CLIMATE AND HEALTH COUNTRY PROFILE – 2015

UNITED STATES OF AMERICA

World Health Organization

United Nations Framework Convention on Climate Change

OVERVIEW

The United States of America is comprised of a variety of geographic landscapes, nine climatic regions within mainland USA[a] alone and approximately 95,470 miles of shoreline.[b] In 2010, it was estimated that over 123 million people, almost 40% of the nation's total population, lived on a shoreline.[c] Climate change poses one of the most significant environmental and human health threats in America. Rising sea levels, warming oceans, expected increases in the frequency and intensity of extreme weather events and changes in temperature and precipitation patterns pose direct and indirect risks to the health and well-being of the population. For example, heat waves, storms and floods may result in increased deaths and disease and may have long-term impacts on mental health. Changing climate patterns could also cause a deterioration of food security, nutrition and the emergence and reemergence of water-borne, vector-borne and food-borne diseases. Drivers of climate change, such as air pollution also significantly increase the risk of cardio-vascular diseases, cancers, and respiratory diseases. The impacts of climate change are already evident in the US and are projected to intensify in coming years, bringing multiple health threats for the entire population and especially populations of concern, including indigenous peoples, children, pregnant women, older adults vulnerable occupational groups and persons with disabilities.[d]

SUMMARY OF KEY FINDINGS

- Climate change is projected to have substantial direct and indirect human health effects in the United States.
- Generating and understanding scientific evidence is critical for understanding these phenomena.

OPPORTUNITIES FOR ACTION

1) Mitigation

- Mitigation can limit the extent of global climate change and avert some of these effects.
- Mitigation would also yield substantial and immediate co-benefits across sectors (see page 7), including in the health sector itself.
- One comprehensive study[e] found that mitigation will result in:
  - 57,000 fewer deaths from poor air quality.
  - 12,000 fewer deaths from extreme heat and cold in 49 major cities.
  - Avoided loss of 1.2 billion labor hours.
  - $2.6–$3.0 billion in avoided damages from poor water quality.

2) Adaptation

- Adaptation actions can also limit the scope of the health impacts caused by climate change, including impacts to heat extremes, air, water, and food quality, and vector-borne disease.

3) National policy implementation

- The United States has taken numerous policy measures (see pages 9–10) related to climate change and human health.

DEMOGRAPHIC ESTIMATES	
Population (2013)[f]	317 million
Population living in urban areas (2013)[g]	81.3 %
Population under five (2013)[f]	6.3 %
Population aged 65 or over (2013)[f]	14.0 %
ECONOMIC AND DEVELOPMENT INDICATORS	
GDP per capita (current US$, 2013)[h]	52,660 USD
Total expenditure on health as % of GDP (2013)[i]	17.1 %
Percentage share of income for lowest 20% of population (2010)[h]	4.7
HDI (2013, +/- 0.01 change from 2005 is indicated with arrow)[j]	0.914 ▲
HEALTH ESTIMATES	
Life expectancy at birth (2013)[k]	79 years
Under-5 mortality per 1000 live births (2013)[l]	7

a National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental Information. Note: Climatic regions do not cover Alaska or US territories and possessions. https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-regions.php.

b National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, US Department of Commerce. Note: Total length of tidal shorelines include measurements of the coastal states and US territories and possessions. http://oceanservice.noaa.gov/facts/shorelength.html

c National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, US Department of Commerce. http://oceanservice.noaa.gov/facts/population.html

d The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. 2016. U.S. Global Change Research Program. https://health2016.globalchange.gov/

e EPA. 2015. Climate Change in the United States: Benefits of Global Action. United States Environmental Protection Agency, Office of Atmospheric Programs, EPA 430-R-15-001. www.epa.gov/cira

f World Population Prospects: The 2015 Revision, UNDESA (2015)

g World Urbanization Prospects: The 2014 Revision, UNDESA (2014)

h World Development Indicators, World Bank (2016)

i Global Health Expenditure Database, WHO (2014)

j United Nations Development Programme, Human Development Reports (2014)

k Global Health Observatory, WHO (2014)

l Levels & Trends in Child Mortality Report 2015, UN Inter-agency Group for Child Mortality Estimation (2015)

1 CURRENT AND FUTURE CLIMATE HAZARDS

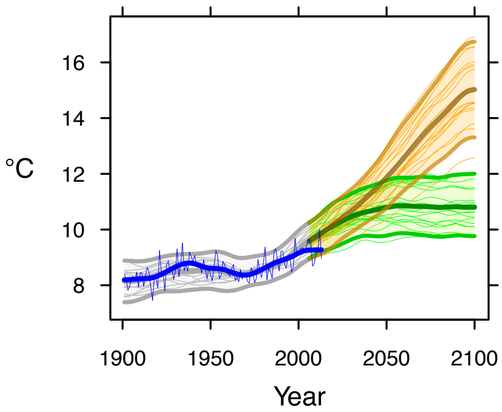
Due to climate change, many climate hazards and extreme weather events, such as heat waves, heavy rainfall and droughts, could become more frequent and more intense in many parts of the world.

