One in four people worldwide is infected with tuberculosis, and the world needs better vaccines, drugs, and diagnostics to reduce the global burden of the disease. India, 2008.

Our Goal: to accelerate the decline in tuberculosis incidence worldwide.

The Challenge

Over the past two decades, significant progress has been made in the fight against tuberculosis (TB). Between 1990 and 2009, TB mortality worldwide fell by 35 percent. Due to coordinated global efforts and the use of the directly observed therapy short-course (DOTS) strategy, the recommended treatment for TB developed in the 1980s, 55 million people with TB were treated between 1995 and 2010, 46 million of them successfully. This approach is estimated to have saved nearly 7 million lives compared to the earlier standard of care. Almost 1 million lives are estimated to have been saved through increases in collaborative treatment of TB and HIV between 2005 and 2010.

Despite this progress, TB remains one of the leading causes of death worldwide. In 2010, nearly 9 million new cases were reported. In recent years, TB control efforts have taken on increased urgency due to the emergence of multidrug-resistant TB (MDR-TB), a form of the disease that is resistant to frontline drugs, and extensively drug-resistant TB (XDR-TB), which is also resistant some second-line drugs. MDR-TB has emerged in nearly every country in the world, with an estimated 440,000 new cases in 2008. These forms of the disease are especially difficult and costly to treat and are a consequence of years of inadequate diagnosis and treatment. The TB epidemic in countries with a high rate of HIV has also accelerated. In 2010, 350,000 people died who were co-infected with TB and HIV.

Current approaches to preventing, diagnosing, and treating TB are inadequate. The TB vaccine used today provides limited protection for newborns and children and no protection against pulmonary TB in adults, which accounts for most of the TB cases worldwide. The most commonly used diagnostic tool, the microscope, detects only half of all cases and is labor-intensive for health providers. Finally, while the standardized DOTS treatment regimen has had significant success, it requires the patient to take a complex combination of pills every day for six to nine months, assumes that a healthcare worker will supervise the full duration of treatment, and has significant side effects. The result is that many patients end treatment prematurely.
**AT A GLANCE**

- The global TB mortality rate fell by 35 percent between 1990 and 2009, but TB remains one of the leading causes of death worldwide, with almost 9 million new cases reported each year.

- The TB vaccine used today provides limited protection for newborns and children and no protection against pulmonary TB in adults, which accounts for most of the TB cases worldwide.

- The foundation is working to speed the decline in global TB incidence by investing in the development and deployment of better vaccines, treatment regimens, and diagnostic tools. We are also working to increase the involvement of governments, multinational organizations, and the private sector in fighting TB.

- Our efforts are concentrated in countries with the highest incidence of TB, including India, China, and South Africa.

- Our TB strategy, last updated in 2011, is led by Jan Gheuens, interim director, TB, and is part of the foundation’s Global Health Division.

**THE OPPORTUNITY**

The past decade has seen substantial new investments in addressing the TB epidemic, and a promising array of new tools is in development. New drugs, diagnostic technologies, and eventually a vaccine could vastly improve the worldwide response to TB. But more research and development are needed to ensure that these tools are fast acting, accessible, affordable, and simple to use.

A more effective vaccine would be the single most powerful tool to reduce the incidence of TB. Even a partially effective new vaccine could, by some projections, decrease TB incidence by 39 to 52 percent by 2050. For the first time in decades, a new TB vaccine candidate is in a Phase IIb efficacy trial for infants, which has the potential to demonstrate how well the vaccine works in a small population.

But finding a new vaccine could take many years, so it is critical to also develop short- and medium-term strategies that can help reduce the rate of TB infection. For example, new TB diagnostic tools can reduce treatment delays and make it more likely that the disease will be caught before the patient transmits TB to many others. In addition, a simpler, shorter-course drug regimen would improve treatment success rates because patients would be more likely to complete it.

A number of vaccines, diagnostic technologies, and drugs are in clinical development, but they can only reach those who need them most if they are affordable and can be deployed efficiently. Substantial financial resources for research and development will be needed, and investments from developed and TB-endemic countries, pharmaceutical companies, and foundations must be sustained.

**OUR STRATEGY**

The Bill & Melinda Gates Foundation’s TB strategy for 2011–2016 addresses many of the factors associated with the TB epidemic.

A new vaccine would provide the most effective way to decrease the incidence of TB, so our top priority is the development of new vaccines as well as innovative and accelerated approaches to vaccine development. However, the combined deployment of vaccines, diagnostics, and drugs is essential to addressing the epidemic.

We are also focusing on the development of shorter, simpler treatment regimens. Patients who do not complete their treatment as prescribed are likely to transmit TB to others and may develop drug-resistant strains that can take up to two years to treat with more expensive, second-line drugs.

