



Extreme Heat and Public Health | Impacts & Adaptation Solutions

Extreme heat has disproportionate impacts on older adults, children, people who do not live or work in climate-controlled conditions, who do not have personal vehicles, or who have pre-existing medical conditions. San Mateo County will experience an increase in the frequency and duration of extreme heat events due to climate change, impacting public health, at-risk communities, and infrastructure. This factsheet provides an overview of the risks facing San Mateo County from extreme heat and outlines adaptation strategies to build resilience.

Key Definitions

High Heat Days: High heat is defined as 85°F in this fact sheet. However, heat can negatively impact human health at lower thresholds.

Extreme Heat Days: Days 100°F or higher.

Heat Wave: Five consecutive days when air temperatures exceed temperatures that negatively impact human health.

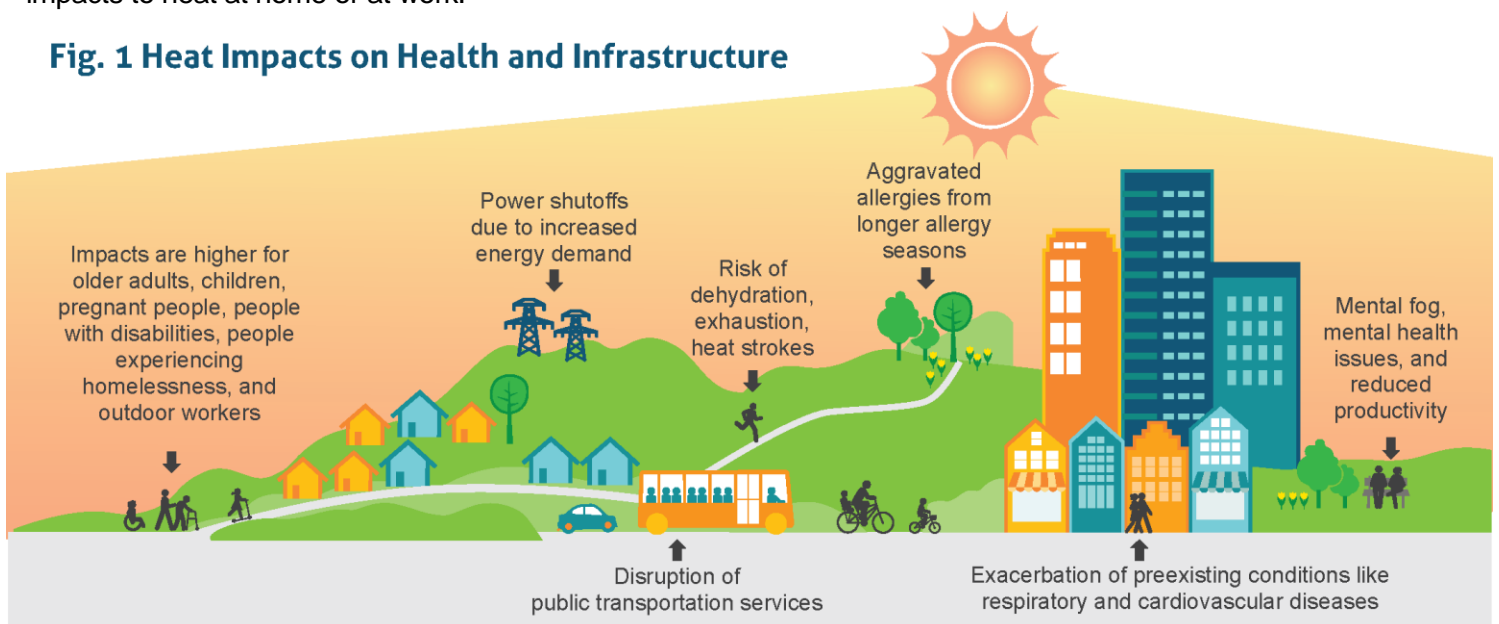
Heat related illness: Heat illness, such as exhaustion, heat stroke, and respiratory problems, can occur when temperatures rise above 85°F, and risks vary depending on who is exposed and how long the exposure lasts.

