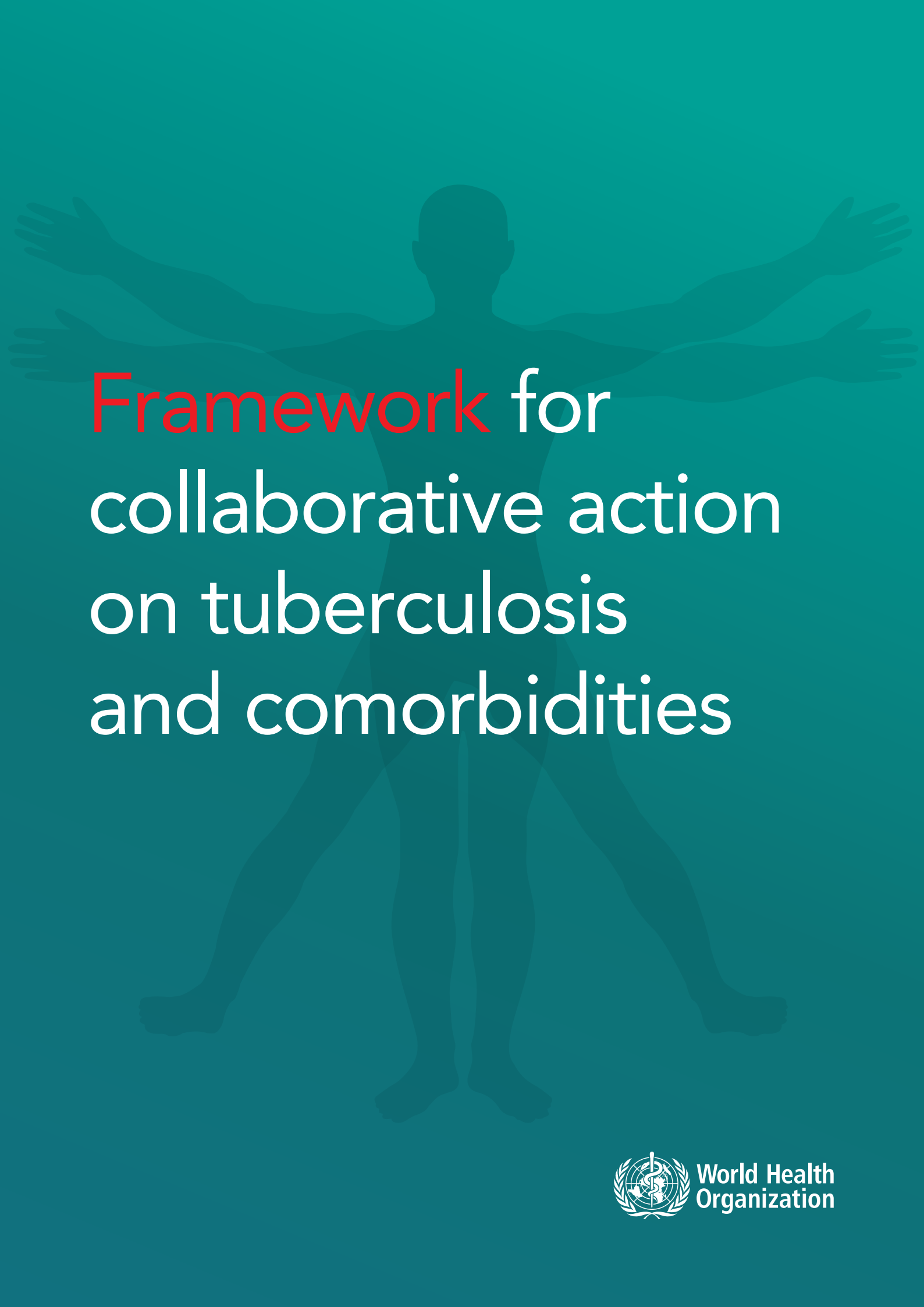
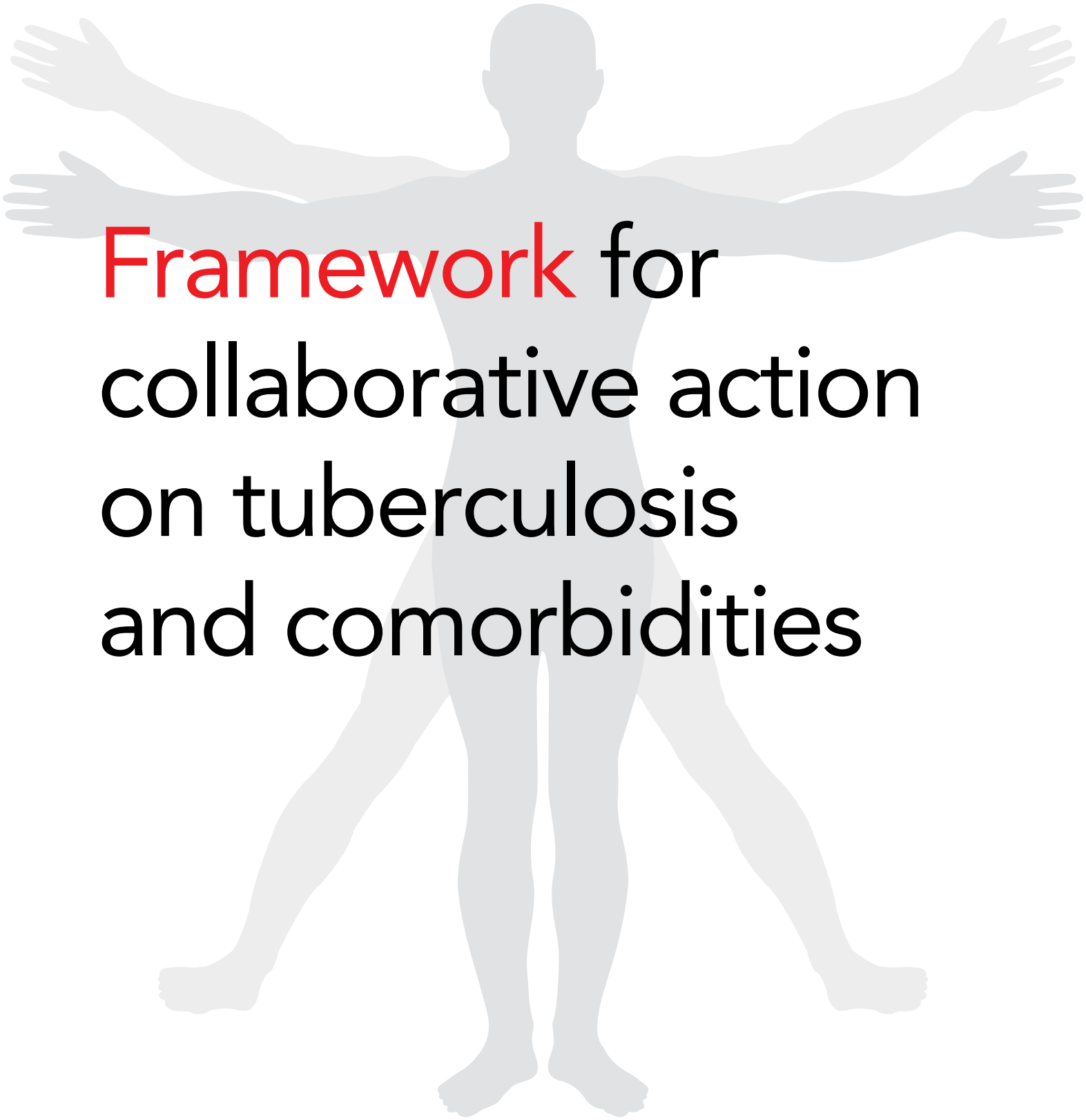


Framework for collaborative action on tuberculosis and comorbidities

World Health Organization



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Abbreviations and acronyms

AIDS	acquired immunodeficiency syndrome
ART	antiretroviral therapy
BMI	body mass index
CCM	country coordinating mechanism
COVID-19	coronavirus disease
DHIS2	District Health Information Software
HBV	hepatitis B virus
HCV	hepatitis C virus
HIV	human immunodeficiency virus
IPC	infection prevention and control
IQR	interquartile range
MAF-TB	Multisectoral accountability framework for TB
MDR-TB	multidrug-resistant tuberculosis
MDT	multidisciplinary team
mhGAP	Mental Health Gap Action Programme
MOOC	massive open online course
MUAC	middle upper arm circumference
NCD	noncommunicable disease
NGO	nongovernmental organization
NSP	national strategic plan
NTP	national tuberculosis programme
OAMT	opioid agonist maintenance therapy
ONN	Office National de Nutrition
PHC	primary health care
PPM	public–private mix
PWID	people who inject drugs
PWUD	people who use drugs
SARA	Service Availability and Readiness Assessment
SDGs	Sustainable Development Goals
TB	tuberculosis
TNFα	tumour necrosis factor alpha
UHC	universal health coverage
UN HLM	United Nations high-level meeting
VCC	Vulnerable populations, Communities and Comorbidities Unit
WFP	World Food Programme
WHO	World Health Organization

Definitions

Civil society organizations: Non-profit organizations that operate independently from the state and from the private-for-profit sector, e.g. advocacy groups, faith-based and community-based and community-led organizations, and other nongovernmental organizations.

Comorbidity: A concurrent disease or health condition in a person with tuberculosis (TB).

Disorders due to substance use: According to the International Classification of Diseases (ICD)-11 *(1)*, the term "disorders due to substance use" refers to a group of disorders that arise from a single or repeated use of substances that have psychoactive properties, including certain medications. For the purposes of this Framework, "disorders due to substance use" is divided into "disorders due to alcohol use" (or "alcohol use disorders"), which refer specifically to the use of alcohol, and "disorders due to drug use" (or "drug use disorders"), which refer to the use of psychoactive substances other than alcohol and nicotine.

Health-related risk factor: A condition, disease or behaviour that increases the likelihood of developing TB.

High-quality health care: Health services that are safe, effective and people-centred, providing timely, equitable, integrated and efficient care *(2)*.

Multimorbidity: The presence of two or more concurrent diseases or health conditions in a person with TB.

Operational research: Research aimed at improving programme performance, or to assess the feasibility, effectiveness or impact of new interventions and to guide policy recommendations *(3)*.

People-centred services: A human rights-based approach to care that consciously adopts the perspectives of individuals, carers, families and communities as participants in, and beneficiaries of, trusted health systems that respect social preferences and are organized around the comprehensive needs of people rather than individual diseases *(4)*.

Primary care: A key process in the health system that supports accessible, continued, comprehensive and coordinated patient-focused care at the first point of contact *(5)*.

Primary health care: A whole-of-society approach to health that aims to maximize the level and distribution of health and well-being through three components: (i) primary care and essential public health functions as the core of integrated health services; (ii) multisectoral policy and action; and (iii) empowered people and communities *(5)*.

Social determinants of health: Non-medical factors that influence health outcomes. Examples include, but are not limited to, income and social protection, education, food security, housing, basic amenities and the environment, social inclusion and non-discrimination, and access to affordable health services of decent quality *(6)*.

Tuberculosis (TB): The disease state due to *Mycobacterium tuberculosis (7)*. In this document, it is commonly referred to as "TB disease" to distinguish it from TB infection.

Tuberculosis (TB) infection: A state of persistent immune response to stimulation by *Mycobacterium tuberculosis* antigens with no evidence of clinically manifest active TB *(7)*.

Universal health coverage: Under universal health coverage, individuals and communities have access to high-quality promotive, preventive, curative, rehabilitative and palliative essential health services without experiencing financial hardship *(8)*.

Executive summary

Globally, tuberculosis (TB) remains one of the leading causes of death due to a single infectious agent. The main TB comorbidities and health-related risk factors include human immunodeficiency virus (HIV), disorders due to the use of alcohol, undernutrition, tobacco smoking, diabetes mellitus, mental disorders, silicosis and viral hepatitis. Addressing health-related risk factors and comorbidities among people with TB is essential for ending the TB epidemic. To achieve this, care should be organized around the end user, rather than around the respective diseases.

There is substantial global commitment to address TB and comorbidities collaboratively. Integrated patient-centred care and prevention for TB, including for HIV-associated TB and other comorbidities are key components of pillar one of the End TB Strategy *(9)*. The importance of integrated people-centred services is reiterated by the political declarations of the respective United Nations high-level meetings (UN HLMs) on the fight against TB *(10)*, on noncommunicable diseases (NCDs) *(11)*, on HIV and AIDS *(12)*, and on universal health coverage (UHC) *(8)*.

Although global guidance on interventions to address TB and comorbidities exists, its uptake has been variable. Therefore, the World Health Organization (WHO), in consultation with key stakeholders, has developed a Framework for collaborative action on TB and comorbidities to enhance the response to TB and comorbidities, contributing towards addressing multimorbidity as part of people-centred care. The Framework is complementary to, and intended to be used in conjunction with, WHO guidelines on the prevention, screening, diagnosis and treatment of TB and key comorbidities. The strategies presented in this document endeavour to build strong collaboration across health programmes, affected communities, civil society, public and private health sectors, non-health actors and other stakeholders involved in health and social protection for people with TB and comorbidities.

This Framework is intended for use by people working in ministries of health, particularly in national programmes or departments responsible for TB, HIV, NCDs, primary health care, tobacco cessation, undernutrition and substance use. It is also targeted at relevant line-ministries, policy-makers, international technical and funding organizations, researchers, nongovernmental and civil society organizations. In addition, it is intended for primary care workers, specialist health practitioners, and community health workers who support the response to TB and comorbidities both in the public and private sectors.

The Framework is organized in the following five sections, each of which lists key activities for scaling up collaborative action on TB and comorbidities. These sections are: (A) Strengthen governance and accountability for collaborative action; (B) Conduct an analysis of access to quality services for TB and comorbidities; (C) Coordinate planning and resource mobilization for collaborative action; (D) Implement and scale up people-centred services for TB and comorbidities; and (E) Strengthen monitoring, evaluation and research.

Summary of the Framework for collaborative action on TB and comorbidities

Strengthen governance and accountability for collaborative action

A.1 Strengthen political commitment, coordination and accountability for collaborative action on TB and comorbidities
A.2 Support financing and legislation that promote people-centred care
A.3 Ensure meaningful engagement of civil society and affected communities at all stages of planning, implementation, monitoring and evaluation

Conduct an analysis of access to quality services for TB and comorbidities

B.1 Assess the joint burden of TB and comorbidities
B.2 Determine access to services and the financial burden for people with TB and comorbidities
B.3 Map health service delivery for TB and comorbidities
B.4 Identify gaps in services and conduct root cause analysis

Coordinate planning and resource mobilization for collaborative action

C.1 Identify priority comorbidities and interventions
C.2 Define and reorient models of care for TB and comorbidities towards people-centred services, primary health care and universal health coverage
C.3 Conduct collaborative planning and budgeting to scale up people-centred services for TB and comorbidities
C.4 Align advocacy and communication across health programmes

Implement and scale up people-centred services for TB and comorbidities

D.1 Jointly develop policies, guidelines and procedures for collaborative action on TB and comorbidities
D.2 Mobilize a qualified multidisciplinary workforce, including among private providers and non-health sectors for collaborative action
D.3 Ensure access to essential medicines, vaccines, diagnostics and health technologies for TB and comorbidities
D.4 Engage civil society and communities affected by TB and comorbidities in refining and delivering people-centred services
D.5 Optimize access to social protection to prevent financial hardship due to TB and comorbidities
D.6 Facilitate uptake of digital technologies to deliver health and social protection services across programmes
D.7 Introduce phased scale-up of people-centred services for TB and comorbidities

Strengthen monitoring, evaluation and research

E.1 Adopt indicators and set targets for collaborative action on TB and comorbidities
E.2 Strengthen surveillance for comorbidities among people with TB, and surveillance for TB among people with comorbidities and health-related risk factors in accordance with WHO recommendations
E.3 Introduce and scale up monitoring and evaluation of collaborative action on TB and comorbidities at all levels
E.4 Conduct joint reviews of quality and coverage of services to inform programming
E.5 Conduct operational and implementation research to inform policy, programming and service delivery

Introduction

Background and rationale

Globally, tuberculosis (TB) remains a significant cause of ill health and is a leading cause of death due to an infectious agent. In 2020, five key health-related risk factors for TB, namely, diabetes, human immunodeficiency virus (HIV), disorders due to alcohol use, tobacco smoking and undernutrition accounted for 4.5 million (45%) new and relapse TB episodes globally *(13)*. Other significant health-related risk factors for TB disease include silicosis and disorders due to drug use. These health-related risk factors are considered comorbidities when a person also has TB. People with TB frequently experience other comorbidities including mental disorders and viral hepatitis. All these comorbid conditions are associated with poorer TB treatment outcomes and adverse socioeconomic impact. Moreover, people with TB may develop chronic lung disease, requiring care and rehabilitation after completing treatment for TB. The COVID-19 pandemic shares common risk factors for poor outcomes with TB and has led to increased poverty, undernutrition, mental health burden and stigma associated with social distancing measures *(14)*. Further, the disruption of services during the pandemic has highlighted the need for integrated, people-centred approaches, and implementation of improved, evidence-based models of care *(15)*.

