

is instructive to look to HIV/AIDS, which in the course of the last three decades has become the world's leading infectious cause of adult death.

### HIV INFECTION/AIDS

**Chapter 226** provides an overview of the HIV epidemic in the world today. Here the discussion will be limited to HIV/AIDS in the developing world. Lessons learned from tackling HIV/AIDS in resource-constrained settings are highly relevant to discussions of other chronic diseases, including NCDs, for which effective therapies have been developed.

Approximately 34 million people in all countries worldwide were living with HIV infection in 2011; more than 8 million of those in low- and middle-income countries were receiving antiretroviral therapy (ART)—a number representing a 20-fold increase over the corresponding figure for 2003. By the end of 2011, 54% of people eligible for treatment were receiving ART. (It remains to be seen how many of these people are receiving ART regularly and with the requisite social support.)

In the United States, the availability of ART has transformed HIV/AIDS from an inescapably fatal destruction of cell-mediated immunity into a manageable chronic illness. In high-income countries, improved ART has prolonged life by an estimated average of 35 years per patient—up from 6.8 years in 1993 and 24 years in 2006. This success rate exceeds that obtained with almost any treatment for adulthood cancer or for complications of coronary artery disease. In developing countries, treatment has been offered broadly only since 2003, and only in 2009 did the number of patients receiving treatment exceed 40% of the number who needed it. Before 2003, many arguments were raised to justify not moving forward rapidly with ART programs for people living with HIV/AIDS in resource-limited settings. The standard litany included the price of therapy compared with the poverty of the patient, the complexity of the intervention, the lack of infrastructure for laboratory monitoring, and the lack of trained health care providers. Narrow cost-effectiveness arguments that created false dichotomies—prevention *or* treatment rather than both—too often went unchallenged. As a cumulative result of these delays in the face of health disparities, old and new, there were millions of premature deaths.

Disparities in access to HIV treatment gave rise to widespread moral indignation and a new type of health activism. In several middle-income countries, including Brazil, public programs have helped bridge the access gap. Other innovative projects pioneered by international NGOs in diverse settings such as Haiti and Rwanda have established that a simple approach to ART that is based on intensive community engagement and support can achieve remarkable results (**Fig. 2-2**).

During the past decade, the availability of ART has increased sharply in the low- and middle-income countries that have borne the greatest burden of the HIV/AIDS pandemic. In 2000, very few people living with HIV/AIDS in these nations had access to ART, whereas by 2011, as stated above, 8 million people, a majority of those deemed eligible, in these countries were receiving ART. This scale-up was made possible by a number of developments: a staggering drop in the cost of ART, the development of a standardized approach to treatment, substantial investments by funders, and the political commitment of governments to make ART available. Civil-society AIDS activists spurred many of these efforts.

Starting in the early 2000s, a combination of factors, including work by the Clinton Foundation HIV/AIDS Initiative and Médecins Sans Frontières, led to the availability of generic ART medications. While first-line ART cost more than \$10,000 per patient per year in 2000, first-line regimens in low- and middle-income countries are now available for less than \$100 per year. At the same time, fixed-dose combination drugs that are easier to administer have become more widely available.

Also around this time, the WHO began advocating a public health approach to the treatment of people with AIDS in resource-limited settings. This approach, derived from models of care pioneered by the NGO Partners In Health and other groups, proposed standard first-line treatment regimens based on a simple five-drug formulation, with a more complex (and more expensive) set of second-line options in reserve. Clinical protocols were standardized, and intensive training packages for health professionals and community health workers were developed and implemented in many countries. These efforts were supported by new funding from the World Bank, the Global Fund, and PEPFAR. In 2003, lack of access to ART was declared a global public health emergency by the WHO and UNAIDS, and those two agencies launched the “3 by 5 initiative,” setting an ambitious target: to have 3 million people in developing countries on treatment by the end of 2005. Worldwide funding for HIV/AIDS treatment increased dramatically during this period, rising from \$300 million in 1996 to over \$15 billion in 2010.

Many countries set corresponding national targets and have worked to integrate ART into their national AIDS programs and health systems and to harness the synergies between HIV/AIDS treatment and prevention activities. Further lessons with implications for policy and action have come from efforts now under way among lower-income countries. Rwanda provides an example: Over the past decade, mortality from HIV disease has fallen by >78% as the country—despite its relatively low gross national income (**Fig. 2-3**)—has provided almost universal access to ART. The reasons for this success include strong national leadership, evidence-based policy, cross-sector collaboration, community-based care, and a deliberate focus on a health system approach that embeds HIV/AIDS treatment and prevention in the primary health care service delivery platform. As we will discuss later in this chapter, these principles can be applied to other conditions, including NCDs.

### TUBERCULOSIS

**Chapter 202** provides a concise overview of the pathophysiology and treatment of TB. In 2011, an estimated 12 million people were living with active TB, and 1.4 million died from it. The disease is closely linked to HIV infection in much of the world: of the 8.7 million estimated new cases of TB in 2011, 1.2 million occurred among people living with HIV. Indeed, a substantial proportion of the TB resurgence



**FIGURE 2-2** An HIV/TB-co-infected patient in Rwanda before (*left*) and after (*right*) 6 months of treatment.