



AMERICAN PUBLIC HEALTH ASSOCIATION

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Lancet Countdown 2017 Report: US Briefing

October 31st, 2017



Introduction

This brief draws out some of the most nationally-relevant findings of the 2017 Lancet Countdown on Health and Climate Change paper, to highlight some of the key threats and opportunities climate change poses for the health of US citizens. It finds that:

- Exposure to dangerous heat is increasing.
- Exposure to severe weather events is increasing, but thanks to adaptation measures, these events are killing fewer people.
- Exposure to disease and allergies is changing.
- The carbon intensity of US energy use is decreasing, but this process must be accelerated to reduce climate-related health risks.

Acknowledgements

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Strategic Partners

THE LANCET



About the Lancet Countdown

The Lancet Countdown: Tracking Progress on Health and Climate Change is a global, interdisciplinary research collaboration between 24 academic institutions and inter-governmental organisations. It monitors progress on the relationships between health and climate, and their implications for national governments, reporting annually. It was launched following the 2015 Lancet Commission on Health and Climate Change, which concluded that, left unmitigated, climate change will undermine 50 years of public health gains, whilst responding to it could represent “the greatest global health opportunity of the 21st century”.

The 2017 report presents data on the indicators selected following a consultation process in 2016. These span 5 domains, from impacts and adaptation to mitigation, and the economics and politics of climate action.

About the American Public Health Association

The American Public Health Association (APHA) champions the health of all people and all communities. It works to strengthen the public health profession and speak out for public health issues and policies backed by science. APHA's mission is to improve the health of the public and achieve equity in health status and it envisions creating the healthiest nation in one generation.

Key Messages:

The 2017 Lancet Countdown paper arrives at three central conclusions:

1.

The human symptoms of climate change are unequivocal and potentially irreversible – affecting the health of populations around the world, today.

2.

The delayed response to climate change over the past 25 years has jeopardized human life and livelihoods.

3.

The transition to low-carbon electricity generation is gathering pace, suggesting the beginning of a broader transformation that will benefit human health.

Climate policy should aim to mitigate negative impacts on human health. Policies should encourage reduction of greenhouse gas emissions and effective adaptation to climate impacts. The response to climate change also presents the potential for enormous health co-benefits. For example, phasing out coal-fired power not only lowers greenhouse gas emissions, but also reduces local air pollution, thus improving the cardiopulmonary health of surrounding populations.

This report provides a version of the Lancet Countdown findings specific to the US. It highlights both worrisome trends affecting Americans' health, and very promising signs of responses by government, the private sector, and institutions that protect health. It finds that:

1.

Exposure to dangerous heat is increasing. Between 2000 and 2016, Americans experienced an average temperature increase of about 1.1°F (0.6°C). During the same period, the number of Americans exposed to heatwave events annually increased by an average of approximately 14.5 million.

2.

Exposure to severe weather events is increasing, but thanks to adaptation measures, these events are killing fewer people. Between 1990 and 2016, the US experienced 623 instances of droughts, floods, heatwaves, wildfires and storms, affecting over 110 million Americans and resulting in at least 9,551 deaths.¹ Continued improvements in disaster preparedness and response are essential to ensure that the number of Americans who lose their lives in each disaster remains relatively low as climate change alters the severity of such events.

3.

Exposure to disease and allergies is changing. Climate change is contributing to changing patterns of infectious diseases in the US - intensifying several risks - and is worsening allergies.

4.

The carbon intensity of US energy use is decreasing, but this process must be accelerated to reduce climate-related health risks. The US has lowered the carbon intensity of its energy supply, with 2013 levels 6.7% below 1990 levels. This is due in large part to the reduction in coal as an energy source. Between 1990 and 2014, coal's share of US electricity generation dropped from 53% to 40%. Renewable energy's share of total electricity generation (in GWh) increased from 1% to 5% between 1990 and 2013.

Health and Climate Change

The health impacts of climate change are experienced directly through increased frequency and severity of extreme weather events such as heatwaves, floods, droughts, and storms, resulting in death, injury, and loss of livelihoods. Indirectly, climate change may interact with other environmental systems, for example, altering the burden and pattern of distribution of vector-, water-, or food-borne diseases. Combined, these challenges present an unprecedented threat that, left unmitigated, could reverse the last half-century of gains made in public health.

It is vital to understand and track the impacts climate change is having on human health as well as the health benefits of mitigating and adapting to climate change. This is the role of the Lancet Countdown: Tracking Progress on Health and Climate Change, an international, interdisciplinary research collaboration comprised of 24 academic institutions and United Nations agencies.