Addressing individual comorbidities, multimorbidity and health-related risk factors for TB is therefore crucial as part of accelerated efforts to end TB. Thus, pillar one of the End TB Strategy focuses on integrated patient-centred care and prevention, including action on TB and comorbidities *(9)*. In September 2018, the *Political Declaration of the United Nations High Level Meeting (UN HLM) on the fight against tuberculosis (10)* reaffirmed the commitment to ending the TB epidemic globally by 2030, in line with the Sustainable Development Goals (SDGs) *(16)*. In the declaration, Member States committed to a comprehensive response that addresses TB and comorbidities, and social and economic determinants of the epidemic, that protects and fulfils all people's human rights and dignity. This commitment was echoed in the respective UN HLM declarations on noncommunicable diseases (NCDs) and HIV in 2018 and 2021, respectively, in which Member States committed to assuring integrated people-centred services for TB, HIV, NCDs and mental health *(10,11)*.

Although global guidance on interventions to address TB and key comorbidities exists (see Annex 1), its uptake by most countries has been limited. One exception is the uptake of guidance and policy on HIV-associated TB, which has been progressively scaled up globally in many settings, due to strong advocacy and investment in both the TB and HIV programmes. Building upon the success of the *WHO policy on collaborative TB/HIV activities (17)*, the Framework for collaborative action on TB and comorbidities, hereafter referred to as the Framework, aims to support countries in the evidence-informed introduction and scale-up of holistic people-centred services for TB and comorbidities, with the ultimate goal of comprehensively addressing TB and multimorbidity. Beyond the impact on TB, collaborative action on TB and comorbidities may also improve efficiency of resource use, reduce healthcare visits, address fragmentation in health systems and improve health outcomes.

Overview of key comorbidities

For the purposes of this Framework, a health-related risk factor is a condition or behaviour that increases the risk of TB disease. When combined with TB, health-related risk factors are also considered comorbidities, and may increase the risk of poor TB treatment outcomes. There are five main health-related risk factors that drive the TB epidemic globally, namely, diabetes, disorders due to alcohol use, HIV, smoking and undernutrition. However, the impact of these conditions on TB differs between countries. This Framework supports the uptake of WHO guidance on these comorbidities, and will also be applicable for scaling up action on other comorbidities as evidence emerges. An overview of the related interventions is given in Table 1. Table 2 summarizes the health-related risk factors and comorbidities, for which there are WHO-recommended interventions.

Table 1. Interventions to address TB and comorbidities

Reduce the burden of TB among people with health-related risk factors and comorbidities	Reduce the burden of comorbidities among people with TB
Find and treat TB among people with key health-related risk factors for TB disease, through screening or intensified case-finding, diagnosis and appropriate treatment	Find and treat comorbidities among people with TB through screening, diagnosis and treatment of comorbidities associated with poor TB treatment outcomes
Prevent TB among people with identified health-related risk factors through the provision of TB preventive treatment and infection prevention and control	Prevent comorbidities among people with TB

Key drivers of the TB epidemic

Disorders due to alcohol use

Disorders due to alcohol use triple the risk of TB disease, and accounted for 740 000 new TB episodes in 2020 *(13)*. Notably, there are considerable sex differences in the proportion of TB episodes attributed to alcohol use disorders. In 2020, the proportion of TB episodes attributed to alcohol was 13% among men and 1.7% among women *(13)*. The estimated global prevalence of disorders due to alcohol use among adults (aged 15+ years) was 5.1% in 2016; however, there are significant regional differences, with the prevalence of alcohol use disorders among adults ranging from 0.8% in the Eastern Mediterranean Region to 8.8% in the European Region *(18)*. In 2016, alcohol was the cause of an estimated 254 000 deaths from TB *(18)*. People with TB who consume alcohol are twice as likely to have a poor TB treatment outcome (treatment failure, death, or loss to follow-up) *(19)*. Alcohol use disorder is listed in the WHO TB screening guidelines as a risk factor to consider when prioritizing TB screening among people attending healthcare settings *(20)*. Regular clinical monitoring and psychological support, including counselling for alcohol cessation, are recommended among people with TB who also have alcohol use disorder *(21)*.

Diabetes mellitus

Diabetes is associated with a two-to-three-fold risk of TB disease, and a higher risk of multidrug-resistant TB (MDR-TB). People with TB and diabetes are twice as likely to die during TB treatment, and have a four-fold risk of TB relapse after treatment completion *(22–24)*. In 2020, an estimated 369 000 new episodes of TB were attributable to diabetes, and in 2019 just over 15% of people with TB were estimated to have diabetes globally, compared with 9.3% among the general adult population (aged 20–79 years) *(13,25,26)*. This equates to about 1.5 million people with TB and diabetes who required coordinated care and follow-up to optimize the management of both conditions. Diabetes is estimated to increase globally by 50% between 2019 and 2045, with a median increase of 99% (interquartile range [IQR]: 69–151%) in countries with a high burden of TB *(13)*. In 2011, WHO and the International Union Against Tuberculosis and Lung Disease published the *Collaborative framework for care and control of tuberculosis and diabetes (27)*. Collaborative activities outlined in the framework include the establishment of mechanisms for collaboration, detection and management of TB among people with diabetes, and detection and management of diabetes among people with TB.

HIV

People living with HIV are at 18 times higher risk of developing TB than the rest of the population *(28)*, and in 2020, an estimated 787 000 people with HIV developed TB *(29)*. People with advanced HIV are at higher risk of developing TB disease *(30)*. TB remains a leading cause of hospitalization and in-hospital death among adults and children living with HIV worldwide, and accounts for about a third of all HIV-related deaths *(13,31)*. A global review of autopsy studies, among people who had died from HIV, found 40% prevalence of TB among adults, with only 45% of TB diagnosed before death *(32)*. In 2004, WHO released the *Interim WHO policy on collaborative TB/HIV activities*, which was updated in 2012. TB/HIV collaborative activities include the establishment and strengthening of mechanisms for delivering services for TB and HIV, reducing the burden of TB among people living with HIV, and reducing the burden of HIV in patients with presumptive and diagnosed TB. The scale-up of these activities is estimated to have saved 9 million lives during 2005–2020, according to modelling for the Global TB Report 2021[1].

Tobacco smoking

Globally, in 2020 an estimated 991 million people aged 15 years or older smoked tobacco, with an estimated prevalence of 28.9% among men and 5.2% among women *(33)*. Among the 10 countries with the highest incidence of TB[2], the median smoking prevalence is 35% (IQR: 18–45%) for men, and 2% (IQR: 1–3%) for women *(13,33)*. Tobacco almost doubles the risk of developing TB, with an estimated 730 000 new episodes of TB attributable to tobacco use in 2020 *(13)*. Tobacco use is associated with poor TB treatment outcomes, and the implementation of tobacco cessation activities can improve TB treatment outcomes and reduce relapse rates *(34)*. Further, people with diabetes who also smoke have an elevated risk of TB compared to people with diabetes who do not smoke, suggesting that multimorbidity due to diabetes and

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[1] To estimate the number of deaths averted by collaborative TB/HIV activities, the actual numbers of TB deaths can be compared with the number of TB deaths that would have occurred in the absence of antiretroviral therapy (ART) provided alongside TB treatment for people with HIV-associated TB. This number can be estimated conservatively as the number of estimated incident cases multiplied by the relevant estimated case fatality ratio for untreated HIV-associated TB. The estimates are conservative because they do not account for the impact of TB services or availability of ART or TB preventive treatment on the level of TB incidence; they also do not account for the indirect, downstream impact of these interventions on future levels of infections, cases and deaths.

[2] The 10 countries with highest TB incidence in 2020, in alphabetical order, were: Bangladesh, China, Democratic Republic of the Congo, India, Indonesia, Nigeria, Pakistan, the Philippines, South Africa and Viet Nam *(161)*.

smoking may synergistically increase the risk of TB *(35)*. Since 2008, WHO has recommended screening for tobacco use and tobacco cessation activities among people with TB as part of broader tobacco control initiatives *(36)*.

Undernutrition

Undernutrition accounted for an estimated 1.9 million new TB episodes in 2020, making it one of the most significant drivers of TB *(13)*. People with undernutrition are three times more likely to develop TB disease compared with people who do not have undernutrition, and undernutrition is a common consequence of TB. Moreover, the risk of TB disease, as well as the severity of lung disease, increases as body mass index (BMI) decreases, for which there is consistent evidence across different settings and with different underlying burdens of TB *(37,38)*. Undernutrition has also been identified as a risk factor for poorer TB treatment outcomes as well as TB mortality, with increased weight as a predictor of better treatment outcomes *(39,40)*. Since 2013, WHO has recommended nutritional status assessment and counselling, as well as co-management of TB and undernutrition *(41)*. Further, WHO recommends screening for TB among people with undernutrition *(20)*.

Other health-related risk factors and comorbidities

Chronic respiratory disease

Chronic respiratory disease includes silicosis, asthma, chronic obstructive pulmonary disease and lung cancer. Silicosis quadruples the risk of developing TB, with the risk of TB disease increasing with increasing severity of silicosis *(42)*. In southern African countries, HIV is a common comorbidity of silicosis among miners. Combined, HIV and silicosis further heighten the risk of developing TB disease, compared with HIV or silicosis alone *(43)*. WHO recommends TB screening among workers who are currently or previously exposed to silica, and people with silicosis are eligible for receiving TB preventive treatment *(7,20)*.

In TB-endemic areas, a history of TB disease is strongly associated with the presence of chronic respiratory disease in adults *(44,45)*; therefore, people who have recovered from TB may require care and lung rehabilitation after completion of TB treatment *(44,46,47)*. The signs and symptoms of TB are similar to those of other lung diseases. Hence, strengthened collaboration between TB services and services addressing other lung diseases is critical to facilitate swift referrals, early diagnosis and appropriate treatment, as outlined in the *Practical Approach to Lung Health (48)*.

COVID-19

The coronavirus disease (COVID-19) pandemic has led to a global decline in notification of TB disease, due to the disruption of TB services *(13,14)*. WHO has recommended a set of measures to maintain continuity of essential TB services during the COVID-19 pandemic *(14)*. There is also evidence that people with COVID-19 who have TB have an elevated risk of mortality *(49)*. Similarly, people with HIV and HIV-associated TB are also at higher risk of more severe COVID-19 with higher mortality rates *(50)*. Other key risk factors for poor outcomes for both COVID-19 and TB include diabetes and smoking *(13,14,51)*, supporting a multimorbidity approach such as simultaneous screening and testing where indicated *(14)*. COVID-19 and TB are both infectious diseases that are transmitted primarily through close contact and share key symptoms such as cough, fever and difficulty in breathing *(14)*. Services should therefore be aligned to facilitate rapid diagnosis, referral for differential diagnosis and timely treatment as applicable, with due attention to infection prevention and control (IPC).

Table 2. Health-related risk factors and TB comorbidities, with related interventions recommended in current WHO guidelines

Health-related risk factors for TB	Interventions to reduce the burden of TB among people with comorbidities and health-related risk factors		
Key drivers for TB	**Find and treat TB**	**TB preventive treatment**	**Infection prevention and control**
Diabetes	✓	⬚	✓
Disorders due to alcohol use	✓	⬚	✓
HIV	✓	✓	✓
Smoking	⬚	⬚	✓
Undernutrition	✓	⬚	✓
Other health-related risk factors and comorbidities			
Disorders due to drug use	✓	✓	✓
Silica exposure, silicosis	✓	✓	✓
Viral hepatitis	✓	⬚	✓
Other clinical risk factors: treatment with anti-TNFα[3], dialysis, organ or haematological transplantation	✓	✓	✓
Comorbidities associated with poorer TB treatment outcomes	**Interventions to reduce the burden of comorbidities among people with TB**		
Key drivers for TB	**Find and treat comorbidities**	**Counsel on and prevent comorbidities**	
Diabetes	✓	⬚	
Disorders due to alcohol use	✓	✓	
HIV	✓	✓	
Smoking	✓	✓	
Undernutrition	✓	✓	
Other comorbidities			
COVID-19	✓	⬚	
Mental disorders	✓	✓	
Viral hepatitis	✓	✓	

✓: recommendation exists; ⬚: currently no recommendation

[3] Currently, there is no recommendation on TB screening for people receiving anti-TNFα treatment; however, treatment of TB infection is recommended.

Disorders due to drug use

People with disorders due to drug use (injecting and non-injecting) have an elevated risk of both TB infection and TB disease, irrespective of their HIV status, and TB is a leading cause of HIV-related mortality among people who inject drugs (PWID) *(52–54)*. Drug use disorders are also associated with comorbidities such as HIV, viral hepatitis and mental disorders *(52)*. People with drug use disorders are more likely to have been incarcerated at least once *(55)*, which increases their exposure and vulnerability to TB and other comorbidities *(56)*.

Marginalization of people who use drugs (PWUD), resulting from criminalization, stigma and discrimination, impedes their access to and retention in health care including TB care *(53,57,58)*. This is exacerbated by the limited availability of prevention, treatment and care for drug use, including opioid agonist maintenance therapy (OAMT) *(53,54)*. The existence of common comorbidities such as HIV, mental disorders and viral hepatitis among PWUD may further delay TB treatment, and require careful clinical management to minimize drug–drug interactions, optimize adherence and achieve treatment success *(59–61)*. WHO recommends a comprehensive package of services to address infectious diseases among PWUD, including but not limited to harm reduction services, prevention and management of TB, HIV, viral hepatitis and mental health conditions, as well as structural interventions such as supportive legislation, decriminalization and addressing stigma and discrimination *(62–65)*. WHO has also produced a range of guidelines and technical tools to support Members States in their efforts to develop and expand effective, evidence-based and ethical prevention and treatment interventions for PWUD and those with disorders due to drug use *(63–65)*.

Mental disorders

Mental health conditions are common among people with TB. A systematic review estimated that 45.2% of people with any form of TB have depression *(61)*, and there is an elevated risk of depression, anxiety and psychosis among people with MDR-TB *(61,66)*. The most common social stressors reported are stigma, discrimination, isolation, and a lack of social support *(66)*. TB and mental disorders together can lead to greater morbidity and poorer TB treatment outcomes *(67)*; however, providing integrated mental health interventions within TB services can boost the rates of treatment completion *(68)*. WHO recommends the provision of psychological support for people with TB *(69)*.

Viral hepatitis

The estimated global prevalence of chronic viral hepatitis in 2019 was 296 million for hepatitis B virus (HBV) and 58 million for hepatitis C virus (HCV) *(70)*. There is considerable geographical variation in the prevalence of viral hepatitis among people with TB, ranging from 0.5% to 44% for HBV, and from 3.4% to 45% for HCV *(71)*. Certain populations such as PWID and people in prisons are among those most at risk of both TB and viral hepatitis coinfection (in particular HBV and HCV) *(56,60)*, although other populations are also at risk if they live or have lived in regions or settings that are endemic for these infections. Estimates show that among PWID who have TB, two in three also have viral hepatitis, compared to one in three for HIV *(60)*. Drug-induced liver injury is up to six times higher among persons coinfected with HBV or HCV who are receiving anti-TB drugs, and mortality rates are also higher during TB treatment among people with HCV *(72)*. TB screening, and diagnostic assessment if indicated, is advised as part of the clinical evaluation of patients being considered for HBV and/or HCV treatment *(73)*. Screening for viral hepatitis among people with TB who inject drugs is recommended as part of harm reduction services *(74)*.

