

HEAT-RELATED ILLNESS

QUICK FACTS

Despite the fact that all heat-related deaths and illnesses are preventable, each year an average of about 658 people succumb to extreme heat[1].

Estimating the public health impact of extreme heat is difficult because heat-related illnesses, such as heat stroke and heat exhaustion, do not require reporting to public health agencies.

Aspects of the man-made environment—access to transportation, medical care, and cooling centers and prevalence of crime in a neighborhood—can accentuate the health risks of heat waves.[2]

Heat-related deaths are one of the deadliest weather-related health outcomes in the United States.[1]

WHAT IS HEAT-RELATED ILLNESS?

Heat-related illness, also called hyperthermia, is a condition resulting from exposure to extreme heat where the body becomes unable to properly cool, resulting in a rapid rise in body temperature. The evaporation of sweat is the normal way to remove body heat, but, when the humidity is high, sweat does not evaporate as quickly.[3] This, in turn, prevents the body from releasing heat quickly. Prompt treatment of heat-related illnesses with aggressive fluid replacement and cooling of core body temperature is critical to reducing illness and preventing death.[4]

HEAT EXHAUSTION

Exposure to excessive heat can directly or indirectly cause some illnesses and can exacerbate many preexisting conditions, such as heart and respiratory disease. Of the heat-related illnesses, heat exhaustion and heat stroke are the most serious. The symptoms of heat exhaustion include[5]

- Muscle cramping
- Fatigue
- Headache
- Nausea or vomiting
- Dizziness or fainting

Ironically, a patient with heat exhaustion often might have cool and moist skin, indicating that the body's ability to cool itself is still present, but the patient's pulse rate is fast and weak, and breathing is rapid and shallow.[5]

HEAT STROKE

If untreated, heat exhaustion may progress to heat stroke. Heat stroke is a serious, life-threatening condition characterized by the following symptoms:[5]

- A body temperature greater than 103°F (39.4°C)
- Red, hot, and dry skin (no sweating)
- Rapid, strong pulse
- Throbbing headache
- Dizziness
- Nausea
- Confusion
- Unconsciousness

Very high body temperatures can damage the brain or other vital organs. In severe cases, the problem can progress to multiple organ system failure and death.

While heat-related illnesses and deaths are preventable, many people still succumb to illness caused by extreme heat each year. In addition to the actual air temperature and a person's underlying health issues, environmental factors, such as humidity, can contribute to hyperthermia, as can strenuous physical activities in hot conditions. Buildings and other parts of the man-made environment can also increase the health risks of heat waves.

WHAT ARE THE RISK FACTORS FOR HEAT-RELATED ILLNESS AND DEATH?

NON-ENVIRONMENTAL RISK FACTORS

People at greatest risk for heat-related illness include infants and children up to 4 years old; people 65 years of age and older; people who are overweight or have existing medical conditions, such as diabetes and heart disease; people who are socially isolated; and the poor.[6,7,8] However, even young and healthy individuals can succumb to heat if they participate in strenuous physical activities during hot weather. Other behaviors also put people at greater risk, such as drinking alcohol and taking medications that impair the body's ability to regulate its temperature or that inhibit perspiration.



ENVIRONMENTAL RISK FACTORS

Exposure to temperatures much hotter than those to which the population is accustomed can make people more vulnerable to heat-related illnesses and death. This applies especially to populations living in the midwestern and northeastern United States, where temperatures are typically cooler, and many buildings are not equipped with air conditioning. Increased risks posed by heat waves (generally, three or more consecutive days with at least 90°F [32°C] heat) can be exacerbated by features of the man-made environment, including limited access to transportation, medical care, and cooling centers.

The man-made environment also can lead to what is called the 'urban heat island effect,' in which urban centers are significantly warmer than their surrounding rural areas, even in the absence of a heat wave. This occurs because urban areas have much more concrete and asphalt, which absorb more of the sun's energy.

HOW ARE WE TRACKING HEAT-RELATED ILLNESS AND DEATH?

Estimating the public health impact of extreme heat is difficult because hospitals and health care providers are not required to report heat-related illnesses, such as heat stroke and heat exhaustion, to public health agencies. In addition, heat-related deaths are often misclassified or unrecognized.

To estimate the number of deaths associated with exposure to extreme heat, the CDC uses death certificates. These data are used to determine the annual number of deaths that list exposure to excessive natural heat as the underlying cause, that record hyperthermia as a contributing factor, or both. However, because heat-related illnesses can cause a variety of symptoms and worsen underlying medical conditions, the cause of death is frequently misdiagnosed. Therefore, estimates of the number of hyperthermia-related deaths are lower than the actual number.

