Tuberculosis among populations at high risk and people in vulnerable situations

Policy brief

World Health Organization

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Contents

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Abbreviations

BCG	Bacille Calmette-Guerin
NGOs	nongovernmental organizations
SDGs	Sustainable Development Goals
TB	tuberculosis
TPT	tuberculosis preventive treatment
UN	United Nations
WHO	World Health Organization
WRD	WHO-recommended rapid diagnostic

Definitions

Health inequity: Differences in health outcomes and care that are unnecessary, unfair, unjust and avoidable.[1]

Health-related risk factors: Conditions, diseases or behaviours that increase the likelihood of developing TB disease.[2]

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

People-centred care: An approach to care that consciously adopts the perspectives of individuals, families and communities and sees them as participants as well as beneficiaries of health systems. This includes ensuring that people are fully informed about the benefits and risks of treatment options and that health services respond to individual needs and preferences.[3]

Populations who are vulnerable to TB: People at higher risk of exposure to TB or of developing TB once exposed because of structural, social or demographic determinants or health-related risk factors.[4]

Risk group: Any group of people at increased risk of TB infection, or progression from TB infection to TB disease, or TB-associated mortality, compared with the general population.[3]

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, the environment, social inclusion, non-discrimination, and access to affordable high-quality health services.[5] The social determinants of TB can be social, structural or demographic (see **Fig. 3**).

Structural determinants: Conditions that generate or reinforce social stratification (such as socioeconomic inequalities, population growth, urbanization or political instability).

Tuberculosis (TB): A disease caused due to *Mycobacterium tuberculosis*. In this document, it is commonly referred to as "TB disease" to distinguish it from TB infection.[6]

TB infection: A state of persistent immune response to stimulation by *Mycobacterium tuberculosis* antigens, with no evidence of clinically manifest active TB.[6]

TB related risk factor: Any attribute or characteristic that increases the likelihood of developing TB or of having poor outcomes.

TB related vulnerability: The susceptibility of a person or group to TB or poor outcomes, which can arise from various factors (including social, cultural, economic, physical, environmental or economic factors).[7]

1 Regional framework for reaching the unreached in the Western Pacific (2022 -2030). Manila: World Health Organization Regional Office for the Western Pacific; 2023 *(29)*.

2 Framework for collaborative action on tuberculosis and comorbidities. Geneva: Switzerland World Health Organization; 2022 *(5)*.

3 Consolidated guidance on tuberculosis data generation and use. Module 1: tuberculosis surveillance. Geneva: World Health Organization; 2024 *(37)*.

4 Guidance on engagement of communities and civil society to end tuberculosis. Geneva: World Health Organization; 2023 *(41)*.

5 Closing the gap in a generation: health equity through action on the social determinants of health. Final report of the Commission on Social Determinants of Health. Geneva: World Health Organization; 2008 *(32)*.

6 WHO consolidated guidelines on tuberculosis. Module 1: prevention - tuberculosis preventive treatment, second edition. Geneva: World Health Organization; 2024 *(3)*.

7 Definition: Vulnerability. Sendai Framework Terminology on Disaster Risk Reduction. In: UN Office for Disaster Risk Reduction [website] *(46)*.

Key messages

- Tuberculosis (TB) remains a global public health problem affecting over 10 million people each year.
- TB can affect anyone. However, due to structural, social, demographic determinants and health-related risk factors, some populations have a higher risk of: being infected with TB, developing TB disease once infected, having poor outcomes when they develop TB, or having limited or no access to quality health care.
- Understanding the distribution of risk factors in any given setting can help identify individuals and populations at higher risk of TB infection and subsequent TB disease. This can be done through assessments of data and evidence from national surveillance systems, surveys, research or other methods. The assessment should also include people at risk of TB who cannot access health care and are therefore not reflected in routine surveillance data.
- Identifying individuals and populations at higher risk for TB is an essential step for effective planning and resource allocation to ensure optimal and equitable delivery of people-centred, human rights-based TB services.[8] Identifying people at higher risk for TB is an essential component of universal health coverage, as emphasized in World Health Organization's (WHO) End TB Strategy and the United Nations (UN) political declaration on the fight against TB, and contributes to the attainment of Sustainable Development Goals (SDGs) target 1 (to end poverty in all its forms everywhere) and target 3.3 (to end the epidemics of AIDS, TB, malaria and neglected tropical diseases and combat hepatitis, waterborne diseases and other communicable diseases).
- To achieve the goal of ending TB, each country should gain a clear understanding of the individuals and populations at highest risk of TB infection and TB disease. This allows for optimization of the national response to TB to comprehensively address the needs of those most affected.
- The WHO publishes national estimates of TB incidence attributable to five major health-related risk factors for TB (i.e. undernourishment, HIV infection, alcohol use disorders, smoking and diabetes), which can help countries to understand the relative contribution of these drivers of TB in their context.
- Reaching all people at higher risk for TB or with TB, including those who are in vulnerable or in marginalized situations,[9] with appropriate services, requires dedicated and sustained efforts from all stakeholders including national governments, funding agencies, technical partners, UN organizations, affected communities, civil society, nongovernmental organizations (NGOs) and the private sector.
- Community empowerment and engagement are particularly important to identify people at higher risk for TB and to develop local solutions to improve access to TB services and overcome any barriers in accessing this care.
- WHO recommends numerous actions to address the broader determinants and drivers of TB, to improve access to TB care and to address vulnerability to TB. In addition, WHO has several recommendations that aim to detect people with TB early, provide them with effective care and social protection, and optimize treatment and socioeconomic outcomes.

[8] The term 'TB services' is used to refer to those that are accessed for the prevention, diagnosis, treatment and care of people with TB, treatment of comorbidities and social protection.

[9] This is consistent with the language in the United Nations General Assembly resolution 76/136 (2021) on promoting social integration through social inclusion – "persons in vulnerable or marginalized groups or situations."

1. Overview

Tuberculosis (TB) is a preventable and curable communicable disease that continues to affect millions of people worldwide. An estimated 10.8 million people fell ill with TB in 2023 and 1.25 million died from the disease, including 161 000 among people with HIV *(1)*. While TB can affect anyone, it is often concentrated among the most socially and economically disadvantaged communities and among people with risk factors that increase their risk of developing TB. These risk factors and vulnerabilities influence the risk of TB infection, as well as the risk of developing TB disease once infected or of having poor outcomes. Additionally, people and populations with structural risk factors for TB, including those who have reduced access to health services are at increased risk of TB disease, as well as poorer outcomes. Ending TB will require that all people at risk of TB are identified and there is universal access to TB prevention and care for all those requiring these services, paying particular attention to people in vulnerable situations or those who are at a higher risk of developing TB *(2)*.

This policy brief presents a summary of current evidence on vulnerability to TB and proposes interventions for more equitable, person-centred TB prevention and care, with due protection of human rights. It builds on existing evidence and is fully aligned with WHO policies and guidance on: TB prevention and TB screening *(3,4),* the management of TB and comorbidities *(5,6,7),* access to health care, universal health coverage, the determinants of TB *(1)*, TB-associated impairment and disability *(6)*, social protection *(7)*, as well as ethics, equity and human rights.

In addition to this policy brief, and based on identified needs, WHO will develop guidance on addressing TB in specific high-risk populations, considering the unique needs of different populations and communities affected by TB. WHO is currently developing guidance on addressing TB in prisons, and is working towards a consensus statement and call to action on the earlier inclusion of pregnant and lactating women in TB trials.