Other clinical risk factors: treatment with anti-tumour necrosis factor alpha (TNFα), dialysis, organ transplantation

A number of other clinical risk factors have been identified in high-risk groups, which increase the risk of developing TB disease among people with TB infection. At high risk are people who receive anti-TNFα, those receiving dialysis, and candidates for organ transplantation *(75)*. WHO recommends systematic testing and treatment of TB infection among these high-risk groups to prevent the development of TB disease *(7)*.

Principles

The Framework is based on six principles that are fundamental to implementation. These are as follows.

1. Evidence-based response

An effective response to TB and comorbidities should be evidence-based and data-driven. Data should be continuously collected and analysed to identify and prioritize problems, develop solutions, and optimize interventions along the continuum of care. The main areas for analysis are: data on the joint burden and impact of TB and comorbidities, including the prevalence of key comorbidities among people with TB and the effect of comorbidities on treatment outcomes and quality of life; risk profiles, knowledge, financial vulnerability, expectations and behaviour of affected people or people at risk; and capacity, performance, limitations and distribution of the health system and social services *(76)*. It is important to map and utilize existing data sources where available to avoid duplication of efforts. The implementation of policies, programmes and interventions should be accompanied by continuous data collection on their reach and impact. Meetings of key stakeholders from within and beyond the health sector should be convened regularly to review data and adapt collaborative action in accordance with the evolving needs, and to scale up successful models of care.

2. Multisectoral engagement and accountability

Multisectoral engagement is critical for advancing the global TB response as well as for collaborative action on TB and comorbidities. To ensure accountability, the roles and responsibilities of the respective actors should be clearly defined, and actions accompanied by ongoing monitoring, evaluation and review of performance and impact. Civil society and affected communities have a fundamental role to play in all components of accountability related to TB, including through community-led monitoring. To accelerate progress to end the TB epidemic, WHO released the *Multisectoral accountability framework for TB* (MAF-TB) in 2019 *(77)*, which aims to facilitate action and accountability of governments and all stakeholders, at the global, regional and country levels. To deliver a fully comprehensive response to TB and comorbidities, countries should ensure that collaborative action is considered during the development of the national MAF-TB. To this end, the coordination of multisectoral action for TB and comorbidities at the national and subnational levels should be integrated with the coordination platforms and mechanisms for the MAF-TB.

3. People-centred services

People-centred services provide holistic, individualized, empowering and respectful care, organized around the comprehensive needs of the person rather than around individual diseases *(78,79)*. This is important for addressing TB and comorbidities given the additional health and support needs. People-centred services can improve continuity of care, strengthen collaboration within and across the health sector, and promote health equity *(4)*. Individuals, carers, families and communities should be considered active participants and collaborators in care, who are empowered through education and support to make decisions around their care *(4,5,80)*. People-centred services are inherently human rights-based, recognizing and working towards protecting and promoting the human right to health for each individual. Models of care should be adapted to individuals' needs throughout the continuum of care, extending from pre-diagnosis to beyond the completion of TB treatment *(78)*. A people-centred approach can promote autonomy and shared decision-making, improve outcomes for people with TB and comorbidities, ensure equitable access to services and contribute to achieving universal health coverage (UHC).

4. Protection and promotion of human rights, ethics and equity

Every person has a fundamental right to health, including access to high-quality care and social protection *(81)*. Social determinants of health, such as socioeconomic status, education and housing, significantly influence the risk of TB disease and common comorbidities, produce inequalities, and frequently impede or delay access to prevention, diagnosis, treatment and care *(82,83)*. To ensure the human right to health, access to services should be equitable for all regardless of factors such as age, sex, gender, sexuality, race or ethnicity, and socioeconomic status. Policies, strategies and services for TB and comorbidities should explicitly address human rights, ethics and equity, and should be guided by the principles of non-discrimination and equality, participation and inclusion, and accountability *(81)*. Services should also be sensitive to communities who face overlapping vulnerabilities and risk factors, such as migrants, prisoners, PWUD, sexual minorities, and transgender people. Applying a human rights-based approach to collaborative action on TB and comorbidities will improve health outcomes for individuals and communities and promote equity *(9)*.

5. Strong coalition with affected communities and civil society

Persons affected by or at risk of TB and comorbidities, their communities and civil society should be actively engaged in defining needs, prioritizing actions, designing and implementing interventions to address TB and comorbidities, and monitoring, evaluating and reviewing their impact. They are also important partners in delivering health education, advocacy and peer support for those undergoing treatment as well as for the wider community *(9)*. Communities include a diverse set of actors, such as individual users of health services, and their families and extended support network. The needs of affected communities are continuously evolving along with broader shifts in the socioeconomic and political context. Building collaborative relationships with the community enables the co-development of models of care that respond to the evolving needs and preferences for care, including for people with TB and comorbidities *(5)*.

6. Universal health coverage

In the political declaration from the 2019 UN HLM on universal health coverage, countries committed to achieving UHC by 2030 *(8)*. This declaration recognized the importance of equity, social justice and social protection, and committed to strengthen the efforts to address TB as

part of wider efforts to achieve UHC. In working towards UHC, countries should define national essential packages of care, prioritizing key interventions *(84)*. Further, countries should ensure financial risk protection and eliminate impoverishment due to health-related expenses. Efforts to achieve UHC also place a special emphasis on the poor, vulnerable and marginalized segments of the population, many of whom are at elevated risk of experiencing TB and comorbidities. Therefore, to improve health for all, collaborative action on TB and comorbidities should be aligned with and feed into the national UHC agenda.

Goal, aim and objectives

Goal

The goal of the Framework is to decrease the joint burden of TB and comorbidities, in line with the End TB Strategy targets, and the United Nations High Level Meeting commitments on TB, noncommunicable diseases, HIV and universal health coverage.

Aim

The aim of the Framework is to improve access to people-centred services for TB, comorbidities and health-related risk factors.

Objectives

The objectives of the Framework are to:

1. establish and strengthen collaboration across health programmes and across sectors for delivering people-centred services for TB and comorbidities;
2. provide guidance on assessment, planning, prioritization, scale-up and evaluation of people-centred services for TB and comorbidities; and
3. facilitate scale-up of WHO recommendations on TB, comorbidities and health-related risk factors for TB and poor TB treatment outcomes.

Scope

The Framework provides a structure and suggested mechanisms for establishing and strengthening collaborative action across disease programmes and relevant sectors outside the health system, to ensure the delivery of evidence-based and people-centred care for people with, or at risk of, TB and comorbidities.

Process of development

The development of the Framework for Collaborative Action on TB and Comorbidities was coordinated by the Vulnerable populations, Communities and Comorbidities (VCC) Unit of the WHO Global TB Programme. A WHO Steering Group was set up in 2020, which included members from across the WHO Global TB Programme, TB advisors and focal points responsible for selected comorbidities from all the six WHO regions, and the WHO Departments of Global HIV, Hepatitis and STIs Programmes; Health Promotion; Health Systems Governance and Financing; Mental Health and Substance Use; Noncommunicable Diseases; Nutrition and Food Safety; and

the Special Programme on Primary Health Care. Meetings of the Steering Group were convened at the end of 2020 and regularly throughout 2021, to guide the development of the Framework.

To inform the Framework, evidence was gathered including from the existing literature, during consultations with national and regional staff, and through interviews with TB survivors and key stakeholders. A policy review was conducted in 2020 to assess the uptake of WHO recommendations on TB and comorbidities within national TB strategic plans, national guidelines for TB and respective comorbidities. A systematic review on barriers to and enablers of collaborative care for people with TB and comorbidities was commissioned in 2021. Focus group discussions to elicit key barriers and enablers to scaling up collaborative action on TB and comorbidities were conducted during June–August 2021 with representatives from 16 countries (Bangladesh, Belarus, Brazil, Georgia, India, Indonesia, Kenya, Mexico, Namibia, Pakistan, Peru, the Philippines, Sierra Leone, United Republic of Tanzania, Zambia, Zimbabwe) from all six WHO regions. Participants included representatives from ministries of health, national TB programmes, programmes for key comorbidities, health systems and related focal points from the WHO country and regional offices. Interviews with people with lived experience of TB and one or more comorbidities were conducted during August–September 2021, to assess barriers to and preferences for accessing people-centred health care. A summary of the barriers and enablers identified in the literature and during the consultations and interviews is provided in Annex 2. A stakeholder consultation with a broad array of experts was held in October 2021 to seek inputs into the draft Framework. This consultation also included representatives from the Civil Society Task Force on TB as well as TB survivors to ensure a people-centred perspective. A revised draft was peer-reviewed by an external review group during December 2021–January 2022. Experts consulted during the development of the Framework completed a declaration of interests form in accordance with WHO processes (see Annex 3).

Planned dissemination

The Framework will be translated and published electronically on the WHO Global TB Programme website. It will be referenced within subsequent clinical guideline updates and operational handbooks for TB and the respective comorbidities. To accelerate scale-up of action on TB and comorbidities, WHO will work closely with implementing partners to disseminate the Framework through regional and subregional meetings. Training modules will be developed to assist in the adoption of this Framework together with the respective guidelines.

Target audience

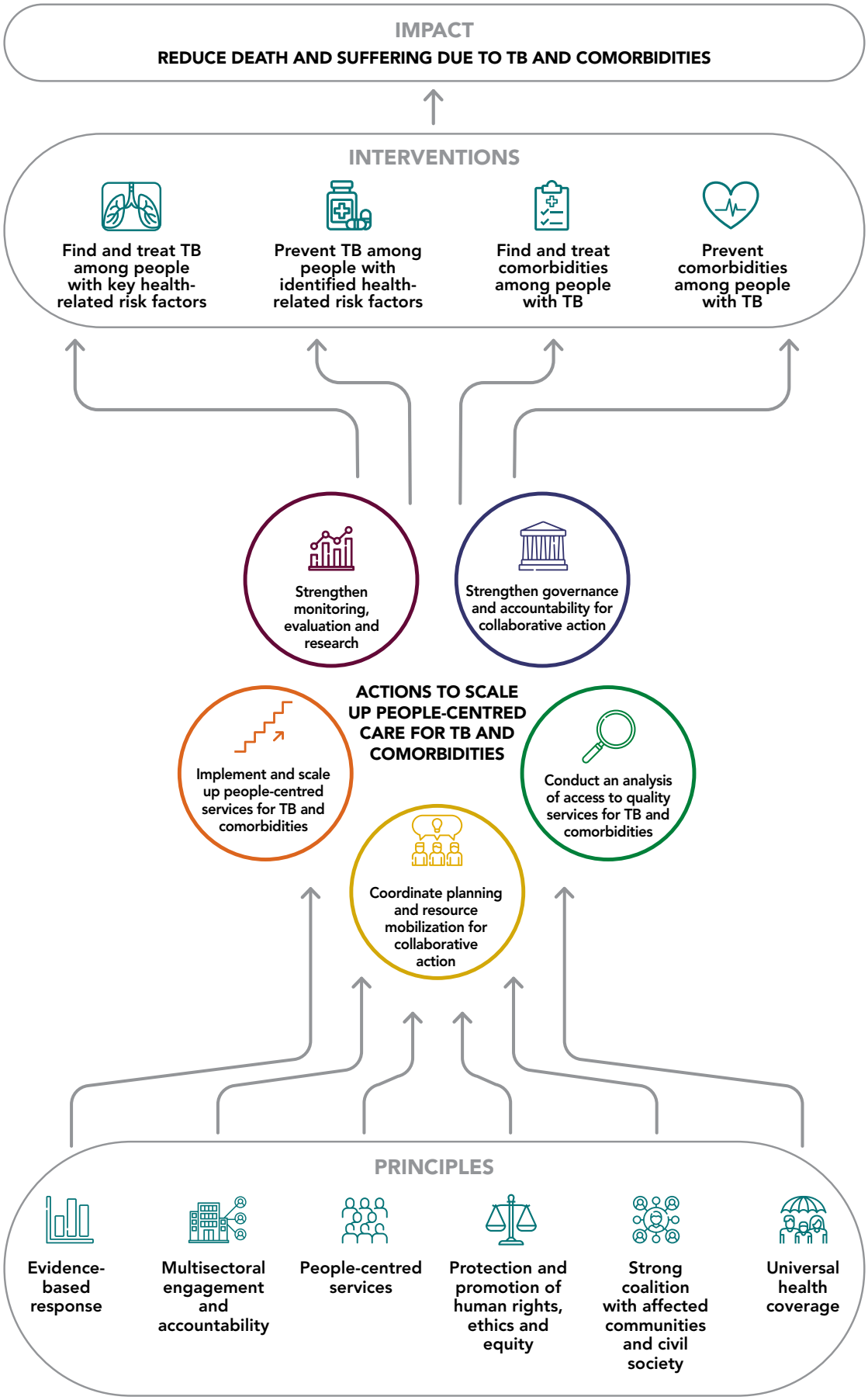
The Framework is intended for use by people working in ministries of health, particularly national programmes or relevant departments responsible for TB, HIV, NCDs, primary health care, tobacco cessation, undernutrition, substance use and mental health. The Framework is targeted at relevant line-ministries, policy-makers, international technical and funding organizations, researchers, nongovernmental and civil society organizations, as well as primary care workers, specialist health practitioners, and community health workers who support the response to TB and comorbidities in both the public and private sectors.

Framework for collaborative action on TB and comorbidities

The Framework for collaborative action on TB and comorbidities outlines actions to support countries in the introduction and scale-up of collaborative action on TB and comorbidities (Fig. 1). It is oriented around six core principles and is organized in sections A to E, which list key actions for ensuring people-centred services. These sections have been ordered logically to support the stepwise introduction and scale-up of collaborative action on TB and comorbidities.

The Framework should be used to support the scale-up of WHO recommendations and guidelines on TB and comorbidities as listed in Annex 1, as well as related updated guidelines and guidance available on the Global TB Programme Knowledge Sharing Platform *(85)*. Health programmes should ultimately aim to implement collaborative action for all identified comorbidities along the continuum of care, including prevention, diagnosis and treatment, as well as care after the completion of TB treatment. A phased approach, starting with a few comorbidities informed by local epidemiology and feasibility of implementation will facilitate progress towards this goal. Services should be continuously evaluated and adapted accordingly.

Fig. 1. Framework for collaborative action on TB and comorbidities



A. Strengthen governance and accountability for collaborative action

A.1 Strengthen political commitment, coordination and accountability for collaborative action on TB and comorbidities

A.2 Support financing and legislation that promote people-centred care

A.3 Ensure meaningful engagement of civil society and affected communities at all stages of planning, implementation, monitoring and evaluation

Collaboration across health programmes, with clear mechanisms for accountability and active engagement of affected people and communities, is critical for people-centred care for TB and comorbidities *(76,77,86)*. Evidence from the TB/HIV response has shown that coordinating bodies that operate at all levels of the health system with active participation of all relevant stakeholders – including affected people and communities, civil society, and the respective health programmes – is feasible and can effectively establish political commitment and ownership of collaborative activities at the country level *(87,88)*. Existing health-sector coordination platforms should be identified and built upon to address comorbidities while strengthening collaboration between the health programmes and reducing duplication of efforts (see Section A.1). The health programmes, or relevant departments of the ministry of health, to be considered as members of the coordination platform include the national HIV programme, NCD programme, primary health care programme, nutrition programme, and programmes for mental health, disorders due to substance use and smoking cessation. It may also be appropriate to include representatives from other relevant ministries or government departments involved in the provision of health services, e.g. prisons or mining services, to strengthen practical on-the-ground planning and implementation.

Some areas for action, such as legislation, financing, social protection and nutrition, may lie outside the purview of the national TB programme and collaborating health programmes. It is essential therefore to develop strong partnerships with stakeholders from outside the health system, including funding agencies, to advocate for and assist in addressing these areas (see Section A.2). Moreover, in countries where a national multisectoral mechanism for TB has already been established (e.g. as part of the MAF-TB), the coordinating platforms for TB and comorbidities should have clear linkages with this mechanism to optimize synergies.

Affected people and communities, and civil society, should be empowered to play an active and ongoing role in defining health needs, developing solutions, prioritizing actions, delivering health care and advocacy messages, as well as in monitoring, evaluation and review *(77,89)*. Governance structures should create an enabling environment for continuing dialogue and partnership at all levels *(5)* (see Section A.3).

