

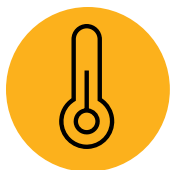
## Summary for Clinicians

Climate change is already affecting the health and well-being of Americans. Children are uniquely vulnerable in part because of the natural physiology of growing bodies. Children – particularly those in the earliest lifestages – also have less control over their environment, less knowledge about health effects from climate change, and are less able to remove themselves from harm. Climate impacts can have lifelong consequences stemming from effects on cognition, physical development, chronic disease, or other complications.

This factsheet summarizes findings from EPA's report [Climate Change and Children's Health and Well-Being in the United States](#), which quantifies future health risks to children for a sub-set of key impacts, in addition to reviewing a broader set of pathways in which children are affected by climate stressors. The analyses presented in this report are part of the EPA's [Climate Change Impacts and Risk Analysis \(CIRA\) project](#), a framework for quantifying and monetizing the impacts of climate change in the U.S. Some of the findings from the report most relevant to clinicians are summarized in the pages that follow by climate stressor. The pages also identify the ways clinicians can reduce risks to children.

*For more details, please see the report, appendices, and data linked below.*





## Extreme Heat

Extreme heat, including sustained high temperatures and heat waves, can have a variety of effects on children's physical and psychosocial health and cognitive capabilities. Effects may include hyperthermia, dehydration, and death, as well as premature birth or low birth weight, clinical psychological impacts, and an inability to concentrate.

### WHAT DID THIS REPORT FIND?

Heat experienced during the school year affects learning in children. This report projects a reduction in annual academic achievement per child of 4% under a moderate level of warming (2°C). These losses can affect future income, with

potential losses across cohorts of graduating students reaching billions of dollars annually, even under more moderate warming scenarios. Installing air conditioning (A/C) in schools is generally less costly, although this action only partially mitigates these effects. Black, Hispanic or Latino, and low-income students report the lowest rates of current A/C in schools, and therefore are likely to experience these impacts disproportionately.



David L. Ryan / The Boston Globe via Getty Images

### WHAT EMERGING ISSUES SHOULD CLINICIANS BE AWARE OF?

The number of emergency department visits among children is expected to increase between May and September each year as summer temperatures continue to rise, up to tens of thousands of additional visits annually.



### HOW CAN CLINICIANS HELP REDUCE RISKS TO CHILDREN?

- Talk with patients and their caregivers about limiting time outdoors in hot weather.
- Educate them on proper hydration in all temperatures, how to recognize the early warning signs of dehydration and overheating, and the risks associated with excessive exposure to high heat. Emphasize that dehydration can occur easily even in what seem like lower temperatures.
- Empower patients to know how to advocate for [safe practices](#) in outdoor activities, and destigmatize safety, especially in sports.



## Air Quality

Most health effects associated with poor air quality stem from climate-induced changes in weather conditions that impact concentrations of particulate matter (PM) and ozone, including wildfires and ground-level dust in the arid Southwest. Exposure to poor air quality can result in the development and exacerbation of asthma, poor cognition, and other pulmonary health outcomes, including upper respiratory tract infections, cancers, and chronic obstructive pulmonary disease (COPD) in adulthood. Preterm birth, low birth weight, and birth defects are associated with *in utero* exposures.



### WHAT DID THIS REPORT FIND?

Rates of pediatric pulmonary conditions have been steadily increasing over the past decades, in part due to changes in air quality and more children being exposed to higher levels of air pollutants. New asthma diagnoses across the U.S. are projected to increase 4% due to climate change-induced effects on air quality at 2°C of global warming. This rate rises to 11% under a higher level of warming. Low-income and Black, Indigenous, people of color (BIPOC) children are more likely to experience new asthma diagnoses associated with climate-related exposure to PM<sub>2.5</sub>.

### WHAT EMERGING ISSUES SHOULD CLINICIANS BE AWARE OF?

Emergency department (ED) visits and hospital admissions from respiratory conditions also are expected to increase because of these effects, as are school days lost. Further, the analysis projects an increase in premature deaths among newborns due to poor air quality impacts on maternal health.

Wildfire smoke is comprised of numerous other air pollutants that pose significant human health impacts, including adverse birth outcomes. New research documents the association between wildfire smoke exposure and risk of preterm birth, suggesting a dramatic potential increase in these outcomes as wildfire activity continues to increase.

### HOW CAN CLINICIANS HELP REDUCE RISKS TO CHILDREN?

- Advise patients and their caregivers to avoid being outside on days with the poorest air quality. Patients can check the [Air Quality Index forecast](#) for their area.
- Advise patients to reduce exposure to [wildfire smoke and ambient dust](#) by closing windows and vents in homes and vehicles. Encourage patients to consider purchasing a high-efficiency furnace or HVAC filter and/or a portable air cleaner to use during smoke emergencies.
- Learn more on patient health related to [ozone](#), [particle pollution](#), and [wildfire smoke](#), and [safeguarding indoor air quality](#) during wildfires.