The Lancet Countdown will continue to track these impacts and consequences from now until 2030, reporting annually on indicators in five thematic groups:

- Climate Change Impacts, Exposures and Vulnerability
- Adaptation Planning and Resilience for Health
- Mitigation Actions and Health Co-Benefits
- Economics and Finance
- Public and Political Engagement

The full Lancet Countdown report provides global data on each of these thematic groups. In the following sections, we present selected findings specific to the US to provide a more complete picture of how climate change and health are connected on a national level.

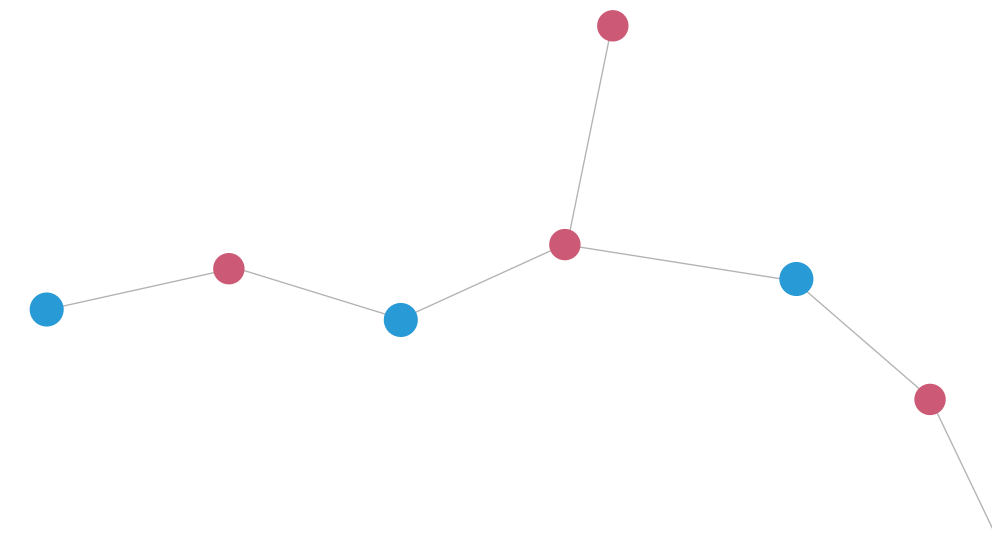
Rising Temperatures and Increased Exposure to Heatwaves

Headline Findings: Between 2000 and 2016, the average number of Americans exposed to heatwave events annually increased by an average of 14.5 million, compared to the reference period (1986-2008). 2011 was a year of extremely high risk, with nearly 130 million additional Americans exposed to heatwaves.³

Temperatures in the US since 1991 have averaged 1°F to 1.5°F (0.6°C to 0.8°C) above 1901-1960 levels, except for the Southeast, which has experienced warming less than 1°F (0.5°C).⁴ Higher temperatures are not necessarily a threat to human health, but extreme heat can put public health at risk if it occurs where people live, work, and play. Between 2000 and 2016, Americans experienced an average temperature increase of about 1.1°F (0.6°C) (Indicator 1.1 of the Lancet Countdown).

The health impacts of extreme heat include direct heat stress and heat stroke, exacerbation of pre-existing heart disease, and even an increased incidence of acute kidney injury resulting from dehydration. The elderly, children under the age of 12 months, and people with chronic cardiovascular and renal disease, dementia, and mental illness are particularly sensitive to these changes.⁵ During heatwaves, sleep is disturbed, crime increases, work capacity declines, and people exercise less - all undermining health and well-being.

People over the age of 65 are especially vulnerable to health impacts of extreme heat. Unfortunately, an increasing number of people aged over 65 have been exposed to heatwaves since 2000 - this has also coincided with an increase in the length of heatwaves.⁶ An additional 14.5 million people aged over 65 in the US have been exposed to heatwaves on average each year between 2000 and 2016 relative to the reference period, 1968-2008 and during this time, the average heatwave was also 0.37 days longer than in the reference period (Indicator 1.2 of the Lancet Countdown). So not only are the elderly particularly vulnerable, they're also increasingly exposed to extreme heat.