Outlined here are country–specific projections up to the year 2100 for climate hazards under a 'business as usual' high emissions scenario compared to projections under a 'two-degree' scenario with rapidly decreasing global emissions. Most hazards caused by climate change will persist for many centuries.

COUNTRY-SPECIFIC CLIMATE HAZARD PROJECTIONS

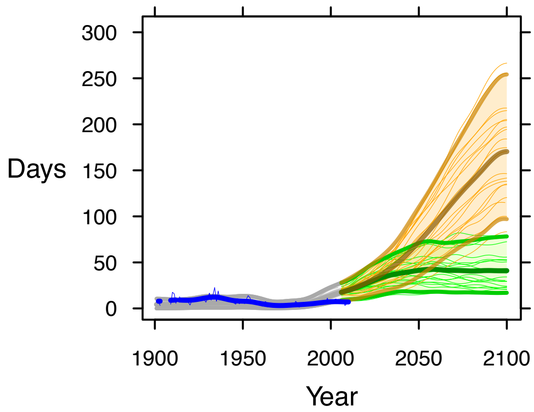
The model projections below present climate hazards under a high emissions scenario, Representative Concentration Pathway 8.5 [RCP8.5] (in orange) and a low emissions scenario, [RCP2.6] (in green).[a] The text boxes describe the projected changes averaged across about 20 models (thick line). The figures also show each model individually as well as the 90% model range (shaded) as a measure of uncertainty and, where available, the annual and smoothed observed record (in blue).[b,c]

MEAN ANNUAL TEMPERATURE



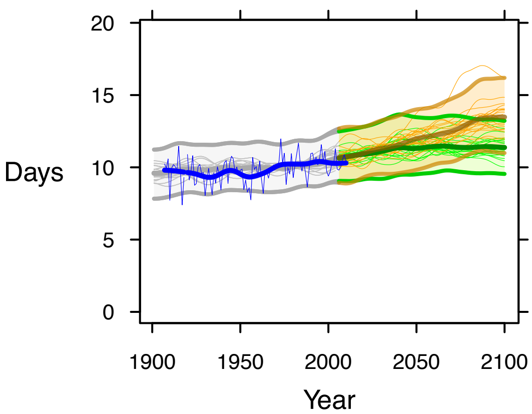
Under a high emissions scenario, mean annual temperature is projected to rise by about 6.2°C on average from 1990 to 2100. If global emissions decrease rapidly, the temperature rise is limited to about 2°C.

DAYS OF WARM SPELL ('HEAT WAVES')



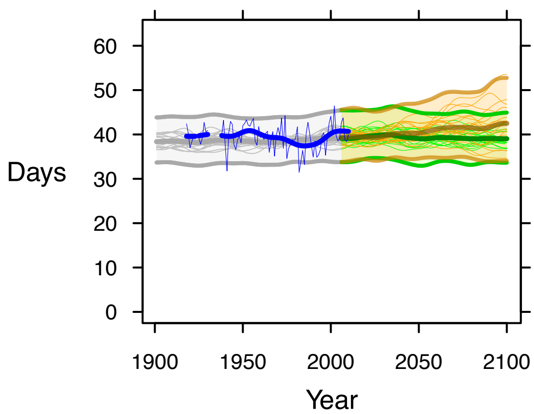
Under a high emissions scenario, the number of days of warm spell[d] is projected to increase from less than 10 days in 1990 to about 170 days on average in 2100. If global emissions decrease rapidly, the days of warm spell are limited to about 40 on average.

DAYS WITH EXTREME RAINFALL ('FLOOD RISK')



Under a high emissions scenario, the number of days with very heavy precipitation (20 mm or more) is indicated to increase by about 3 days on average from 1990 to 2100. Some models indicate increases outside the range of historical variability, implying even greater increase in flood risk. If global emissions decrease rapidly, any change in risk is much reduced.

CONSECUTIVE DRY DAYS ('DROUGHT')



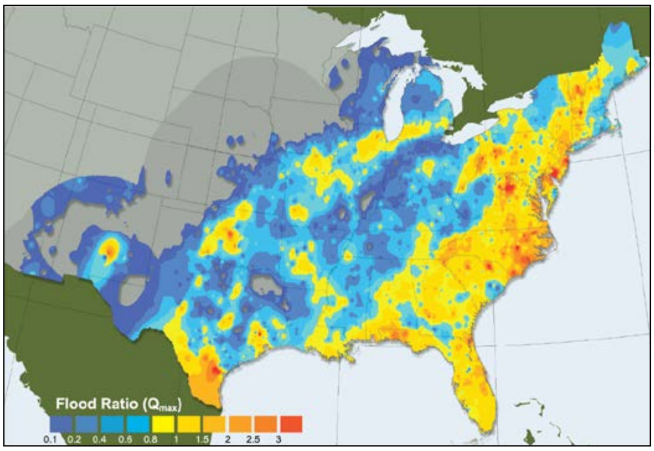
Under both high and low emissions scenarios, the longest dry spell remains around 40 days on average, with continuing large year-to-year variability. Under a high emissions scenario, a few models indicate increases just outside the range of historical variability.

