

Mycobacterium tuberculosis Infection and Disease

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Epidemiology

Tuberculosis (TB) is the leading cause of morbidity and mortality among people with HIV worldwide. In 2020 and 2021, progress towards reducing TB morbidity and mortality slowed amidst the widespread disruption of health services from the COVID-19 pandemic. Globally, the annual number of estimated TB deaths increased in 2020 and 2021, to 1.5 million and 1.6 million, respectively.^{1,2} Among people with HIV, there were an estimated 703,000 people who had TB, but only 52% were diagnosed and reported. A total of 187,000 deaths among people with HIV were attributed to TB in 2021, the first time there has been an increase in HIV-associated TB deaths since 2006.² People with HIV still account for a disproportionate number of TB deaths worldwide (11.8% of deaths vs. 6.7% of TB cases); however, a 47% reduction in deaths has occurred since 2010.²

In the United States, more than two-thirds (5,456; 71.4%) of people newly reported with TB in 2021 were born outside the United States, similar to 2019 and 2020 proportions.³ The incidence of HIV-related TB in the United States has declined substantially, in part because of the widespread use of antiretroviral therapy (ART).^{4,5} Among all people reported with TB with known HIV status in the United States in 2021, 293 people (4.2%) were coinfecting with HIV (6.3% among people with TB aged 25–44 years vs. 5.6% among those aged 45–64 years).⁶ Overall, the proportion of reported people with TB and HIV co-infection has been steadily declining over the past decade (7.4% in 2011).

Latent TB Infection

TB infection occurs when a person inhales droplet nuclei containing *Mycobacterium tuberculosis* organisms. Usually within 2 to 12 weeks after infection, the immune response limits the multiplication of tubercle bacilli. However, viable bacilli can persist for years, a condition referred to as latent TB infection (LTBI). People with LTBI are asymptomatic and are not infectious. TB disease (defined as clinically active disease, often with positive smears and cultures) can develop soon after exposure to *M. tuberculosis* organisms (primary disease) or after reactivation of latent infection.^{7,8} The risk of TB disease due to reactivation of LTBI for people with untreated HIV has been estimated as 3% to 16% per year, which approximates the lifetime risk of TB disease for people with LTBI who do not have HIV (approximately 5%).^{9–14} The risk of TB disease begins in the first year following HIV infection.¹⁵ TB disease can occur at any CD4 T lymphocyte (CD4) cell count, although the risk increases with progressive immunodeficiency.^{15,16} The estimated annual risk of developing TB disease among people with LTBI (diagnosed by a positive tuberculin skin test [TST] or interferon-gamma release assay [IGRA] in the absence of a TB disease diagnosis) is 3 to 12 times greater for people with untreated HIV than for those without HIV.¹⁷ Even with effective ART, the risk of TB disease among people with HIV remains greater than that among the general population.¹⁸ Since 2006, the TB incidence rate in people with HIV has been lower than in previous years, but the TB risk is still substantially higher than among people without HIV.¹⁹ In the United States, the most common predisposing factor for TB infection is birth or residence outside of the United States.²⁰