Populations with greater heat vulnerability: People may experience greater impacts to heat due to physiological susceptibility (older adults, the very young, and those with access and functional needs) or due to social inequities that result in increased exposure and impacts to heat at home or at work.

Key Messages

1. Extreme heat is the deadliest climate hazard in the U.S., but impacts are preventable with adequate preparation.
2. San Mateo County already experiences high heat events and even small increases in temperature can negatively impact public health. North Fair Oaks, Menlo Park, Redwood City, and East Palo Alto are projected to be the most impacted areas, though coastal residents should also prepare for increasing temperatures.
3. Heat risks are higher for older adults, children, people with chronic illness or disability, people experiencing homelessness, and outdoor workers.
4. Adaptation solutions to heat include community sites serving as cooling centers, urban forestry programs, adding tree cover to transit stations, adopting building codes to address rising heat, and battery backups to address power shutoffs.

Fig. 1 Heat Impacts on Health and Infrastructure



Climate Ready San Mateo County (SMC) Initiative

In 2019, the Climate Ready SMC Initiative, led by the Office of Sustainability, began efforts to better understand how climate change impacts, including high heat, debris flows, sea level rise, and wildfire, could affect transportation systems and vulnerable communities in the county, in part through data analysis.

The Office of Sustainability is currently using heat projection data developed by the Stanford Future Bay Initiative, which predicts number of high heat days for different areas of the county over different time periods. The [Climate Ready](#) website provides a data resource page that links users to this dataset, as well as other climate-related hazard datasets of interest to stakeholders.



SMC Extreme Heat Data and Modeling

High heat days pose significant risks to public health and transportation infrastructure. For this fact sheet, high heat days are days that reach or exceed 85°F, though impacts can occur at temperatures of 80°F, especially in areas where residents are used to relatively cooler temperatures, such as the coastal and northern parts of San Mateo County.

The Stanford Future Bay Initiative combines ten different climate models of average daily maximum temperature, allowing users to view the average and maximum temperatures across models over the near-term (2020-2029) and the long-term (2016-2045). Users can then filter results to see how many days specific areas are projected to experience temperatures that exceed 85°F, 90°F, 95°F, 100°F, 105°F, and 110°F. For some higher thresholds such as 110°F, days may be represented as a value above 0 but lower than 1; this means that temperatures are not expected to exceed the threshold every single year but may do so over a period of years.

Average Number of High Heat Days in SMC

The following table and map show projections for average number of high heat days (above 85°F), by jurisdiction over the near-term (2020-2029) and long-term (2016-2045). Modeling suggests the average number of high heat days will increase for many jurisdictions across the county. Areas expected to feel the greatest impacts include Atherton, East Palo Alto, Menlo Park, North Fair Oaks, and Redwood City (Table 1). North Fair Oaks is expected to see the greatest increase in high heat days overall.

Table 1 Number of High Heat Days >85°F per Year

Jurisdiction Name	Near-Term (2020-2029)	Long-Term (2016-2045)	Change in high heat days
Atherton	54.07	57.07	+3
Belmont	28.7	30.65	+1.95
Brisbane	5.8	6.18	+0.38
Burlingame	10.19	10.74	+0.55
Colma	5.49	5.69	+0.20
Daly City	3.65	3.85	+0.20
East Palo Alto	37.6	39.86	+2.26
Foster City	28.48	30.35	+1.87
Half Moon Bay	2.69	2.6	-0.09
Hillsborough	11.68	12.41	+0.73
Menlo Park	42.47	45.02	+2.55
Millbrae	7.01	7.32	+0.31
North Fair Oaks	58.42	61.57	+3.15
Pacifica	5.29	5.36	+0.07
Pescadero	7.32	7.29	-0.03
Portola Valley	32.45	34.25	+2.51
Redwood City	48.39	51.25	+2.86
San Bruno	6.68	7	+0.32
San Carlos	36.43	38.71	+2.28
San Mateo City	20.17	21.49	+1.32
South San Francisco	7.05	7.49	+0.44
Woodside	41.12	43.59	+2.47

