneva, World Health Organization, 1998 (WHO/TB/98.250).
4) WHO/HTM/STB/PSI/2011.21 Early detection of tuberculosis: An overview of approaches, guidelines and tools
5) WHO Collaborative framework for care and control of Tuberculosis and Diabetes.
6) WHO/ . Nutritional care and support for patients with tuberculosis.

VII.6.3. TB/HIV

1) WHO/HTM/TB/2012.1 WHO policy on collaborative TB/HIV activities: guidelines for national programmes and other stakeholders
2) WHO/HTM/TB/2011.11 Guidelines for intensified tuberculosis case-finding and isoniazid preventive therapy for people living with HIV in resource-constrained settings
3) WHO/HTM/TB/2012.3 Working together with businesses: Guidance on TB and TB/HIV prevention, diagnosis,treatment and care in the workplace

VII.6.4. M&E

1) WHO/HTM/TB/2013.2 Definitions and reporting framework for TB - 2013 revision
2) WHO/HTM/TB/2011.22 Electronic reporting and recording for tuberculosis care and control

VII.6.5. Human resources development

1) WHO/HTM/TB/2008.407. Planning the development of human resources for health for implementation of the Stop TB Strategy

VII.6.6. 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.

VII.6.7. Planning

1) WHO. Toolkit to Develop National Strategic Plan for TB Control