Part I:

# Epidemiologic Surveillance and Disease Control after Natural Disaster

Chapter 1

# Risk Factors for Communicable Diseases after Disasters

Until approximately 1850 and the onset of the era of science, administrators of the day were well aware of the triad of famines, epidemics and social disruption, and their consideration of the major causes of disaster was focused on famine and epidemics of quarantinable diseases. With improved sanitary conditions and the documentation of natural catastrophe beyond Europe and North America, brought about by more rapid communication and transportation, interest in natural disaster gradually grew.

In industrialized societies today, advances in economic conditions and in public health have virtually eliminated the problem of communicable diseases as disasters. In developing countries, however, communicable diseases continue to cause primary disasters. This is frequently true of such diseases as measles, poliomyelitis, malaria, typhoid fever, and arthropod-borne viruses such as dengue and yellow fever. When this occurs, national authorities usually seek assistance from agencies where there is expertise with communicable disease control, such as the Pan American Health Organization or the Centers for Disease Control, rather than from disaster relief agencies.

## Epidemiologic Factors that Determine the Potential of Communicable Disease Transmission

The potential risk of communicable diseases after disaster is influenced by six types of adverse change. These are changes in preexistent levels of disease; ecological changes which are the result of the disaster; population displacement; changes in population density; disruption of public utilities; and interruption of basic public health services.

### *Changes in preexistent levels of disease*

Usually the risk of a communicable disease in a community affected by disaster is proportional to the endemic level. There is generally no risk of a given disease when the organism which causes it is not present beforehand. Developing countries frequently have such poor systems for reporting communicable disease, however, that their national authorities lack adequate information about levels of specific organisms. Political pressure is nonetheless sometimes exerted for taking public health measures against diseases such as smallpox, cholera, yellow fever or other vector-borne diseases in geographic areas considered free of them by communicable disease specialists.

Relief workers can conceivably introduce communicable disease into areas affected by disaster. Diseases potentially introduced include new strains of influenza, foot-and-mouth disease, and those borne by insect vectors, particularly by *Aedes aegypti*. Also, nonimmune relief workers may be susceptible to endemic diseases to which the local population is tolerant or immune, and they may become ill.

### *Ecological changes caused by the disaster*

Natural disasters, particularly droughts, floods and hurricanes, frequently produce ecological changes in the environment which increase or reduce the risk of communicable disease. Vector-borne and water-borne diseases are the most significantly affected. A hurricane with heavy rains which strikes the Caribbean coastal area of Central America may, for example, reduce the number of *Anopheles aquasalis* hatched, since the vectors prefer brackish tidal swamps and increase *A. albimanus* and *A. darlingi*, which breed easily in fresh, clear water and overflows. The net effect of the hurricane on human malaria, of which both mosquitoes are vectors, would be difficult to predict. Rain from such a hurricane would also cause flooding of streams and canals which in rural areas are often the source of drinking water. Under some circumstances, a water-borne zoonotic disease, such as leptospirosis, may become more widely disseminated via water-contact or drinking from contaminated sources. There is evidence that the short term effect of diluting supplies of already contaminated drinking water with rain may, however, reduce the level of disease (*1*). The population may,