

HEAT WAVES

Lightning, hail, and tornadoes are all severe weather killers which claim dozens of lives annually. Severe thunderstorms also injure hundreds each year, but the deadliest weather in the United States arrives every summer and has killed, on average, 235 people per year for the last 10 years. This deadly weather comes in the form of long periods of excessive heat and humidity, or heat waves. In the summer of 1995, a heat wave killed over 700 people in Chicago. In 2003, The Earth Policy Institute reported over 35,000 deaths in Europe, with 14,802 deaths in France alone, during a two week heat wave with high temperatures soaring to 104° Fahrenheit.



Heat waves are ruthless killers that prey on the elderly, the very young, and those who fail to heed the excessive heat warnings and the symptoms of heat-related trauma. With increased awareness of this deceptive killer at both personal and governmental levels, heat-related deaths can be prevented. South Carolina suffers from searing summer temperatures courtesy of its sub-tropical geography and the orientation of the Sub-Tropical High pressure system centered over the southwestern Atlantic. The Sub-Tropical High, or Bermuda High, is quasi-stationary during the summer months, forcing very warm, moist tropical air north from the tropical Atlantic and the Gulf of Mexico over

South Carolina and the southeast United States. The Bermuda High also forces air to sink in the atmosphere. This downward motion causes the atmosphere to heat up and suppress cloud formation. Clouds help shade the ground and moderate surface temperatures. The Bermuda High also adds to the summer heat wave misery by trapping ozone, smoke and other pollutants in the lower atmosphere. Cities further increase heat wave intensity as the concrete and asphalt canyons trap and store excess heat, raising temperatures 5-10 degrees higher in these areas than in the surrounding suburbs that have more natural surfaces, vegetation and bodies of water.

Heat alone is enough to cause death, particularly among the elderly, but coupled with tropical levels of humidity, heat waves become insidious killers. The body's protective response to heat is sweating. Sweat helps transport heat from the body and acts to cool the skin when it evaporates, absorbing excessive body heat. Increased humidity saturates the surrounding air and reduces the evaporation of sweat. With the reduction of the body's cooling mechanism, the internal body core temperature increases, causing dizziness, dehydration, unconsciousness and ultimately coma and death without medical attention.

The National Weather Service has devised a heat index scale based upon both temperature and dew point. Heat index values more accurately portray how the humid summer air feels to a person in a shaded location. Heat index values can only be calculated for temperatures above 80° Fahrenheit and dew point values above 65°. On a sunny, humid summer day the temperature rises to 95° Fahrenheit and the dew point is a steamy 70%, the calculated heat index value would be 103°. Direct sunlight can increase heat index values by 15° Fahrenheit.

Heat index values of 80-90° Fahrenheit will cause fatigue and muscle cramps with prolonged exposure and without adequate hydration. Heat index values of 90-105° Fahrenheit will bring on heat exhaustion with the following symptoms: heavy sweating, paleness, dizziness, nausea and fainting. Hydration and avoiding excessive exertion is crucial to preventing heat exhaustion. Heat stroke or hyperthermia is the most serious heat induced illness and can be lethal. Heat index values above 105° Fahrenheit will put a person at risk for heat stroke. Heat stroke, also known as sunstroke, occurs when the heat index rises above 130° Fahrenheit. A person has heat stroke when their body temperature rises above 106° Fahrenheit and exhibits: flushed skin, rapid pulse, no sweating, hallucinations, seizures and coma. Victims of heat stroke require immediate emergency medical treatment and hospitalization since any treatment delay can be fatal. Heat stroke is not just an outdoors danger; it can also occur in indoor environments such as factories, foundries and ship's engine rooms.

From July 12-16, 1995, Chicago suffered record temperatures and an epidemic of heat stroke. Over 700 people perished from heat-related

illness as heat index values hovered between 115-125° Fahrenheit. Nighttime low temperatures only dropped into the low 80s and provided little relief from the week-long killer heat wave. The casualties taxed hospitals and city government as they struggled to deal with the number of victims and the severity of cases of hyperthermia. Since this extreme event, the National Weather Service Hydrometeorological Prediction Center (<http://www.hpc.ncep.noaa.gov>) issues regular operational heat index forecasts for the continental United State during the summer. Local National Weather Service Forecast Offices will issue a heat advisory whenever the forecast or observed heat index is between 105-114° Fahrenheit for a two hour period. National Weather Service forecasters issue an Excessive Heat Warning when the heat index equals or exceeds 115° Fahrenheit.

Excessive summer heat and heat waves are notorious killers of the unprepared and those who fail to heed the warnings. Fortunately, many South Carolinians know the risk of prolonged heat exposure and overexertion when the heat index climbs above 90° Fahrenheit. Acclimatization is one way to beat the heat along with light, breathable clothing, adequate hydration and heeding heat advisories and warnings. Heat stroke is a killer, more lethal than lightning, tornadoes, floods and hail.

Klinenberg, Eric, 2002: Heat Wave: A Social Autopsy of Disaster in Chicago. University of Chicago Press.

Heat Index Calculator

Dewpoint (° F)



Temperature (° F)

	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
65	94	95	96	97	98	100	101	102	103	104	106	107	108	109	110	112
66	94	95	97	98	99	100	101	103	104	105	106	108	109	110	111	112
67	95	96	97	98	100	101	102	103	105	106	107	108	110	111	112	113
68	95	97	98	99	100	102	103	104	105	106	108	109	110	111	113	114
69	96	97	99	100	101	103	104	105	106	108	109	110	111	113	114	115
70	97	98	99	101	102	103	105	106	107	109	110	111	112	114	115	116
71	98	99	100	102	103	104	106	107	108	109	111	112	113	115	116	117
72	98	100	101	103	104	105	107	108	109	111	112	113	114	116	117	118
73	99	101	102	103	105	106	108	109	110	112	113	114	116	117	118	119
74	100	102	103	104	106	107	109	110	111	113	114	115	117	118	119	121
75	101	103	104	106	107	108	110	111	113	114	115	117	118	119	121	122
76	102	104	105	107	108	110	111	112	114	115	117	118	119	121	122	123
77	103	105	106	108	109	111	112	114	115	117	118	119	121	122	124	125
78	105	106	108	109	111	112	114	115	117	118	119	121	122	124	125	126
79	106	107	109	111	112	114	115	117	118	120	121	122	124	125	127	128
80	107	109	110	112	114	115	117	118	120	121	123	124	126	127	128	130
81	109	110	112	114	115	117	118	120	121	123	124	126	127	129	130	132
82	110	112	114	115	117	118	120	122	123	125	126	128	129	131	132	133

Possibility of heat-related injury during strenuous activity or prolonged exposure

Extreme Caution

Danger

Extreme Danger