Tuberculosis National Strategic Plan 2023 -2028

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Foreword

This fourth TB national strategic plan, which will be implemented with an integrated approach together with the HIV programme, was developed through review of literature, and other international and national strategic documents as well as guidelines and multiple consultations with various stakeholders. The WHO people-centred framework for TB programmes formed the underlying structure for setting the goals and objectives. In addition, the goals, objectives, and interventions were developed on the principles of integrated health services, intensified case finding, participatory community engagement, advocacy for political commitment, resource mobilization and research and innovation.

The NSP on TB is not merely a policy document, this plan signifies a resolve. It epitomizes the nation's forward-thinking approach, underscoring the importance of a collaborative battle against both HIV and TB. Recognizing the interplay, understanding the stakes, and championing a concerted effort are at its core.

In the realms of public health, few challenges are as intertwined as those presented by HIV and Tuberculosis (TB). These diseases, each formidable on their own, become particularly complex when their paths converge, leading to compounded health concerns, especially in our country, which grapple with a high prevalence in both diseases. It is a testament to the interplay between HIV and TB, that a person's vulnerability to one can increase due to the other.

Addressing these dual epidemics requires an astute understanding of the broader healthcare and social landscape. Lesotho's pioneering use of the Integrated Health Tool (IHT) for TB stands as a demonstration to this. Adopting a holistic approach, the IHT will aid in addressing multiple health challenges simultaneously going forward. This means optimized resource deployment, streamlined patient care, and a roadmap for anticipating and countering challenges. This approach, emphasizing the confluence of shared resources, emphasizes the potency of unified strategies. Whether it is leveraging diagnostic tools for dual purposes, sharing human resources or tailoring training for healthcare workers, the emphasis is on synergy.

In the journey to mitigate and ultimately overcome the challenges posed by HIV and TB, strategic, integrative, and adaptive planning is paramount. Lesotho's joint initiative serves as a beacon, guiding the way towards a future where the interrelationship between these diseases is acknowledged, addressed, and acted upon to secure the health and well-being of its populace. What follows is the detailed document focusing mainly on TB and how TB relates to HIV.

Acknowledgments

The development of the National Tuberculosis Strategic Plan of Lesotho 2023 – 2028 has been a joint effort between the National Tuberculosis and Leprosy Programme and diverse stakeholders and development partners. We wish to acknowledge with gratitude their valuable contribution in the creating this strategic plan.

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Finally, deepest gratitude goes to the staff of the Programme for their precious inputs and their day-by-day dedication.

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Abbreviations and Acronyms

Abbreviation	Definition
COVID-19	Coronavirus Disease 2019
CAD	Computer-aided detection
CHAL	Christian Health Association of Lesotho
DR-TB	Drug Resistant Tuberculosis
DS-TB	Drug Sensitive Tuberculosis
LAM	Lipoarabinomannan
MDR-TB	Multidrug-Resistant Tuberculosis
Mtb	Mycobacterium tuberculosis
NAAT	Nucleic Acid Amplification Test
NAC	National AIDS Council
NCD	Non-Communicable Disease
NGO	Non-governmental Organisation
NSP	National Strategic Plan
NTLP	National Tuberculosis and Leprosy Control Programme
NTRL	National Tuberculosis Reference Laboratory
PLHIV	People living with HIV
POC	Point of care
SDGs	Sustainable Development Goals
TPT	Tuberculosis Preventive Treatment
TST	Tuberculin skin test
VHWs	Village Healthcare Workers
WHO	World Health Organization
TB	Tuberculosis
XDR-TB	Extensively drug-resistant tuberculosis

Executive Summary

Lesotho is classified as one of the TB high burden countries by the World Health Organization. In 2021, the estimated TB incidence was 614 (CI: 382-900) per 100 000. The 2019 TB prevalence survey of indicated a prevalence of 581 per 100 000 (CI: 466-696) amongst people aged 15 years and older. Approximately 3.8% of people with TB have MDR/RR-TB. GeneXpert is the first-line diagnostic test and has improved the rate of bacteriologically confirmed TB from 52% in 2017 to 64% in 2021. However, only 4 600 people with TB were diagnosed in 2021, compared to the estimated 14 000.

TB treatment coverage is below 50%, and 19% of families affected by TB face catastrophic costs. The COVID-19 pandemic has also affected access to TB services and worsened morbidity and mortality associated with TB. The overall TB mortality in 2021 was 234 per 100 000 population per year. There has been a 16% reduction in TB mortality when comparing 2021 data to 2015.

There is a high (55%) TB-HIV coinfection, and 92% of those people with HIV are already receiving antiretroviral treatment. Additional risk factors for TB include undernourishment, contact with people with TB disease and living and working in areas with high exposure to TB and limited access to TB services.

Based on these data, the country is not on track to achieve to END TB strategy targets by 2030, and innovative approaches and new tools will be required as part of the new strategy to improve TB services delivery and outcomes. Therefore, this fourth TB national strategic plan, that will be implemented with an integrated approach with the HIV programme was developed through a series of consultations with various stakeholders, review of literature and other international and national strategic documents and guidelines. The WHO people-centred framework for TB programmes was the core guiding theory. In addition, the goals, objectives, and interventions were developed on the principles of integrated health services, intensified case finding, participatory community engagement, advocacy for political commitment, resource mobilization and research and innovation.

The objectives and interventions have been structured around two goals as outlined in **Box A.** Goal one focuses on the scale up of TB prevention, diagnosis and treatment and care, while goal two focuses on strengthening health systems related structures. There is a total of five objectives, and 17 related interventions. Each of the interventions has several key activities that have been identified as essential in achieving reduced TB burden. There are targets there have been set for each of the interventions, and some are summarised in **Table A.**

Box A: Summary of the TB NSP 2023-2028 goals, objectives, and interventions

Goal 1: Reduce TB burden by scaling up TB prevention, diagnosis, and care through a people-centred approach.

Objective 1: Scale up TB prevention interventions to reach 95% of eligible people.

Interventions

1.1: Enhance coverage for TB preventative therapy.

1.2: Enhance TB vaccine coverage.

1.3: Reduce TB risk factors and barriers to TB services through a multisectoral approach.

Objective 2: Increase TB detection rate and linkage into care to 95%

Interventions

2.1: Find the missing people with TB.

2.2: Support linkage into TB care and support services for people with TB

Objective 3: Enhance support and quality of care to achieve TB treatment success rate of 95%

Interventions

3.1: Provide integrated quality care and support to people with TB.

3.2: Reduce the impact of TB to affected people.

3.3: Provide post-TB care and support.

Goal 2: Strengthen structures and support systems for integrated, efficient, and quality TB services.

Objective 4: Strengthen structures and support systems for TB programme.

Interventions

4.1: Human resources and community systems strengthening for TB services.

4.2: Strengthen TB programme health systems structures for efficiency, resilience, and pandemic preparedness.

4.3: Strengthen airborne infection control measures.

4.4: Invest in Information systems and digital solutions for TB programme.

4.5: Strengthen procurement systems and supply chain management for TB programme.

4.6: Evaluate for impact and guide innovation and research for TB.

4.7: Lead resource mobilization and coordination of the TB programme

Objective 5: Intensify communication and advocacy for TB.

Interventions

5.1: Enhance TB advocacy and communication with communities and other stakeholders.

5.2: Reinforce partnerships and collaborations for TB Programme.

Table A: Summary of some of the baseline and target indicators for the TB Programme

Indicators	Baseline 2021	Target 2027/28
TB incidence rate per 100,000 population	614	617
Estimated number of new and relapse TB cases occurring during the year	14005	15,000
Proportion of estimated TB cases to detect	32%	66%
TB mortality rate per 100,000 population	234	60
Estimated number of deaths from all forms of TB and deaths from TB in people with HIV in the given year	5339	1458
RR-TB and/or MDR-TB prevalence among new TB patients: Proportion of new TB patients with RR-TB and/or MDR-TB.	2.53%	1.26%
TB HIV incidence rate per 100,000 population	383	385
Number of new and relapse HIV-TB cases occurring during the year	2504	5419
TB/HIV I-1: TB/HIV mortality rate per 100,000 population	174	45
Proportion of TB affected households facing catastrophic costs	19%	0.0%

The National Tuberculosis and Leprosy Programme (NTLP) in Lesotho utilized the Tuberculosis Module of the Integrated Health Tool for Planning and Costing (IHT:TB) to develop realistic budget estimates and assess the potential impact of different interventions for the new Joint HIV and Tuberculosis (TB) National Strategic Plan (NSP) for 2023-2028.

The IHT:TB enabled evidence-based decision making using its health systems approach to cost essential elements like medication, supplies, health worker time, infrastructure, and programme administration. With extensive local adaptation, we projected a total NSP budget need of $84 million **(Table B)** over the NSP period. Key priorities include expanding preventive TB treatment, enhancing screening (especially for high-risk groups), bolstering diagnostic capacity, ensuring treatment access, and monitoring drug resistance. Given evidence of the extent of the costs incurred by patient, investment in patient support (non-medical support) has been prioritized, in the form of food parcels budgeted at $11 914 167 from 2023 to 2028. If fully implemented as costed, the ambitious plan is predicted to yield major impact - averting over 24 000 TB deaths and achieving 35 545 more notifications from 2023-2028 compared to a baseline scenario. The comprehensive budgeting process facilitated by IHT:TB underscores Lesotho's commitment to strategic investment in ending TB, while the projected health gains highlight the immense potential of the new NSP targets. Regular review and updates of these cost estimates using IHT:TB for projections will promote successful plan implementation.

Table B: Total estimated costs for the TB NSP 2023-2028

	Total costs 2023-2028
Drugs and supplies	**$39 713 837**
Programme costs	**$11 773 835**
Health System costs	
Personnel time costs	**$9 844 058**
Inpatient day costs	**$1 905 228**
Outpatient visits	**$19 651 487**
Equipment costs	**$1 489 565**
Total	**$84 378 010**

1. Introduction

1.1. Background

Country context: Lesotho is a small lower middle-income country with a population of 2.3 million and a gross domestic product (GDP) per capita of USD1,300.[1]. Almost two thirds (67%) of the population live in rural areas and females account for 51% of the population.[1, 2] The majority (62%) of the population are aged 15-64 years and average life expectancy at birth is 55 years.[3] The high prevalence of human immunodeficiency virus/ advanced immunodeficiency virus (HIV/AIDS) and tuberculosis (TB) are the major health challenges that contribute to the lower estimated life expectancy.[1, 4-6]

There are high levels of inequality in Lesotho, with a Gini coefficient of 44.6%, and 24% of people live in extreme poverty.[4] The risk factors for poverty include living in rural areas, dependence on agriculture, being part of a larger household and female headed household.[1, 4] Youth (15 – 35 years) unemployment rate in 2019 was 29%.[1] The major economic activities of Lesotho include mining, agriculture and manufacturing.[5] The economy was severely affected by the Coronavirus Disease 2019 (COVID-19) epidemic and contracted by 9.6% in 2020, and has been slowly recovering.[1] The government has made significant improvements in developing social protection programs that target the vulnerable population with programs such as an old age pension, school feeding program and tertiary bursaries.[4]

The country is administratively divided into five rural and five urban districts. These districts also serve as TB and HIV programme coordinating and reporting units under the leadership of the ten District Health Management Teams. Almost half (42%) of the health facilities in the country are owned by government, and others are mostly owned by Christian Health Association of Lesotho (CHAL) and the private sector. The village health workers (VHWs) play a critical role in the provision of community-based programmes and linkages to health centers.

TB Epidemiology: The World Health Organization (WHO) TB statistics for Lesotho for 2021 give an estimated TB incidence of 614 (CI: 382-900) per 100 000. This incidence has reduced by 21% compared to the 2015 data, the year all countries adopted the United Nations Sustainable Development Goals (SDGs).[6] Goal three of the SDGs includes a target to end the TB epidemic by 2030.[6] Lesotho is one of seven high burden countries that have achieved the 2020 milestone of reducing TB incidence by achieving the 2020 milestone of the End TB strategy (a 20% reduction compared with the 2015 baseline).[6] The estimated proportion of people with multi-drug resistant/ rifampicin resistant TB (MDR/RR-TB) in 2021 was 3.8%. [6] The TB prevalence survey in 2019, also found a high TB prevalence of 581 per 100 000 (CI: 466-696) amongst people aged 15 years and older.[8]

Half (55%) of people with TB, are also co-infected with HIV. A significant proportion of the population also has additional risk factors for TB, with 24% undernourishment and 54% of urban population living in informal settlements.[6] In the last few years, there has been an improvement in the provision of TB preventative therapy (TPT), with 92% of child contacts and approximately 60% of people living with HIV (PLHIV) receiving TPT.

Although various interventions have been implemented to support TB diagnosis, there is a 68% case identification gap, with only 4600 people with TB identified compared to the estimated burden of 14 000 in Lesotho.[6] The COVID-19 pandemic exacerbated the case detection gap as fewer people accessed TB services during lockdown and health system resources were also diverted to deal with the pandemic which reduced capacity for other health programmes. TB treatment coverage in 2021 was 32%, and 19% families face catastrophic costs as a result of TB disease [6, 7]. The treatment success rate for new and relapse cases is 76%.[2]. The treatment success rate for new and relapse cases is 76%.[2] The overall TB mortality rate in 2021 was 234 per 100 000 population, which implies a fatality ratio of 40%.[6] The TB review and gap analysis identified four key areas to be addressed in this strategic plan: 1) the high mortality, 2) low case detection rate, 3) high prevalence of risk factors for TB and 4) suboptimal completion of TPT.

1.2. Process for the development of the strategic plan

This Fourth TB National Strategic Plan (TB NSP), which will be implemented in an integrated approach with the HIV programme, was developed through a series of consultations with the Lesotho National TB and Leprosy Programme (NTLP) Managers, TB Programme implementing partners, funders, and other key stakeholders. Some of the key documents that were considered include, but are not limited to, the Stop TB END TB by 2030 Strategy, United Nations High Level Meeting Political Declaration, United Nations Sustainable Development Goals, Lesotho National HIV Multisectoral Strategic Plan 2023-2028 and Lesotho Civil Society Organizations' HIV and TB Priority Charter for Children and Adolescents.

The programme review, consultations with the key stakeholders, TB mortality review, the prevalence survey 2019and literature review informed the proposed goals, objectives, and interventions. The WHO guidance on the development of the TB NSP was also used as a guided to be comprehensive and follow a people centred approach in developing the interventions.

In addition, the development of the of the TB NSP was guided by the following principles.

- *Integrated Health Services*: The aim of combining the HIV and TB NSP is to enhance integration of health services as there is an increase in multi-morbidity, with the

increasing prevalence of non-communicable diseases (NCDs). Therefore, integration of services will also include the management of other chronic diseases such diabetes, hypertension and mental health within the HIV and TB programme health services.

- *Patient Centred Approach:* The patient needs and increasing inequitable access to health services for *prevention*, support and care for HIV and TB diseases is the fundamental principle of this TB NSP.
- *Intensified Case Finding for HIV and TB:* Finding the 'missing people' with HIV and TB must be prioritized to improve case detection rates and treatment outcomes.
- *Participatory Community Engagement:* Civil society, private sector and general community members need to be engaged and participate in finding the solutions for HIV and TB diseases.
- *Advocacy for Political Commitment:* Addressing the social determinants for HIV and TB, as well as providing psychosocial support to people on treatment requires a multi-sectoral approach.
- *Resource Mobilisation and Coordination of TB programme:* The ambitious targets to reach the 95-95-95 targets for PLHIV set by the Joint United Nations Programme on HIV/AIDS (UNAIDS) and bold interventions will need both local and international financing to be achieved.
- *Research and Innovation:* Implementation of newer evidence-based tools (diagnostic tools, vaccines, and medications) and interventions (test and treat programmes and systematic screening) are critical to reduce the burden of HIV and TB.

1.3. Structure of the Goals of the goals, objectives, and interventions

The TB NSP 2023-2028 serves as the roadmap to provide the essential interventions towards achieving global targets for TB and a world free of TB. This NSP also aims to reverse the losses observed in the TB Programme during the COVID-19 pandemic with the associated disruptions to access to health services including TB diagnosis, treatment, and care. These innovative and bold proposed strategic intentions are structured around two main goals. Goal One focuses on the scale-up of all TB services across the continuum of care, prevention, treatment and care and support for people affected by TB according to the people-centred approach. Goal Two emphasises the need to strengthen health system related structures and support systems for the TB programme to provide integrated, efficient, and quality TB services.

1.4. The goals of the TB NSP 2023 -2028

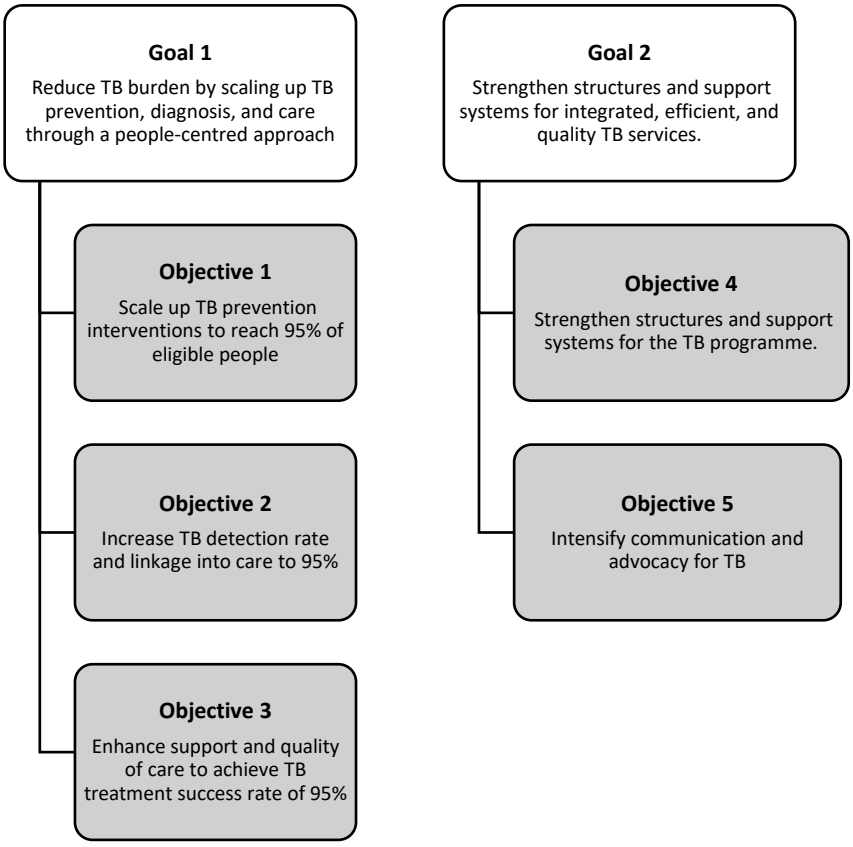
Goal One: *Reduce TB burden by scaling up TB prevention, diagnosis, and care through a people-centred approach.*

Goal Two: *Strengthen structures and support systems for integrated, efficient, and quality TB services.*

1.5. The objectives of the TB NSP 2023 -2028

To achieve the two TB NSP 2023-2028 goals on scale up TB services and strengthening of health system, five objectives have been defined to serve as the basis for the interventions and key activities. There are three objectives under Goal One, and two objectives under Goal Two as outlined in **Figure 1.**

Figure 1: Outline of Goals and Objectives for the TB NSP 2023-2028



These five objectives have several underlying interventions and key activities that have been proposed to further outline how the goal of reduced TB burden in Lesotho would be achieved through strengthened health systems structures and infrastructure. The goals, objectives, and interventions are outlined in **Table 1.**

Table 1: Summary of the TB NSP 2023 -2028 Goals, Objectives, and Interventions

Goal 1: Reduce TB burden by scaling up TB prevention, diagnosis, and care through a people-centred approach			**Goal 2: Strengthen structures and support systems for integrated, efficient, and quality TB services.**	
Objective 1: Scale up TB prevention interventions to reach 95% of eligible people	**Objective 2:** Increase TB detection rate and linkage into care to 95%	**Objective 3**: Enhance support and quality of care to achieve TB treatment success rate of 95%	**Objective 4**: Strengthen structures and support systems for TB programme	**Objective 5**: Intensify communication and advocacy for TB
Intervention 1.1: Enhance coverage for TB preventative therapy. **Intervention 1.2**: Enhance TB vaccine coverage. **Intervention 1.3**: Reduce TB risk factors and barriers to TB services through a multisectoral approach.	**Intervention 2.1**: Find the missing people with TB. **Intervention 2.2**: Support linkage into TB care and support services for people with TB	**Intervention 3.1**: Provide integrated quality care and support to people with TB. **Intervention 3.2**: Reduce the impact of TB to affected people. **Intervention 3.3:** Provide post-TB care and support	**Intervention 4.1**: Human Resources and community systems strengthening for TB services. **Intervention 4.2**: Strengthen TB Programme health systems structures for efficiency, resilience, and pandemic preparedness. **Intervention 4.3**: Strengthen airborne infection control measures. **Intervention 4.4**: Invest in Information systems and digital solutions for TB Programme. **Intervention 4.5**: Strengthen procurement systems and supply chain management for TB Programme. **Intervention 4.6**: Evaluate for impact and guide innovation and research for TB. **Intervention 4.7:** Lead resource mobilization and coordination of the TB Programme.	**Intervention 5.1**: Enhance TB advocacy and communication with communities and other stakeholders. **Intervention 5.2**: Reinforce partnerships and collaborations for TB Programme.

2. Situation analysis: Progress and trends in the HIV and TB response

1.1. Demographic characteristics

Lesotho is a mountainous lower-middle income country (LMIC) that is landlocked and surrounded by South Africa.[1] There is an estimated total population of 2.3 million people. [6] Approximately 67% of the population live in rural areas.[1] Half of the people that live in urban areas, reside in Maseru, the country's capital city. [2] Overall, females account for 51% of the population. [2] Almost two thirds (62%) of the population are aged between 15-64 years, and children 0-14 years account for 34% of the population **(Figure 2)**. [3]

Figure 2: Population proportion by geographic, gender and age group distribution.[1-3]

Figure 2A: Population geographic distribution

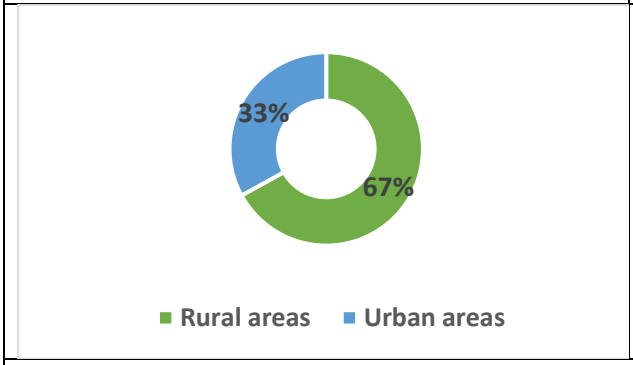


Figure 2B: Population gender distribution

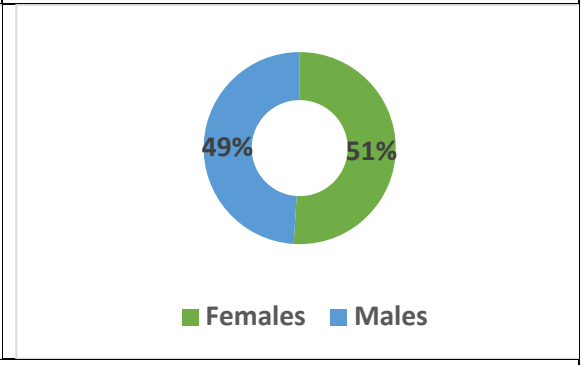
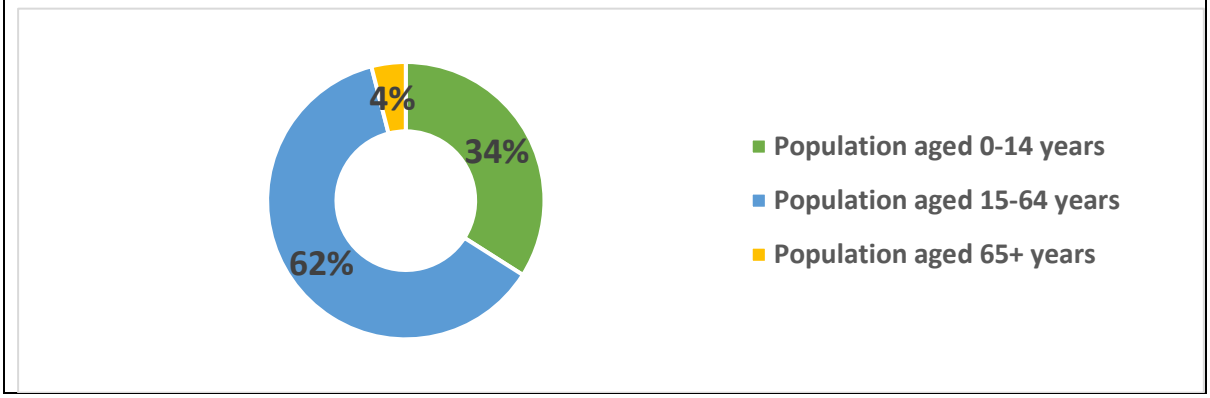


Figure 2C: Population age distribution



The post coronavirus disease (COVID-19) life expectancy has increased by 0.78% between 2021 and 2022 to 55.22 years, and is lower than the 60.9 years life expectancy of other sub-Saharan countries with similar economic status. [1, 4] The high prevalence of HIV/AIDS and TB are the major health challenges that contribute to lower life expectancy. [1, 4-6]

1.2. Political and socioeconomic context

Since independence on the 4th of October 1966, the country has been ruled by a constitutional monarchy, the King as Head of State and a Prime Minister as Head of Government. [5] Therefore, the government is led by a 33-member Senate and a 120-member National Assembly. A new Prime Minister was elected to office in November 2022.[5]

Lesotho has a gross domestic product (GDP) per capita of approximately USD1,300. [1]. There are high levels of inequality, as measured by the Gini coefficient even though inequality declined from 51.9% in 2002 to 44.6% in 2017. Similarly, the human development index (HDI) has been increasing slowly (0.527 in 2020 compared to 0.517 in 2017) even though it is still in the low human development category[1]. Almost a quarter (24.1%) of people live in extreme poverty and half (497%) live below the national poverty line of Lesotho Loti (LSL) 648 per month. [4] People in female headed households, larger households, dependance on agriculture and living in rural areas and children are more affected by poverty [1, 4]. The youth (15 – 35 years) unemployment rate in 2019 was 29%. [1]The government fiscal year is 1st of April to 31st of March. [1] The Lesotho Ministry of Health (MoH) is amongst 15 ministries in the Lesotho Government, which is where the NTLP is located.

The major economic activities in Lesotho are agriculture, mining, and manufacturing. [5] Lesotho's economy contracted by 9.6% in 2020 and grew by 3.0% in 2021.[1] Some of the factors that have resulted in weak economic growth include political instability in the country, challenging global geopolitical tensions, climate change and the COVID-19 pandemic. [1, 5]. The construction of the Phase II Lesotho Highlands Water Project, advances in agriculture from increased government support and growth in the mining industry are expected to improve economic activity [5]. The main agriculture contribution to GDP has declined from an average of 6.3% in the 1980s to 4.9% in 2021.[4, 5]

Lesotho Government has made significant improvements in developing social protection programmes that target the vulnerable populations. [4] The country spends about 6.4% of its GDP on social assistance programmes such as old age pension, school feeding and tertiary bursaries. [4]

1.3. The health system structures.

The country is divided into ten administrative districts, five of the districts are referred to as Highlands, and five as Lowlands. These districts serve as TB and HIV programmes coordinating and reporting units. The administrative authority of the Ministry of Health is decentralized to the local government structures, with 10 District Health Management Teams (DHMTs) managing and coordinating the health activities. The NTLP Manager that

oversees national coordination of the TB programmes reports to the Head of Disease Control. The health system is structured into three levels, primary healthcare clinics or health centers, general hospitals, and specialized hospitals. In addition, there are health posts which are structures which healthcare workers from health centers utilize for outreach and community level Village Healthcare Workers (VHW). Almost half of the health facilities (42%; 115/274) are owned by government, while CHAL owns 29% (79/274) and 1% (4/274) and 28% (74/274) are owned by the Lesotho Red Cross and private sector respectively. Primary health care (PHC) is provided by resident nurses or nurse practitioners working in the 261 health centers and clinics, each of them serving 6000-10 000 population. The health centers are also supported by more than 6000 village health workers (VHWs). The general hospitals at district level serve as referral centers for patients from the health centers as well as centers for coordination and supervision.

