

University of New Mexico

## UNM Digital Repository

---

Climate Change and Public Health  
Preparedness

Health Sciences Center Student Scholarship

---

7-26-2020

### Climate Change and Community Health

Parasto Baghae Pour

Follow this and additional works at: [https://digitalrepository.unm.edu/hsc\\_climate](https://digitalrepository.unm.edu/hsc_climate)

---

# **Climate Change and Community Health**

By:

Parasto Baghae Pour

PH 560

## **Part 1 - The Impact of Drought on New Mexico**

Climate change affects temperatures, water availability, and weather extremes in New Mexico. The state's weather is getting drier and hotter because of global warming. New Mexico is the sixth fastest warming state in the nation. The average annual temperature has increased about 2.7°F since 1970 (350). As the temperature increases, less precipitation falls as snow, which is crucial to manage water. Because of rises in the temperature, snow melts earlier in the spring, resulting in lower stream flows and availability to water (350). The shortage of water over an extended period of time is known as drought. .

The U.S. Drought Monitor (USDM) shows the location and intensity of drought across the country and is updated each Tuesday and released on Thursday (National Integrated Drought Information System, 2020). The following are the drought conditions in New Mexico as of June 09, 2020:

- Abnormally Dry (23.7% of state)
- Moderate Drought (21.2% of state)
- Severe Drought (21.3% of state)
- Extreme Drought (8.9% of state)
- Exceptional Drought (0.0% of state)

Thirty-five percent and 59% of the state's population (730,000, 1,199,000 residents) live in drought and abnormally dry areas, respectively. Since 2000, the longest duration of drought in New Mexico has lasted 329 weeks (started on May 1, 2001 and ended on August 14, 2007) (National Integrated Drought Information System, 2020).

Higher temperatures and drought will impact agriculture, and human health, and increase the severity and frequency of wildfires in New Mexico.

### **Wildfires**

Higher temperatures and drought can increase the frequency and severity of wildfires, which could harm properties and human health. On average, more than 2 percent of the land in New

Mexico has burned per decade since 1984 (EPA 2016). Wildfire smoke can reduce air quality and increase respiratory and heart problems (EPA, 2016).

### **Pests**

Higher temperature decreases the mortality rate of many pests. On the other hand, Drought reduces the ability of trees to defend against pests including bark beetles, which have taken over 200,000 acres in New Mexico (EPA, 2016).

### **Tribal Communities**

Rising temperatures and increasing drought decrease the availability of certain fish and wild plants that the Navajo have relied on for generations (EPA 2016).

### **Agriculture**

Drought decreases the soil's ability to absorb moisture. When heavy rain falls on this this type of soil, instead of seeping down, it runs off, and causes dangerous flash floods (350). The timing and patterns of precipitation have been changing in New Mexico, resulting in a mismatch between supply and demand for water, which create problems for agriculture (350). Increasing droughts and higher temperatures interfere with New Mexico's farms and cattle ranches. A higher temperature increases the stress on plants and makes them more vulnerable to agricultural pests and diseases (EPA, 2016). According to the US Forest Service projects, piñon pine, the New Mexico state tree, could disappear from much of its current range by 2030, even if the rise in greenhouse gas emissions is slowed (350). As drought conditions persist, farmers spend more money on crop irrigation. They also have to pump more groundwater and dig deeper wells to reach the water that often contains high level of salt and minerals that damage crops (Union of Concerned Scientists, 2016).

Hot weather and droughts can threaten cows' health as well. Changes in landscape from grass to woody shrubs can result in livestock eating less, growing more slowly, and producing less milk (EPA 2016).

Drought is the most damaging environmental event. It results in water stress, which affects global agriculture, especially livestock and crop production, and leads to considerable losses of production, which eventually create food insecurity.

