

Drought, Climate Change and Health



DID YOU KNOW?

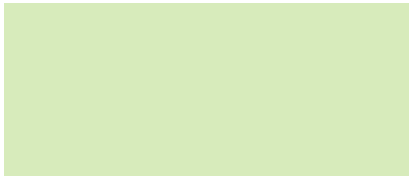
California's [The Human Right to Water Act](#) statutorily recognizes that “every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.



Drought impacts health through many pathways. Water is life! People need water to drink, grow food, and be clean. But drought affects health in many other ways too. In this brief we focus on the impact of climate change and drought in California and the U.S.

Drought and health

- Access to clean and safe drinking water is something we take for granted in the U.S., but in many poor, rural communities that access is tenuous, and further threatened by drought (see box below on Tulare County).
- Drought results in lower crop yields and increased crop loss or destruction, exposing large populations of people to rising food prices, food insecurity and — especially in developing nations — malnutrition, famine, and forced migration. See [Food Security, Climate Change and Health](#).
 - In 2015 the California drought resulted in \$900 million in crop revenue loss, \$350 million in livestock and dairy loss, and tens of thousands of lost jobs in agriculture. The total economic impact to the state's agriculture is estimated to be \$2.7 billion.¹
- During droughts, communities increasingly turn to groundwater stores for water supply. Groundwater is often contaminated with industrial materials, heavy metals and agriculture runoff, including nitrates from fertilizers in the Central Valley. Drought increases the concentration of these contaminants, further increasing the risk of waterborne disease.
 - As communities draw on groundwater stores, land subsidence — or sinking — puts critical infrastructure like roads, aqueducts and levees at risk of permanent damage.²
- Drought conditions create the need to conserve water, which may limit sanitation and hygiene practices, resulting in greater exposure to disease-causing organisms or chemicals.
- The multiple and interconnected impacts of drought on physical health, food security, economic livelihood and social stability can have serious mental health impacts. Long-term drought and its impacts has been linked to increased rates of suicide among rural Australian farmers.³ See [Mental Health and Climate Change](#).
- Drought is often accompanied by dry, dusty conditions. Valley Fever, which is caused by inhaling the fungus *Coccidioides immitis*, spreads under drought conditions when dried out dirt and dust are dispersed in the air.
- Dry vegetation and increased heat from drought are associated with more frequent and intense wildfires, which pose a risk of smoke inhalation and increased exposure to particulate matter and resultant asthma exacerbation, other respiratory illness, and cardiovascular disease.⁴ See [Wildfires, Climate Change and Health](#).



Drought, Conflict, and Migration

Drought is to blame for the largest mass migration in U.S. history. By 1940 the Dust Bowl had forced 2.5 million people out of the Plains states, with 200,000 of them heading to California.⁵ Today, scientists and political observers believe drought contributed to the Syrian civil war, as widespread crop failure from a 2007–2011 drought drove farming families to urban centers and fueling existing political unrest.⁶

- Warmer temperatures and changes in precipitation have impacts on the habitat and distribution of disease carrying vectors such as mosquitos carrying West Nile Virus or Dengue, and ticks transmitting Lyme Disease. [See Infectious Disease, Climate Change and Health.](#)

Health Impacts of Drought: Focus on Tulare County

Tulare County, California – a rural agricultural community in California’s San Joaquin Valley – may be a harbinger of what increased drought looks like on the ground. As the worst California drought in recorded history lingered on (and on), private wells in Tulare County started to run dry.

- By November 2015, 1,308 wells had run dry, affecting over 6,000 residents in the county.⁷
- Thousands of agricultural workers lost their jobs as thousands of acres of farmland were fallowed due to lack of water.
- Local food banks and other services were overwhelmed.
- Local emergency rooms reported a 25% increase in respiratory disease visits.⁸
- Illnesses such as West Nile Virus and Valley Fever began to rise.⁹
- The county experienced twice the statewide rate of diarrheal disease in 2013.¹³ and rising levels of stress, anxiety, depression and other mental health concerns.¹¹

The Human Right to Water¹²

California’s The Human Right to Water Act was signed into law in 2012, making California the first state in the nation to legally recognize the human right to water (HRTW). The Act statutorily recognizes that “every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.” The HRTW extends to all Californians, including vulnerable and marginalized individuals, groups, and communities in rural, tribal and urban areas. It affirms the State’s commitment to guaranteeing affordable, accessible, acceptable and safe water sufficient to protect the health and dignity of all residents; prioritizes water for personal and domestic use; and delineates the responsibilities of public officials at the state level.

Climate change and drought

Climate change is increasing the frequency, severity and duration of droughts due to:

- less total precipitation
- a higher proportion of precipitation as rain instead of snow,
- less snowpack with more and earlier spring runoff and
- higher temperatures that increase evaporation rates.



DID YOU KNOW?

Drought results in lower crop yields and increased crop loss or destruction, exposing large populations of people to rising food prices, food insecurity and — especially in developing nations — malnutrition, famine, and forced migration.



At the same time, water consumption and withdrawal of water from surface and underground water aquifers is increasing, leading to greater clean water shortages.

