

## Review Article

# Short Overview of The Burden of Tuberculosis

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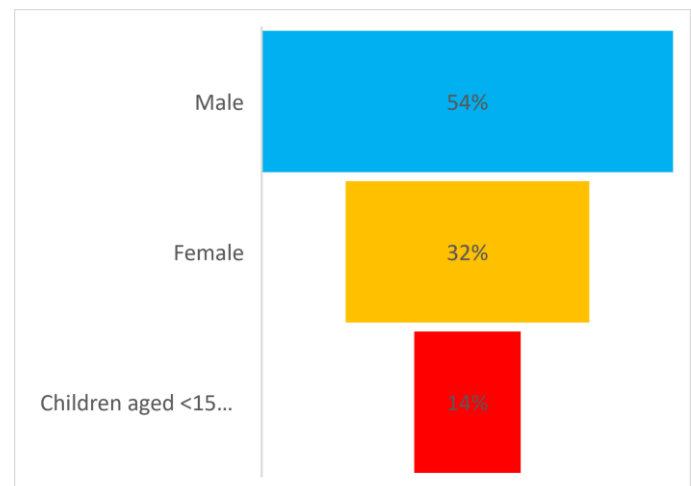
## Tuberculosis

Tuberculosis has been a common infectious disease among humans since ancient times. *Mycobacterium tuberculosis* can affect different parts of the human body – commonly, human lungs. Tuberculosis is one of the significant public health issues in most countries. According the World Health Organization (WHO) globally, tuberculosis kills approximately 2 million people every year, and 10 million new cases were diagnosed in 2019 (WHO, 2020). The primary source of infection in the community is people who have smear-positive *Mycobacterium tuberculosis* and their sputum. Among people infected with *Mycobacterium tuberculosis*, 5 to 10% of people might develop clinical manifestations of the disease. The emergence of clinical manifestation is significantly increased in HIV-positive people (Harries & Dye, 2006).

Countries utilize different tools to diagnose the existence of *Mycobacterium tuberculosis* in people in developing countries. Healthcare professionals use chest X-rays and sputum smear microscopy to diagnose pulmonary tuberculosis. Although treatment of tuberculosis has been in the medical arena for 40 years, *mycobacterium tuberculosis* still has a higher rate of mortality in people, especially people who are HIV and people with drug-resistant *Mycobacterium tuberculosis* (Harries & Dye, 2006).

In the world tuberculosis is one of the infectious diseases that are the primary cause of death in infectious diseases (WHO, 2018), and tuberculosis causes approximately 40% of deaths in people with HIV infection (Gupta et al., 2015). (See **Figure 1** and **Figure 2**).

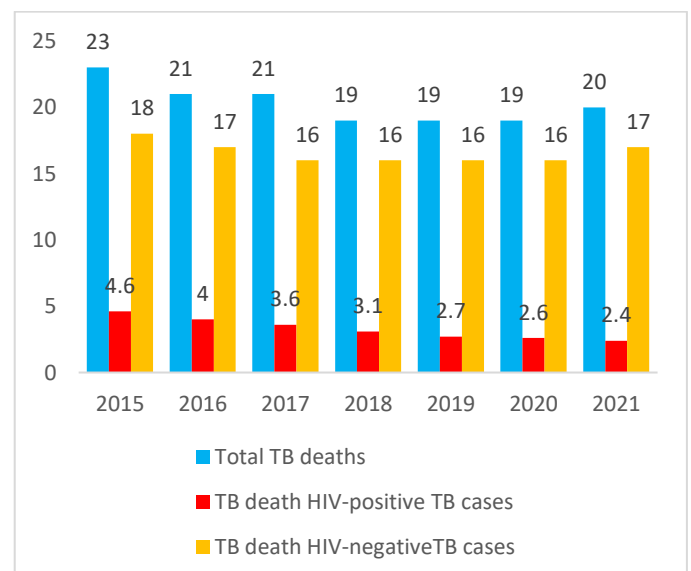
Figure 1



Estimated Global Distribution of Death in 2021

Source: World Health Organization (2024a). TB mortality. <https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2022/tb-disease-burden/2-2-tb-mortality>.