## **Part 2 - The Impact of Food Insecurity on Children in New Mexico**

Food insecurity is a lack of consistent physical, social, and economic access to food on a daily basis for an active and healthy life (Hunger Health, 2020). Food insecurity results in malnutrition, chronic hunger, and low quality of health. On average, more than 9 million people die from global food insecurity each year (Kriftcher, 2019). In 2018, an estimated 1 in 9 Americans were food insecure, equating to over 37 million Americans, including more than 11 million children (Hunger Health, 2020). According to the USDA, in New Mexico, 326,000 people (1 in 6 individuals), including over 118,000 children (1 in 4 children) are food insecure (NM-IBIS, 2019). Seventy five percent of these food insecure individuals purchase inexpensive, unhealthy food in order to have at least some food to eat. Sixty one percent choose between paying utilities or buying food. Fifty nine percent choose between paying for medicine or medical care or buying food. Forty eight percent choose between paying their rent or mortgage or buying food (Food Insecurity in New Mexico, 2015).

Food insecurity can be broken down into three aspects (Kriftcher, 2019):

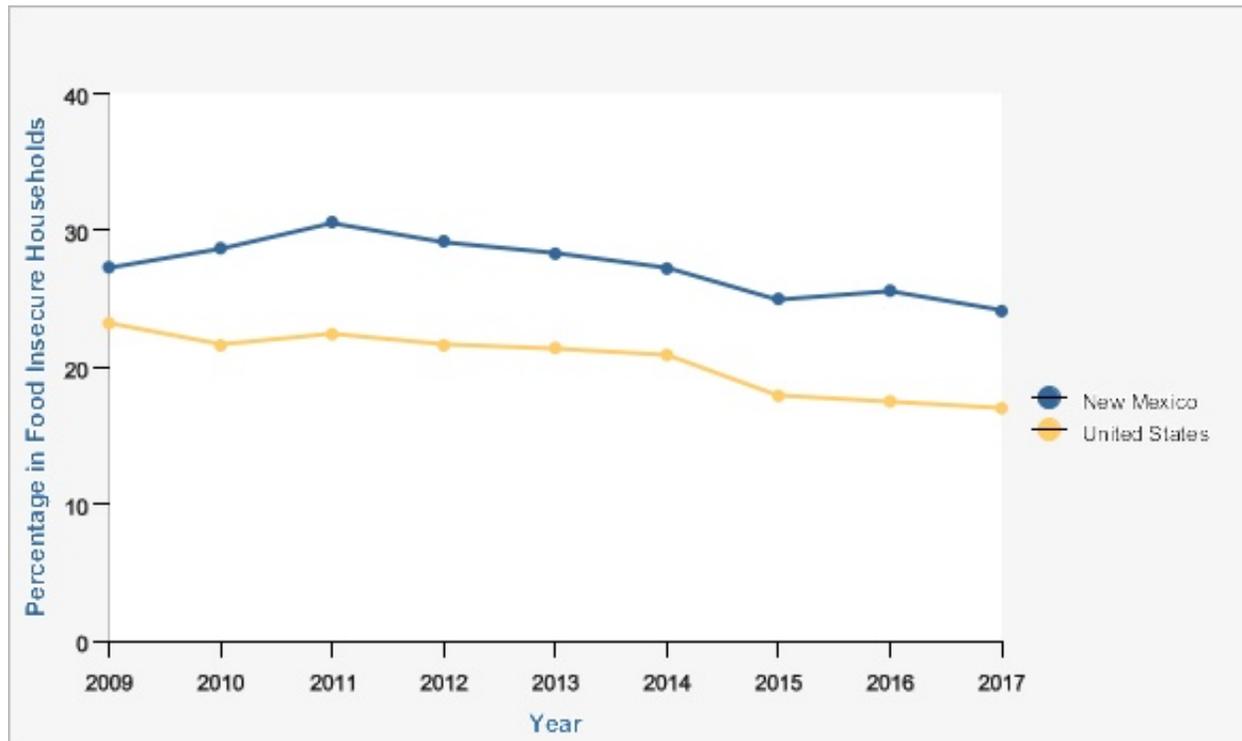
- **Food availability** - Having physical access to a food supply on a consistent basis.
- **Food access** - Having the resources, such as money, to obtain a sufficient amount of food.
- **Food utilization** - The proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, and adequate sanitation.

