

An Overview of Deaths Associated with Natural Events in the Northwest Region of the United States, 1979–2004

Robin Lee
Raquel Sabogal
Maria Thacker
Alden Henderson

Extrême cold or heat accounted for a majority of the total number of deaths attributed to natural events across the United States—more than all deaths resulting from lightning, storms and floods, and earth movements, such as earthquakes and landslides. Most deaths associated with natural events are preventable and society can take action to decrease the morbidity and mortality connected with them.

From 1979 to 2004, there were 10,827 cold-related deaths and 5,279 heat-related deaths in the United States. Other deaths associated with natural events were attributed to lightning (1,906), storms and floods (2,741), and earth movements (738). In the Northwest region of the United States, deaths associated with natural events were mainly cold-related (931). Other deaths in the Northwest region that were related to natural events included 103 heat-related deaths, 46 lightning deaths, 79 storm-and flood-related deaths, and 274 deaths related to earth movements.

A recent article in June 2008, “Overview of deaths associated with natural events, United States, 1979–2004”, is the first study to investigate which types of natural events cause the most deaths in the United States. This review, excerpted from that article, highlights results specific to the Northwest region of the United States (Alaska, Idaho, Montana, Oregon, Washington, and Wyoming).

The data reviewed come from the Centers for Disease Control and Prevention’s (CDC) National Center for Health Statistics’ Compressed Mortality File (CMF). The CMF contains the underlying cause of death as recorded on a death certificate for US residents. Death certificates include state and county of residence, year of death, race, sex, and age of the decedent. The International Classification of Diseases classifies whether the underlying cause of death were related to natural events, including cold, heat, lightning, storms or floods, and earth movements. Crude US death rates for a 26-year period between 1979 and 2004 were calculated by dividing the number of condition-specific deaths by current 2000 US census figures and converting the rate to per million persons. Thus, all crude death rates reported represent the number of deaths per

one million persons. Age group-specific death rates identify demographic characteristics of the groups mostly affected. Additional methods used in the data analyses are available in the original June 2008 publication.

Data for the Northwest region indicated a higher incidence of cold-related deaths than the national average. Alaska’s rate was nine times higher than the national average, Montana’s rate was nearly six times higher, and Wyoming’s rate was about four times higher. Cold weather mostly affected the elderly, particularly those 85 and older, in the United States and similarly in the Northwest region.

Although other regions of the United States may experience heat waves more frequently, deaths due to heat also occur in the Northwest region. In 1999, researchers reported one heat-related death in Alaska. Idaho had the highest crude heat-related death rate, which equaled the United States’ average. All other Northwest states were less than the national average. The highest heat-related crude death rates occur in Arizona, Missouri, and Arkansas according to the June 2008 article. As is the case in cold-related deaths, extreme heat is more likely to affect the elderly.

Crude death rates for lightning-related deaths were all less than one. The Northwest states of Idaho, Montana, and Wyoming were above the national average. Storms and floods made up 13 percent of the deaths from natural events. In the Northwest, Wyoming had the highest deaths rate from storms and floods. Although all age categories had a death rate of less than one, the highest death rates were among those aged 55 years or older.

Earthquakes and landslides were the least common fatal events in the United States; however, some of the highest death rates from these earth movement events occurred in the Northwest region. The crude death rate from earth movements for the United States was less than one. The highest crude death rate for earth movements in the United States was in Alaska. Montana and Wyoming also had higher-than-average crude death rates for these events.

Media attention and disaster relief resources often focus on cataclysmic events such as hurricanes, floods, and tornadoes, rather than on the temperature extremes that accounted for three-quarters of the

deaths. For example, the Chicago heat wave of 1995 caused an estimated 700 deaths; yet, these deaths were reported mainly in the local news media. The City of Chicago or local organizations primarily provided disaster assistance for this event.

In contrast, the local and national media dedicate significant airtime and newspaper space to destructive natural phenomena such as earthquakes, floods, hurricanes, landslides, and tornados. Hurricane Andrew, which caused \$26 billion of damage and resulted in 26 directly related deaths based on reports post-hurricane, received months of national media coverage, including front-page stories about the devastation and federal and state assistance.

