

INJURY UPDATE

*A Report to Oklahoma Injury Surveillance Participants**

May 31, 2002

Heat-Related Deaths, Oklahoma, 1990 – 2001

Heat-related illnesses are a serious health problem. Each year more people in the U.S die from extreme heat than from hurricanes, lightning, tornadoes, floods, and earthquakes combined. During 1979-1998, a total of 7,421 deaths in the U.S. were attributed to excessive heat exposure with an average annual rate of 1.49 per million population, averaging nearly 400 deaths each year.

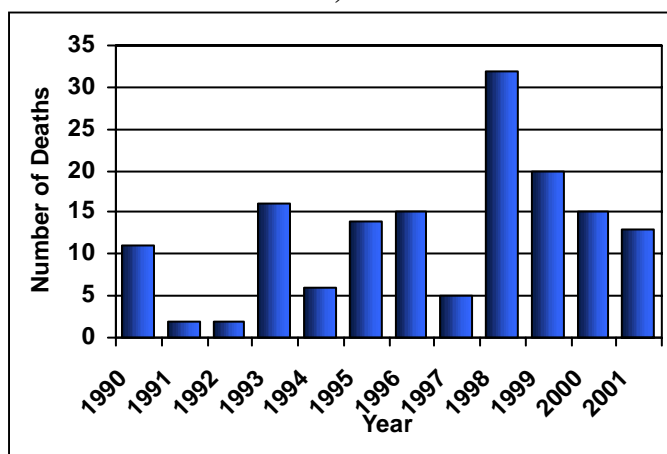
Several factors affect the body's ability to cool itself during extremely hot weather. When the body cannot perspire fast enough to get rid of heat, the body temperature rises causing vital organs to malfunction, and even death. Three common heat-related disorders are heat cramps, heat exhaustion, and heat stroke. Painful cramps in the stomach, arms and legs can result if heavy sweating drains a person of salt. Cramps are a warning that more serious heat disorders may occur if the stress continues. Heat exhaustion occurs when the body's cooling system cannot keep up with the heat stress. Signs of heat exhaustion include: heavy sweating, cool moist skin, body temperature greater than 100°F, weak pulse and normal or low blood pressure. Victims may be tired, weak, clumsy, upset or confused, have blurred vision, and are normally very thirsty. Heat stroke develops when all the water in the body available for perspiration has been used. This may cause the body temperature to rise to above 104°F, and the skin becomes hot, dry, and red. Victims in the later stages of heat stroke may faint or have convulsions and should be taken to a hospital immediately.

Lifestyle factors that can increase risk of heat-related deaths include: unbearably hot living quarters; lack of transportation; overdressing; and not understanding weather conditions. Other conditions related to risk include: age (the elderly and young children), obesity; reduced water intake; heart, lung, and kidney diseases; any illness that causes general weakness or fever; mental illness; poor circulation; sunburn; prescription drug use (diuretics, sedatives, tranquilizers, and certain heart and blood pressure drugs); and alcohol use.

Occupations that expose one to heat and/or fire also increase the risk. A person who is unable to remove himself/herself from an enclosed vehicle is at risk for a life-threatening crisis if left alone in a sun exposed car for even a relatively short period of time. This is especially so for infants and young children.

According to the Office of the Chief Medical Examiner, 151 heat-related deaths were recorded in Oklahoma between 1990 and 2001, with an average annual rate of 3.8 per million population. The ages of cases ranged from 1 to 90 years, with average age of 64 years. One-fifth of the deaths were recorded in 1998 (Figure 1).

Figure 1. Heat-Related Deaths by Year, Oklahoma, 1990-2001



*The INJURY UPDATE is a report produced by the Injury Prevention Service, Oklahoma State Department of Health. Other issues of the INJURY UPDATE may be obtained from the Injury Prevention Service, Oklahoma State Department of Health, 1000 N.E. 10th Street, Oklahoma City, Oklahoma 73117-1299, 405/271-3430 or 1-800-522-0204 (in Oklahoma). INJURY UPDATES and other IPS information is also available at www.health.state.ok.us/program/injury.

The average annual death rate for males was about 1.5 times higher than for females (4.6 vs. 3.1 per million population, respectively). The annual death rate of persons aged 65 and over was about 10 times higher than that of cases below age 65 (17.0 vs. 1.8 per million population) (Figure 2). Over half of the deaths (81/151) occurred in the month of July (Figure 3). The deaths were a result of exposure to high environmental temperatures directly or indirectly (indoors); three deaths resulted from malfunctioning heating units. The rate for blacks (8.6 per million population) was about two and a half times higher than that for whites (3.5 per million population) and almost four times that for Native Americans (1.9 per million population). About 39% of the cases were suffering from other conditions, including: diabetes mellitus, heart, lung and kidney diseases (24%); mental disorders (8%); and alcoholism and drugs (7%).