a Model projections are from CMIP5 for RCP8.5 (high emissions) and RCP2.6 (low emissions). Model anomalies are added to the historical mean and smoothed.
b Observed historical record of mean temperature is from CRU-TSv.3.22; observed historical records of extremes are from HadEX2.
c Analysis by the Climatic Research Unit and Tyndall Centre for Climate Change Research, University of East Anglia, 2015.
d A 'warm spell' day is a day when maximum temperature, together with that of at least the 6 consecutive previous days, exceeds the 90th percentile threshold for that time of the year.

2 CURRENT AND FUTURE HEALTH RISKS DUE TO CLIMATE CHANGE

Human health is profoundly affected by weather and climate. Climate change threatens to exacerbate today's health problems – deaths from extreme weather events, cardiovascular and respiratory diseases, infectious diseases and malnutrition – whilst undermining water and food supplies, infrastructure, health systems and social protection systems.

HURRICANE-INDUCED FLOOD EFFECTS IN EASTERN & CENTRAL UNITED STATES (1981–2011)



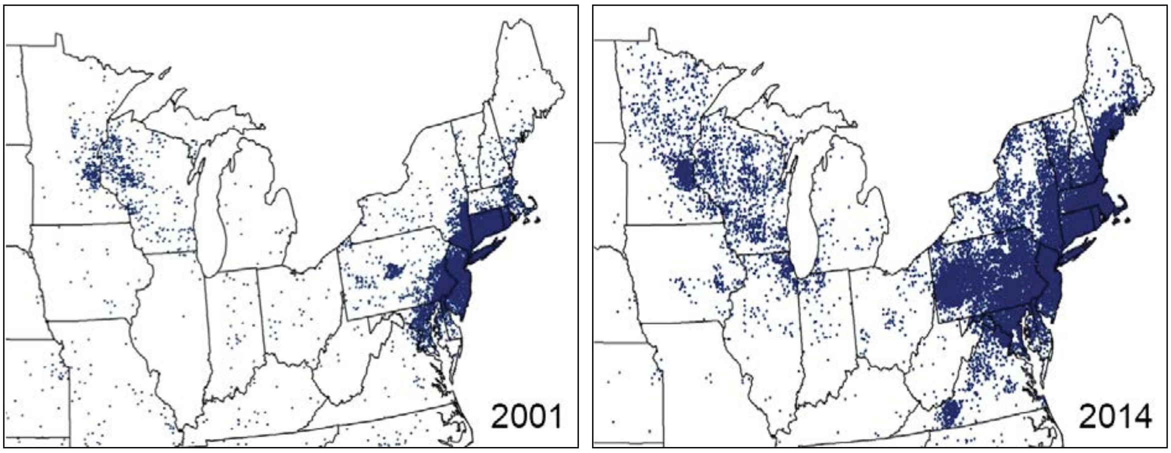
Coastal flooding is predominately caused by storm surges that are exacerbated by sea level rise. In addition, hurricanes are important contributors to flooding in the eastern United States, and can also cause substantial inland flooding before, during, and after landfall, even when far from the storm's center. The deadliest U.S. storms of this century to date were Hurricane Katrina (2005) and Superstorm Sandy (2012). Hurricane Katrina was responsible for almost half of the hurricane-related deaths over the past 50 years, with the majority of deaths directly related to the storm in Louisiana (an estimated 971 to 1,300 deaths) due to drowning or flood-related physical trauma. Hurricane intensity and rainfall are projected to increase as the climate continues to warm.[a]

KEY IMPLICATIONS FOR HEALTH

Increased flood frequency and severity are projected in the Northeast and Midwest regions, while increasing snowmelt and runoff in the Western United States will increase flooding in some mountain watersheds. In addition to deaths from drowning, flooding can cause injuries, affect food production and distribution, contaminate drinking water, and increase risk for infectious disease. Longer term effects of flooding may include mental health conditions and population displacement.

Droughts, which are projected to become more intense in the Southwest, may also lead to health hazards, including wildfires, dust storms, extreme heat events, flash flooding, degraded air and water quality, and reduced water quantity.