A.1 Strengthen political commitment, coordination and accountability for collaborative action on TB and comorbidities

Countries should strengthen platforms for coordination of collaborative action on TB and comorbidities that are functional at the national, regional, district and facility levels. Where such platforms, working groups or coordinating bodies already exist, e.g. for TB/HIV, their terms of reference may be revised to include coordination for other comorbidities. The coordination of multisectoral actions to address comorbidities should be included in the national MAF-TB.

- Depending on the level of the coordinating platform, members may include representatives from:
  - national TB programme;
  - other relevant health programmes including primary health care directorates;
  - national health insurance programme;
  - other relevant ministries or government departments as appropriate;
  - international organizations;
  - professional associations;
  - researchers and academic institutions;
  - private-for-profit sector;
  - civil society organizations;
  - community health workers and peer supporters; and
  - people at risk of or affected by TB and comorbidities.
- Suggested outputs for the coordination platform include but should not be limited to:
  - agreement on terms of reference for the coordination platform, including roles and responsibilities of the national TB programme, other health programmes and relevant sectors in implementing, scaling up, monitoring and evaluating collaborative action on TB and comorbidities at all levels;
  - coordination of action on TB and comorbidities throughout the programme management cycle from assessment, planning and resource mobilization, scale-up and monitoring and evaluation;
  - liaison with and reporting to the multisectoral coordination mechanism for TB, and for the relevant comorbidities, e.g. national AIDS commission;
  - facilitation of the involvement of civil society, nongovernmental and community organizations, and individuals; and
  - ensuring alignment of advocacy and communication on TB and comorbidities and health-related risk factors.

CASE STUDY:

People-centred approach to tuberculosis, HIV and opioid agonist maintenance therapy in Moldovan prisons

Context: Incarcerated populations are at higher risk of tuberculosis (TB) and blood-borne viruses such as HIV and viral hepatitis *(52,56,90)*. Key drivers of the joint burden of disease include detention of people who use drugs (PWUD), in combination with overcrowding and lack of access to adequate prison health services *(52,56)*. In the Republic of Moldova, the TB incidence was more than ten-fold higher in prisons (1166/100 000 population) compared to that in the overall community (86/100 000) in 2018 *(91)*, and the HIV prevalence more than four times higher among people in prisons (2.6%) compared to that in the community (0.6%) in 2015 *(92)*. Incarcerated people are served by specialized prison health services, separate from the civilian health system. Provision of opioid agonist maintenance therapy (OAMT) is associated with improved TB treatment outcomes and reduced transmission of HIV and viral hepatitis; however, coverage of OAMT services is limited, including among incarcerated people. Hence, simultaneous provision of TB treatment, antiretroviral therapy (ART) and OAMT has the potential to significantly reduce the joint burden of disease in prison settings.

Intervention: In the Republic of Moldova, a programme has been established to comprehensively address TB, HIV and substance use among incarcerated people, leveraging the political commitment to deliver the same standard of health care to people in prisons as for the general population. The national Global Fund Country Coordinating Mechanism (CCM), which includes representatives from the Ministry of Justice, health sector, academic institutions, social services, nongovernmental organizations (NGOs) and civil society, coordinated the development of funding requests and oversaw implementation of the programme. Changes in legislation in 2004 and 2005 permitted the provision of OAMT both in the civil sector and in penitentiary services, respectively *(93)*, which enabled the introduction of integrated services for TB, HIV and OAMT in prisons. By 2021, OAMT had been introduced in 13 out of 17 penitentiary institutions in Moldova. To ensure equitable healthcare provision for people in the penitentiary system, the Ministry of Health and Ministry of Justice jointly conducted training on the co-management of TB, HIV and OAMT. Multidisciplinary teams were then set up in the national penitentiary hospital, providing comprehensive medical care for TB, HIV and OAMT, as well as psychosocial support.

Several measures were introduced to ensure continuity of care and effective coordination. Collaboration with NGOs across the country was established, to facilitate linkage to care for those who require ongoing treatment for TB and comorbidities upon release from prison services. An integrated health information system was set up to capture data and ensure that medical information is accessible in both the civil health system and prison health services. A financial sustainability plan was also developed, whereby the prison administration has taken on the financial burden for the procurement of first-line TB medications, while ART, OAMT and medical equipment are covered by the respective national programmes for HIV and drug use, Global Fund and various donors.

Lessons learnt: Key facilitators for implementation of the integrated patient-centred model of triple care for TB, HIV and OAMT in prisons included strong political commitment and an enabling legal framework to ensure equivalence of care for incarcerated people through the training of prison medical staff to provide integrated care and using shared electronic recording and reporting systems. Constructive dialogue and collaboration with civil society organizations also helped overcome barriers to access to care and treatment, and to close gaps in the treatment cascade.

A.2 Support financing and legislation that promote people-centred care

To create an enabling environment for people-centred care, programmes in collaboration with stakeholders should:

- Support the scale-up of financing models that promote integrated people-centred care, and that incentivize provision of comprehensive services as part of the national health financing and strategic purchasing strategies.
- Promote and support legislation and financing that allow engagement of peer supporters with lived experience of related health conditions to deliver people-centred TB care.
- Advocate for legislation that permits qualified providers to screen, diagnose and prescribe treatment for both TB and comorbidities (e.g. OAMT, TB treatment) in the same facility according to best practice and WHO recommendations.
- Promote and support measures to uphold the human right to health, including for those most at risk of or affected by TB and comorbidities (e.g. people in the criminal justice system, PWUD). Measures may include:
  - capacity building of civil society organizations to monitor and address stigma and discrimination;
  - promotion of other initiatives to address stigma and discrimination;
  - targeted advocacy to support decriminalization of drug use in accordance with UN commitments and WHO recommendations; and
  - strengthen linkages with prison services to ensure equitable access to comprehensive care for people with TB and comorbidities including harm reduction services.

A.3 Ensure meaningful engagement of civil society and affected communities at all stages of planning, implementation, monitoring and evaluation

Effective engagement of civil society and affected communities is essential for developing and implementing people-centred services for TB and comorbidities. The following strategies are recommended:

- Engage civil society and affected communities in policy formulation, planning, implementation, monitoring, evaluation and review, as well as operational research, for collaborative action.
- Expand community engagement by including interventions for the prevention, detection, treatment, care and support for TB and comorbidities within community-based and community-led activities for TB and for other health areas, in line with WHO guidance.
- Empower and engage affected communities and civil society in advocacy for scale-up of non-discriminatory, high-quality care for TB and comorbidities, and for availability of related resources through domestic and external sources.

CASE STUDY:

Action on tuberculosis and mental health at the community level, Peru

Context: Peru is classified by WHO as a country with a high burden of MDR-TB. In Lima North, Peru, the loss-to-follow up rates among people with drug-susceptible and drug-resistant tuberculosis (TB) were 10% and 42%, respectively, in 2015. People with TB frequently experience mental health conditions such as anxiety or depression *(66,68)*. Though mental disorders are associated with poorer TB treatment outcomes, including loss to follow-up and treatment failure *(67)*, healthcare workers in the TB programme often lack capacity to manage these comorbidities. To address the burden of mental disorder comorbidity, the national TB programme has introduced an intervention to build capacity among healthcare workers and improve the comprehensive management of mental health among people with TB in Lima North.

Intervention: In 2015, the regional emergency programme for TB prevention and control in Lima North, Peru committed to addressing mental disorders among people with TB. This initiative received strong support from the local mayors, the nongovernmental organization Socios en Salud (Partners in Health), and from several universities. To advance collaborative action on TB and mental health, the capacity of multidisciplinary teams (MDTs) for TB has been strengthened by involving psychologists. Further, healthcare workers in the TB programme receive training on mental health interventions according to the WHO Mental Health Gap Action Programme (mhGAP) guidelines, including supervised practical sessions. Thus, the MDTs can collaboratively assess the needs of people with TB and comorbidities and provide specialist care for both TB and mental health conditions as a one-stop-shop service. Broader psychosocial care is also provided for the family and community, in the form of group psychotherapy and activities such as yoga or musical therapy, with the aim to improve mental health and address stigma.

Lessons learnt: The integration of services addressing TB and mental health was facilitated by strong political commitment and buy-in, as well as engagement of external partners. Routine data from Lima North report a reduction of loss to follow-up to 2% and 4% for people taking treatment for drug-susceptible and drug-resistant TB, respectively, between 2015 and 2021.

B. Conduct an analysis of access to quality services for TB and comorbidities

B.1 Assess the joint burden of TB and comorbidities

B.2 Determine access to services and the financial burden for people with TB and comorbidities

B.3 Map health service delivery for TB and comorbidities

B.4 Identify gaps in services and conduct root cause analysis

To guide planning, priority setting and implementation, it is essential to understand the joint burden in terms of morbidity and mortality due to TB and comorbidities, the accessibility of care relevant for TB and comorbidities, and the socioeconomic impact of TB and comorbidities *(89)*. These vary considerably between and within countries, depending on factors such as health system structures, degree of decentralization of health services and the broader socioeconomic determinants of health. Many countries have a range of existing data sources which can inform an assessment of the disease burden, risk factors and service availability *(76)*, and help in the identification of any evidence gaps that need addressing. Assessment should start with a comprehensive mapping and analysis of existing resources such as surveillance data, demographic and health surveys, prevalence studies and mortality records. These data can be analysed as part of overall country review and planning processes for TB and the relevant comorbidities, to avoid duplication of efforts. Gaps in evidence identified during this process can provide direction for further data collection.

The People-centred framework for TB programme planning and prioritization (76) recommends using three types of data: epidemiological, people-centred, and system-related, as detailed in Sections B.1–B.3. These data help build a complete picture of the epidemiological burden, affected populations and service availability for care and prevention of TB and comorbidities. Epidemiological data should include the burden of disease and its distribution by factors such as geography, sex and age, which can be found in, e.g. epidemiological reviews, national surveillance systems, mortality studies or national vital registration systems (see Section B.1). People-centred data include data on risk factors, stigma, financial vulnerability, patient expectations, and behaviour of people with or at risk of disease, which can be sourced from, e.g. patient pathway analyses, demographic and health surveys and health expenditure and utilization surveys (see Section B.2). System-related data include data on the capacity, performance, limitations and distribution of health and social services, which can be harnessed from, e.g. health systems reviews or readiness assessment mapping (see Section B.3), such as the Service Availability and Readiness Assessment (SARA) *(94)*.

Once data have been consolidated, they should be reviewed in consultation with stakeholders to identify programmatic gaps as well as missed opportunities. The root causes of these problems should then be identified *(76)* (see Section B.4). It is crucial that these efforts should not only evaluate collaborative action, but also inform programming and highlight readiness for new interventions on TB and comorbidities to be introduced. Hence, the assessment of disease burden and health system capacity should be an ongoing and iterative process, regularly updated as the epidemiology and joint response to TB and comorbidities evolve.

B.1 Assess the joint burden of TB and comorbidities

Assessing the joint epidemiological burden of TB and comorbidities will enable countries to develop effective services and focus efforts where needs are greatest. To achieve this, countries should:

- Use existing data sources for an initial assessment of the joint burden of TB and key comorbidities and health-related risk factors (e.g. diabetes, disorders due to substance use, HIV, mental disorders, tobacco and undernutrition).
- Address data gaps on the joint burden, where these exist. Methods for addressing data gaps may include, but are not limited to, sentinel surveys, small-scale studies among people with TB, and periodic cross-sectional surveys.

B.2 Determine access to services and the financial burden for people with TB and comorbidities

To understand the barriers and facilitators to accessing people-centred services from the perspective of the end user, the programmes in collaboration with stakeholders should:

- Determine the access to services for TB and comorbidities, using appropriate methodologies, such as patient pathway analyses, surveys or operational research to increase understanding of the gaps and opportunities for screening, diagnosis, treatment and prevention.
- Determine the financial burden to people affected by TB and comorbidities through methods that may include but should not be limited to national demographic and health surveys, health expenditure and utilization surveys and household surveys.
- Assess access to existing social protection schemes that mitigate the financial impact of TB and comorbidities.

CASE STUDY:

Introducing and scaling up collaborative action on tuberculosis and diabetes, Mexico

Context: People with diabetes mellitus (diabetes) have a higher risk of tuberculosis (TB) disease and poor TB treatment outcomes. The prevalence of diabetes is rising rapidly in many countries with a high burden of TB, requiring coordinated action to optimize screening coverage, rates of diagnosis and treatment outcomes for both diseases. In Mexico, the prevalence of diabetes has increased from 14.2% in 2010 to 16.9% in 2021, with a projected rise to 18.3% by 2030 *(26)*.

Intervention: Collaborative action on TB and diabetes was first introduced in Mexico in 2012, using an adaptation of the WHO *Collaborative framework for care and control of tuberculosis and diabetes*. Initially, the Ministry of Health conducted a study in 15 primary care facilities to evaluate the feasibility and effectiveness of collaborative action on TB and diabetes in Mexico. The facilities were selected based on the estimated joint burden of TB and diabetes, the availability of infrastructure for screening and co-management of TB and diabetes, and the willingness of health authorities to participate in the programme. Bidirectional screening, that is, screening for TB in people with diabetes and screening for diabetes in people with TB, was provided by trained nurses, and people diagnosed with TB and diabetes received treatment for both conditions in the same primary care clinic. Glycaemic control was monitored by regular measurements of random and fasting blood glucose, and HbA1c. Weekly counselling sessions were conducted to strengthen adherence to treatment and promote a healthy diet and physical activity *(95)*.

In 2013, the national TB guidelines (Norma Oficial Mexicana) incorporated guidance on diabetes to promote scale-up of collaborative action on TB and diabetes. This includes guidance on bidirectional screening and co-management of TB and diabetes, as well as the provision of TB preventive treatment for people with diabetes who had had contact with a person with TB *(96)*.

The strategies to implement and scale up collaborative action on TB and diabetes include regular meetings with representatives of the TB and diabetes programmes; training of healthcare workers in the respective programmes on co-management of TB and diabetes; and the introduction of national joint indicators capturing (i) the proportion of people with TB screened for diabetes; (ii) prevalence of diabetes among people with TB; and (iii) treatment of TB infection among people with diabetes who have had contact with TB. In addition, recording and reporting tools were updated to capture data on the indicators and a question on productive cough was added to chronic disease monitoring cards. The government has also been exploring avenues for strengthening federal commitment to ensure that treatment for diabetes can be provided for free alongside TB treatment, and for engaging community TB treatment supporters for delivery of diabetes care at the community level *(97)*.

In 2020 in Mexico, 17 603 new and relapse TB episodes were notified, among whom 84.7% were either screened for diabetes by the TB services or a pre-existing diagnosis of diabetes was established. A total of 5361 people had diabetes, representing 36% of those who were asked about or screened for diabetes.

Lessons learnt: The initial small-scale implementation demonstrated that primary care-based collaborative TB and diabetes activities are feasible, and showed improved TB treatment outcomes among those who received collaborative services *(95)*. The introduction and scale-up of collaborative action was facilitated by the incorporation of collaborative care for TB and diabetes in national guidelines and norm-setting documents, awareness raising among healthcare workers on the association between TB and diabetes, and a focus on people-centred care.

B.3 Map health service delivery for TB and comorbidities

In coordination with affected communities, key stakeholders and relevant multidisciplinary experts, programmes should consolidate the existing data on availability of services to guide the development, planning, implementation and delivery of collaborative action along the cascade of care from screening and diagnosis to treatment and prevention. To achieve this, they should:

- Determine the availability, deployment, qualification, supervision and mentoring of the health workforce including affiliated cadres such as community health workers and social workers.
- Conduct mapping of public and private facilities and other state and non-state actors who provide services for TB, comorbidities and health-related risk factors, including for vulnerable, at risk and marginalized populations, e.g. people with undernutrition, prisoners, migrants, PWUD, residents of long-stay mental healthcare institutions.
- Identify what services are delivered and assess their quality and safety.
- Determine the availability of equipment, tools and commodities to screen for, diagnose, treat and prevent TB and comorbidities.
- Assess the feasibility and acceptability of introducing collaborative action on TB and comorbidities, for healthcare workers and affected communities.