Among cases where place of injury was known, 70% (94/130) of the deaths occurred indoors. Persons 45 years and older were significantly more likely to die indoors (83%) than younger persons (27%) while persons under 45 were significantly more likely to die outdoors (73%) than persons aged 45 years and older (17%) (Table 1) Over half of the deaths (56%) occurred at the scene of injury, while 44% died in the hospital.

Oklahoma and Tulsa counties recorded the most deaths (55 and 17, respectively), however the average annual rate for Oklahoma County was 7.3 per million population and that for Tulsa County was 2.7 per million population. The highest average annual death rates were recorded for Carter (15 per million population), Marshall (14 per million population) and Jackson counties (11 per million population) (Figure 4.)

Figure 2 Heat-Related Deaths by Age and Sex, Oklahoma, 1990-2001

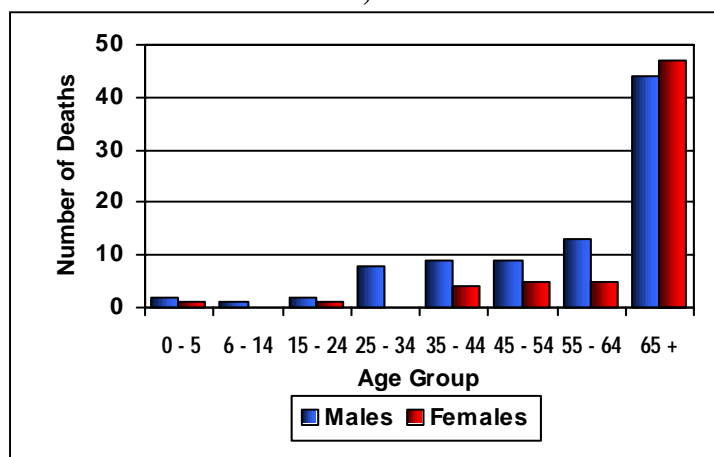


Figure 3. Heat-Related Deaths by Month, Oklahoma, 1990-2001

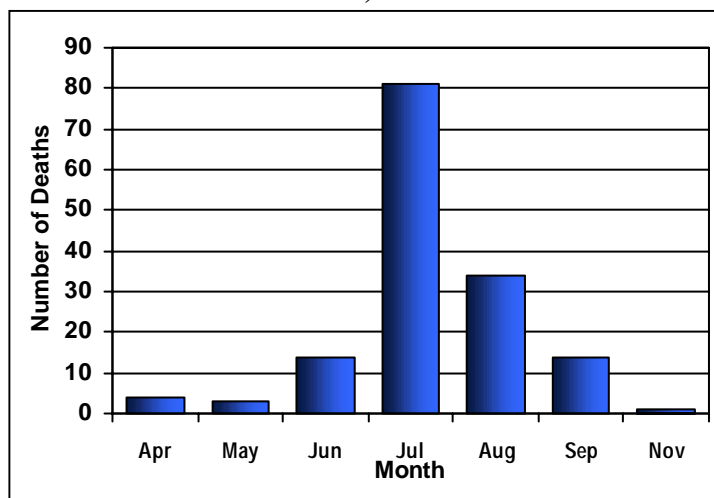


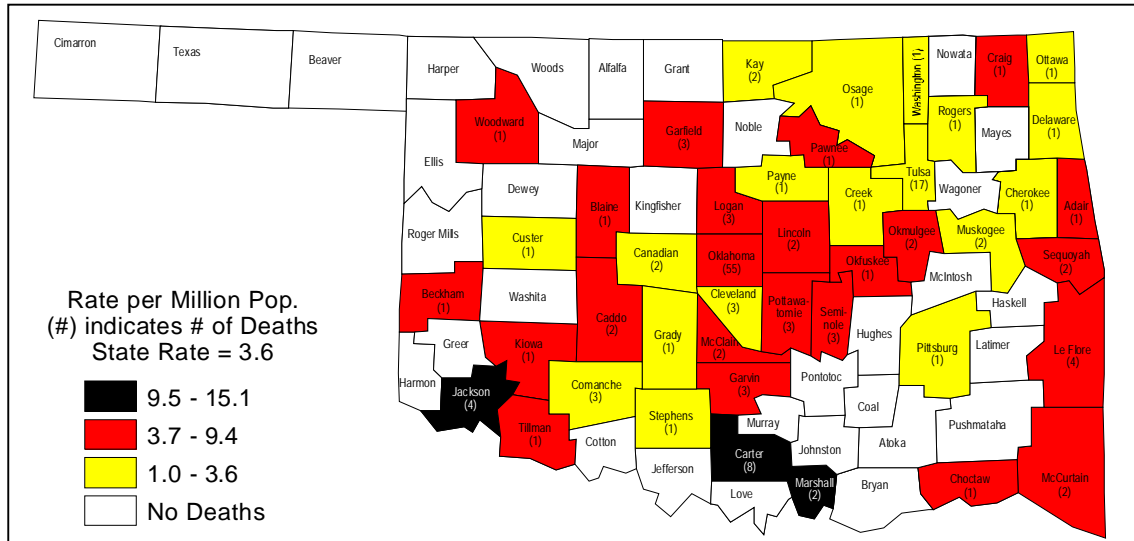
Table 1. Heat-Related Deaths by Age Group and Place of Injury, Oklahoma, 1990-2001