In a 2020 study that evaluated out of pocket expenditure for TB services in all the ten districts, 64% of people with TB were diagnosed in public health facilities, while 31% were diagnosed in non-governmental organisation (NGO) or CHAL facilities and 5% in the private sector.[7] The mean out of pocket expenditure for a single TB episode was LSL 809 (~US$ 150), with most (88%) costs being incurred post TB diagnosis phase, and 6% of these were on direct medical costs.[7] The other direct non-medical costs were for travel, food, nutritional supplements, and accommodation.[7] Direct nonmedical expenses also contributed a large (57%) proportion of costs for a TB episode.[8] Overall, 19.2% (95% CI: 14.7–24.6%) of families affected by TB face catastrophic costs. [8] The incidence of catastrophic costs among families affected by TB was 17% (95% CI: 13 – 23%) for patients with drug-sensitive TB (DS-TB) and 92% (95% CI: 81 – 97%) for multidrug-resistant TB (MDR-TB.) [7] The high proportion of patients and families that face catastrophic costs with MDR-TB compared to DS-TB is similar to findings from other 20 countries evaluated in 2015-2021.[8]

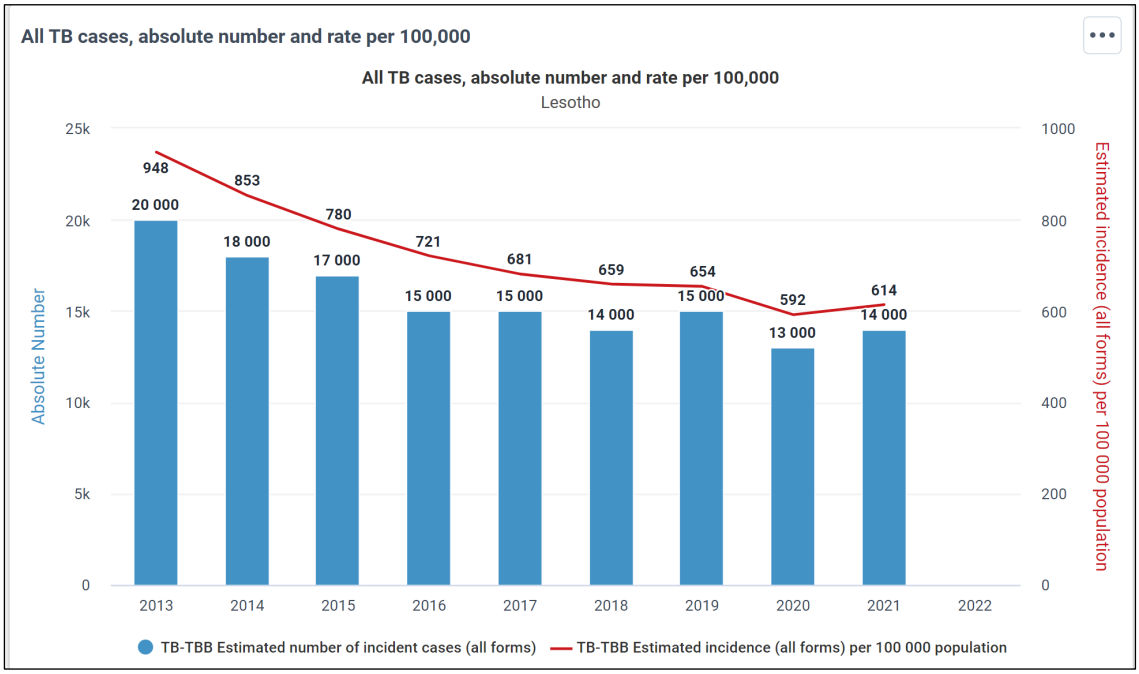
The Department of Pharmaceutical Services is responsible for the provision of medicines to all hospitals and health centres in the country, while the National Drug Services Organisation (NDSO) is responsible for the procurement and distribution of these medicines throughout the health system. As there are no local pharmaceutical manufacturers in Lesotho, all pharmaceuticals are imported. The National Laboratory Services of the MoH is responsible of the National Reference Laboratories (NRL) which lists the National Tuberculosis Reference Laboratory (NTRL) and the National HIV/AIDS Reference Laboratory.

1.4. Epidemiology of TB in Lesotho

Overall TB Epidemiology: Globally, Lesotho is considered a high TB burden country, together with 29 other countries. The estimated TB incidence in 2021 was 614 (CI: 382-900)

per 100 000, which is a 21% change in incidence compared to 2015 **(Figure 3)**.[6] This implies that Lesotho is one of the countries that achieved the 2020 End TB strategy milestone on reducing TB incidence by 20% compared to 2015 baseline.[6] However, the 614 is still above the NSP 2018-2022 target of 420 per 100,000. The TB Prevalence Survey in 2019, also confirmed the high TB prevalence of 581 per 100 000 (CI: 466-696) amongst people aged 15 years and older.[9] The majority (91%) of cases among new and relapse TB notified were pulmonary TB. [6] Similar to many other countries, men were 63% of people with TB, while women and children (0-14 years) were 32% and 5% respectively. [6, 9] The estimated proportion with MDR/RR-TB in 2021 was 3.8%, and this has reduced from 5% in 2015.[6] The proportion of people with MDR/RR-TB was higher (7.7%) for people previously treated for TB (i.e. retreatment).[6]

Figure 3: Estimated Incidence of TB cases (All forms of TB)[6]



TB/HIV and other determinants, risk factors and comorbidities: Almost half (55%) of people with TB with known HIV status are coinfected with HIV, and 92% of those PLHIV are already receiving antiretroviral treatment (ART).[6] Living with HIV is one of the major risk factors for developing TB, and having adverse treatment outcomes. The high HIV prevalence 21% in people aged 15-49 years continues to be a major driver of the high TB burden. A significant proportion of the population also has additional risk factors for TB, with 24% undernourishment and 54% of urban population living in informal settlement.[6] Mental health conditions and substance abuse have also been reported to be higher amongst people with TB-HIV coinfection with negative impact of TB diagnosis, linkage into care and adherence and other treatment outcomes.[10]

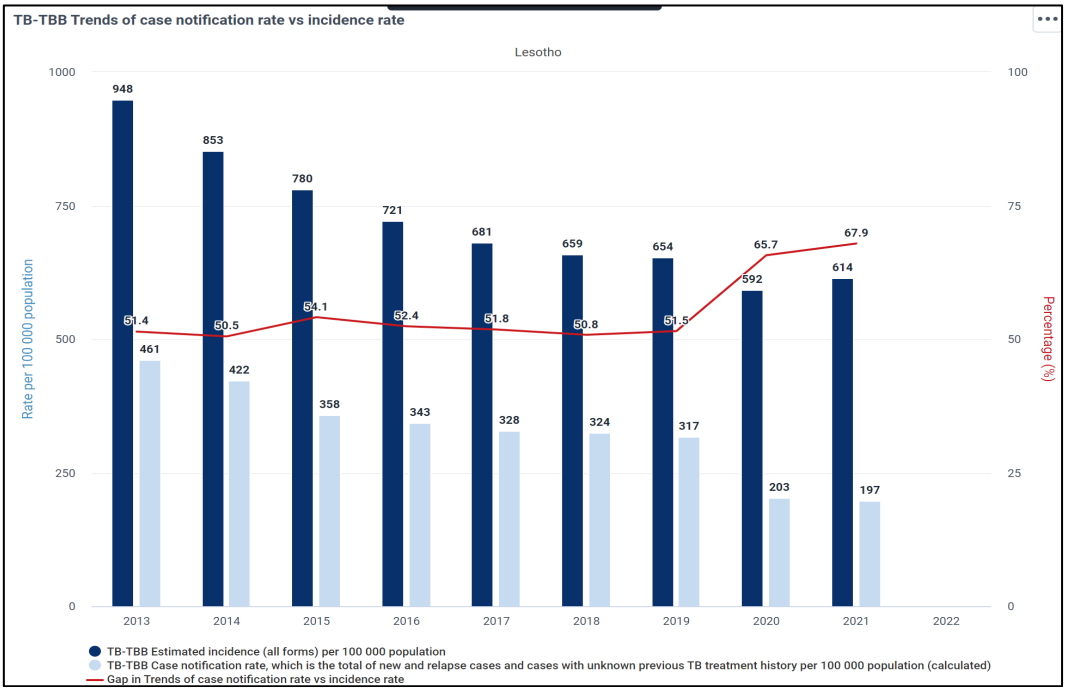
TB preventative therapy (TPT): In the last few years, the country has received USAID/PEPFAR funding to support the TPT programme. The programme has also started the

introduction of shorter regimens for TPT such as 3HP, a 3-monthsupply of a weekly dose of isoniazid and rifapentine. In 2021, 92% of children that are five years and younger and had contact with a person with TB received TPT. TPT uptake amongst people living with HIV (PLHIV) is about 60% and varies by district.[11]

TB screening and diagnosis: GeneXpert for detection of Mycobacterium TB and rifampicin resistance (Xpert MTB/Rif) is used as the first-line diagnostic test for TB and was introduced in 2013. The detection rates of bacteriologically confirmed TB cases out of total TB notified have significantly improved from 52% in 2017 to 64% in 2021. However, there is a variation in rates of bacteriological confirmation by district. In 2021, the rate varied from 49% in Botha Bothe to 78% in Quthing.

Only 4600 people with TB were diagnosed and notified compared to the estimated 14 000 in 2021.[6] This represents a 68% case identification gap or 9,400 people with TB that have been missed **(Figure 4).[6]** The case detection gap was approximately 51% prior to the COVID-19 pandemic. [6] The COVID-19 pandemic resulted in a large relative year to year (between 2019 and 2020) reduction in the number of people with TB disease notified. [6] Some of the reasons for the decrease in case detection during the COVID-19 pandemic include lockdown restrictions, stigma with similar symptoms between COVID-19 and TB, concerns about risk when going to health facilities during the pandemic and reduced capacity of health system to provide regular services.[6, 12]

Figure 4: Trends of the gap between incidence and notified TB cases, 2012-2021. [6]



TB treatment and care: Based on 2021 data, TB treatment coverage in the country is 32%.[6] Lesotho is among ten high TB burden countries that have treatment coverage below 50%.[6] Overall, 17-19% of TB patients face catastrophic costs[6, 7]. The treatment success rate for new and relapse cases is 76%.[6] Yet, the treatment success rate for previously treated TB patients is 79% while for MDR/RR-TB patients is 80%.[6] There have not been any considerable improvements in the treatment success rate over the years, especially between 2015 and 2020 **(Figure 5).**

Figure 5: Trends of TB treatment success rate for DS-TB (HIV-Positive TB cases all types, New & Relapse and Previously treated DSTB)

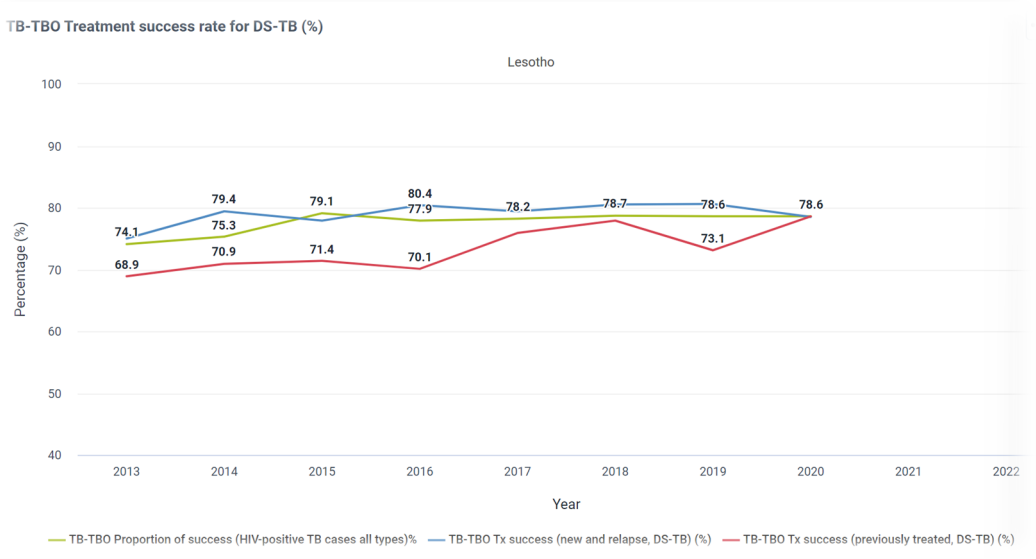
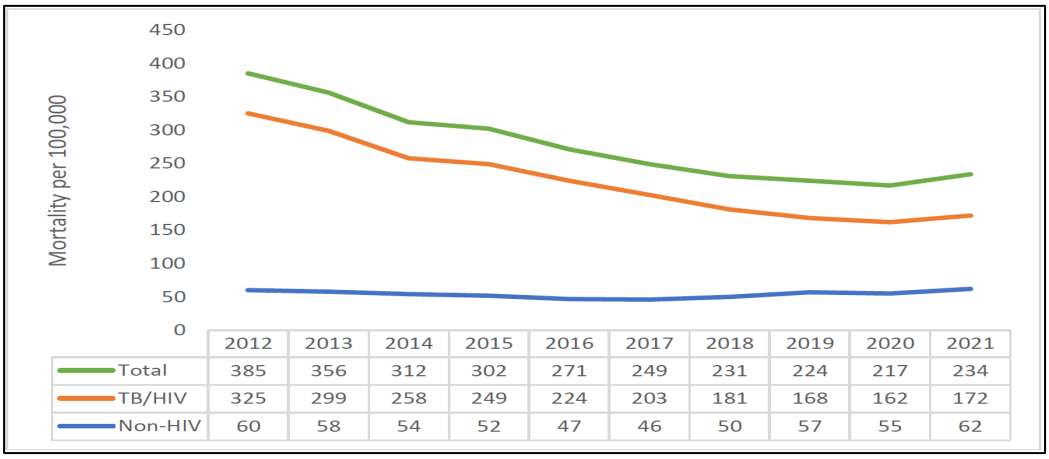


Figure 6: Trends in TB mortality



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total	385	356	312	302	271	249	231	224	217	234
TB/HIV	325	299	258	249	224	203	181	168	162	172
Non-HIV	60	58	54	52	47	46	50	57	55	62

TB mortality: Based on the WHO 2022 Global TB Report, the TB case fatality ratio is 40%, implying that almost half of people that develop active TB disease will die from TB.[6] The overall TB mortality in 2021 was 234 per 100 000 population per year. [6].There has been a

16% reduction in TB mortality when comparing 2021 data to 2015. [6] TB related mortality is higher in PLHIV compared people with TB who are not infected with HIV disease **(Figure 6).** For example, the TB mortality in 2021 in PLHIV was 172 (CI:107 – 251) per 100 000 population per year, while for those that are HIV-negative was 62 (CI: 25 – 116).[6]. In a review of treatment outcomes conducted between 2015 and 2020 in northern Lesotho, almost a quarter (23%) of patients, had unfavourable TB treatment outcomes, and unemployment and age older than 59 years increased the risk of unfavourable outcomes. [13] Mortality in the same review was 19% (342/1781), and the risk of death was higher during the intensive phase of treatment.[13]

1.5. TB programmatic review and gaps analysis

The TB programme review was conducted in 2022 through desk review, interviews with key informants and direct observations at selected health facilities across the country. Therefore, the summary **(Table 2)** of this gap analysis is based on literature, the programme review report, the 2019 TB surveillance, the TB mortality report and the consultations with programme implementers and other stakeholders that support the TB programme.

Although there is high overall knowledge on TB in the general population, more strategies are required to reach men, farmers, illiterate people, and those in rural areas to improve their understanding and attitudes on TB.[14] One of the successes of the TB programme is the roll-out of the Xpert MTB/RIF testing that is available at general hospitals and health centres, however relocation of these machines to facilities (point of care testing) with high demand is necessary to increase access, reduce transport costs and improve turnaround time for results. [15]

A TB Prevalence Survey successfully conducted in 2019, provided timely data on the age groups and genders most affected by TB and confirmed the high (30%) TB and HIV coinfection.[9] Community-based programmes have been observed to increase initiation (98% vs. 88%) and completion (82% vs. 59%) of TPT in children contacts compared to facility based programmes.[16] Furthermore, screening (94%) and contact yield per TB case (0.4) for TB in children contacts was higher in community-based programmes compared to facility based screening (62%) and contact yield per TB case (0.2).[17] Facilitators for successful TPT initiation were healthcare workers training and understanding on TB prevention, while barriers included supply chain management inefficiencies, access to health services and poor adherence (non-adherence) to TPT. [18]

Some of the observed challenges with low case detection rate are that only half (48%) of healthcare centres, and one in five (22%) of hospital visits include a TB symptom screen.[19] Some of the reasons for the low TB symptom screening include staff shortages, minimal training for healthcare worker on TB screening and barriers faced by patients in accessing health services.[19] Half, of the people with positive TB symptoms or a cough during the TB

survey (mostly men) had not sought care for their symptoms. VHW are not knowledgeable on TB screening and diagnosis and need enhanced support and training. However, VHW are underutilized as a TB support system by the communities they serve. [20] Following TB diagnosis, evidence of linkage into care was found to be 70% in a review in the Thaba-Tseka district.[21] For those with MDR/RR-TB, median delay in treatment initiation from availability of results was 12 days (IQR: 7-19).[22] mHealth tools that include sending a short message (SMS) to patients on TB treatment to support adherence were found to be acceptable and also improved the quality of health communication between the patients, healthcare workers and treatment supporters.[23] Despite the strong correlation between untreated mental illness and delayed diagnosis, non-adherence, and poor treatment outcomes in TB [10], mental health screening is currently not a part of routine TB care.

These observed achievements and challenges were instrumental in the development of the new proposed goals, objectives, and interventions for the TB programme. A total of 17 interventions have been proposed under the five objectives. These interventions have numerous key activities under each. In the next section, the interventions, rationale for prioritization, associated key activities and expected outcomes will be described.

Table 2: Summary of key findings in the TB programme review and gaps analysis.

	TB prevention	TB diagnosis	TB treatment and care	Health system
Observed achievements	. High (92%) uptake of TPT for TB contacts, children under 5 years. . Community-based programmes have high initiation and completion for TPT. . Introduction of shorter regimens (3HP) for TPT . High prevalence of social determinants for TB such as poverty, undernutrition, and poor housing.	. Scaled up the use of GeneXpert. . Adoption of urinary LAM for TB diagnosis . Utilization of digital chest X-ray for TB screening . Availability of sputum induction machines for children . High rates of screening and diagnosis for child contacts in community-based programmes	. Stable TB treatment success rate of above 70% . 92% of PLHIV that have TB received antiretroviral medication. . Revised TB treatment guidelines and included newer regimens for DS-TB and MDR/RR TB . mHealth tools for TB treatment support were found to be acceptable by patients and healthcare workers	. Investment in capacity building of healthcare workers . Implementation of community-based programmes . Coordination of implementing partners that support TB services. . Improved data quality and management . Decentralisation of TB services through district TB expert teams and centres of excellence for TB . Developed country specific multi-sectorial accountability framework.
Observed challenges	. Low uptake (50-60%) of TPT in PLHIV. . Suboptimal TPT completion . Other high-risk groups population not included in the TPT guidelines. . Poor compliance to infection control measures in some health facilities	. Case detection rate below 40% . Low case detection especially for children and adolescents, and for extra pulmonary TB . Low TB symptom screening at health facilities . Limited use of other samples for TB tests other than sputum . Reliance on symptom screening and missing or not investigating asymptomatic people with TB. . No clear guidelines on subclinical TB diagnosis and management . Delays in diagnosis and treatment for TB that require multiple visits to a health facility.	. Low linkage into care for people with TB that are diagnosed in community-based programmes or private sector. . Minimal adherence support for people on TB treatment . No guidelines on post-TB care and management and support	. 1 in 5 (17-19%) people face catastrophic costs for accessing TB services. . Limited integration of HIV and TB services . Inadequate advocacy and community engagement on TB . Inefficiencies in supply chain management . Inadequate level of staff at health facilities, laboratories, and community-based programmes. . Difficulty in accessing health facilities or services in some areas, especially in the highlands. . Inconsistent turnaround time for TB results . Village healthcare workers not knowledgeable on TB

1.6. TB key and vulnerable people

A critical component in reducing TB burden includes a greater attention to providing comprehensive patient-centred TB services to vulnerable and hard-to-reach populations.[24] People could be at higher risk of exposure to TB due to where they live or work. [24] Secondly, other vulnerable populations are at higher risk of developing TB due to biological or behavioural factors that compromise immune function.[24] People with limited access to TB services due to structural and socioeconomic factors are also considered as TB vulnerable people.[24]

Based on literature, and programme data, there are various groups of people that are considered key and vulnerable populations for TB as outlined in **Table 3**. According to the WHO TB report, there are five risk factors that account for most of the TB cases. [6] The five risk factors are HIV, harmful use of alcohol, diabetes, tobacco smoking and undernourishment.[6] Additionally, there are multiple overlapping interacting TB risk factors. For example, there is a high prevalence of depressive symptoms (30%) and harmful alcohol use (25%) among people co-infected with TB and HIV.[10] Some of the risks associated with depressive symptoms and harmful alcohol use in people affected by TB include greater stigma, male gender and non-disclosure about their TB disease. [10]

It is estimated that over 40% of people with TB and over 50% of people with MDR-TB suffer from comorbid depression. [25]. Poor mental health in patients living with TB is associated with a three times greater chance of mortality and a nine times higher risk for loss to follow up during treatment. [26]

Based on 2021 data, almost half (49%) of TB cases is attributable to HIV, while 34% are due to undernourishment, 11% to harmful alcohol use, 10% to tobacco smoking and 4% to diabetes. Therefore, the high HIV prevalence continues to be a major driver for the high burden of TB.

Although there are a few mines in the country, for many decades, Lesotho has been a labour sending country for the mining sector in South Africa. Most (86%) of the ex-miners worked in gold mines, and the districts with the highest number of miners are Leribe, Berea, Maseru, Mafeteng and Mohale's Hoek.[27] There is limited available data on artisanal and small-scale mining in Lesotho (sandstone quarries). Occupational lung disease, particularly silicosis, is a major issue in the gold and coal sectors. Ex-miners and miners are at risk of developing silicosis, which is also a risk factor for TB. The prevalence of TB in miners is estimated at 1.3- 7.2%.[27]

The latest TB prevalence survey also indicated that TB prevalence was highest amongst those that are 55 years and older and men.[9] In addition, half of the people with a cough did not seek care for their symptoms, especially men, HIV uninfected people, those living in rural areas and those that were 65 years or older were least likely to seek care. [9]

Table 3: TB key and vulnerable people

1. People at increased risk of developing TB due to behavioral or biological factors a. People living with HIV. b. People that are undernourished c. People with diabetes or silicosis **d.** People with behavioral risk factors (smoking, excessive alcohol use, inject drugs)
2. People who have increased exposure (home/work) to TB. a. Contacts of people with TB, including children b. Peri-urban communities c. People in close contact with livestock d. Healthcare professionals e. People in correctional institutions f. Staff members in correctional Institutions g. Mineworkers, ex-mineworkers, and their households **h.** Public Transport operators and their assistants
3. People who have limited access to quality TB services. a. Migrant workers b. People living in the highland areas. c. People with mental health conditions d. People with physical disabilities e. Older (65 years and older) people f. LGBTQI+

3. Reducing new HIV and TB infections

3.1. TB prevention strategic focus

Objective 1: Scale up TB prevention interventions to reach 95% of eligible people.

Intervention 1.1: Enhance coverage for TB preventative therapy.

Rationale for prioritization: TPT coverage in children aged 5 years and younger in the 2021 report was 92%. There is no data available on the coverage of TPT in PLHIV. There are several studies that have demonstrated that TPT reduces the risk of TB in people that are at higher risk of developing TB such as contacts of people with TB, children, PLHIV and other key and vulnerable populations.

Key activities

1.1.1. **TB preventative therapy guidelines review**: Review and update TB preventative guidelines to consider other key and vulnerable populations for TB based on available evidence-based recommendations. In the review, consider other new regimes as more data is established for shorter regimens. The healthcare workers to be trained on the guidelines following dissemination of the new guidelines.

1.1.2. **Finding people eligible for TPT**: Intensify contact tracing for contacts of people with TB including household members and co-workers to be assessed and initiated on TPT. This will include giving messages and pamphlets to people affected by TB to increase awareness for TPT. Support the integration of TB and HIV services so that more PLHIV could be reached with TPT. Enhance multi-sectoral engagement including the private sector to promote TPT initiation and completion.

1.1.3. **Utilise new TB preventative therapy short regimens**: The are newer shorter regimens that have been adopted already such as the 3HP (isoniazid and rifapentine, weekly for 3 months) for TPT. There is also ongoing research for 1-month regimes. If evidence show that these are as effective in preventing TB, and cost-effective in the long-term, newer shorter regimens should be considered for incorporation in the guidelines. Adequate planning, logistics and supply chain management approaches to be applied to ensure sufficient stock levels on TPT medication in all health facilities.

1.1.4. **Adherence support for people on TPT**: People on TPT to be provided with support to complete treatment with counselling, involving patient supporters, sending short messages (SMS) reminders, multi-month dispensing, differentiated service delivery models and community-based pick-ups.

Expected outcomes: To initiate 95% of people eligible for TPT and support them to complete the TPT.

Intervention 1.2: Enhance TB vaccine coverage.

Rationale for prioritization: Bacillus Calmette–Guérin (BCG) vaccine is provided at birth in countries with a high TB disease incidence or burden. The BCG coverage was reported to be 76% in 2022. There is documentation that BCG vaccine provides protection against severe forms of TB in children such as TB meningitis and disseminated TB. Importantly, BCG is far less effective in preventing pulmonary TB in adolescents and adults. Therefore, new vaccines that target adolescents and adults are urgently needed. There are multiple TB vaccines being evaluated for various clinical scenarios.

Key activities

1.2.1. Increase BCG vaccine coverage: Children are currently provided with BCG vaccination soon after birth as part of the national vaccination schedule. WHO recommends administration of a single dose of BCG vaccine to infants in high TB endemic areas. The aim of this intervention would be to enhance the reach on BCG vaccination services and increase proportion of infants that received BCG from 76% in 2022 to 95% or more by 2028. Logistics and supply chain management to be improved to ensure that there are no BCG vaccine shortages. Engage with the community and provide adequate information to enhance vaccine uptake and reduce barriers to accessing vaccine services.

1.2.2. Support research for new TB vaccines: There is a need for more effective TB vaccines to reduce TB incidence and mortality. Multi-sector collaboration will be essential to build strong regulatory framework for research into TB vaccines and partnerships to have TB vaccine evaluations done in the country.

1.2.3. Advocacy for TB vaccine research: Development of cost-effective TB vaccines needs political commitment, resource mobilisation and community engagement. The country to contribute TB vaccine advocacy within the civil society, national and international political leaders, and other stakeholders. In addition, enhance community engagement with an emphasis to vaccine acceptance and demand issues all people.

1.2.4. Review guidelines for TB vaccines: Review data of new TB vaccines as it becomes available and consider adoption of vaccines that have been shown to be cost-effective across all age groups, especially adolescents and adults.

1.2.5. Plan for implementation of TB vaccines: In preparation for the roll-out of new TB vaccines, put implementation plans on communication of the vaccine, facilities to provide the vaccine and the necessary logistics and supply chain management.

Expected outcomes: Firstly, to have 95% of all children receiving a BCG vaccination. Secondly, to have at least one new TB vaccine that is effective in preventing pulmonary TB in adolescents and adults included in the TB vaccine programme.

Intervention 1.3: Reduce TB risk factors and barriers to TB services through a multisectoral approach.

Rationale for prioritization: A high proportion of TB cases are attributable to HIV, undernourishment, harmful use of alcohol, smoking, and diabetes. Undernourishment was recorded to be increased from 29% in 2018 to 35% in 2020. Similarly, stunting in children 5 years and younger was 35%. Based on the 2019 WHO data, 19% of people with TB face catastrophic costs[28].[6] Although poverty reduced from 57% in 2002 to 50% in 2017 and 36% in 2021, more work still needs to be done to reduce risk factors for TB and enhance equitable and equal access to TB services. Poverty reduction through increase in social protection spending has been shown to be linked with lower prevalence of TB.[28]

Key activities

1.3.1 **Reduce barriers to access to health services:** Accelerate implementation of initiatives that support integrated community-based TB programme to enhance to TB services. This will reduce costs associated with accessing TB services or TB related catastrophic costs faced by people and families affected with TB. All people with TB to be provided with quality holistic care that includes nutritional support, psychosocial support, and screening for other conditions such as mental health conditions as part of the people centred approach. Adopt a multi-sectoral approach to addressing poverty reduction and sustainable development and reduction of other social and structural barriers under the multisectoral accountability framework.

1.3.2 **Health promotion and behavioural change to reduce TB risk factors:** Tobacco smoking cessation counselling and management of alcohol use disorders to be included in the prevention, treatment and support for people affected by TB.

1.3.3 **Integration TB services with other health services:** Integration of TB services with other services, especially for chronic diseases such as HIV, mental health, diabetes, and other non-communicable diseases will enhance screening and access to TB treatment, care, and support. Retention of PLHIV in HIV care and treatment would increase the number of PLHIV virologically suppressed and with restored immune function to reduce the incidence of opportunistic infections like TB.