B.4 Identify gaps in services and conduct root cause analysis

A review of all relevant data is critical for informing and prioritizing collaborative action on TB and comorbidities. To achieve this, countries should:

- Analyse data on epidemiology, people-centred services and the health system to identify gaps and opportunities in services.
- Conduct root cause analysis to understand the reasons for these gaps, and inform strategies to address the gaps (e.g. lack of policy, lack of standard operating procedures, infrequent training) *(76)*.
- Identify gaps in data and evidence that could be used to inform the agenda for operational research.

CASE STUDY:

Behavioural support for smoking cessation among people with tuberculosis, Pakistan

Context: In Pakistan, the prevalence of smoking among people aged 15 years and older was 25% among men and 3% among women in 2020 *(33)*. Further, Pakistan is classified by WHO as a country with a high burden of tuberculosis (TB), with a TB incidence of 259/100 000 in 2020 *(29)*. In 2020, the estimated number of TB episodes attributable to smoking was 53 000 for men and 3600 for women. Smoking increases the risk of TB disease, is associated with worse TB treatment outcomes and doubles the risk of TB-related death *(34)*. Integration of TB treatment and tobacco cessation services is one of the priorities for TB and comorbidities in the End TB Strategy.

Intervention: In Pakistan, a bespoke smoking cessation intervention has been developed for people with TB, in a collaborative partnership between the national TB programme and the University of York. The intervention consists of brief (8 minutes) behavioural support sessions that provide messages on TB, healthy behaviour and advice on how to quit tobacco smoking, delivered by the regular TB programme staff. Following an initial trial over 3 years (the "TB & Tobacco" trial), healthcare workers were interviewed to suggest changes for optimization of the intervention prior to scale-up. As a result of these consultations, recording and reporting systems were revised to record smoking status at registration and treatment completion, training was shortened to one half-day and provincial TB programme leads were engaged.

An evaluation of the initial trial showed that 25% of people with TB quit tobacco use, as measured by self-reported abstinence and verified biochemically at 6 and 12 months *(34)*. Those who quit had better TB treatment outcomes, including higher rates of sputum conversion and treatment success, and lower rates of TB relapse compared to those who did not stop tobacco use. In collaboration with the provincial TB programme, the intervention was scaled up in 59 out of 121 health facilities in the Khyber Pakhtunkhwa Province, representing urban, rural, private and public centres.

Lessons learnt: Key facilitators include the close collaboration between researchers and provincial and national programmes to evaluate effectiveness and impact on TB treatment outcomes. Commitment from organizations involved was reflected in joint funding of the intervention. Consultation with healthcare workers who implemented the intervention helped to identify opportunities to improve feasibility and acceptability as part of assessment for scale-up.

C. Coordinate planning and resource mobilization for collaborative action

C.1 Identify priority comorbidities and interventions

C.2 Define and reorient models of care for TB and comorbidities towards people-centred services, primary health care and universal health coverage

C.3 Conduct collaborative planning and budgeting to scale up people-centred services for TB and comorbidities

C.4 Align advocacy and communication across health programmes

Primary health care (PHC), which delivers services that are integrated, comprehensive and affordable, is a cornerstone of UHC *(98)*. Programmes should aspire to decentralize and integrate services for TB and all key comorbidities at the primary care level. Countries may need to prioritize action on TB and comorbidities based on an assessment of the evidence outlined in Section B. Data review, root cause analysis and prioritization should be conducted in close consultation with key stakeholders. The criteria for prioritization may include, but should not be limited to, the morbidity and mortality burden, cost implication, ethical considerations and acceptability (see Section C.1). The *WHO People-centred framework for tuberculosis programme planning and prioritization (76)*, and the *WHO Compendium of data and evidence-related tools for use in TB planning and programming (99)* provide further guidance on prioritization.

People-centred services for TB and comorbidities should be tailored to the needs and preferences of affected persons as far as possible and should aim to minimize the time and financial costs incurred by the end user for accessing care. To this end, programmes should work together to define and reorient models of care that assure the provision of integrated services, preferably at the same time and location, and as close as possible to people who need them (see Section C.2 and Box 1). Integrated models of care are feasible, acceptable, cost-effective and have high rates of TB treatment success *(34,68,100–102)*. The engagement of community health workers can also enhance health system performance and efficiency, and capitalize on local resource mobilization *(103)*.

The process of joint planning and budgeting for collaborative action on TB and comorbidities helps to strengthen efficiencies (see Section C.3). Beyond the impact on TB, collaborative action on TB and comorbidities may improve broad health outcomes, improve efficiency of resource use, and promote people-centred and integrated services. To ensure sustainability, planning should be harmonized with the country's national health strategic plans, health-system strengthening agenda and overall efforts towards achieving UHC. Key areas for planning collaborative action on TB and comorbidities to be covered include quality-assured health

services; a well-performing health workforce; well-functioning information systems; equitable access to essential medicinal products, vaccines and technologies; good health financing; and leadership and governance. Planning for collaborative action on TB and comorbidities should include joint efforts to identify suitable funding sources and programme synergies, e.g. for nutrition support. Stakeholders from across and outside the health sector should collaborate on domestic and external resource mobilization, and evidence should be used to advocate for higher political commitment. Advocacy is a vital tool for advancing collaborative action, and has higher chances of success when implemented jointly. Programmes should work together to seek allies and develop joint advocacy strategies and align communication to garner buy-in for and promote collaborative action (see Section C.4).

C.1 Identify priority comorbidities and interventions

Prioritization is critical for scaling up action on all comorbidities. In collaboration with stakeholders, programmes should:

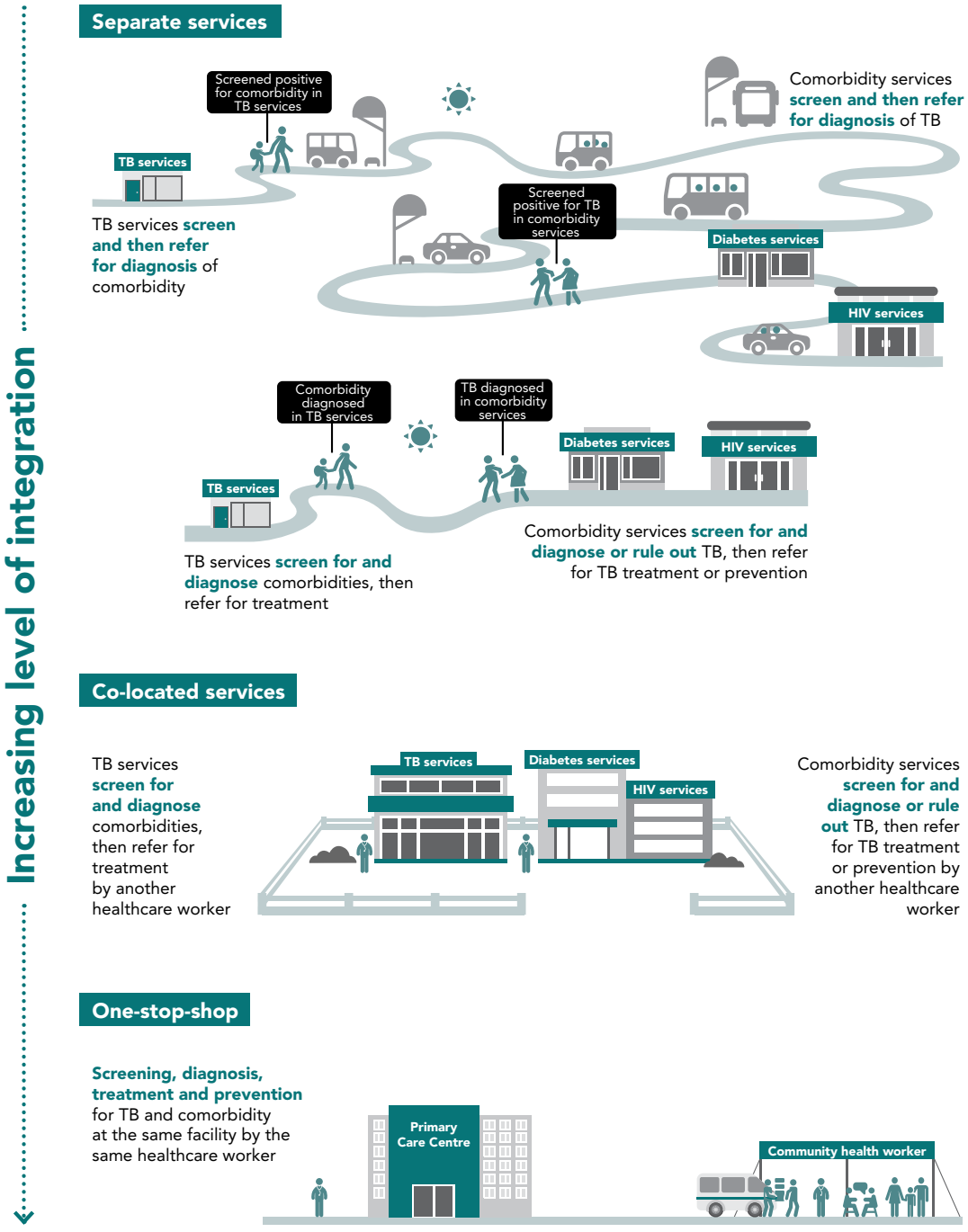
- Identify comorbidities and interventions to be prioritized for national policy adaptation and adoption, based on reviews of the burden of TB and comorbidities according to criteria agreed with the coordination platform or related technical working group. The criteria to be considered in discussion for prioritization may include but not be limited to the morbidity and mortality burden, cost implications, ethical considerations and acceptability.
- Continuously review national and local priorities as the joint burden of TB and the different comorbidities evolves and collaborative action matures.

C.2 Define and reorient models of care for TB and comorbidities towards people-centred services, primary health care and universal health coverage

To design people-centred models of care according to the local context, programmes should:

- Engage civil society and affected communities in developing models to deliver person- and family-centred care according to the preferences of affected persons.
- Orient services towards primary care and ambulatory services.
- Maximize opportunities to manage TB and comorbidities in the same place at the same time, including through the use of telemedicine.
- Develop models of care that address the needs of the vulnerable, at risk and marginalized populations through strengthened collaboration with key stakeholders to provide comprehensive social and nutritional support.
- Ensure that IPC is prioritized during the design and reorientation of models of care.
- Ensure that interventions and products to address TB and comorbidities are included within the country's essential package of health services.

Fig. 2. Models of integrated care for people with TB and comorbidities



Adapted from Chifundo (2010) *(104)*, De Foo et al. (2022) *(105)* and Legido-Quigley et al. (2013) *(106)*

Box 1. Models of service delivery for TB and comorbidities

Models of service delivery for TB and comorbidities range from the least integrated, where stand-alone disease-specific providers refer patients to the relevant specialist services for comorbidities, to the most integrated, where all services across the cascade of care for TB and key comorbidities are provided in a "one-stop-shop" by one healthcare worker *(105,106)*. Services may be provided at different levels of the health system, depending on the availability of comprehensive primary care and the degree of decentralization of the respective services. In some settings, TB services may be decentralized to the primary care level, while services for comorbidities such as diabetes and mental disorders may be available only at the secondary care level. In this situation, the degree of integration can be increased only if diabetes and mental health services are also decentralized closer to the end user.

Within these models, care may be provided by separate specialist healthcare workers who refer patients to different services according to established pathways. Alternatively, multidisciplinary teams comprising professionals with a mix of skills, including medical and non-medical, required to meet the needs of the end user, may provide coordinated care *(107)*. Care can also be provided by one healthcare worker for both TB and comorbidities, where the expertise is available, e.g. for TB/HIV *(106)*. All models of care may be strengthened by the engagement of community healthcare workers, outreach teams and peer supporters.

The models of care described here are categorized according to where a person first seeks care, and according to the degree of integration (Fig. 2). They are not prescriptive; national programmes should define the models that best enable the provision of quality-assured comprehensive services as close as possible to the end user.

Separate service delivery

Stand-alone service providers may screen for TB or relevant comorbidities, then refer for diagnosis and treatment. For example, TB service providers may screen for mental disorders using validated screening tools, then refer those who need further assessment. Such models of care can be relatively simple to introduce at a low cost to health services, utilizing available human resources *(105)*. The healthcare workforce would require training on screening tools such as brief questionnaires or point-of-care tests, recording and reporting, and referral pathways. However, these least integrated services require end users to attend multiple separate appointments in different locations to receive a diagnosis and engage in treatment, which may be associated with loss to follow-up and high out-of-pocket payments *(105,106)*.

Alternatively, stand-alone service providers may screen and diagnose TB or relevant comorbidities, then refer the person for treatment as required *(105)*. For example, TB services may diagnose diabetes or mental disorders, then refer for treatment initiation and counselling on management. Conversely, diabetes services may screen for TB and collect sputum for diagnosis as indicated. This model is closely aligned with people-centred services and may reduce the number of separate healthcare appointments needed; however, it may require additional staff capacity and logistical resources such as point-of-care diagnostics and/or linkage to the sputum transportation network.

Co-located services

Co-location refers to separate service providers located in the same or adjacent premises. Co-located models of care may further reduce the need to travel to multiple distant facilities and enable a higher degree of integration between services. However, while services are provided on the same premises, it is important to highlight the need for close collaboration between the different service providers, e.g. to minimize the waiting time between appointments, reduce the number of times a person needs to attend to receive care for TB and the respective comorbidities, and enable integrated patient health records *(105,106)*. This model of care facilitates linkage to care and promotes closer collaboration between providers but may be more time-consuming and costly to the end user and their family compared to fully integrated models.

One-stop-shop

Under fully integrated models of care, collaborative services are provided in a one-stop-shop for TB and comorbidities, including screening, diagnosis, sputum collection for TB, treatment and care, by the same healthcare worker in the respective specialist services or in primary health care services, on the same day. These may be provided in primary care settings or through community outreach initiatives that are adapted to the needs of service users and available close to where they live. Integrated models of care may facilitate a holistic case management approach *(68)*; reduce transport costs, income loss and other costs associated with attending appointments; simplify recording and reporting; and can be more time-efficient.

Changing to a fully integrated model of care may require alignment of financing, human resources and multidisciplinary training, as well as logistical and infrastructural investment. Preventing nosocomial spread of TB is a key consideration for integration, therefore, comprehensive IPC measures should be enforced *(108)*. However, concerns over nosocomial TB transmission should not be a barrier to integration, as integrated care supports early detection and treatment of undiagnosed infectious TB and may result in a reduction of TB risk compared with separate services *(106)*.

When establishing integrated services, it is important to note that one-stop-shop services still require strong referral pathways. For example, referrals may be needed for confirmation of diagnosis, specialist input or for ongoing management of TB-related disability and comorbidities upon completion of TB treatment. Further, the preferences of the person with TB and comorbidities should be considered, e.g. separate services may be appropriate to maintain continuity of care for pre-existing comorbidities, to provide highly specialized medical care, or may be preferred among people who experience stigma in relation to comorbidities, such as injecting drug use.

CASE STUDY:

Integrated screening and care for tuberculosis, viral hepatitis and HIV, Georgia

Context: The joint burden of TB, HIV and viral hepatitis tends to be elevated among particular high-risk groups, such as people in prison and people who inject drugs, yet, diagnosis and care are frequently provided in separate facilities for each infection. In Georgia, where services for TB, HIV and viral hepatitis have historically been provided by separate programmes, an integrated model of screening and care has been developed to improve diagnosis and management of TB, HCV and HIV at the primary care level *(109,110)*. In 2018, when the intervention was first introduced, the TB incidence in Georgia was 80/100 000 *(29)*; among people diagnosed with TB, 21% had HCV coinfection and 2% had HIV coinfection *(91)*.

Intervention: An integrated model of screening and care for TB, HCV and HIV within primary care was first introduced in 2018 in the Samegrelo-Zemo Svaneti region. With a population of 330 000 and a significant share of internally displaced people, the region has a higher burden of TB, HIV and HCV respectively, per capita compared to the country's overall per capita burden. Prior to implementation, a regional campaign was conducted, which comprised advocacy, communication and social mobilization efforts to increase awareness of TB, HCV and HIV among relevant stakeholders, including public health centres, local government, primary care providers and civil society. Further, memoranda of understanding with defined roles and responsibilities of stakeholders were agreed and signed between the partners in 2017.

