

Climate and Health Outlook: Extreme Heat

Welcome to the second edition of the Climate and Health Outlook from the Department of Health and Human Services (HHS) Office of Climate Change and Health Equity (OCCHE). The Climate and Health Outlook is an effort to inform health professionals and the public on how our health may be affected in the next 30 and 90 days by climate events and provide resources to take proactive action.

This edition focuses on the months of June–August, 2022 and uses the most current long-term temperature forecasts that come from the National Oceanic and Atmospheric Administration (NOAA) to illustrate how extreme heat poses a health risk for all Americans.

Where are extremely hot days expected to be most frequent in June?

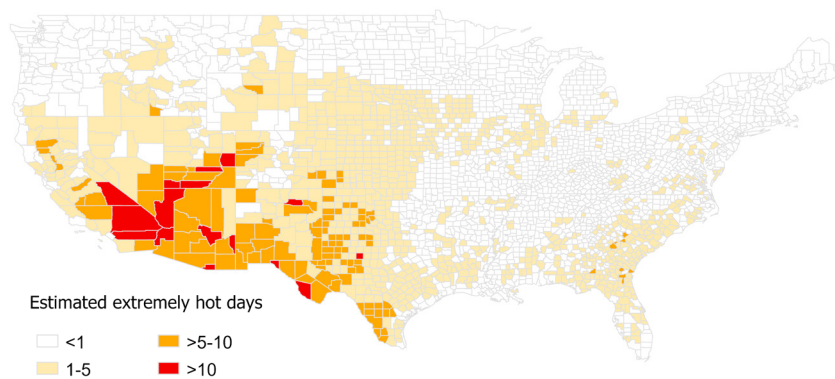


Figure: This map shows the expected number of extremely hot days in June in each county in the contiguous U.S. The forecast is based on the NOAA Climate Prediction Center’s probabilistic outlook of temperatures being above, below, or near normal in June. A county’s ‘normal’ temperature is based on the 30-year average from 1991–2020. An ‘extremely hot day’ is when the daily maximum temperature is above the 95th percentile value of the historical temperature distribution in that county. For more information on your county, please refer to the [Centers for Disease Control and Prevention \(CDC\) Heat and Health Tracker](#).

In June, 132 counties across 13 states are projected to have more than 5 extremely hot days – Texas (57), New Mexico (16), Arizona (14), California (12), Utah (10), Georgia (7), Colorado (6), Oklahoma (3), Kansas (2), Nevada (2), Idaho (1), South Carolina (1), Wyoming (1). In these 132 counties, the total population at risk is **21,729,969** people.

Who is at high risk from heat in the counties with the most extreme heat days?

Some communities face greater health risks from extreme heat given various risk factors they face. These communities include people who: are elderly and live alone, have existing health conditions, have poor access to healthcare, live in rural areas, work outdoors, make a low income, face difficulty paying utility bills, live in poor housing, and live in urban areas without adequate tree cover.

These risk factors vary across the 132 counties estimated to have more than 5 expected extreme hot days in June. Of these counties:

- **23 (17%)** have a high number of people aged 65 or over, living alone.
- **22 (17%)** have a higher number of people with diabetes.
- **74 (56%)** have a high number of people without health insurance.
- **35 (27%)** have a high number of people living in rural areas.
- **35 (27%)** have a high number of people employed in construction.
- **59 (45%)** have a high number of people living in poverty.
- **16 (12%)** have a high number of people spending a large proportion of their income on home energy.
- **39 (30%)** have a high number of people with electricity-dependent medical equipment and enrolled in the HHS emPOWER program.
- **53 (40%)** have a high number of people in mobile homes.
- **41 (31%)** have a high number of people with severe housing cost burden.
- **88 (67%)** have a high number of people living in areas without adequate tree cover.
- **76 (58%)** are identified as highly vulnerable by CDC’s Social Vulnerability Index.

Decision makers in these counties should consider these various risk factors when developing and implementing heat illness prevention strategies to protect specific populations.