WHAT ARE THE TRENDS AND INCIDENCE OF HEAT-RELATED ILLNESS AND DEATH?

From 1999 to 2010, 8,081 heat-related deaths were reported in the United States. In 5,783 (72%) of these deaths, the underlying cause was exposure to excessive heat, and heat was a contributing factor in the remaining 2,298 (28%) deaths. Of these 8,081 deaths, 6,850 occurred among U.S. residents and 1,231 occurred among non-U.S. residents. Heat-related deaths were reported most frequently among males (5,567; 69%) and among adults aged ≥65 years (2,901; 36%) (Figure 1).[9,10] The lowest crude death rates were among White females and White males (Figure 2).

Almost all heat-related deaths occurred during May–September (7,621; 94%), with the highest numbers reported during July (3,145; 39%) and August (2,138; 26%). Heat-related deaths occurred most frequently in urban areas (81%), and the three states with the highest burden, Arizona, Texas and California accounted for 43% of all heat-related deaths.[1]

More than half of the deaths to which hyperthermia contributed occurred in patients for whom an underlying cause of death was reported as a cardiovascular condition (1,595 of 2,298 deaths or 69%).[1]

Hospitalizations for heat-related illness increase with age, especially for those 85 years of age and older (Figure 3.) In a study conducted in California, researchers found that heat-related illness was more likely to result in emergency department (ED) visits than hospitalizations.[10] Although ED visits are considered a less severe health outcome than a hospitalization, each visit is still an indicator of a potentially serious health outcome with a substantial burden on the health care system.[11]

HOW CAN PREVENT HEAT-RELATED ILLNESS AND DEATH

By knowing who is at risk and what prevention measures to take, heat-related illness and death can be prevented. Air-conditioning is the number one protective factor against heat-related illness and death.[11] If a home is not air-conditioned, people can reduce their risk for heat-related illness by spending time in public facilities that are air-conditioned. This is particularly important during a heat wave. Periodically checking on neighbors who do not have

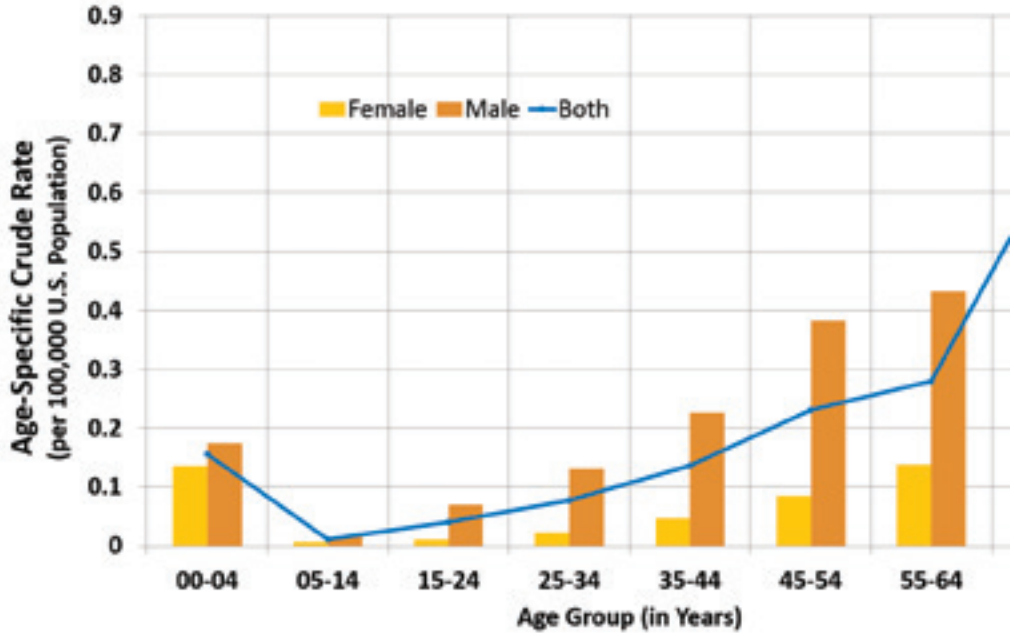


FIGURE 1. Age-specific Crude Death Rate for Heat-Related Deaths, by Gender and Age Group for U.S. Residents—United States, 1999–2010 (n=6850)[9]

