

Tips for managing high humidity and hot summers

Summer Discomfort: Mixing Heat and Humidity

We all recognize that summer is a time for warmer temperatures. But in addition to the effects of heat, personal comfort and health are strongly affected by the humidity -- the moisture content of the air. The combination of heat and high humidity may cause discomfort, heat stroke or even death to humans and animals. In fact, on an average, in the United States, only one weather condition, extreme cold, kills more people than high heat/humidity. For example, in July 1995, a strong heat wave killed over 600 people in the City of Chicago alone. In the heat waves of 1936, more than 4,768 Americans died from heat and high humidity. Because humidity affects the body's ability to cool itself, biometeorologists -- scientists who study the relationship between weather and life -- have looked for ways in which to combine the air temperature and humidity.

First, let us look at how the body reacts to heat and the role humidity plays in cooling the body. Then we will look at the indices used to alert the public to the potential dangers of high heat and humidity.

How the Body Reacts To Excess Heat

When blood is heated above 37° C (98.6° F), the human body attempts to lose the extra heat by losing water through the skin and sweat glands, altering the rate and depth of blood circulation and, as a last resort, by panting. As body temperature rises, the heart rate increases and blood vessels dilate to increase blood flow from the body's core to the skin's surface. There, the blood is circulated through tiny capillaries threading around the upper layers of skin, and some excess heat drains off into the hopefully cooler atmosphere. At the same time, water moves from the blood through the skin, a process we refer to as perspiration or sweating. About 90 percent of the body's heat is lost through the skin, and most of that is lost through perspiration. When the air temperature is greater than 37° C, heat can only be lost through sweating. Sweating by itself, however, does nothing to cool the body unless the water is removed by evaporation. In order to evaporate the sweat from the body, heat energy is required to change liquid water into the vapour state: 540 calories of heat energy per gram of water to be exact. That *heat of vaporization* is contributed by the body to the water -- that is where the cooling comes from. However, some water vapour also condenses back onto the body returning those 540 calories per gram of heat in the process. If the rate of evaporation exceeds the rate of condensation, the body will cool. The concentration of water vapour in the air, the humidity, is a prime factor in determining the degree of evaporative cooling.

Those who inhabit the areas affected by both heat and humidity often wonder about the relative comfort of desert heat, which exceeds 40° C (104° F). The answer lies in the water vapour content of the air: the humidity. In a hot, dry environment, more heat can be lost through evaporation than regained through condensation and the body cools. When the humidity is high,

however, much of the heat lost is countered by an almost equal heat gain. Thus the cooling of the body is minimal, leading to overheating. And overheating can cause discomfort at the very least and death at the very worst. Continued loss of water and a variety of dissolved chemicals such as sodium chloride -- salt -- from the body, if not replenished, can cause dehydration and chemical imbalances. Dehydration depletes the body of water needed for sweating and thickens the blood, requiring more pressure to pump it through the body, thus straining the heart and blood vessels. In addition, the increased heart rate and blood flow may harm or kill those with heart or circulatory diseases. Research on the effects of heat and humidity on humans has shown the severity of heat disorders increases with age. Conditions which cause heat cramps in a 16-year old may cause heat exhaustion in a 40-year old and heat stroke in someone over 60.

Giving Discomfort a Number

The danger posed by heat and humidity has led bio meteorologists to develop various *discomfort indices* in order to define the danger and alert the public. Canadian and American weather services issue heat warnings with their weather forecasts similar to the wind-chill warnings of winter. In winter we are concerned about too rapid heat loss; in the summer, too slow a cooling rate.

Because these indices are, to some degree, subjective, the level of discomfort or danger will depend on a person's age, health and physical condition, on the type and amount of clothing worn, and their activity level. Besides the temperature and humidity, weather conditions such as amount of sunshine and wind speed also will affect the "feel" of temperature and humidity.

Humidex

The Canadian index, called *Humidex*, combines the temperature and humidity into one number which is intended to reflect perceived temperature. Here are the perceived conditions for a variety of *Humidex* values.

Humidex	Comfort Level
Less than 29 °C	No discomfort
30 to 39 °C	Some discomfort
40 to 45 °C	Great discomfort; exertion should be minimal
Above 45 °C	Dangerous conditions, exertion should be avoided
Above 54 °C	Heat stroke imminent

The Heat Index

In the United States forecasters use the *Heat Index Apparent Temperature*, more commonly known as the *Heat Index*, as their accepted measure of thermal discomfort. It is a simplification of an index developed by R.I. Steadman in 1979. Steadman originally included 20 factors in his index, but the American *Heat Index* is calculated only from temperature and relative humidity. Strong sunshine can increase the *Heat Index* value by up to 15 F.

And when the air is very hot, strong winds can actually increase the body temperature rather than cool it.

The relationship between the *Heat Index* and heat disorders can be summarized as:

Heat Index	Health Effects
80 - 90 °F	Fatigue possible with prolonged exposure and/or physical activity.
90 -105 °F	Heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.
105 -130 °F	Heat cramps or heat exhaustion likely and heatstroke possible with prolonged exposure and/or physical activity.
130 °F or higher	Heatstroke highly likely with continued exposure.

Tips for Enjoying Summer Heat

- Avoid excess activity during periods of hot temperatures and high humidity.
- Drink plenty of fluids and replace lost electrolytes (potassium, sodium, chloride, etc.) with foods or supplements.
- Avoid the direct sun.
- Avoid sunburn: the skin cannot lose heat effectively when burned.
- Wear loose-fitting clothing.
- Eat "light" foods such as fruit and vegetables and avoid heavy foods such as proteins which increase body heat.
- Give the body time to adjust to warmer temperatures during the first hot days.
- If necessary, seek areas with cooler temperatures: air-conditioned buildings, forests, and lake or sea shores.

Source: Internet / Warning issued by the US Met Department