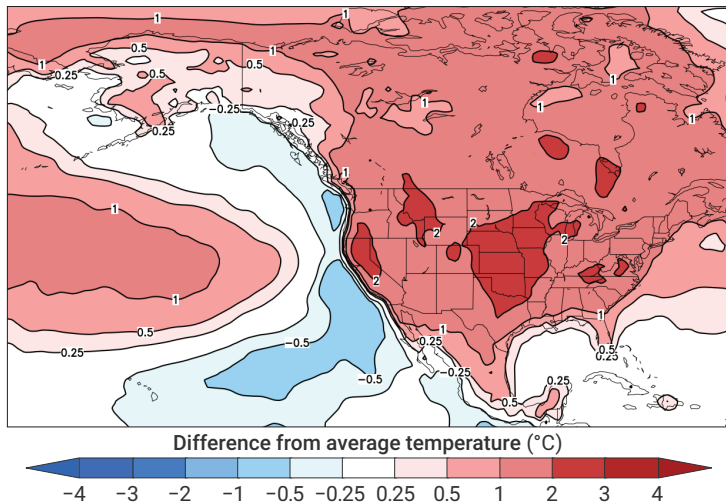


Figure: The North American Multi-Model Ensemble (NMME) predicts that average temperature over the next 3 months (June–August) will be 1.8–3.6°F (1–2°C) hotter than average across much of the contiguous U.S. For more information about this model or prediction, please refer to the [NMME website](#).

How hot will it be, and where, over the next 3 months?

For June–August 2022, the North American Multi-Model Ensemble (NMME) predicts that the average temperature will be 1.8 to 3.6°F (1 to 2°C) above-normal for most of the continental United States. However, the U.S. Central and Western regions may experience a higher 90-day average that is 3.6 to 5.4°F (2 to 3°C) above the normal average temperature for this time period. The NMME integrates multiple forecasts of the next 90 days to build the best estimate of temperatures and precipitation over that time frame. This year’s 90-day NMME average temperature forecast for June–August is much warmer than last year’s temperature forecast for the same period. Last summer, temperatures were predicted to be 0.9 to 3.6°F (0.5 to 2°C) above normal, whereas this summer’s forecast predicts temperatures 1.8 to 5.4°F (1 to 3°C) above normal for most of the continental United States. Note that although many regions may expect a warmer 90-day average temperature, this is not the same as your local weather forecast, in which large fluctuations in temperature may be predicted from day to day.

Heat Affects Health in Many Ways

Warmer temperatures increase the risk for a diverse range of health risks. For example:



An increased risk of **hospitalization for heart disease**.



Heat exhaustion, which can lead to **heat stroke** if not treated, can cause critical illness, brain injury, and even death.



Worsening **asthma** and **chronic obstructive pulmonary disease (COPD)** as heat increases the production of ground-level ozone.



Dehydration, which can lead to **kidney injury** and blood pressure problems. Some kidney damage can become irreversible with repeated or untreated injury.



Violence, crime, and **suicide** may increase with temperature, adding to the rates of depression and anxiety already associated with climate change.

Health Impacts During the Heat Dome of 2021

During June–July 2021, the western U.S. experienced a record-breaking heat wave that lasted for several days. Estimated heat-related deaths and illnesses demonstrate the tragic toll of the heat wave on public health. Comparing the health records from June 26–July 10 between 2021 and 2020, heat-related deaths increased from 2 to 145 in Washington, 0 to 119 in Oregon, and 12 to 25 in California. These estimates were provided by the California Department of Public Health, Oregon Health Authority, and Washington State Department of Health. For context, the CDC estimates an average of 702 heat-related deaths per year for the entire U.S. (based on 2004–2018 data).

Medications and Heat Risk

Some medications increase the risk of heat-related illness. These include diuretic medicines (sometimes called “water pills”), antihistamine medicines (including many allergy medicines), and many antipsychotic medicines used to treat a variety of psychiatric and neurologic illnesses. Please review this [list of common psychiatric medications](#) that can impair the body’s normal ability to cool itself.

Resources for People at High Risk of Heat-Related Health Problems

Certain populations with limited resources may have restricted access to information on heat illness prevention, cool indoor environments, and government programs that provide critical support. Find more resources on heat illness prevention from the [National Integrated Heat Health Information System \(NIHHIS\)](#) and [CDC](#) websites.