1.3.4 **Reduction of TB related stigma and discrimination:** As part of the multi-sectoral accountability framework, work with other stakeholders to remove legal, cultural, human rights- and gender-related barriers to accessing TB services. Train healthcare workers on provision of stigma and discrimination free health services. Conduct research to further understand the causes of stigma and what evidence-based

interventions could be implemented in communities to reduce stigma and discrimination for people affected by TB.

Expected outcomes: Equitable and equal access to TB prevention, diagnosis, treatment, and care services, especially for TB key and vulnerable populations. Reduction of risk factors for TB.

Objective 2: Increase TB detection rate and linkage into care to 95%

Intervention 2.1: Find the missing people with TB.

Rationale for prioritization: Based on the 2021 data as reported in the WHO TB report, only 32% (4 500) of people with TB were diagnosed compared to the estimated incidence (14 000; CI: 8700 – 21 000). The gap in case detection has increased from 52% in 2019 to 68% in 2021. The disruption of health services and supply chain management to diagnostic tools and reagents could have contributed to this decline in case detection, as between 2018 and 2021 notification of new and relapse TB cases reduced by 44%. The use of GeneXpert, urinary-Lipoarabinomannan (LAM)and digital X-ray has increased screening and TB diagnosis but these need to be scale-up to reach more people.

Key activities

2.1.1. Systematic active finding for TB: Regular, preferably bi-annual community-based TB screening at household level by the VHWs that is monitored by community leaders. Integration of all community outreach services to include TB screening, diagnosis, and linkage to care. Increase the number of male VHWs to increase gender sensitivity in community-based TB services. Intensify participatory community engagement and involve traditional healers in community-based screening for TB.

2.1.2. Review and update guidelines on TB screening and diagnosis: There has been new research findings and recommendations by WHO to emphasis systematic screening and testing especially amongst key and vulnerable populations for TB. The update on guidelines should consider systematic strategies such as targeted universal testing for high-risk groups irrespective of symptoms, and other forms of TB, including sub-clinical TB diagnosis. Disseminate the guidelines and train healthcare workers on the new guidelines. Implement quality improvement training/initiatives on case identification in health facilities and community-based programmes.

2.1.3. Scale-up the use of digital X-ray for TB screening: Procure additional digital chest x-ray machines to increase coverage and utilization of the digital x-ray for TB screening. Invest in alternative renewable energy power supply for the X-rays and computer-aided detection (CAD) support.

2.1.4. Strengthen contact tracing: Intensify contact tracing for all contacts of people with TB, with a focus to key and vulnerable populations, and screen them for TB and offer TPT to those that do not have active TB disease. Counsel the index patient and enumerate household and close contacts, and conduct home visits or refer contacts to be screened at health facilities. Where possible, utilise digital chest x-ray to screen for TB amongst TB contacts.

2.1.5. Implementation of test and treat strategies for TB: GeneXpert implementation has included both central laboratories and health facilities placements, and that has increased the number of people being diagnosed with a molecular test for TB. To further increase access to TB diagnosis, an increase in facilities that have GeneXpert machines or other Nucleic Acid Amplification Test (NAAT) would be considered based on presumptive TB cases and easy to transport specimens to a central laboratory. In addition, there will be a scale up of utilization of other point-of care diagnostic tests such as urinary-LAM.

2.1.6. Enhance TB diagnosis in children and for extra-pulmonary TB: Scale up utilization of other diagnostic tools such as ultrasound and non-sputum samples such as stool, fine needle aspiration biopsy, urine for TB testing to enhance TB diagnosis in children and extra-pulmonary TB.

2.1.7. Use newer diagnostic tools for TB diagnosis: There is ongoing research on newer diagnostic tools for TB that also use other specimens such as stools, saliva, and blood. Such diagnostic tools should be considered for incorporation into the guidelines as evidence becomes available.

2.1.8. Strengthen health systems structures and communication to support TB detection: Provide back-up renewable energy power supply to facilities with digital x-rays to minimise interruptions of services. Enhance data collection tools to ensure accurate reporting of TB screenings, tests conducted, and number of people diagnosed with TB. Engage private healthcare practitioners, including pharmacists on TB screening, diagnosis and treatment initiation and appropriate reporting mechanisms. Support policy development and dissemination that recognises TB as a notifiable condition.

Expected outcomes: To find 95% of the estimated number of people with TB using the latest recommended guidelines and newer screening and diagnostic tools.

Intervention 2.2: Support linkage into TB care and support services for people with TB

Rationale for prioritization: The proposed interventions in this strategic document are placing a huge emphasis on community-based provision of TB services including screening and testing. Therefore, clear communication and referral pathways need to be established between community-based programmes with the appropriate health facilities. Almost all (96% in 2021) notified DS-TB patients were put on treatment compared to 79% in 2018.

Key activities

2.2.1. Enhance communication and clear referral pathways: Strengthen the linkage and referral between health facilities and community-based programmes. If a person with TB is diagnosed in a hospital, part of the counselling sessions on discharge should include referral to their nearest health facility and community-based programme. There should also be consideration of prisoners at discharge to be linked to their nearest health facility.

2.2.2. Counselling of people newly diagnosed with TB: People recently diagnosed with TB need counselling on the diagnosis, the treatment they need, duration of treatment, identification of people that can offer support and assessment for risk factors that could make it difficult for them to adhere to chronic medication. Based on the identified risk factors for low adherence such as excessive alcohol use, mental health conditions and social barriers, patients need to be referred for appropriate support and care services.

2.2.3. Utilize technology to support adherence: The use of technology to communicate results and provide adherence support.

Most of the key activities that have been included under intervention 3.1 on providing integrated quality care and support to people with TB would also be utilized to support adherence to newly diagnosed people with TB and reduce initial lost-to-follow-up.

Expected outcomes: Reduce initial lost-to-follow-up amongst people newly diagnosed with TB and have 95% or more of people with TB initiated on treatment and supported for optimal adherence

4. Reducing HIV and TB associated burden and mortality

4.1. TB treatment and care strategic focus.

Objective 3: Enhance support and quality of care to achieve TB treatment success rate of 95%

Intervention 3.1: Provide integrated quality care and support to people with TB.

Rationale for prioritization: The TB treatment success rate for new and relapse cases in 2019 was 76%, and this rate was lower for PLHIV (76%).[6] The TB treatment success rate has not varied significantly since 2017. The end TB strategy targets include reducing TB related mortality by 80% by 2030, compared to the 2015 data. The country had only achieved a reduction of 16% in TB-related mortality between 2015 and 2021. Therefore, more innovative strategies are needed to improve the treatment success rate and reduce TB related mortality.

Key activities

3.1.1. Review and update TB treatment guidelines: As the TB treatment drug discoveries are continuously being updated, there is a need to review and update TB treatment guidelines based on the latest evidence-based recommendations. Considerations should also incorporate new shorter regimens for antituberculosis treatment. The TB treatment guidelines need to be integrated with other clinical guidelines such as for non-communicable diseases (mental health, diabetes, hypertension) and HIV and take into consideration the severity of the TB disease [Drug Resistant Tuberculosis (DR-TB), DS-TB, disseminated TB] and the various level of care [community and PHC (decentralized care) and hospital]. Further than that, develop community led monitoring of TB guidelines to support the acceleration of community -based TB services.

3.1.2. Clinical support for healthcare providers: There are patients that have complicated TB or other comorbidities that make the management of their TB disease complex. It is therefore important to establish national and district level consortiums to provide support and training to healthcare providers in the management of people with complicated TB disease, especially acute care. These consortiums would also facilitate routine TB mortality audits at all levels.

3.1.3. Provide differentiated models of care: People with TB to be managed with others with all other patients with chronic diseases. The integrated chronic diseases (HIV and non-communicable diseases) management, that adheres to patient-centred

management plans, patients that are stable on TB treatment will be provided with multi-month dispensing. Similarly, those that are at high risk of complications on TB treatment will be monitored more closely.

3.1.4. Strengthen community-based and community-led support for people with TB: Community-based adherence support and monitoring will improve treatment success and reduce the number of patients that are their outcomes are not evaluated and did not complete TB treatment. This will also be one of the approaches to increase reach of TB services and reduce costs to the patient if the services are closer to where they live. Some of the TB services to be offered in the community TB treatment initiation, medication refills, DOTs, and household contact tracing. In addition, develop participatory community communication and engagement strategies for advocacy and social mobilisation to further facilitate improvements of TB treatment completion.

3.1.5. Enhance utilization of various tools to support adherence: There are various tools such as pillboxes, SMS reminder and COMM-care that have been shown to improve adherence to TB treatment. These tools will need to be scale up to reach more people with TB. Moreover, develop TB treatment literacy aids that target the people with TB and their families.

3.1.6. Establish support groups for people with TB: There is enormous data from the HIV programme that indicate that support groups and peer champions are beneficial for people on chronic medication to improve retention in care. Adopting this model and or using people that have completed TB treatment or integrating with HIV support groups will enhance assisted self-supportive management.

3.1.7. Support TB research and innovation: Establish a surveillance system for detection and monitoring of emerging drug resistance and use the data to support revision of treatment guidelines. The TB programme leadership to contribute to developing TB research agenda with the various partners.

3.1.8. Health systems strengthening for high TB treatment success: Scale up the utilization of TB module in the e-register to monitor adherence and adequately capture TB treatment outcomes. Scale up equine-hire in hard-to-reach areas to support sample transportation follow-up sputum that aids in defining TB treatment outcomes. Continue engagements with the private sector to provide the practitioners with the appropriate tools and referral pathways for supporting people on TB treatment and reporting data on the relevant platforms.

Expected outcomes: Enhanced integrated people-centred care and support for people with TB to improve treatment success rate to 95% by 2028 and reduce TB related mortality by 90% by 2030.

Intervention 3.2: Reduce the impact of TB to affected people.

Rationale for prioritization: Based on the last evaluation, overall, 19% (17% of those with DS-TB and 100% of those with DR-TB) of people with TB experienced TB related diagnosis and care catastrophic costs. Most of the costs were related to transportation/ travel to health facilities and food. One of the TB targets outlined in the STOP TB partnership that's aligned with the United Nations sustainable development goals and WHO end TB strategy is to eliminate TB-related catastrophic costs.

Key activities

3.2.1. Provide psychosocial support to people affected by TB: Increase the number of personnel that offer psychosocial support at all levels of care (clinics, hospitals) to increase access to such services for people affected by TB. Strengthen the social protection support by amendment of the national social protection strategy to include vulnerable TB patients.

3.2.2. Provide material support for families affected by TB: Provide Food-for-TB-treatment in collaboration with Ministry of Agriculture and Social development, UNICEF, WFP, World vision and others. This will require collaboration and coordination between programmes and sectors under the multi-sectoral accountability framework.

3.2.3. Reduce costs of accessing TB related services: Universal health coverage index for essential health services was 48% in 2019.[6] Strengthening of community-based and community-led support for people with TB will reduce need to travel for services increase reach of TB services.

3.2.4. Community engagement to reduce TB related stigma and discrimination: Conduct campaigns and education to reduce TB related stigma and discrimination that might be a barrier to accessing TB services. Measure the impact of such initiatives with stigma index assessment and scale up successful interventions.

Expected outcomes: Elimination of people/families experiencing TB-related catastrophic costs by 2028.

Intervention 3.3: Provide post-TB care and support.

Rationale for prioritization: The TB programme services need to continue beyond TB treatment successfully completed as some patients continue to suffer with post-TB treatment sequelae. The advent of newer TB regimens, especially for MDR-TB and improvements in TB care and support implies that more people will need post-TB care. Post-TB treatment care and support requires a multi-disciplinary people-centred approach management to enhance the quality of life and prevent TB recurrence.

Key activities

3.3.1. Develop post-TB care and support guidelines: There are no country specific guidelines of the management of post-TB care and support. TB programme to work with partners and experts in the field to develop post-TB care and support guidelines. Elements to consider in the guidelines to comprise review of lung functioning, psychosocial needs assessment and evaluation of TB recurrence. The guidelines to be disseminated to all healthcare providers and included in the TB treatment training programmes.

3.3.2. Establish clear notification and referral pathways for post-TB care: Develop community-based feedback mechanisms to communicate patient status, including social needs at 1 year post treatment by VHWs, local council and or the chief. Some patients might require referrals for specialist care for lung rehabilitation, surgery, and social services.

Expected outcomes: Enhanced quality of life for people previously treated for TB.

5. Health system strengthening for integrated HIV and TB services.

5.1. Health system strengthening strategic focus.

Objective 4: Strengthen structures and support systems for TB programme.

I**ntervention 4.1**: Human resources and community systems strengthening for TB services.

Rationale for prioritization: Investment in human resources and community systems strengthening is a critical enabler in scaling up TB prevention, diagnosis and treatment and care. There is currently shortage of healthcare workers according to the population needs. Capacity building with coordinated trainings for healthcare workers has previously improved the quality of TB services.

Key activities

4.1.1. Increase the number of healthcare workers positions: Review the number of the different levels of health professionals in health facilities such as medical doctors, nurses, laboratory technicians, pharmacists, counsellors, radiologists and increase positions depending on the needs of the health facilities. Advocate for political commitment to break the cycle of shortages in the health systems and increase financial commitments.

4.1.2. Investment in capacity building: There are several guidelines' reviews and updates that have been recommended for screening, diagnosis and treatment and care for TB. Therefore, it will be important to invest in continuous capacity building for the healthcare workers to improve diagnosis and treatment, especially in children and for extra-pulmonary TB. The trainings should cover topics such as use of alternative specimens to sputum (stool, urine, and blood) for TB screening and diagnosis and use of point-of-care tests for TB. Intensify supportive supervision for all levels of personnel.

4.1.3. Retain, support, and motivate healthcare workers: Motivate for the inclusion of VHWs and contact tracers, TB screeners, data clerks in the establishment list of MOH Public Service establishment so that they can receive all the benefits of permanent employment such as occupational health services and wellbeing programmes. Reinforce the operationalization of the occupational health policy in health facilities.

4.1.4. **Strengthen community systems for health:** Resource and capacitate community health systems structures that support health programmes. Advocate for leadership development and better integration and coordination of the community systems

Expected outcomes: TB services that are supported by adequate, resilient, and knowledgeable healthcare providers of different cadres.

Intervention 4.2: Strengthen TB programme health systems structures for efficiency, resilience, and pandemic preparedness.

Rationale for prioritization: The COVID-19 pandemic demonstrated that many countries were not prepared for a pandemic of this scale and speed. The pandemic also highlighted the weaknesses in the health systems. Effectively dealing with ongoing epidemics of TB and HIV will assist in strengthening the health system to be more resilient and better prepared for other pandemics.

Key activities

4.2.1. **Support policy development**: Advocate and support the development and operationalization of a policy on community-based initiation of TPT and TB treatment.

4.2.2. **Invest in facilities and infrastructure:** Increase the number of buildings for screening points and waiting areas for TB. Advocate for establishment and revival of functional health posts by providing appropriate equipment, deploying relevant human resources, and scheduling medical doctor's visits at clinic level. Build centres of excellence for referral of complicated TB patients. Expand utilization of artificial intelligence equipment for TB services such as digital chest x-rays. Procure equipment for telemedicine implementation in TB programme. Prioritize maintenance of laboratory equipment including calibration and replacement of faulty equipment. Procurement of sputum induction machines to be included in the financial planning.

4.2.3. **Coordinate and integrate TB services with other health services:** TB services to be integrated with all other services provided at community level, primary healthcare facilities and hospitals. Integration of services should also be implemented during community outreach services. Support coordination and collaboration with private practitioners and pharmacists for integrated care and reporting.

Expected outcomes: Health systems structures and infrastructure that is well functioning for an overall efficiency and pandemic preparedness.

Intervention 4.3: Strengthen airborne infection control measures.

Rationale for prioritization: TB prevention and control consists of several measures designed to reduce the risk of M. tuberculosis transmission within populations. The WHO has developed three levels of controls that include administrative controls, environmental controls, and respiratory protection controls. In line with the goal to reduce TB disease burden, and decrease TB incidence rate, the infection prevention control (IPC)measures need to be implemented at all health facilites and places where people congregate.

Key activities

4.3.1. Adhere to recommended IPC measures guidelines: Develop standards for airborne infection control in health facilities and other indoor places where people congregate based on international guidance. Disseminate the guidelines to all relevant stakeholders and government departments. Develop guidelines for monitoring and evaluation of airborne infection control. A multi-sectoral approach for advocating for the IPC standards such as 5-6 air exchanges per hour for buildings, occupational programmes at workplaces will be essential.

4.3.2. Implement administrative, environmental, and respiratory protection controls: Follow the WHO recommended guidelines on the three-level hierarchy of controls. Support IPC committees in healthcare facilities and correctional institutions to effectively implement the recommended controls. Ensure quality assurance and improvement initiatives on IPC measures are funded and implemented in healthcare facilities.

Expected outcomes: Reduce the risk of f M. tuberculosis transmission within populations by reducing the concentration of infectious droplets in the air and the exposure of susceptible people.

Intervention 4.4: Invest in Information systems and digital solutions for TB programme.

Rationale for prioritization: Information systems for healthcare have become increasingly advanced in the last years, and the TB programme needs to ensure that they utilize the wide range of capabilities that digital solutions provide. The mobile technology applications could also support community-based programmes.

Key activities

4.4.1. Invest in digital solutions for TB data: Support development of recording and reporting modules in papers and electronic records systems. Collaborate with Ministry of communications in licences and antiviruses support and ensure internet access in all health facilities.

4.4.2. Procure essential equipment for information systems: Procure equipment to improve electronic information management systems at facility, district, and national levels. Ensure maintenance and servicing of information system equipment through budget allocation. Procure additional x-rays machines with AI capability and for better coverage. Where possible, link AI with telemedicine.

Expected outcomes: Utilization of the latest digital solutions to support the scale up of TB screening, diagnosis and treatment and care services.

Intervention 4.5: Strengthen procurement systems and supply chain management for TB programme.

Rationale for prioritization: The supply of essential commodities such as medication, reagents for testing and other consumables for the management of people affected by TB is the backbone to achieving optimal outcomes. Reagents and medication stock outs are disadvantageous to the health system and could result in loss in confidence by both healthcare providers and patients.

Key activities

4.5.1. Commodities management: Support Supply chain unit to develop informed estimates for commodities and ensure their availability. Prevent stock-outs of TPT and TB treatment medication. Adequately plan for the introduction of new regimes. Ensure 90% stock availability for reagents and consumables. Monitor stock-outs of essential commodities and report at appropriate levels.

4.5.2. Diversify transportation: Procurement/hiring of transport systems like motorcycles for sample collection and delivery of results. Invest in technology like drones for sample and or medication transportation in hard-to-reach areas. Revive equine hire in hard-to-reach areas for samples and drugs transportation from community level.

Expected outcomes: Adequate levels of all commodities required to scale up TB screening, diagnosis, treatment, and care.

Intervention 4.6: Evaluate for impact and guide innovation and research.

Rationale for prioritization: The scale up of TB services needs to be informed by accurate data. Therefore, it's important to facilitate easy with which data is collected and to improve the accuracy of data on people affected by TB.

Key activities

4.6.1. Enhance utilization of data reporting tools: Review Health information management systems to ensure all activities, at all levels of care can be reported in existing systems such as DHIS 2 and LOMSHA. In addition, ensure that all organizations and partners also report in these systems, including Scale up health management information systems in correctional services facilities. Scale up e-Register TB module utilization. Work towards a shared patient record for integrated disease management. Direct supportive supervision of data collection to districts and health care centers. Strengthen reporting by VHWs and community implementing partners. Employment of more M&E HR (data clerks) to facilitate transition to paperless RR (HSS)

4.6.2. Analyse data and inform TB services strategy: Analyse routinely collected data to inform the TB services strategy. Increase access to data for all TB services implementers and ensure that data quality assessments, quality improvements and quality assurance are conducted, including a mandatory TB mortality audit at all health system levels.

4.6.3. Support innovation and research in the TB programme: Support the conduct of verification and roll out point-of-care tests. Motivate TB research in all districts. Review the roll-out of new regimens with surveillance. Develop an annual TB research agenda to be included into the National Health Research Agenda. Support the conduct clinical trials and operational research studies. Advocate for situation analysis about human rights and developing patient groups and other key groups.

Expected outcomes: Enhanced routinely collected data processes and dissemination to improve the TB services and research.

Intervention 4.7: Lead resource mobilization and coordination of the TB programme.

Rationale for prioritization: Resources are essential to support the NTLP, improve equitable access to TB services and reduce the burden of TB.

Key activities

4.7.1. Resource mobilization for the TB programme: Advocate for political commitment to reduce the burden of TB disease through strengthened health systems structures and an increase funds allocation to NTLP from the MoH. Advocate for establishment of Parliamentary TB caucus and for the office of the Prime Minister for clear directives relating to TB activities to the Ministries. TB programme activities to be included in funding requests to local and international funding agencies.

4.7.2. Coordination of TB activities: The TB programme leadership to coordinate all interventions and activities on TB. Collate data on TB services and report to relevant stakeholders. Reinforce compliance to health and safety regulations. In addition, reinforce functionality of technical working groups for TB.

Expected outcomes: Sufficiently resourced TB programme to support the scale up of TB services.

Objective 5: Intensify communication and advocacy for TB.

Intervention 5.1: Enhance TB advocacy and communication with communities and other stakeholders.

Rationale for prioritization: Participatory community engagement, linkages, and coordination are essential for the scale up of TB screening, diagnosis, treatment, and care. The health sector, including the TB programme needs to establish longstanding and effective partnerships with the community and an improved uptake of services that are tailored to the unique needs of that community. If the trust relationship is established, the community will be more likely to accept recommendations and implementation of TB programme plans will be more robust.

Key activities

5.1.1. Enhance communication with communities: Improve communication with people affected by TB using various platforms, such as print media, radio, social media, and community gatherings. Engagement of community leaders will be essential to facilitate participation of communities in the engagement. Development of

community working groups might also serve as a channel to disseminate information and sensitization of the communities on essential TB services. Capacitate NAC and District AIDS Committee on TB. Conduct TB awareness campaigns.

5.1.2. **Develop content and materials for communication**: Develop IEC materials in Sesotho and English to target communities with different levels of education. Establish e-learning platform for community stakeholders. Advocate for expansion of the pull of CSOs to indulge in TB response.

Expected outcomes: Communities engaged in the fight against TB disease.

Intervention 5.2: Reinforce partnerships and collaborations for TB programme.

Rationale for prioritization: Partners have previously supported the TB programme with human resources, equipment, and infrastructure to support the TB programme. These collaborations and partnerships need to be continued for efficient TB programme services. WHO has recommended that each country to develop the multi-sectoral accountability framework to enhance political commitments and support coordinated multisectoral response in addressing healthcare problems.

Key activities

5.2.1. **Apply the multi-sectoral accountability framework (MAF):** Advocate for declaration of TB as a Public health emergency of concern that all ministries, government, and private sectors need to contribute towards reducing. Under the recently established MAF, engage the Justice sector to accelerate policy reforms to help reduce overcrowding in prisons. Advocate for social support for TB patients by collaborating with relevant stakeholders for food security such as social development.

5.2.2. **Strengthen collaborations for TB control**: Activating and reinforcing the school health programme of the MoH to include TB services as part of the integrated health services provided to learners in schools. Encourage private sector collaborations for supporting domestic funding and human resource for health work force. Encourage police leadership to consider regular TB screening for suspects and police officers as well as segregation of suspects based on screening outcome. Strengthen linkages and referrals between correctional health system and the public health system.

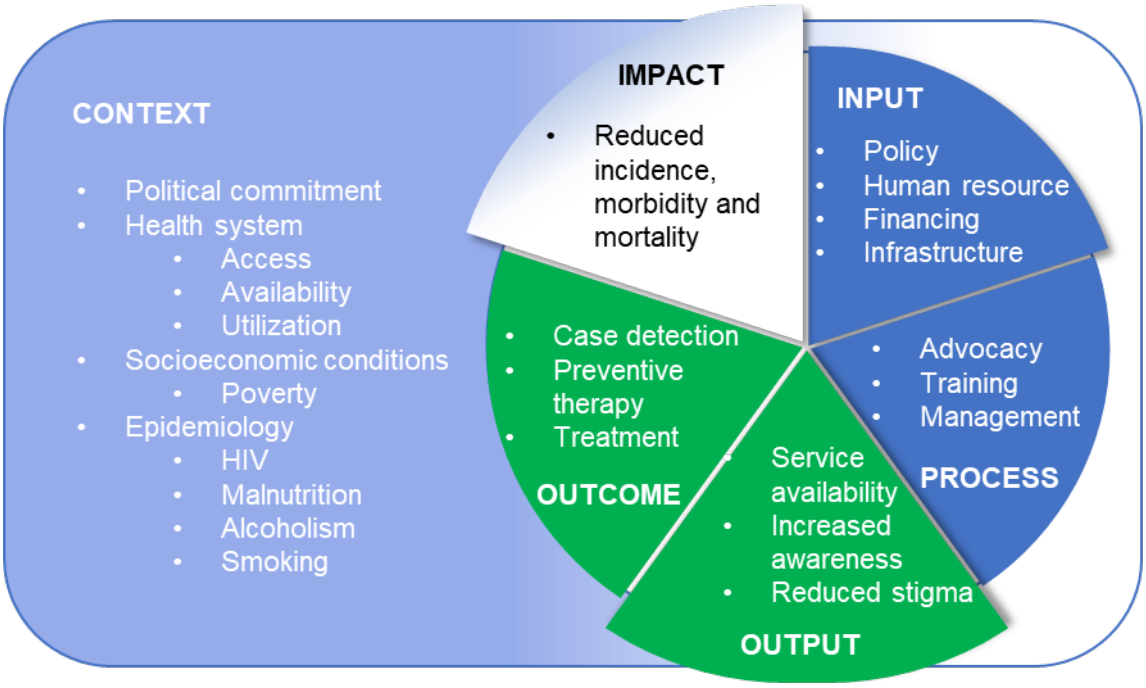
Expected outcomes: All relevant ministries and government and private sectors involved in the multi-sectoral accountability framework.

6. Monitoring and evaluation for TB programme

6.1. Monitoring and evaluation Plan

Monitoring and evaluation framework: The NSP inputs, processes, outputs, outcomes, and expected impact form the monitoring and evaluation (M&E) framework, from which relevant indicators and targets shall be used for monitoring and evaluation **(Figure 7)[29].**

Figure 7: The monitoring and evaluation framework [29]



M&E coordination mechanisms: The NTLP has a M&E section that is led by a technical lead and reporting to the head of the program.

The roles and responsibilities include:

- Continuous surveillance of Tuberculosis and Leprosy trends
- Coordination of the M&E and research activities in order to provide performance measurements for the TB control interventions and activities.
- Capacity building of all TB service providers on recording, reporting, data management, analysis and dissemination of TB outputs, and outcomes.
- Development and dissemination of M&E policies, guidelines, and tools
- Coordination of M&E stakeholders in the program
- Develop and roll out integrated data systems for the program such as DHIS2 and a proposed electronic case-based surveillance system.

M&E Partnerships: The M&E unit participates in the Strategic information technical working group of the ministry of health that meets on a need's basis (ideally quarterly), and the focus has been on the dhis2 platform. There are meetings with stakeholders related to strategic information regarding TB related data, but this is not yet structured and formalised.

6.2. Monitoring and evaluation capacity

Surveillance System: The NTLP has a surveillance system under the MoH surveillance unit. The source data are paper-based records at health facilities which are aggregated into the web based DHIS2 platform. Lesotho Output Monitoring System for HIV-AIDS (LOMSHA) is another source of data and currently has TB indicators incorporated. This NSP period hopes to realise the integration of TB & HIV in the electronic case-based surveillance system for real-time patient level data (intervention 4.6). TB surveillance includes weekly screening cascade, case notification and TPT enrolments that are shared with the following stakeholders:

Human resources: The NTP currently has an M&E unit with a team of 3 national and 2 field M&E officers. Donors currently support all 5 officers. The TB data at district level is managed by health information officers (government paid) who oversee all health data as well as Strategic Information and Evaluation officers (supported by the Elizabeth Glaser Paediatric Aids Foundation – EGPAF) and at the facilities have data clerks (supported by Global Fund) and records assistants (supported by the Elizabeth Glaser Paediatric Aids Foundation – EGPAF). Collaboration at the ministry of health level is on a need's basis.