CHANGES IN LYME DISEASE CASE REPORT DISTRIBUTION (2001–2014)



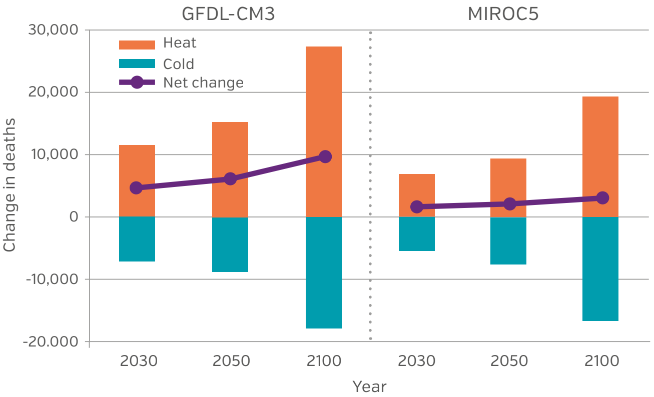
Ticks capable of carrying the bacteria that cause Lyme disease and other pathogens will show earlier seasonal activity and a generally northward expansion in response to increasing temperatures associated with climate change. Longer seasonal activity and expanding geographic range of these ticks will increase the risk of human exposure to ticks in the United States.[b]

a Bell, J.E., S.C. Herring, L. Jantarasami, C. Adrianopoli, K. Benedict, K. Conlon, V. Escobar, J. Hess, J. Luvall, C.P. Garcia-Pando, D. Quattrochi, J. Runkle, and C.J. Schreck, III,. (2016). Ch. 4: Impacts of Extreme Events on Human Health. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC, 99–128. HYPERLINK http://dx.doi.org/10.7930/J0BZ63ZV

b Beard, C.B., R.J. Eisen, C.M. Barker, J.F. Garofalo, M. Hahn, M. Hayden, A.J. Monaghan, N.H. Ogden, and P.J. Schramm, 2016: Ch. 5: Vectorborne Diseases. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC, 129–156. http://dx.doi.org/10.7930/J0765C7V

HEAT-RELATED MORTALITY

Projected changes in temperature-related mortality in 209 USA cities by season (from baseline 1976–2005)



KEY IMPLICATIONS FOR HEALTH

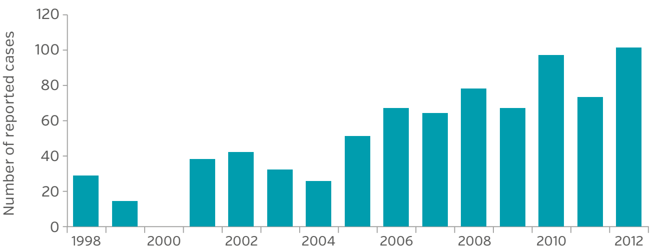
As heat waves become more intense and frequent, health risks include heat exhaustion or heatstroke; worsened cardiovascular, respiratory, and renal disorders; and death.

Older adults are particularly vulnerable to heat-related conditions, as well as children, the chronically ill, the socially isolated and at-risk occupational groups. Mental, behavioral, and cognitive disorders can also be triggered or exacerbated by heat waves.

Heat waves were the number one cause of fatalities due to extreme events between 2004 and 2013 in the United States. By the end of the century, climate change is projected to lead to an increase of thousands to tens of thousands of premature heat-related deaths in the summer, which exceed the reduction in deaths during the cold season. Global greenhouse gas mitigation is projected to result in approximately 12,000 fewer deaths from extreme temperature each year in 49 modeled U.S. cities in 2100.[a] Inclusion of the entire U.S. population would increase the number of avoided deaths,[b] but accounting for adaptation would decrease the number.[c]

AGRICULTURAL PRODUCTION & FOOD SECURITY

Chesapeake region *Vibrio* infections



Food security can be defined as permanent access to a sufficient, safe, and nutritious food supply needed to maintain an active and healthy lifestyle.[d] Climate change is very likely to affect food security by disrupting food availability, decreasing access to food, and making utilization more difficult. While food production is important, for most developed countries such as the United States, food shortages are uncommon; rather, nutritional quality and food safety are the primary health concerns.[e] Elevated sea surface temperatures are leading to increases in *Vibrio* species in seafood and seafood biotoxins (see figure on left[f]), and possibly greater accumulation of mercury in seafood. Certain populations, such as the elderly, infants, and the immunocompromised may be more vulnerable to climate impacts on food safety, nutrition, and distribution.