Figure 2



*Estimated Global Trends of TB Mortality Rate per 100,000 Population between 2015 and 2021*

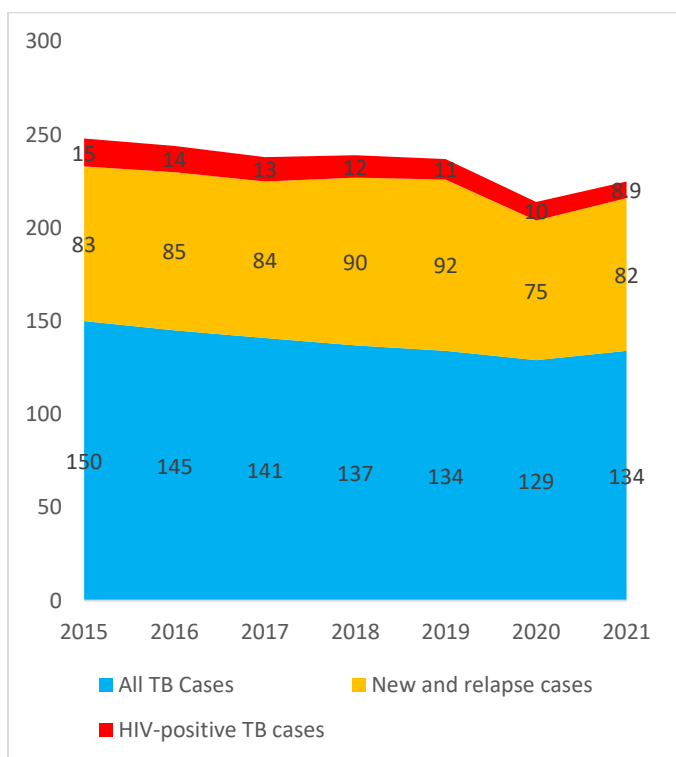
Source: World Health Organization (2024a). TB mortality. <https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2022/tb-disease-burden/2-2-tb-mortality>.

**The global incidence of tuberculosis**

In 2017, tuberculosis cases were 10 million, 133 cases per hundred thousand population, with a death toll of 1.57 million. The incidence of tuberculosis has decreased by an average of 1.5% every year since 2000 (MacNeil et al., 2017).

In 2017, tuberculosis among HIV-infected people was approximately 920,000 cases, 9% of all tuberculosis cases, with 300,000 deaths among HIV-infected people (case fatality 32.6%). Approximately 558,000 cases of multi-drug-resistant tuberculosis, and 230,000 people died from multi-drug-resistant tuberculosis (case fatality 41%) (MacNeil et al., 2017). (See **Figure 3**)

**Figure 3**



*Estimated Global Trends of TB Incidents Rate per 100,000 Population between 2015 and 2021*