The factors contributing to food insecurity include the population growth, global water crisis, natural disasters, and climate change (Kriftcher, 2019). Climate change (such as extreme weather events, floods, or droughts) can cause food insecurity. By 2050, it is estimated that the number of people at risk for hunger will increase by 20%. Globally, climate change, such as drought, is expected to threaten food production and certain aspects of food quality, as well as food prices and distribution systems (CDC, 2020). As a result, climate change will affect food availability, accessibility, utilization, and food systems stability (A well-fed world). Food production (crop yields, livestock, and fish production) declines with increases in temperature, changes in the amount, timing, and intensity of precipitation, and reduced availability of water in dry areas. Processing, packaging, transportation, and storage are very likely to be affected by temperature increases that could increase costs and spoilage (USDA). Decline in food production and distribution result in reduced availability and accessibility, and increased food costs.

Temperature increases could also make utilization more difficult by increasing food- safety risks as a result of bacteria-related food poisoning, such as Salmonella (EPA, 2017). Climate change can also cause a decline in nutritional value of some foods. Elevated CO<sub>2</sub> is associated with decreased plant nitrogen concentration, and therefore decreased protein in crops, including wheat, barley, rice, and soy. The nutrient content of crops such as iron, zinc, and B vitamins also decline as the environmental CO<sub>2</sub> level increases (EPA, 2017).

Reduced accessibility to affordable nutritious food could result in an increase in diet-related health problems (Ruwoldt, 2013). Climate change is one of the leading global causes of hunger. Although food insecurity is harmful to any individual, it can be particularly devastating among children because they are more vulnerable to potential long-term consequences for their future physical and mental health, and academic achievement. In New Mexico, 27% of children do not have access to enough nutritious food (Food Insecurity in New Mexico, 2015). Studies have found that food insecurity in children is associated with increased use of emergency department services and hospitalizations. Food insecurity may also negatively affect children's acute and chronic health conditions, such as compromised immune system functioning, anemia, and asthma. Children who experience food insecurity may be at higher risk for behavioral issues (fighting, hyperactivity, aggression, mood swings, and bullying) and social difficulties, as well as poor academic performance. The stress produced by food insecurity may be directly related to mental health outcomes such as depression (Thomas, et al., 2019). The consistent harmful impacts of food insecurity on children's health emphasizes the need to help this vulnerable population by tackling climate crisis and mitigating the impact of climate change on food security.

## Food Insecurity Rate by Year, Children Age 0 to 17 Years, New Mexico and U.S. 2009-2017



New Mexico Department of Health, Indicator-Based Information System (NM-IBIS) for Public Health. (Updated 2019). Retrieved from [https://ibis.health.state.nm.us/indicator/view/FoodInsec.Overall.Year.NM\\_US.html](https://ibis.health.state.nm.us/indicator/view/FoodInsec.Overall.Year.NM_US.html).

### Part 3 - Tackling the impact of climate change on food security

Food insecurity and climate change inhibit human wellbeing and economic growth throughout the world, and the link between these two issues is not inevitable. Therefore, it is urgent to construct a global food system that adapts to climate change and ensures food security, while minimizing greenhouse gas emissions.

Current farming practices, including land clearing and conversion of land for agriculture, excessive use of fossil fuels, and inefficient use of fertilizers, is a significant contributor to greenhouse gas emissions. There is a large potential for reducing net food system emissions through efficiency measures in production. Global food production methods must change to better manage soil, water, and other resources, minimize the impact on the environment, and support the world's capacity to produce food in the future (Beddington, et al., 2012). Farmers

can plant different crops at different times to cultivate more food. This could increase farmers' income, improve food security, and promote healthy environments by not clearing more lands for agricultural use. Farmers can also improve irrigation techniques to minimize how much water they use (McCarthy, 2019).

