Disasters disrupt the natural, built, and social environments, affecting communities and the people within them. Disasters can be triggered by climatic, geophysical, technological, or human-initiated events, or a combination of these. Their impact on the health of a community can be immediate or delayed, and changes in health status may be attributable to the original event or result from events subsequent to the disaster. Deaths, injuries, and other health outcomes of a disaster are usually caused by the destruction of the built infrastructure. In the absence of people living in built communities, disasters do not occur.

The frequency and severity of disasters triggered by natural hazards have increased over the last 15 years, part of which is attributable to cyclic changes in climate patterns. Of even greater relevance, however, is the fact that population density in cities and in geophysically vulnerable areas has increased dramatically since 1950, both in developed and developing countries. The majority of the world’s largest cities (17 of 20) are in developing countries, 80% of the world’s population will be concentrated in developing countries by 2025, and half of the large cities in the developing world are vulnerable to natural disasters such as floods, severe storms, and earthquakes (Noji, 2005). Disaster-related health problems in developing countries are exacerbated by lower immunization rates and poor nutritional status relative to those in the United States and other developed countries, and greater vulnerability of the facilities that provide water and handle sewage.

Health effects vary across disaster types. For example, death by drowning rarely occurs during earthquakes, but is a major cause of death during hurricanes and floods. The extent to which infectious diseases occur is determined by the health of the affected community before the disaster, and the ability of the infrastructure to recover sufficiently to prevent, or at least control, the spread of infectious diseases. In general, increases in infectious disease rates following disasters are more common in developing than in developed countries.

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It has often been stated that “vulnerable” populations, such as women, children, the elderly, undocumented immigrants, underrepresented groups, and the poor, are differentially and negatively affected by disasters (e.g., Bolin, 1976; Bolin & Bolton, 1986; Bolin & Stanford, 1991; Drabek & Key, 1984; Kaniasty & Norris, 1994; Kilijanek & Drabek, 1979; Tierney, Lindell, & Perry, 2001). Research on physical morbidity and mortality associated with natural hazards and terrorist events generally does not support that perception, at least in the United States. In contrast, the literature on mental health morbidity shows that vulnerable persons are particularly prone to post-disaster stress, a topic addressed at the end of this chapter.

Age is the only characteristic that has been consistently reported to have a weak association with disaster-related morbidity and mortality. Following the Northridge earthquake, studies of hospital admissions and emergency room logs found that older persons were more likely to be hospitalized because of injuries suffered (Peek-Asa et al., 1998; Seligson & Shoaf, 2003) and were somewhat more likely to present at emergency rooms (Mahue-Giangreco, Mack, Seligson, & Bourque, 2001), but when residents were asked about injuries in community-based samples following three California earthquakes, women and younger persons were more likely to report being injured (Shoaf, Nguyen, Sareen, & Bourque, 1998). The elderly were also more likely to be killed in the Hanshin-Awaji earthquake in Kobe, Japan, but here the higher death rates for elderly are confounded by the fact that the elderly tended to sleep on the first floor of “bunka jutaku,” two-story wooden houses with heavy tiled roofs and thin walls that were built after World War II (Kunii, Akagi, & Kita, 1995).

It is somewhat easier to conclude that recovery from disasters favors those with knowledge and money. In a series of analyses conducted at UCLA, we have demonstrated that persons with higher education and income are more likely to engage in preparedness and hazard mitigation activities before earthquakes, are more likely to take first aid courses, and know more about where to obtain assistance after disasters. Conversely, immigrants and persons who are linguistically isolated are less likely to have invested in preparedness and hazard mitigation, or to know where to go for assistance (e.g., Goltz, 2005; Kano, Siegel, & Bourque, 2005; Nguyen, Shen, Ershoff, Afifi, & Bourque, in press; Nguyen, Shoaf, Rottman, & Bourque, 1997; Russell, Goltz, & Bourque, 1995). Interestingly, however, during the Northridge earthquake, newer homes inhabited by middle-class whites were more likely to be damaged than older homes that were inhabited by groups more often considered vulnerable (Comerio, 1995; Shoaf & Bourque, 1999), but African-American residents more often perceived themselves to be victims of the earthquake than did other groups with more property damage.

The inability to demonstrate a relationship between traditional indicators of vulnerability and morbidity and mortality does not automatically mean that it does not exist. Rather it may reflect the generally weak methodology of most studies. Very few studies allow prevalence estimates and rates to be calculated for the morbidity and mortality associated with disasters (Bourque, Shoaf, & Nguyen, 1997; Dominici, Levy, & Louis, 2005; Ibrahim, 2005). Most studies describe those cases in a coroner or medical examiner’s office, or at a hospital or emergency room, with no effort to describe the denominator population from which the cases are drawn. A study focused only on the dead, injured, and sick who present at a particular location provides no insight into how deaths and injuries are distributed across the population at risk, and whether certain groups are more vulnerable to death and injury. Increased use of cluster samples in rapid needs assessments after floods and hurricanes provides some ability to generalize to a larger population. Unfortunately, rapid assessment techniques do not work well following earthquakes where structural damage is less predictably distributed (Noji, 2005).

Other useful, but underutilized, methodologies include case-control designs, geographic information systems (GIS), comparative cohorts, and probability proportionate to size (PPS)