Heat Vulnerability Atlas
San Diego County

August, 2012

Purpose: The purpose of this atlas is to describe areas of San Diego County where residents are at increased risk for heat-related illness. These maps may assist public health professionals in formulating and implementing plans to prevent or ameliorate bad health outcomes during heat-related emergencies.

Heat-related illness describes a variety of symptoms which occur when a person’s core temperature rises, but the body’s ability to cool is impaired. Typically, this occurs due to physical exertion and/or environmental heat (high temperatures, often including high relative humidity). Symptoms can range from cramps, nausea, fainting, edema and weakness to seizures, hallucinations and life-threatening stroke.1

Anyone can suffer heat-related illness due to weather patterns, the climate, and other environmental features where they live, but certain individuals are more at risk than others. At highest risk for poor medical outcomes due to heat-related illness include those individuals who are:

- Elderly (65+ years) or children (0-4 years)
- Poor or medically underserved
- Chronically ill
- Socially isolated
- Participants in athletic events or working outdoors

In addition, a critical feature is the ability to adapt to higher temperatures; acclimation to higher temperatures is dependent on both personal characteristics (physiology and behaviors), environmental factors (built environment, housing, availability of air conditioning) and community planning (heat emergency preparedness, availability and access to “cool zones” where people can congregate to escape hot weather).2

References:

Maps included in this Atlas

2. San Diego County Total Population, Climate Zones.
3. Heat Vulnerability in San Diego County by Selected Demographics: Age 65+y.
5. Heat Vulnerability in San Diego County by Selected Demographics: Children 0-4y.
11. Composite Vulnerability to Heat-related Illness Due to Chronic Diseases: COPD, CHD, Diabetes, Asthma
12. Heat Vulnerability in San Diego County by Areas of Outdoor Activity
Heat Vulnerability in San Diego County by Selected Demographics

Facility
- Residential Care, Elderly
- Adult Residential

Ages 65+y

Census tract, 2010 estimates

- 1 - 500
- 501 - 1,000
- 1,001 - 1,500
- 1,501 - 2,000
- > 2,000

Data not shown

Climate Zone

Inset map:
Weather Station Hot Spots* and Climate Zones

*Weather Station Hot Spot: Highest temperature measured at selected weather stations in San Diego County. Data were collected daily June 1 - October 31, 2008 - 2010. Areas of sustained heat are those where weather stations reported temperatures or heat index of 90°F for 3 or more days. Source: NWS Mesowest, http://www.wrh.noaa.gov/mesowe.sth/emap.php?map=sgx&limit=1&list=1.
Heat Vulnerability in San Diego County by Selected Demographics

Facility
- Residential Care, Elderly
- Adult Residential
- Ages 85+y

Census tract, 2010 estimates
- 1 - 100
- 101 - 200
- 201 - 300
- 301 - 400
- > 400
- Data not shown

Climate Zone

Inset map: Weather Station Hot Spots* and Climate Zones

*Weather Station Hot Spot: Highest temperature measured at selected weather stations in San Diego County. Data were collected daily June 1 - October 31, 2008 - 2010. Areas of sustained heat are those where weather stations reported temperatures, or heat index of 90°F for 3 or more days. Source: NWS Mesowest, http://www.wrcc.dri.edu/mesoweat/mwmap.php?map=sgx&limit=1&list=1.
Heat Vulnerability in San Diego County by Selected Demographics

Child Care, Infants
Ages 0-4y
Census tract, 2010 estimates

1 - 800
801 - 1,600
1,601 - 2,400
2,401 - 3,200
3,201 - 4,000
Data not shown
Climate Zone

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Heat Vulnerability in San Diego County by Selected Demographics

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Heat Vulnerability in San Diego County by Selected Demographics

- Affordable Housing Apartments
- Mobile Home Parks
- Single Room Occupancy

Income < 100% FPL
SRA, 2010 estimates

- 1 - 2,500
- 2,501 - 5,000
- 5,001 - 7,500
- 7,501 - 10,000
- > 10,000

Climate Zone

Inset map: Weather Station Hot Spots* and Climate Zones

*Weather Station Hot Spot: Highest temperature measured at selected weather stations in San Diego County. Data were collected daily June 1 - October 31, 2008 - 2010. Areas of sustained Heat are those where weather stations reported temperatures or heat index of 90°F for 3 or more days. Source: NWS Mesowest, http://www.wrh.noaa.gov/mesowe st/mwmap.php?map=sgx&limit=1&list=1.