A summary of WHO's global level policy guidance which relates to specific populations at higher risk for TB is included in **Table 1**. These documents intend to highlight the policy response for populations at higher risk for TB, or for people who are in vulnerable situations. In addition to these global-level documents, there exist several other relevant WHO policy documents, many of which are referenced in this policy brief.

Aims

This policy brief aims to:

- highlight the importance of addressing vulnerability to TB (including individual vulnerabilities and population groups at higher risk for TB), the barriers faced in accessing TB care, and evidence-based interventions that can improve this access and promote equity;
- strengthen collaborative and sustainable multisectoral partnerships between TB programmes and other health and social protection programmes, as well as affected communities and civil society to achieve people-centred TB care for all, especially in populations at higher risk for TB; and
- improve equitable access to TB services based on WHO-recommended interventions to prevent, diagnose, treat and provide appropriate care for people affected by TB, particularly those at higher risk for TB, or those currently unreached by health services or social protection services, or those who may drop out of TB care.

Table 1. World Health Organization publications relevant to addressing TB among high-risk populations

WHO guidance	Scope and focus
Framework for collaborative action on tuberculosis and comorbidities *(5)*	The framework provides a structure and suggests 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 for, TB and comorbidities. 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 (UN) high-level meeting commitments on TB, noncommunicable diseases, HIV and universal health coverage. The aim is to improve access to people-centred services for TB, comorbidities and health-related risk factors.
WHO consolidated guidelines on tuberculosis. Module 6: tuberculosis and comorbidities *(6)* WHO operational handbook on tuberculosis. Module 6: tuberculosis and comorbidities *(7)*	The consolidated guidelines summarize WHO recommendations on TB and selected health-related risk factors and comorbidities and the evidence behind these recommendations, while the operational handbook provides practical guidance to aid in the implementation of these recommendations. The guidelines and operational handbook are aligned with WHO's framework for collaborative action on TB and comorbidities. The WHO recommendations are also featured on WHO's Knowledge Sharing Platform *(8)*.
Policy brief on tuberculosis-associated disability *(9)*	One out of four people who develop TB will also experience a TB-associated disability *(10,11)*. The policy brief presents the current perspectives on TB-associated disability and approaches to mitigating the impact of these disabilities on health-related quality of life during TB treatment, as well as beyond the completion of treatment. It aims to increase awareness and catalyse policy responses at the national level, as part of integrated patient-centred care and prevention, a key pillar of the WHO's End TB Strategy.
Guidance on social protection for people affected by tuberculosis *(12)*	Social protection refers to the set of policies and corresponding programmes designed to prevent and reduce poverty, vulnerability and social exclusion throughout the life course *(13)*. As part of efforts to address the social determinants of TB as well as to mitigate the total costs incurred by people with TB and their households, this guidance, jointly developed by WHO and the International Labour Organization, is designed to facilitate planning and implementation of social protection programmes for people affected by TB.
Multisectoral accountability framework to accelerate progress to end tuberculosis by 2030 *(14)*	Multisectoral actions are required to address the drivers and determinants of TB. Published in 2019, the framework aims to support effective accountability of governments and all stakeholders, at global, regional and country levels, to accelerate progress to end the TB epidemic; and to fully align with the End TB Strategy and the 2030 Agenda for Sustainable Development.
Roadmap towards ending TB in children and adolescents, third edition *(15)*	Children, adolescents and pregnant and postpartum women have a higher risk of developing TB, or severe forms of TB, or of having poorer TB treatment outcomes *(16–18).* The roadmap defines actions to be prioritized and implemented between 2023 and 2027 to significantly reduce TB-related morbidity and mortality in children and adolescents, and to decrease the TB burden in pregnant and postpartum women. The roadmap proposes priority actions to address current challenges related to TB in children and adolescents, highlighting key areas where the specific needs of children, adolescents, as well as those of pregnant and postpartum women, must be considered and prioritized.

WHO guidance	Scope and focus
WHO consolidated guidelines on tuberculosis. Module 5: management of tuberculosis in children and adolescents *(19)* WHO operational handbook on tuberculosis. Module 5: management of tuberculosis in children and adolescents *(20)*	The consolidated guidelines summarizes WHO's recommendations on the management of TB in children and adolescents across the cascade of care and the evidence and processes behind them. The operational handbook provides practical guidance to aid in the implementation of these recommendations by country programmes. The recommendations are also featured on WHO's Knowledge Sharing Platform *(8)*.
Innovative solutions for the elimination of tuberculosis among migrants and refugees *(21)*	This technical report, prepared by WHO in collaboration with the World Innovation Summit for Health, Qatar Foundation, outlines innovative solutions and policy options to address TB in migrant and refugee populations. The report outlines 10 policy options to effectively prevent and address TB among refugees and migrants. The policy options are fully aligned with global strategies and commitments including WHO's End TB Strategy, the political declaration from the 2023 UN high-level meeting on the fight against TB, WHO's global action plan on promoting the health of refugees and migrants, and the Global Compact on Refugees, Global Compact for Safe, Orderly and Regular Migration, as well as the Sustainable Development Goals (SDGs).
The interagency field guide on TB prevention and care among refugees and other populations in humanitarian settings *(22)*	This interagency field guide is a joint effort of the Centers for Disease Control and Prevention, the United Nations High Commissioner for Refugees and the WHO. The guide provides an overview of key actions in preparing for, and delivering, effective TB prevention and care (diagnosis, treatment and prevention) services for refugees and other populations during humanitarian emergencies. These actions are designed to be integrated fully within coherent emergency preparedness planning and response.
Information note on ensuring continuity of essential TB services for people with or at risk of TB in Ukraine and refugee-hosting countries *(23)*	This special information note was released by WHO to provide key information and guidance on ensuring continuity of essential TB services for people with TB and refugees affected by the war in Ukraine. The note provides an overview of key tools available to health authorities, partners, civil society and other stakeholders. WHO continues to monitor the situation closely for any changes that may influence this note and has committed to issuing updates should any factors change.
Co-administration of treatment for drug-resistant tuberculosis and hepatitis C: rapid communication *(24)* WHO consolidated guidelines on tuberculosis: Module 4: treatment and care *(26)*	There is a substantial overlap in the epidemiology of hepatitis C infection and TB due to overlapping risk factors *(25)*. This rapid communication aims to inform national TB programmes, technical partners and other stakeholders about the key implications for the co-administration of treatment for drug-resistant TB and hepatitis C, facilitating seamless integration and planning at the country level. It outlines expert evidence which indicates that co-administering multidrug resistant-TB and hepatitis C treatments, as compared to delaying hepatitis C treatment while treating multidrug resistant TB alone, may yield several benefits. It emphasizes that people with multidrug resistant-/rifampicin-resistant-TB can undergo treatment with either shorter or longer all-oral regimens concurrently with hepatitis C treatment. The content of the rapid communication has now been incorporated into the WHO consolidated guidelines on tuberculosis: Module 4: treatment and care.

Target audience

This policy brief is intended for use by all stakeholders working in TB services in both public and private sectors, including:

- national TB programmes and other relevant departments within the ministry of health, such as primary health care, health promotion, nutrition, noncommunicable diseases, mental health and substance use, HIV, as well as those working on the expansion of universal health coverage and the direct provision of health care;
- other relevant government ministries, departments and agencies such as those responsible for housing, social protection, prisons or places of detention, migrants or refugees, disaster and emergency management, natural resources, employment and labour, disability and social work; and
- other national and international nongovernmental stakeholders, those working to address TB and its determinants, and those working on promoting and protecting the human right to health and social protection in affected communities.