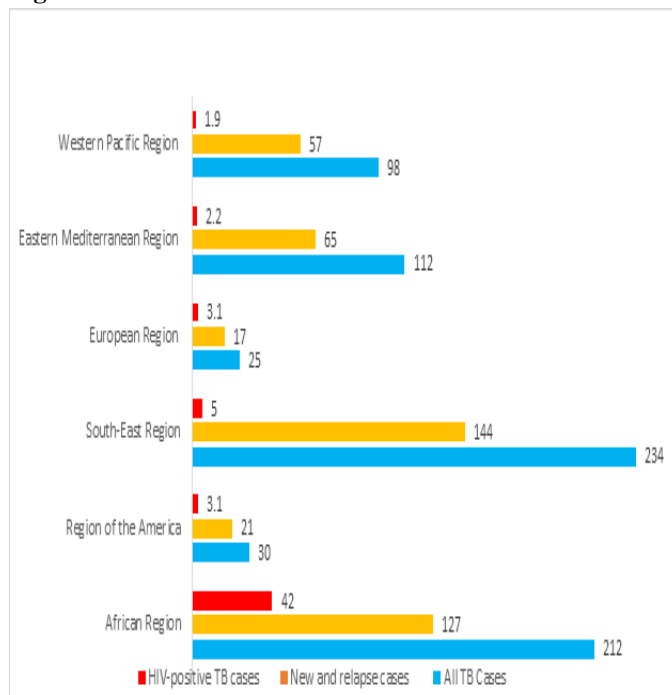
Source: World Health Organization (2024b). 2.1 TB incidence. <https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2022/tb-disease-burden/2-1-tb-incidence>.

**Regional incidence of tuberculosis**

Southeast Asia and Africa comprise approximately 70% of worldwide tuberculosis cases. Even though the number of tuberculosis cases was less in Africa, the incidence was almost the same in both regions (226 per hundred thousand in southeast Asia and 237 per hundred thousand in Africa). The incidence of tuberculosis in the European region was low. However, this region had higher cases (40%) of multi-drug-resistant

tuberculosis than other regions in the world invert, ranging from 3.6% to 6.3%. (MacNeil et al., 2017). (See **Figure 4**)

**Figure 4**



*Regional Estimated of TB Incidents Rate per 100,000 Population in 2021*

Source: World Health Organization (2024b). 2.1 TB incidence. <https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2022/tb-disease-burden/2-1-tb-incidence>.

**Tuberculosis Mortality and DALYs**

Death from tuberculosis is related to patients' risk factors, smoking, alcohol use, and diabetes. For example, a study in Brazil indicated in 2017 that 59 percent of total DALYs in the HIV-negative population due to tuberculosis were related to alcohol use, smoking, and diabetes. Alcohol consumption was considered for 47.5 percent, diabetes mellitus 7.7 percent, and smoking 17.9 percent (Martins-Melo et al., 2017).

**Management of Global Burden of Tuberculosis.**

To have healthy communities improve people's health and decrease the burden of diseases, we need to have well-designed healthcare policies to improve people's health. When healthcare policies are poorly designed and evidence-based, they cannot decrease the burden of diseases and contribute to harm (Bjelakovic et al., 2007).

**Factors Contribute to the Burden of Tuberculosis**

Different challenging factors contribute to the tuberculosis burden worldwide, and these factors have global and regional aspects. To reduce the disease burden, healthcare entities at the international and national levels need resources to find solutions and address the challenges appropriately.

1. Tuberculosis care: Most TB cases can be missed in developing countries due to the lack of well-equipped diagnostic and curative centers. Recent studies indicate that

around 3.6 million cases of tuberculosis are missed every year. Undiagnosed or partial treatment of tuberculosis can cause a continuation of transmission and increase the chances of multi-drug-resistant tuberculosis (Hebert et al., 2014; Falzon et al., 2015).

2. **Financial support:** The lack of financial resources to support and create healthcare facilities to deliver healthcare services to remote communities globally is a challenge that increases the burden of tuberculosis. World Health Organization (2015) estimated that 8 billion dollars are annually required to ensure the basic costs of tuberculosis detection and treatment globally; however, the available funds are approximately \$6.4 billion, which is insufficient to address the communities' needs globally (WHO, 2015).

3. **Lack of comprehensive research:** Developing countries need to support and provide financial and technical resources for intensifying comprehensive research on a broader spectrum towards developing diagnostic tools with better sensitivity and specificity, drugs, and vaccines to reduce the burden of the disease (Raviglione & Sulis, 2016).