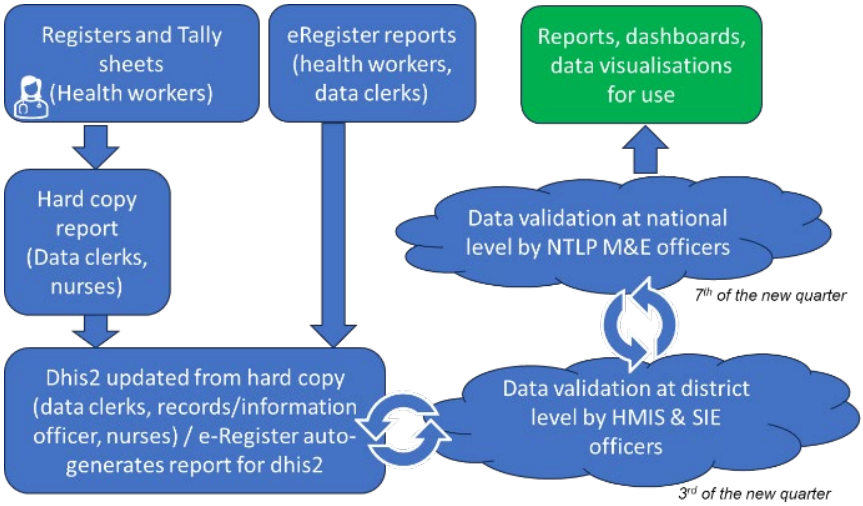
Big Data analysis, Refresher training on GIS mapping, modelling, and costing skills are some of the critical skills needed by team to boost their support to the NTLP. At district level the HMIS and SIE officers need data visualization and analysis skills using the DHIS2 platform.

In terms of staffing, high volume facilities could have a focal point and thus improve the focus on TB data at facility level.

6.3. Data management processes

Data Collection: Routine data collection is undertaken at various service delivery points including public health facilities, private health facilities and community level either using paper based or electronic data capture systems as summarised in **Figure 8.**

Figure 8: Diagrammatic representation of TB programme data flow



Data storage archiving and confidentiality: DHIS2 data is hosted on the ministry of communication server, whereas the e-Registers are hosted on facility-based servers. Survey data is not hosted on any server but is retrieved from mail or local backups.

There is a research and ethics department of the ministry of health that oversees confidentiality of human subjects as well as data protection. The HMIS policy addresses data security.

There is no current backup for manual archives before DHIS2. Data migration and digital archiving needs to be done for comprehensive data storage within this NSP period.

Reporting: Apart from monthly DR-TB data (collected for validation and triangulation) most of the data is reported on a quarterly basis in the TB HMIS report.

Data analysis: Data is validated, analysed, and disseminated for use on a quarterly basis using dhis2 dashboards.

6.4. Data quality assurance

Routine DQAs are done at facility level using trends and the poorly performing facilities are supported in ensuring data quality improvement. Key aspects include, data system requirements, flow charts, checklists, responsibilities, availability of reports, use of the standard operating procedures (SOPs), capacity of data personnel, etc. these are to be done on a quarterly basis.

Key program indicators and the variance margins and periodicity of the data quality assessments. This is in addition to the data validation done prior to submission to DHIS2 mentioned in the figure above.

Standardized development and utilization of tools, guidelines, and checklists: Standard operating procedures are in place; tools were last reviewed 5 years ago prior to the end term evaluation.

Supportive supervision: These are to be conducted on a quarterly basis although due to competing priorities, only 1 out of 4 were done in the previous year. Supervisions are targeted, variances with indicators are looked at (reports versus dhis2 submitted data). This is usually done with the district coordinators and M&E personnel.

6.5. Program review, evaluation, and surveys

Program reviews and evaluations: The NTP regularly undertakes standard program reviews in line with global best practices. This includes internal program reviews, mid-term, and end term review of the NSP as well as epidemiologic review. The reviews are typically led by the NTP but where necessary, involve external stakeholders to validate the exercise and ensure alignment with global best practice.

Under this NSP, the program shall undertake the following programmatic reviews:

- **Mid-term review***:* This will be undertaken at the mid-point of the NSP (2024/25) in line with global best practice.
- **End Term review:** This will be undertaken on the last year of the NSP (2027/8) and shall inform the subsequent strategic planning process.
- **Epidemiological Review** This will be conducted using WHO standards and benchmark criteria in line with global best practice. The proposed year is 2024/25.

Surveys and surveillance: The NTLP conducted the following surveys: TB prevalence survey (2019) DR Survey (in process) Catastrophic cost survey etc. We propose a Stigma index survey, TB prevalence survey in correctional facilities, mines, etc.

Research and special studies: There is currently no National research agenda. However, it is in plan to have it developed where national TB research priorities shall be outlined and collaborations with other related ministries and academia involved.

6.6. Information products, dissemination, and use

The National TB Program develops a variety of M&E information products for internal and external use.

Key information products developed by the program include:

- **Performance review meetings:** These are held on a quarterly basis to inform the NTLP and stakeholders at district levels. Donor governance meetings are also held quarterly to review their performance.
- **Programmatic reports**: The program produces an annual report that contains information on TB control activities in the country including performance monitoring as well as service and data quality. This report has not always been timely and the plan is to write sections of it on a quarterly basis for easier compilation.
- **Guidelines and Policy Documents**: These are produced and reviewed regularly to ensure that stakeholders at the various levels are up to date with current TB control recommendations. They are produced through consultative process that involve various stakeholders. They inform decision makers, service providers and other stakeholders on technical direction the program is taking and help ensure that patients receive the best possible care, and that TB prevention and control efforts are evidence-based and effective.
- **Patient education materials**: These products provide information about TB to patients and their families, including information on TB symptoms, treatment, and prevention. They help patients understand their condition and how to manage it, as well as reduce stigma associated with TB. These are developed by the NTLP team with support from the M&E team.
- **Dissemination:** The TB program utilizes various channels to disseminate TB information and information products. This *includes print and digital media, conferences and workshops, TB data dashboards, and social media campaigns.*

Mortality audits, NSP, epidemiological and program reviews are disseminated at the Ministry of health with invited key stakeholders. Global TB (WHO) report is submitted annually, whereas the Global fund report is submitted quarterly.

The assumptions and the targets for the period 2023 – 2028 have been presented in Appendix 2, Monitoring and evaluation.

7. Resource Mobilisation and costing for HV and TB program

7.1 Estimating TB programme costs and impact with a health system approach

The success of Lesotho's National Strategic Plan for HIV and Tuberculosis (TB) (NSP) for 2023-2028 depends on realistic and comprehensive planning that includes estimating the costs and impact of different intervention scenarios. To achieve this, the National Tuberculosis and Leprosy Programme (NTLP) staff and relevant local partners were trained in using the Tuberculosis Module of the Integrated Health Tool for Planning and Costing (IHT: TB) by an independent Health Economist consultant who represented the World Health Organization (WHO) Global TB Programme and one of the mathematical modelers behind the IHT: TB (https://tb.integratedhealthtool.org/). The IHT is a United Nations (UN) flagship tool developed by the WHO secretariat, which utilizes a modular design with inbuilt links between impact models, demographic projections, and disease-specific assessments. This chapter outlines the methodology and processes involved in estimating the Lesotho TB Programme costs and impact with a health systems approach using IHT: TB.

IHT: TB presents a unified costing approach. IHT is the next-generation and upgraded web version of the OneHealth Tool, a UN flagship tool (WHO secretariat) to support planning, impact analysis and costing that functioned as a desktop (downloadable) version and that was used by over 60 countries from 2012 to 2022.

IHT is a web-based tool (WHO, 2023) which is used to support national strategic health planning over the medium term (3-10 years). It provides planners with a single framework to assess costs, health impact, scenario comparisons and financing strategies for one or multiple diseases, or health sector wide. IHT encourages unified planning for the health sector and uses an integrated approach to health system and disease programme planning. It adheres to WHO guidelines and standardized methods for costing, cost-effectiveness, and investment cases such as the Reference Case for Estimating the Costs of Global Health Services and Interventions; Reference Case for Economic Evaluation and the Costing Guidelines for Tuberculosis Interventions [30-32].

The TB module of IHT (IHT:TB) https://tb.integratedhealthtool.org/ launched by WHO on 1st of July 2023 was the first IHT module for cost and impact assessment to upgrade and migrate from OHT desktop to the IHT-web-based format. Importantly Lesotho is one of the pioneer countries employing this new tool and its costing method, together with Ethiopia and Eswatini who also adopted the approach in 2023. This work has been presented at the

WHO End TB Strategy Summit in Paris, France in November 2023, where the presentation made by the NTLP manager won an award for the best poster presentation.

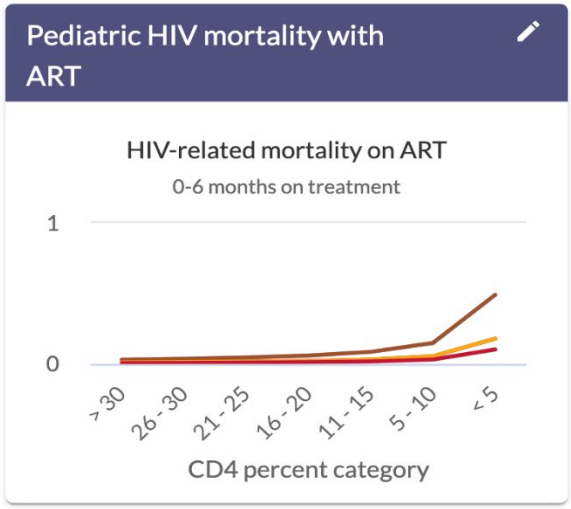
Furthermore, due to the nature of extensive comorbidity between HIV and TB as well as the need to provide a joint HIV and TB NSP, the underlying model of IHT:TB that incorporates HIV and TB model interactions and data specifically through Demographic Projections in the DemProj Model and AIDS Impact Model (AIM) provided an opportunity to join forces in a more meaningful way. The TB module in IHT (IHT:TB) comprises three components: a cost component that includes a section to forecast TB target populations to receive TB services and two impact components that assess health impact either statistically or with dynamic transmission model. Lesotho's planning team used IHT:TB's cost and impact statistical model to inform the strategy for 2023-2028 and cost the plan.

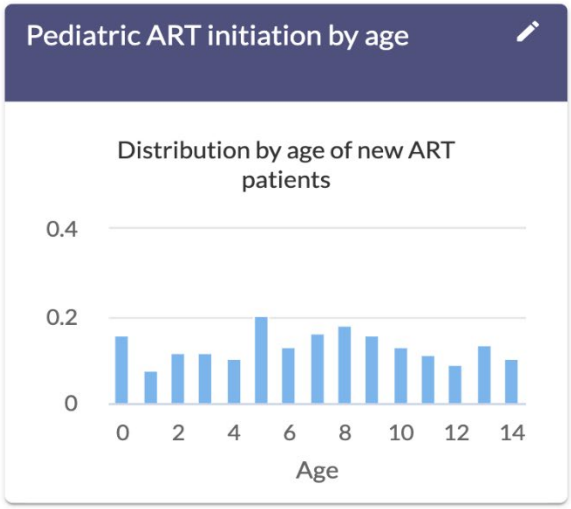
The IHT:TB tool calls for the user to review and replace as needed, the epidemiology, strategy, and cost data, including,

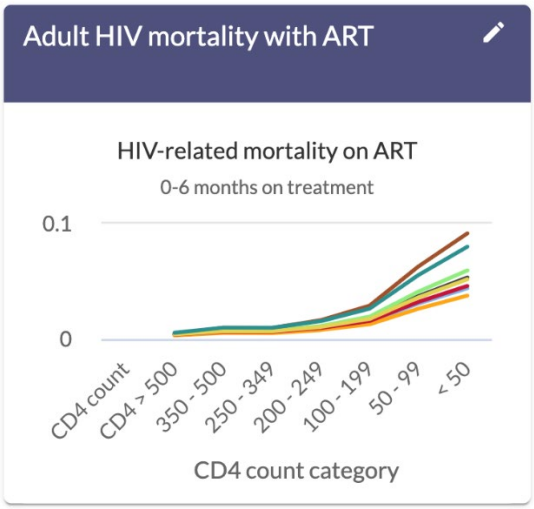
- Demographics, HIV (AIMs), TB epidemiology (history, projection)
- High-risk population size/ TB prevalence in groups, projections; baseline and projection
- Targets and coverage for prevention, diagnosis, treatment and monitoring, patient support
- TB screening and diagnostic algorithms
- TB programme activities list and key cost inputs
- Health systems related investments, TB-specific human resources, equipment, and infrastructure needs
- Per case cost for TB services: per case consumables, minutes of staff time and visits

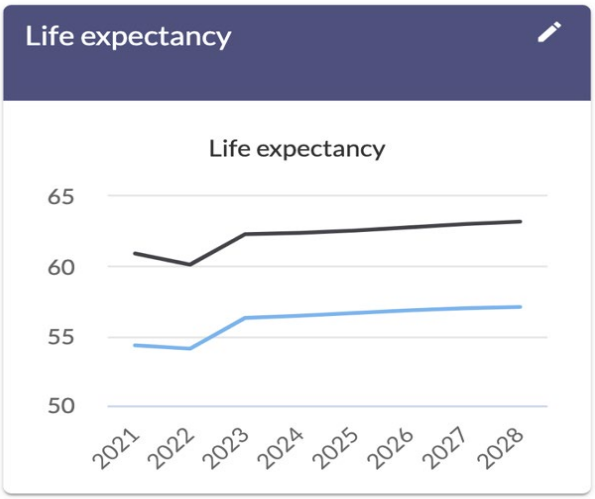
Some of the HIV (AIMs) data for Lesotho incorporated in IHT: TB/ Demographics and HIV are outlined in **Figure 9.**

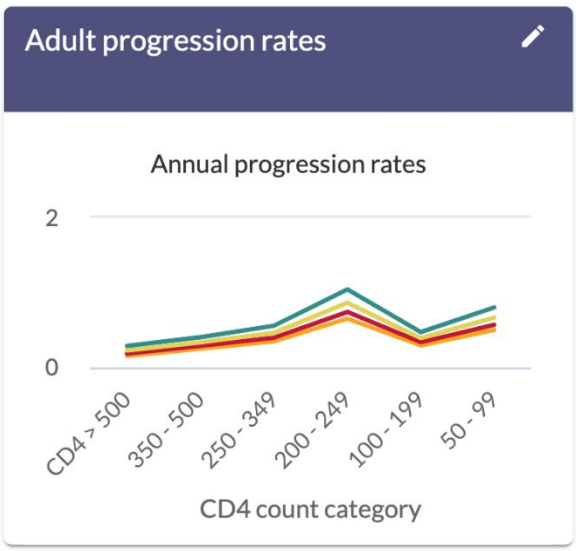
Figure 9: Output from the AIDS Impact Model (AIM)

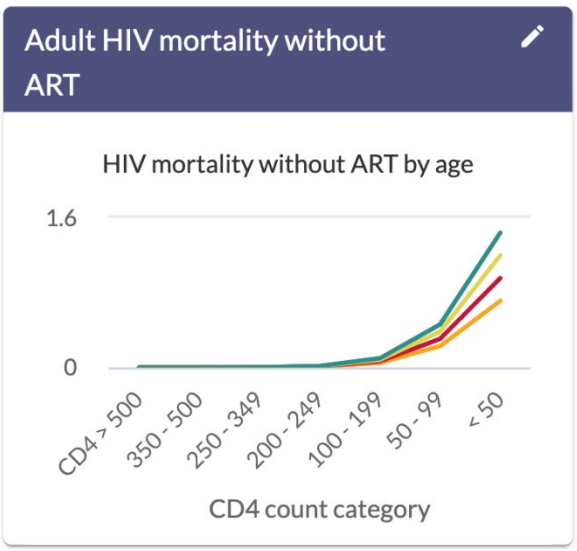












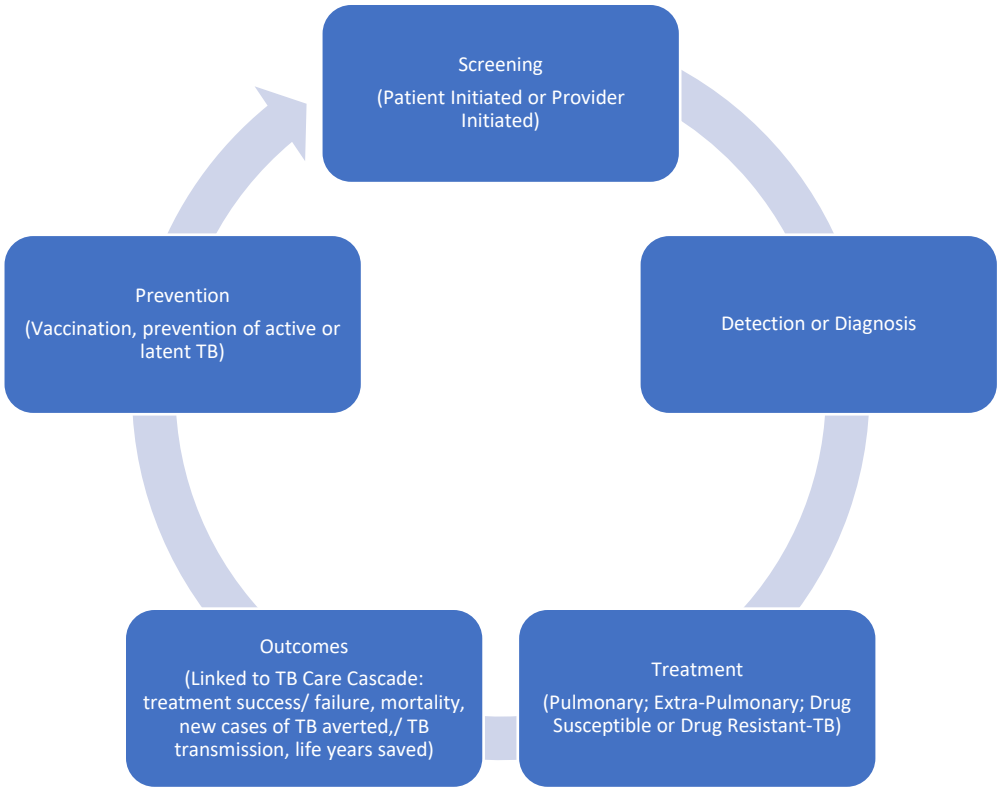
Training on IHT:TB: During the preparation of Lesotho's TB NSP 2023-2028, workshop training was held in a hybrid and in-country format in order to ensure that capacity and understanding was built within the NTLP and WHO Country Office regarding the components of the IHT:TB, data requirements and the use case going forward. This workshop was led by the independent Health Economist consultant who represented WHO with extensive support from WHO Global TB Programme (GTP) with co-facilitation for Impact modelling from Avenir Health's impact modeller. The workshop was organised by the NTLP and Lesotho Ministry of Health with support from WHO Lesotho Country Office, and KNCV (The TB Foundation) with funding from the Global Fund. The workshop involved a process of presentations, demonstrations, followed by hand-on data entry and consensus building.

Configuration of the IHT:TB: The first step of the costing work for Lesotho's TB NSP TB 2023-2028, involved configuring the IHT:TB to the context of Lesotho and adapting IHT:TB model design to reflect Lesotho's TB plan. This process included inputting key parameters and variables into IHT:TB. During this stage, NTLP staff and relevant local partners defined various elements, such as subgroups and interventions **(Figure 10, and Appendix 4)**, delivery channels, facility, and staff types. By providing comprehensive data inputs, the configuration stage ensures the generation of valuable outputs and facilitates efficient decision-making for the successful implementation of the TB NSP.

Provider initiated groups of interest in Lesotho, which were modelled in the target population estimates are as follows.

- Household contacts
- People living with HIV on antiretroviral therapy (ART)
- High risk groups:
    - Prisoners
    - Miners and ex-miners exposed to silica
    - People with risk factors for TB seeking health care in settings with more than or equal to 0.1% TB prevalence
    - Populations with structural risk factors for TB and limited access to health care
    - General population in settings with more than or equal to 0.5% general prevalence
    - People with untreated fibrotic lesions on chest x-ray

Figure 10: TB Care Cascade within which interventions and patient subgroups are located.



7.2. Estimating costs and impact

Inputting TB Target Populations: The first step in estimating costs and impact is to estimate the Lesotho's HIV and TB Target Populations for key strategic interventions for TB care. This is achieved by fitting demographic and epidemic trajectories to WHO country-level burden estimates and projecting estimates over a five-year period. The IHT:TB tool section supporting the projection of cases (called "IHT:TB/ TB Target population estimation") represents notification scale-up but does not account for indirect impact via reduced incidence. It uses two approaches to estimate target populations for patient-initiated and provider-initiated pathways, resulting in a "Target Population" table showing populations sizes for over 300 indicators[1] for all NSP years. These indicators are found within the IHT: TB model as calibrated for Lesotho, as however the result of these indicators can be found as the interventions displayed in the supplementary tables within Appendix 4. These population forecasts are linked to costing. This essential step lays the foundation for estimating costs and impact, allowing evidence-based choices for the development of the TB NSP and resource mobilization. The entire NTLP was present during the training workshop, which enabled the TB Target Populations to be extensively tailored to represent the context

[1] A summary table with TB Target population estimation is in IHT:TB/Results and Appendix 4.

of the HIV and TB epidemics in Lesotho. This was an ongoing process of data entry and checking between the NTLP and independent Health Economist consultant.

Overview of the budget for TB national strategy: The budget for the TB NSP was calculated by the tool as the sum of three cost areas: intervention, programme, and health systems (shared) costs from the public health care provider perspective.

This approach allows the assessment of costs associated with HIV and TB illness incurred above the level of the facilities such as programme running costs as well as across the facilities.

During the training workshop participants broke into smaller groups to update the intervention inputs with the expected quantities of supplies (consumables) and drugs (medication), health care provider time and number of inpatient and outpatient visits, for Lesotho. Together with the NTLP, this was then extensively updated by the independent consultant Health Economist.

The following equations represent the calculations in IHT:TB:

i. $CostIntervention = Qcaseload \times Pconsumables,staff,visits$

Programme costing (such as the running costs of NTLP, development of guidelines as well as many other programmatic elements) in IHT utilizes an activity-based costing approach.

ii. $Costactivity = Qactivity \times Pactivity$

The health systems costs can be further broken down into personnel time costs, inpatient day costs, outpatient visits and equipment costs (investment in new equipment for Lesotho).

iii. $Costequipment\ per\ facility\ type = Qnew\ equipment \times Pnew\ equipment$

iv. $Costvisits/beddays = Qvisits/beddays \times Pvisits/beddays\ by\ delivery\ level$

v. $Coststaff\ time\ per\ intervention = Qminutes\ medical\ personnel\ time\ per\ intervention \times Pcompensation\ per\ minute\ per\ staff\ type$

Intervention and programme Costing: Programmatic costs are a very important above service level cost, which impacts greatly on the success of a TB programme. Lesotho's committed NTLP span several areas. The first aspect of the programmatic costs is the cost of staffing the NTLP at a national, and district level. Then aspects of training; supervision; monitoring and evaluation; quality control/ assurance; programme-specific transport cost; communication, media, and outreach; advocacy; general programme management and administration; and research and innovation. Where possible these aspects were linked to the specific numbered items within the NSP. Programme costs other than the cost of staffing the NTLP at a national, and district level, include supervision, training, and meeting costs such as venue hire (the price of which depends on the number of participants), refreshments, facilitator fees, consultants travel and hiring fees. The time and cost of the NTLP are not double counted, however the capacity of the staff to run all aspects of the NTLP is stretched. Investment in human resources for health is prioritised in the NSP, however it should be noted that expansion of the NTLP team, capacity building and retention will be needed in order to successful reach, maintain and improve on the ambitious goals that have been set.

Maintenance of the new equipment has been included in the programmatic costs from 2025-2028 at 5% per annum [33, 34]. An crucial point that Wahyudi et al. [33] reiterate is that it is important to include maintenance costs of equipment in health care, and furthermore to be aware that at a certain threshold, rather than endlessly maintaining obsolete/old equipment one should consider replacing it, with newer technology if possible.

The chosen delivery levels for Lesotho are displayed in **Table 4.** When adapting IHT:TB to the Lesotho context, we adapted the delivery channels and facility types following **Table 4** nomenclature.

IHT defines:

- *target population* (TP) as the number of individuals targeted for a specific intervention.
- *population in need* (PIN) as the percentage of the target population requiring the intervention.
- *coverage (COV)* as the percentage of the population in need who will receive the intervention. This parameter plays a crucial role in determining the scale-up extent and is the primary driver for the total cost of the TB NSP.

Table 4: Lesotho specific Delivery Channels and Facility types

Delivery Channels	Facility types
Community (Community Healthcare Worker (CHW) or Village Healthcare Workers (VHW) refer to Health Centre)	Referral to Health Centre (Outpatients)
Outreach (Health Centre workers go to Health Post facility building)	Health Posts
Correctional Services (Screening at CS, clients referred to Hospital)	Referral to Hospital
Health Centre (Outpatients)	Health Centre (Outpatients)
Hospital (Inpatient and Outpatient services)	Hospital
Referral and Regional Referral	Regional (Referral) Hospital Or Referral Hospital
Reference Laboratory	Reference Laboratory

Budget for health system's shared costs: Health System's shared costs invested through the NTLP, such as health care workers, inpatient and outpatient services, and equipment, are also factored into the costing analysis in IHT:TB. In addition, there are several budget items that would be funded through different departments or programmes, and these have been indicated. For instance, the Bacillus Calmette-Guérin (BCG) vaccination costs would be provided through the Lesotho Expanded Programme on Immunisation (EPI) as a routine immunisation for children at birth (under one year of age); non-medical support is provided through Social Development; and cotrimoxazole prophylaxis (TB and other diseases infection prevention, medication) through the HIV programme. However even though these items are funded through other programmes, they impact on TB care and outcomes and so have been calculated and included in the costing. For instance, staff for programme administration at both the national and district level account for staffing costs of the NTLP as well as administration staff, administrative running costs (office rental, cleaning, security, utilities, and laptops) and NTLP vehicles including a fleet of motorcycles for specimen collection and delivery. Training comprises in-service training, training of trainers and the development of training programmes and materials. And supervision involves supportive supervisory visits as well as coordination meetings.

7.3. Default Costs and Updates

The IHT:TB is pre-populated with default costs, which are sourced from unit cost builders based on 2023 TB prices (e.g., The Global Drug Facility Catalogue February 2023 https://www.stoptb.org/global-drug-facility-gdf/gdf-product-catalog) or mean prices (2023 adjusted) from primary research studies. In some cases, modelled unit costs from econometric analysis are used for specific components (e.g. visit and bedday (hotel costs). However, as IHT:TB was adapted to Lesotho's context these have checked these against data from Lesotho and these default costs based on baseline and target local data for Lesotho have been updated. While some of the defaults were relevant, as global procurement mechanisms were used for Lesotho's drug and laboratory supplies, in other instances like equipment investments and the drug prices for adverse events, prices were locally or regionally procured and IHT:TB prices were replaced. The drug prices for adverse events were updated with the single exit prices from South African publicly available information (https://medicineprices.org.za/). The rationale for using South African data was that in the absence of publicly available data in Lesotho, it is felt that is an adequate proxy.

Treatment Inputs/ Intervention Costs: For each of the subgroups, we have input and assessed quantities and prices to estimate the cost per intervention, which in turn is linked to the utilisation (number of TB visits needed). For instance, the number of minutes (quantities) that would be required by different cadre of staff (prices here relate to the staff salaries/ compensation as provided by the Lesotho NTLP), the resource requirements (quantities) including drugs and supplies and the number of inpatient and/ or outpatients visits required. Each of these ingredients-based costings is performed for the different levels of care where services are provided in Lesotho **(Box 1).**

Box 1: An example of cost function.

Health centre (outpatients) Intervention unit cost for Diagnosis (patient initiated), "Pulmonary TB disease, adults 15+"
=
% receiving itemised diagnostics (drug supply)# of units or case (# of times or days*# of days or case)*unit cost in USD*
+
Staff type (cadre of staff)% treated by this cadre*number of minutes (staff time on average for this task)*number of days or visits.*
+
% receiving outpatient visits# of outpatient visits on average*
+
% receiving inpatient visits# of inpatient visits on average*

Health Systems Costs: For each intervention the personnel time costs are included. These personnel time costs are calculated using the compensation/ salary (price) multiplied by the

number of minutes of each staff type (see above cost function for **Cost staff time per intervention**).

Inpatient and outpatient costs were calculated by using values (prices) sourced from WHO Choice multiplied by the number of inpatient days (beddays) and outpatient visits for each of the interventions (see above cost function for **Cost visits/beddays**). The approach that has been taken is that these inpatient values (prices) from WHO Choice are treated as hotel costs and so personnel time costs are added over and above these inpatient costs.