In order to stop food insecurity, factory farming should be eliminated. According to the Humane Society, half of the total grain harvested is fed to animals in factory farming to produce meat, eggs, and dairy products. In order to fight the global hunger crisis, grain production should be redirected to help feed human beings around the world (Beddington, et al., 2012).

According to researchers helping smaller farms to persist, teaching local farmers to optimize water use and plant drought-resistant vegetables is another key to ensuring good food and local economic stability. To adapt as best as possible to the drought and heat waves hitting our regions, we need to breed annual crops that can cope with higher temperatures. The crops that require less water than others once they are established include Beans, okra, asparagus, peppers, barley, quinoa, wheat, chard, melon, eggplant, cucumber, tomato, squash, and sunflower (ucanr, 2016).

Another way to minimize food insecurity is Plant, Eat, and Share (Change Food, 2020). We need communities to come together to grow food for each other. One example is planting fruit trees and vegetables around the city. Community gardens provide individuals and families with the opportunity to grow fresh food, herbs, and plants. These gardens act as a promising strategy to decrease food insecurity because of their ability to provide lower-income households with access to nutritious foods (Change Food, 2020).

Charitable contributions and federal nutrition programs remain the backbone of efforts to combat hunger and food insecurity. The nation's most important anti-hunger program is the Supplemental Nutrition Assistance Program (SNAP, formerly food stamps). SNAP reduces the overall prevalence of food insecurity by as much as 30 percent, and is even more effective among the most vulnerable population, such as children (Carlson, et al., 2018). Double Up Food Bucks (DUFEB) is a healthy food incentive program that allows SNAP recipients to double their purchases of fresh and locally grown produce when they shop at participating farmers' markets.

These types of programs that promote the consumption of fresh produce are needed in New Mexico where only 18 percent of adults and 21 percent of children and teens eat the recommended five or more fruit and vegetable servings per day (Casau, 2016). Food pantries and food banks also definitely help ease food insecurity by providing food to those in need (Change Food, 2020).

As a global community, we need to make strategic investments to end hunger. We need to establish climate-resilient agricultural production systems, make efficient use of resources, develop low-waste supply chains, ensure adequate nutrition, and encourage healthy eating choices.

#### **Part 4 - Recovering From Food Insecurity**

It is estimated that by 2050 the world's population will reach nearly 10 billion (34% higher than today), and global food demand will increase by 56% (McCarthy, 2019). If we do not make any changes in the current food trends, an extra 593 million-hectare land (an area nearly twice the size of India) will be needed to feed everyone in 2050 (Ranganathan, J., et al., 2018). We must find ways to sustainably increase food production while significantly reducing the carbon footprint of our food system. What people eat has a strong impact on the environment, including water, energy, and land use, as well as greenhouse gas emission (Nelson, et al., 2016). Producing one gram of animal-based protein requires 20 times more land and water, and emits 20 times more GHGs, compared to producing one gram of plant-based protein, such as beans and lentils. Shifting to healthier, more sustainable plant-based diets has a more positive impact on health and a lower environmental impact than animal-based dietary patterns (McCarthy, 2019). With the SNAP DUFEB program, more SNAP beneficiaries in New Mexico are able to shop at farmer's markets for fresh and locally grown fruits and vegetables, and more of the economic stimulus benefits local farmers and other New Mexico food producers.