Methods

The development of this policy brief was overseen by a WHO Steering Committee composed of staff from the WHO Global Programme on Tuberculosis and Lung Health, including from WHO headquarters and regional and country offices.

This policy brief was informed by a narrative review and a systematic review commissioned by the WHO Global Programme on Tuberculosis and Lung Health and a global survey that was sent out by the WHO Global Programme on Tuberculosis and Lung Health in collaboration with the WHO regional offices. The narrative review was guided by the Commission on Social Determinants of Health framework and aimed to synthesize definitions of vulnerability as it relates to TB and compile information on which groups of people are vulnerable to developing TB, which was then used to derive a conceptual framework on vulnerability to TB *(27)*. This conceptual framework was further adapted in **Fig. 3** (see page 14). The systematic review was conducted to describe populations who are at higher risk for TB, and to estimate effective measures of TB risk for these populations, based on the published scientific literature *(28)*.

In November 2023, an online survey on TB and high-risk populations using a self-administered questionnaire (available in English, Russian and Spanish) was conducted among national TB programme managers and key stakeholders. The survey aimed to gain an understanding of the prioritization of TB prevention and care at the national and subnational levels, and the perceived gaps in policies for TB prevention and care for populations who are at higher risk of developing TB. The survey was complemented with interviews with WHO staff and key stakeholders who provide technical assistance or support to national TB programmes. A total of 153 complete responses were collected in the survey from 73 countries (25 responses from the African Region, 22 responses from the European Region, 72 responses from the Region of the Americas, 14 responses from the Eastern Mediterranean Region, 9 responses from the South-East Asia Region and 11 responses from the Western Pacific Region). A draft of this policy brief was peer reviewed by the WHO Steering Committee and an external peer review group composed of multidisciplinary experts in TB prevention and care.

2. Background

Overview

Annually, an estimated 10.8 million people develop TB and 1.25 million people die from this curable and preventable disease, including 161 000 among people with HIV *(1)*. While TB can affect anyone, not everyone carries the same risk of being infected with TB or developing TB disease, nor has the same possibility of having a successful treatment outcome or a healthy life post-TB treatment. Treatment and socioeconomic outcomes also differ among those affected; for example, treatment outcomes may be poorer among people with substance use disorders or other risk factors, and people from lower income groups may spend a greater percentage of their total income on accessing TB care. In addition, some populations "have no, or limited, access to effective, quality health services and social protection with poorer health outcomes than would be expected" resulting in a situation of health inequity, defined as "differences in health outcomes and care that are unnecessary, unfair, unjust and avoidable" *(29)*.

Addressing TB in high-risk populations is essential to accelerate progress towards the targets of the second UN high-level meeting on the fight against TB, which in turn contributes to the goal of the WHO End TB Strategy to end TB as a public health problem. The WHO End TB Strategy is aligned to SDG target 1, to end poverty in all its forms everywhere, and target 3.3 which is to end the epidemics of AIDS, TB, malaria and neglected tropical diseases, and to combat hepatitis, waterborne diseases and other communicable diseases *(30)*.

Determinants of TB infection, TB disease and adverse outcomes

Social determinants of TB

Whether someone is exposed to TB, develops TB after infection, has access to health services for TB prevention and care, or has optimal treatment outcomes, depends on several factors. Upstream determinants of TB include weak economic and social policies (including on social protection), urbanization, migration, climate change, food insecurity, poverty, lack of educational opportunities, income inequality and a discriminatory legal environment *(31)*.

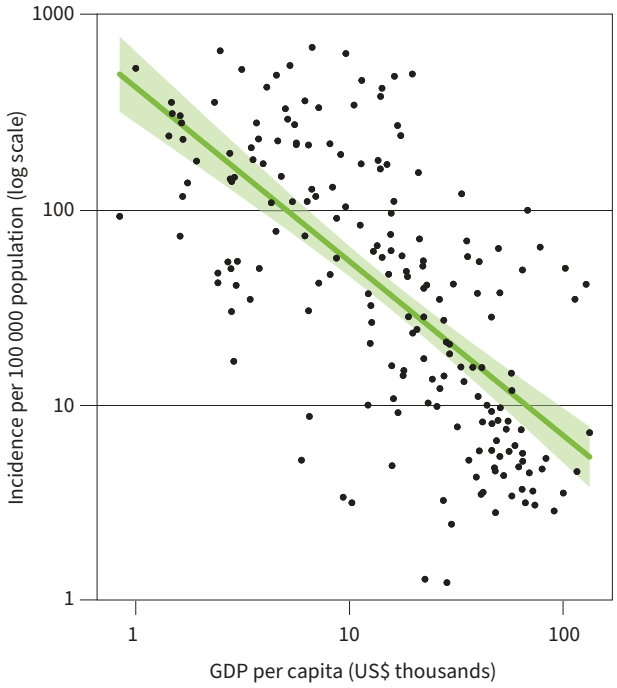
These upstream determinants, also sometimes called structural determinants, are conditions that generate or reinforce social stratification, such as socioeconomic inequalities, population growth, urbanization and political instability. This stratification leads to unequal distribution of key social or demographic determinants influencing TB epidemiology, including poor living and working conditions, environmental conditions which favour TB transmission, the presence of medical conditions which may increase TB risk, poor access to effective TB and social protection services, human rights-related barriers to health, and other contextual factors. These factors, in turn, influence vulnerability to TB disease and the ability to recover after developing TB *(32,33)*.

It is estimated that up to 60% of the variation in health status globally is driven by the social determinants of health, which in turn influences access to services and health outcomes, including for people at risk of developing TB *(34)*.

Fig. 1 illustrates the relationship between gross domestic product (GDP) per capita (US$ in thousands) and TB, showing the clear relationship between the two, whereby as GDP per capita increases, TB incidence per 100 000 population decreases *(1)*.

Fig. 1. The relationship between gross domestic product per capita (US$ thousands) and TB incidence per 100 000 population, 2023[a] *(1)*

Each dot represents a country or area.



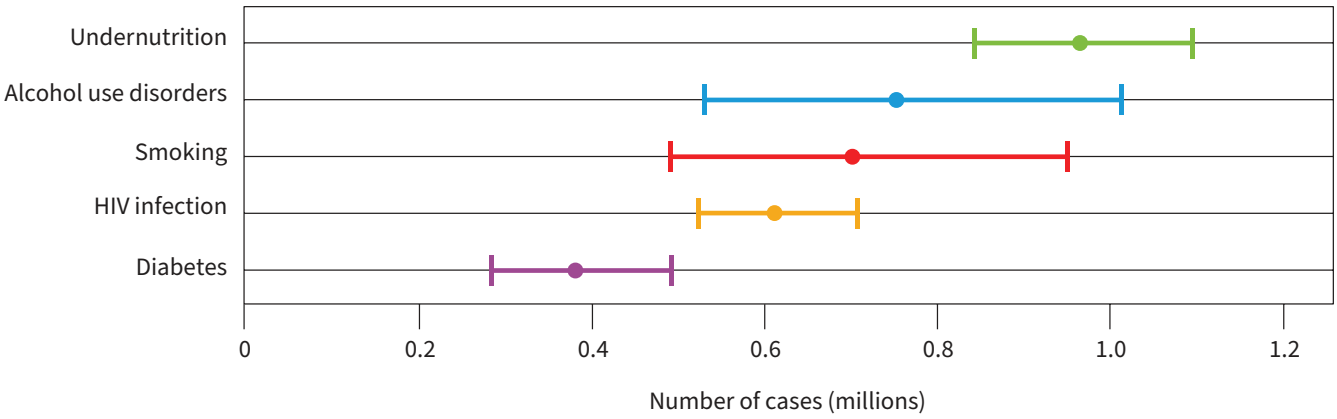
[a] The year of data used for GDP per capita is the latest year for which data are available from the World Bank (https://data.worldbank.org/, accessed 15 January 2025) and the WHO Global Health Observatory (https://www.who.int/data/gho, accessed 15 January 2025), respectively.