KEY IMPLICATIONS FOR HEALTH

Rising temperatures and changes in weather extremes, e.g., flooding, are expected to increase the exposure of food to certain microbial pathogens and chemical contaminants.[e] This will increase the risk of illness associated with those pathogens and contaminants. The actual incidence of food-borne illness will depend on the efficacy of practices that safeguard food in the United States. Climate change will increase human exposure to microbial and chemical contaminants in food through several pathways.[e]

- Flooding may introduce contaminants into the food chain, e.g., floodwater could carry animal feces into fields of lettuce and tomatoes.
- Elevated sea surface temperatures are leading to increases in *Vibrio* species in seafood and seafood biotoxins, and possibly greater accumulation of mercury in seafood.
- Warmer, more humid weather is likely to result in increased mycotoxin production on corn and peanuts.
- Rising carbon dioxide concentrations and climate change will alter incidence and distribution of pests, parasites, and microbes, leading to increases in the use of pesticides and veterinary drugs, which may contaminate the food supply.[e]
- The nutritional value of agriculturally important food crops, such as wheat and rice, will decrease as rising levels of atmospheric carbon dioxide continue to reduce the concentrations of protein and essential minerals in most plant species.[e] This may not have a major public health impact in the US, where other sources of protein and micronutrients are available.
- Increases in the frequency or intensity of extreme weather events will increase disruptions of food distribution by damaging existing infrastructure or slowing food shipments.[e] These impediments lead to increased risk for food damage, spoilage, or contamination, which will limit availability of and access to safe and nutritious food depending on the extent of disruption and the resilience of food distribution infrastructure.

a EPA. 2015. Climate Change in the United States: Benefits of Global Action. United States Environmental Protection Agency, Office of Atmospheric Programs, EPA 430-R-15-001. www.epa.gov/cira

b Schwartz, J. D. . L., M.; Kinney, P.L.; Yang, S.; Mills, D.; Sarofim, M.; Jones, R.; Streeter, R.; Juliana, A. St.; Peers, J.; Horton, R.M., 2015: Projections of temperature-attributable premature deaths in 209 U.S. cities using a cluster-based Poisson approach. Environmental Health, 14, doi:HYPERLINK "http://dx.doi.org/10.1186/s12940-015-0071-2" 10.1186/s12940-015-0071-2.

c Sarofim, M.C., S. Saha, M.D. Hawkins, D.M. Mills, J. Hess, R. Horton, P. Kinney, J. Schwartz, and A. St. Juliana, 2016: Ch. 2: Temperature-Related Death and Illness. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC, 43–68. http://dx.doi.org/10.7930/J0MG7MDX

d Brown, M.E., et al. 2015. Climate Change, Global Food Security, and the U.S. Food System. http://www.usda.gov/oce/climate_change/FoodSecurity.htm

e Ziska, L., A. Crimmins, A. Auclair, S. DeGrasse, J.F. Garofalo, A.S. Khan, I. Loladze, A.A. Pérez de León, A. Showler, J. Thurston, and I. Walls, 2016: Ch. 7: Food Safety, Nutrition, and Distribution. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC, 189–216. http://dx.doi.org/10.7930/J0ZP4417

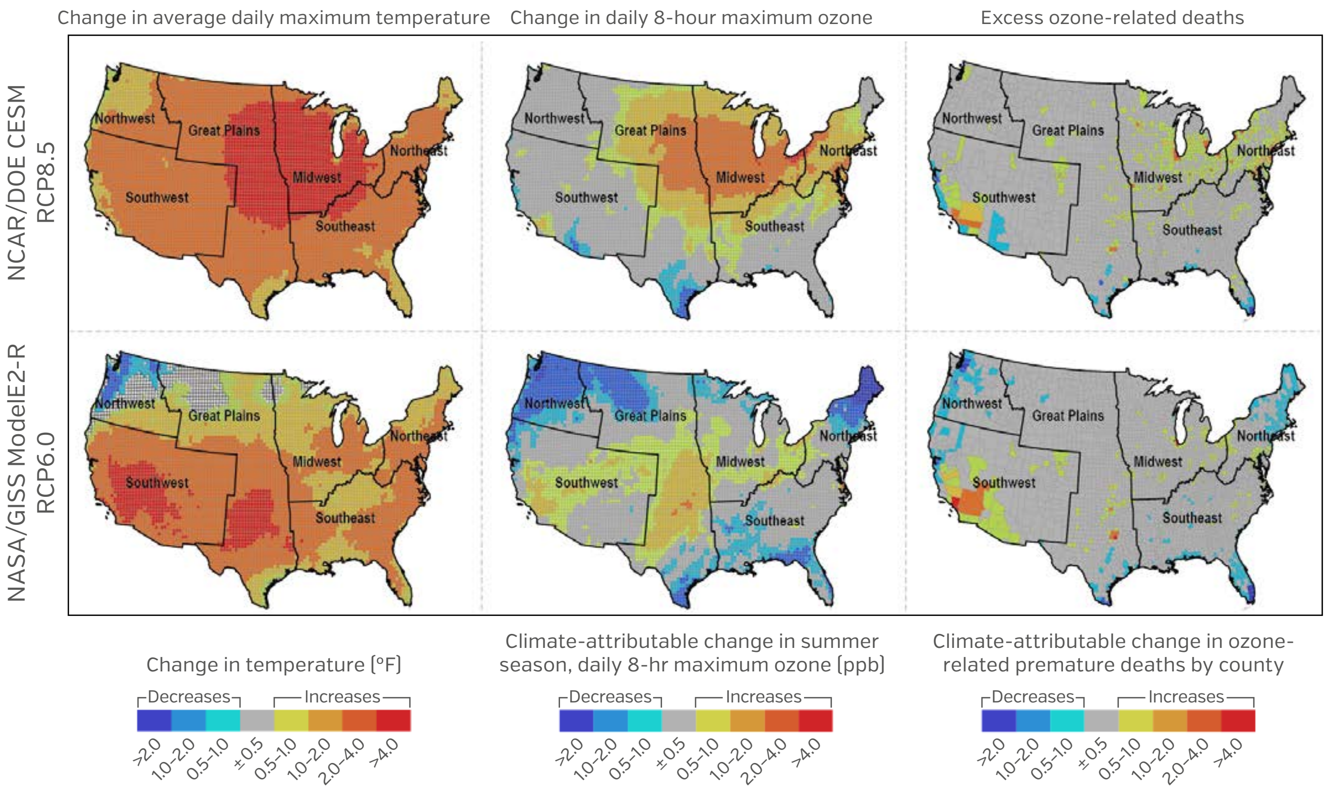
f CDC (2016) Cholera and other Vibrio Illness Surveillance (COVIS). (www.cdc.gov/vibrio/surveillance.html (accessed October 12, 2016))