In order to limit food demand, we should reduce food loss and waste. Globally, more than one-third of all food is either lost or wasted (McCarthy, 2019). In industrialized countries, roughly half the food loss occurs at the consumer end. In developing countries, two-thirds of food loss occurs during harvesting, handling, and storage. Cutting these losses is an immediate

and cost-effective option for increasing food availability (Searchinger, et al., 2013). Since 1991, the New Mexico Recycling Coalition, which is a non-profit, member-supported organization, has served as a recycling advocate. Their mission is to inspire New Mexicans to reduce, reuse, and recycle. Their vision is a New Mexico where waste is a resource (NMRC, 2014). The New Mexico Recycling Coalition and the New Mexico Organics Recycling Organization work together to ensure less food is wasted, more people are fed, and what is leftover is used as animal feed or to enrich soils as compost. The “Hunger in New Mexico” report found that every week, close to 40,000 New Mexicans seek food assistance (NMRC, 2014). Retailers have been quite successful in New Mexico working with their local food bank to divert a significant amount of valuable food items to those in need. Reducing food loss and waste by 25 percent by 2050 would close the food gap by 12 percent and the land gap by 27 percent (Ranganathan, J., et al., 2018).

Reducing the fertility rate is another way to reduce demand for food. The fertility rate is the average number of children born per woman. This rate is roughly 2.1 children per woman for most countries. The birth rate in New Mexico was consistently higher than the U.S. rate until 2014 when the state rate dropped below the U.S. rate, and has remained lower through 2017 (NM Department of health, 2017). However, the New Mexico teen birth rate continues to be nearly 50% higher than the U.S. teen birth rate. The 2017 teen birth rate for New Mexico was 27.6 compared to the 2017 U.S. rate of 18.8 (NM Department of health, 2017). Increased educational opportunities for girls, as well as increased access to reproductive health services, including family planning, can decrease the fertility rate and population growth (Ranganathan, J., et al., 2018). Access to family planning counseling and technology ensures that women and men can make informed choices about reproduction. Increasing access to reproductive health services, combined with increasing educational opportunities for girls, can help delay a woman’s first child-birth. The age at which a woman gives birth to her first child is a strong indicator of how many children she will ultimately have (Ranganathan, J., et al., 2018).

The global demand for food will increase with population growth, but the amount of food per person that needs to be produced can be brought down by eliminating waste in supply chains, ensuring more equitable access to food and moving to more resource efficient and healthier vegetable-rich diets. Food insecurity is real. Millions of people do not have access to their

minimum daily caloric needs or even water. There is no reason for food insecurity to continue if we use crops more efficiently.

## References

1. 350. Climate Change in New Mexico. Retrieved from <https://350newmexico.org/confronting-climate-change-in-new-mexico/>.
2. National Integrated Drought Information System. (2020, June 9). Drought in New Mexico. Retrieved from <https://www.drought.gov/drought/states/new-mexico>.
3. Union of Concerned Scientists. (2016, May 2). Confronting Climate Change in New Mexico, Action needed today to prepare the state for a hotter, drier future. Retrieved from <https://www.ucsusa.org/resources/confronting-climate-change-new-mexico>.
4. United States Environmental Protection Agency (EPA). (2016, August). What Climate Change Means for New Mexico. Retrieved from <https://www.epa.gov/sites/production/files/2016-09/documents/climate-change-nm.pdf>.
5. Hunger Health. (2020). What is Food Insecurity. Retrieved from <https://hungerandhealth.feedingamerica.org/understand-food-insecurity/>.
6. Kriftcher, C. M. (2019). What is food insecurity. Retrieved from <https://borgenproject.org/what-is-food-insecurity/>.
7. New Mexico Department of Health, Indicator-Based Information System (NM-IBIS) for Public Health. (Updated 2019). Retrieved from [https://ibis.health.state.nm.us/indicator/view/FoodInsec.Overall.Year.NM\\_US.html](https://ibis.health.state.nm.us/indicator/view/FoodInsec.Overall.Year.NM_US.html).
8. Food Insecurity in New Mexico. (2015). Retrieved from <http://www.nmvoices.org/wp-content/uploads/2016/12/Food-insecurity.pdf>.
9. Center for Disease Control and Prevention (CDC). (2020). Climate Effects on Health. Retrieved from <https://www.cdc.gov/climateandhealth/effects/default.htm>.
10. A well-fed world. Plant-based hunger solutions. Food insecurity and climate change. Retrieved from <https://awellfedworld.org/food-insecurity-climate-change>.
11. United States Environmental Protection Agency (EPA). (2017). Climate Change Impacts. Retrieved from [https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-human-health\\_.html#Populations%20of%20concern](https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-human-health_.html#Populations%20of%20concern).
12. U.S. Department of Agriculture. Climate Change, Global Food Security, and the U.S. Food System. Retrieved from <https://www.usda.gov/our-agency/staff-offices/oce/energy-and-environment/food-security>.
13. Thomas, M.C., Miller, D. P., Morrissey, T. W. (2019). Food Insecurity and Child Health. *Journal of the American Academy of Pediatrics*. 144 (4) e20190397; DOI: <https://doi.org/10.1542/peds.2019-0397>.
14. Beddington, J.R., Asaduzzaman, M., Clark, M.E., Bremauntz, A.F., Guillou, M.D., Jahn, M. M. , Lin, E., □□□□□T., Negra, Ch. ,Nobre, C. A., Scholes, R. J., Sharma, R., Van BO, N., Wakhungu, J. (2012). The role for scientists in tackling food insecurity and climate change. *Agric & Food Secur* 1, 10. Retrieved from <https://link.springer.com/article/10.1186/2048-7010-1-10>.
15. McCarthy, J. (2019). Here's What It Will Take to Feed 10 Billion People by 2050. Retrieved from <https://www.globalcitizen.org/en/content/sustainably-feeding-10-billion-2050>.
16. University of California Agriculture and Natural Resources. (2016). Drought-Resistant Crops and Varieties. Retrieved from <https://ucanr.edu/sites/scmg/files/183771.pdf>.
17. Change Food. (2020). Reduce Food Insecurity. Retrieved from <https://www.changefood.org/plant-eat-share/reduce-food-insecurity>.