The burden of TB is greatest among those who face structural, social or demographic determinants of TB, especially in the context of TB exposure or in settings with a high burden of TB, where these determinants intersect or overlap *(31)*. Exposure to overlapping determinants of TB can lead to: delays in the diagnosis of TB, advanced TB disease, ongoing TB transmission and preventable TB related deaths, all of which can aggravate existing inequalities for families and communities. Populations with an increased likelihood of being exposed to TB include those living in overcrowded environments, refugees, migrants and internally displaced populations, health care workers, mine workers, contacts of people with infectious TB, people with substance use disorders and people in other congregate settings (such as homeless shelters, prisons and other places of detention or incarceration). The risk of being exposed is generally higher in settings with a high TB burden.

Health-related risk factors

In addition to the social determinants described above, TB also disproportionately affects people with specific health conditions that increase their biological risk of developing TB disease, following infection (**Fig. 2**). In this policy brief, health-related risk factors are defined as conditions, diseases or behaviours that increase the likelihood of developing TB *(5)*. They may also increase the risk of adverse outcomes or the likelihood of developing TB-related impairments or disability. Figure 2 shows estimates of the number of people with a new episode of TB (incident cases) attributable to alcohol use disorders, diabetes, HIV infection, smoking and undernutrition *(1)*. Globally, in 2023, an estimated 0.96 million incident episodes of TB were attributable to undernutrition, 0.75 million to alcohol use disorders, 0.70 million to smoking, 0.61 million to HIV infection and 0.38 million to diabetes *(1)*. These conditions as well as other health-related risk factors – such as chronic obstructive pulmonary disease, mental health conditions, or substance use – share common socioeconomic determinants with TB. Together, these socioeconomic determinants and health related risk factors may further intensify health risks and amplify inequities, leading to unequal risks of TB exposure, the development of TB disease, unequal access to health care and social protection, and poorer health outcomes *(12,31).* Other important health-related risk factors for TB include extremes of age (young children and the elderly), a prior TB episode, pregnancy and the postpartum period, or underlying immune suppressing conditions or medical treatments that suppress the immune system.

Fig. 2. Global estimates of the number of people with a new episode of TB (incident cases) attributable to five risk factors,[a] 2023 *(1)*



[a] Undernutrition is defined as a low body mass index for people aged ≥5 years. Underweight (low weight-for-age), wasting (low weight-for-height) and stunting (low height-for-age) are used to define undernutrition for people aged under 5 years.

Data sources used to produce estimates include journal articles, the World Bank SDG database (https://datatopics.worldbank.org/sdgatlas?lang=en, accessed 15 January 2025), the WHO Global Health Observatory (https://www.who.int/data/gho, accessed 15 January 2025), and the WHO World Health Data Hub (https://data.who.int/, accessed 15 January 2025).

Access to health services

People with limited or no access to high-quality TB services, or who experience other human rights related barriers to health and social protection are also at a higher risk of being exposed to TB or developing TB *(35)*. This includes those who cannot access Bacille Calmette-Guérin (BCG) vaccination or TB preventive treatment (TPT), those living in settings without proper infection prevention and control measures in place, or people who cannot access TB services in a timely manner. Many of the factors that hinder timely access to TB diagnosis and treatment also negatively impact TB treatment outcomes, quality of life post-TB treatment and socioeconomic outcomes. Other human rights infringements such as dismissal from employment as well as stigma, discrimination and marginalization also negatively impact health-care seeking and access, and therefore adversely impact outcomes for people with TB or at risk of TB.

3. Why focus on vulnerability to TB?

Scientific rationale

Scientific evidence and analyses of surveillance data highlight the higher risk for TB faced by some populations, including for those in high TB burden settings, where the social determinants of TB influence TB risk and for those with health-related risk factors for TB. Examples of this include the relationship between TB incidence and undernutrition and TB incidence and GDP per capita (**Fig. 1** and **Fig. 2**). Several population groups (such as mine workers, people in prisons and health care workers, among others) have a higher risk of developing TB compared to the general population. This has been documented in several settings *(28)* as well as in epidemiological analyses and reviews of national TB surveillance data *(36–39)*. In response, many national TB strategic plans refer to population groups who would benefit from TB screening interventions or other interventions to prevent TB or promote access to TB services. Therefore, the scientific evidence as well as analyses of surveillance data confirm that several population groups may be at higher risk of developing TB.

Equity imperative

The global commitment to end TB cannot be achieved without specific interventions to improve access to TB services, including social protection, particularly for those at higher risk of TB infection and TB disease, and of adverse outcomes, including post-TB impairment and disability. Reaching all people who require TB services is essential to preventing suffering, reducing costs incurred by accessing TB care and reducing deaths due to TB *(2),* and is an ethical, equity and human rights imperative.

A pro-equity, human rights-based, comprehensive and people-centred response to the global TB epidemic requires particular focus on people who are disadvantaged, marginalized or have specific risks or vulnerabilities. Out-of-pocket costs, loss of employment and stigmatization or discrimination faced while accessing TB services further exacerbate poverty. Therefore, ending TB as a public health problem can only be achieved when all people with TB are reached with TB services, including social protection. This may require targeted interventions to reach those at higher risk or for people in vulnerable situations. This is reflected in the first pillar of the WHO End TB Strategy which includes a focus on providing universal access to TB care and prevention, with greater attention to vulnerable and hard-to-reach populations *(40).*

Political commitment to addressing TB in high-risk populations

The political declaration of the 2023 UN high-level meeting on the fight against TB recognizes that TB disproportionately affects people in vulnerable situations and affirms that "the response to TB needs to be people-centred, community-based, gender-responsive, with full respect for human rights, and integrated across relevant health and other sectors." In the political declaration, Member States committed to "strengthen comprehensive care for all people with tuberculosis, using specific models of care such as nutritional, mental health, health education and psychosocial support, social protection, as well as rehabilitation, treatment of post-tuberculosis lung disease, and palliative care, paying particular attention to people in vulnerable situations or who are vulnerable to tuberculosis, including women during pregnancy, lactation and postpartum period, children and adolescents, people living with HIV, persons with disabilities, including those with lifelong disabilities due to tuberculosis, Indigenous Peoples, health-care workers, older persons, migrants, refugees, internally displaced people, people living in situations of complex emergencies, stateless persons, people in prison and other closed settings, people living in impoverished areas, people affected by extreme poverty, miners and others exposed to silica, undernourished people, ethnic minorities, people and communities at risk

of exposure to bovine tuberculosis, taking into account the higher prevalence of tuberculosis among men and that the gaps in case detection and reporting are higher among men" *(2)*.

Targeted programming to those most in need

Addressing risks and vulnerabilities associated with TB is important at the level of individuals, populations, communities and organizations, and should be an integral component of TB programming. Identifying the populations and communities most affected by TB allows countries, programmes and stakeholders to direct their efforts to populations most in need, and facilitates equitable access to health care through interventions targeted at underserved or marginalized populations. In addition, as TB incidence in the general population declines, targeted programming will be required to efficiently and effectively identify people at highest risk of developing TB and to link them to TB services.