Prevent Heat Illness at Work

Ease into Work. Nearly 3 out of 4 fatalities from heat illness happen during the first week of work.

Build a tolerance to heat by increasing intensity by 20% each day.

| Day | Intensity |
|-----|-----------|
| MON | 20% |
| TUE | 40% |
| WED | 60% |
| THU | 80% |
| FRI | 100% |

- Drink cool water even if you are not thirsty
- Rest for long enough to recover from the heat
- Take breaks in a shady or cool area
- Wear a hat and dress for the heat
- Watch out for each other
- Verbally check on workers wearing face coverings

Image source: <https://www.osha.gov/heat>

LIHEAP's Impact By the Numbers

In Fiscal Year 2020, LIHEAP:

- Reduced energy burden by an average of **~35%**
- Prevented the loss of home energy services for **over 1.4 million households**
- Helped **5.6 million households** pay their energy bills
- Served **over 50,000 households** with weatherization or minor home energy repairs
- Provided cooling and summer crisis assistance to over **900,000 households**
- Provided an average cooling assistance benefit of **\$439** and/or summer crisis benefit **\$353**

This figure provides national statistics that help demonstrate the impact of the HHS Low Income Home Energy Assistance Program (LIHEAP) in alleviating the economic burden of energy costs for low-income families. Image sources: https://www.acf.hhs.gov/sites/default/files/documents/ocs/COMM_LIHEAP_Earth%20Day_FY2022.pdf, <https://liheappm.acf.hhs.gov/datawarehouse>

Worker Health

Occupations that require strenuous work outdoors pose a high risk for heat-related illness. This includes construction workers, farmers, agricultural workers, delivery workers, athletes, landscapers, and others. [Learn more](#) about the dangers of working in heat. Employer responsibilities and resources for safety are also available through the Occupational Safety and Health Administration (OSHA) [Heat Illness Prevention campaign](#).

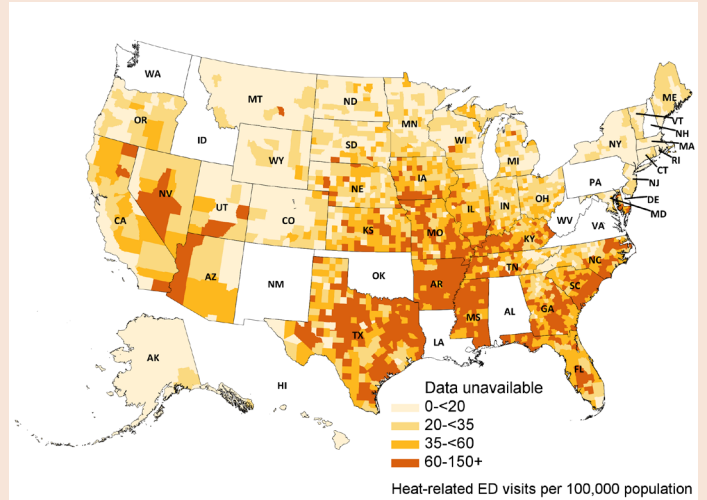
- The [Heat Safety Tool](#) provides real-time heat index and hourly forecasts, specific to your location, as well as occupational safety and health recommendations from OSHA and the National Institute for Occupational Safety and Health (NIOSH).
- The [National Institute of Environmental Health Sciences \(NIEHS\) Worker Training Program](#) has heat safety and health training for at-risk workers.
- The Health Resource Services Administration (HRSA) funds [National Training and Technical Assistance Partners – Farmworker Justice and Migrant Clinicians Network](#) that helps clinicians prevent and treat heat-related illness among agricultural workers.

Staying Safe Indoors

- The [Low Income Home Energy Assistance Program \(LIHEAP\)](#) and the Weatherization Assistance Program (WAP) help keep families safe and healthy through initiatives that assist families with energy costs. To inquire about LIHEAP assistance, call the National Energy Assistance Referral (NEAR) hotline at 1-866-674-6327.
- Medicare Advantage (MA) plans may provide [Special Supplemental Benefits for the Chronically Ill \(SSBCI\)](#) with equipment and services that improve indoor air temperatures and quality (such as portable air conditioners) to chronically ill patients.