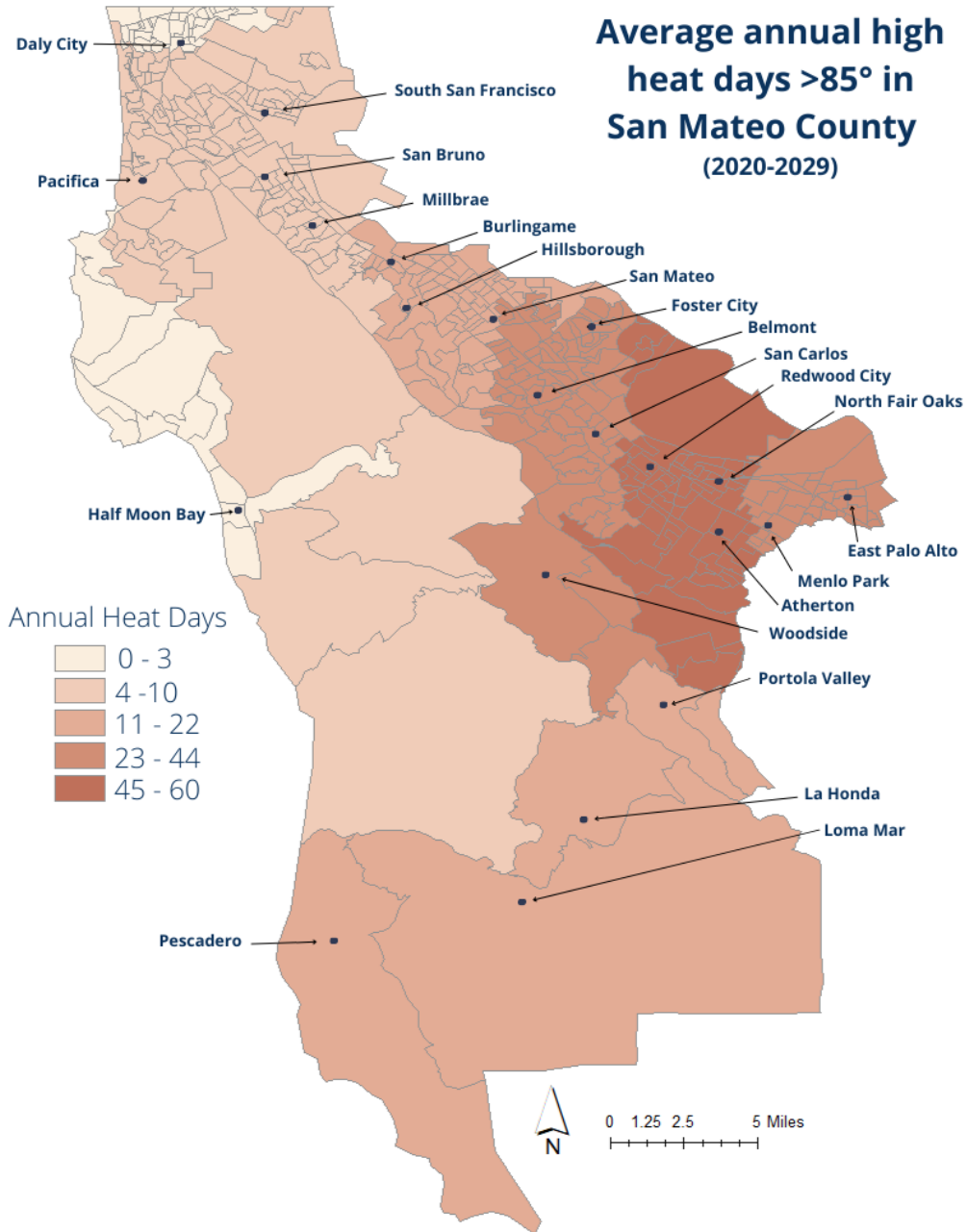


Figure 2. Number of annual high heat days across San Mateo County census block groups (2020-2029).