4. What is vulnerability to TB and who is at risk?

Defining vulnerability to TB

Populations who are vulnerable to TB are operationally defined as people at higher risk of exposure to TB or of developing TB once exposed because of structural, social or demographic determinants or health-related risk factors *(41)*. When defining populations who have increased vulnerability to TB, it is important to ensure that such definitions do not inadvertently exacerbate stigma towards population groups who may already be experiencing difficulties in accessing health care or social protection.

Common population groups who are vulnerable to TB

Populations who are vulnerable to TB are country- and context-specific and therefore will vary, but common populations include children, health care workers, Indigenous or First Nations Peoples (especially if the historical context has resulted in structural racism or social exclusion), people living with HIV, people with diabetes, people with mental health conditions, people from sexual and gender minorities particularly in settings with discriminatory laws and policies *(42)*, people with substance use disorders, people who are undernourished, pregnant and postpartum women, people in prisons and other places of detention or incarceration, miners, mobile and migrant populations, and the urban and rural poor *(43)*. Other relevant populations can include: people in poverty, people experiencing homelessness, sex workers, individuals in remote areas suffering from social exclusion, nomadic populations and other ethnic minorities *(44)* (**Table 2**). Reaching these populations will be essential to ending TB *(45)*.

Conceptual framework for vulnerability to TB

A conceptual framework for vulnerability to TB is provided in **Fig. 3**. This emphasizes the role of structural, social and demographic determinants and health-related risk factors, and the potential additive effects that these risk factors have in determining TB risk, especially in the context of high TB burden settings or when there has been known TB exposure.

TB related risk factors are defined as any attribute or characteristic that increases the likelihood of developing TB or having poor outcomes, while vulnerability refers to the susceptibility of a person or group to TB or poor outcomes, which can arise from various factors (including social, cultural, economic, physical, environmental or economic factors) *(46)*. Vulnerability indicates a lack of resilience or capacity to cope with TB or recover from TB.

Table 2. Populations who are at high risk of TB exposure, TB disease, poor TB outcomes or with limited access to high quality TB services

Increased risk of TB exposure due to living or working conditions	Increased risk of developing TB disease once infected
• Prisoners • Household contacts and other close contacts • People who live or work in overcrowded environments such as urban slums or informal settlements • Miners • Health care workers, including community health care workers • People in congregate settings such as nursing homes, hospitals, drug dens, military barracks • Children • Sex workers	• People living with HIV • Young children • People with silicosis or those exposed to silica dust • People with diabetes • People who are undernourished • People who use tobacco • People with alcohol use disorders • People who inject drugs • Pregnant and postpartum women • The elderly • People undergoing immunosuppressive therapy or with immune suppressing conditions including transplant recipients, those undergoing anti-TNF-alpha therapy, those with late-stage chronic kidney disease or those on dialysis • People with untreated fibrotic lesions (on chest X-ray) • People in high TB burden settings who have a clinical risk factor and are either seeking or already in health care (this includes people with previous TB, diabetes mellitus, people who smoke, people who are malnourished and those with chronic lung disease)

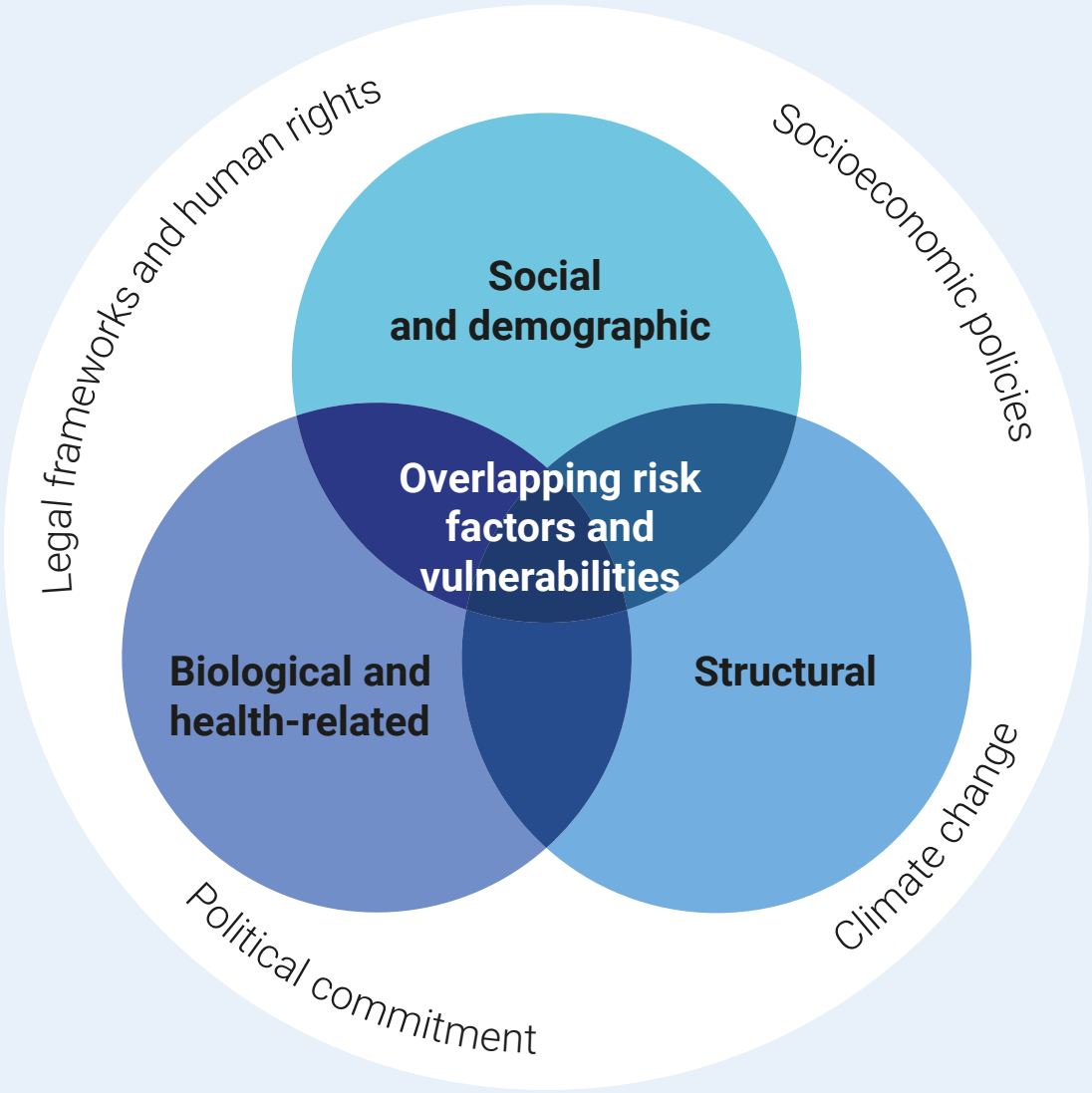
Limited access to high quality TB services including prevention and care	Increased risk of poor treatment outcomes or other adverse outcomes[a] or TB associated disability
• Migrant workers • Women in settings with gender disparity • Men in settings where health care access is not tailored to their needs • Children and adolescents • Refugees, internally displaced people, undocumented migrants, asylum seekers • Nomadic populations • Illegal miners • People who are homeless • People who face legal, structural or cultural barriers to accessing care • Indigenous and First Nations Peoples • People from sexual and gender minorities, particularly in settings with discriminatory laws and policies • People with mental health conditions or physical disabilities • People living in conflict zones or in humanitarian emergencies • People with alcohol use disorders • People with drug use disorders • Sex workers • Poor and low-income families and individuals including the rural poor • Other groups living in conditions of vulnerability with limited access to health care including communities in remote or isolated areas	• People living with HIV • People with diabetes • People who are undernourished • People suffering from alcohol use disorders • People who inject drugs • People with mental health conditions • People with multidrug-resistant TB (increased risk of total costs incurred by people with TB and their households) • People with severe forms of extra pulmonary TB • Pregnant women and their infants

TNF-alpha = tumour necrosis factor inhibitors

[a] Includes poor treatment outcomes as well as other adverse outcomes, such as catastrophic costs, post-TB sequelae or post-TB disability, stigmatization, marginalization, discrimination, unemployment.