Age Group	Indoors	Outdoors
<45 years*	7 (27%)	19 (73%)
45+ years*	86 (83%)	18 (17%)
Total	93	37
Odds Ratio† =12.7; CI 3.6 – 34.2		

*Place of injury unknown/missing for 19 persons 45+ years and for 2 persons <45 years.

†Odds Ratio (of dying indoors) comparing persons 45+ to persons <45 years.

Figure 4. Number and Rate of Heat-Related Deaths by County of Residence, Oklahoma, 1990-2001



CASE BRIEFS

- A 29-year-old disoriented male was found wandering in a parking lot. He had apparently fallen in the parking lot and had abrasions on his knees and a broken tooth. In the emergency department, he was unresponsive but combative with a rectal temperature that increased from 105.4°F to 107.8°F. The decedent tested positive for cocaine and alcohol. The Office of the Chief Medical Examiner attributed the death to heat-related illness. No other social/medical history was known.
- A 44-year-old neurologically debilitated woman was found dead on the patio of her residence in the month of June. Multiple Sclerosis was a contributory cause.
- An 84-year-old widowed male was found dead at his home in the month of April. The decedent had a history of emphysema and coronary artery disease. The cooling/heating system in his apartment was malfunctioning at the time of his death.
- Police were called to check on an 62-year-old male with a history of alcoholism, heavy smoking, and poor diet who had not been seen for seven days. The home was very hot and rodent infested with mice and rat feces. Because of a concern of hantavirus, police officers were told to back out of the scene. Medical Examiner staff investigated the scene in full protective apparatus. A fan and air conditioning unit in the home was in working order but turned off. An autopsy was performed and the death was certified probable hyperthermia.
- A 76-year-old widowed male was found dead in a ditch in the month of August. The decedent was unofficially absent from a nursing home at the time of his death and had a history of Alzheimer’s.
- A 15-year-old female with a history of cerebral palsy and mental retardation died due to exposure to hot weather in the month of August. The decedent was in a vehicle outside in a parking lot.
- A 1-year-old baby died in the month of September, after being left in a closed vehicle in a parking lot. The baby died at the scene.

PREVENTION

Oklahoma records temperatures over 100°F every summer, particularly in July; thus, prevention of heat-related adverse effects is paramount. The media (print, television and radio) should routinely advise persons how to prevent heat-related conditions (see Fact Sheet). In addition, medical providers, faith and senior citizen groups, and other outreach organizations should routinely advise their clientele. During prolonged extreme temperatures, additional efforts to provide conditional shelters and transportation are necessary. The following page has additional tips to prevent heat-related illness.

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Warning Signs and Symptoms of Heat-Related Illnesses

Heat Cramps

- Painful muscle spasms in the abdomen, arms or legs following strenuous activity
- Skin usually moist and cool
- Pulse and body temperature usually normal or slightly raised

Heat Exhaustion

- Heavy sweating
- Paleness
- Cold/clammy skin
- Muscle cramps
- Irritability
- Tiredness or weakness
- Dizziness or headache
- A “sick stomach” feeling or vomiting

Heat Stroke

- Lack of sweating (some victims may sweat)
- Reddish tinge to skin
- Body temperature of 103 °F or higher
- Strong rapid pulse
- Confusion or unconsciousness (passing out)
- Possible delirium or coma
- Throbbing headache or dizziness
- A “sick stomach” feeling or nausea

Heat-Related Illness Prevention Tips

- Drink plenty of fluids (nonalcoholic), regardless of your activity level.
- Don't drink fluids that contain caffeine, alcohol, or large amounts of sugar as these actually cause you lose more body fluid.
- Wear lightweight, light-colored, loose fitting clothing.
- Stay indoors and, if at all possible, in an air conditioned place.
- Taking a cool shower or bath, frequent sponging with cool or cold washcloths or moving to an air conditioned place is recommended. Electric fans may provide comfort, but when temperature is in the high 90's, fans will not prevent heat-related illnesses.
- **Never** leave anyone in a closed, parked vehicle.
- Schedule vigorous activities and sports for cooler times of the day.
- Check regularly on people at a greater risk of hyperthermia including: infants and young children, people aged 65 or older, people who have a mental illness, and those who are physically ill, especially with heart disease or high blood pressure.