

NYC Vital Signs

Investigation Report

Deaths Associated with Heat Waves in 2006

This report summarizes findings from an investigation of deaths associated with heat waves that occurred in New York City during the summer of 2006. 46 heat stroke deaths resulted from two heat waves – the first was from July 16 to 18 (3 days, causing 6 heat stroke deaths), and the second was longer and hotter, from July 27 to August 5 (10 days, causing 40 heat stroke deaths). The investigation largely focuses on the second heat wave.

Heat stroke deaths are caused by prolonged exposure to extreme heat. Deaths from other causes, such as cardiovascular and respiratory disease, also increase during heat waves. Heat stroke deaths are preventable with appropriate interventions among those at high risk. Such measures might also reduce excess deaths from other causes.

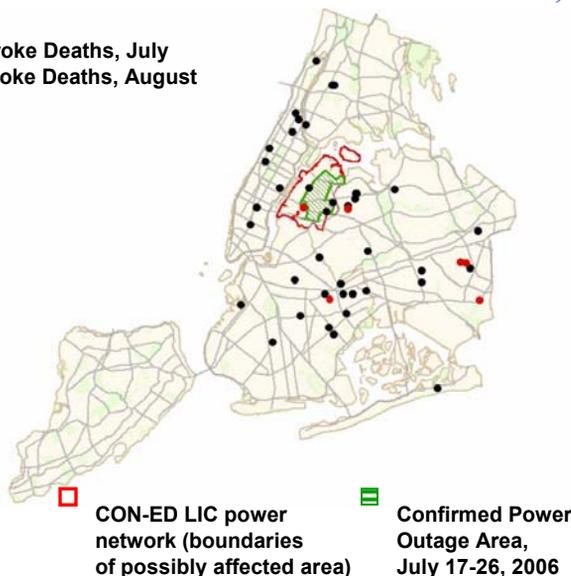
Heat Wave Definition: 3 or more consecutive days of $\geq 90^{\circ}\text{F}$ maximum temperatures

The investigation of deaths related to heat exposure in NYC during the summer of 2006 included (1) a review of personal characteristics and circumstances of people who died from heat stroke between July 16 and September 6, 2006, and (2) a statistical estimate of the excess mortality that occurred due to other causes as a result of the second heat wave from July 27 to August 5, 2006.

The findings revealed that people who died of heat stroke had known risk factors, including older age and chronic health conditions. Lack of air conditioning, also a known risk factor for heat stroke, was documented as a problem in several deaths, but information was unavailable for many of the people who died. During the second heat wave, the average daily death rate from natural causes, such as heart and lung disease, increased by an estimated 8%; this increase is similar in magnitude to increases during past heat waves.

46 heat stroke deaths in NYC, July 15 – September 6, 2006

- Heat Stroke Deaths, July
- Heat Stroke Deaths, August



- As a result of the first heat wave (July 16-18), 6 heat stroke deaths occurred, 5 of which were in Queens. These are noted in red on the map.

- No deaths were attributable to the Western Queens power outage (LIC power network) that occurred in mid-July.

- Although one death occurred in the LIC power network area during the first heat wave, the person had been living in a vehicle and was unlikely to have been affected by the outage.

- 40 heat stroke deaths occurred throughout the city as a result of the second heat wave, July 27-August 5. These are shown in black on the map.

Note: Findings from this investigation are based on (a) review of charts from the Office of the Chief Medical Examiner (OCME) for 46 confirmed heat stroke deaths and (b) a statistical assessment of mortality from natural causes in New York City in relation to hot weather during the months of June through August and the years 2000-2006. Since 1989, at least 2 of the following 3 criteria must be met to fulfill the OCME definition of a confirmed heat stroke death: 1) pathologically elevated core body temperature of the decedent, usually $\geq 105^{\circ}\text{F}$ (40.6°C) at the time of or immediately after death, 2) substantial environmental or circumstantial evidence of heat as a contributor to death (e.g., decedent found in a room without air conditioning, all windows closed, and a high ambient temperature, or 3) decedent in a decomposed condition without evidence of other cause of death.

Heat stroke deaths were more common among adults who were older, had multiple medical/psychiatric problems, or lacked air conditioning

Based on a review of death records for years with major heat waves since World War II, the 40 heat stroke deaths in late July - early August of 2006 are the most since 1952, when 61 deaths occurred as the result of a heat wave.

Factors commonly associated with heat stroke played a major role in heat stroke deaths in the July/August 2006 heat wave:

- Most heat stroke deaths (53%) occurred among adults aged 65 years or older.
- Multiple medical conditions (i.e., two or more) were identified for more than two-thirds (68%) of people who died from heat stroke.
- Most deaths were among those with known cardiovascular disease (68%), while 28% had a known psychiatric or cognitive disorders and 23% had diabetes.
- More than half of those who died (53%) were living with someone at the time of their death.
- Only 2 of the 40 people who died from heat stroke were known to have a functioning air conditioner in their home.