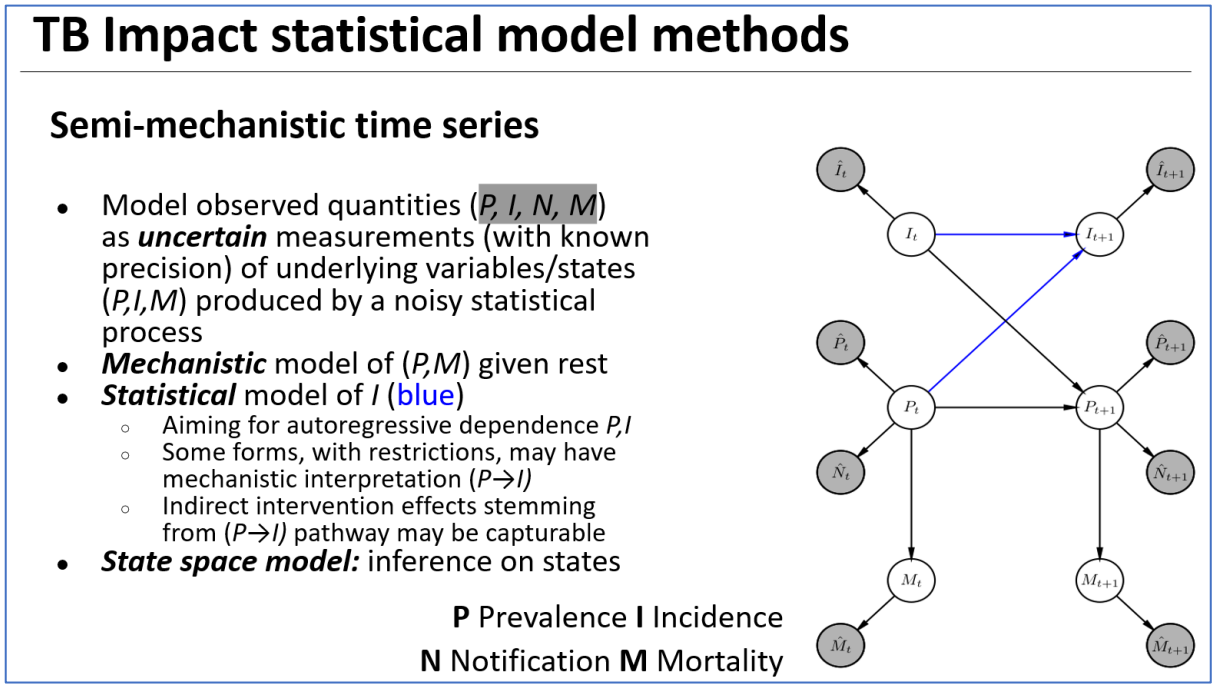
Infrastructure and equipment costs were included for Lesotho's expected investment in equipment in 2024 (see cost function above for **Cost equipment per facility type**). As described elsewhere, maintenance costs were included, at 5% per annum for these items, starting in the year after investment until the end of the NSP timeline (2028).

Impact: We used the IHT:TB Impact statistical model to assess health impact of Lesotho's NSP 2024-2028 plan. The IHT:TB Impact statistical model uses a semi-mechanistic time series model . This model allows one to estimate the impact outcomes such as TB detection among prevalent case, TB success rates and mortality. It has a sophisticated calculation engine (designed by Sheffield University Model) that links with IHT cost coverage and TB Target Estimates indicators to model notifications, incidence, prevalence, and mortality **(Figure 11).**

The IHT:TB Impact statistical model allows for impact estimation by summarizing scale-up in 3 overall impact variables: detection, prevention, and treatment success.

a) Increase in probability of detection;
b) Decrease in risk of TB disease;
c) Decrease in risk of mortality for those receiving treatment (and in the future the risk of mortality for those not receiving treatment may be added).

Figure 11: IHT:TB Impact statistical model methods (Source: Professor P.J. Dodd, at Sheffield University with TB Modelling and Analysis Consortium (TB MAC) who designed the IHT:TB Impact statistical model)



In order to obtain impact results using IHT:TB Impact statistical model, the Lesotho costing team:

- Reviewed baseline and scale up coverage in IHT/ TB Target Population Estimates and IH/ Cost/ Intervention/ Coverages
- Reviewed baseline and scale up Treatment Success per year in IHT/ Impact
- Documented Treatment Success Targets

Results were obtained for notifications, incidence, mortality and prevalence modelled for 2024-2028.

7.4. Scenario analyses

Scenario analyses refer to the establishment of projections for the NTLP and Lesotho MoH through building detailed files in IHT:TB. The NSP for TB control is anchored in four core projection scenarios over the period of 2023 to 2028, guiding the strategic direction and resource allocation for the NTLP.

7.4.1. Baseline Projection: The counterfactual scenario

An initial/ baseline/ counterfactual scenario was constructed using data from Lesotho's country context. This first projection establishes the baseline and is an essential benchmark reflecting the trajectory of TB control efforts if one was to adopt the NSP interventions without any scale up. This scenario is derived from the comprehensive data populated in IHT:TB, maintaining current screening and treatment rates among the general population (i.e. no scaling up of interventions nor increase in TB case notifications).

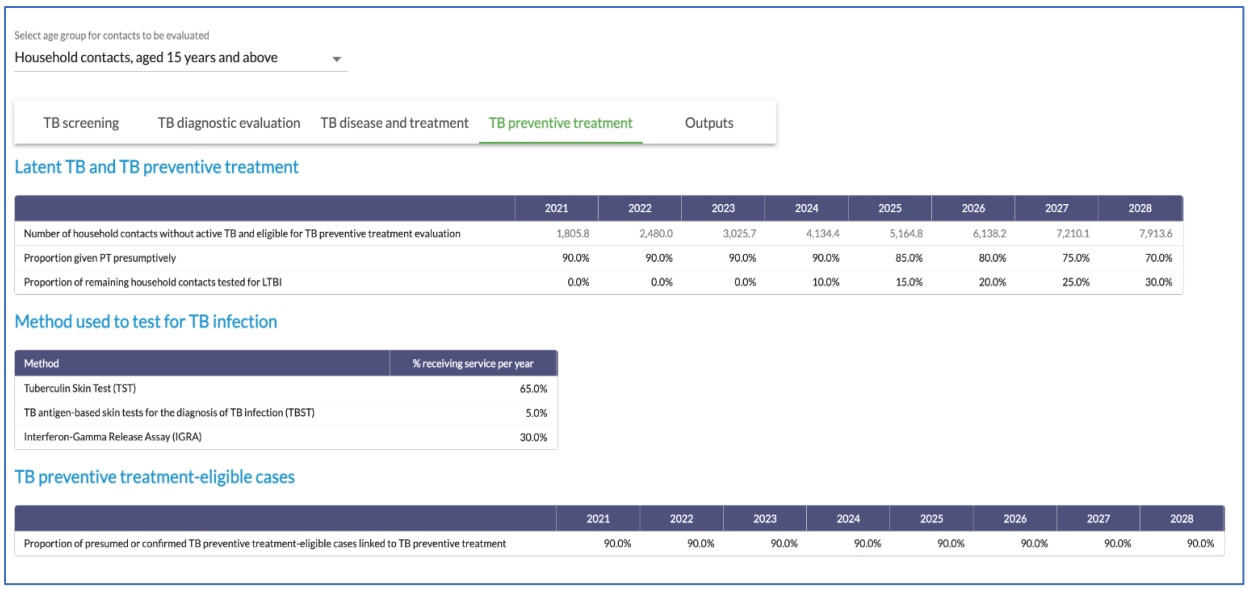
7.4.2. Second Projection: Strategic scale-up of TB preventive treatment

The second projection encompasses a targeted scale-up scenario, where the NTLP intensifies TPT. This scenario specifically focuses on:

Scaling up TPT: Extending coverage of preventive treatments, especially among those at higher risk such as people living with HIV.

Currently the Lesotho NTLP does not provide testing for TB infection, but rather gives TB prevention treatment presumptively. As part of the second scenario, we assessed the slow change over from presumptive treatment to testing of household contacts for latent TB infection moving from 90% presumptive treatment to 70% in 2028; and 0% latent TB testing among household contacts to 30% in 2028. 65% receiving Tuberculin skin test (TST) per year; 5% receiving TB antigen-base skin tests for the diagnosis of TB infection (TBST); and 30% receiving interferon-Gamma release assay (IGRA) per year **(Figure 12).**

Figure 12: Example of TB preventive treatment for adult household contacts



Select age group for contacts to be evaluated

Household contacts, aged 15 years and above

TB screening | TB diagnostic evaluation | TB disease and treatment | TB preventive treatment | Outputs

Latent TB and TB preventive treatment

	2021	2022	2023	2024	2025	2026	2027	2028
Number of household contacts without active TB and eligible for TB preventive treatment evaluation	1,805.8	2,480.0	3,025.7	4,134.4	5,164.8	6,138.2	7,210.1	7,913.6
Proportion given PT presumptively	90.0%	90.0%	90.0%	90.0%	85.0%	80.0%	75.0%	70.0%
Proportion of remaining household contacts tested for LTBI	0.0%	0.0%	0.0%	10.0%	15.0%	20.0%	25.0%	30.0%

Method used to test for TB infection

Method	% receiving service per year
Tuberculin Skin Test (TST)	65.0%
TB antigen-based skin tests for the diagnosis of TB infection (TBST)	5.0%
Interferon-Gamma Release Assay (IGRA)	30.0%

TB preventive treatment-eligible cases

	2021	2022	2023	2024	2025	2026	2027	2028
Proportion of presumed or confirmed TB preventive treatment-eligible cases linked to TB preventive treatment	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%

7.4.3. Third Projection: Strategic Scale-Up of TPT (maintained) plus Enhanced Screening

The third projection maintains the targeted scale-up scenario, where the NTLP intensifies TPT but in addition expands TB screening across all groups. This scenario specifically focuses on: Enhancing Screening Efforts: Increasing the frequency and reach of TB screenings, not only among the general populace but prioritizing high-risk groups, including household contacts of TB patients and people living with HIV.

7.4.4. Final projection: The NSP at full scale

The final projection embodies the NSP at full scale, including scale up of TPT and enhanced screening. This projection builds on and is integrated with the NSP monitoring and evaluation framework within this NSP document. This scenario represents the ambitious but achievable target of the NSP when fully implemented, with all strategic interventions operating at optimal capacity. This comprehensive scale-up is the NSP's vision actualized, aiming for a substantial reduction in TB incidence and mortality rates by 2028. The subgroups, target population, population in need and coverage documented for Lesotho's NSP interventions can be found in **Appendix 4.**

These projections are underpinned by rigorous data analysis and modelling, providing a clear pathway for the NTLP, from the current state to an envisioned future with a significantly reduced burden of TB. Each scenario builds upon the previous, outlining the incremental steps and resources necessary to achieve the NSP's objectives within the five-year strategic period.

7.5. Results of cost and impact analysis

Summary of the cost and impact: The integration of the IHT:TB in Lesotho's joint HIV and TB NSP 2023-2028 enables evidence-based decision-making, cost estimation, and impact assessment for various intervention scenarios. The tool's health systems approach and unified costing design provide a comprehensive framework to support realistic planning and efficient allocation of resources. The estimates can be continually revised post finalisation and updated to ensure accurate projections and successful implementation of the NSP, including midterm reviews. addition budget and funder mapping allows the NTLP to track what specific interventions are likely to cost, and where the resources to fund these interventions will come from, for instance specific domestic or international funding.

Table 5: Total costs by cost category

	2023	2024	2025	2026	2027	2028	**Total**
Drugs and supplies	$3 491 181	$4 575 237	$5 632 764	$7 032 841	$8 700 971	$10 280 844	**$39 713 837**
Programme costs	$1 929 516	$1 938 720	$1 972 941	$2 013 954	$1 942 180	$1 976 524	**$11 773 835**
Health system costs							
Personnel time costs	$1 202 470	$1 348 218	$1 491 848	$1 697 454	$1 928 507	$2 175 560	**$9 844 058**
Inpatient day costs	$177 089	$234 053	$276 242	$346 178	$405 087	$466 580	**$1 905 228**
Outpatient visits	$1 708 455	$2 298 904	$2 765 001	$3 568 673	$4 273 962	$5 036 492	**$19 651 487**
Equipment costs	-	$1 489 565	-	-	-	-	**$1 489 565**
Total	**$8 508 712**	**$11 884 697**	**$12 138 796**	**$14 659 099**	**$17 250 706**	**$19 936 000**	**$84 378 010**

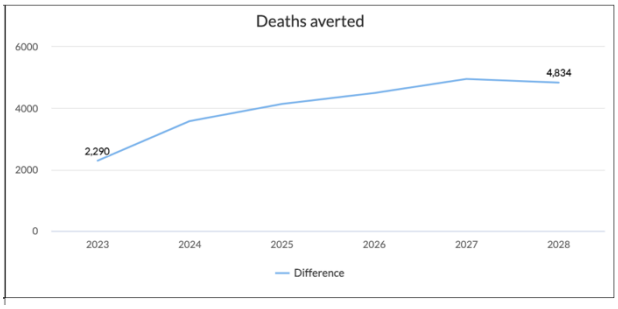
Table 6:Total estimates costs for the TB programme

Health services costs (cost of interventions)	$71 114 610
Equipment costs (capital investment)	$1 489 565
Programme costs (above service level costs)	$11 773 835
Total budget	**$84 378 010**

Total budget and impact: The total budget for 2023-2028 represents the health service costs plus the investment in equipment and programmatic costs, which amounts to $84 378 010 **(Table 5 and 6)**, ranging from $8 508 712 in 2023 to $19 936 000 in 2028 **(Figure 13)**. The extensive list of quantities that make up these costs are displayed in Appendix 4. **Figure 14** shows the modelled number of deaths averted from the fully scaled up NSP. As you can see, the number of deaths averted by the TB programme is estimated at 2 290 in 2023, peaking at 4954 in 2027, with a cumulative number of 24 290 deaths averted (area under the graph in **Figure 14**) over the NSP period. Cumulatively, TB notifications are predicted to increase by 35 545 over the NSP period.

Figure 13: Total cost, number on treatment and cost drivers

Figure 14: Modelled impact (deaths averted and notifications) for scaled up NSP in comparison to counterfactual (baseline)



Number of TB notifications							
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**Total**
Baseline/ Counterfactual	**3 859**	**3 500**	**3 175**	**2 882**	**2 616**	**2 376**	**18 409**
NSP scaled-up	**7 559**	**9 038**	**9 415**	**9 367**	**9 633**	**8 940**	**53 954**
Difference	**3 700**	**5 538**	**6 240**	**6 485**	**7 017**	**6 564**	**35 545**

In comparison to the baseline a scenario of only scaling up TPT, resulted in a budget requirement of $54 677 334 for the NSP period, while a scenario of scaling up TPT plus scaling up screening, requires a budget of $ 64 952 482. More details can be found in Appendix 4.

Health service costs: The TB NSP budget for health service costs (cost of interventions) for 2023-2028 requires a dedicated budget of $71 114 610 . This comprehensive funding is distributed across vital components of our mission to combat TB. It includes resources for provider-initiated screening to proactively identify cases, TB infection prevention testing and medication to reduce the transmission of TB, patient-initiated screening to link individuals to timely care, and diagnostic services delivered both through patient and provider initiatives. Moreover, our budget supports drug resistance detection, ensuring early identification and treatment of resistant strains. It provides for treatment, encompassing drug-susceptible and drug-resistant TB, with meticulous monitoring at both first-line and second-line stages of treatment. Additionally, we prioritize the management of adverse events during treatment, ensuring the well-being and adherence of our patients. These health service costs represent $42 635 548 of the budget **(Table 7)**, 60% when these health service costs are combined with the health service costs funded through other programmes **(Table 8)**. An expanded table with these combined and fully scaled up health service costs can be found in the Appendix 4.

The health service costs funded through other programmes (such as social development and the HIV programme) for non-medical support, cotrimoxazole prophylaxis for PLHIV, first-line HIV treatment, palliative care, and BCG immunization amount to $28 479 062 (40%) when the health service costs are combined (i.e. 60% of $ 71 114 610). The aspects, although not all directed through the NTLP, are crucial to the success of the NSP. The financial commitment to the TB NSP budget for 2023-2028, underscores the dedication to Lesotho's pursuit of a TB-free future, where every individual receives the care, they need to overcome this disease and live a healthy life. Crucially the investment in patient support (non-medical support) in the form of food parcels is budgeted at $11 914 167 from 2023 to 2028 which accounts for 17% of the health service cost budget of $ 71 114 610.

Investment in new equipment and programme costs: **Table 9** outlines the new equipment, which is expected in 2024 in Lesotho, which will aid the expansion of screening services of high-risk groups, particularly those in hard to reach areas. For ease the maintenance costs are include in the table but are separately listed in IHT:TB as the equipment is a capital investment while the maintenance is a recurrent item. The programmatic costs amount to $ 11 773 835 and a more detailed breakdown according to the NSP goals, objectives and interventions is provided in **Table 10**.

Table 7: *TB Health Service Costs for the NSP period 2023-2028*

	2023	2024	2025	2026	2027	2028	Total
Screening (provider-initiated)	$885 958	$1 314 637	$1 678 945	$2 331 678	$2 865 766	$3 490 429	**$12 567 415**
TB infection prevention testing (provider-initiated)	$-	$23 531	$46 816	$67 966	$ 118 250	$ 157 776	**$ 414 338**
TB infection prevention medication (provider-initiated)	$294 168	$ 437 505	$ 535 984	$ 712 155	$ 841 165	$ 984 023	**$3 805 001**
Case finding (patient-initiated)	$137 080	$ 160 087	$ 160 097	$ 148 001	$ 142 292	$ 117 222	**$ 864 778**
Diagnosis (patient-initiated)	$207 589	$ 246 397	$ 254 214	$ 242 431	$ 240 448	$ 201 380	**$1 392 459**
Diagnosis (provider-initiated)	$334 664	$ 518 971	$ 719 394	$1 055 855	$1 389 646	$1 775 531	**$5 794 062**
Drug resistance detection	$149 134	$ 193 673	$ 218 052	$ 245 043	$ 274 903	$ 290 513	**$1 371 319**
Treatment drug-susceptible	$568 506	$728 676	$809 548	$904 019	$999 388	$1 048 987	**$5 059 124**
Treatment drug-resistant	$231 093	$313 884	$368 765	$436 623	$509 011	$564 000	**$2 423 376**
First-line drug treatment monitoring	$44 232	$104 037	$173 756	$264 695	$380 279	$497 895	**$1 464 894**
Second-line drug treatment monitoring	$31 282	$46 660	$60 119	$77 942	$99 410	$120 378	**$435 791**
Adverse events treatment	$268 076	$558 748	$877 462	$1 283 916	$1 783 777	$2 271 010	**$7 042 990**
Total	**$3 151 783**	**$4 646 807**	**$5 903 153**	**$7 770 324**	**$9 644 338**	**$11 519 144**	**$42 635 548**

Table 8: Health Service Costs provided by other programmes for the NSP period 2023-2028

Non NTLP funded	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**Total**
Palliative care	$228	$410	$593	$776	$959	$1 143	$4 110
Non-medical support	$382 707	$885 741	$1 454 741	$2 176 677	$3 070 643	$3 943 657	$11 914 167
Cotrimoxazole prophylaxis, PLHIV	$654 759	$632 701	$611 393	$590 855	$571 096	$552 115	$3 612 919
HIV treatment, first-line	$2 251 717	$2 146 753	$2 046 331	$1 950 456	$1 859 089	$1 772 160	$12 026 506
Vaccination, BCG immunization	$138 001	$143 999	$149 644	$156 057	$162 401	$171 257	$921 360
Total	**$3 427 414**	**$3 809 604**	**$4 262 703**	**$4 874 821**	**$5 664 189**	**$6 440 332**	**$28 479 062**

Table 9: TB Health Equipment Costs for the NSP incurred in 2024.

			New equipment in Lesotho placed at Health Centres
Item	**Units**	**Unit cost**	**Overall cost**
Chest X-ray (digital, mobile)	17	$49 000	$833 000
Computer-aided detection software for automated reading of digital chest radiographs	17	$16 650	$283 050
Annual maintenance	4 (years)	$55 803	$223 210
Total			$1 339 260
New equipment in Lesotho placed at Hospitals			
Chest X-ray (conventional)	1	$45 000	$45 000
Biosafety cabinet 4 feet, 3 filters	21	$15 644	$328 515
Annual maintenance	4 (years)	$18 676	$74 703
Total			$448 217
Grand total equipment at Health Centres and Hospitals (including maintenance)			**$1 787 477**

Table 10: TB Programme costs

	2023	2024	2025	2026	2027	2028	**Total**
Staff for programme administration	$ 1 308 184	$ 1 327 736	$ 1 308 184	$ 1 308 184	$ 1 308 184	$ 1 327 736	**$7 888 208**
Training	$14 515	$14 515	$14 515	$14 515	$14 515	$14 515	**$87 090**
Supervision	$1 469	$1 469	$1 469	$1 469	$1 469	$1 469	**$8 814**
Monitoring and evaluation	$1 662	$1 662	$1 662	$1 662	$1 662	$1 662	**$9 972**
Quality control/Quality assurance	$-	$6 682	$6 682	$6 682	$6 682	$6 682	**$33 410**
Programme-specific transport cost	$220 584	$160 424	$160 424	$190 986	$160 424	$160 424	**$1 053 266**
Communication, media and outreach	$194 024	$194 024	$194 024	$194 024	$194 024	$194 024	**$1 164 144**
Advocacy	$11 130	$46 760	$36 309	$46 760	$11 130	$25 922	**$178 011**
General programme management and administration	$177 948	$170 417	$249 672	$249 672	$244 090	$244 090	**$1 335 889**
Research and innovation	$-	$15 031	$-	$-	$-	$-	**$15 031**
Total	**$ 1 929 516**	**$ 1 938 720**	**$ 1 972 941**	**$ 2 013 954**	**$ 1 942 180**	**$ 1 976 524**	**$ 11 773 835**

7.6. Discussion of cost and impact analysis

At the United Nations (UN) high-level meeting on the 22nd of September 2023, a renewed commitment was made to end the tuberculosis (TB) epidemic by 2030. Lesotho, recognizing the challenges brought about by the COVID-19 pandemic and the rise of drug-resistant TB, is fortifying its strategic approach against TB. This plan aligns with the UN directives and the End TB Strategy, aiming to prevent any citizen from facing catastrophic costs due to TB and meeting the objectives of the 2030 Agenda for Sustainable Development [35].

As one of the 30 high TB burden countries [36], Lesotho conducted a National TB Patient Cost Survey in 2019. Despite free TB treatments and care in many places, significant economic challenges persist for affected individuals. By December 2022, only 29 of 135 low- and middle-income countries (encompassing 99% of global TB cases) had conducted relevant national surveys. Data from 22 national surveys (2015-2022) showed that in these countries, average direct medical costs for TB patients were US$211, with direct non-medical and indirect costs reaching $512 and $530, respectively, per TB episode. The total cost per patient averaged $1 253. A significant 54.9% of households experienced catastrophic costs, with the rate soaring to 75.2% in the poorest quintile. Portnoy and colleagues (2023) utilized the existing National TB Patient Cost Survey data to predict the unit costs for Lesotho using the number of notified tuberculosis (TB) cases in Lesotho for 2021. They found the direct medical costs to be $729 (95% confidence interval (CI) $172–$1 937), direct non-medical unit costs to be $1 119 (CI $446–$2 305), and indirect unit costs to be $3 497 (CI $1 788-$5 979) [37]. The high nature of these values reminds us of the need for social and financial protection of Lesotho's citizens when they are suffering from the effects of TB. For instance, during treatment and care, it is indicative that social protection to the value of $3 497 per patient be granted to protect livelihoods either as an income replacement or alternatively work should be safeguarded. The direct non-medical costs can be utilized as a measure of the need to provide financial protection or reimbursement in kind for travel costs, nutrition (food parcels), palliative care. As part of this NSP, we have modelled what provision of nutrition would cost, however the overall cost is still somewhat lower than the indication of what is required for Lesotho to close the gap and protect citizens with TB and/ or living with HIV.

Lesotho's National Strategic Plan (2023-2028) underscores the commitment to end the TB epidemic by 2030. The plan emphasizes providing comprehensive financial support for TB initiatives, aiming for universal access to health and social benefits for TB patients by 2028. Priorities include ensuring access to quality TB services, especially in isolated regions, and allocating resources to ensure that the majority of TB patients receive quality care. The plan's costing component is crafted to address various challenges, including rapid molecular testing, and providing preventive treatments, especially for vulnerable groups such as

miners and ex-miners, prisoners in correctional services and people living with HIV. Through strategic funding and resource management, Lesotho aims to reduce the economic and health impacts of TB.

According to the Lesotho WHO TB data country profile for 2022 [38], the TB budget requirements for Lesotho for 2023, are $13 million, and only $6.6 million is funded. This budget requires $8.5 million for 2023, but this steadily increases over the NSP period, which aims to guide the country to acquiring a more realistic funding to achieve its NSP targets. As already mentioned, budget and funding mapping will enable the identification of where gaps lie and the leveraging of funds to meet the countries need. Given that running an effective TB programme requires both commitment and adequate funding, Lesotho is now in a good position to request the appropriate budget and resources that are required to undertake reaching its ambitious goals. The costing section outlines the financial requirements for the effective implementation of the TB National Strategic Plan in Lesotho. This serves as a guide for domestic and international stakeholders, providing a clear understanding of the financial needs and ensuring optimal utilization of resources.

Limitations of the NSP costing: Currently the NTLP is unable to provide surgery for TB patients such as lung resection. In addition, although we have indicated in the NSP that Lesotho will adopt a new vaccine, this will only be done if one proves efficacious and effective in LMIC settings in the near future. However, we have made provision for research into new vaccine candidates in 2024 as part of the programmatic costs (1.2.2 Support research for new TB vaccines: multi sectoral collaboration to establish regulatory framework for TB vaccines research).

Concluding remarks and recommendations regarding the NSP costing: The majority of TB diagnosis in Lesotho is conducted with Xpert Ultra a WHO recommended rapid diagnostic (WRD), which is ideal. In 2022 the proportion of presumptive TB patients who accessed a WRD in Lesotho was 83%, this should be increased and maintained at the 100% level as indicated during the UN high level meeting. A strong focus on patient support as well as increasing the budget will assist patients in remaining financially protected and help reach Goal One of this NSP to "*Reduce TB burden by scaling up TB prevention, diagnosis, and care through a people-centred approach".* Once the patient support, in the form of food packages, has been in place for some time, it would be good to repeat the National TB Patient Cost Survey as has been done in other countries, to assess if the increased support has improved patient's TB journeys and reduced catastrophic spending.

The integration of the IHT:TB in Lesotho's National Strategic Plan for TB 2023-2028 enables evidence-based decision-making, cost estimation, and impact assessment for various intervention scenarios. The tool's health systems approach and unified costing design

provide a comprehensive framework to support realistic planning and efficient allocation of resources. The estimates can be continually revised post finalization and updated to ensure accurate projections and successful implementation of the NSP, including midterm reviews. Lesotho is now embarking on an exciting journey of having this tool to facilitate a good understanding of the countries TB cost requirements which can be iteratively reviewed and altered.

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9. Appendices

Appendix 1: Glossary of terms

Appendix 2: Monitoring and evaluation framework

Appendix 3: Operational Plan

Appendix 4: Resource Mobilisation and costing for HV and TB program supplementary tables and figures

Appendix 1: Glossary of terms

Active case finding: Health system proactive TB screening, conducted within facilities and in the community.

Active TB disease: An illness in which TB bacteria are multiplying in different parts of the body, resulting in symptoms such as cough, weakness, weight loss, fever, loss of appetite and night sweats.

TB Contact: A person who has spent time with a person with infectious or active TB disease.

Drug-resistant TB Disease: TB disease caused by a strain of TB bacteria that is resistant to the most used anti-tuberculosis drugs.

Extensively drug-resistant TB disease: TB illness caused by a strain of TB bacteria that is resistant to isoniazid and rifampicin, as well as fluoroquinolone and at least one of the three injectable second-line drugs.

Health Posts: Small community health facilities that provide basic health services and preventative medication in rural areas, often manged by a nurse with the support of village healthcare workers.

People with TB (PWTB): This phrase encompasses people who are ill with active TB disease.

TB Preventive Therapy (TPT): The use of medicines to prevent TB infection from progressing to active TB disease.

Subclinical TB: TB disease that is confirmed by presence of TB bacilli following investigations such as culture/Xpert/chest x-ray, but the person with TB has no observable symptoms.