To facilitate introduction of the primary care-based triple screening programme, local public–private partnerships were developed. A regional steering committee was set up to lead implementation and district multidisciplinary teams were established to provide monitoring and support. A monitoring and evaluation framework defining indicators and annual targets was developed in collaboration with the National Family Medicine Training Centre. Technical assistance for developing the integrated screening model, and for conducting awareness-raising and capacity building, was provided by the Global Fund. The local government allocated a budget for the joint initiative, which included an incentive scheme for primary care providers. Funding for tests and supplies was provided through state programmes.

Standardized protocols for integrated screening were developed, including a questionnaire on signs and symptoms of TB and point-of-care rapid diagnostic tests for HCV and HIV. Primary care providers were trained on screening and diagnostic procedures, ethical conduct, and on web-based recording and reporting of results. Triple screening was then conducted by trained primary care physicians in primary care facilities, as well as by outreach teams using a door-to-door approach.

The intervention has been associated with increased coverage of screening and linkage to care for TB, HCV and HIV. During the first 7 months of the intervention in Samegrelo-Zemo Svaneti, triple screening was conducted for 88 178 people, exceeding the previous three years combined. Among those screened, 192 had presumptive TB and were referred for further testing, 22 of whom were subsequently diagnosed with TB disease. Further, 1277 people were diagnosed with active HCV infection, and 37 with HIV. Following the pilot implementation, the programme was scaled up to all regions in Georgia.

Lessons learnt: Key facilitators for implementation and scale-up of the primary care-based model of care of triple screening for TB, HCV and HIV included strong political commitment, investment and government leadership, the establishment of a steering committee with defined and pre-agreed roles and responsibilities between partners, target setting, development of an appropriate public–private mix, implementation of standardized clinical protocols and public awareness campaigns. Decentralization and integration of TB, HCV and HIV services in primary care can help overcome barriers to access to care and treatment, and close gaps in the treatment cascade including reduced time between diagnosis and starting treatment.

C.3 Conduct collaborative planning and budgeting to scale up people-centred services for TB and comorbidities

Based on the situation analysis, collaborative planning and budgeting is required to support the introduction and scale-up of collaborative action on TB and comorbidities across the care cascade and from the district level to nationwide coverage.

- Key areas to consider in this process include:
  - community involvement at all levels;
  - quality-assured health and social services in the public and private sectors;
  - an adequately trained, motivated and well-performing health workforce, social workers and community health workers;
  - equitable and sustainable access to essential tools, medicines and products to enable screening, diagnosis and management of comorbidities, such as weighing scales, blood glucose strips, screening tools for mental health conditions, tobacco, alcohol and substance use, medicines for comorbidities and nutrition support;
  - expansion of telemedicine and mHealth to bridge service delivery gaps; and
  - well-functioning, interoperable health information systems, and adequate workforce capacity to conduct recording, reporting, analysis and review of data at all levels.
- Harmonize national strategic plans, policies and guidelines for TB and the respective comorbidities and ensure alignment within the national health plan.

C.4 Align advocacy and communication across health programmes

Advocacy targeted at influencing policy and implementation of interventions should engage a range of stakeholders at all levels. In collaboration with the respective health programmes and stakeholders, the national TB programme should:

- Develop strategies for advocacy and communication informed by evidence review and assessment (Section B).
- Advocate for collaborative action on TB and comorbidities at all levels, as shown in Table 3.

Table 3. Strategies for advocacy

Target audience and allies	Advocacy focus and action
Leadership and government structures, e.g. ministry of health, parliament, treasury, other relevant ministries, regional and subnational government; international organizations, donors	Consolidate and present global, regional and national evidence on the joint burden and socioeconomic impact to garner political commitment and funding for addressing TB and comorbidities
Private healthcare providers and associations	Advocate for the inclusion of actions on TB and comorbidities in public–private mix initiatives
Healthcare workers, community health workers, allied health professionals	Disseminate scientific advocacy on the impact of comorbidities on TB, and vice versa, and evidence for related interventions
Academic and scientific institutions	Advocate for the advancement of research priorities
Civil society organizations, communities and affected populations	Engage and train civil society and TB survivors to support the development and dissemination of messaging around TB and comorbidities (see Section A.3) to build health awareness, health literacy and reduce stigma. Identify "champions", ambassadors or influential spokespeople for TB and comorbidities. Jointly develop and disseminate health education materials
General population	Align advocacy and communications across services to ensure inclusion of comorbidities in TB-related communication, and of TB in relevant communication on comorbidities. Leverage on world health days, e.g. World HIV Day, World Diabetes Day to raise awareness

D. Implement and scale up people-centred services for TB and comorbidities

D.1 Jointly develop policies, guidelines and procedures for collaborative action on TB and comorbidities

D.2 Mobilize a qualified multidisciplinary workforce, including among private providers and non-health sectors for collaborative action

D.3 Ensure access to essential medicines, vaccines, diagnostics and health technologies for TB and comorbidities

D.4 Engage civil society and communities affected by TB and comorbidities in refining and delivering people-centred services

D.5 Optimize access to social protection to prevent financial hardship due to TB and comorbidities

D.6 Facilitate uptake of digital technologies to deliver health and social protection services across programmes

D.7 Introduce phased scale-up of people-centred services for TB and comorbidities

Common barriers to implementing collaborative services for TB and comorbidities include lack of policies, guidelines or tools for operationalization *(111)*, inadequate numbers of healthcare workers and low levels of awareness and capacity to manage comorbidities *(112–116)*, and unavailability of equipment, consumables and medicines *(114,117)*. Where services do exist, stigma and discrimination faced by people with TB and comorbidities frequently preclude care-seeking and engagement with treatment *(111,118–120)*. Moreover, the costs of accessing health care may be prohibitively high. Although TB services are generally free of charge, services for comorbidities often incur costs at the point-of-care *(111,117,121)*. In addition, there may be high costs related to accessing TB services, such as transport costs and income loss *(122)*.

The strategies described in Sections D.1–D.6 aim to address these barriers and to assist in scaling up effective and responsive people-centred services. Affected populations and civil society should be engaged throughout this process to jointly identify challenges, develop solutions, design models of care and deliver services. Engagement of representatives from the most marginalized groups – such as those with disorders due to substance use, HIV or mental disorders – is especially important for addressing stigma and discrimination.

Countries may adopt a phased approach to the scale-up of collaborative action, scaling up services according to the local burden of the comorbidities, by geographical area and by feasibility of interventions along the cascade of care (see Section D.7).

CASE STUDY:

Cough monitors to improve linkage between tuberculosis services and the lung cancer control program, Kenya

Context: Among people with symptoms of tuberculosis (TB), alternative causes for the respiratory symptoms, such as lung cancer or fibrosis, should be pursued if TB is ruled out. Kenya is categorized as a country with a high burden of TB, with an incidence rate of 259/100 000 in 2020 *(29)*. Further, in 2019, 0.44% of all deaths in Kenya were attributed to lung cancer *(123)*. Given the overlap of signs and symptoms between TB and lung cancer, there is an opportunity to collaborate between relevant programmes to ensure early detection, appropriate treatment and survival.

Intervention: In Kenya, a model of care has been developed, whereby cough monitors are employed to improve cross-referral diagnosis of lung cancer for people with respiratory symptoms in whom TB has been ruled out. The AMPATH Multinational Lung Cancer Control Program was established through a partnership between the Ministry of Health, the Ministry of Higher Education, Science and Technology and a consortium of universities. The programme identifies individuals testing negative for TB and enables further investigation of underlying lung disease. Cough monitors, who regularly work with TB clinics to facilitate active case-finding, attend a one-day training to improve their skills and awareness of the diagnosis of other lung diseases, including cancer. A weekly cough monitoring log and a referral form captures the information on symptoms and duration. Cough monitors work with TB services to identify symptomatic individuals for whom TB has been ruled out and refer those who require further investigations to specialist services.

During the first year of implementation of the intervention, a total of 274 individuals were referred for lung cancer investigations. Among referred individuals, 41% had lung masses, and of these, 29 people (11% of all those referred for further investigation) were diagnosed with lung cancer. Individuals without lung masses were diagnosed with other respiratory conditions, including chronic pneumonia and fibrosis.

Lessons learnt: Early observations show that it is feasible and acceptable to engage cough monitors in models of care for TB to facilitate referral for differential diagnosis after TB is ruled out. The initiative has fostered collaboration between TB and lung cancer facilities, improved referral mechanisms and aided in earlier diagnosis.

D.1 Jointly develop policies, guidelines and procedures for collaborative action on TB and comorbidities

To maximize uptake of interventions, programmes should work together to develop guidance and mainstream recommendations throughout policies, guidelines and tools. For broader dissemination, programmes should:

- Mainstream guidance in the respective guidelines for TB and comorbidities.

- Ensure alignment within other guidelines, e.g. for primary care, community health workers, community-based and community-led care, prison health workforce and mining organizations.
- Develop and strengthen standard operating procedures and clinical algorithms to support and promote routine implementation. Tools should focus on:
  - routine screening, diagnosis, co-management and prevention of TB and comorbidities according to recommendations for the different comorbidities;
  - linkage to counselling, peer support, social care and nutritional support; and
  - referral and counter-referral when indicated, including for continuity of care for comorbidities after completion of TB treatment.

D.2 Mobilize a qualified multidisciplinary workforce, including among private providers and non-health sectors for collaborative action

Strategies for mobilizing an effective workforce for TB and comorbidities include:

- Defining roles and responsibilities of the health workforce in accordance with the models of care.
- Linking with national efforts on task shifting, task sharing and community health worker initiatives to expand the reach of collaborative action.
- Developing and updating job descriptions to reflect changes in responsibilities, for task shifting or task sharing[4], as well as for supervision, mentoring and quality improvement.
- Strengthening strategies for recruitment, retention and distribution of healthcare workers appropriate to the needs for TB and comorbidities, and as part of the broader health workforce strengthening strategy.
- Building the necessary competencies among healthcare workers (including among private providers and healthcare workers in other sectors) to deliver quality care for TB and comorbidities, aligned with PHC:
  - advocate for updating of pre-service curricular training to address TB and comorbidities;
  - collaborate to provide training and capacity building on interventions to address TB and comorbidities, including among private providers and non-health sectors, as locally relevant;
  - build capacity for recording, reporting, analysis and review of data on collaborative action to inform programming;
  - promote and support the formal integration and remuneration for services of community health workers and peer supporters within the health system;
  - engage affected populations in healthcare worker training on health-related needs and psychosocial vulnerabilities, to prevent stigma and discrimination; and
  - promote continuing professional development on TB and comorbidities.

[4] Task *shifting* refers to the rational redistribution of tasks from qualified healthcare workers to healthcare workers with less training such as community health workers *(162)*, whereas task *sharing* refers to the sharing of tasks across equally qualified cadres of healthcare workers *(163)*.

D.3 Ensure access to essential medicines, vaccines, diagnostics and health technologies for TB and comorbidities

To facilitate access to quality-assured essential medicines, products and equipment, it is vital to:

- Lobby for inclusion of prevention measures, screening tools, diagnostic tests including point-of-care tests, medication and care for TB and comorbidities within the essential package of care under UHC.
- Ensure all commodities are quality-assured.
- Collaborate with international organizations, such as the World Food Programme, and NGOs working on food security and nutrition to facilitate access to nutritional support.
- Develop adequate laboratory network capacity or strong linkages to existing laboratory networks (e.g. expand sputum transportation network to where relevant comorbidity services are delivered; invest in expanded use of common diagnostic platforms for TB, HIV, viral hepatitis, SARS-CoV-2, etc.).
- Strengthen capacity in procurement and supply management, including training, storage and management information systems to reduce stock-outs.
- Where possible, stock medications for key comorbidities in TB services, and vice versa, to minimize the need for referral for diagnosis and treatment.

CASE STUDY:

Nutrition programme in Madagascar supporting people with tuberculosis

Context: Undernutrition is a key driver of the tuberculosis (TB) epidemic and a significant risk factor for poor TB treatment outcomes. Undernutrition is also a common consequence of TB disease. In Madagascar, the average 3-year prevalence of undernourishment was 43% in 2018–2020, ranking as the fifth most severely affected country worldwide *(124)*. In 2021, an assessment conducted by the World Food Programme (WFP) indicated that 80% of people with newly diagnosed TB in Madagascar were malnourished, and WHO estimates that 31 000 (47%) new TB episodes in the country were attributable to undernutrition in 2020. Nutrition support has been demonstrated to improve adherence *(125)*, and nutritional assessment, counselling and support are essential components of TB treatment support.

Intervention: To address the nutritional needs of people with TB in southern Madagascar, the National TB Programme (NTP), in collaboration with the WFP, has established and scaled up a nutrition rehabilitation intervention for people with TB. The intervention comprises nutritional assessment and counselling for all people with TB, and provision of specialized nutritious foods for those who are found to be malnourished. Supplementation continues until target criteria are met (body mass index [BMI] or middle upper arm circumference [MUAC], depending on the individual being assessed).

The intervention was first introduced by WFP in 2005 in southern Madagascar, the area with the highest levels of poverty, food insecurity and TB in the country. In 2014, the NTP committed to incorporating nutritional care into the National Strategic Plan (NSP) for the fight against TB 2015–2019. The programme was funded by the National Office for Nutrition (Office National de Nutrition [ONN]), complemented by the Global Fund.

As part of scale-up of the intervention, the NTP identified more than 120 facilities in regions with a high prevalence of TB, and where the burden of undernutrition among people with TB was very high. Experience from the WFP nutrition programme informed the NTP in setting up a standardized national protocol for the nutritional assessment and care of people with TB. To facilitate assessment of nutritional status, WFP supplied anthropometric equipment to all TB diagnostic and treatment centres. Distribution of specialized nutritious foods to TB facilities was coordinated by WFP, including regular deliveries every 2 months to ensure sufficient stock.

To monitor the need for and the impact of nutritional support for people with TB, the NTP has included indicators on nutrition in the suite of NTP data collection tools. In 2021, WFP conducted an assessment of the impact of the nutritional support programme, which indicated a nutritional recovery rate of 90% among those who received the intervention.

Lessons learnt: The partnership between the NTP, WFP and ONN has enabled successful scale up of interventions to address malnutrition among people with TB in southern Madagascar. Logistic support provided by WFP enabled a robust assessment of the nutritional status of people with TB and a reliable supply of specialized nutritious foods. Implementation and scale-up was phased according to an assessment of the joint burden of TB, malnutrition and food insecurity. The development of a standardized protocol on nutrition assessment and support enabled routine implementation of the intervention. Routine monitoring and evaluation, including standardized indicators, has helped to monitor the joint burden and effectiveness of the response.

D.4 Engage civil society and communities affected by TB and comorbidities in refining and delivering people-centred services

Engage civil society and affected and at-risk populations (e.g. people with diabetes, PWUD and people living with HIV), as well as their families and communities to support in the following areas:

- Healthcare delivery, including through peer support initiatives.
- Assessing quality of care.
- Advocacy for improved quality and coverage of services where needed.
- Monitoring and addressing stigma and discrimination.
- Implementation of outreach and education initiatives to strengthen health literacy on TB and comorbidities, and to inform on how and where appropriate care and prevention can be accessed.

D.5 Optimize access to social protection to prevent financial hardship due to TB and comorbidities

Social protection measures mitigate the direct and indirect financial burden of engaging in care for TB and comorbidities. In collaboration with social welfare and other relevant agencies, optimize access to social protection, to prevent financial hardship due to TB and comorbidities, through the following actions:

- Strengthening collaboration with the relevant social services and stakeholders to facilitate linkage with the existing social protection interventions, e.g. nutritional support, employment guarantee, safe housing and poverty alleviation.
- Lobbying for health insurance cover for people with TB and comorbidities to minimize out-of-pocket payments, to cover the cost of essential products and services that are not freely available in the public healthcare system.
- Lobbying for funding to support non-medical costs (e.g. transport costs) and income losses related to treatment.
- Including information on provision of social protection in health worker training and health education materials.

