

# Tuberculosis

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*About a third of the world's population is infected with the bacterium that causes active, infectious tuberculosis disease. While 90 percent of infected people will not progress to disease, people with compromised immune systems, including from HIV, face much greater risks of illness. This is just one of the reasons tuberculosis, with growing incidence of strains that do not respond to the most effective and least toxic treatments, resurged at the end of the last century. In the last year, new cases of disease in the United States rose for the first time in two decades. Globally, tuberculosis now ranks with HIV as one of the two leading infectious disease killers worldwide and took more than **1.8 million lives** in 2015. That year also saw **10.4 million new active cases of tuberculosis disease**, including about a third of all cases that went undiagnosed, and about a million among children. Multidrug-resistant tuberculosis is increasing globally and now accounts for more than 3 percent of new tuberculosis cases.*



**BACKGROUND** Tuberculosis had a long head start on science and medicine, with more than two millennia elapsing between Hippocrates' writing about the wasting effects of the disease and physician scientist Robert Koch's identification in **1882** of the bacterium that causes it. Science began to overtake the illness during the century that followed, with research and development producing a vaccine that prevented disease in infants, public health policies that controlled the spread of bacteria, diagnostic technologies that detected active infection, and antibiotic drugs that cured it. Together these advances curtailed the impact of tuberculosis in developed countries for the first time in history. After that, funding for tuberculosis research and development declined.

The advances, though, represented partial solutions. The vaccine only prevents disease in young children. The cure requires a lengthy regimen of multiple medicines with sometimes serious and debilitating side effects. Drug-resistant tuberculosis strains require longer treatments with side effects that can include permanent hearing loss. Infection control and diagnosis demand resources that are absent or insufficient in countries where tuberculosis has spread most widely. Underfunded and poorly managed programs around the world have led to increasing numbers of people not completing treatment and developing strains of tuberculosis that do not respond to most drugs. While people with healthy immune systems who are infected with tuberculosis face an estimated **10 percent lifetime** risk of developing active disease, the risk for infected people living with HIV of developing active disease is approximately **10 percent per year**. In the 1980s, HIV and rapid urbanization fueled the spread of tuberculosis, once again, globally. TB became the leading killer of people with HIV. While tuberculosis incidence rose steeply in developing countries, developed countries also saw disease incidence rise for the first time in three decades.

**From 1985 to 1992**, cases of tuberculosis in the United States consistently increased. In 1992, rising incidence of tuberculosis, with outbreaks of multidrug-resistant strains of disease in Miami and New York led the U.S. Centers for Disease Control and Prevention to issue a National Action Plan to Combat Multidrug-Resistant Tuberculosis. While the 1992 plan was not backed by sufficient funding to carry out all of its components, strengthened surveillance systems, improved infection control, and updated laboratory services under the plan led to declining U.S. tuberculosis cases. **In 1993**, the World Health Organization declared tuberculosis a global health emergency, and in 1998 USAID began its global TB control program, building skills across countries with the highest burdens of the disease to diagnose, treat and prevent disease according to international standards. In 2001, the creation of the Global Fund to Fight AIDS, Tuberculosis and Malaria opened new avenues for supporting national TB control programs in heavily affected countries. From 2013, funding for tuberculosis programs declined, however, and then flattened. After two decades of a continued downturn in numbers of TB cases in the U.S., tuberculosis incidence in the U.S. plateaued in 2013, with 3 cases per 100,000 persons during 2013–2015.

**At the end of 2015**, the White House released a [National Action Plan for Combating Multidrug-Resistant Tuberculosis](#), setting specific treatment and disease impact targets in the U.S. and abroad as well as goals to build collaborative international responses and capacities to fight multidrug-resistant tuberculosis. **In February**, however, the President's budget for fiscal year 2017 proposed just \$191 million for global tuberculosis efforts, a \$45 million cut from the previous year's funding.