Systematic Screening for TB: Systematic screening for active TB entails health-system-initiated TB screening for large numbers of people to identify patients with symptoms suggestive of TB]

Appendix 2: Monitoring and evaluation framework

Summary of assumptions

No.	Indicator	Assumptions
1	**TB incidence rate**	About 15000 estimated cases were agreed upon by the NTLP and maintained throughout the 5 years until new evidence suggests otherwise
2	Population figures	World Bank estimates
3	TB-HIV coinfected	55% Coinfection rate based on latest data
4	RR prevalence	Country will half the incidence of MDR-TB in the next 5 years
5	OPD attendances:	90% to 95% shall be screened for TB during the NSP period.
6	Number of presumptive TB cases:	These were 11.2 times the number of TB cases.
7	TB cases tested by WRDs	95% is the target at end of the NSP; need to disaggregate TB cases by type of diagnosis. This does not mean that 95% of cases will be diagnosed bacteriologically, given the HIV-driven disease burden.
8	TB treatment coverage	All notified TB cases are started on treatment (no cases of initial loss to follow up or death before start of treatment)
9	Proportion of TB affected households facing catastrophic costs	Made a simple calculation to reduce the costs to 0% but this may not be realistic.
10	TB cases notified	Having realised at 22% increment from 2021, it is maintained for 2 years, till pre-Covid achievements, and then a 6% increment for the next 3 years of the NSP. 100% of those diagnosed are notified. Male projections are 67% of the total notified.
11	TB cases with bacteriological confirmation	Not all TB cases shall be PBCs due to the HIV-driven TB burden of disease.
12	Proportion of presumptive TB clients tested for HIV	This is an indicator that was not considered critical to the NTLP given the HIV screening algorithm implemented by the AIDs Control Program
13	PLHIV on ART screened for TB	TB screening is part of routine care, so the expectation is 100%
14	DR-TB notified	2.5% proportion of all DS-TB; Maintained estimate over the next 5 years of the NSP.
15	TB patients with DST result	Projections the same as access to WRD as these tests have Rifampicin DST
16	DST for Fluroquinolones	All DR-TB should have this DST
17	Contacts screened	All contacts of all forms of TB need to be screened 2 Contacts per PBC notified 2 Contacts <15 years for every person with TB notified

	Treatment success rate DS-TB	All notified start treatment with no initial losses to follow-up; A steady 2.5% increase till 2028
	Treatment success rate DR-TB	Steady increase to 90% by 2028
Limitations		
	Key populations for TB	Baseline data and denominators missing
	TPT for contacts	Data only available or PLHIV and contacts >15yrs. Missing data for contacts <15 years.
	OPD screening data	MoH does not comprehensively capture facility attendances and screening for TB at all entry points in a way that can trace the screening to an attendance. As such it is difficult to document the cascade at present.
	Extrapulmonary TB	This seems to have a larger than estimated proportion but has not been considered since there is no baseline value
Excluded indicators		
	RR/MDR-TB lost to follow up during the first 6 months of treatment	
	Presumptive TB tested for HIV	

Baseline and targets for the period 2022/23 to 2027/28

	Baseline 2021	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Goal: Reduce TB burden by scaling up TB prevention, diagnosis, and care through a people-centred approach							
TB incidence rate per 100,000 population	614	661	644	637	630	623	617
Estimated number of new and relapse TB cases occurring during the year	14005	15,242	15,000	15,000	15,000	15,000	15,000
Number of people in the population	2,281,455	2,305,825	2,330,318	2,356,083	2,381,381	2,406,247	2,430,720
TB Treatment coverage	32%	37%	45%	55%	58%	62%	66%
TB mortality rate per 100,000 population	234	165	144	123	102	81	60
Estimated number of deaths from all forms of TB and deaths from TB in people with HIV in the given year	5339	3805	3356	2898	2429	1949	1458
RR-TB and/or MDR-TB prevalence among new TB patients: Proportion of new TB patients with RR-TB and/or MDR-TB.	3.70%	3.5	3.33%	2.96%	2.59%	2.22%	1.85%
TB HIV incidence rate per 100,000 population	383	406	402	397	393	389	385
Number of new and relapse HIV-TB cases occurring during the year	2397	3017	3730	4550	4823	5112	5419
TB/HIV mortality rate per 100,000 population	174	105	93	81	69	57	45
Proportion of TB affected households facing catastrophic costs	19%	NA	NA	9.7%	NA	NA	0.0%
Objective 1: Scale up TB prevention interventions to reach 95% of eligible people.							
Number of people in contact with TB patients aged 0-14 yrs who were screened for TB	4,396	6,506	6,530	7,967	8,445	8,951	9,488

Number of people in contact with TB patients aged 0-14 yrs who were screened for TB AND Eligible for TB preventive Therapy	3,834	5,832	5,877	7,170	7,600	8,056	8,540
Number of people in contact with TB patients aged 0-14 yrs who began TB preventive therapy.	2,346	3,892	4,040	5,076	5,542	6,051	6,607
Proportion of people in contact with TB patients who were screened and began TB preventive therapy	61.19%	66.74%	69%	71%	73%	75%	77%
Total number of PLHIV newly enrolled on antiretroviral therapy	13,042	16,080	15,824	15,565	15,289	15,018	14,751
Percentage of people living with HIV currently enrolled on antiretroviral therapy who started TB preventive treatment (TPT) during the reporting period.	NA	NA	93%	94%	95%	95%	95%
Total number of PLHIV newly enrolled on antiretroviral therapy who started TB preventive treatment (TPT)	NA	NA	14,637	14,553	14,448	14,267	14,013
Percentage of people who completed TPT out of those who initiated TB preventive treatment	NA	NA	90%	90%	90%	90%	90%
Number of vaccines licensed since BCG	0		0	0	0	0	1
Percentage of people diagnosed with TB who experienced self-stigma that inhibited them from seeking and accessing TB services.	NA	NA	30%	NA	10%	NA	10%

Percentage of people diagnosed with TB who report stigma in health care settings that inhibited them from seeking and accessing TB services.	NA	NA	30%	NA	10%	NA	10%
Percentage of people diagnosed with TB who report stigma in community settings that inhibited them from seeking and accessing TB services.	NA	NA	30%	NA	10%	NA	10%
Proportion of Outpatient attendees screened for TB	NA	NA	90%	92%	93%	94.50%	95%
Percentage of notified patients with all forms of TB (i.e., bacteriologically confirmed + clinically diagnosed) contributed by non-national TB program providers-private/non-governmental facilities; *includes only those with new and relapse TB.	5%	4%	6%	7%	8%	9%	10%
Percentage of notified patients with of all forms of TB (i.e., bacteriologically confirmed + clinically diagnosed) contributed by non-national TB program providers-public sector; *includes only those with new and relapse TB.	95%	96%	94%	93%	92%	91%	90%
Percentage of notified patients with all forms of TB (i.e., bacteriologically confirmed + clinically diagnosed) contributed by non-national TB program providers-community referrals; *includes only those with new and relapse TB.	4%	2%	4%	6%	8%	10%	12%

Percentage of new and relapse TB patients tested using WHO recommended rapid diagnostic tests at the time of diagnosis.	85%	91%	90%	90%	90%	90%	90%
Number of people with TB (all forms) notified among miners; *includes only those with new and relapse TB.	84	66	118	156	179	203	228
Number of people with TB (all forms) notified among key affected populations/ high risk groups (other than miners); *includes only those with new and relapse TB.	1478	1849	2515	3334	3814	4340	4927
Proportion of identified targeted key affected population screened annually	34%	34%	37%	40%	43%	47%	50%
Objective 2: Increase TB detection rate and linkage into care to 95%							
Total number of TB cases notified	4584	5650	6781	8273	8769	9295	9853
TB treatment coverage: Percentage of patients with new and relapse TB that were notified and treated among the estimated number of incident TB in the same year (all forms of TB - bacteriologically confirmed plus clinically diagnosed).	32%	37%	45%	55%	58%	62%	66%
Percentage of new and relapse TB patients tested using WHO recommended rapid diagnostic tests at the time of diagnosis.	85%	91%	92%	93%	94%	95%	95%
Number of new and relapse TB patients tested using a WRD at the time of diagnosis	3247	3,446	6,239	7,694	8,243	8,830	9,360

Percentage of notified new and relapse TB cases with bacteriological confirmation	64.5%	60.5%	64%	68%	72%	76%	80%
Number of notified new and relapse TB cases with bacteriological confirmation	2,957	3,418	4,367	5,650	6,331	7,073	7,882
Average Turn Around Time (TAT)to obtain patient results back to the Health facility	6 days	5 days	4 day	4 days	3 days	3 days	2 days
Proprotion of TB cases notified that started treatment within 7 days of notification	NA	NA	95%	95%	95%	95%	95%
Proportion of TB cases notified that were lost to follow up initially	1%	0.3%	<1%	<1%	<1%	<1%	<1%
Proportion of childhood TB cases notified	5%	6%	7%	8%	9%	10%	11%
Number of Male TB cases notified	2,965	3,684	4,521	5,515	5,846	6,197	6,569
Percentage of registered new and relapse TB patients with documented HIV status.	96%	96%	97%	98%	99%	100%	100%
Percentage of HIV-positive new and relapse TB patients on ART during TB treatment	93%	96%	96%	97%	98%	99%	100%
Percentage of HIV-positive new and relapse TB patients on CPT during TB treatment	96%	92%	94%	96%	98%	100%	100%
Proportion of presumptive TB clients tested for HIV	NA	NA	100%	100%	100%	100%	100%
Percentage of people living with HIV newly initiated on ART who were screened for TB	NA	NA	100%	100%	100%	100%	100%

Number of people living with HIV newly initiated on ART who were screened for TB	NA	NA	15,824	15,565	15,289	15,018	14,751
Number of people living with HIV newly initiated on ART	13,042	16,080	15,824	15,565	15,289	15,018	14,751
Proportion of EPTB cases detected	8%	8%	10%	12.50%	15%	15%	15%
Number of EPTB cases detected	389	444	678	1,034	1,315	1,394	1,478
Treatment coverage of RR-TB and/or MDR-TB: Percentage of notified people with bacteriologically confirmed, drug resistant RR-TB and/or MDR-TB as a proportion of all estimated people with RR-TB and/or MDR-TB.	18%	18%	28%	34%	37%	39%	41%
Number of people with confirmed RR-TB and/or MDR-TB notified.	110	107	170	207	219	232	246
Estimated number of people with RR-TB and/or MDR-TB	620	600	600	600	600	600	600
Percentage of people with confirmed RR-TB and/or MDR-TB that began second-line treatment.	100.0%	100.0%	100%	100%	100%	100%	100%
Percentage of bacteriologically confirmed notified TB patients with DST result for at least Rifampicin among the total number of notified (new and retreatment) patients during the reporting period.	89%	84%	86%	88%	90%	93%	95%
Number of notified bacteriologically confirmed TB patients with DST result for at least Rifampicin	2,627	3,099	3,758	4,987	5,727	6,554	7,488
Percentage of TB patients with DST result for Isoniazid among the total number of notified people with TB (new and retreatment)	89%	84%	86%	88%	90%	93%	95%

Number of notified bacteriologically confirmed TB patients with DST result for Isoniazid	2,627	3,099	3,758	4,987	5,727	6,554	7,488
Percentage of RR/MDR-TB patients with DST results for Fluoroquinolone among the total number of notified RR/MDR-TB patients	61%	95%	100%	100%	100%	100%	100%
Number ofof RR/MDR-TB patients with DST results for Fluoroquinolone among the total number of notified RR/MDR-TB patients	67	102	170	207	219	232	246
Percentage of Pre-XDR TB patients with DST results for Group A drugs, other than fluoroquinolones, among the total number of notified Pre-XDR TB patients (new and retreatment) during the reporting period.	0%	0%	100%	100%	100%	100%	100%
Number of people with pre-XDR/XDR TB enrolled on treatment.	5	3	5	5	5	5	5
Contact investigation coverage: Proportion of contacts of people with bacteriologically confirmed TB screened for TB among those eligible.	81%	82%	84%	87%	89%	92%	95%
Number of contacts of people with bacteriologically confirmed TB screened for TB among those eligible	3,887	5,403	5,760	7,586	10,110	11,657	13,439
Number of contacts of people with bacteriologically confirmed TB	4,781	6,616	6,836	8,733	11,300	12,662	14,146
Proportion of contacts of all forms of TB notified that were screened for TB	80%	83%	85%	87%	90%	92%	95%
Number of contacts of all forms of TB notified that were screened for TB	12,107	16,799	19,946	25,021	27,249	29,656	32,387
Number of contacts of all forms of TB notified	15,114	20,335	23,462	28,625	30,341	32,161	34,091
Objective 3: Enhance support and quality of care to achieve TB treatment success rate of 95%							

Proportion of TB notified cases (new and relapse that cured or completed treatment	76%	77%	80%	83%	85%	88%	90%
Number of new and relapse TB cases notified that cured or completed treatment	3,404	3,466	4,520	5,594	7,032	7,673	8,366
Total new and relapse TB cases started on treatment/registered	4,486	4,494	5,650	6,781	8,273	8,769	9,295
Proportion of new and relapse RR/MDR-TB cases registered that cured or completed treatment	80%	74%	77%	80%	84%	87%	90%
Number of new and relapse RR/MDR-TB cases registered that cured or completed treatment	144	82	85	86	142	180	197
Number of new and relapse RR/MDR-TB cases registered	180	111	110	107	170	207	219

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Proportion of TB affected households facing catastrophic costs	19%	NA	NA	9.7%	NA	NA	0.0%
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Proportion of people in contact with TB patients who were screened and began TB preventive therapy	61.19%	66.74%	69%	71%	73%	75%	77%
Total number of PLHIV newly enrolled on antiretroviral therapy	13,042	16,080	15,824	15,565	15,289	15,018	14,751
Percentage of people living with HIV currently enrolled on antiretroviral therapy who started TB preventive treatment (TPT) during the reporting period.	NA	NA	93%	94%	95%	95%	95%
Total number of PLHIV newly enrolled on antiretroviral therapy who started TB preventive treatment (TPT)	NA	NA	14,637	14,553	14,448	14,267	14,013
Percentage of people who completed TPT out of those who initiated TB preventive treatment	NA	NA	90%	90%	90%	90%	90%
Number of vaccines licensed since BCG	0		0	0	0	0	1
Percentage of people diagnosed with TB who experienced self-stigma that inhibited them from seeking and accessing TB services.	NA	NA	30%	NA	10%	NA	10%
Percentage of people diagnosed with TB who report stigma in health care settings that inhibited them from seeking and accessing TB services.	NA	NA	30%	NA	10%	NA	10%
Percentage of people diagnosed with TB who report stigma in community settings that inhibited them from seeking and accessing TB services.	NA	NA	30%	NA	10%	NA	10%
Proportion of Outpatient attendees screened for TB	NA	NA	90%	92%	93%	94.50%	95%
Percentage of notified patients with all forms of TB (i.e., bacteriologically confirmed + clinically diagnosed) contributed by non-national TB program providers- private/non-governmental facilities; *includes only those with new and relapse TB.	5%	4%	6%	7%	8%	9%	10%
Percentage of notified patients with of all forms of TB (i.e., bacteriologically confirmed + clinically diagnosed) contributed by	95%	96%	94%	93%	92%	91%	90%

non-national TB program providers- public sector; *includes only those with new and relapse TB.							
Percentage of notified patients with all forms of TB (i.e., bacteriologically confirmed + clinically diagnosed) contributed by non-national TB program providers- community referrals; *includes only those with new and relapse TB.	4%	2%	4%	6%	8%	10%	12%
Percentage of new and relapse TB patients tested using WHO recommended rapid diagnostic tests at the time of diagnosis.	85%	91%	90%	90%	90%	90%	90%
Objective 2: Increase TB detection rate and linkage into care to 95%							
Total number of TB cases notified	4584	5650	6781	8273	8769	9295	9853
TB treatment coverage: Percentage of patients with new and relapse TB that were notified and treated among the estimated number of incident TB in the same year (all forms of TB - bacteriologically confirmed plus clinically diagnosed).	32%	37%	45%	55%	58%	62%	66%
Percentage of new and relapse TB patients tested using WHO recommended rapid diagnostic tests at the time of diagnosis.	85%	91%	92%	93%	94%	95%	95%
Number of new and relapse TB patients tested using a WRD at the time of diagnosis	3247	3,446	6,239	7,694	8,243	8,830	9,360
Percentage of notified new and relapse TB cases with bacteriological confirmation	64.5%	60.5%	64%	68%	72%	76%	80%
Number of notified new and relapse TB cases with bacteriological confirmation	2,957	3,418	4,367	5,650	6,331	7,073	7,882
Average Turn Around Time (TAT)to obtain patient results back to the Health facility	6 days	5 days	4 day	4 days	3 days	3 days	2 days
Proprotion of TB cases notified that started treatment within 7 days of notification	NA	NA	95%	95%	95%	95%	95%
Proportion of TB cases notified that were lost to follow up initially	1%	0.3%	<1%	<1%	<1%	<1%	<1%
Proportion of childhood TB cases notified	5%	6%	7%	8%	9%	10%	11%
Number of Male TB cases notified	2,965	3,684	4,521	5,515	5,846	6,197	6,569
Percentage of registered new and relapse TB patients with documented HIV status.	96%	96%	97%	98%	99%	100%	100%
Percentage of HIV-positive new and relapse TB patients on ART during TB treatment	93%	96%	96%	97%	98%	99%	100%
Percentage of HIV-positive new and relapse TB patients on CPT during TB treatment	96%	92%	94%	96%	98%	100%	100%

Proportion of presumptive TB clients tested for HIV	NA	NA	100%	100%	100%	100%	100%
Percentage of people living with HIV newly initiated on ART who were screened for TB	NA	NA	100%	100%	100%	100%	100%
Number of people living with HIV newly initiated on ART who were screened for TB	NA	NA	15,824	15,565	15,289	15,018	14,751
Number of people living with HIV newly initiated on ART	13,042	16,080	15,824	15,565	15,289	15,018	14,751
Proportion of EPTB cases detected	8%	8%	10%	12.50%	15%	15%	15%
Number of EPTB cases detected	389	444	678	1,034	1,315	1,394	1,478
Treatment coverage of RR-TB and/or MDR-TB: Percentage of notified people with bacteriologically confirmed, drug resistant RR-TB and/or MDR-TB as a proportion of all estimated people with RR-TB and/or MDR-TB.	18%	18%	28%	34%	37%	39%	41%
Number of people with confirmed RR-TB and/or MDR-TB notified.	110	107	170	207	219	232	246
Estimated number of people with RR-TB and/or MDR-TB	620	600	600	600	600	600	600
Percentage of people with confirmed RR-TB and/or MDR-TB that began second-line treatment.	100.0%	100.0%	100%	100%	100%	100%	100%
Percentage of bacteriologically confirmed notified TB patients with DST result for at least Rifampicin among the total number of notified (new and retreatment) patients during the reporting period.	89%	84%	86%	88%	90%	93%	95%
Number of notified bacteriologically confirmed TB patients with DST result for at least Rifampicin	2,627	3,099	3,758	4,987	5,727	6,554	7,488
Percentage of RR/MDR-TB patients with DST results for Fluoroquinolone among the total number of notified RR/MDR-TB patients	61%	95%	100%	100%	100%	100%	100%
Number ofof RR/MDR-TB patients with DST results for Fluoroquinolone among the total number of notified RR/MDR-TB patients	67	102	170	207	219	232	246
Percentage of Pre-XDR TB patients with DST results for Group A drugs, other than fluoroquinolones, among the total number of notified Pre-XDR TB patients (new and retreatment) during the reporting period.	0%	0%	100%	100%	100%	100%	100%
Number of people with pre-XDR/XDR TB enrolled on treatment.	5	3	5	5	5	5	5

Contact investigation coverage: Proportion of contacts of people with bacteriologically confirmed TB screened for TB among those eligible.	81%	82%	84%	87%	89%	92%	95%
Number of contacts of people with bacteriologically confirmed TB screened for TB among those eligible	3,887	5,403	5,760	7,586	10,110	11,657	13,439
Number of contacts of people with bacteriologically confirmed TB	4,781	6,616	6,836	8,733	11,300	12,662	14,146
Proportion of contacts of all forms of TB notified that were screened for TB	80%	83%	85%	87%	90%	92%	95%
Number of contacts of all forms of TB notified that were screened for TB	12,107	16,799	19,946	25,021	27,249	29,656	32,387
Number of contacts of all forms of TB notified	15,114	20,335	23,462	28,625	30,341	32,161	34,091
Objective 3: Enhance support and quality of care to achieve TB treatment success rate of 95%							
Proportion of TB notified cases (new and relapse that cured or completed treatment	76%	77%	80%	83%	85%	88%	90%
Number of new and relapse TB cases notified that cured or completed treatment	3,404	3,466	4,520	5,594	7,032	7,673	8,366
Total new and relapse TB cases started on treatment/registered	4,486	4,494	5,650	6,781	8,273	8,769	9,295
Proportion of new and relapse RR/MDR-TB cases registered that cured or completed treatment	80%	74%	77%	80%	84%	87%	90%
Number of new and relapse RR/MDR-TB cases registered that cured or completed treatment	144	82	85	86	142	180	197
Number of new and relapse RR/MDR-TB cases registered	180	111	110	107	170	207	219

Appendix 3: Operational Plan

Operational Plan with description of activities, sub-activities, and implementers

Key activities	Description and sub activities		Implementing partners	2023/2024	2024/2025	2025/2026	2026/2027	2027/2028
	Goal 1: Reduce TB burden by scaling up TB prevention, diagnosis, and care through a people-centred approach.							
	Objective 1: Scale up TB prevention interventions to reach 95% of eligible people							
	Intervention 1.1: Enhance coverage for TB preventative therapy.							
1.1.1. TB preventative therapy (TPT) guidelines review and update	. Review TPT guidelines . Review TPT programmatic data . Update guidelines based latest evidence and WHO recommendations. . Print and disseminate TPT guidelines. . Train healthcare workers on the new TPT guidelines		. NTLP . Implementing partners					
1.1.2. Finding people eligible for TPT	. Intensify contact tracing for contacts of people with TB and provide TPT to those with no active TB disease. . Increase awareness on TPT in the community with IEC material and health promotion activities. . Integrate TB services with HIV services, and increase proportion of PLHIV on TPT . Multi-sectoral engagement, including private sector to promote TPT initiation.		. NTLP . Private sector . Implementing partners . MOJCS					

1.1.3. Utilise new TB preventative therapy short regimens.	. Scale up the use of shorter regimens for TPT. . Evaluate evidence for newer regimens and incorporate in guidelines. . Support supply chain management to ensure adequate levels of TPT drugs		. NTLP . MoH . Department of pharmaceutical services					
1.1.4. Adherence support for people on TPT	. Adherence counselling for people on TPT . Multi-month dispensing for TPT. . Utilize technology to send reminders for TPT adherence and completion. . Community-based pick-ups for TPT		. NTLP . MoH . Implementing partners . Department of pharmaceutical services					
	Intervention 1.2: Enhance TB vaccine coverage.							
1.2.1. Increase BCG vaccine coverage.	. Increase proportion of infants that receive BCG vaccine from 76% to 95% . Support supply chain management for BCG vaccine to avoid stock-outs at facilities. . Community engagement to enhance BCG vaccine uptake		. NTLP . MoH . Department of pharmaceutical services					
1.2.2. Support research for new TB vaccines	. Multi-sectoral collaboration to establish regulatory framework for TB vaccines research. . Support initiatives for TB vaccines research in Lesotho		. NTLP . MoH . Private sector . Implementing partners					
1.2.3. Advocacy for TB vaccine research	. Engagement and working together with various		. NTLP . MoH					

	stakeholders including communities, political leaders, and research funders to support and contribute towards TB vaccines research		. MAF members . Civil society					
1.2.4. Review guidelines for TB vaccines	. Review evidence on new TB vaccines and consider incorporation into guidelines		. NTLP . MoH					
1.2.5. Plan for implementation of TB vaccines	. Develop a strategy for the roll-out of TB vaccines		. NTLP . MoH . Department of pharmaceutical services					
	Intervention 1.3: Reduce TB risk factors and barriers to TB services through a multisectoral approach.							
1.3.1. Reduce barriers to access to health services.	. Support community-based programs for TB services to reduce barriers to services. . Provide nutritional support (food parcels, supplements) for people with TB. . Multi-sectoral approach to reduce poverty and other social barriers through MAF		. NTLP . MoH . Ministry of social development . Ministry of agriculture . MAF members					
1.3.2. Health promotion and behavioural change to reduce TB risk factors.	. Health promotion on dangers of tobacco smoking and excessive alcohol use. . Provide tobacco and alcohol cessation counselling and programmes		. NTLP . MoH					
1.3.3. Integration TB services with other health services	. Integration of TB services with other chronic diseases (mental health, diabetes, HIV and other NCDs)		. NTLP . MoH					
1.3.4. Reduction of TB related stigma and discrimination	. In collaboration with other MAF partners increase		. NTLP . MoH					

	awareness on TB related stigma **.** Hold workshops with MAF partners, communities, and healthcare workers on TB related stigma reduction. . IEC material on TB related stigma reduction		**.** Community leaders . MAF members . Implementing partners					
	Objective 2: Increase TB detection rate and linkage into care to 95%							
	Intervention 2.1: Find the missing people with TB.							
2.1.1. Systematic active finding for TB	. Bi-annual community-based TB screening by VHWs . Integrated community-outreach health services that include TB screening. . Train and support traditional healers on TB screening . Community engagement to enhance awareness of TB screening		. NTLP . MoH **.** Community leaders . MAF members . Implementing partners					
2.1.2. Review and update guidelines on TB screening and diagnosis	. Review and update guidelines for TB screening, investigations, and diagnosis . Consider systematic screening approaches such as targeted universal testing for some of the key and vulnerable populations for TB. . Disseminate, print, and train healthcare workers on the new TB screening and diagnosis guidelines.		. NTLP . MoH					
2.1.3. Scale-up the use of digital X-ray for TB screening	. Procure additional digital x-rays machines.		. NTLP . MoH					

	. Provide computer aided support for X-rays.							
2.1.4. Strengthen contact tracing.	. Intensify contact tracing for people diagnosed with TB with VHWs, home visits and facilities referrals. . Screen all contacts for TB. . Counsel people with TB on contact tracing		. NTLP . MoH . Community leaders . MAF members . Implementing partners					
2.1.5. Implementation of test and treat strategies for TB.	. Increase the number of facilities that have GeneXpert or other NAAT testing instruments to enhance POC testing for TB. . Increase the use of urinary-LAM. . Provide same day TB treatment initiation for people newly diagnosed with TB.		. NTLP . MoH . Implementing partners					
2.1.6. Enhance TB diagnosis in children and for extra-pulmonary TB.	. Provide training on TB diagnosis in children. . Support the use of other diagnostic tools such as ultrasound and non-sputum samples for pulmonary and extra-pulmonary TB diagnosis.		. NTLP . MoH . Implementing partners					
2.1.7. Use newer diagnostic tools for TB diagnosis.	. Review data on newer diagnostics tools, and consider incorporation of other non-sputum samples for TB diagnosis such as stools, saliva (tongue swabs) and blood in the guidelines		. NTLP . MoH . Implementing partners . NTRL					

2.1.8. Strengthen health systems structures and communication to support TB detection.	.Invest in renewable energy powers supply for x-rays such as solar. . enhance data collection tools for TB screening and testing to improve accurate data collection		. MoH . NTLP					
	Intervention 2.2: Support linkage into TB care and support services for people with TB							
2.2.1. Enhance communication and clear referral pathways.	**.** Draft clear referral processes for each community-based program . Define referral processes for people with TB diagnosed at a hospital to be linked with PHC facilities or community-based program. . Define referral pathways for people with TB on treatment in prisons to be linked to a health facility on discharge.		. NTLP . MoH . Implementing partners . MOJCS					
2.2.2. Counselling of people newly diagnosed with TB.	**.** Train healthcare workers on providing counselling for people newly diagnosed with TB with an emphasis on retention in care and treatment completion. . Address identified risk factors for poor adherence such as excessive alcohol use during the counselling. **.** Refer people with TB for other services such as mental health care and management		. NTLP . MoH . Implementing partners					
2.2.3. Utilizes technology to support adherence.	**.** Review evidence for technological tools that		. NTLP . MoH					

	support adherence such as SMS reminders. . Scale up the use of technology to support adherence.		. Implementing partners					
	Objective 3: Enhance support and quality of care to achieve TB treatment success rate of 95%							
	Intervention 3.1: Provide integrated quality care and support to people with TB.							
3.1.1. Review and update TB treatment guidelines	**.** Review and update TB treatment guidelines as new TB drugs data emerges and consider incorporating short TB treatment regimens. . Train healthcare workers on the new TB treatment guidelines . Print and disseminate the new TB treatment guidelines.		. NTLP . MoH . Implementing partners					
3.1.2. Clinical support for healthcare providers	**.** Establish national and district level consortium that provide support to clinicians for complicated people with TB. . Provide communication to healthcare workers on how to access the support for the management of complicated patients with TB. . Facilitate routine TB mortality audits at facility, district, and national level		. NTLP . MoH . Implementing partners					
3.1.3. Provide differentiated models of care.	**.** Provide differentiated care for people with TB that are stable on TB treatment including multi-month dispensing and community-		. NTLP . MoH . Implementing partners					

	based collection of TB treatment							
3.1.4. Strengthen community-based and community-led support for people with TB.	**.** Develop guidelines on treatment adherence through community-based programmes. **.** Establish more community-based programmes that provide TB services. such as medication refills and household contact tracing . Enhance communication and community engagement of the quality of TB services and areas of improvement		. NTLP . MoH . Implementing partners					
3.1.5. Enhance utilization of various tools to support adherence.	. Enhance and monitor the utilization of technological tools such COMM-care, SMS reminders and pillboxes to support TB treatment adherence. . Develop TB treatment literacy aids that could be printed or shared electronically.		. NTLP . MoH . Implementing partners					
3.1.6. Establish support groups for people with TB.	**.** Develop guidelines for TB treatment support groups. . Establish TB treatment support groups or incorporate TB treatment support into existing support groups for chronic diseases		. NTLP . MoH . Implementing partners					
3.1.7. Support TB research and innovation	. Establish a surveillance system for detection and monitoring of emerging drug resistance.		. NTLP . MoH . Implementing partners					

	. Use TB surveillance data to support revision of treatment guidelines							
3.1.8. Health systems strengthening for high TB treatment success.	. Utilize digital tools including e-register to monitor adherence. . Enhance supply chain management to support transportation of samples from facilities to the laboratory		. NTLP . MoH					
	Intervention 3.2: Reduce the impact of TB to affected people.							
3.2.1. Provide psychosocial support to people affected by TB.	. Increase the number of personnel that offer psychosocial support for people affected by TB. . Amendment of the national social protection strategy to include vulnerable TB patient		. NTLP . MoH . Implementing partners					
3.2.2. Provide material support for families affected by TB.	. Provide Food-for-TB-treatment for families affected by TB		. NTLP . MoH . Community leaders . MAF members . Implementing partners . Ministry of Agriculture . Ministry of social development					
3.2.3. Reduce costs of accessing TB related services	. Increase number of community-based programs that provide TB services and support.		. NTLP . MoH . Community leaders . MAF members					

			. Implementing partners					
Community engagement to reduce TB related stigma and discrimination.	. Conduct campaigns and education to reduce TB related stigma and discrimination. . Conduct TB stigma assessments		. NTLP . MoH . Community leaders . MAF members . Implementing partners					
	Intervention 3.3: Provide post-TB care and support.							
3.3.1. Develop post-TB care and support guidelines.	. Develop country specific post-TB care and support guidelines. . Train healthcare workers on the post-TB care and support guidelines . Disseminate the post-TB care support guidelines.		. NTLP . MoH					
3.3.2. Establish clear notification and referral pathways for post-TB care.	. Develop community-based feedback mechanisms to communicate patient status, including social needs at 1 year post treatment by VHWs, local council and or the chief. . Provide guidance on referral of people with previous TB that r**equire** lung rehabilitation and surgery.		. NTLP . MoH					
	Goal 2: Strengthen structures and support systems for integrated, efficient, and quality TB services.							
	Objective 4: Strengthen structures and support systems for TB Programme.							
	Intervention 4.1: Human Resources and community systems strengthening for TB services.							