3 CURRENT EXPOSURES AND HEALTH RISKS DUE TO AIR POLLUTION

Many of the drivers of climate change, such as inefficient and polluting forms of energy and transport systems, also contribute to air pollution. Air pollution is now one of the largest global health risks, causing approximately seven million deaths every year. There is an important opportunity to promote policies that both protect the climate at a global level, and also have large and immediate health benefits at a local level.

OUTDOOR AIR POLLUTION: OZONE

Projected changes in temperature, ozone, and ozone-related premature deaths in 2030



KEY IMPLICATIONS FOR HEALTH

Climate change will make it harder for any given regulatory approach to reduce ground-level ozone pollution in the future as meteorological conditions become increasingly conducive to forming ozone over most of the United States. Unless offset by additional emissions reductions, these climate-driven increases in ozone will cause premature deaths, hospital visits, lost school days, and acute respiratory symptoms.[a]

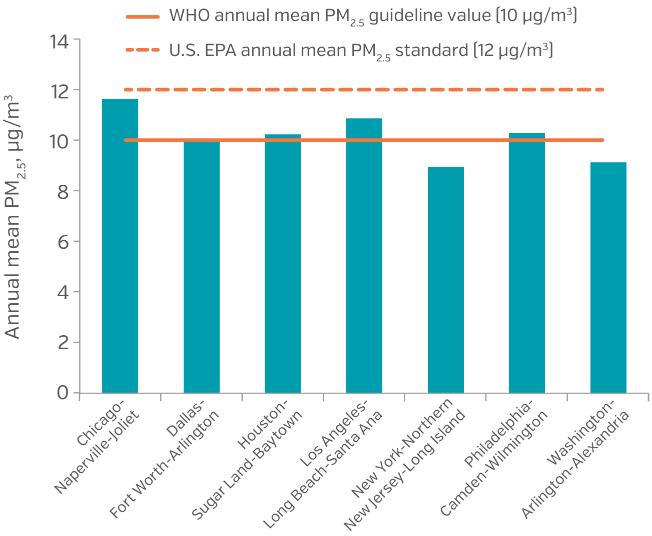
Poor air quality, whether outdoors or indoors, can negatively affect the human respiratory and cardiovascular systems. Climate change may have already increased ozone pollution in some regions of the United States and has the potential to affect future concentrations of ozone and fine particles. Current levels of ground-level ozone have been estimated to be responsible for tens of thousands of hospital and emergency room visits, millions of cases of acute respiratory symptoms and school absences, and thousands of premature deaths each year in the United States. Fine particle pollution has also been linked to even greater health consequences through harmful cardiovascular and respiratory effects.

Climate change is projected to increase the number and severity of naturally occurring wildfires in parts of the United States, increasing emissions of particulate matter and ozone precursors and resulting in additional adverse health outcomes. A changing climate can also influence the level of aeroallergens such as pollen, which in turn adversely affect human health.

a Fann, N., T. Brennan, P. Dolwick, J.L. Gamble, V. Ilacqua, L. Kolb, C.G. Nolte, T.L. Spero, and L. Ziska, 2016: Ch. 3: Air Quality Impacts. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC, 69–98. http://dx.doi.org/10.7930/J0GQ6VP6

OUTDOOR AIR POLLUTION: PARTICULATE MATTER

Outdoor air pollution in metropolitan cities in USA annual mean $PM_{2.5}$ (µg/m³) 2014