Note: Interventions to address TB related vulnerability could be mapped against each column in this table, underpinned by broader and multisectoral interventions to reduce TB related vulnerability (such as poverty alleviation measures, social protection measures, improved living and working conditions, socioeconomic development, reduced gender disparities and other measures).

Fig. 3. Summary of risk factors and vulnerabilities to TB



Social and demographic:

- Poor living conditions, including living in slums
- Poor working conditions
- Indigenous status
- Stigmatization and discrimination
- Lack of access to clean cooking fuels
- Work as a female sex worker
- Living in poverty
- Living in remote areas

Biological and health-related:

- HIV infection
- Diabetes mellitus
- History of TB disease or fibrotic lesion on chest radiograph
- Immunosuppressive conditions
- Lung conditions due to silica dust, indoor air pollution or other factors
- TB associated impairment
- Pregnancy and postpartum status
- Undernutrition
- Infants and children
- Elderly
- Sex
- Smoking
- Substance use disorders

Structural:

- Lack of access to health care
- Lack of access to social protection
- Low gross domestic product per capita
- Inadequate infection prevention and control
- Food insecurity
- Lack of access to education
- Migration and displacement
- Lack of employment opportunities
- Income inequality
- Natural or man-made disasters
- Conflict
- Urbanization

Risk of TB infection

The risk of TB infection is determined by several factors. In settings where there are people with infectious TB, the risk of transmission is primarily influenced by structural, social and demographic factors. For example, overcrowding in hospitals, workplaces, prisons, health facilities and other congregate settings increases the risk of TB transmission, particularly in settings with inadequate infection prevention and control practices.

Risk of TB disease

The risk of progression from TB infection to TB disease is primarily determined by health-related risk factors, including age, the presence of medical conditions or health-related risk factors (such as HIV, undernutrition, diabetes, alcohol use disorders and smoking, as well as other conditions that affect immunity), and lack of access to TB prevention services (such as TPT or nutritional interventions). The highest risk of progression from TB infection to TB disease typically occurs within the first two years after infection, if known *(47,48)*). The risk of severe TB disease, TB-associated impairment and death are determined by numerous factors, including health-related risk factors as well as timely access to TB services, and the quality of those services.

Risk of adverse outcomes

Selected health-related risk factors as well as limited access to health and social protection systems put people at risk of adverse outcomes, potentially widening health and social inequity. These health-related risk factors include the presence of some comorbidities (such as alcohol use disorders *(49)*, HIV *(1)* or undernutrition *(50,51)*), and other adverse social conditions such as poverty, which are associated with lower levels of treatment success, higher levels of total costs incurred by people with TB and their households and lower levels of health-related quality of life.

5. Determining who is at risk

Assessing the risk of developing TB at an individual level relies on an understanding of potential exposure to TB (which may relate to living in a high TB burden setting or having close contact with someone with infectious TB), and individual level risk factors that may predispose someone to develop TB disease after infection. To assess individual level risk for TB, various tools have been developed based on health administrative data or prospective cohort data from diverse settings *(52–54)*. These tools estimate the future risk of developing TB for an individual who has migrated to a low TB incidence country or for those who have been tested for TB infection. The tools aim to inform people about their risk and guide shared decision making for TB prevention or TB screening. Going forward, WHO plans to assess the feasibility of developing more comprehensive risk prediction tools applicable across different settings (including for people in high TB burden areas). An understanding of local data on the social determinants of TB, and of the sociocultural and legal contexts can help identify populations at higher risk for TB, those with limited or no access to quality TB services, and populations who have a higher risk for adverse TB outcomes. This data can be obtained from national and subnational health information and surveillance systems, surveys and/or research studies.

National health information and surveillance systems

Strong national health information and surveillance can be useful for identifying populations disproportionally affected by TB *(37)*. Case-based digital surveillance systems can allow for sub-analysis of notification data, with disaggregation by risk factors for TB, such as age, sex, comorbidities and socioeconomic risk factors, where these are documented *(37)*. Collecting information on specific social and demographic risk factors such as homelessness, imprisonment or occupation may also help understand the populations at higher risk for TB.

At the population level, understanding the burden of key comorbidities and health-related risk factors relevant to TB (such as HIV, diabetes, undernutrition, mental health conditions, drug and alcohol use disorders and smoking) can inform the mapping of populations at higher risk of TB infection, TB disease or poorer TB outcomes. The joint burden of TB and comorbidities and health-related risk factors can also be determined through data linkages (such as linkage of individual records from a national TB surveillance database with individual records in databases for other diseases such as nutrition or diabetes), where these exist.

In addition, sector-specific health data, when available, such as data from occupational health clinics in industries or workplaces (e.g. mines, factories or farms) or from institutions and congregate settings (e.g. prisons, military establishments, hospitals or police) can also help to assess the burden and impact of TB in these populations.

In many contexts, national-level datasets may not enable sufficient disaggregation to be useful at local or national levels, and data at the health service level will only provide information about those already accessing TB services. Progressive strengthening of disease and mortality surveillance systems, civil registration and vital statistics[10] should also consider collection of information to facilitate gender- and equity-focused planning, monitoring, evaluation and quality improvement. Vulnerability to TB is also influenced by factors such as population dynamics, migration, socioeconomic factors, geopolitical conflict, climate-related events (drought and floods), global pandemics among others. It is therefore important to regularly review the recording and reporting system to ensure that it remains relevant to the evolving TB risk profile in the country. When data are collected, they should be analysed and reported on regularly and used to inform public health action.

While national TB programme data should be reviewed at regular intervals to monitor programme effectiveness, national epidemiological reviews and TB programme reviews provide an opportunity to conduct a more in-depth review of epidemiological data, as well as data that focus on the local determinants of TB and risk factors for TB. The aim of the epidemiological review is to identify the most important drivers of the TB epidemic, the distribution and weight of those drivers, and sectors beyond the health sector responsible for tackling them *(38)*. The data collection and analysis included in an epidemiological review cover a range of areas, from the person's individual characteristics and behaviours to housing and employment, food insecurity, stigma, discrimination and gender barriers.

The national epidemiological review will inform the component of the programme review that aims to understand what is (or is not) in place in various sectors or settings to address TB among high-risk groups *(28,38).* A national TB programme review should refer to data from an epidemiological review, which provides background information on the burden of TB and the characteristics of the TB epidemic in the country, including the social determinants of TB *(38)*.

Surveys and other research

While routine data from the health information system are useful in understanding some of the populations most affected by TB, these data may exclude populations who are not reached by services or populations who are not routinely captured in surveillance data. Data from routine surveillance can therefore be complemented by data from research or surveys (i.e. demographic and health surveys or living standards surveys) to further understand vulnerability among those not represented in the national recording and reporting system. Estimating the size of specific population groups in conditions of vulnerability to TB can also be carried out using tools specifically designed for this purpose *(55).* The use of these tools can allow for identification and prioritization of people at higher risk for TB in a particular country context, which can then contribute to TB strategies, policies, programmes and interventions that better cater to their needs and contribute to improved outcomes *(55)*.