4.1.1. Increase the number of healthcare workers positions.	**.** Review the number of the different levels of health professionals in health facilities. . Increase positions for health professionals depending on the needs of the health facilit**ies.** **.** Advocacy for adequate staff levels for health professionals and support staff		. NTLP . MoH . MAF members					
4.1.2. Investment in capacity building	. Plan and provide training on TPT, TB screening and diagnosis and TB treatment and care guidelines. . Intensify supportive supervision for TB services		. NTLP . MoH					
4.1.3. Retain, support, and motivate healthcare workers.	. Motivate for the inclusion of VHWs and contact tracers, TB screeners, data clerks in the establishment list of MOH. . Reinforce the operationalization of the occupational health policy in health facilities.		. NTLP . MoH . MAF members . Implementing partners					
4.1.4. Strengthen community systems for health.	. Resource and capacitate community health systems structures that support health programme. . Advocate for leadership development and better integration and coordination of the community systems		. NTLP . MoH **.** Community leaders . MAF members . Implementing partners					
	Intervention 4.2: Strengthen TB Programme health systems structures for efficiency, resilience, and pandemic preparedness.							
4.2.1. Support policy development	**.** Advocate and support the development and		. NTLP . MoH					

	operationalization of a policy on community-based initiation of TPT and TB treatment.		. MAF members					
4.2.2. Invest in facilities and infrastructure.	. Increase the number of buildings for screening points and waiting areas for TB. Advocate for establishment and revival of functional health posts that provide TB services as part of integrated health services. . Procure equipment for telemedicine implementation in TB programme. . Maintenance of laboratory equipment		. NTLP . MoH					
4.2.3. Coordinate and integrate TB services with other health services.	. Integrate TB services with all other services provided at community level, primary healthcare facilities and hospitals. . Support coordination and collaboration with private practitioners and pharmacist for integrated care and reporting.		. NTLP . MoH . Implementing partners					
	Intervention 4.3: Strengthen airborne infection control measures.							
4.3.1. Adhere to recommended IPC measures guidelines.	. Develop standards for airborne infection control in health facilities and other indoor places where people congregate based on international guidance.		. NTLP . MoH . Implementing partners MAF Partners . Environmental Health					

	. Develop guidelines for monitoring and evaluation of airborne infection control. . Advocacy for IPC measures							
4.3.2. Implement administrative, environmental, and respiratory protection controls.	. Follow the WHO recommended guidelines on the three-level hierarchy of controls. . Support IPC committees in healthcare facilities and prisons		. NTLP . MoH . Implementing partners . MAF members . Environmental Health . MOJCS					
	Intervention 4.4: Invest in Information systems and digital solutions for TB Programme.							
4.4.1. Invest in digital solutions for TB data.	. Support development of recording and reporting modules in papers and electronic records systems. . Request licences and antiviruses support for the IT equipment.		. NTLP . MoH . Implementing partners . Ministry of Communications					
4.4.2. Procure essential equipment for information systems.	. Procure equipment to improve electronic information management systems. . Maintain and service information system equipment.		. NTLP . MoH					
	Intervention 4.5: Strengthen procurement systems and supply chain management for TB Programme.							
4.5.1. Commodities management	. Develop informed estimates for commodities and ensure availability. . Monitor stock-outs of essential commodities and report at appropriate levels.		. NTLP . MoH . Implementing partners . Department of pharmaceutical services					

4.5.2. Diversify transportation.	. Procurement/hiring of transport systems like motorcycles for sample collection and delivery of results. . Invest in technology like drones for sample and or medication transportation in hard-to-reach areas. . Revive equine hire in hard-to-reach areas for samples and drugs transportation from community level.		. NTLP . MoH . Implementing partners . NTRL					
	Intervention 4.6: Evaluate for impact and guide innovation and research for TB.							
4.6.1. Enhance utilization of data reporting tools	. Review Health information management systems and ensure their utilization at all levels by all implementers. . Strengthen reporting by VHWs and community implementing partners. . Employ of more M&E HR (data clerks)		. NTLP . MoH . Implementing partners					
4.6.2. Analyse data and inform TB services strategy	. Analyse routinely collected data to inform the TB services strategy. . Increase access to aggregated TB data. . Conduct mortality TB audits at all health facilities		. NTLP . MoH . Implementing partners					
4.6.3. Support innovation and research in the TB programme	. Support the conduct of verification and roll out point-of-care tests. . Review the roll-out of new regimens with surveillance.		. NTLP . MoH . Implementing partners . NTRL					

	. Develop a country specific TB research agenda.							
	Intervention 4.7: Lead resource mobilization and coordination of the TB Programme.							
4.7.1. Resource mobilization for the TB programme	**.** Advocate for political commitment for TB disease burden reduction through appropriate budget allocation. . Advocate for establishment of Parliamentary TB caucus and for the office of the Prime Minister for clear directives relating to TB activities to the Ministries.		. NTLP . MoH **.** MAF members					
4.7.2. Coordination of TB activities	**.** NTLP programme leadership to coordinate all interventions and activities on TB. . Reinforce functionality of technical working groups for TB.		. NTLP . MoH					
	Objective 5: Intensify communication and advocacy for TB.							
	Intervention 5.1: Enhance TB advocacy and communication with communities and other stakeholders.							
5.1.1. Enhance communication with communities.	. Improve communication with people affected by TB using various platforms, such as print media, radio, social media, and community gatherings. . Develop of community working groups.		. NTLP . MoH **.** Implementing partners **.** MAF members					
5.1.2. Develop content and materials for communication.	**.** Develop IEC materials in Sesotho and English on TB disease prevention, testing and treatment.		. NTLP . MoH **.** Implementing partners					

	Intervention 5.2: Reinforce partnerships and collaborations for TB Programme							
5.2.1. Apply the multi-sectoral accountability framework (MAF)	**.** Advocate for declaration of TB as a Public health emergency of concern that all ministries, government, and private sectors need to contribute towards reducing. . Advocate for social support for TB patients by collaborating with relevant stakeholders for food security such as social development**.**		. NTLP . MoH **.** MAF members					
5.2.2. Strengthen collaborations for TB control	. Activate partnerships with the school health programme. . Encourage private sector collaborations for supporting domestic funding and human resource for health work force. . Strengthen linkages and referrals between correctional health system and the public health system		. NTLP . MoH . MAF members . MOJCS					

Appendix 4: Resource Mobilisation and costing for HIV and TB programme supplementary tables and figures

Supplementary Table 1: TP, PIN and Coverage we documented for Lesotho's NSP interventions.

		PIN	PIN	COV	COV	COV	COV	COV	COV	COV	COV
Intervention	Target population	Start 2021	End 2028	Start 2021	Start 2022	Start 2023	Start 2024	Start 2025	Start 2026	Start 2027	End 2028
Screening (provider-initiated)											
PLHIV ≥ 10 years, enrolled on ART, without serious illness	PLHIV, pulmonary TB, enrolled on ART, without serious illness, population 10+: Number eligible to be screened for TB disease	100	100	16	24	33	42	50	59	68	77
PLHIV not on ART ≥ 10 years, without serious illness	Pulmonary TB, HIV+, not on ART, population 10+: Number eligible to be screened for TB disease	100	100	29	39	49	59	69	79	89	100
PLHIV ≥ 10 years, inpatient	PLHIV, pulmonary TB, enrolled on ART, with serious illness, population 10+: Number eligible to be screened for TB disease	100	100	16	26	37	47	58	68	79	90
PLHIV, children 0-9, outpatient	CLHIV, pulmonary TB, enrolled on ART, without serious illness, children 0-9: Number eligible to be screened for TB disease	100	100	16	26	37	47	58	68	79	90
Household contacts, children 0-14	Household contacts, pulmonary TB, children 0-14: Number eligible to be screened for TB disease	100	100	50	55	61	66	72	77	83	89
Household contacts, children 0-4	Household contacts, pulmonary TB, children 0-4: Number eligible to be screened for TB disease	100	100	50	55	61	67	72	78	84	90
Household contacts, children 5-14	Household contacts, pulmonary TB, children 5-14: Number eligible to be screened for TB disease	100	100	50	55	61	67	72	78	84	90
Household contacts, adults 15+	Household contacts, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	100	100	50	55	61	67	72	78	84	90
Prisoners, adults 15+	Prisoners, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	100	100	95	95	96	97	97	98	99	100
Miners exposed to silica, adults 15+	Miners exposed to silica, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	100	100	82	84	86	89	91	94	96	99
People with untreated fibrotic lesions on chest x-ray	Population with untreated fibrotic lesions on chest x-ray, pulmonary	100	100	6	9	12	16	19	23	26	30

	TB, adults 15+: Number eligible to be screened for TB disease										
People with risk factors for TB seeking health care	Population with risk factors for TB seeking health care in settings with ≥ 0.1% TB prevalence, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	100	100	6	9	12	16	19	23	26	30
Populations with structural risk factors for TB	Populations with structural risk factors for TB and limited access to health care, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	100	100	10	15	21	27	32	38	44	50
General population in settings with ≥ 0.5% general prevalence	General population in settings with ≥ 0.5% general prevalence, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	100	100	5	8	12	15	19	22	26	30
TB infection prevention, testing (provider-initiated)											
Testing of latent TB infection, household contact, children 5-14	Household contacts, pulmonary TB, children 5-14: Number eligible for evaluation of TB infection	100	100	0	4	8	12	17	21	25	30
Testing of latent TB infection, household contact, adults 15+	Household contacts, pulmonary TB, adults 15+: Number eligible for evaluation of TB infection	100	100	0	4	8	12	17	21	25	30
Testing of latent TB infection, household contact, children 0-4	Household contacts, children 0-4: Number eligible for evaluation of TB infection	100	100	0	4	8	12	17	21	25	30
Testing of latent TB infection, other high-risk groups, adults 15+	Provider-initiated, high-risk groups, all high-risk groups combined: Number eligible for evaluation of TB infection	100	100	0	4	8	12	16	20	24	28
TB infection prevention, medication (provider-initiated)											
TB preventive treatment, adults	Prevention of TB infection, adults 15+: Number with presumed or confirmed TB infection, drug-susceptible strains	100	100	90	90	90	90	90	90	90	90
TB preventive treatment, children 0-14	Prevention of TB infection, children 0-14: Number with presumed or confirmed TB infection, drug-susceptible strains	100	100	90	90	90	90	90	90	90	90
TB preventive treatment, MDR/RR TB strain	Prevention of TB infection, all ages: Number with presumed or confirmed TB infection, drug-resistant strains	100	100	10	10	10	10	10	10	10	10

Case finding (patient-initiated)											
Pulmonary TB case finding (patient-initiated), HIV-negative, adults 15+	Pulmonary TB, HIV-, adults 15+: Number clinically assessed for TB disease	100	100	50	57	64	71	78	85	92	100
Pulmonary TB case finding (patient-initiated), HIV-negative, children < 15	Pulmonary TB, HIV-, children 0-14: Number clinically assessed for TB disease	100	100	50	57	64	71	78	85	92	100
Extra-pulmonary TB case finding (patient-initiated), HIV-negative, adults 15+	Extrapulmonary TB, HIV-, adults 15+: Number clinically assessed for TB disease	100	100	50	57	64	71	78	85	92	100
Extra-pulmonary TB case finding (patient-initiated), HIV-negative, children < 15	Extrapulmonary TB, HIV-, children 0-14: Number clinically assessed for TB disease	100	100	50	57	64	71	78	85	92	100
Diagnosis (patient-initiated)											
Pulmonary TB disease, adults 15+	Pulmonary TB, any HIV status, adults 15+: Number referred for diagnostic evaluation of TB disease	100	100	60	65	71	76	82	87	93	99
Extra-pulmonary TB disease, adults 15+	Extrapulmonary TB, any HIV status, adults 15+: Number referred for diagnostic evaluation of TB disease	100	100	60	65	71	76	82	87	93	99
Pulmonary TB disease, children 0-14	Pulmonary TB, any HIV status, children 0-14: Number referred for diagnostic evaluation of TB disease	100	100	60	65	71	76	82	87	93	99
Extra-pulmonary TB disease, children 0-14	Direct entry	100	100	60	65	71	76	82	87	93	99
Diagnosis (provider-initiated)											
Pulmonary TB disease, all high-risk groups, adults 15+	All high-risk groups, pulmonary TB, adults 15+: Number referred for diagnostic evaluation of TB disease	100	100	60	65	71	76	82	87	93	99
Pulmonary TB disease, household contacts, children 0-14	Household contacts, pulmonary TB, children 0-14: Number referred for diagnostic evaluation of TB disease	100	100	60	65	71	76	82	87	93	99
Pulmonary TB disease in PLHIV enrolled on ART,	PLHIV, pulmonary TB, enrolled on ART, without serious illness, adults	100	100	60	65	71	76	82	87	93	99

children and adults 15+ in outpatient care	15+: Number referred for diagnostic evaluation of TB disease										
Pulmonary TB, PLHIV enrolled on ART, children and adults 15+ in inpatient care	PLHIV, pulmonary TB, enrolled on ART, with serious illness, adults 15+: Number referred for diagnostic evaluation of TB disease	100	100	60	65	71	76	82	87	93	99
Pulmonary TB disease in PLHIV enrolled on ART, children 0-14 in outpatient care	PLHIV, pulmonary TB, enrolled on ART, without serious illness, children 0-14: Number referred for diagnostic evaluation of TB disease	100	100	60	65	71	76	82	87	93	99
Pulmonary TB disease in PLHIV enrolled on ART, children 0-14 in inpatient care	PLHIV, pulmonary TB, enrolled on ART, with serious illness, children 0-14: Number referred for diagnostic evaluation of TB disease	100	100	60	65	71	76	82	87	93	99
Drug resistance detection											
Rifampicin and isoniazid resistance testing	Pulmonary and extrapulmonary TB, all ages: Testing for rifampicin resistance	100	100	80	82	85	88	91	94	97	100
isoniazid resistance testing, among rifampicin-sensitive cases	Pulmonary and extrapulmonary TB, all ages: Testing for isoniazid resistance among rifampicin-sensitive cases	100	100	10	15	21	27	32	38	44	50
Fluoroquinolone resistance testing, among rifampicin-resistant cases	Pulmonary and extrapulmonary TB, all ages: Number to be tested for fluoroquinolone resistance, among rifampicin-resistant cases	100	100	10	15	21	27	32	38	44	50
Resistance testing for bedaquiline, linezolid, levofloxacin, moxifloxacin	Number to be tested for resistance to bedaquiline, linezolid, levofloxacin, moxifloxacin	100	100	0	2	5	8	11	14	17	20
Treatment, drug-susceptible											
Treatment of drug-susceptible TB, rifampicin- and isoniazid-sensitive adults 15+	Pulmonary and extrapulmonary TB, adults 15+, without severe TB: Number confirmed rifampicin- and isoniazid-sensitive	100	100	70	74	78	82	87	91	95	100
Treatment of drug-susceptible TB, rifampicin- and	Pulmonary and extrapulmonary TB, children 0-14: Number confirmed rifampicin-sensitive and isoniazid-resistant	100	100	70	74	78	82	87	91	95	100

isoniazid-sensitive children 0-14											
Treatment of drug-susceptible TB, rifampicin- and isoniazid-sensitive children 3 months-16 without severe TB	Pulmonary and extrapulmonary TB, children 0-14, without severe TB: Number confirmed rifampicin and isoniazid-sensitive	100	100	70	74	78	82	87	91	95	100
Treatment of TB meningitis and pericarditis, bones, joint TB, adults 15+	Drug susceptible TB, adults 15+: Number drug-susceptible TB with meningitis and pericarditis	100	100	70	74	78	82	87	91	95	100
Treatment of drug-susceptible TB meningitis and pericarditis, children 0-14	Drug susceptible TB, children 0-14: Number drug-susceptible TB with meningitis and pericarditis	100	100	70	74	78	82	87	91	95	100
Treatment, drug-resistant											
Treatment of drug-resistant TB, rifampicin-sensitive regimen in isoniazid-resistant adults 15+	Pulmonary and extrapulmonary TB, adults 15+: Number confirmed rifampicin-sensitive and isoniazid-resistant	100	100	70	74	78	82	87	91	95	100
Treatment of drug-resistant TB, rifampicin-sensitive regimen in isoniazid-resistant children 0-14	Pulmonary and extrapulmonary TB, children 0-14: Number confirmed rifampicin-sensitive and isoniazid-resistant	100	100	70	74	78	82	87	91	95	100
BpalM regimen or shorter all-oral bedaquiline-containing regimen for treatment of drug-resistant TB, adults 15+	Pulmonary and extrapulmonary TB, adults 15+:Number confirmed rifampicin-resistant and fluoroquinolone-sensitive	100	100	70	74	78	82	87	91	95	100
Shorter all-oral bedaquiline-containing regimen for treatment of drug-resistant TB, children 0-14	Pulmonary and extrapulmonary TB, children 0-14:Number confirmed rifampicin-resistant and fluoroquinolone-sensitive	100	100	70	74	78	82	87	91	95	100
BPal regimens for drug-resistant TB	Pulmonary and extrapulmonary TB, adults 15+:Number confirmed	100	100	70	74	78	82	87	91	95	100

treatment, adults 15+	rifampicin-resistant and fluoroquinolone-resistant, pre-XDR										
Longer regimens for drug-resistant TB treatment, adults 15+	Pulmonary and extrapulmonary TB, adults 15+:Number confirmed rifampicin-resistant and fluoroquinolone-resistant, pre-XDR	100	100	70	74	78	82	87	91	95	100
Longer regimens for drug-resistant TB treatment, children 0-14	Pulmonary and extrapulmonary TB, children 0-14:Number confirmed rifampicin-resistant and fluoroquinolone-resistant, pre-XDR	100	100	70	74	78	82	87	91	95	100
Treatment of extensively drug-resistant TB (XDR), adults	Pulmonary and extrapulmonary TB, adults 15+: Number Pre-XDR and resistant to at least one of bedaquiline, linezolid, levofloxacin, moxifloxacin	100	100	100	100	100	100	100	100	100	100
Treatment of extensively drug-resistant TB (XDR), children	Pulmonary and extrapulmonary TB, children 0-14: Number Pre-XDR and resistant to at least one of bedaquiline, linezolid, levofloxacin, moxifloxacin	100	100	100	100	100	100	100	100	100	100
First-line drug treatment monitoring											
Treatment monitoring for patients on first-line drug regimen, adults 15+	Number needing first-line drug treatment, adults 15+	100	100	80	82	85	88	91	94	97	100
Treatment monitoring for patients on first-line drug regimen, children 0-14	Number needing first-line drug treatment, children 0-14	100	100	80	82	85	88	91	94	97	100
Second-line drug treatment monitoring											
Treatment monitoring for patients on 6-month isoniazid-resistant and shorter second-line drug regimen, adults 15+	Patients on 6-month isoniazid-resistant and shorter second-line drug regimen, adults 15+	100	100	80	82	85	88	91	94	97	100
Treatment monitoring for patients on 6-month isoniazid-resistant and shorter second-	Patients on 6-month isoniazid-resistant and shorter second-line drug regimen, children 0-14	100	100	80	82	85	88	91	94	97	100

line drug regimen, children 0-14											
Treatment monitoring for longer regimens for MDR/RR-TB or XDR, children and adults	Patients on longer regimens for MDR/RR-TB or XDR, children and adults	100	100	80	82	85	88	91	94	97	100
Adverse events treatment											
Adverse events treatment on patients on shorter DR treatment	Patients on 6-month isoniazid-resistant and shorter second-line drug regimen	100	100	80	82	85	88	91	94	97	100
Adverse events treatment on patients on longer DR treatment	Patients on 6-month isoniazid-resistant and shorter second-line drug regimen, children 0-14	100	100	80	82	85	88	91	94	97	100
Adverse events treatment on patients on first-line drug treatment	Number needing first-line drug treatment, all ages	100	100	80	82	85	88	91	94	97	100
Non-medical support											
Non-medical treatment support for patients on first-line drug regimen, adults 15+	Number needing first-line drug treatment, adults 15+	100	100	80	82	85	88	91	94	97	100
Non-medical treatment support for patients on first-line drug regimen, children 0-14	Number needing first-line drug treatment, children 0-14	100	100	80	82	85	88	91	94	97	100
Non-medical treatment support for patients on second-line drug regimen, adults 15+	Number needing second-line drug treatment, adults 15+	100	100	80	82	85	88	91	94	97	100
Non-medical treatment support for patients on second-line drug regimen, children 0-14	Number needing second-line drug treatment, children 0-14	100	100	80	82	85	88	91	94	97	100
Palliative care											

Palliative care	Direct entry	100	100	0	7	14	21	28	35	42	50
TB and other diseases infection prevention, medication											
Cotrimoxazole prophylaxis, PLHIV	HIV and TB co-infection, children and adults: Number PLHIV with TB	100	100	80	82	85	88	91	94	97	100
HIV treatment, first-line											
ART for PLHIV with TB, adult and adolescent	HIV and TB co-infection, children and adults: Number PLHIV with TB	100	100	80	82	85	88	91	94	97	100
ART for PLHIV with TB, paediatrics	HIV and TB co-infection, children: Number PLHIV with TB	100	100	80	82	85	88	91	94	97	100
Vaccination											
BCG immunization	Children 0-11 months	100	100	84	86	88	90	93	95	97	100

*TP= Target population; PIN=population in need; COV=coverage

Supplementary Table 2: Health services costs (cost of interventions)

	2023	2024	2025	2026	2027	2028	Total
Screening (provider-initiated) subtotal	**$885 958**	**$1 314 637**	**$1 678 945**	**$2 331 678**	**$2 865 766**	**$3 490 429**	**$12 567 415**
PLHIV ≥ 10 years, enrolled on ART, without serious illness	$676 079	$1 013 007	$1 281 817	$1 839 520	$2 267 833	$2 800 777	**$9 879 032**
PLHIV not on ART ≥ 10 years, without serious illness	$45 851	$64 970	$77 317	$83 942	$93 216	$90 529	**$455 825**
PLHIV ≥ 10 years, inpatient	$6 383	$10 538	$15 102	$20 408	$25 915	$32 314	**$110 660**
PLHIV, children 0-9, outpatient	$13 528	$19 647	$25 917	$33 230	$40 128	$48 122	**$180 571**
Household contacts, children 0-14	$17 671	$24 706	$31 604	$38 494	$46 378	$52 254	**$211 108**
Household contacts, children 0-4	$10 603	$14 824	$18 963	$23 096	$27 827	$31 353	**$126 665**
Household contacts, children 5-14	$7 069	$9 882	$12 642	$15 398	$18 551	$20 902	**$84 443**
Household contacts, adults 15+	$37 555	$52 525	$67 216	$81 900	$98 712	$111 262	**$449 170**
Prisoners, adults 15+	$12 689	$13 483	$14 334	$15 266	$16 271	$17 360	**$89 404**
Miners exposed to silica, adults 15+	$15 784	$17 003	$18 511	$19 934	$21 691	$23 354	**$116 277**
People with untreated fibrotic lesions on chest x-ray	$1 155	$2 000	$3 120	$4 334	$5 649	$7 077	**$23 334**
People with risk factors for TB seeking health care	$1 156	$2 001	$3 122	$4 336	$5 652	$7 081	**$23 349**
Populations with structural risk factors for TB	$14	$38	$84	$147	$237	$354	**$875**
General population in settings with ≥ 0,5% general prevalence	$40 423	$70 012	$109 196	$151 674	$197 706	$247 690	**$816 701**
TB infection prevention, testing (provider-initiated) subtotal	**$-**	**$23 531**	**$46 816**	**$67 966**	**$118 250**	**$157 776**	**$414 338**
Testing of latent TB infection, household contact, children 5-14	$-	$1 228	$2 311	$3 680	$5 432	$7 193	**$19 845**
Testing of latent TB infection, household contact, adults 15+	$-	$6 497	$12 230	$19 476	$28 744	$38 065	**$105 012**
Testing of latent TB infection, household contact, children 0-4	$-	$1 595	$3 020	$4 837	$7 184	$9 575	**$26 210**
Testing of latent TB infection, other high-risk groups, adults 15+	$-	$14 212	$29 255	$39 972	$76 890	$102 943	**$263 272**
TB infection prevention, medication (provider-initiated) subtotal	**$294 168**	**$437 505**	**$535 984**	**$712 155**	**$841 165**	**$984 023**	**$3 805 001**
TB preventive treatment, adults	$177 726	$270 169	$331 648	$452 989	$539 053	$639 487	**$2 411 073**
TB preventive treatment, children 0-14	$93 982	$133 335	$162 666	$202 521	$234 853	$264 988	**$1 092 345**
TB preventive treatment, MDR/RR TB strain	$22 460	$34 000	$41 670	$56 645	$67 259	$79 549	**$301 583**

Case finding (patient-initiated) subtotal	**$137 080**	**$160 087**	**$160 097**	**$148 001**	**$142 292**	**$117 222**	**$864 778**
Pulmonary TB case finding (patient-initiated), HIV-negative, adults 15+	$116 163	$135 771	$135 912	$125 827	$121 171	$100 057	**$734 901**
Pulmonary TB case finding (patient-initiated), HIV-negative, children < 15	$5 021	$5 553	$5 046	$3 987	$3 160	$1 612	**$24 379**
Extra-pulmonary TB case finding (patient-initiated), HIV-negative, adults 15+	$15 195	$17 943	$18 313	$17 411	$17 203	$14 904	**$100 968**
Extra-pulmonary TB case finding (patient-initiated), HIV-negative, children < 15	$701	$819	$827	$777	$758	$649	**$4 530**
Diagnosis (patient-initiated) subtotal	**$207 589**	**$246 397**	**$254 214**	**$242 431**	**$240 448**	**$201 380**	**$1 392 459**
Pulmonary TB disease, adults 15+	$160 101	$190 294	$196 834	$188 519	$187 816	$158 622	**$1 082 186**
Extra-pulmonary TB disease, adults 15+	$31 052	$37 711	$40 176	$39 880	$41 134	$36 687	**$226 640**
Pulmonary TB disease, children 0-14	$16 275	$18 217	$17 013	$13 824	$11 273	$5 830	**$82 431**
Extra-pulmonary TB disease, children 0-14	$161	$175	$191	$208	$226	$241	**$1 203**
Diagnosis (provider-initiated) subtotal	**$334 664**	**$518 971**	**$719 394**	**$1 055 855**	**$1 389 646**	**$1 775 531**	**$5 794 062**
Pulmonary TB disease, all high-risk groups, adults 15+	$155 536	$240 147	$340 656	$485 238	$637 255	$807 270	**$2 666 101**
Pulmonary TB disease, household contacts, children 0-14	$94 144	$142 973	$192 503	$280 720	$366 193	$461 198	**$1 537 731**
Pulmonary TB disease in PLHIV enrolled on ART, children and adults 15+ in outpatient care	$53 662	$87 224	$120 702	$188 407	$251 635	$332 186	**$1 033 814**
Pulmonary TB, PLHIV enrolled on ART, children and adults 15+ in inpatient care	$1 494	$2 622	$4 031	$5 819	$7 842	$10 225	**$32 033**
Pulmonary TB disease in PLHIV enrolled on ART, children 0-14 in outpatient care	$29 779	$45 924	$61 393	$95 545	$126 582	$164 508	**$523 731**
Pulmonary TB disease in PLHIV enrolled on ART, children 0-14 in inpatient care	$49	$81	$110	$126	$140	$145	**$651**
Drug resistance detection subtotal	**$149 134**	**$193 673**	**$218 052**	**$245 043**	**$274 903**	**$290 513**	**$1 371 319**
Rifampicin and isoniazid resistance testing	$147 633	$190 223	$212 532	$237 054	$263 999	$276 991	**$1 328 432**
isoniazid resistance testing, among rifampicin-sensitive cases	$1 435	$3 299	$5 278	$7 637	$10 422	$12 923	**$40 994**
Fluoroquinolone resistance testing, among rifampicin-resistant cases	$66	$152	$242	$351	$479	$594	**$1 883**
Resistance testing for bedaquiline, linezolid, levofloxacin, moxifloxacin	$0	$0	$1	$2	$3	$5	**$11**
Treatment, drug-susceptible subtotal	**$568 506**	**$728 676**	**$809 548**	**$904 019**	**$999 388**	**$1 048 987**	**$5 059 124**
Treatment of drug-susceptible TB, rifampicin- and isoniazid-sensitive adults 15+	$541 098	$688 689	$759 025	$835 999	$913 900	$944 559	**$4 683 270**
Treatment of drug-susceptible TB, rifampicin- and isoniazid-sensitive children 0-14	$61	$156	$278	$488	$749	$1 090	**$2 821**

