The Climate and Health Outlook is an effort to inform health professionals and the public on how our health may be affected in the coming month(s) by climate events and provide resources to take proactive action. An associated webpage includes additional resources and information.

**Northeast:** Counties in West Virginia (10) and Pennsylvania (2) are projected to have more than 5 heat exceedance days in August, 2022. Drought is favored to persist in parts of West Virginia and Pennsylvania. Above normal wildland fire* potential is projected for northern Ohio, southern and central Pennsylvania, and southern and western Washington.

**Southeast:** The Atlantic basin is forecasted to have an above-average hurricane season. Counties in Arkansas (42), Mississippi (24), Alabama (18), Tennessee (17), Louisiana (15), Kentucky (10), Georgia (6), South Carolina (4), North Carolina (3), and Virginia (3) are projected to have more than 5 heat exceedance days in August, 2022. Drought is favored to persist in parts of Arkansas, Kentucky, Louisiana, Mississippi, North Carolina, Tennessee, and Virginia. Above normal wildland fire* potential is projected for western Arkansas.

**Southwest:** Counties in California (23), Utah (13), Nevada (11), Arizona (9), Colorado (6), and New Mexico (6) are projected to have more than 5 heat exceedance days in August, 2022. Drought is favored to persist in most of California and Nevada. Above normal wildland fire* potential is projected for northern Idaho, southern and central Oregon, and southern and western Washington.

**Southern Great Plains:** Counties in Texas (115), Kansas (62), and Oklahoma (57) are projected to have more than 5 heat exceedance days in August, 2022. Drought is favored to persist in most of Texas and southern Oklahoma. Above normal wildland fire* potential is projected for much of Texas and Oklahoma.

**Hawai‘i and Pacific Islands:** The Central Pacific is projected to have a below-average hurricane season. Drought is favored to persist in parts of Hawai‘i. Above normal wildland fire* potential is projected for Hawai‘i, especially leeward locations.

**Hawai‘i and Pacific Islands:** The Central Pacific is projected to have a below-average hurricane season. Drought is favored to persist in parts of Hawai‘i. Above normal wildland fire* potential is projected for Hawai‘i, especially leeward locations.

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*Smoke from wildfires can impact health hundreds of miles from site of the fire.
A “heat exceedance day” is when the daily maximum temperature is above the 95th percentile value of the historical temperature distribution in that county.
Developed with data from the Centers for Disease Control and Prevention, National Oceanic and Atmospheric Administration, and National Interagency Fire Center.

We want to hear from you! Please send your feedback on ways to improve the Climate and Health Outlook to ocche@hhs.gov.
Who is at high risk in the counties with above-normal wildland fire potential in August?

Wildland fires are occurring more frequently in the United States and present a health hazard for populations living close to a fire. As indicated in the map to the left, 684 counties across 19 states are projected to have above-normal wildfire potential in August. In these counties, the total population at risk is 58,588,799 people. Of these counties:

194 (28%) have a high number of people aged 65 or over, living alone.
300 (44%) have a high number of people without health insurance
317 (47%) have a high number of uninsured children.
133 (20%) have a high number of people with frequent mental distress.
85 (12%) have a high number of adults with asthma.
144 (21%) have a high number of adults with coronary heart disease.
140 (21%) have a high number of people living in poverty.
129 (19%) have a high number of people with electricity-dependent medical equipment and enrolled in the HHS emPOWER program.
122 (18%) have a high number of people in mobile homes.
163 (24%) have a high number of people with one or more disabilities.
170 (25%) are identified as highly vulnerable by CDC's Social Vulnerability Index.

“A high number” indicates that these counties are in the top quartile for this indicator compared to other counties.

Wildfires Affect Health in Many Ways

Wildland fire increases the risk for a diverse range of health outcomes. For example:

- Due to the nature of their work, firefighters are at risk of developing severe heat-related illness (such as heat stroke) and rhabdomyolysis (muscle breakdown).
- Wildfire can cause burns through contact with flames and hot surfaces as well as chemical and electrical burns.
- Wildfire smoke can irritate the respiratory tract and lead to reduced lung function, bronchitis, exacerbation of asthma, and heart failure.

For pregnant people, smoke exposure can result in problems with a baby’s nervous system, or can lead to miscarriage or birth defects.

Wildfire smoke can affect the immune system, leading to increased vulnerability to lung infections like COVID-19.

Smoke and ash from wildfires can travel downwind and affect air quality hundreds of miles away from the fire.
How Does Smoke Impact Firefighter Health?


One study funded by the Joint Fire Science Program found that wildland firefighters are at an increased risk for the development of lung cancer (8 percent to 43 percent above the general population) and cardiovascular disease (16 percent to 30 percent above the general population). This risk increases with an increase in career duration and days spent on wildfire incidents (short and long season) each year. The risk of lung cancer steadily rose as career length, while the risk of cardiovascular disease increased sharply for firefighters with 5- to 15-year careers and increased slightly over 20- and 25-year careers. As fire seasons continue to increase in severity and duration, firefighters should reduce exposure to smoke in any way possible.