### **How to Decrease the Burden of Tuberculosis**

Studies have indicated that several determinants are involved in the continuation and existence of tuberculosis globally, such as lack of treatment, malnutrition, co-existence of HIV, multi-drug resistant tuberculosis, poor economy, shelters, and environmental sanitation.

The burden of tuberculosis is complex and multifactorial, integrated - to decrease the burden of the disease. We need to have a comprehensive approach to intervening in every determinant that can decrease the burden and existence of tuberculosis.

Healthcare entities throughout history have presented local and international guidelines in the form of a framework to decrease the burden of tuberculosis, such as Millennium Development Goals, Sustainable Development Goals, WHO End TB Strategy, and local tuberculosis prevention programs and strategies.

### **Impact of Sustainable Development Goals on the Burden of Tuberculosis**

The Sustainable Development Goals emerged in 2016 as a successor or replacement for the Millennium Development Goals. The Sustainable Development Goals encompass an extensive range of environmental, economic, and social factors that are profoundly connected and inseparable and contribute to tuberculosis's burden. Tuberculosis, as a disease, has an extensive relationship with communities' financial, social, and structural stability (Desa, 2016).

The Sustainable Development Goals (SDG) have the same conceptual purpose as the WHO's End TB Strategy (Lönnroth & Raviglione, 2016). SDG prioritizes targets that relate to the root determinants of human health (Fitchett et al., 2016). One of the essential targets of SDG agendas is the social determinants of tuberculosis, acknowledged as a programmatic priority.

The End TB Strategy aims to reduce tuberculosis incidence by

90 percent, deaths by 95 percent, and costs by 100 percent by 2035. A milestone for 2030, mirrored in SDG 3, is to reduce the incidence of tuberculosis by 80 percent (Uplekar et al., 2015).

To reduce the burden of tuberculosis and eventually eliminate it from developing and developed countries, we need to foster the SDG 1 sub-targets, which encompass endeavors toward minimizing poverty and enhancing social protection coverage (Carter et al., 2018). Research has indicated that maximizing social protection can decrease the burden of tuberculosis (Siroka et al., 2016).

Healthcare authorities need to intervene in the determinant roots of the disease bio socially and biomedically. The biosocial theory of disease presents a critical mechanism by which protection, social protection, and minimizing poverty could reduce the burden of tuberculosis at the individual level (Krieger, 2012; Ortblad et al., 2015).

Focusing mainly on bio-medical intervention alone to decrease the burden of tuberculosis will not expedite the reduction of tuberculosis incidence that is required to hit the programmatic targets of the End TB Strategy (Uplekar et al., 2015).

### **Strategies to Decrease Tuberculosis and Appropriately Allocating Resources**

In developing and developed countries, reducing the tuberculosis burden, as measured by incidence, death, and medication resistance, requires a comprehensive approach—allocating resources to reduce poverty and make healthcare coverage increasingly accessible, affordable, appropriate, and available.

Innovative strategic policies of policymakers to decrease the burden of tuberculosis and their priority should differ from region to region and country to country. For example, multi-drug-resistant tuberculosis cases are prominent in Europe, and the co-existence of HIV infection with tuberculosis is more prominent in Africa (MacNeil et al., 2019). Policy for both regions has to be comprehensive, including decreasing poverty, improving environmental sanitation and economy, evidence-based treatment, and on-time diagnosis of tuberculosis. However, their priority should be different. Policymakers in Europe have to allocate more resources to assist in decreasing multi-drug resistance, and in Africa, they have to focus more on decreasing tuberculosis co-infection with HIV.

### **Conclusion**


Tuberculosis is a global challenge for humans globally, and every country has to contribute to the programs with resources to decrease the burden of tuberculosis. Furthermore, nations must follow WHO guidelines to decrease the incidence of tuberculosis and meet the targets predicted in the WHO End TB Strategy and SDG. Finally, healthcare entities have to have evidence-based policies to prioritize the determinants that contribute prominently to the incidence of tuberculosis in the region to decrease the incidence.

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