The data in this factsheet is meant to be used for:

- Informing decision-makers, community and cross-sector leaders about heat impacts and solutions
- Planning for hazards; prioritizing hotspots, opportunities for action and collaboration.
- Developing heat climate adaptation strategies, policies and plans (e.g., General Plans).

For more information on the Office of Sustainability’s climate resilience efforts, visit the Climate Ready SMC website: <https://climatereadysmc.org/>

The map in Figure 1 illustrates how communities across San Mateo County will experience vastly different levels of heat over the next ten years. The [Stanford Future Bay Initiative Viewer](#) shows number of high heat days (above 85°F) projected in the near-term (2020-2029), as shown above, as well as the long-term (2016-2045). Lighter areas will experience fewer high heat days and darker areas with experience more high heat days. Warming trends across the county are expected to result in increased energy consumption and costs associated with cooling homes and businesses, which can increase greenhouse gas pollution that causes climate change.

Heat-Related Health Impacts on Vulnerable Communities

Extreme heat can result in life-threatening conditions like heat exhaustion, heat stroke and respiratory problems associated with poor air quality due to heat's effect on pollutant build-up. Some people are more susceptible to heat impacts due to physiological characteristics, including:

- **Older adults**
- **The very young**
- **Pregnant people**
- **People with chronic illness or disability**

People may also be susceptible to heat impacts due to higher heat exposure. This may include:

- **Outdoor workers**
- **Low-income** households that do not have access to cooling or shading.
- **People experiencing homelessness**
- **Those who rely on public transportation** and must wait at transit stops in hot conditions
- **Limited English-speaking households** that are less likely to receive heat-related health information or emergency communications.

Underserved communities often experience multiple risk factors for heat illness, creating intersecting vulnerabilities likely to produce poor outcomes in a high heat event. Someone living in an underserved community is less likely to have air conditioning or a personal vehicle, and more likely to have preexisting health conditions that make them physiologically more vulnerable to high temperatures.

It is important to identify communities at high risk to heat impacts to prioritize adaptation solutions, discussed on the following page, that can reduce household- and community-level heat risk.

Social vulnerability indices are one manner of conducting a high-level screening of communities that may be at high risk to heat. However, practitioners should consult directly with communities and trusted community partners to identify pockets of vulnerability that may not be represented in vulnerability indices due to the nature in which indices aggregate data and potentially “erase” pockets of under-resourced communities.

Using the Health Equity Index to Identify Heat Vulnerability

The Health Equity Index (HEI) can help practitioners prioritize communities that may be at high risk of heat-related illness by identifying areas where people are already experiencing poorer outcomes in their daily lives.

The HEI combines and weights social indicators and community conditions related to income, employment, education, and household environment at the census tract level and assigns each census tract a percentile score, which represents its health relative to other census tracts in the state. Higher percentile scores (darker colors) mean poorer health conditions; for example, a score of 70% means that the census tract has worse outcomes than 70% of other national census tracts.

Some San Mateo County census tracts located in North Fair Oaks, Redwood City, and East Palo Alto have high scores of up to 78.2%, indicating poor health outcomes relative to the rest of the country. Users can explore the HEI dataset here: <https://www.smcalletogetherbetter.org/indexsuite/index/healthequity>.