Another area of focus is the development of faster and more accurate diagnostic tools, which would lead to earlier treatment and fewer transmissions of the disease. But such new tools can reduce cases of TB and save millions of lives only if they are implemented rapidly and effectively where they are most needed. We are therefore funding operations research in India and China, which together have nearly 40 percent of the world’s TB cases, as well as South Africa, which has one-fifth of all African TB cases and significant numbers of people with HIV and TB co-infection.

We also advocate for adequate financing to combat TB. We support efforts to raise critically needed funding for research and development. And we work with global financing institutions such as the Global Fund to Fight AIDS, Tuberculosis and Malaria and UNITAID to reduce the cost of innovative technologies and accelerate their adoption.
More Effective Drug Regimens

TB can rapidly develop resistance to a single drug, so treatment will always require a combination of drugs. However, conventional drug development requires that new TB drugs be evaluated separately in clinical trials, so new drugs can be tested in combination only after they have been approved individually. This means that developing more effective TB regimens could take decades. To address this obstacle, we have joined with partners to create the Critical Path to TB Drug Regimens (CPTR) initiative, which brings together leading international pharmaceutical companies, public health experts, nongovernmental organizations, and U.S. and other regulatory authorities to expedite testing of promising TB drug candidates in combination and identify new regulatory pathways and other means of accelerating the drug development process.

We also need new drugs that can radically shorten the course of treatment. We are funding the TB Drug Accelerator program, which aims to identify new ways to target bacteria that are resistant to current drug regimens, develop new tools for drug discovery, and discover new drugs that can lead to accelerated treatment regimens.

New Diagnostic Tools

We are developing less expensive, more effective diagnostic tools that can reach more of the TB patient population and can be used at the point of care rather than requiring processing by a distant lab. Part of this effort involves research into new biomarkers of TB infection and treatment responses that will improve detection and clinical management of TB.

One new technology we have funded, GeneXpert, has the potential to significantly increase the speed and accuracy of TB diagnosis. We need to find ways to expand access to this tool because fast, accurate diagnosis is essential to enabling patients to begin appropriate treatment quickly and preventing further transmission.
Disseminating Innovations in TB Control

We are conducting pilot studies of innovative TB control tools and delivery approaches in India, China, and South Africa and using the findings to disseminate the most effective approaches globally. One of our projects focuses on finding cost-effective ways to deploy a more rapid and accurate diagnostic tool in South Africa. In India, we have supported efforts to bring together the Indian government, the World Health Organization (WHO), USAID, and the World Bank to support innovative TB control efforts. We are also engaging the private sector in India to promote TB diagnosis and treatment research and development. Through our advocacy work in China, MDR-TB has been classified as a "highly reimbursable disease" under the country’s health insurance schemes, which means that Chinese patients with this condition will be more likely to receive financial assistance in paying for their treatment.

Access, Efficiency, and Cost Reductions

We collaborate with global health partners such as the Global Fund to Fight AIDS, Tuberculosis and Malaria; WHO; and UNITAID to make the most of their resources and investments and thereby reduce the cost of innovative technologies, attract enough manufacturers to ensure stable and affordable prices for new TB technologies, and accelerate adoption of effective new approaches to fighting TB.

Advocacy

We advocate for greater political commitment and funding for fighting TB, particularly for research and development in the later phases of clinical trials. We believe that strengthening partnerships with donor governments and multinational institutions, the pharmaceutical and biotechnology industries, and governments of TB-endemic countries is critical to fighting the disease. These partnerships can lead to greater investment in research and development as well as in the delivery of existing and new tools.

ABOUT THE FOUNDATION

Guided by the belief that every life has equal value, the Bill & Melinda Gates Foundation aspires to help all people lead healthy, productive lives. We are dedicated to discovering and disseminating innovative approaches to addressing extreme poverty and poor health in developing countries and improving the U.S. education system. Because our financial resources, while significant, represent a small fraction of what’s needed to address these challenges, we work in partnership with governments, the private sector, and other donors and organizations to achieve the greatest possible impact.

LEARN MORE

Our Tuberculosis Program:
www.gatesfoundation.org/tuberculosis

Aeras:
www.aeras.org

Global Alliance for TB Drug Development:
www.tballiance.org

Foundation for Innovative New Diagnostics (FIND):
www.finddiagnostics.org

Global Fund to Fight AIDS, Tuberculosis and Malaria:
www.theglobalfund.org

Progress Against Tuberculosis:

Critical Path to TB Drug Regimens:
www.cptrinitiative.org

TB advocacy is essential to mobilizing resources and engaging communities in fighting the disease. Zambia, 2012.