Treatment of drug-susceptible TB, rifampicin- and isoniazid-sensitive children 3 months-16 without severe TB	$24 568	$33 216	$39 100	$50 060	$59 456	$69 497	**$275 896**
Treatment of TB meningitis and pericarditis, bones, joint TB, adults 15+	$2 209	$5 158	$8 545	$12 911	$18 284	$23 660	**$70 766**
Treatment of drug-susceptible TB meningitis and pericarditis, children 0-14	$570	$1 458	$2 600	$4 561	$7 000	$10 180	**$26 369**
Treatment, drug-resistant subtotal	**$231 093**	**$313 884**	**$368 765**	**$436 623**	**$509 011**	**$564 000**	**$2 423 376**
Treatment of drug-resistant TB, rifampicin-sensitive regimen in isoniazid-resistant adults 15+	$1 353	$3 156	$5 222	$7 880	$11 144	$14 401	**$43 156**
Treatment of drug-resistant TB, rifampicin-sensitive regimen in isoniazid-resistant children 0-14	$178	$454	$810	$1 421	$2 181	$3 171	**$8 216**
BpalM regimen or shorter all-oral bedaquiline-containing regimen for treatment of drug-resistant TB, adults 15+	$206 698	$275 561	$317 622	$365 540	$416 936	$449 426	**$2 031 781**
Shorter all-oral bedaquiline-containing regimen for treatment of drug-resistant TB, children 0-14	$20 394	$28 905	$35 613	$47 678	$59 107	$72 046	**$263 743**
BPal regimens for drug-resistant TB treatment, adults 15+	$300	$721	$1 202	$1 812	$2 558	$3 287	**$9 880**
Longer regimens for drug-resistant TB treatment, adults 15+	$768	$1 845	$3 077	$4 638	$6 545	$8 412	**$25 287**
Longer regimens for drug-resistant TB treatment, children 0-14	$59	$150	$268	$470	$721	$1 047	**$2 715**
Treatment of extensively drug-resistant TB (XDR), adults	$1 207	$2 759	$4 386	$6 248	$8 446	$10 312	**$33 357**
Treatment of extensively drug-resistant TB (XDR), children	$137	$332	$565	$936	$1 375	$1 898	**$5 242**
First-line drug treatment monitoring subtotal	**$44 232**	**$104 037**	**$173 756**	**$264 695**	**$380 279**	**$497 895**	**$1 464 894**
Treatment monitoring for patients on first-line drug regimen, adults 15+	$40 157	$93 632	$155 185	$232 393	$330 481	$425 768	**$1 277 616**
Treatment monitoring for patients on first-line drug regimen, children 0-14	$4 075	$10 406	$18 571	$32 302	$49 798	$72 127	**$187 278**
Second-line drug treatment monitoring subtotal	**$31 282**	**$46 660**	**$60 119**	**$77 942**	**$99 410**	**$120 378**	**$435 791**
Treatment monitoring for patients on 6-month isoniazid-resistant and shorter second-line drug regimen, adults 15+	$28 462	$42 045	$53 641	$68 282	$86 051	$102 436	**$380 916**
Treatment monitoring for patients on 6-month isoniazid-resistant and shorter second-line drug regimen, children 0-14	$2 611	$4 092	$5 566	$8 216	$11 215	$15 035	**$46 736**
Treatment monitoring for longer regimens for MDR/RR-TB or XDR, children and adults	$209	$523	$912	$1 444	$2 145	$2 906	**$8 140**
Adverse events treatment subtotal	**$268 076**	**$558 748**	**$877 462**	**$1 283 916**	**$1 783 777**	**$2 271 010**	**$7 042 990**
Adverse events treatment on patients on shorter DR treatment	$64 863	$93 377	$116 092	$145 251	$178 666	$208 637	**$806 885**
Adverse events treatment on patients on longer DR treatment	$6 376	$9 716	$12 839	$18 394	$24 352	$31 636	**$103 312**
Adverse events treatment on patients on first-line drug treatment	$196 838	$455 656	$748 531	$1 120 271	$1 580 760	$2 030 737	**$6 132 793**
Non-medical support subtotal	**$382 707**	**$885 741**	**$1 454 741**	**$2 176 677**	**$3 070 643**	**$3 943 657**	**$11 914 167**

Non-medical treatment support for patients on first-line drug regimen, adults 15+	$341 461	$783 759	$1 277 903	$1 881 300	$2 628 213	$3 323 922	**$10 236 558**
Non-medical treatment support for patients on first-line drug regimen, children 0-14	$32 358	$81 413	$143 058	$244 842	$371 147	$528 199	**$1 401 018**
Non-medical treatment support for patients on second-line drug regimen, adults 15+	$8 125	$18 650	$30 407	$44 764	$62 534	$79 084	**$243 564**
Non-medical treatment support for patients on second-line drug regimen, children 0-14	$763	$1 919	$3 372	$5 772	$8 749	$12 452	**$33 027**
Palliative care subtotal	**$228**	**$410**	**$593**	**$776**	**$959**	**$1 143**	**$4 110**
Palliative care	$228	$410	$593	$776	$959	$1 143	**$4 110**
TB and other diseases infection prevention, medication subtotal	**$654 759**	**$632 701**	**$611 393**	**$590 855**	**$571 096**	**$552 115**	**$3 612 919**
Cotrimoxazole prophylaxis, PLHIV	$654 759	$632 701	$611 393	$590 855	$571 096	$552 115	**$3 612 919**
HIV treatment, first-line subtotal	**$2 251 717**	**$2 146 753**	**$2 046 331**	**$1 950 456**	**$1 859 089**	**$1 772 160**	**$12 026 506**
ART for PLHIV with TB, adult and adolescent	$2 140 089	$2 040 343	$1 944 913	$1 853 804	$1 766 979	$1 684 370	**$11 430 497**
ART for PLHIV with TB, paediatrics	$111 629	$106 410	$101 418	$96 652	$92 111	$87 790	**$596 009**
Vaccination subtotal	**$138 001**	**$143 999**	**$149 644**	**$156 057**	**$162 401**	**$171 257**	**$921 360**
BCG immunization	$138 001	$143 999	$149 644	$156 057	$162 401	$171 257	**$921 360**
Total	**$6 579 196**	**$8 456 412**	**$10 165 855**	**$12 645 145**	**$15 308 526**	**$17 959 476**	**$71 114 610**

Supplementary Table 3: Quantities linked to TB costing including population number, population in need, coverage and total number of services by service package.

Intervention	Target	Population number		PIN		Coverage		Total number of services by service package	
Screening (provider-initiated)		**2022**	**2028**	**2022**	**2028**	**2022**	**2028**	**2022**	**2028**
PLHIV ≥ 10 years, enrolled on ART, without serious illness	PLHIV, pulmonary TB, enrolled on ART, without serious illness, population 10+: Number eligible to be screened for TB disease	300 679	377 293	100	100	23	77	69 156	290 516
PLHIV not on ART ≥ 10 years, without serious illness	Pulmonary TB, HIV+, not on ART, population 10+: Number eligible to be screened for TB disease	5 448	6 363	100	100	39	100	2 125	6 363
PLHIV ≥ 10 years, inpatient	PLHIV, pulmonary TB, enrolled on ART, with serious illness, population 10+: Number eligible to be screened for TB disease	6 165	7 650	100	100	23	90	1 418	6 885
PLHIV, children 0-9, outpatient	CLHIV, pulmonary TB, enrolled on ART, without serious illness, children 0-9: Number eligible to be screened for TB disease	4 137	4 637	100	100	23	90	952	4 173
Household contacts, children 0-14	Household contacts, pulmonary TB, children 0-14: Number eligible to be screened for TB disease	2 457	4 355	100	100	50	90	1 228	3 920
Household contacts, children 0-4	Household contacts, pulmonary TB, children 0-4: Number eligible to be screened for TB disease	1 474	2 613	100	100	50	90	737	2 352
Household contacts, children 5-14	Household contacts, pulmonary TB, children 5-14: Number eligible to be screened for TB disease	983	1 742	100	100	50	90	491	1 568
Household contacts, adults 15+	Household contacts, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	5 167	9 160	100	100	50	90	2 584	8 244
Prisoners, adults 15+	Prisoners, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	1 591	1 748	100	100	95	100	1 511	1 748
Miners exposed to silica, adults 15+	Miners exposed to silica, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	1 591	1 748	100	100	82	99	1 304	1 730
People with untreated fibrotic lesions on chest x-ray	Population with untreated fibrotic lesions on chest x-ray, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	159	175	100	100	6	30	95	524
People with risk factors for TB seeking health care	Population with risk factors for TB seeking health care in settings with ≥ 0.1% TB prevalence, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	1 591	1 748	100	100	6	30	95	524
Populations with structural risk factors for TB	Populations with structural risk factors for TB and limited access to health care, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	1 591	1 748	100	100	11	50	1	26
General population in settings with ≥ 0.5% general prevalence	General population in settings with ≥ 0.5% general prevalence, pulmonary TB, adults 15+: Number eligible to be screened for TB disease	55 675	61 175	100	100	5	30	2 784	18 353
TB infection prevention, testing (provider-initiated)									
Testing of latent TB infection, household contact, children 5-14	Household contacts, pulmonary TB, children 5-14: Number eligible for evaluation of TB infection	469	1 495	100	100	0	30	0	449

Testing of latent TB infection, household contact, adults 15+	Household contacts, pulmonary TB, adults 15+: Number eligible for evaluation of TB infection	2 480	7 914	100	100	0	30	0	2 374
Testing of latent TB infection, household contact, children 0-4	Household contacts, children 0-4: Number eligible for evaluation of TB infection	703	2 243	100	100	0	30	0	673
Testing of latent TB infection, other high-risk groups, adults 15+	Provider-initiated, high-risk groups, all high-risk groups combined: Number eligible for evaluation of TB infection	5 770	22 930	100	100	0	28	0	6 420
TB infection prevention, medication (provider-initiated)									
TB preventive treatment, adults	Prevention of TB infection, adults 15+: Number with presumed or confirmed TB infection, drug-susceptible strains	52 698	187 016	100	100	90	90,481 6342	5 288	18 802
TB preventive treatment, children 0-14	Prevention of TB infection, children 0-14: Number with presumed or confirmed TB infection, drug-susceptible strains	2 577	7 896	100	100	90	90,074 1612	2 324	7 112
TB preventive treatment, MDR/RR TB strain	Direct entry	6 142	21 657	100	100	10	10	614	2 166
Case finding (patient-initiated)									
Pulmonary TB case finding (patient-initiated), HIV-negative, adults 15+	Pulmonary TB, HIV-, adults 15+: Number clinically assessed for TB disease	6 867	4 100	100	100	57	100	3 914	4 100
Pulmonary TB case finding (patient-initiated), HIV-negative, children < 15	Pulmonary TB, HIV-, children 0-14: Number clinically assessed for TB disease	310	70	100	100	57	100	177	70
Extra-pulmonary TB case finding (patient-initiated), HIV-negative, adults 15+	Extrapulmonary TB, HIV-, adults 15+: Number clinically assessed for TB disease	959	647	100	100	57	100	546	647
Extra-pulmonary TB case finding (patient-initiated), HIV-negative, children < 15	Extrapulmonary TB, HIV-, children 0-14: Number clinically assessed for TB disease	56	38	100	100	57	100	32	38
Diagnosis (patient-initiated)									
Pulmonary TB disease, adults 15+	Pulmonary TB, any HIV status, adults 15+: Number referred for diagnostic evaluation of TB disease	5 586	4 578	100	100	65	99	3 631	4 532
Extra-pulmonary TB disease, adults 15+	Extrapulmonary TB, any HIV status, adults 15+: Number referred for diagnostic evaluation of TB disease	707	658	100	100	65	99	459	651
Pulmonary TB disease, children 0-14	Pulmonary TB, any HIV status, children 0-14: Number referred for diagnostic evaluation of TB disease	284	130	100	100	65	99	150	68
Extra-pulmonary TB disease, children 0-14	Extrapulmonary TB, any HIV status, children 0-14: Number referred for diagnostic evaluation of TB disease	41	38	100	100	65	99	3	5
Diagnosis (provider-initiated)									
Pulmonary TB disease, all high-risk groups, adults 15+	All high-risk groups, pulmonary TB, adults 15+: Number referred for diagnostic evaluation of TB disease	2 144	8 442	100	100	65	99	3 345	19 927
Pulmonary TB disease, household contacts, children 0-14	Household contacts, pulmonary TB, children 0-14: Number referred for diagnostic evaluation of TB disease	250	797	100	100	65	99	980	5 203
Pulmonary TB disease in PLHIV enrolled on ART, children and adults 15+ in outpatient care	PLHIV, pulmonary TB, enrolled on ART, without serious illness, adults 15+: Number referred for diagnostic evaluation of TB disease	1 987	8 374	100	100	65	99	1 291	8 290
Pulmonary TB, PLHIV enrolled on ART, children and adults 15+ in inpatient care	PLHIV, pulmonary TB, enrolled on ART, with serious illness, adults 15+: Number referred for diagnostic evaluation of TB disease	41	200	100	100	65	99	26	198

Pulmonary TB disease in PLHIV enrolled on ART, children 0-14 in outpatient care	PLHIV, pulmonary TB, enrolled on ART, without serious illness, children 0-14: Number referred for diagnostic evaluation of TB disease	1 088	3 924	100	100	65	99	667	3 614
Pulmonary TB disease in PLHIV enrolled on ART, children 0-14 in inpatient care	PLHIV, pulmonary TB, enrolled on ART, with serious illness, children 0-14: Number referred for diagnostic evaluation of TB disease	3	3	100	100	65	99	1	2
Drug resistance detection									
Rifampicin and isoniazid resistance testing	Pulmonary and extrapulmonary TB, all ages: Testing for rifampicin resistance	5 558	9 859	100	100	80	100	4 447	9 859
isoniazid resistance testing, among rifampicin-sensitive cases	Pulmonary and extrapulmonary TB, all ages: Testing for isoniazid resistance among rifampicin-sensitive cases	4 251	9 341	100	100	10	50	425	4 671
Fluoroquinolone resistance testing, among rifampicin-resistant cases	Pulmonary and extrapulmonary TB, all ages: Number to be tested for fluoroquinolone resistance, among rifampicin-resistant cases	195	429	100	100	10	50	20	215
Resistance testing for bedaquiline, linezolid, levofloxacin, moxifloxacin	Number to be tested for resistance to bedaquiline, linezolid, levofloxacin, moxifloxacin	0	0	100	100	0	20	0	0
Treatment, drug-susceptible									
Treatment of drug-susceptible TB, rifampicin- and isoniazid-sensitive adults 15+	Pulmonary and extrapulmonary TB, adults 15+, without severe TB: Number confirmed rifampicin- and isoniazid-sensitive	4 603	7 684	100	100	74	100	3 407	7 684
Treatment of drug-susceptible TB, rifampicin- and isoniazid-sensitive children 0-14	Pulmonary and extrapulmonary TB, children 0-14: Number confirmed rifampicin-sensitive and isoniazid-resistant	1	14	100	100	74	100	1	14
Treatment of drug-susceptible TB, rifampicin- and isoniazid-sensitive children 3 months-16 without severe TB	Pulmonary and extrapulmonary TB, children 0-14, without severe TB: Number confirmed rifampicin and isoniazid-sensitive	482	1 176	100	100	74	100	357	1 176
Treatment of TB meningitis and pericarditis, bones, joint TB, adults 15+	Drug susceptible TB, adults 15+: Number drug-susceptible TB with meningitis and pericarditis	19	191	100	100	74	100	14	191
Treatment of drug-susceptible TB meningitis and pericarditis, children 0-14	Drug susceptible TB, children 0-14: Number drug-susceptible TB with meningitis and pericarditis	2	30	100	100	74	100	1	30
Treatment, drug-resistant									
Treatment of drug-resistant TB, rifampicin-sensitive regimen in isoniazid-resistant adults 15+	Pulmonary and extrapulmonary TB, adults 15+: Number confirmed rifampicin-sensitive and isoniazid-resistant	9	90	100	100	74	100	7	90
Treatment of drug-resistant TB, rifampicin-sensitive regimen in isoniazid-resistant children 0-14	Pulmonary and extrapulmonary TB, children 0-14: Number confirmed rifampicin-sensitive and isoniazid-resistant	1	14	100	100	74	100	1	14
BpalM regimen or shorter all-oral bedaquiline-containing regimen for treatment of drug-resistant TB, adults 15+	Pulmonary and extrapulmonary TB, adults 15+:Number confirmed rifampicin-resistant and fluoroquinolone-sensitive	176	368	100	100	74	100	131	368
Shorter all-oral bedaquiline-containing regimen for treatment of drug-resistant TB, children 0-14	Pulmonary and extrapulmonary TB, children 0-14:Number confirmed rifampicin-resistant and fluoroquinolone-sensitive	18	57	100	100	74	100	14	57

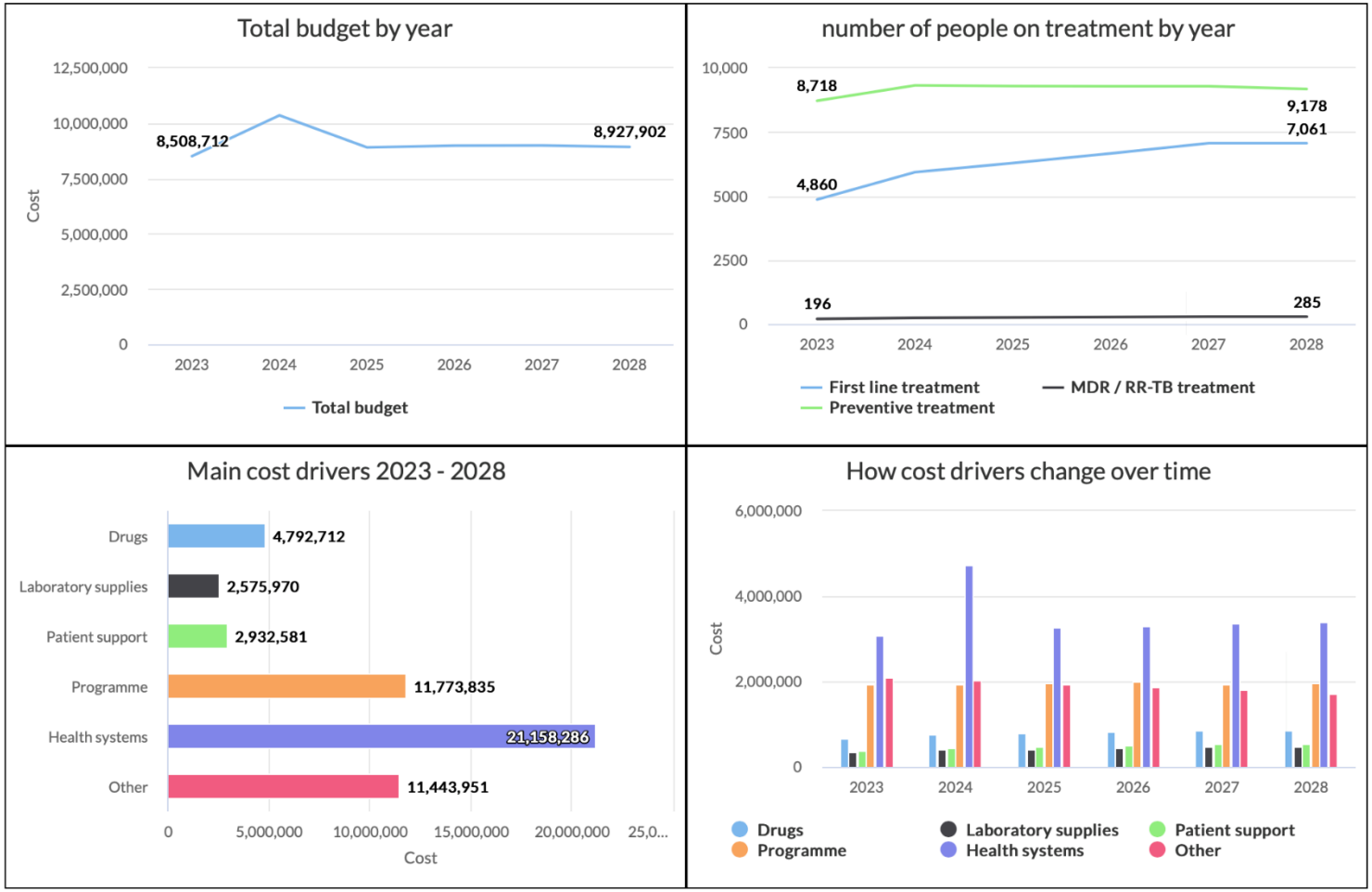
BPal regimens for drug-resistant TB treatment, adults 15+	Pulmonary and extrapulmonary TB, adults 15+:Number confirmed rifampicin-resistant and fluoroquinolone-resistant, pre-XDR	0	4	100	100	74	100	0	4
Longer regimens for drug-resistant TB treatment, adults 15+	Pulmonary and extrapulmonary TB, adults 15+:Number confirmed rifampicin-resistant and fluoroquinolone-resistant, pre-XDR	0	4	100	100	74	100	0	4
Longer regimens for drug-resistant TB treatment, children 0-14	Pulmonary and extrapulmonary TB, children 0-14:Number confirmed rifampicin-resistant and fluoroquinolone-resistant, pre-XDR	0	1	100	100	74	100	0	1
Treatment of extensively drug-resistant TB (XDR), adults	Pulmonary and extrapulmonary TB, adults 15+: Number Pre-XDR and resistant to at least one of bedaquiline, linezolid, levofloxacin, moxifloxacin	0	0	100	100	100	100	0	4
Treatment of extensively drug-resistant TB (XDR), children	Pulmonary and extrapulmonary TB, children 0-14: Number Pre-XDR and resistant to at least one of bedaquiline, linezolid, levofloxacin, moxifloxacin	0	0	100	100	100	100	0	1
First-line drug treatment monitoring									
Treatment monitoring for patients on first-line drug regimen, adults 15+	Number needing first-line drug treatment, adults 15+	376	3 828	100	100	82	100	308	3 828
Treatment monitoring for patients on first-line drug regimen, children 0-14	Number needing first-line drug treatment, children 0-14	39	609	100	100	82	100	32	609
Second-line drug treatment monitoring									
Treatment monitoring for patients on 6-month isoniazid-resistant and shorter second-line drug regimen, adults 15+	Patients on 6-month isoniazid-resistant and shorter second-line drug regimen, adults 15+	N/A	N/A	100	100	82	100	113	462
Treatment monitoring for patients on 6-month isoniazid-resistant and shorter second-line drug regimen, children 0-14	Patients on 6-month isoniazid-resistant and shorter second-line drug regimen, children 0-14	N/A	N/A	100	100	82	100	12	71
Treatment monitoring for longer regimens for MDR/RR-TB or XDR, children and adults	Patients on longer regimens for MDR/RR-TB or XDR, children and adults	N/A	N/A	100	100	82	100	1	9
Adverse events treatment									
Adverse events treatment on patients on shorter DR treatment	Patients on 6-month isoniazid-resistant and shorter second-line drug regimen	N/A	N/A	100	100	82	100	124	533
Adverse events treatment on patients on longer DR treatment	Patients on 6-month isoniazid-resistant and shorter second-line drug regimen, children 0-14	N/A	N/A	100	100	82	100	12	71
Adverse events treatment on patients on first-line drug treatment	Number needing first-line drug treatment, all ages	N/A	N/A	100	100	82	100	341	4 437
Non-medical support									
Non-medical treatment support for patients on first-line drug regimen, adults 15+	Number needing first-line drug treatment, adults 15+	376	3 828	100	100	82	100	308	3 828
Non-medical treatment support for patients on first-line drug regimen, children 0-14	Number needing first-line drug treatment, children 0-14	39	609	100	100	82	100	32	609

Non-medical treatment support for patients on second-line drug regimen, adults 15+	Number needing second-line drug treatment, adults 15+	9	90	100	100	82	100	7	90
Non-medical treatment support for patients on second-line drug regimen, children 0-14	Number needing second-line drug treatment, children 0-14	1	14	100	100	82	100	1	14
Palliative care									
Palliative care	Palliative care, all ages: Number of patients whose curative treatment options have been completely exhausted	Not captured	Not captured	100	100	0	50	0	3
TB and other diseases infection prevention, medication									
Cotrimoxazole prophylaxis, PLHIV	HIV and TB co-infection, children and adults: Number PLHIV with TB	Not captured	Not captured	100	100	82	100	11 821	8 047
HIV treatment, first-line									
ART for PLHIV with TB, adult and adolescent	HIV and TB co-infection, children and adults: Number PLHIV with TB	Not captured	Not captured	100	100	82	100	11 821	8 047
ART for PLHIV with TB, paediatrics	HIV and TB co-infection, children: Number PLHIV with TB	Not captured	Not captured	100	100	82	100	611	416
Vaccination									
BCG immunization	Pulmonary and extrapulmonary TB, all ages: Number to be tested for fluoroquinolone resistance, among rifampicin-resistant cases	2 255	13 462	100	100	84	100	45 238	53 090

Supplementary Table 4: Costs for scenario with TPT scaled up only.

	2023	2024	2025	2026	2027	2028	Total
Drugs and supplies	$3 491 181	$ 3 689 670	$3 662 777	$3 657 761	$3 674 258	$3 569 565	$21 745 213
Programme costs	$1 929 516	$ 1 938 720	$1 972 941	$2 013 954	$1 942 180	$1 976 524	$11 773 835
Health system costs							
Personnel time costs	$1 202 470	$ 1 226 961	$1 227 547	$1 233 926	$1 246 822	$1 246 064	$ 7 383 791
Inpatient day costs	$177 089	$188 073	$188 222	$188 983	$190 401	$187 712	$ 1 120 480
Outpatient visits	$1 708 455	$ 1 822 584	$1 854 453	$1 891 108	$1 939 812	$1 948 037	$11 164 449
Equipment costs	$ -	$ 1 489 565	$ -	$ -	$ -	$ -	$ 1 489 565
Total	$8 508 712	$10 355 573	$8 905 940	$8 985 733	$8 993 473	$8 927 902	$54 677 334

Supplementary Figure 1: Cost and cost drivers for scenario with TPT scaled up only.



Supplementary Table 5: Costs for scenario with TPT scaled up only.

	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**Total**
Drugs and supplies	$ 3 491 181	$3 780 239	$3 840 285	$3 972 294	$4 104 955	$4 128 657	$ 23 317 611
Programme costs	$ 1 929 516	$1 938 720	$1 972 941	$2 013 954	$1 942 180	$1 976 524	$ 11 773 835
Health system costs							
Personnel time costs	$ 1 202 470	$1 285 055	$1 353 523	$1 465 908	$1 584 998	$1 710 410	$8 602 365
Inpatient day costs	$177 089	$226 388	$258 447	$314 568	$357 865	$402 691	$1 737 047
Outpatient visits	$ 1 708 455	$2 213 501	$2 578 068	$3 259 463	$3 823 631	$4 448 941	$ 18 032 058
Equipment costs	$-	$1 489 565	$-	$-	$-	$-	$1 489 565
Total	$ 8 508 712	$ 10 933 468	$ 10 003 263	$ 11 026 187	$ 11 813 629	$ 12 667 223	$ 64 952 482

Supplementary Figure 2: Cost and cost drivers for scenario with TPT scaled up plus scaled up screening.