



CLIMATE CHANGE AND HEALTH IN NEW MEXICO

Human-induced global climate change is well-studied and documented. Despite G-8 nations' agreement to limit warming to 3.6°F by 2050, New Mexico's average temperatures have risen 1.8°F since 1976 (Lenart 2007) and are expected to exceed the 3.6°F threshold by mid-century even with substantial reductions in greenhouse gas emissions. With warming half of the G-8 target, major impacts on human health have already been observed and, as warming progresses, they will likely increase. This document provides an overview on how climate change affects the health of New Mexicans and has been reviewed by Harvard Medical School faculty members, who specialize in the health impacts of global environmental change and hold degrees in medicine and public health.

KEY FINDINGS FOR NEW MEXICO: CLIMATE CHANGE AND HEALTH

- 1) Longer and more frequent heat waves, elevated ground-level ozone and higher pollen counts are projected to increase morbidity and mortality, especially among those with chronic heart and lung disease.
- 2) Warmer average temperatures enable the proliferation of mountain pine beetles and the destruction of forests, setting the stage for more wildfires that cause injury, respiratory disease and death.
- 3) Weather extremes accompanying climate change increase the risk of hantavirus and San Joaquin Valley fever outbreaks.
- 4) New Mexico's freshwater supplies will become even scarcer as 50-80% of the state's water supply originates from snow pack, which is projected to decrease in the state by as much as 60% by 2040.

CLIMATE CHANGE RESEARCH RELEVANT TO HEALTH OUTCOMES IN NEW MEXICO

Increased atmospheric greenhouse gas concentrations have already changed, and will continue to to change, the climate of New Mexico.

- » Temperatures across New Mexico have risen steeply over the past 3 decades, with the northernmost part of the state having warmed the most: 1.6°F since 1980 (UCS 2007).
- » Without significant reduction in greenhouse gas emissions, New Mexico is projected to warm an additional 2°F by 2040 and 4°F by the end of the century.
- » By 2030, heat waves are projected to last 14 to 21 days more per year than at present (USDA 2006), and the lack of nighttime relief and higher humidity levels associated with climate change increase the harmful effects.
- » New Mexico is already experiencing more heavy precipitation events (>2 inches a day) as well as an increase in the frequency and duration of droughts.

MAJOR HEALTH EFFECTS OF CLIMATE CHANGE IN NEW MEXICO

More respiratory disease, heart disease and death from heat waves are projected.

- » About 8% of New Mexicans have heart disease, and over 10% have chronic lung diseases including asthma (CDC 2007). Those with chronic lung or heart disease are respectively 1.5 and 2.5 times more likely than those without illness to suffer heat stroke during a heat wave (Bouchama 2007).
- » Heat stroke, which results from prolonged exposure to intense heat, can lead to permanent neurological deficits and death.
- » Heat waves increase the formation of ground-level ozone (smog) that triggers asthma attacks and which may contribute to the development of asthma in children (McConnell 2002). About 9% of New Mexicans have asthma (CDC 2007).

- » Under warming conditions, models project a ~10 parts per billion by volume (ppbv) increase in average ozone levels for the US Southwest by the 2050s.
- » **Increases in ozone concentration on the order of 10ppbv can increase daily mortality by 0.5% (Bell 2004), which corresponds to 730 additional deaths per year for New Mexico.** [This estimate is based upon 14,983 deaths in New Mexico in 2005.]
- » Severe ozone episodes, with levels 20-30ppbv above average, are expected to be more common by the 2050s throughout the Southwest (Racherla 2009).

Warmer temperatures are encouraging the spread of mountain pine beetles, a major pest of fir trees in New Mexico, which has killed an estimated 6.5 million acres of trees in the US West.

- » With the decline in sustained ‘killing frosts,’ mountain pine beetles are extending their range, and are overwintering and reproducing faster, while prolonged droughts are weakening the trees’ defenses.
- » Dead tree stands provide kindling for fires, which release harmful air pollutants and cancer-causing chemicals.
- » **Inhaling particulate air pollution (soot) can worsen respiratory illness, and, especially in those with heart disease and lung disease, and the elderly, can lead to death. About 12% of the state’s population is over 65 and, by 2030, this percentage is projected to rise to 26%.**

Cycles of drought interrupted by heavy downpours are projected to increase as the climate warms. Such sequences of extreme weather events are associated with outbreaks of hantavirus and San Joaquin Valley fever.

- » **Outbreaks of hantavirus pulmonary syndrome (HPS), which kills 30-40% of those infected, often follow heavy, early-season rains, which increase food for rodents that harbor this viral disease (Glass 2002). New Mexico has more cases of HPS than any other US state.**
- » Increases in flea- and rodent-borne plague also occur after unseasonal winter-spring precipitation (Parmenter et al. 1999).
- » Peak incidence of San Joaquin Valley fever occurs when dry spells follow heavy rains (Kolivras 2004), as the fungal agent that causes the disease grows in moist soil and is aerosolized during dry spells and dust storms.

A warmer climate has created conditions conducive to the emergence of dengue fever. To date, there have been 12 suspected cases in New Mexico (NRDC 2009).

- » Dengue fever, a disease found in the tropics, is a debilitating viral disease and repeated episodes of different strains can cause dengue hemorrhagic fever.
- » The common mosquito carrier for dengue fever – *Aedes aegypti* – is present in Las Cruces, New Mexico; mosquitoes are highly sensitive to warming and can proliferate after rains and in water-storage containers during dry spells.

New Mexico’s water sources, including the Rio Grande and Colorado Rivers, and the Ogallala Aquifer, are already underfed and overdrawn.

- » **Aluminum and mercury are now commonly found in New Mexico’s freshwater supplies (NM Environment Department 2008); water shortages concentrate chemicals, heavy metals and microbial pathogens in drinking water.**
- » In eastern New Mexico, portions of the Ogallala Aquifer are expected to run dry within the next 10 years (Ground Water Protection Council).
- » By 2040, the Colorado River Basin storage will be reduced by over a third, due to earlier spring snowmelt and greater heat and evaporation (Christiansen 2004).
- » Within this century, there will likely be no sustained snow pack south of Santa Fe and in the Sangre de Cristo mountain range.

Climate change will increase water stress across the state, contributing to conflict and endangering ecosystems. Some of these impacts have implications for physical health; all can affect mental health.

- » Tribal rights over water quality standards led to conflict in 1986 in the Pueblo of Isleta, near Albuquerque, and statewide during the hot, dry summer of 1988.
- » **Large reservations in SW New Mexico are home to “sky islands” with high biodiversity (Arias Rojo et al. 1999), sacred to many tribes and containing culturally- and medicinally-important wildlife and plants, some which face extinction due to warming and water stress at high altitudes (USGCRP 2009).**

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Full references are available at <http://chge.med.harvard.edu>, “Policymaker Education”