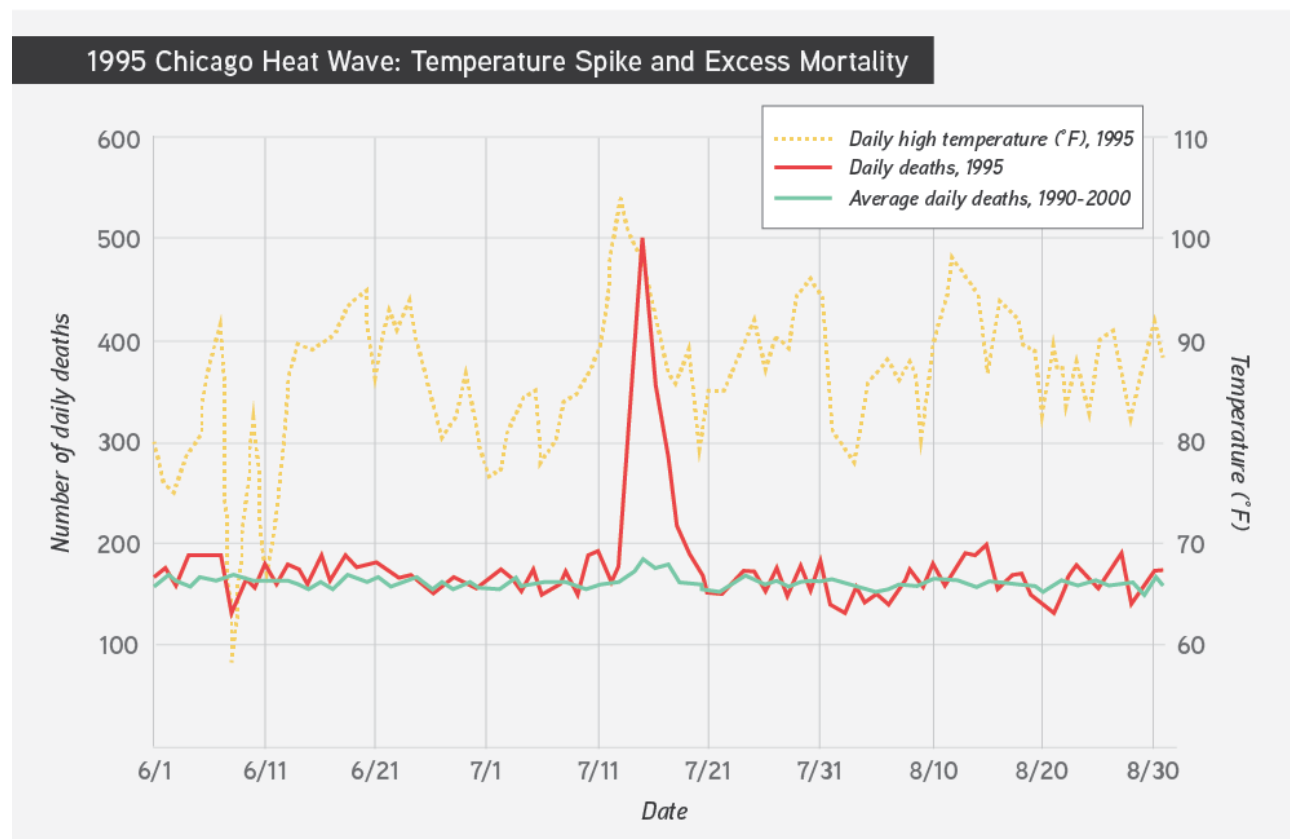


Figure 1. Daily deaths and peak daily temperatures in Cook County, Illinois, June 1 - August 30, 1995. From July 11 to July 27, 1995, there were about 700 excess deaths compared with expected levels, including 465 deaths recorded on death certificates as heat-related. Data sources: CDC, 2012;⁷ NOAA, 2012;⁸ Graphic based on EPA case study.⁹

Case Study: City Heat Action

2016, 2015, and 2014 were respectively the 1st, 2nd and 3rd hottest years on record, globally.¹⁰ Cities face increased risk from climate change-driven temperature rise and simultaneously battle the “heat island” effect, in which urban areas experience hotter temperatures than nearby rural areas. Across the US, cities are taking active steps to prepare for extreme heat to ensure the safety of their citizens.

Phoenix, AZ

The city of Phoenix, Arizona faces significant heat risk, with an average of 26 days per year with maximum temperatures over 110°F (43°C). To address this sustained exposure to extreme heat, Arizona developed a comprehensive heat emergency response plan, involving staff from the state’s departments of health and education and local first-responder agencies. Responsibilities range from operating the state shelter system to collaborating with homeless outreach programs.¹¹ The Arizona Department of Public Health leads and initiates efforts under the plan, sending heat warnings and safety tips to health department staff, school personnel, and the general public using email, text and social media, providing heat safety education and toolkits specific to older adults, and mapping vulnerable populations. National Weather Service alerts are also picked up by media partners and broadcast on TV and radio.