D.6 Facilitate uptake of digital technologies to deliver health and social protection services across programmes

Digital technologies to support scale-up of collaborative action on TB and comorbidities include telemedicine and video-supported treatment, computer-aided detection of TB-related abnormalities on chest radiography, digital data collection tools. To enhance uptake, countries should:

- Adopt and adapt new tools and technologies for prevention, diagnosis and treatment to enhance integration and allow interoperability between TB and comorbidity information systems.
- Safeguard privacy and confidentiality when digital technologies are used to record health information and provide services for TB and comorbidities.
- Develop plans for longer term sustainability of digital technology, including for physical equipment and software updates.
- Exploit other applications of digital technologies to deliver services, for example integrated eLearning courses such as massive open online courses (MOOCs) to improve healthcare worker capacity and health information.
- Collect data on the barriers to and performance of digital technologies, to continuously improve interventions as well as data capture.

D.7 Introduce phased scale-up of people-centred services for TB and comorbidities

Informed by ongoing monitoring, review and prioritization, countries should incrementally scale up services for TB and comorbidities with the aim of nationwide coverage. Phased scale-up should consider the following:

- Cascade of care, e.g. first introduce screening for TB and comorbidities in the respective services, then gradually expand to the full cascade including prevention and co-management of TB and comorbidities in the same facility.
- Geographical setting, e.g. starting in one or two districts with phased nationwide decentralization to the community level.
- Strengths of the existing services, e.g. in countries where TB services have a strong network but services for diabetes are less well established, start with screening and co-management of diabetes among people attending TB services.
- Opportunities to build on the existing networks of integrated care such as TB/HIV services or primary care, e.g. develop services that address multimorbidity by introducing screening for several comorbidities and health-related risk factors, such as mental health conditions, diabetes and malnutrition within TB/HIV services. This may also be done within models of differentiated service delivery for HIV treatment and care.

CASE STUDY:

Scaling up collaborative TB/HIV activities in the concentrated HIV epidemic setting of India

Context: In 2020, India had the highest number of people with tuberculosis (TB) globally, estimated at 2.59 million, with an incidence rate of 188/100 000 *(29)*. Further, India had the second highest number of people with HIV-associated TB disease. While TB is endemic across India, the HIV epidemic in India is concentrated among high risk groups and in six out of the 35 states and union territories; in 2019, the estimated countrywide HIV prevalence was 0.22% among adults 15-49 years, while the estimated HIV prevalence among people with incident TB was 2.2% in 2020 *(13,126)*. Scale-up of collaborative TB/HIV activities in countries with a high burden of TB with concentrated HIV epidemics is challenging due to insufficient political commitment and financing to decentralize HIV services. Collaborative TB/HIV activities in India were first established in the six high burden states and were progressively scaled up nationwide, providing a good example for other countries with concentrated HIV epidemics.

Intervention: In India, TB/HIV collaborative activities have been effectively established and strategically scaled up, from targeted interventions in high-burden states to nationwide coverage of services. Between 2005 and 2010, a national TB/HIV framework was developed, a coordination mechanism and technical working group were established, and joint training modules and surveillance were implemented in all states. In addition, an intensified package of TB/HIV activities was launched, which included HIV testing for all people diagnosed with TB and referral for those eligible for antiretroviral therapy (ART). The intensified TB/HIV package was initially implemented in states with a high HIV burden with the capacity for HIV testing and programme management, and subsequently scaled up to nationwide coverage by 2012.

Following the publication of the WHO Policy on collaborative TB/HIV activities in 2012, the national TB/HIV framework was revised. Between 2015 and 2018, one-stop-shop services for TB and HIV were rolled out across all ART centres with intensified case-finding, molecular WHO-recommended rapid diagnostic tests, a daily TB treatment regimen, TB preventive treatment and strengthened infection prevention and control measures. In addition, guidelines were developed for TB and HIV interventions in prisons and other places of detention, and active case-finding initiatives were implemented for high-risk groups. In 2019, a policy on HIV-testing for all people undergoing investigation for TB was introduced. Activities were accompanied by regular meetings between the HIV and TB programme managers for joint review of data. Between 2008 and 2020, the proportion of people with TB and with an HIV test result increased from 11% to 92%. Further, in 2020, 94% of people living with HIV were screened for TB, and more than 1.1 million people with HIV had received TB preventive treatment.

Lessons learnt: The phased scale-up of TB/HIV activities was informed by the epidemiology and service readiness, focusing first on states with a high burden of HIV and existing management capacity. The available health infrastructure was progressively and strategically expanded to decentralize and extend the reach of TB/HIV activities, for example by introducing HIV screening by point-of-care tests at the primary health subcentre level and by ensuring that TB services were provided at ART clinics *(127)*. The introduction and phased scale-up of TB/HIV collaborative activities were facilitated by political commitment and the development of policy guidelines, as well as by regular monitoring and review by both programmes to ensure that targets were achieved.

E. Strengthen monitoring, evaluation and research

E.1 Adopt indicators and set targets for collaborative action on TB and comorbidities

E.2 Strengthen surveillance for comorbidities among people with TB, and surveillance for TB among people with comorbidities and health-related risk factors in accordance with WHO recommendations

E.3 Introduce and scale up monitoring and evaluation of collaborative action on TB and comorbidities at all levels

E.4 Conduct joint reviews of quality and coverage of services to inform programming

E.5 Conduct operational and implementation research to inform policy, programming and service delivery

Target-setting, monitoring and evaluation, regular review and operational research are critical enablers for scaling up collaborative action on TB and comorbidities. These have been essential facilitators for introducing, implementing and scaling up collaborative TB/HIV activities *(127)*. Clear definitions of indicators can drive progress and accountability, especially if linked with established accountability mechanisms such as MAF-TB *(77)*.

Indicators that may be adopted at the national level are included in the WHO guidelines on monitoring and evaluation of collaborative TB/HIV activities, for TB and diabetes and for TB and tobacco *(27,36,128)*. In addition, guidance on new and updated indicators will also be included within WHO guidance and operational handbooks for TB and the respective comorbidities, which will be published on the Global TB Programme Knowledge Sharing Platform *(85)*. Countries should set time-bound targets to scale up collaborative action on TB and comorbidities, which can strengthen collaboration between programmes, promote involvement across sectors and help to mobilize political commitment *(17)* (see Section E.1).

Surveillance and regular assessment should be conducted to inform programming (see Section E.2). Multiple data sources can be utilized during monitoring, evaluation, reporting and review *(5,129)*, as outlined in Section B. The existing surveillance systems can provide valuable, real-time information on service utilization and health outcomes. The WHO toolkit for analysis and use of routine health facility data *(130)* provides a standardized approach to analysing routine facility data for the national, district and facility levels, which may be adapted for assessing services for TB and comorbidities. Data from a range of non-health sectors could also be utilized to promote multisectoral action and accountability. The sources may include, inter alia, the prison sector, mining sector and social services *(5)*.

The rapid development of digital technology provides novel opportunities for collecting and analysing data *(5,129,131)*. Programmes should strive to implement interoperable electronic recording and reporting such as the District Health Information Software (DHIS2) *(132)*, which can facilitate co-management, referral and follow-up, as well as real-time analysis of emerging trends in epidemiology. Such systems should however safeguard the confidentiality of patient data throughout implementation *(81,133)*.

As part of scale-up, recording and reporting tools should be updated to capture and strengthen data on the continuum of care for TB and comorbidities. Human resource capacity should be developed to collect and analyse data (see Section E.3). It is critical that data are jointly reviewed on a regular basis, and used to drive performance improvement, as part of existing review processes (see Section E.4). Where data gaps exist, operational research should be conducted to fine-tune programming and people-centred service delivery (see Section E.5).

E.1 Adopt indicators and set targets for collaborative action on TB and comorbidities

When adopting indicators and setting targets, the following factors should be considered:

- Select and adopt standardized joint indicators for TB and comorbidities in accordance with recommendations for the respective comorbidities and local epidemiological burden.
- Set and adapt national targets according to the local epidemiology and readiness of the health system to achieve the targets.

E.2 Strengthen surveillance for comorbidities among people with TB, and surveillance for TB among people with comorbidities and health-related risk factors in accordance with WHO recommendations

Surveillance of the joint burden of TB and comorbidities should inform priority setting, budgeting, planning and implementation. To strengthen surveillance, countries should:

- Select methods for surveillance in accordance with the national context, available resources and WHO recommendations for the respective comorbidities. The most appropriate method will vary depending on the comorbidity, the epidemiology and health systems context, and may include:
  - use of routine health systems data;
  - periodic cross-sectional surveys among a nationally representative sample;
  - TB prevalence surveys; and
  - sentinel surveys.
- Train staff at all levels to collect, analyse, report and use data.
- Plan for, adopt and scale up electronic recording and reporting systems (e.g. DHIS2) that are interoperable between programmes at all levels of the health system, while maintaining confidentiality. To support this, programmes should:

- harmonize recording and reporting systems across programmes and services and introduce unique patient identifiers to facilitate information sharing and minimize duplication;
- ensure availability and maintenance of physical equipment and build the required technical capacity among healthcare workers to document and access patient health information on electronic health records;
- establish mechanisms to capture data relating to implementation by private, non-governmental and non-health sectors; and
- adapt standardized paper-based recording and reporting systems to collect data on TB and comorbidities, where electronic recording and reporting is not yet feasible.

E.3 Introduce and scale up monitoring and evaluation of collaborative action on TB and comorbidities at all levels

To support the collection, reporting and use of data that reflect the joint burden and implementation, countries should:

- Embed indicators of TB and comorbidities into routine recording and reporting.
- Build capacity including human resources, training and tools, at the subnational and health facility level for recording, reporting, monitoring, evaluation and review, as well as supervision.
- Introduce systematic cross-checking, reconciliation, analysis and review of data between programmes on a regular basis down to the clinic level.
- Disseminate results to healthcare workers through supervision and mentoring to incentivize continued implementation, monitoring and evaluation.

E.4 Conduct joint review of quality and coverage of services to inform programming

In collaboration with the relevant health programmes, the national TB programme should review action on TB and comorbidities as part of the regular review processes of the respective programmes at the national and subnational levels (e.g. epidemiological reviews, national TB programme reviews, HIV programme reviews, and quarterly supervision visits). During the review process, countries should:

- Engage with the stakeholders, healthcare providers and affected communities to appraise the evidence.
- Identify shortcomings and unmet needs.
- Based on collected data and evidence for effective interventions, adapt and adjust the response to TB and comorbidities according to the evolving situation.

CASE STUDY:

Simultaneous screening and testing for tuberculosis and COVID-19 in Manila, the Philippines

Context: The COVID-19 pandemic resulted in a global drop in the reported number of people newly diagnosed with tuberculosis (TB), from 7.1 million in 2019 to 5.8 million in 2020 *(13)*. The reduced access to TB diagnosis and treatment resulted in an increase in the estimated number of deaths due to TB for the first time in over a decade *(13)*. The Philippines has a high burden of TB, with an incidence rate of 539/100 000 in 2020 *(29)*. Diagnostic and treatment services for TB are provided by the National TB Programme (NTP) within a range of public and private health facilities.

Intervention: A model of simultaneous screening and testing for TB and COVID-19 was introduced in August 2021 in the city of Manila, to address the drop in TB case notifications. The development and implementation of this model was informed by several assessments on the impact of COVID-19 on TB screening and rates of diagnosis, jointly conducted by academia, international organizations and the Ministry of Health. The assessments included a modelling study on the impact of COVID-19 on reaching the national TB notification targets, an analysis of TB notification rates before and after the introduction of community quarantine, and a rapid assessment of the impact of COVID-19 on the provision of TB services. To garner political commitment and stakeholder buy-in, the results of these assessments were presented to key stakeholders including the local government, management of health facilities and TB laboratories.

TB screening was offered to all people attending COVID-19 swabbing facilities, and TB testing was offered to all people with confirmed COVID-19 who were admitted to an isolation facility. The roles and responsibilities of stakeholders were outlined clearly before implementation, and communication activities were designed to increase awareness and uptake of services among the public. Additional laboratory staff were hired to perform Xpert MTB/Rif testing, and field teams received continuous mentoring and support. Monitoring and evaluation was established with regular on-site and remote joint monitoring activities conducted by technical and operational teams. A project-specific database recorded real-time updates, and TB notifications were captured in the NTP's integrated TB information system. Indicators on number of persons screened in the respective services, and number of persons diagnosed with TB, were reviewed at regular meetings between the technical and operational teams, Manila Health Department NTP team and other stakeholders. During the first 2 months, 1106 individuals underwent symptom-based TB screening in facilities where swabbing for SARS-CoV-2 was performed, 889 of whom were then screened using chest X-ray. Among these, 243 were tested using Xpert MTB/RIF and 11 were diagnosed with TB. In isolation facilities, 404 people were tested for TB, among whom 5 people received a TB diagnosis.

Lessons learnt: Key facilitators to the introduction of simultaneous screening for COVID-19 and TB included the use of multiple and complementary assessments to identify gaps and garner political commitment. Close collaboration with stakeholders including the local government, management of COVID-19 facilities, TB laboratories and TB services facilitated the integration of TB screening and testing services within COVID-19 services. Further, communication and health education activities aimed at the public helped to increase awareness and generate demand for services.

E.5 Conduct operational and implementation research to inform policy, programming and service delivery

Operational and implementation research is key to improving people-centred services. To this end, the following actions are recommended:

- Identify research priorities for TB and comorbidities based on data and evidence gaps identified during assessment (see Section B) and review, and in line with national priorities and research gaps highlighted in the relevant WHO guidelines.
- Promote research to determine the financial burden of TB and comorbidities on those affected and on the health system.
- Assess the costs and cost-effectiveness of alternative integrated models of care.
- Explore the potential contribution of comorbidities to the burden of TB disease and mortality, including for emerging threats such as COVID-19.
- Strengthen and encourage operational and implementation research on TB and comorbidities at all levels to identify challenges and develop effective solutions.
- Develop funding applications and proposals for operational and implementation research and economic analyses of TB and comorbidities in collaboration between TB and the relevant services, informed by the results of national evaluations.
- Facilitate the translation of research findings into revised and strengthened policy, programming and service delivery.