18. Carlson, S., Keith-Jennings, B. (2018). SNAP Is Linked with Improved Nutritional Outcomes and Lower Health Care Costs. Retrieved from <https://www.cbpp.org/research/food-assistance/snap-is-linked-with-improved-nutritional-outcomes-and-lower-health-care>.
19. Casau, A. (2016). Helping Food-Insecure Households in New Mexico Afford Healthier Choices through the SNAP Double Up Food Bucks Program. Retrieved from <https://www.nmvoices.org/wp-content/uploads/2014/01/SNAP-DUFB-policy-brief-web.pdf>.
20. McCarthy, J. (2019). Here's What It Will Take to Feed 10 Billion People by 2050. Retrieved from <https://www.globalcitizen.org/en/content/sustainably-feeding-10-billion-2050>.
21. Ranganathan, J., Waite, R., Searchinger, T., Hanson, C. (2018). How to Sustainably Feed 10 Billion People by 2050, in 21 Charts. Retrieved from <https://www.wri.org/blog/2018/12/how-sustainably-feed-10-billion-people-2050-21-charts>.
22. Nelson, M.E., Hamm, M.W., Hu, F.B., Abrams, S.A., Griffin, T.S. (2016). Alignment of Healthy Dietary Patterns and Environmental Sustainability: A Systematic Review. *Adv Nutr.* 2016;7(6):1005–1025.
23. Searchinger, T., Hanson, C., Ranganathan, J., Brian, L., Waite, R., Winterbottom, R., Dinshaw, A., Heimlich, R. (2013). Creating a Sustainable Food Future: Interim Findings, A menu of solutions to sustainably feed more than 9 billion people by 2050. Retrieved from <https://www.wri.org/publication/creating-sustainable-food-future-interim-findings>.
24. NMRC. (2014). Managing Food Waste in New Mexico Grocers. Retrieved from <http://www.recyclenewmexico.com/pdf/food-waste-management-grocers-web.pdf>.
25. New Mexico Department of Health. (2017). New Mexico Selected Health Statistics Annual Report 2017. Retrieved from <https://www.nmhealth.org/data/view/vital/2208>.