Phoenix also employs innovative initiatives to make the city more heat-safe, including a Cooling Ordinance to protect renters, mandating defined levels of cooling and ventilation in rental units, and a campaign to provide free water bottles and promote awareness of cooling refuge locations throughout the city.¹² Cooling facilities, where anyone can take indoor refuge from the heat, include senior centers, community centers, and homeless shelters. The vast majority of cooling center visitors, according to surveys, are unemployed, nearly a quarter are over the age of 65, and two-thirds don’t have permanent residences, suggesting that the program reaches some of the most vulnerable residents.¹³

Lethality of Weather-Related Disasters

Headline Finding: Between 1990 and 2016, the US experienced 623 instances of droughts, floods, heatwaves, wildfires and storms, resulting in at least 9,551 deaths and affecting over 110 million Americans (Indicator 1.4 of the Lancet Countdown). On average, 15 Americans lose their lives per weather-related disaster - a relatively low fraction of those affected, but still too high. Continued efforts to improve disaster preparedness and response will be needed as climate change increases the severity and frequency of weather-related disasters.

Droughts, flood, storms, heatwaves, and wildfires all have strong links to climate change.¹⁴ Of these, storms did the most harm to US in terms of number of people affected (over 97 million) and lives lost (6,903) between 1990 and 2016. The deadliness of a disaster reflects several factors, including its severity and the level of disaster preparedness and response, key components of climate adaptation.¹⁵ Here, is a disaster defined as an event with at least 10 deaths, 100 people affected (needing immediate assistance), a declaration of emergency, or a call for international assistance. Another protective measure is “hardening” health infrastructure. The US is among the less than half of countries worldwide that reported taking measures to increase the climate resilience of health infrastructure (Indicator 2.6 of the Lancet Countdown).

The average ratio of deaths to people affected, or the lethality, is relatively high for storms - nearly 2%, compared with 0.3% for floods.¹⁶ The ratio varies, however, likely because of the limited number of disasters that qualify for inclusion in the EM-DAT database, and because the data here do not capture the severity of events. The health impacts of weather-related disasters extend beyond mortality to injuries, mental health impacts, spread of disease, and food and water insecurity, and these impacts could be considered and measured in future tracking.

Case Study: Hurricane Harvey

Texas authorities estimated that 82 people died as a result of Hurricane Harvey in 2017.¹⁷ At least 35 of those deaths were in Harris County, which encompasses the Houston area. According to the Harris County Institute of Forensic Sciences, all but one were drownings or other injuries directly related to flood waters. This parallels findings of a review of fatalities in the US from Atlantic tropical cyclones between 1963 and 2012, conducted by the National Hurricane Center, which found that 90% of the deaths attributed to these storms were drownings and half were caused by storm surge.¹⁸

Hurricane Harvey was a record-breaking storm in terms of rainfall: 51.88 inches recorded during the storm in Cedar Bayou broke the previous record of 48 inches from a tropical storm in the contiguous US.¹⁹ Despite the quantity of rainfall, the storm was much less lethal than previous hurricanes of similar size and strength. Harvey's estimated death toll, for example, was dramatically lower than the 1,800 deaths from Hurricane Katrina and the 117 from Hurricane Sandy in 2012. The difference between those hurricanes and Harvey, experts and local officials say, has to do with the lessons learned from Katrina and Sandy and with the preparations made in the days before Harvey hit.

Houston Mayor Sylvester Turner did not issue an evacuation order, to avoid a "6.5 million person traffic jam" and potential casualties. Approximately 130 people died while attempting to evacuate in 2005 for Hurricane Rita.²⁰ Texas hospitals were also relatively well prepared for Harvey. In 2001, flooding from Tropical Storm Allison caused billions of dollars of damage to Houston's hospitals, many of which were forced to close because of power outages. Ahead of Harvey, hospitals raised flood gates and moved emergency generators to higher ground to avoid power outages.

The 2014 US National Climate Assessment reported that "Hurricane-associated storm intensity and rainfall rates are projected to increase as the climate continues to warm."²¹ Hurricane Harvey shows that, when previous experience informs plans for and responses to extreme weather events, it saves lives. In a climate changed future, this is a vital lesson.

Infectious Diseases and Allergies

Headline Finding: Climate change is contributing to changing patterns of infectious disease in the US - intensifying several risks - and is worsening allergy risks.