Spotlight on Heat Health Impacts in Rural Areas

In April 2022, Agency for Healthcare Research and Quality used the Healthcare Cost and Utilization Project (HCUP) 2016–2019 to estimate county-level population rates of emergency department (ED) visits with a diagnosis directly indicating heat exposure. The analysis was limited to records of ED visits, regardless of hospital admission, at community hospitals, excluding rehabilitation and long-term acute care facilities, with any-listed diagnosis directly indicating heat exposure. This analysis includes ED data from 2,550 counties in 39 States and the District of Columbia, representing 85 percent of the population and 81 percent of all counties in the United States in 2019. Among the 1,122 rural counties, 152 (13.5%) had heat-related ED visit population rates of 85 or more per 100,000 population (i.e., 90th percentile of population rates). In contrast, among the 344 large metropolitan counties, 8 (2.3%) had heat-related ED visit population rates in the 90th percentile. The [report](#) highlights that a larger proportion of rural than large metropolitan counties experience a high rate of heat-related illness, although there are more heat-related ED visits



Emergency Department Visits with a Diagnosis Directly Indicating Heat Exposure per 100,000 Population, 2016-2019. Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), State Emergency Department Databases (SEDD) and State Inpatient Databases (SID), 2016-2019.

in large metropolitan areas (n=135,585 ED visits) than in rural areas (n=30,115 ED visits).

Best Practices for Emergency Managers

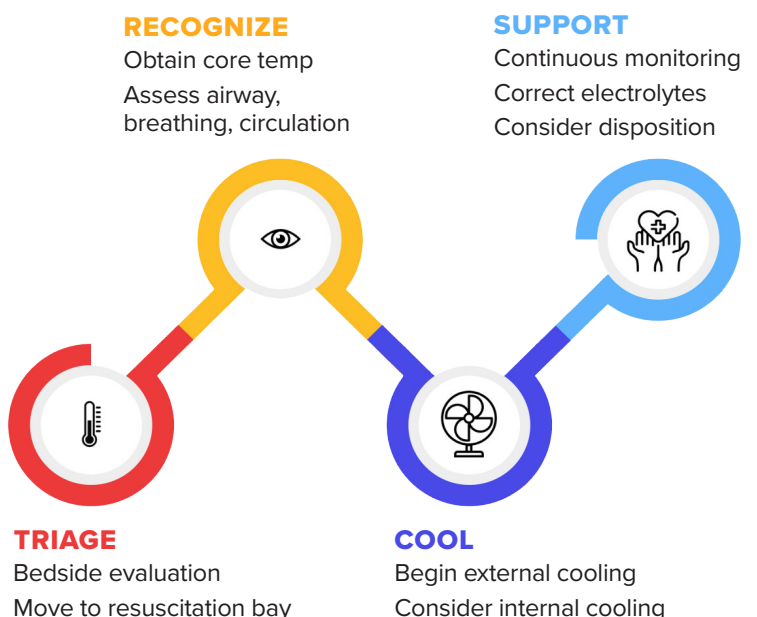
This CDC report on [Heat Response Plans](#) reviews steps emergency managers and health officials can take to develop and implement measures to protect their communities. Spikes in energy demand should be expected during summer months as air conditioning use increases. The combination of sagging power lines (copper expands as it heats up, thus increasing impedance and reducing throughput) and increased energy demands can cause power failures that make certain populations more vulnerable when the risk is highest. The HHS [emPOWER](#) collects and shares de-identified Medicare data to help response agencies take action to protect the health of Medicare beneficiaries who depend on vulnerable electrical medical equipment.

Real-time information on health impacts from extreme heat can also help decision-makers implement strategies to reduce risk. [CDC's Heat and Health Tracker](#) provides regular updates on the rate of heat-related Emergency Department visits (organized by HHS regions) and observed temperature.

If you are a local organization planning to open a cooling shelter, consider referring to [CDC guidance](#) on how to maintain a safe shelter during a heat wave.

Clinical Best Practices

A heat stroke is a medical emergency, and rapid recognition and aggressive early treatment are essential to reduce morbidity and mortality (as illustrated below).



See <https://pubmed.ncbi.nlm.nih.gov/33856299/> for the full algorithm.