KEY IMPLICATIONS FOR HEALTH

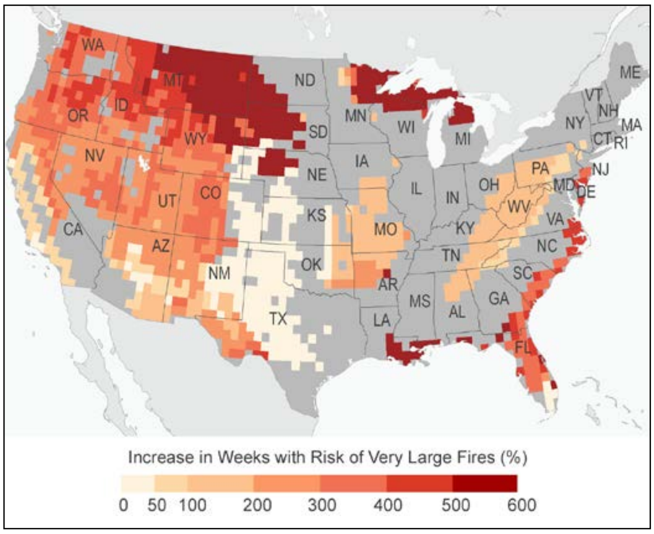
Outdoor air pollution can have direct and sometimes severe consequences for health.

Fine particles which penetrate deep into the respiratory tract subsequently increase mortality from respiratory infections, lung cancer and cardiovascular disease.

The most populated metropolitan cities in the USA had annual mean $PM_{2.5}$ levels that were near or above the WHO guideline value of 10 µg/m³. Source: Ambient Air Pollution Database, WHO, May 2016.

Note: Measured data (stations) were taken from the Environmental Protection Agency (EPA). https://www.epa.gov/outdoor-air-quality-data/monitor-values-report

Projected increase in risk of very large fires by mid-century



KEY IMPLICATIONS FOR HEALTH

Exposure to smoke-related air pollutants from wildfires has been associated with a wide range of human health effects, including early deaths, respiratory problems, and low infant birth weight. In the figure on the left, the darkest shades of red indicates that up to a 6-fold increase in weeks with risk of very large fires is projected by mid-century (2041–2070) compared with the recent past (1971–2000) for parts of the West. Global greenhouse gas mitigation is projected to reduce the cumulative area burned by wildfires over the course of the 21st century by approximately 210–300 million acres.[a,b]

SHORT LIVED CLIMATE POLLUTANTS (SLCPS)

KEY IMPLICATIONS FOR HEALTH

Some climate pollutants have additional health effects aside from the health impacts driven by their radiative forcing contributions to climate change overall. This is particularly true for black carbon, as a component of $PM_{2.5}$, and methane, as a precursor to ground-level ozone pollution. In the case of black carbon, the additional health impacts resulting from emissions accrue near the location of emission, whereas for methane the additional health impacts are global. These effects have been estimated by a number of recent studies (e.g., Shindell, D., Science, 2012, Sarofim et al. 2015). Reductions in other co-emitted particulate and ozone-precursor pollutants due to climate policies can also lead to immediate, localized health benefits (e.g., Zhang et al. 2016).

a Bell, J.E., S.C. Herring, L. Jantarasami, C. Adrianopoli, K. Benedict, K. Conlon, V. Escobar, J. Hess, J. Luvall, C.P. Garcia-Pando, D. Quattrochi, J. Runkle, and C.J. Schreck,III,. (2016). Ch. 4: Impacts of Extreme Events on Human Health. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC, 99–128. HYPERLINK http://dx.doi.org/10.7930/J0BZ63ZV

b EPA. 2015. Climate Change in the United States: Benefits of Global Action. United States Environmental Protection Agency, Office of Atmospheric Programs, EPA 430-R-15-001. www.epa.gov/cira

4 CO-BENEFITS TO HEALTH FROM CLIMATE CHANGE MITIGATION: GLOBAL AND US PERSPECTIVES

Health co-benefits are local, national and international measures with the potential to simultaneously yield large, immediate public health benefits and reduce the upward trajectory of greenhouse gas emissions. Lower carbon strategies can also be cost-effective investments for individuals and societies.

Presented here are examples, from both global and US perspectives, of opportunities for health co-benefits that could be realised by action in important greenhouse gas emitting sectors.*

Transport

Innovative urban design could create increased access to active transport.[a] The compact geographical area found in cities presents opportunities to reduce energy use and emissions of heat-trapping gases and other air pollutants through active transit, improved building construction, provision of services, and infrastructure creation, such as bike paths and sidewalks.[a] Urban planning strategies designed to reduce the urban heat island effect, such as green/cool roofs, increased green space, parkland and urban canopy, could reduce indoor temperatures, improve indoor air quality, and could produce additional societal co-benefits by promoting social interaction and prioritizing vulnerable urban populations.[a] Such multiple-benefit actions can reduce heat-trapping gas emissions that lead to climate change, improve air quality by reducing vehicle pollutant emissions, and improve fitness and health through increased physical activity.[a]

Electricity Generation

Current patterns of electricity generation in many parts of the world, particularly the reliance on coal and other fossil fuel combustion for power generation, contribute heavily to poor local air quality, causing cancer, cardiovascular and respiratory disease. Producing and using electricity more efficiently reduces both the amount of fuel needed to generate electricity and the amount of greenhouse gases and other air pollution emitted as a result. Transitioning to cleaner sources of energy will better protect Americans from other harmful air pollution.