Lyme Disease

Lyme disease is the most commonly reported vector-borne disease in the US.²² With warmer temperatures and milder winters, the blacklegged tick (or deer tick) can carry the disease, caused by the *Borrelia* bacteria, farther north. Changes in seasonal patterns and warming are also expected to lead to earlier seasonal tick activity. Centers for Disease Control (CDC) data show a tripling of reported Lyme disease cases between 1995 and 2015, but CDC estimates that the true number of cases has reached about 300,000 per year - or ten times higher than reported.

The lifetime of a deer tick is structured around three blood meals, one at each phase in its development. Climate change expands the amount of time during the year in which they can find these critical blood meals (they can't feed when temperatures are below freezing), allowing more ticks to survive and infect humans. Tick populations are also getting a boost from faster development rates from warmer temperatures.

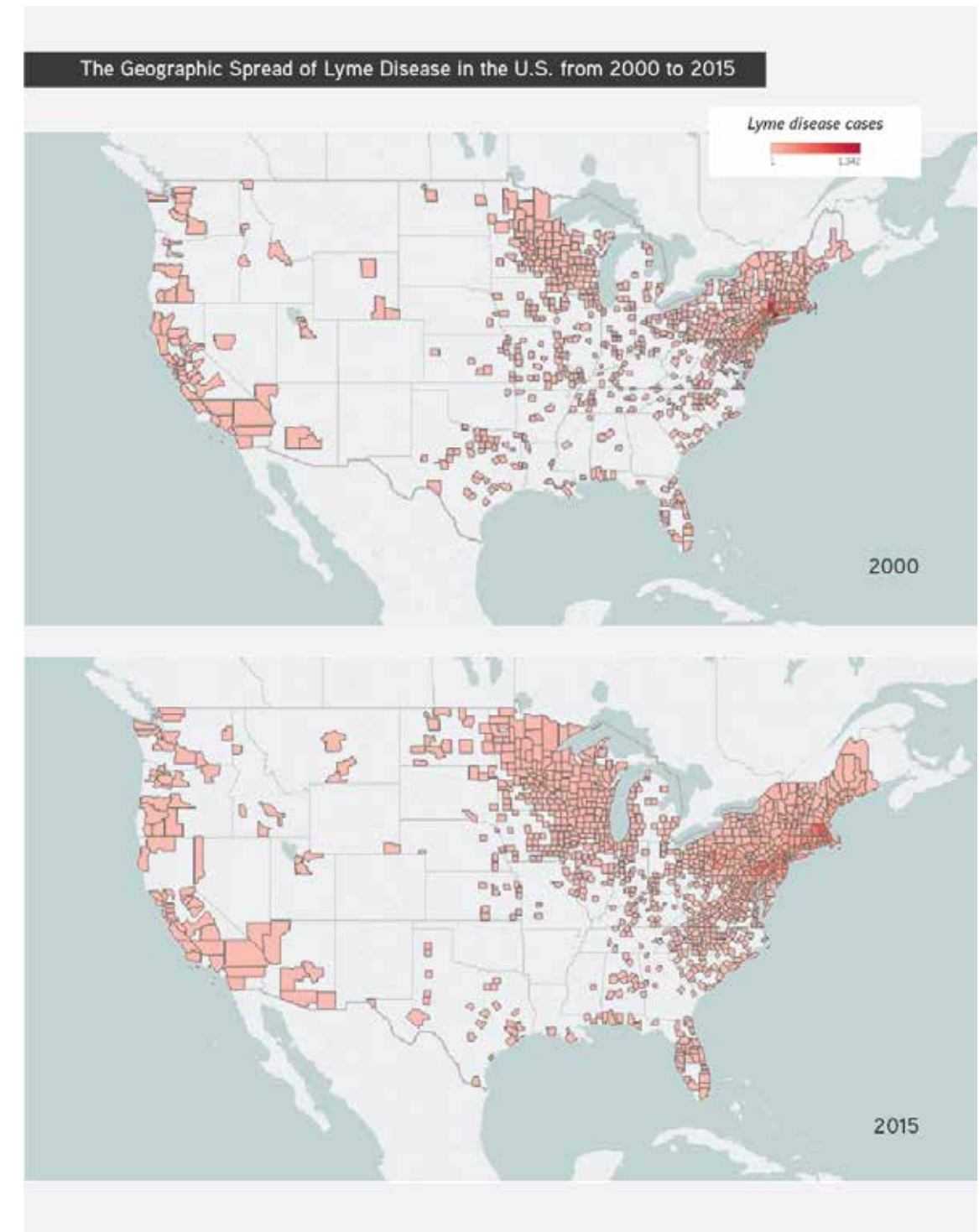


Figure 2. Geographic spread of Lyme disease in the US based on county-level data between 2000 and 2015. Data source: Centers for Disease Control and Prevention.