The U.S. Southwest has already shifted to a much drier climate, with a downward trend in overall precipitation, and scientists are predicting that the American West may experience a “mega-drought” lasting decades in the latter half of this century.¹³ Despite the 2015–16 “El Nino”, California remains in a significant drought and can expect to see more severe droughts in the future.

- By mid-century, 83% of California counties will experience water shortages as a result of climate change. This leads to increased reliance on groundwater, which is often polluted with pesticides, fertilizer and other industrial chemicals.¹⁴
- The Sierra Snowpack — the biggest storage site for California water — is expected to be reduced by 25% by mid-century.¹⁵

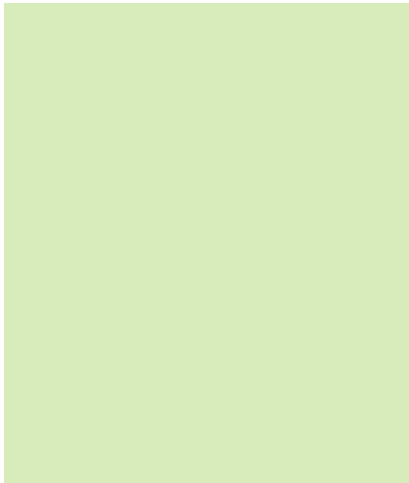
Climate change, drought and health equity

Social and economic inequities, as well as individual characteristics, place some individuals and communities at greater risk than others for the effects of drought:

- **Poverty:** Those with limited income or financial resources are especially vulnerable to food insecurity from rising food prices associated with drought and crop loss. Food insecurity is associated with higher risks of chronic illness such as diabetes and hypertension. See [Food Security, Climate Change and Health](#). People without home insurance are less able to recover after displacement from wildfires.
- **Agricultural workers and communities** are more vulnerable to the significant adverse economic impacts of drought, and to the mental health impacts of drought. Poor rural communities are also disproportionately reliant on small water systems or private drinking water wells, and thus at increased risk of water shortages or exposure to contaminated well water.
- **Chronic illness:** Lack of safe drinking water can exacerbate pre-existing renal disease and other chronic illness

What can physicians do to address climate change and drought?

- Talk to your patients about the impacts of drought and how best to protect their health:
 - Educate patients about [West Nile Virus](#) and ways to avoid transmission, including insect repellent, clothing and screens to keep mosquitos out of homes.
 - Educate patients about [Valley Fever](#) and ways to avoid becoming ill, including avoiding areas and activities with high dust exposure (construction or dusty fields, gardening, etc), staying indoors with windows closed on windy and dusty days, wearing a respirator, such as an N95 mask if areas and activities with dust can't be avoided, and ensuring good indoor air filtration.



FAST FACT:

By mid-century, 83% of California counties will experience water shortages as a result of climate change.

- Discuss the social and psychological impacts of drought on patients and refer for mental health care.
- Advise patients to create a personal and family emergency plan in case of evacuation from wildfire.
- Educate your colleagues and community on the links between climate change, drought and health, and what can be done to prevent adverse health impacts.
- Promote mitigation and adaptation solutions related to climate change and drought
 - Promote action to protect groundwater and surface water from contamination, for example through reduced use of fossil fuel based agricultural inputs such as pesticides and nitrogen-based fertilizers, and use of green infrastructure.
 - Promote water conservation in agriculture and in cities.
 - Promote upgrades to the [Safe Drinking Water Information System](#), which provides information about violations of public drinking water regulations to ensure safe and reliable public water sources.
- Support policies and programs in your community and in your health system that authentically engage and partner with community residents in addressing climate and health problems. Address the individual and community factors that lead to health inequities from drought.
 - Ask your patients if they are having difficulty accessing clean and safe drinking water, and connect them to resources for water assistance and disaster insurance
 - Support full implementation of California's Human Right to Water law
 - Promote local and sustainable agriculture practices, such as urban gardens, to reduce food insecurity when food prices increase.
 - Advocate for more investment in communities hardest hit by drought, and for full funding of assistance measures such as water relief, local food security measures, job relief, and displacement prevention.
 - Advocate for measures to protect against risks of vector born disease due to drought. See [Infectious Disease, Climate Change and Health](#).
 - Advocate for policies that provide unemployment assistance and sustainable economic opportunities for disadvantaged workers, such as farm workers.

For More Information

- CDC Drought and Health site:
<http://www.cdc.gov/nceh/drought/>
- Research Article:
[Health effects of drought: A systematic review of the evidence](#)

Page 2 photo: Patrick Emerson; page 3: Cate Turton/Department for International Development; page 5: MPCA.



DID YOU KNOW?

During droughts, communities increasingly turn to groundwater stores for water supply. Groundwater is often contaminated with industrial materials, heavy metals and agriculture runoff, including nitrates from fertilizers in the Central Valley.



Citations

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- ⁸ Zelezny, L., Fu, X., Harootunian, G., Drexler, D., Avalos, A., Chowdhury, N., ...Edmonson, C. (2015). Impact of the Drought in the San Joaquin Valley of California. Available at: <http://www.fresnostate.edu/academics/drought/>
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- ¹⁰ Ibid
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