[10] A well-functioning civil registration and vital statistics system registers all births and deaths, issues birth and death certificates, and compiles and disseminates vital statistics, including cause of death information. It may also record marriages and divorces (https://www.who.int/data/data-collection-tools/civil-registration-and-vital-statistics-(crvs), accessed 15 January 2025).

Complementary data collection for selected populations at higher risk for TB

To address the needs of specific high-risk populations, bespoke data collection systems can also be developed. If used, such systems should ensure rigorous data governance and management processes that protect the privacy, security and safety of data collection. These systems:

- may involve quantitative and qualitative data collection methods to gather information with and from people with TB or at higher risk for TB;
- can include data fields that enable systematic, useful and ethical data disaggregation, such as by socioeconomic status, sex, ethnicity, indigeneity, disability, gender identity and other equity-related fields; and
- should build capacity (including the capacity of affected communities and civil society) to collect, analyse, interpret, disseminate, use and report on data, and have resourced and maintained data infrastructure and human resources, along with policies, processes and guides supporting data management and use.

Principles to guide data collection for populations at higher risk for TB

To ensure more systematic data disaggregation to help achieve and measure the SDGs (including for TB) and as part of efforts to leave no one behind, the following principles should be considered when designing systems to collect data on populations in conditions of vulnerability to TB, accounting for confidentiality, privacy and human rights.

- Ensure participation of the relevant target population in data collection exercises, including planning, training as well as collection, dissemination and analysis of data.
- Ensure that data disaggregation facilitates the understanding of the subpopulation of interest and enables implementation of interventions targeted to the population most in need.
- Allow for populations to self-identify and self-define, and provide options and opportunities for individuals to disclose or withhold information about their personal characteristics.
- Ensure that data collectors provide transparency about their operations, including research design and data collection methodology, and that data collected by state agencies are openly accessible to decision-makers, organizations and the public in a timely way.
- Protect and keep private data disclosed to data collectors and ensure the confidentiality of individuals' responses and personal information.
- Provide accountability, whereby data collectors are upholding human rights in their operations and where data can be used to hold Member States and others accountable on human rights issues *(56).*

6. What can be done for people at higher risk for TB and to address vulnerabilities?

Interventions to detect people with TB among those at higher risk or in vulnerable situations may comprise TB screening (including contact tracing), TB prevention, treatment support, social protection, community engagement, including community-based outreach and linkage services, the engagement of peers, cross-border referral systems, and actions taken by ministries outside of the health sector, among others. Addressing vulnerability to TB requires comprehensive and targeted interventions from all relevant stakeholders within and beyond the health sector, including affected communities and civil society.

Interventions and policies to prevent, detect and treat TB in high-risk populations

WHO has several recommendations for country uptake and implementation on: systematic screening for TB; provision of preventive measures such as BCG vaccination and TPT; bi-directional screening for TB and HIV and other comorbidities such as diabetes; nutritional assessment and counselling; provision of nutritional support; decentralized, integrated and family-centred care; and TB treatment support, among others.

Several WHO policies and normative documents outline recommendations for all people with TB – such as the updated WHO guidelines on systematic screening for TB *(4),* TPT *(3),* TB care and support (including health education and counselling, psychological support and material support), the standard on universal access to rapid TB diagnostics *(57)*, the policy brief on TB-associated disability *(9)*, the roadmap towards ending TB in children and adolescents *(15)*, guidelines on the management of TB in children and adolescents *(19)*, guidelines on treatment support *(26),* as well as guidelines on TB and key comorbidities such as HIV-associated TB *(58),* TB and diabetes *(7),* and TB and undernutrition *(59).* These publications also focus on improving access to TB prevention and care for high-risk populations and for people in vulnerable situations.

Other key documents – such as the 2022 information note on ensuring continuity of essential TB services for people with or at higher risk for TB in Ukraine and refugee-hosting countries *(23)*, the interagency field guide on TB prevention and care among refugees and other populations in humanitarian settings *(22),* the regional guidance for TB prevention and control in Indigenous populations in the Region of the Americas *(60)*, the guidance on TB control in complex emergencies (Eastern Mediterranean Region) and the regional framework for reaching the unreached in the Western Pacific (2022–2030) *(29,61)* – also emphasize the policy response for populations at higher risk for TB or for people who are in vulnerable situations.

Evidence-based interventions to prevent, detect and provide support to people at higher risk of TB infection or who develop TB disease, including for those in the most vulnerable situations are listed below.

- **Provision of TPT** to all eligible groups, after the exclusion of TB disease. People living with HIV, household contacts of individuals with TB disease and other risk groups (such as those who are initiating anti-tumour necrosis factor treatment, receiving dialysis, preparing for an organ or haematological transplant), people with silicosis, prisoners, health workers, immigrants from high TB burden countries, as well as homeless people and people who use drugs. It should be noted that the highest risk of progression from TB infection to TB disease typically occurs within the first two years after infection, if known *(47,48)*.
- **Systematic screening for TB** to detect TB early, using the WHO recommended tools and approaches such as symptom screening, chest X-ray with computer aided detection, as well as C-reactive protein and WHO-recommended molecular rapid diagnostic (mWRD) tests.[11] Priority groups for TB screening include:
  - household contacts and other close contacts of individuals with TB,
  - people in prisons and other penitentiary institutions,
  - people living with HIV, current and former workers in workplaces with silica exposure,
  - people living in high TB burden settings with a risk factor for TB who are either seeking health care or who are already in care (such as those with an untreated fibrotic lesion on chest X-ray, people with diabetes, pregnant women, people who are undernourished or with chronic alcohol use disorders (among other risk factors)), and
  - subpopulations with structural risk factors for TB (these include urban poor communities, homeless communities, communities in remote or isolated areas, communities in urban poor areas, Indigenous Peoples, migrants, refugees, health care workers, internally displaced persons and other groups in conditions of vulnerability with limited access to health care and social protection).

  Several systematic screening interventions among high-risk populations have yielded promising results *(62–64)*.
- **Timely and accessible TB diagnosis** so that all people with presumptive TB can be diagnosed early during the illness. All people with presumptive TB should have access to a rapid diagnostic test, including at the primary health care level. TB diagnostic algorithms should include the use of a WHO-recommended WRD test as the initial diagnostic test, including for children and people living with HIV (combined with lateral flow lipoarabinomannan) and extrapulmonary TB. For children, the use of validated treatment decision algorithms that include a WRD test are preferred and allow for a clinical diagnosis if the diagnostic test is negative. The early detection of TB can also prevent TB-associated disability, which is an additional TB related vulnerability.
- Provision of **treatment, care and support interventions** once a person is diagnosed with TB can aid them to complete TB treatment. These include health education and counselling, and a range of treatment adherence interventions (such as tracers,[12] digital medication monitors, material support, psychological support) being offered in the community or at a facility. Offering treatment support options suited to the needs of persons with TB and their families would allow TB care to be more people centred. The aim is to ensure that each person can access a level of support that is commensurate with their needs over time. This is informed by a careful and sensitive assessment of their needs at the time of diagnosis and throughout treatment. Treatment support models should promote medication adherence as part of a package of holistically tailored support that addresses barriers to care and can include peer counselling as well as the engagement of community health workers.
- **People-centred models of care** that provide TB prevention and management services should be closer to where people live. WHO recommends decentralized, integrated and family-centred care for children and adolescents with TB or at higher risk for TB. Strengthening the implementation of integrated, people-, family- and

[11] Screening for TB is defined as the "systematic identification of people at risk for TB disease, in a predetermined target group, by assessing symptoms and using tests, examinations or other procedures that can be applied rapidly" *(4)*.