West Nile

Since it was first diagnosed in the US in 1999, West Nile virus (WNV) has become endemic across most of the country. Today, WNV is the most common mosquito-borne disease nationwide, and from 1999 to 2015, a total of 43,937 cases were reported. There is significant year-to-year variability; 2003 and 2012 were particularly bad years. Birds are the natural hosts of WNV and mosquitoes become carriers when they feed on infected birds, spreading the infection to other birds and humans.

Although there are many remaining questions about how climate change is changing transmission dynamics, a significant body of research shows that almost all of the biological processes that affect WNV transmission are accelerated as temperatures rise. Warmer temperatures speed-up mosquito biting rates, accelerate the mosquito life cycle, and decrease the time needed for an infected mosquito to transmit WNV by increasing viral replication rates within the mosquito.

Allergies

Climate change exacerbates seasonal allergies, as more frost-free days prolong flowering time, and as elevated CO₂ levels increase plants' production of allergens. Ragweed seasons are getting longer, especially in northern locations, where fall frosts are occurring later than in the past. Americans faced significantly longer exposure to ragweed pollen in 2016 compared to 1990. In 2016, residents of Bellevue, NE faced a ragweed season 17 days longer; Minneapolis, MN endured 21 additional days; and Kansas City, MO now experiences 23 additional days of ragweed exposure, bringing its total up to 81 days.

Ragweed pollen is a significant cause of hay fever (allergic rhinitis), a chronic disease that torments allergy sufferers and accounts for direct medical costs of \$6.2 billion annually in the US.^{23,24} Other climate-driven impacts - including extreme rainfall and warmer temperatures - can aggravate allergies in other ways, such as by promoting growth of indoor molds and fungi.²⁵ Exposure to these organisms and their toxic products in indoor air may aggravate allergies and asthma - a growing problem for affected people, and a growing challenge for health professionals.

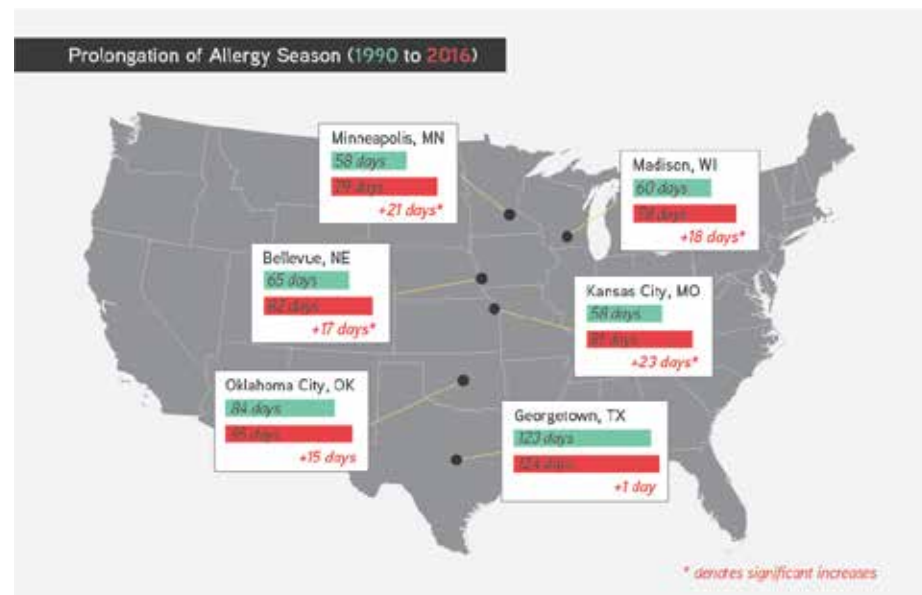


Figure 3. Change in number of days of exposure to ragweed pollen, a significant cause of hay fever, between 1990 and 2016 for selected cities.²⁶ Based on 2017 analysis by Lewis Ziska, PhD, US Department of Agriculture.

Building an Energy System to Mitigate Climate Change and Protect Public Health

Headline finding: The US has made strides toward reducing its energy supply's carbon intensity (tCO₂/TJ), with 2013 levels 6.7% lower than 1990 levels.²⁷ Major contributors to this are the phase-out of coal, the increased competitiveness of natural gas, the deployment of renewable and zero-carbon emission electricity sources, as well as a variety of energy and fuel efficiency measures in buildings, cars, and across manufacturing and industry.

