

HEALTH AND NUTRITION

EMERGING AND REEMERGING ISSUES IN DEVELOPING COUNTRIES

TUBERCULOSIS

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Tuberculosis (TB) is the world's leading infectious killer of young and middle-aged adults, causing 26 percent of avoidable deaths in the developing world. The Global Burden of Disease study (see brief 2 in this collection) places TB among the seven leading causes of lost Disability-Adjusted Life Years (DALYs) well into the 21st century.

TB is a highly infectious airborne disease caused by *Mycobacterium tuberculosis*. Crowded homes and congregate settings (such as shelters, hospitals, and prisons) tend to foster transmission. Although pulmonary TB is the most common form, the disease can affect virtually any organ (for example, lymph nodes, brain, and genitals). Classical clinical manifestations include coughing (sometimes bloody), fever, and weight loss. The germ may remain dormant for years before it emerges as "active" disease. While activation of dormant infection is hard to predict, TB emerges most commonly among people with compromised immunity, such as those with malnutrition, diabetes, and HIV/AIDS infection.

Half of HIV-positive people are infected with TB, and TB kills 30 percent of AIDS victims in Africa and Asia. Likewise, the majority of TB patients in Africa are HIV-infected, and HIV accelerates the progression to active TB up to one hundredfold. Caring for AIDS victims is inconceivable without caring for TB. In a ministerial conference in Amsterdam on World TB Day 2000, TB was recognized beyond its health impact as a major developmental issue.

THE BURDEN OF TB

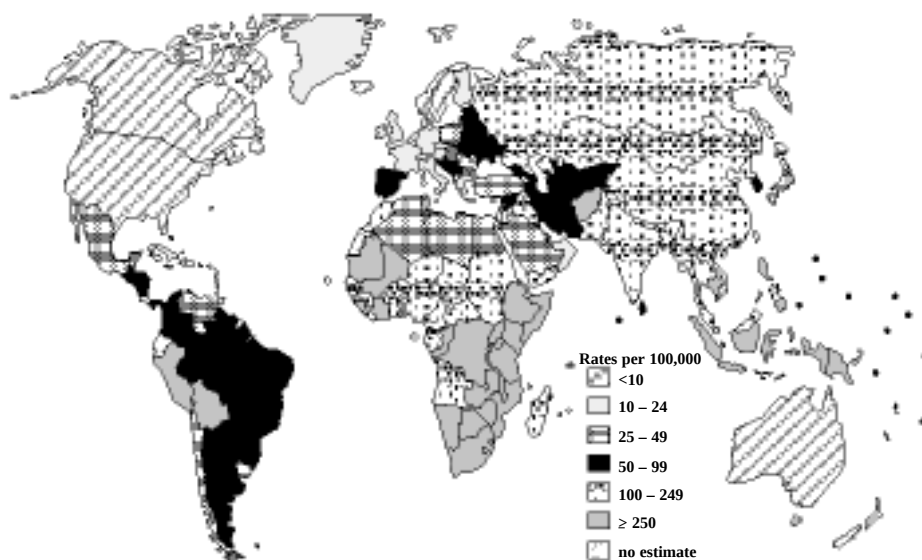
Although considered an ancient killer, TB is at its highest levels in history. TB, the "white plague," was the leading cause of death at the dawn of the 20th century. During the first half of the century, there was a steady decline in incidence, and in many industrialized nations TB was on the brink of elimination. With the introduction of effective drug treatment in the 1950s, society grew optimistic and then overconfident that the disease would be eradicated. However, by 1990 TB had made

an impressive comeback in Europe, North America, and, more recently, Japan, fueled by the HIV epidemic, migration, and the collapse of public health programs targeting TB.

More than 90 percent of TB cases and 98 percent of TB deaths occur in the developing world. The annual risk of TB infection in Sub-Saharan Africa is more than 50 times the rate in Western Europe. In India alone, one person dies of TB every minute. In 1993, the World Health Organization (WHO) declared TB a "global emergency." An estimated 30 million people have died during the 1990s. WHO estimates that 2 billion people—one third of the world's population—are already infected with the tubercle bacillus and at least 5 to 10 percent will become ill in coming years (see figure).

Dramatic outbreaks of multidrug-resistant tuberculosis (MDR-TB) in HIV-infected patients in the United States and Europe recently focused international attention on the emergence of this menace. Patients infected with strains resistant to multiple drugs are difficult to cure, and treatment is long, toxic, and expensive.

ESTIMATED RATES OF NEW CASES OF TUBERCULOSIS, 1997



Source: World Health Organization.



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Because only a few effective drugs are available against *M. tuberculosis*, drug resistance threatens the standard method of TB control, the DOTS strategy (directly observed treatment, short-course). WHO recently documented the presence of MDR-TB in virtually every country.

