

Chapter 14 Highlights

1. Water can transmit infectious diseases through multiple pathways; there are *waterborne*, *water-washed*, *water-based*, insect-borne, and *environmental* pathogens. Breaking the cycle of disease transmission requires access to safe *water, sanitation, and hygiene (WASH)*, as well as better management of ambient surface water.
2. The historical evolution of urban water systems consists of three stages. Water 1.0 is the Roman model of centralized water delivery and drainage, Water 2.0 adds drinking water treatment on the front end, while *Water 3.0*, which serves most Americans, also adds wastewater treatment, which is important for protecting aquatic ecosystems and drinking water sources.
3. Even with water treatment plants in place, it is still important to protect water sources from polluting activities. Water providers are implementing effective source protection programs in cooperation with local governments and residents.
4. Under the Safe Drinking Water Act, EPA sets standards for contaminants in water (*MCLGs* and *MCLs*), but has been slow to address new threats and to update existing standards.
5. Water 3.0 has led to a large decline in water-related infectious diseases in the US over the past century. The remaining health threat is primarily associated with environmental pathogens like Legionella, along with a poorly quantified risk from chemical contaminants, including arsenic, lead, and *disinfection byproducts*.
6. Some 2 million people in the US—disproportionately indigenous and people of color—do not have access to drinking water and sanitation. Even among those with access, there are significant racial and economic disparities in safety and quality of service. Prominent examples include the lead water crisis in Flint, Michigan, the lack of household plumbing in the Navajo Nation, the contamination of private wells in California’s Central Valley, and the use of “straight pipes” in Lowndes County, Alabama.
7. Some of the weaknesses of US water systems include: under-investment in infrastructure maintenance; environmental contamination from combined sewer overflows; a slow and reactive approach to new chemical threats; a reliance on potable water to flush away human “waste”; linear flows of water and nutrients; the large number of small, under-resourced rural utilities, especially in low-income and minority communities; the high costs of maintaining and improving water infrastructure in *legacy cities*; and the increasing use of bottled water, which reflects, in part, public mistrust of the water-supply system.