Characteristic	N (%)*
Age	
<50	8 (20%)
50-64	11 (28%)
65-79	9 (23%)
≥ 80	12 (30%)
Number of Medical Conditions	
None	1 (3%)
One	8 (20%)
Two or More	27 (68%)
Unknown	4 (10%)
Type of Medical Condition†	
Cardiovascular	27 (68%)
Psychiatric/Cognitive	11 (28%)
Diabetes Mellitus	9 (23%)
Respiratory	5 (13%)
Other	23 (58%)
Living Alone	
Yes	9 (23%)
No/Family Member on Property	21 (53%)
Unknown	10 (25%)
Air Conditioner in Dwelling	
Yes	2 (5%)
No	14 (35%)
Unknown	24 (60%)
* Percentages may not sum to 100% due to rounding	
† More than one medical condition could be reported for each decedent	

The death rate from natural causes was estimated to be 8% higher during the July 27 – August 5 heat wave compared to non-heat wave summer days

- In addition to heat stroke deaths, the average daily death rate from natural causes (which exclude external causes such as heat stroke) during the July 27-August 5 heat wave was estimated to be 8% (approximately 100 deaths) above the expected rate during non-heat wave summer days.

- From 2000 through 2006, there were 21 heat waves, 6 of which lasted 5 or more days. The second heat wave of 2006 was the most severe among these, lasting 10 days with maximum temperatures of $\geq 100^{\circ}\text{F}$ for 3 days.

- The estimated 8% increase in observed mortality in 2006 was similar to the increased observed rate during recent, long NYC heat waves.

Estimated Percent Increase in Death Rate from Natural Causes from Heat Waves Lasting At Least 5 Days, 2000-2006		
Dates	Duration (days)	Estimated % Excess Daily Deaths
August 5-10, 2001	6	12
July 29-August 5, 2002	8	9
August 11-19, 2002	9	5
July 18-22, 2005	5	3
August 10-14, 2005	5	7
July 27-August 5, 2006	10	8

SUMMARY

A long, intense heat wave from July 27 through August 5, 2006 caused 40 heat stroke deaths in NYC. In addition, the average death rate from natural causes (excluding heat stroke) is estimated to have increased by 8%, or approximately 100 deaths, during that time.

Because heat waves can be forecasted and the risk factors for heat-related death have been consistently shown in this and other studies, heat-related deaths are potentially preventable. Findings from this investigation suggest that encouraging friends and family members to help relocate those at highest risk for heat stroke to air-conditioned environments might save lives in future heat waves. In particular, efforts should be made to relocate those who are elderly or have medical and psychiatric conditions.

NYC government agencies are continuing to work together to enhance the prevention of heat-related deaths in future heat waves and to educate family members and friends of those who are at-risk of heat stroke or have multiple medical conditions about what to do in preparation for a heat wave.

—Other Information about Heat Waves and Preventing Heat-Related Deaths —

Centers for Disease Control and Prevention – <http://www.bt.cdc.gov/disasters/extremeheat/>

NYC Office of Emergency Management – <http://www.nyc.gov/html/oem/html/hazards/heat.shtml>

NYC Department for the Aging – <http://www.nyc.gov/html/dfta/html/health/seasonal.shtml>

Tips to Prevent Heat-Related Deaths

Persons at Risk of Heat Stroke and Heat-Related Deaths:

- ≥ 65 years old
- Lacking air conditioning
- One or more medical conditions, including
 - Heart Disease
 - Lung Disease
 - Diabetes Mellitus
 - Psychiatric disorders or Alzheimer's disease

Before a Heat Wave

- Preparations should include maintaining a well-functioning air conditioner. Individuals and families should also identify a nearby cooling center and make plans to relocate, when possible, those at high risk for heat stroke and their families in the event that home air-conditioning is not available during a heat wave.
- Clinicians and community organizations can educate at-risk persons and their families about the symptoms of heat-related illness and how to reduce the risk of heat stroke and heat-related deaths..

During a Heat Wave

- Limit outdoor activity and drink more non-alcoholic fluids.
- Use an air-conditioner while indoors or go to a cooling center. For proper energy conservation, units should be set maintain a temperature of about 78°F.
- Family and friends can also take steps to prevent heat stroke among at-risk persons during a heat wave by reminding them about activity, fluids and air conditioning.
- Family and friends should monitor at risk persons for signs of heat exhaustion (including fatigue, headache, dizziness, and rapid heartbeat)

For information about the prevention of heat-related deaths and locations of cooling centers: call 311

CALL 911 in any medical emergency



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