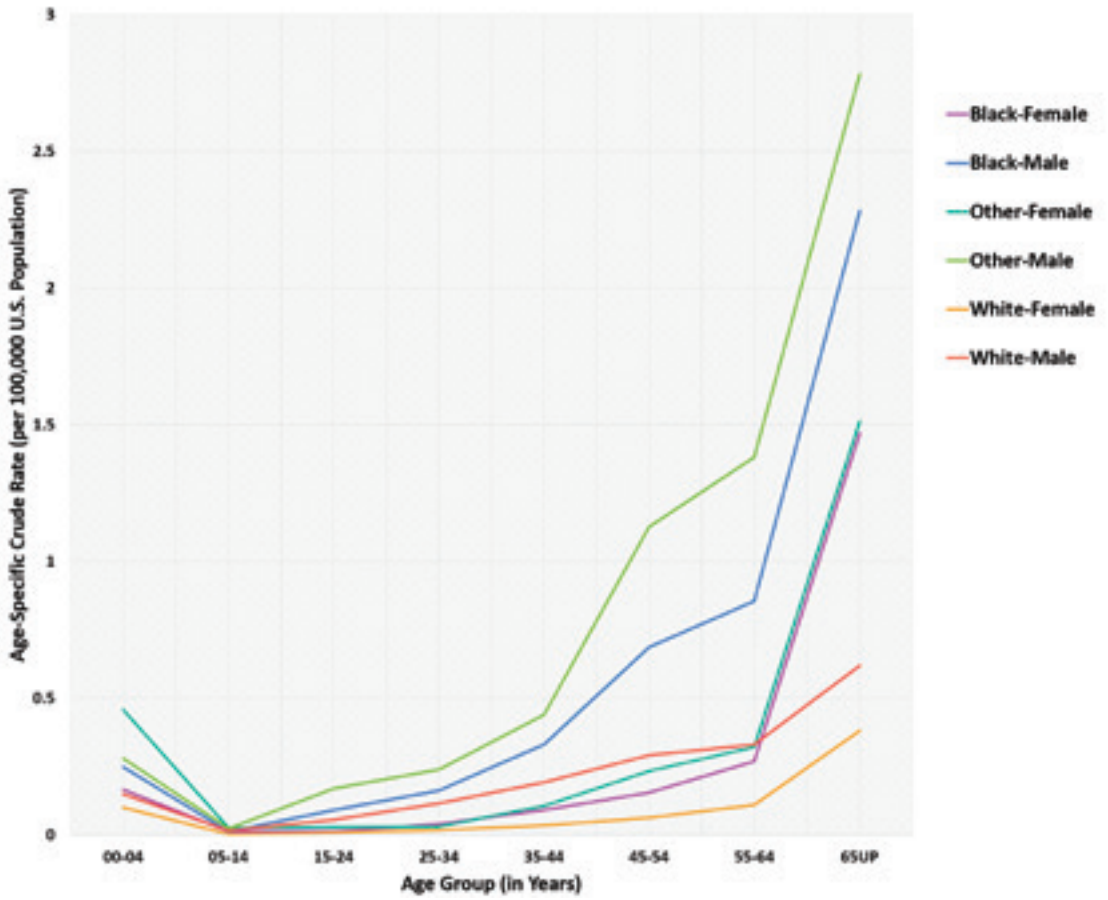


FIGURE 2. Age-Specific Crude Death Rate for Heat-Related Deaths, by Race, Gender, and Age Group for U.S. residents—United States, 1999–2010 (n=6,850)[9]