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Annex 1. Relevant WHO documents

Table A1.1. Relevant current WHO policy documents

Comorbidity	Relevant WHO policy documents
Chronic lung disease	– Practical approach to lung health *(48)*
COVID-19	– WHO Information Note: COVID-19 considerations for tuberculosis (TB) care *(14)*
Diabetes	– Collaborative framework for care and control of tuberculosis and diabetes *(27)*
HIV	– Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: recommendations for a public health approach, 2021 update *(59)* – Consolidated HIV strategic information guidelines: driving impact through programme monitoring and management *(134)* – Integrating collaborative TB and HIV services within a comprehensive package of care for people who inject drugs: consolidated guidelines *(74)* – WHO policy on collaborative TB/HIV activities *(17)*
Mental disorders	– Management of physical health conditions in adults with severe mental disorders *(135)*
Nutrition	– Nutritional care and support for patients with tuberculosis *(41)*
Tobacco	– A WHO/the Union monograph on TB and tobacco control *(36)*
Tuberculosis (relevant for all comorbidities)	– WHO consolidated guidelines on tuberculosis: – Module 1: Prevention – tuberculosis preventive treatment *(7)* – Module 2: Screening – systematic screening for tuberculosis disease *(20)* – Module 3: Diagnosis – rapid diagnostics for tuberculosis detection, 2021 update *(136)* – Module 4: Treatment – drug-resistant tuberculosis treatment *(21)* – Module 4: Treatment – tuberculosis care and support *(69)* – Module 4: Treatment – drug-susceptible tuberculosis treatment *(137)* – Module 5: Management of tuberculosis in children and adolescents *(138)* For the latest updated guidelines on tuberculosis please refer to the WHO TB Knowledge Sharing Platform
Viral hepatitis	– Guidelines for the care and treatment of persons diagnosed with chronic hepatitis C virus infection *(139)* – Guidelines for the prevention, care and treatment of persons with chronic hepatitis B infection *(140)* – Guidelines on hepatitis B and C testing *(73)*

Table A1.2. Other relevant WHO documents and frameworks

Comorbidity	Relevant WHO documents and frameworks
Alcohol use	– Global strategy to reduce the harmful use of alcohol *(141)*
Diabetes	– HEARTS D: diagnosis and management of type 2 diabetes *(142)*
Drug use	– International standards for the treatment of drug use disorders *(63)* – Guidelines for the psychosocially assisted pharmacological treatment of opioid dependence *(143)*
HIV	– A guide to monitoring and evaluation for collaborative TB/HIV activities *(128)*
Mental disorders	– mhGAP Intervention Guide *(144)*
Nutrition	– Essential nutrition actions: mainstreaming nutrition through the life-course *(145)*
Tobacco	– Be He@lthy, Be Mobile: a handbook on how to implement mTB-Tobacco *(146)*
Tuberculosis (relevant for all comorbidities)	– The End TB Strategy *(9)* – Multisectoral accountability framework to accelerate progress to end tuberculosis by 2030 (MAF-TB) *(77)* – People-centred framework for tuberculosis programme planning and prioritization: user guide *(76)*
Other: health systems-related frameworks	– Framework on integrated people-centred health services: an overview *(4)* – Operational framework for primary health care: transforming vision into action *(5)*

Annex 2. Barriers to and enablers of collaborative care

Table A2.1. Barriers to collaborative action on TB and comorbidities, elicited during focus group discussions with 16 countries[5] and from literature review *(105,111–120,147–159)*

Aspect	Barrier	Focus group discussions	Literature review
Leadership and governance	Lack of political commitment to address TB comorbidities (other than HIV)	X	X
	Lack of national guidelines or policies for TB and comorbidities	O	X
	Limited collaboration between health programmes as well as with sectors beyond the healthcare system	X	X
	Limited engagement by related health programmes in collaborative action (other than the national TB programme)	X	O
	Limited engagement of the private sector	X	O
	Criminalization, which hinders access to TB services by people who use drugs, due to fears of engagement with law enforcement agents	O	X
Health workforce	Staff shortages for screening, treatment and referral, especially at the primary care level, which may affect quality of care	X	X
	Uneven distribution of healthcare workers, potentially skewed towards urban areas and tertiary centres	X	O
	High staff turnover and rotation	X	X
	Limited training on screening, diagnosis and joint management of TB or comorbidities in the respective programmes	X	X

[5] Bangladesh, Belarus, Brazil, Georgia, India, Indonesia, Kenya, Mexico, Namibia, Pakistan, Peru, the Philippines, Sierra Leone, United Republic of Tanzania, Zambia, Zimbabwe

Aspect	Barrier	Focus group discussions	Literature review
	Limited skills on joint management of TB and comorbidities among staff in the respective programmes	X	X
	Legislation that does not allow healthcare workers to prescribe outside area of expertise, e.g. for mental health	X	X
	Fear of TB among healthcare workers and resultant stigmatization of people with presumed TB	X	X
Health systems financing	Inadequate funding for health overall	X	O
	Dependence on external donor funding, which can be unpredictable	X	O
	Earmarked funding and inability to redistribute funds between programmatic areas, which may impede implementation of collaborative activities	X	O
	Insufficient budgets for additional screening and treatment services (e.g. equipment, maintenance, personnel)	O	X
	Limited data on cost-effectiveness of TB screening among people with comorbidities such as diabetes	O	X
	Funding structures that incentivize inpatient treatment, e.g. funding allocated on the basis of bed occupancy	X	O
	Inadequate funding for community-based services, including community health worker programmes	X	O
	High out-of-pocket costs for services for comorbidities for people with TB (who may not have health insurance to cover treatment for comorbidities) may deter end user from accessing services	X	X

Aspect	Barrier	Focus group discussions	Literature review
Access to medicines and other supplies/ equipment	Unavailability and stock-outs of supplies, including screening and diagnostic equipment (e.g. blood glucometers, molecular WHO-recommended rapid diagnostic tests for TB), and medicines	X	X
	Regulations prohibiting prescription of certain medicines (e.g. insulin) outside of specialist services	X	O
	Healthcare workers in TB services, including doctors and nurses who may not be able to prescribe medicines for comorbidities	X	O
	Lack of updated national Essential Medicines Lists	X	O
	Suboptimal screening tools	O	X
	Inadequate supply of therapeutic and supplementary foods	O	X
	High out-of-pocket expenditure faced by patients due to the cost of screening and diagnostic equipment (e.g. blood glucose measurement strips), and treatment costs	X	X
Health service delivery	Limited coordination between disease-specific programmes	X	X
	Long waiting times for end user to receive the required care from different healthcare workers in less integrated models of service delivery, even when services are co-located	X	X
	High out-of-pocket expenditure incurred for appointments and referrals to secondary or tertiary care, which prevents access to and engagement with integrated services	X	X
	Lack of infrastructure for TB and comorbidities (e.g. inappropriate infection prevention and control measures, no space to conduct screening or counselling)	O	X
	Difficulties in ensuring referrals and linkage to quality care for comorbidities; referrals to relevant services not followed through; long waiting times for referrals	O	X

Aspect	Barrier	Focus group discussions	Literature review
	Poorly defined pathways for ongoing management and continuity of care after completion of TB treatment	O	X
	Weak links with social services	O	X
	Cultural beliefs and preconceptions about disease; fear of stigma and discrimination among end users	O	X
	Limited awareness among people with TB of the importance of screening for and co-management of comorbidities throughout TB treatment	O	X
	Side-effects of medications associated with non-adherence, especially if end user is not counselled on possible side-effects	O	X
Health information systems	Limited data on the burden of TB and comorbidities	X	O
	Lack of indicators to monitor and evaluate the joint burden of, and collaborative action on TB and comorbidities	X	O
	Lack of standardized recording and reporting structures for monitoring and evaluation of collaborative action	O	X
	Separate health information systems (electronic and paper-based) for TB and comorbidities, which impede sharing of data between facilities and programmes, with limited cross-checking	X	X
	Inadequate feedback mechanisms (e.g. referral and counter-referral)	X	X

Table A2.2. Enablers of collaborative action on TB and comorbidities, elicited during focus group discussions with 16 countries[6] and from literature review *(105,111–120,147–159)*

Aspect	Enabler	Focus group discussions	Literature review
Leadership and governance	Assessment of the joint burden and cost implications of TB and comorbidities	X	X
	Development of a business case for TB and comorbidities, based on the epidemiological burden and financial impact on health services and affected individuals	X	O
	Political buy-in by government	X	X
	Strong collaborative mechanisms, including for joint planning, budgeting, coordination and accountability	X	O
	Multisectoral collaboration to share technical expertise	X	O
	Strong partnerships between government, private sector, nongovernmental organizations, civil society and the community	X	X
	Development of guidelines and standard operating procedures through collaboration between the national TB programme and other health-related programmes, to support operationalization and institutionalization of recommendations	X	X

[6] Bangladesh, Belarus, Brazil, Georgia, India, Indonesia, Kenya, Mexico, Namibia, Pakistan, Peru, the Philippines, Sierra Leone, United Republic of Tanzania, Zambia, Zimbabwe

Aspect	Enabler	Focus group discussions	Literature review
Health workforce	Recruitment and deployment of healthcare workers guided by needs assessment to ensure sufficient staffing, including of outpatient services and in rural areas	X	O
	Sustained and adequate funding for training needs	X	O
	Joint capacity building for TB and comorbidities at the community level, including in areas of knowledge and technical competence to screen for, diagnose and treat TB and key comorbidities	X	O
	Motivation and incentivization of providers	O	X
	Use of point-of-care tests that require minimal training, e.g. screening for diabetes mellitus	O	X
	Training on stigma reduction and communication skills during pre-service curricular training and continuing professional education	X	O
	Task shifting to empower lay providers to conduct screening and referral activities, to facilitate the delivery of services for TB and comorbidities	X	X

Aspect	Enabler	Focus group discussions	Literature review
Health system financing	Patient cost surveys for people with TB and comorbidities to estimate the financial impact	X	O
	Sustainable domestic funding at the national and subnational levels	X	O
	Use of inexpensive yet accurate point-of-care screening tools, e.g. validated questionnaires administered by healthcare workers	O	X
	Coordinated planning and budgeting for TB and comorbidities	X	O
	Inclusion of comorbidities in national strategic plans for TB, and vice versa, as well as in national health strategic plans	X	O
	Results-based financing, e.g. payment per number of people screened/treated	X	O
	Public–private mix, including strong partnerships with the private sector for delivering TB services	X	O
	Point-of-care screening for comorbidities provided free of charge to end user	O	X
	Removal of or subsidized user fees for diagnosis and treatment of comorbidities	O	X

Aspect	Enabler	Focus group discussions	Literature review
Access to medicines and other supplies/ equipment	Legislation permitting procurement of essential medicines according to need	X	O
	Legislation that permits availability of drugs for key comorbidities within TB services, and vice versa	X	O
	Legislation and qualification that allow healthcare workers in TB services to prescribe for comorbidities, and vice versa	X	O
	Availability of essential medicines and diagnostic tools for TB and key comorbidities (e.g. point-of-care tests, equipment for anthropometry), in the relevant services	X	X
	Strong systems for procurement, supply and dispensation of medicines and other products	O	X
	Inclusion of medications for comorbidities in established integrated drug supply management systems	O	X
	Development of new tools and technologies for diagnosis and treatment, e.g. use of digital technologies	X	O

Aspect	Enabler	Focus group discussions	Literature review
Health service delivery	Sustainable funding for community-based services	X	O
	Building on decentralized TB services can be a good entry point for integrating comorbidity services	O	X
	Decentralization of the different specialist services, which facilitates delivery of integrated services, especially at the community level	X	O
	Availability and dissemination of guidance and normative documents, which facilitate collaborative action	X	O
	Expansion of social protection initiatives to facilitate equitable access to services	X	O
	Co-location of screening and treatment services for TB and comorbidities	O	X
	Mobile clinics providing care in or close to end user's home	O	X
	Training of community health workers to screen for both TB and comorbidities	X	O
	Leveraging the skillset and contact networks of community health workers to expand access	X	O
	Community health workers delivering medicines to end users in the community	O	X
	Availability of psychosocial and family support	O	X
	End user motivation to know their health status	O	X
	Counselling and education of end user on TB and comorbidities	O	X
	Community education to improve health-seeking behaviour for TB and comorbidities	X	O

Aspect	Enabler	Focus group discussions	Literature review
Health information systems	Establishment of indicators on the joint burden and collaborative action for TB and key comorbidities, which can be captured during surveillance activities, and incorporation of these within the TB reporting system	X	X
	Baseline surveys to establish the joint burden of TB and key comorbidities and health-related risk factors	X	O
	Regular joint review and analysis of data by the national TB programme and other relevant health programmes, which feed back into programming	X	O
	Use of existing data to identify those at highest risk for comorbidities	O	X
	Evaluation of effectiveness and cost-effectiveness through randomized controlled trials and implementation science	O	X
	Strengthened data collection and reporting systems (including referral systems)	O	X
	Interoperability of electronic health records to allow sharing of data between TB services, primary care, hospitals and specialist services	X	O

Table A2.3. Summary of experiences of care for TB and comorbidities, elicited from interviews with TB survivors with one or several comorbidities, during the development of the Framework for collaborative action on TB and comorbidities

	Negative experiences	Positive experiences
Diabetes	– Limited and *ad hoc* access to insulin therapy – Nutritional counselling or supplementation not tailored to the combined requirements of people with TB and diabetes – Limited awareness among end users of the connection between TB and diabetes, and the importance of glycaemic control during TB treatment – Disclosure of diagnosis of diabetes to TB provider did not facilitate access to further treatment – Late referrals to diabetes services (e.g. referred only when blood sugar was excessively high)	– Easy to disclose diabetes comorbidity to TB provider – Early screening for diabetes – Early referral for management of diabetes helped improve glycaemic control during TB treatment – Co-management (diagnosis and treatment) of TB and diabetes by the same primary care doctor
HIV[7] *(118,160)*	– High pill burden – Side-effects of treatment – Insufficient funds for transport, which precluded attendance at daily TB treatment support appointments – Fear of stigma and discrimination related to both TB and HIV – Inadequate food intake to mitigate side-effects of the combined treatment regimen for TB and HIV, leading to poor adherence	– Knowledge of the curability of TB – Understanding of the severity of TB in the presence of HIV infection – Support from family and healthcare workers

[7] Interviews did not pursue detailed enquiry into needs and expectations for HIV care as these have been extensively researched in previous work. This table summarizes findings on HIV care from Daftary et al. (2012) *(157)* and Gebremariam et al. (2010) *(118)*

	Negative experiences	Positive experiences
Mental health	– Difficulty in disclosing mental health issues to TB provider due to fear of mental health labelling, stigma or forcible institutionalization – Lack of provider-initiated screening for mental health issues – Perception that TB providers do not have the time or skillset/expertise to address mental health issues – Poor understanding of TB treatment hardships among psychiatrists – Poor appreciation for the range of potential mental health issues (e.g. mild depressive symptoms to severe anxiety or suicidal ideations) – Mental health issues exacerbated by multimorbidity (e.g. diabetes, substance use)	– Routine enquiry into end user's mental and emotional well-being – Counselling provided by trusted community health workers, social workers or peer supporters – Referral/linkage to peer/ support – Referral to psychologist or other specialized care in the case of severe mental health issues – Positive relationships with psychiatrists or psychologists among people with pre-existing mental health problems
Substance use	– Difficulty in disclosing drug or alcohol use to TB provider due to fear of discrimination, disrespect or forcible institutionalization – Lack of routine screening for drug use – Lack of support to discontinue alcohol or drug use, beyond verbal recommendation to quit – Difficulty in engaging with additional support, especially if experiencing multimorbidity (e.g. mental illness, viral hepatitis) – Reluctance to discontinue substance use during TB treatment due to fear of experiencing withdrawal	– Access to specialized treatment and care for drug use disorders/ harm reduction services – Routine provider-initiated queries on alcohol use – Home visits by peer supporters or community health workers
Tobacco	– Tobacco cessation support limited to verbal recommendation to quit – Quitting considered a low priority by end user compared with life-threatening disease	– Easy to disclose tobacco use to TB provider

	Negative experiences	Positive experiences
Viral hepatitis (hepatitis C)	– Viral hepatitis identified only after TB treatment initiation, during monitoring – Difficulty in disclosing viral hepatitis to TB provider due to fear of being perceived as drug users, judged and stigmatized – Limited availability of HCV treatment	– Liver function tests available as part of TB treatment monitoring – TB treatment dose alterations to accommodate compromised liver function

General preferences for care

- Healthcare workers showing kindness, empathy, openness and encouragement
- Healthcare workers querying on comorbidities regularly and repeatedly
- Single provider with multidisciplinary training or multidisciplinary teams including doctors, nurses, social or community health workers, specialist physicians and peer supporters
- Material support to cover the cost of treatment of comorbidities not covered by the government (e.g. insulin, nutrition, etc.)

Annex 3. Declaration of interests

All experts consulted during the stakeholder consultation and external review process for the Framework for collaborative action on TB and comorbidities completed a WHO declaration of interests form. All declarations were evaluated by the WHO secretariat for any conflict of interests, and were presented at the beginning of the stakeholder consultation. The following experts declared interests, none of which were judged as a conflict of interest in relation to the development of the framework.

- **Aneeta Pasha:** Research funding of $187 000 from Harvard Medical School Center for Global Health Delivery, Dubai, between 2015-2017.
- **Harry Hausler:** Currently employed as CEO of TB HIV Care, a non-profit company that provides TB and HIV services for the general population and key populations including people who inject drugs, sex workers and inmates in correctional services. Chair of the TB Prevention Task Team of the National TB Think Tank, responsible for advising government on TB prevention in South Africa.
- **Jeremy Ross:** Employed by the non-governmental organization TreatAsia, who have received research grant funding from the United States National Institutes of Health (NIH) for HIV-related research that includes impact and outcomes related to various comorbidities and coinfections.
- **Mary Rosary Santiago:** Currently employed by the organization FHI360, which has a primary mandate to provide technical assistance to the NTP in the Philippines in identifying and introducing innovative approaches across the TB cascade of care which may involve clinical and system integration of TB with other diseases such as HIV, diabetes, etc.
- **Phangisile Mtshali:** Chairperson of the Non-Executive Board of Directors of the Aurum Institute, remuneration of ZAR 20 000 per quarter for board meetings.
- **Zahedul Islam:** Member of the Community Advisory Panel (UCAP) of the International Union Against TB and Lung Disease. Voluntary role.

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