Reducing carbon intensity of energy supply (Indicator 3.1 of the Lancet Countdown)

Limiting global temperature rise to 2°C will require a large reduction in the carbon intensity of the global energy system (tCO₂/TJ). Replacing fossil fuels, particularly coal, with renewable energy can also reduce morbidity and mortality from air pollution, offering a hopeful pathway forward for global health. Between 1990 and 2013, the US succeeded in lowering the carbon intensity of its energy system by 6.7%. Other high-income countries, such as Germany and the UK, also reduced carbon intensity. However, these reductions have been offset by increased coal use in lower- and middle-income countries, and the carbon intensity of the global energy supply increased 28.9% over the same time period.

Phasing out coal (Indicator 3.2 of the Lancet Countdown)

Coal contributes 44% of global CO₂ emissions, is a major source of air pollution, releases toxic mercury, and generates fine particulate matter (PM_{2.5}) linked with increased mortality. While the total global primary coal supply has increased nearly 60% since 1990, the US maintained a stable level of consumption until a recent decline. Coal's share of US electricity generation decreased from 53% in 1990 to 40% in 2014. Phasing-out coal and lowering the energy supply's carbon intensity has been largely driven by the growth of energy from natural gas and renewables, including wind and solar. Between 2002 and 2016, almost 228 GW of natural gas was added to the US's electricity generating capacity, compared to about 20 GW of new coal capacity.²⁸

Ramping up renewable and zero-carbon energy (Indicator 3.3 of the Lancet Countdown)

Renewable electricity in the US increased nearly 10-fold in absolute terms (GWh) and renewables as a share of total electricity generation increased from 1% to 5% between 1990 and 2013. Globally, renewables as a share of total generation increased over 20% during this time period, led by rapid growth and increasing wind and solar PV investment in the US, China and Europe.

Cutting carbon emissions does not have to come at the cost of economic growth. In March 2017, for instance, wind and solar contributed over 10% of electricity generation in the US for the first time ever.²⁹ In 2016, over 60% of large additions to generation capacity in the US were wind and solar (8.7 GW and 7.7 GW, respectively), with another 33% from natural gas (9 GW).³⁰ During this period, the US economy grew.

Case study: The Health Benefits of the Clean Energy Shift

Reduced coal use in the US has had significant health benefits. Shifting to wind and solar energy from other, higher-emitting forms of energy, resulted in between 3,000 and 12,700 avoided premature deaths from 2007 to 2015.³¹

The Regional Greenhouse Gas Initiative (RGGI) provides a useful example of how a policy designed to reduce CO₂ emissions and mitigate climate change can have significant, short-term health benefits. RGGI, which aims to reduce greenhouse gas emissions in nine Northeast and Mid-Atlantic states, is estimated to have saved 300 to 830 lives; helped avoid 8,200 asthma attacks; averted 39,000 lost work days; and led to \$5.7 billion in health savings and other benefits, between 2009 and 2014.³²

Switching from coal to natural gas has already lowered human exposure to particulate matter. Transitioning all coal-fired power plants to natural gas could reduce SO₂ emissions by more than 90%, and NO_x emissions by more than 60%.³³ However, emissions from natural gas are higher than those associated with wind and solar. Moving directly from coal to renewables, bypassing natural gas as a bridge fuel, would have even greater health and climate benefits. Moving directly from coal to renewables, bypassing natural gas as a bridge fuel, would have even greater health and climate benefits.

Policy Recommendations

It is not possible, nor desirable, to provide here a comprehensive list of policy recommendations for protecting health in the face of climate change. However, good policy should adhere to the following principles:

Recommendation 1

Every level of government should commit to providing incentives for the deployment of clean energy in order to lower greenhouse gas emissions. In particular, governments, as well as utilities, should look to accelerate the phase-out of sources of energy that are also harmful to human health, including coal.

Recommendation 2

Cities are on the front lines of protecting public health in the face of rising temperatures, weather-related disasters, and other climate impacts. City and state health departments should engage partners, such as transportation agencies, parks departments, zoning and construction code commissions, housing agencies, and others, to reduce air pollution and mitigate climate-related health risks.

Recommendation 3

Health systems should work to ensure that they are resilient to the impacts of climate change, including weather-related disasters, and are able to provide necessary services in times of crisis.