The future is not bright for TB victims. The burden of HIV and malaria is expected to decline significantly by 2020. Perinatal and childhood mortality in general will decrease by half in the same period. The burden of TB, however, is expected to increase over the next two decades. Mathematical models predict 225 million cases and 80 million deaths from TB over the next three decades.

TB AND POVERTY

TB has evolved a predilection for the poor and disenfranchised, and today it is considered a barometer of social welfare. During the recent resurgence of TB in New York City and in England, poverty again played a role, and the disease concentrated in minorities and the homeless. TB remains a familiar scourge in Africa and South Asia, where it is the leading cause of death, particularly amongst the poor. In South Africa, the risk of developing TB is 22 times greater for blacks than for whites. Similar gradients are evident in most countries.

TB creates as many orphans as AIDS and more than any other infectious disease. It also kills more women than the direct complications of pregnancy and childbirth combined, with enormous negative impact on the social fabric of families. As poverty fuels TB (through crowding and malnutrition), so TB fuels poverty. Widows and orphans lose not only loved ones but also breadwinners, and in many cases they are left with debts from the medical care of TB victims. TB patients lose three to four months of work and 20 to 35 percent of annual household income. In Asian countries, that translates to a 4 to 7 percent loss of gross domestic product. In India alone, the loss to the economy is estimated to be nearly US\$400 million each year. The world spends almost \$4 billion on TB control every year.

With the advent of AIDS, even previously coping countries are unable to keep up with the increasing burden of TB.

THE STATE OF TB CONTROL

Introduction of effective antituberculosis drugs 50 years ago left behind the era of sanatorium confinement and 50-percent case fatality rates. Antituberculosis treatment is today one of the most cost-effective health interventions. Based on data from Sub-Saharan Africa, the cost per TB death averted by drug therapy can be as low as \$20 and never exceeds \$100. These low costs translate into costs per DALY saved of about \$1 to \$3.

Drug treatment can cure more than 90 percent of patients in developing countries, and the cost is continuing to decrease. Because one patient with TB leads to one to four new cases, the best prevention is curing infectious persons early in the course

of the disease. After introducing DOTS as the breakthrough of the 1990s, WHO set optimistic program goals: detecting 70 percent of TB cases and curing 85 percent of them by 2000. Notable DOTS successes occurred in Bangladesh, China, India, Morocco, Peru, Viet Nam, and New York City.

Half the countries in the world have signed on to the DOTS method. Yet less than 25 percent of patients today have access to DOTS and another 25 percent get no formal treatment. Current efforts detect barely one-third of the estimated number of cases, and drug resistance looms as a threat to effective treatment.

WHO control targets have now been pushed back at least 20 years. Antituberculosis treatment takes a minimum of six months to complete. Without close supervision, up to half the patients default treatment, especially the poorest, fostering contagion and the development of MDR-TB.

A successful program requires adequate infrastructure, a regular supply of drugs, and training and management at district and national levels. This is particularly difficult in rural areas of poor countries undergoing health-sector reform. The urgent need to increase the number of successful programs to control TB requires national commitment and investment as well as international support. WHO has led a growing partnership of international organizations in a global movement to "stop TB" (www.stoptb.org).

A vaccine against TB (BCG) has existed since 1921 and is the most widely administered vaccine in the world. Although it is effective against serious but not contagious forms of TB in children and against leprosy, BCG has not contained the epidemic in developing countries. The National Institutes of Health in the United States is leading an effort to develop a vaccine that could eradicate TB by the close of this century.

Despite the technological revolution of the 20th century, no new diagnostic test has replaced the inefficient chest radiogram and labor-intensive smear microscopy introduced in the 19th century. Likewise, no new antituberculosis drug has been developed in 30 years. But the sequencing of the genome of *M. tuberculosis* has brought unprecedented opportunities and new initiatives are addressing these gaps.

Although the number of TB cases is greater today than in any other time in history, the opportunities and the will to fight the disease are great. TB can be controlled, and eradication will be possible one day. ■

For further reading see A. Pablos-Mendez, M. Raviglione, A. Laszlo, et al., for The WHO/IUATLD Global Working Group on Anti-tuberculosis Drug Resistance Surveillance, "Global Surveillance for Antituberculosis Drug Resistance, 1994–1997," *New England Journal of Medicine* 338 (23, 1998): 1641–49; and C. Dye, S. Scheele, P. Dolin, V. Pathania, and M. Raviglione for the WHO Global Surveillance and Monitoring Project, "Global Burden of Tuberculosis: Estimated Incidence, Prevalence, and Mortality by Country," *Journal of the American Medical Association* 282 (7, 1999): 677–86.

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