Map Date: February, 2011
Contact: Isabel Corcos or Leslie Ray, County of San Diego Emergency Medical Services 619.285.6429

NAD_1983_StatePlane_California_VI_FIPS_0406_Feet, D_North_American_1983, Foot_US
Heat Vulnerability in San Diego County by Selected Demographics

Householder Lives Alone
Census tract, ACS 05-09**

- 1 - 500
- 501 - 1000
- 1001 - 1500
- 1501 - 2000
- 2001 - 2500
- Data not shown

Climate Zone

Inset map:
Weather Station Hot Spots* and Climate Zones

*Weather Station Hot Spot: Highest temperature measured at selected weather stations in San Diego County. Data were collected daily June 1 – October 31, 2008 – 2010. Areas of sustained heat are those where weather stations reported temperatures, or heat index of 90°F for 3 or more days. Source: NWS Mesowest, http://www.wrcc.dsc.edu/mesowest/mwmap.php?map=sgx&limit=1&list=1.

**American Community Survey, 2005-9
Heat Vulnerability in San Diego County by Selected Demographics

Householder Lives Alone, 65+y Census tract, ACS 05-09

1 - 200
201 - 400
401 - 600
601 - 800
801 - 1000
Data not shown
Climate Zone

Inset map: Weather Station Hot Spots* and Climate Zones

*Weather Station Hot Spot: Highest temperature measured at selected weather stations in San Diego County. Data were collected daily June 1 - October 31, 2008 - 2010. Areas of sustained Heat are those where weather stations reported temperatures, or heat index of 90 + F for 3 or more days. Source: NWS Mesowest, http://www.wrh.noaa.gov/mesoweat/map.php?map=sgx&limit=1&list=1.

**American Community Survey, 2005-9
Householder Lives Alone, No Vehicle
Census tract, ACS 05-09

- 0 - 100
- 101 - 200
- 201 - 300
- 301 - 400
- > 400

Data not shown

Climate Zone

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*Weather Station Hot Spot: Highest temperature measured at selected weather stations in San Diego County. Data were collected daily June 1 - October 31, 2008 - 2010. Areas of sustained Heat are those where weather stations reported temperatures, or heat index of 90°F or more, for 3 or more days. Source: NWS Mesowest, http://mesowest.meteor.utah.edu/

**American Community Survey, 2005-9
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*Weather Station Hot Spot: Highest temperature measured at selected weather stations in San Diego County. Data were collected daily June 1 - October 31, 2008-2010. Areas of sustained heat are those where weather stations reported temperatures or heat index of 90°F for 3 or more days. Source: NWS Mesowest, http://www.wrh.noaa.gov/mesowest/mwmap.php?map=sgx&limit=1&list=1.

**Composite chronic disease risk based on rates of hospitalization and emergency department (ED) discharge data for 2008. Rates for each disease medical encounter were ranked for 41 SRAs. Overall “chronic disease risk” was created by summing the ranks for each SRA. Source: County of San Diego, Community Health Statistics Unit, (http://www.sdcounty.ca.gov/hhsa/programs/phs/documents/CHS-33_SRADataSupplement9-2010.pdf).
Heat Vulnerability in San Diego County by Areas of Outdoor Activity

- Athletic Field
- Campgrounds
- Golf Course
- Park/Preserve/Open Space
- Agriculture

Weather Station Hot Spot*
Temp (F)
- 80 - 89 Caution
- 90 - 104 Extreme Caution
- 105 - 120 Danger

Area of Sustained Heat*
90°F for 3 or more days

Inset map: Weather Station Hot Spots* and Climate Zones

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Data Guide

Area of Sustained Heat: These are areas where the temperature measured at the selected weather station was 90°F or higher for at least 3 consecutive days. Highest daily temperature measured at selected weather stations in San Diego County. Data were accessed from the NWS Mesowest website on most days from June 1 through October 31, over a three year interval, 2008-2010. These data are a convenience sample of temperature readings, and are shown to describe areas that may reach temperatures high enough to pose some risk to health. Source: County of San Diego, Emergency Medical Services, daily temperature data collected from NWS Mesowest, http://www.wrh.noaa.gov/mesowest/mwmap.php?map=sgx&limit=1&list=1.