**Now** In 2016, the U.S. Centers for Disease Control and Prevention reported the first increase in the number of tuberculosis cases nationwide in more than two decades. Treatment for each patient in the U.S. for whom first-line drugs are effective costs about \$17,000, while the cost to treat each patient with disease resistant to first-line drugs is about \$150,000, and for patients with extensively drug resistant, or XDR-TB, it is close to half a million dollars each. Globally, only about a quarter of people with multidrug-resistant tuberculosis are identified and treated, while untreated individuals, remaining ill and infectious, transmit drug-resistant strains of disease. In 2016 also, the World Health released updated and corrected tuberculosis incidence and mortality numbers showing that even with a slight drop from the previous year's illnesses and deaths, the toll of tuberculosis in 2015 exceeded estimates previously provided for 2014. The new numbers reflect a need for improved tuberculosis screening, diagnosis and surveillance, as well as stalled, and even reversed progress in some of the hardest hit countries.

**THE NEED** In its global tuberculosis strategy for 2015-2019, the United States Agency for International Development set goals to work with affected countries and other partners to reduce tuberculosis incidence by 25 percent from 2015 levels, successfully treat at least 13 million tuberculosis patients, initiate appropriate treatment for at least 360,000 patients with drug-resistant tuberculosis, cure more than 90 percent of tuberculosis patients whose disease responds to first-line medicines, and provide antiretroviral treatment for all people living with HIV and coinfecting with TB.

USAID leads U.S.-funded tuberculosis responses on the global front, informing priorities for research, and providing technical support that brings advances to the field in 23 high burden countries. The National Institutes of Health leads basic science research efforts and early clinical trials that lead to the development of new medicines and technologies. The CDC supports advanced clinical trials and operational research, policy guideline development, and technical support for programming. Through the President's Emergency Plan For AIDS Relief, the Department of State supports tuberculosis programming in the context of HIV programming, while the Department of Defense provides operational research and evaluation.

After four decades when no new tuberculosis treatments were produced, development of new treatments remains severely limited. Developing a new drug, vaccine or diagnostic tool can cost approximately a billion dollars, with clinical trials alone costing \$50 million or more. The NIH is the largest funder of tuberculosis research globally, and had \$279 million for tuberculosis efforts in fiscal year 2015, while USAID had a research budget of about \$20 million. The CDC's TB Trials Consortium had less than \$8.5 million for 2015, and the CDC's Epidemiologic Studies Consortium had \$6.2 million.

The CDC Division of Tuberculosis Elimination will need at least **\$243 million** to respond to tuberculosis domestically and to conduct clinical trials for more effective prevention and treatment tools. Additionally, at least **\$400 million** through USAID is needed to accomplish sustainable progress against tuberculosis globally.

**MOMENTUM** In the last year, research has shown the promise of briefer, safer, more effective regimens against drug-resistant tuberculosis, as well as more efficient first-line regimens, using new and repurposed drugs. Pilot projects have shown that wider access to the first new tuberculosis drugs developed in nearly half a century is feasible and would be effective among some of the hardest hit populations, including people who are incarcerated, people living with HIV, and people in remote rural areas.

At the end of 2016, the United Nations General Assembly resolved to hold its first high-level meeting on the global fight against tuberculosis in 2018. This November the World Health Organization will hold a global conference on the fight against TB in the context of public health Sustainable Development Goals, in Moscow.

Dedicated funding for science and responsive public policy have led to significant advances against tuberculosis over the last century and a half, but accelerated and sustained progress is necessary. Renewed headway against the disease will require intensification of efforts both in the United States and globally, including support for community-based responses, continued work toward diagnostic tools that can be used in technology-limited settings to detect infection and drug resistance, a more potent vaccine that is effective for all age groups, and treatments with shorter, more easily tolerated regimens, and ones effective against resistant strains. A U.S. commitment to fighting tuberculosis with adequate resources everywhere is fundamental to ending the global health threat of the disease.

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