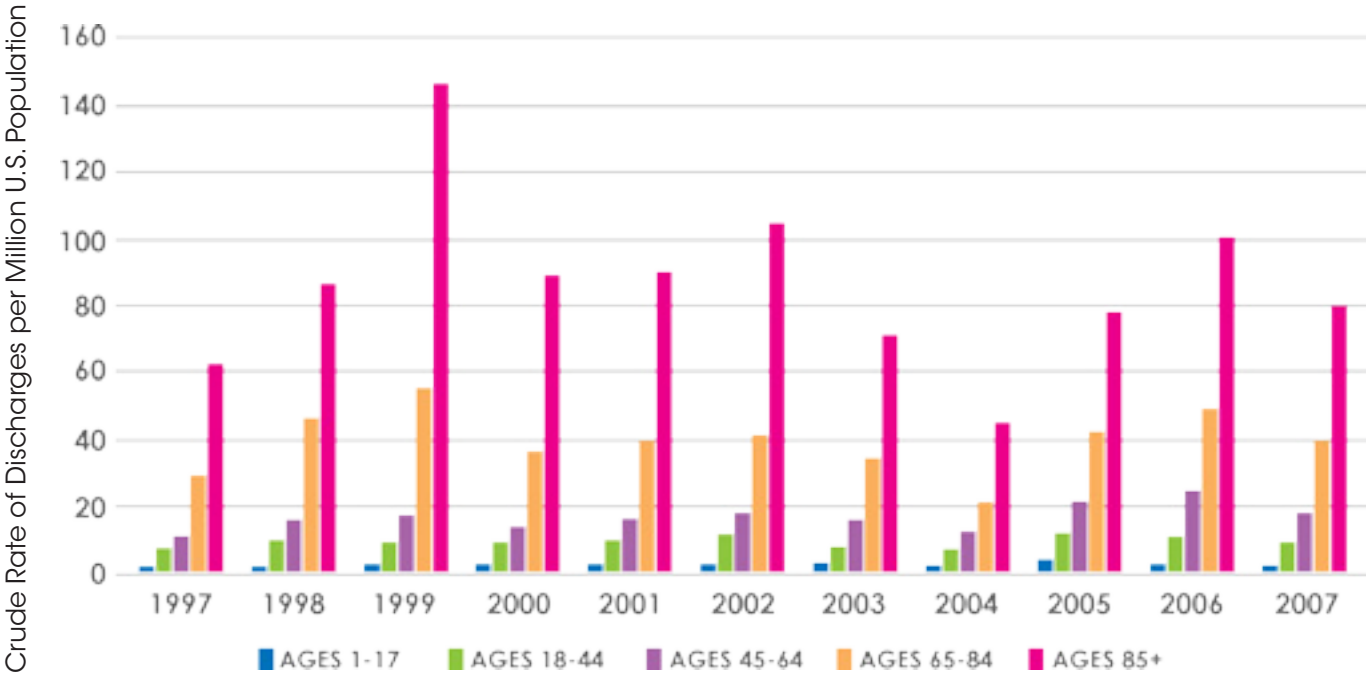


FIGURE 3. Crude Rate of Hospitalizations for Heat-Related Illness, by Age Group — United States, 1997–2007[9]

air-conditioning can be a life-saver. Other protective measures include frequently drinking water or non-alcoholic fluids; wearing lightweight, light-colored, loose-fitting clothing; and reducing or eliminating strenuous activities or doing them during cooler parts of the day.

Communities can prepare for heat waves by developing heat response plans[12] that clearly define specific roles and responsibilities of government and nongovernmental organizations before and during heat waves. Such plans should identify local populations at high risk for heat-related illness and death and determine what strategies will be used to reach such individuals during heat emergencies. The CDC's National Center for Environmental Health, with scientists from the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA), has developed the *Excessive Heat Events Guidebook*. The *Guidebook* is a resource for local and city emergency response personnel in the development of heat response plans and is available at http://www.epa.gov/heatisland/about/pdf/EHEguide_final.pdf. Heat-related deaths also are a problem for athletes, and CDC has developed a Web-based training module for coaches and athletic trainers, especially at the secondary school level: *Recognizing, Preventing and Treating Heat-Related Illness*. http://www.cdc.gov/nceh/hsb/extreme/heat_illness_training.htm.[13]



WHAT YOU CAN DO

- During heat waves, frequently check on people at risk for heat-related death, such as the elderly and disabled or homebound people.
- Never leave children alone in cars, and ensure that children cannot lock themselves in an enclosed space, such as a car trunk.
- Limit sun exposure during midday hours and in places of potential severe exposure, such as beaches.
- Drink plenty of nonalcoholic fluids, and replace the body's salts and minerals, which sweating can release. Do not take salt tablets unless under medical supervision.
- Dress infants and children in cool, loose clothing and shade their heads and faces from the sun with hats or an umbrella.
- Provide plenty of fresh water for pets, and leave the water in a shady area.

ADDITIONAL RESOURCES

- CDC: http://www.cdc.gov/extremeheat/
- EPA: http://www.epa.gov/naturaldisasters/extremeheat.html
- Ready.gov https://www.ready.gov/heat
- NOAA: http://www.nws.noaa.gov/
- American Red Cross: http://www.redcross.org/prepare/disaster/heat-wave



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