Vital records contain essential data about causes and times of death, but these records have their limitations. The CMF underreports the actual number of deaths due to severe heat and perhaps other natural events. CDC has proposed a method to create a standard for ascertaining and classifying disaster-attributed mortality. The proposed method, published in 1999, is flexible enough to include all potentially preventable deaths related to disasters by enhancing current data systems and by using a flow chart and a classification matrix to minimize errors in classifying deaths not related to a disaster.

Although technology cannot prevent a hurricane or heat wave, lives can be saved by accurately detecting and forecasting events, warning potentially affected populations, successfully evacuating residents, and engineering structures to protect occupants. Knowing what types of weather-related events are likely to occur in a particular area, and who is at the greatest risk, can help federal, state, and local governments design effective disaster preparedness and mitigation programs.

Vulnerable groups during weather-related events are the poor, the elderly, and people with limited mobility, a mental or chronic illness, and residence in long-term care facilities. The poor may be financially unable to evacuate the area; the elderly may be less able or willing to leave their homes; people with a chronic illness may need to bring medical equipment to assist them with basic life functions; and people on medication may be more susceptible to the hazards of extreme cold or heat.

Public education programs should be in place before summer or win-

ter to alert people of the dangers of extreme heat or cold. Programs such as the Chicago Extreme Weather Operations Plan serve as a model for state and local governments on how to activate and coordinate a response to hazardous weather conditions.

Most deaths due to natural events are preventable and society can take action to decrease the morbidity and mortality rates connected with them. ■

Authors

Robin Lee, MPH, is an epidemiologist at the US Agency for Toxic Substances and Disease Registry (ATSDR); Raquel Sabogal, MSPH, is an epidemiologist at CDC's National Center for Environmental Health; Maria Thacker, MPH, was a fellow at ATSDR's Division of Health Studies in Chemical Demilitarization; Alden K. Henderson, PhD, MPH, is an epidemiologist at the CDC's Coordinating Office for Global Health.

References

- Combs, DL, Quenemoen, LE *et al.* Assessing disaster-attributed mortality: development and application of a definition and classification matrix. *International Journal of Epidemiology* 1999; 28(6):1124–1129.
- Semenza, JC *et al.* Heat-Related Deaths during the July 1995 Heat Wave in Chicago. *New England Journal of Medicine* 1996; 335(2):84–90.
- Thacker MT, Lee R *et al.* Overview of deaths associated with natural events, United States, 1979–2004. *Disasters* 2008 Jun;32(2):303–15.
- Weisskopf, MG *et al.* Heat Wave Morbidity and Mortality, Milwaukee, Wisconsin, 1999 vs. 1995: An Improved Response? *American Journal of Public Health* 2002; 92(5): 830–833.

Crude Rates¹ of Deaths Due to Natural Events by Geographical Areas—1979 through 2004.

	Total Population	Cold	Heat	Lightning	Storms and Floods	Earth Movements
United States	6,680,742,340	1.6	0.8	0.3	0.4	0.1
Northwest Region	289,073,923	3.2	0.4	0.2	0.3	0.9
Alaska	14,583,400	14.5	0.1 ²	0.1 ²	0.3 ²	3.6
Idaho	28,966,919	3.1	0.8	0.4 ²	0.3 ²	0.9
Montana	21,999,052	9.4	0.5 ²	0.5 ²	0.2 ²	2.1
Oregon	78,466,604	2.3	0.5	0.1 ²	0.2 ²	0.4
Washington	132,454,071	1.3	0.2	0.1 ²	0.2	0.7
Wyoming	12,603,877	6.1	0.3 ²	0.4 ²	1.4 ²	1.7

¹ Crude death rate calculated using 2000 U.S. census figures and multiplying rate by 1 million

² Death rates based on counts of twenty or less have a relative standard error of 23 percent or more and therefore may be statistically unreliable