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Health Risks from the Environment
Challenges to Health Service Delivery

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Introduction

More than 2000 years ago, a strong interrelationship between human populations and their environment was accurately assessed by Hippocrates (in the fifth century BC). In his treatise on Air, Water and Places, he admonished his students to observe the environment to understand the origins of disease in their patients (Francis, 1961). In this ancient context, environment refers to air, water, and soil. With increasing epidemiological data, this narrow definition is replaced by a definition that recognizes the importance of the environment that is manmade or created by society. Thus, lifestyle, homes, communities, work, and global environment enter into the definition of environment. Today, the interactions between humans and their environments, physical, chemical, biological, and social increasingly influence thinking and planning in health services. A classic model of health that embodies this orientation is the epidemiological triangle (Fig. 11.1). This model conceptualizes that health is achieved through an optimal balance among the host, agent, and the environment. The components of the model can be used to assess environmental risk according to biological, chemical, physical, psychological, and, sociological factors. Sociological and psychological factors of environmental origins are not as well delineated as biological, chemical and physical. Evidence abounds that the major disease problems facing all nations today to one degree or another are caused, mediated, or exacerbated by environmental factors (US Public Health Services, 1999; National Institute of Environmental Health Sciences, 1995). For example, without the proper disposal of waste and effective management of water resources, populations could be decimated by water or food-transmitted diseases. According to the report of the US Global Change Research Program (Patz et al., 2000), there are five categories of health outcomes affected by environmental conditions: (1) temperature-related morbidity and mortality; (2) extreme weather events (storms, tornadoes, hurricanes, precipitation extremes); (3) air-pollution-related health effects;
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(4) water- and food-borne diseases; and (5) vector- and rodent-borne diseases. Historically, the health of the environment pertaining to each of these categories has been the purview of governmental agencies. But, because of trends in public–private partnerships, this responsibility will continue to be shared. The increased availability of information (labeling of consumer products, right-to-know workplace laws, package inserts for drugs, etc.) makes it more likely that members of the public will seek advice from health care practitioners about the relationship of environmental agents to current health issues in their families and in their neighborhoods. As we learn more about the health implications of exposure to environmental agents, social and economic forces will compel the health service system to transcend the traditional diagnosis-treatment models. Thus, the purpose of this chapter is twofold: (1) to evaluate how the environment effects health status, and (2) to illustrate the use of epidemiological methods in planning and devising health care services in response to the new challenges in the environment.

Problems in Environmental Health

Most diseases today, even many transmissible ones (such as Legionnaire’s disease), have environmental components. Environmental conditions that represent potential sources of health risks are numerous and can come from the home setting, workplace, or community (Table 11.1).

Gene–Environment Interaction

As mentioned in Chapter 9, environmental factors act in conjunction with normal genetic profiles as with acquired susceptibility states. As our knowledge of DNA has advanced, it