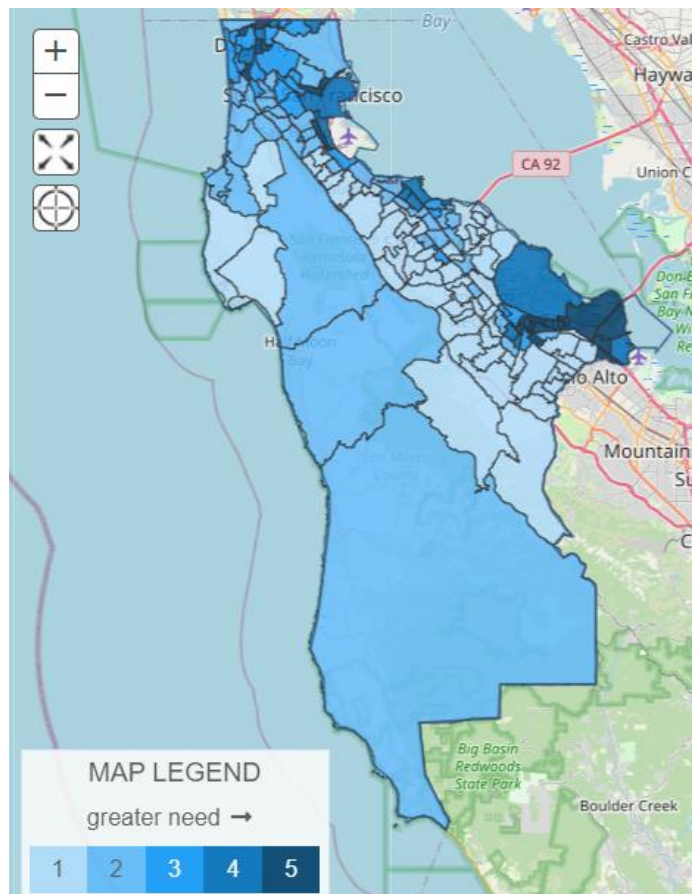


Figure 3. The Health Equity Index provides users with a high-level understanding of where under-resourced populations reside.

Adaptation Solutions for Extreme Heat

Buildings and Open Space

- When strategically planted, **trees can provide shade** at transit stops, keep homes cool, bring utility costs down, and provide relief from heat for outdoor workers or business patrons.
- **Establishing urban forestry or tree planting programs** and a countywide urban forestry plan could lead to protections from heat. This could be supported with tree and landscape protection ordinances, street trees, parking lot shade, green roofs, and cool roofs.



Figure 4. Strategic urban greening projects can support heat risk reduction.

- **Building codes** could be modified to address rising heat. Construction standards and requirements for building materials that can withstand evolving temperature conditions would reduce the risk of infrastructure failure.
- **Grants and technical assistance** could support low or no-cost weatherization efforts to enhance the energy efficiency for homes.



Figure 5. This Menlo Park apartment building received upgraded windows and insulation through BayREN.

City of Daly City: Project Green Space

The City of Daly City and 700+ volunteers partnered to plant over 800 trees, 11 rain gardens and a California native mini park. This citizen engagement initiative adapted the urban forest to future climate changes by planting species that thrive in drier conditions. The new green spaces absorb and purify stormwater, filter air pollution, reduce erosion, capture, and store carbon dioxide and provide wildlife and pollinator habitat. Daly City's urban forest provides close to \$19M in ecosystem and energy efficiency benefits annually.

www.DalyCity.org/ProjectGreenSpace

Emergency Preparedness and Response

- **Centrally located community sites, or resilience hubs, could serve as cooling centers**, stocked with appropriate supplies and trained staff to serve community members that are unable to shelter from extreme heat in their own homes or workplaces. Staging temporary triage centers and emergency vehicles could save lives.
- **Multilingual and community-specific communications** and continuity of operations plans could be developed by trusted community organizations to plan for the impacts of extreme heat events on vulnerable communities in a way that is culturally and linguistically competent.
- **Battery backup systems** could improve the electrical system reliability and provide alternate capacity to minimize the risk of disruption of power for medical needs.
- **Community Emergency Response Teams (CERT)** and community organizations could check on vulnerable and isolated residents and facilitate access to cooling centers or medical support, when needed.
- **Extreme heat plans** could be updated to include activation of cooling centers and other heat resources at lower temperature thresholds.

Bay Area Regional Energy Network (BayREN): Cooler, Healthier Homes



BayREN provides funding for energy efficiency updates for single and multi-family homes. These updates can lower utility bills, reduce summer heat and cold winters, improve air quality, and reduce street noise. Updated windows, insulation, and repairs can keep cool air in and warm air out with rising temperatures. **Learn more:** <https://bayren.org>