The health benefits of transitioning from fuels such as coal to lower carbon sources, including ultimately to renewable energy, are clear: Reduced rates of cardiovascular and respiratory disease such as stroke, lung cancer, coronary artery disease, and COPD; cost- savings for health systems; improved economic productivity from a healthier and more productive workforce.[a]

Food and Agriculture

Current U.S. dietary guidelines and many health professionals have recommended diets higher in fruits and vegetables and lower in red meat as a means of helping to reduce the risk of cardiovascular disease and some cancers.[a] These changes in food consumption, and related changes to food production, could have co-benefits in terms of reducing greenhouse gas emissions. While the greenhouse gas footprint of the production of other foods, compared to sources such as livestock, is highly dependent on a number of factors, production of livestock currently accounts for about 30% of the U.S. total emissions of methane.[a] This amount of methane can be reduced somewhat by recovery methods such as the use of biogas digesters, but future changes in dietary practices, including those motivated by considerations other than climate change mitigation, could also have an effect on the amount of methane emitted to the atmosphere.[a]

Healthcare Systems

Health care activities are an important source of greenhouse gas emissions. In the US and in EU countries, for example, health care activities account for between 3–8% of greenhouse gas (CO_2-eq) emissions.[a] Major sources include procurement and inefficient energy consumption. Many strategies that are employed to meet sustainable design goals improve resilience. Energy conservation measures, for example, reduce energy demands – a hospital that is less energy intensive can operate longer on a fixed amount of reserve fuel. Medical facilities that reduce their water needs can operate longer if they lose water service.[b]

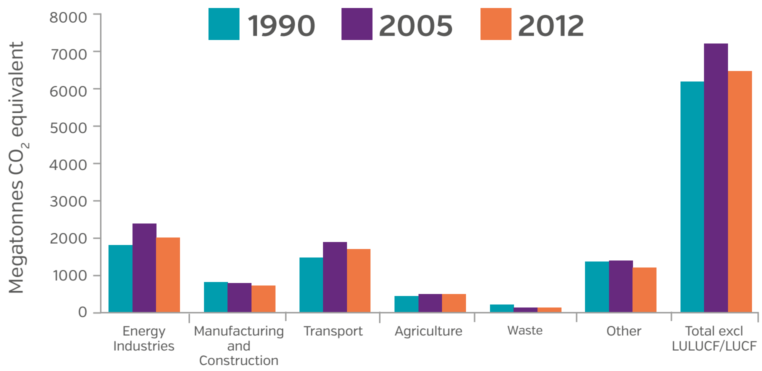
* Please see page 11 for references

5 EMISSIONS AND COMMITMENTS

Global carbon emissions increased by 125% from 1970 to 2010, and continue to rise.[a] Collective action is necessary, but the need and opportunity to reduce greenhouse gas emissions varies between countries. Information on the contribution of different sectors, such as energy, manufacturing, transport and agriculture, can help decision-makers to identify the largest opportunities to work across sectors to protect health, and address climate change.

USA ANNUAL GREENHOUSE GAS EMISSIONS

(megatonnes CO_2 equivalent)



Source: UNFCCC Greenhouse Gas Data Inventory, UNFCCC [2015].

A 2°C upper limit of temperature increase relative to pre-industrial levels has been adopted under the Paris Agreement to prevent severe and potentially catastrophic impacts from climate change. Reductions are necessary across countries and sectors. In order to stay below the 2°C upper limit with 50% confidence, global annual CO_2 emissions need to be reduced from roughly 36 $GtCO_2$ today to less than 26 $GtCO_2$ by 2050 with more aggressive reductions that ultimately reach zero net emissions by around 2100.[b]

Greenhouse gas emissions data for the USA indicate that emissions have declined by 11% from 2005 to 2015, with the largest contributions of emissions from energy industries and transport sectors.[c,d]

The United States has already undertaken substantial policy action to reduce its emissions, taking the necessary steps to be on a path to achieve the 2020 reduction target in the range of 17 percent below 2005 levels.

Additional action to achieve a 2025 target of 26% to 28% below 2005 levels represents a substantial acceleration of the current pace of greenhouse gas emission reductions from 1.2 percent per year to 2.3–2.8 percent per year, or an approximate doubling. The 2025 target is consistent with a pathway to deep decarbonization and a 2°C target. This ambitious target is grounded in intensive analysis of cost-effective carbon pollution reductions achievable under existing law and will keep the United States on the pathway to achieve deep economy-wide reductions of 80 percent or more by 2050.[d]