Wildfire Smoke Can Travel Far Distances

Figure: Example of the AirNow Fire and Smoke Map run by U.S. EPA and the U.S. Forest Service. This screenshot, from September 15, 2020, shows the far distances smoke can travel from the location of wildfires. The map also shows the U.S. Air Quality Index (AQI) from hundreds of air quality monitors and more than 10,000 privately owned air sensors. Green symbols indicate a good AQI; yellow indicates moderate; orange indicates unhealthy for sensitive groups; red indicates unhealthy for everyone; and purple indicates very unhealthy. The flame symbols indicate a large fire incident, and the small yellow spark symbols indicate unverified satellite fire detections.

Wildfire smoke can impact the health of people close to the fire and at distances far from fire impacted areas, depending on meteorological conditions, such as wind speed and direction. As wildfires burn, they generate smoke that is comprised of a mixture of particulate matter (PM) (also referred to as particle pollution) and gaseous pollutants (e.g., carbon monoxide). The pollutant of most concern to public health during a smoke event is fine particulate matter, or PM2.5, because these particles can penetrate deep into your lungs and cause adverse health effects.

Resources to Reduce Health Risks Associated with Wildfire and Smoke

include information about how to prepare for wildfires, stay safe during a fire, and return home after a fire. Pregnant people are particularly sensitive to the harmful effects of wildfire smoke, which can include decreased lung function, inflammation, and other respiratory issues. Other groups like children and those with chronic conditions also need to take extra care to protect themselves against wildfire smoke. Monitor fires and air quality in your area and follow instructions about exercise and going outside for “sensitive individuals.”

The California Air Resources Board Air Cleaner Information for Consumers has information about how to select a safe and effective air cleaner. Exercise caution in using air-cleaning devices in the home; some can produce ozone levels that are higher than health-based standards.
Who is at high risk in the counties projected to have ‘persistent drought’ in August?

As indicated in the map to the left, 618 counties across 30 states are projected to have persistent drought in August. In these counties, the total population at risk is 88,894,450 people and, of those, 1,019,195 people work in agriculture. Of these counties:

- 147 (24%) have a high number of people aged 65 or over, living alone.
- 139 (26%) have a high number of people living in rural areas.
- 132 (21%) have a high number of people living in poverty.
- 83 (14%) have a high number of people with frequent mental distress.
- 83 (14%) have a high number of adults with asthma.
- 268 (43%) have a high number of people without health insurance.
- 317 (51%) have a high number of uninsured children.
- 92 (15%) have a high number of Black or African American persons.
- 157 (26%) have a high number of people with severe housing cost burden.
- 132 (21%) have a high number of people in mobile homes.
- 131 (21%) have a high number of people with one or more disabilities.
- 184 (30%) are identified as highly vulnerable by CDC’s Social Vulnerability Index.

“*A high number* indicates that these counties are in the top quartile for this indicator compared to other counties.

**Drought Affects Health in Many Ways**

Drought increases the risk for a diverse range of health outcomes. For example:

- Low crop yields can result in rising food prices and shortages, potentially leading to malnutrition.
- Dry soil can increase the number of particulates like dust and pollen that are suspended in the air, which can irritate the bronchial passages and lungs.
- Dust storms can spread the fungus that causes coccidioidomycosis (Valley Fever).
- If there isn’t enough water to flow, waterways may become stagnant breeding grounds for disease vectors like mosquitoes as well as viruses and bacteria.
- Drought’s complex economic consequences can increase mood disorders, domestic violence, and suicide.
- Long-term droughts can cause poor-quality drinking water and leave inadequate water for hygiene and sanitation.
Drought conditions can lead to elevated levels of naturally occurring arsenic in the water we drink. The risk of contamination increases the longer that a drought persists. In a study done by U.S. Geological Survey and Centers for Disease Control and Prevention in 2021, researchers estimated that over 9% (4.1 million) of the 44.1 million people in the lower 48 states who use private domestic wells were potentially exposed to unsafe levels of arsenic during drought conditions compared to about 6% (2.7 million people) during non-drought conditions.

Chronic exposure to arsenic from drinking water is associated with an increased risk of several types of cancers, developmental issues, cardiovascular disease, adverse birth outcomes and impacts on the immune and endocrine systems. Arsenic occurs in groundwater due to chemical reactions between the rocks and water, lowering of water levels due to drought may cause chemical changes that release more arsenic from the rocks. Less water could also concentrate existing arsenic in the water.

Figure: Map showing the probability of having arsenic >10 μg/L (“high arsenic”) in domestic wells during drought. Hotspots generally reflect areas in the U.S. with high observed concentrations including New England (predominantly Maine and New Hampshire), a band in the upper Midwest, the southwest (most notably Nevada, southern Arizona, southern and central California, and isolated regions in all western states), and southern Texas.

Resources to Reduce Health Risks Associated with Drought

Drought is a slow-moving hazardous event, so the psychological effects of living through this type of disaster are more subtle and last longer than with other natural disasters. The Substance Abuse and Mental Health Services Administration (SAMHSA) Helpline and Text Service is available 24/7, free, and staffed by trained crisis counselors. Call or text 1-800-985-5990 to get help and support for any distress that you or someone you care about may be feeling related to any disaster.

The Department of Agriculture offers programs that can help with drought recovery as well as those that can help farmers manage risk and build resilience.

The U.S. Drought Monitor is an online, weekly map showing the location, extent, and severity of drought across the United States. The Department of Agriculture uses the Drought Monitor to determine a producer’s eligibility for certain drought assistance programs. You can report drought-related conditions and impacts within the U.S. and associated territories to the Drought Monitor.