Recommendation 4

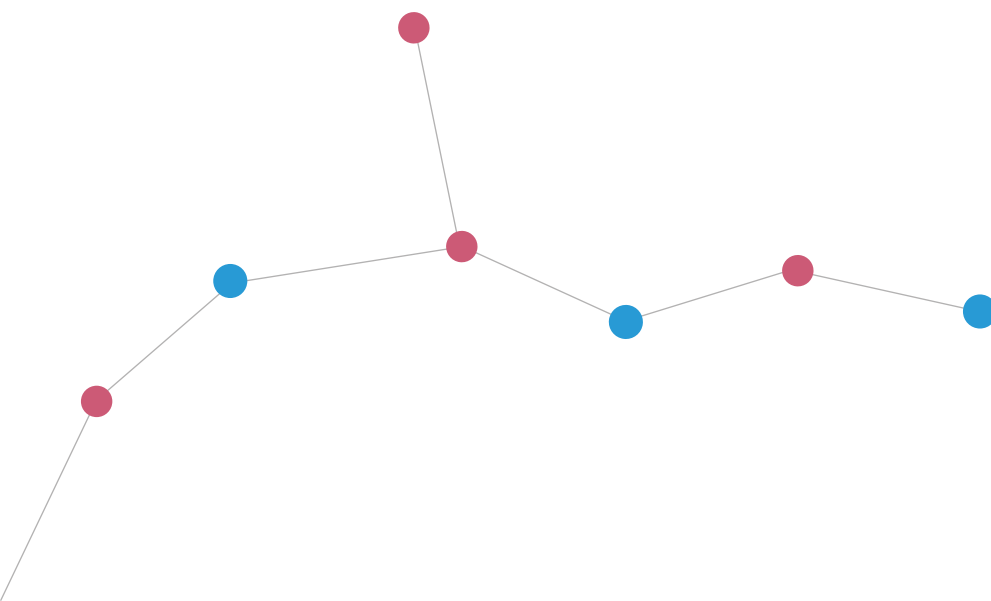
Efforts should continue to educate the public, policymakers, and health professionals about the harmful health effects of climate change, as well as the immediate and long-term health benefits associated with reducing greenhouse gas emissions.

Recommendation 5

Health professionals should also continue to identify and promote these benefits, from cleaner air to increased physical activity to healthier diets.

Recommendation 6

US actions must be integrated into a larger global commitment to shift toward a cleaner energy economy.



Additional Information

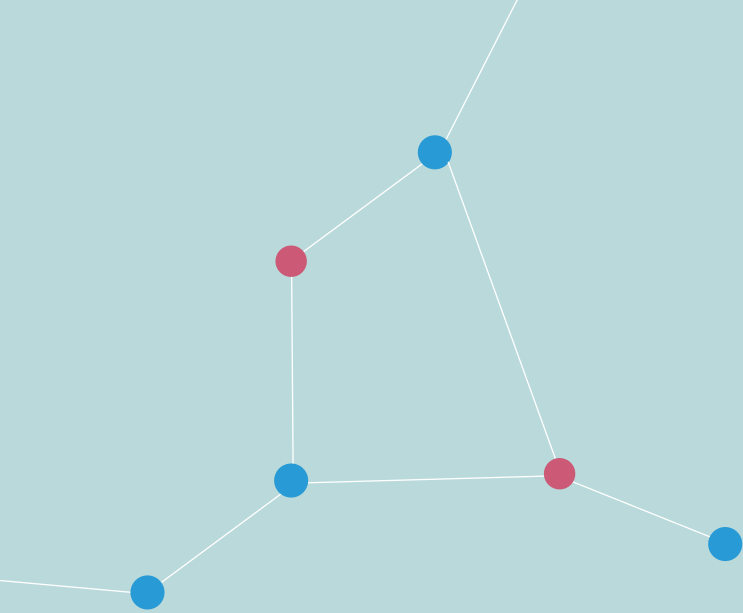
- www.lancetcountdown.org

WHO UNFCCC Climate and Health Country Profiles

The WHO UNFCCC Climate and Health Country Profiles form the foundation of WHO's national level provision of information, and monitoring of progress in climate change and health. The climate and health country profiles, first published in 2015, are developed in collaboration with ministries of health and health determining sectors with the aim of empowering Ministers of Health to engage, advocate and act to protect health from climate change. The most recent and relevant scientific evidence from the health, environment and meteorological communities is presented to highlight country-specific climate hazards and the potential health impacts facing populations. National action on health adaptation and mitigation is reported in the profiles and opportunities to promote actions that improve health while reducing carbon emissions are presented. For more information on the WHO UNFCCC Climate and Health Country Profiles please visit the website and watch the introductory video.

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