[12] Tracers refer to the communication with the patient – including via SMS, telephone (voice) calls or home visits *(40)*.

community-centred strategies as part of primary health care is one of 10 key actions to further reduce morbidity and mortality related to TB in children and adolescents *(15)*. Decentralized TB services are also recommended for people with multidrug- or rifampicin-resistant TB *(26)*. In addition, the implementation of **effective infection prevention and control measures** based on WHO recommendations should aim to minimize exposure to TB while not creating unnecessarily prolonged periods of respiratory isolation.

- Identification of high-risk groups and monitoring of trends in TB notifications in these groups, based on the local epidemiological context. **TB epidemiology reviews** should include a review of the social determinants of TB and describe the main groups who are vulnerable to TB in the country context, as well as the impact of key interventions that are needed to reach these populations. The findings from TB epidemiology reviews should inform programme reviews and national TB strategic plans. National **surveillance systems** can be used to monitor the burden of newly diagnosed TB in selected high-risk groups, and surveys can include variables on specific groups who may be especially vulnerable to developing TB in a specific country context. Estimating the size of specific population groups who are vulnerable to TB can also help to guide planning and resource allocation for targeted interventions to address TB in these populations *(55)*.

Interventions and policies to address the determinants of TB

Upstream and multisectoral interventions to address the main determinants and drivers of the TB epidemic are also important, as emphasized in the WHO End TB Strategy and the multisectoral accountability framework for TB *(14)*. These include addressing poverty, overcrowded living and working conditions, food insecurity, inadequate access to high quality education, gender disparities, climate change, restrictive laws and practices that impinge on human rights, stigma and discrimination, total costs and health expenditures associated with TB care, disabilities and broader societal inequities.

Specific actions related to multisectoral and cross-sectoral collaboration include: collaboration between ministries of health and social protection to ensure that all people with TB are covered with effective social protection; collaboration between ministries of health and that of prisons for TB screening, prevention and care for people in prisons and other places of detention or incarceration; collaboration between ministries of health and agencies or ministries responsible for the care of migrants and refugees for TB care among refugees and migrant populations; addressing undernutrition and food insecurity in collaboration with key UN agencies such as the World Food Programme and Food and Agriculture Organization; and collaboration between ministries and sectors responsible for addressing poor housing in people at higher risk for TB.

The following list presents some specific actions and policies that address the determinants of TB. These actions can overcome some of the barriers to accessing TB services for people at higher risk for TB.

- **Multisectoral action on the social determinants of health** including poverty alleviation initiatives, access to effective social protection and social health insurance schemes, initiatives aimed at improving air ventilation with reduced overcrowding at the household level and in other congregate settings, access to secure employment and initiatives designed to reduce food insecurity.
- **Identifying, monitoring, mitigating and removing human rights-, stigma- and gender-related barriers** to TB care including updating of outdated laws and policies that discriminate against people at higher risk for TB or with TB (such as employment laws, migration laws or civil status in a particular country), addressing stigma through health education and counselling offered at different stages of TB care *(65),* and social participation interventions *(66)* such as community feedback aimed at improving the quality of services.
- **Meaningful engagement**[13] **of and investment in communities in the national TB response**. Partnerships between health systems and communities are critical to identify high-risk populations who require additional attention in the TB response. National TB programmes, in collaboration with affected communities, civil society and nongovernmental organizations (NGOs), should identify groups who require more support and who may not be reached by health services due to their disadvantaged socioeconomic position or biological, cultural, structural or geographical factors. As these populations may lack access to health services provided within the formal health system, community systems can play a vital role in identifying those most affected by conditions of vulnerability and the barriers they face in accessing care as well as in the provision of care and support *(67*). There is a need to strengthen "public sector capacities for the design and implementation of meaningful social participation"[14] – including of TB affected communities – and to enable "equitable, diverse and inclusive participation, with particular focus on promoting the voices of all those in vulnerable and/or marginalized situations" *(66)*. Communities can play a crucial role in identifying people and populations most affected by TB *(41)*.
- Initiatives designed to **improve access to health care** include the promotion of universal health coverage, where "all people have access to the full range of quality health services they need, when and where they need them, without financial hardship" *(68)*. Other initiatives designed to improve health care access include training and capacity building of community health care workers, engagement of community, civil society and NGOs, in providing accountability measures for quality of care, and strengthening of primary health care.
- **Care for people with comorbidities**, as several comorbid conditions increase the risk of developing TB and impact on health-related quality of life, TB treatment outcomes as well as social and economic outcomes. The scale-up of WHO recommendations on comorbidities and health-related risk factors relevant to TB includes bi-directional screening, linkages to care, the provision of TPT (where relevant), counselling and assessment (including for undernutrition), infection prevention and control, interventions that aim to promote smoking cessation, HIV prevention, the prevention and management of undernutrition, prevention, treatment and care of mental health conditions and substance use disorders, diabetes treatment and management, and effective management of other conditions that suppress immunity.

[13] Meaningful engagement is defined as engagement with communities as equal partners, including information about the needs and services related to local issues, to empower them as leaders in identifying problems and co-creating solutions to a specific challenge, such as TB *(41).*

[14] Social participation is used in the policy brief to mean empowering people, communities and civil society, through inclusive participation in decision-making processes that affect health, across the policy cycle and at all levels of the system *(66)*.

Additional actions to overcome barriers to accessing TB services, including for people who are at higher risk for TB, include research and innovation.

- **Research** is essential to advance the understanding of who is vulnerable, why these vulnerabilities exist and appropriate interventions to promote equitable access to TB services for all people at risk. Early inclusion of groups living in conditions of vulnerability (such as pregnant and postpartum women and children) in implementation research, social science research and clinical trials is also encouraged to allow these groups to access innovations earlier, such as new treatment regimens and vaccines. Certain high-risk groups (such as prisoners, people with substance use disorders, migrants, mobile or displaced populations and other population groups in geographically hard-to-reach areas) should be encouraged to participate in national level operational research to improve access, equity and quality of care.
- Access to **innovations** that improve access to care and reduce the costs associated with TB care are important for all people with TB, especially for high-risk populations and those in vulnerable situations. Examples include video-supported treatment that allows people to take their treatment at home, computer-aided detection that can be deployed as part of TB screening for chest X-ray interpretation or point-of-care tests for TB diagnosis or its associated comorbidities.

7. Conclusion

The burden of TB is greatest among those who face structural, social or demographic determinants of TB, especially in the context of TB exposure or in settings with a high burden of TB. It is imperative, from epidemiological, programmatic, and equity and human rights perspectives, that there is a thorough understanding of vulnerability to TB in a given country context and that actions are targeted towards all people at higher risk for TB, with appropriate attention on those most at risk and for those who cannot access TB services or social protection programmes. Several WHO recommended interventions and approaches should be deployed to more effectively reach people at higher risk for TB. Reaching all people living in conditions of vulnerability, or who are marginalized, underserved or at higher risk of TB infection and disease is essential to ending TB.

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Global Programme on Tuberculosis & Lung Health
World Health Organization
20 Avenue Appia
1211 Geneva 27
Switzerland
gtbprogramme@who.int
www.who.int/tb