Affordable housing; apartments and single room occupancy hotels (SROs). There are a variety of programs that offer assistance to individuals and families in need of lower cost housing. SRO hotels typically provide single room units with a bed, small refrigerator and a microwave. Source: Affordable housing: County of San Diego Dept. of Housing and Community Development, Housing Resources Directory 2008-2010.

Child care, infants
Child care centers, group homes, small family homes providing day care to infants and children (2010). Source: California Community Care Licensing Division, http://www.ccld.ca.gov/docs/ccld_search/ccld_search.aspx

Chronic Disease Composite Rates:
The composite chronic disease risk maps were based on rates of hospitalization and emergency department (ED) discharge data for 2008. Rates for each disease and medical encounter (hospitalization or ED discharge) were ranked for 41 SRAs. An index of overall “chronic disease risk” was created by summing the ranks for each SRA. The relative ranking of each SRA by its composite score was mapped (by quintile) to show which SRAs had residents with the lowest to greatest vulnerability to heat-related illness due to chronic disease. Source: County of San Diego, Community Health Statistics Unit, (http://www.sdcounty.ca.gov/hhsa/programs/phs/documents/CHS-33_SRADATA.Supplement9-2010.pdf).

Climate Zone: There are 5 climatic zones in San Diego County: maritime, coastal, transitional, interior, and desert. The maritime and coastal climate zones (combined for the purposes of this atlas) are mild due to close proximity to the Pacific Ocean, and have relatively cool summer and warm winters compared with other regions. Valleys and foothills are comprise much of the transitional and interior zones, with broad variation in summer temperatures, and much lower relative humidity the further the distance from the ocean. The desert zone is very hot and dry in summer, often with temperatures over 100F and relative humidity below 15%. Source: San Diego Geographic Information Source (SanGIS), http://www.sangis.org/Contact_Us.htm.

Population Demographics by census tract
Total Population

Population age distribution, 2010 estimates

Median Income: Divides the income distribution into two equal parts; half of all persons have income above and below the median value. Source: San Diego Association of Governments (SANDAG), 2010 estimates, extracted 01/31/11, http://sandag.org/index.asp?fuseaction=home.home.


Household with no vehicle.
Household where there is no private vehicle available for use. **Source:** U.S. Census Bureau, American Community Survey summary results, 2005-9, http://www.census.gov/acs/www/.

**Single person household, by age group.**
A household includes all the people who occupy a housing unit. (People not living in households are classified as living in group quarters.) A housing unit is a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters. **Source:** U.S. Census Bureau, American Community Survey summary results, 2005-9, http://www.census.gov/acs/www/.

**Residential care facility for the elderly**
Adult residential care facilities (2010). **Source:** California Community Care Licensing Division, http://www.cclld.ca.gov/docs/cclld_search/cclld_search.aspx.

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San Diego County Board of Supervisors

Chief Administrative Officer
Walter F. Ekard

Assistant Chief Administrative Officer
Helen Robbins-Meyer

General Managers

<table>
<thead>
<tr>
<th>David Estrella</th>
<th>Don Steuer</th>
<th>Nick Macchione</th>
<th>Sarah E. Aghassi</th>
<th>Ron Lane</th>
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</thead>
<tbody>
<tr>
<td>General Manager</td>
<td>Chief Financial Officer/General Manager Finance &amp; General Government Group</td>
<td>Agency Director Health and Human Services Agency</td>
<td>General Manager Land Use &amp; Environment Group</td>
<td>General Manager Public Safety Group</td>
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