## Changing Seasons

Increasing temperatures and changing rainfall patterns are extending the growing season, resulting in longer and more intense pollen and allergy seasons. Seasonal allergic rhinitis is a major contributor in the U.S. to the development of poor pulmonary health outcomes, including asthma.

### WHAT DID THIS REPORT FIND?

Due to climate-driven increases in some aeroallergens, rates of annual asthma-related ED visits are projected to increase by 17- 30%, under more moderate to higher levels of warming, 2°C to 4°C, respectively. Less severe outcomes, like visits to healthcare facilities for allergic rhinitis and prescriptions filled for allergy medications for children, may increase by the tens to hundreds of thousands annually at higher levels of warming (4°C or greater). Limited English-speaking or BIPOC children, and children without health insurance are more likely to experience these impacts stemming from oak pollen exposure specifically.



### WHAT EMERGING ISSUES SHOULD CLINICIANS BE AWARE OF?

Overall, new evidence suggests that lengthening warm seasons are expected to result in more time spent on outdoor recreation, especially boating and water sports. On the other hand, the number of trips associated with some recreation types, like winter recreation and cold-water fishing, are projected to decrease under climate change. These changes are likely to have both positive and negative effects, in terms of physical health, mental well-being, and injury risks.



### HOW CAN CLINICIANS HELP REDUCE RISKS TO CHILDREN?

- Talk with patients and caregivers about risk factors associated with developing worse health outcomes following aeroallergen exposure.
- Identify patients with comorbidities that may make them particularly at risk of health effects. Counsel them on relevant treatment regimens, including personally appropriate drug protocols, maintaining awareness [of their area's air quality status](#), and limiting time outdoors on days with poor air quality, including high pollen concentrations (check their local [Air Quality Index forecast](#)).





## Flooding

Coastal and inland flooding can result in exposures to waterborne diseases, housing uncertainty, and psychological trauma. The frequency of flooding events due to storm surge and sea level rise will continue to worsen as the climate changes, affecting homes of children living in coastal zones.

### WHAT DID THIS REPORT FIND?

If no additional adaptation actions are taken, more than 1 million children are estimated to experience temporary home displacement or complete home loss from coastal flooding, at even moderate levels of global mean sea level rise. Under greater levels of sea level rise, the report anticipates that more than 2 million children will be affected due to increases in coastal flooding. Children in overburdened households will experience these impacts disproportionately. Well-timed adaptation measures, including building sea walls, could avoid or delay many of these impacts, but are themselves costly to implement and maintain.



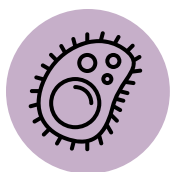
### WHAT EMERGING ISSUES SHOULD CLINICIANS BE AWARE OF?

Inland flooding, also known as riverine flooding, could increase in the future due to climate change, leading to home damage and loss.

### HOW CAN CLINICIANS HELP REDUCE RISKS TO CHILDREN?

- Encourage families who have experienced home damage or loss to seek psychological treatment for children.
- Work with patients and their caregivers to identify evacuation routes and strategies, including support networks outside of their town or city, to employ at times of flooding and severe weather.
- Children and pregnant people should not take part in flood work clean up. Encourage families to safely clean up flooded homes, be aware of the risks of mold, and find [information on mold cleanup](#).





## Infectious Diseases

The range of vector-borne diseases from mosquitoes and ticks, and the duration of favorable weather conditions for the vectors, are expected to increase in a changing climate. Lyme disease is one of the most common and best-known vector-borne diseases in the U.S. If left untreated, or if treatment is delayed, pediatric patients may develop a gamut of severe sequelae, including juvenile arthritis and Lyme carditis.

### WHAT DID THIS REPORT FIND?

This report projects a significant increase in new cases of Lyme disease (Lyme borreliosis) among children in the Eastern U.S. even at lower levels of global warming (2°C), with an expected 31% increase in cases. At higher levels of global warming (4°C), the overall number of new cases increase 272% above baseline levels. States in the northernmost areas of the Northeast and Midwest regions are expected to see most of new cases among children. Some research demonstrates that Lyme disease may be underdiagnosed, misdiagnosed, and undertreated among some overburdened populations, particularly BIPOC children, increasing the likelihood of more severe outcomes in these communities.



### WHAT EMERGING ISSUES SHOULD CLINICIANS BE AWARE OF?

West Nile Virus (WNV), an arbovirus, is also likely to see a rise in new cases as temperatures increase, including among children. While existing evidence suggests the estimated increase in new cases of West Nile Neuroinvasive Disease, a severe outcome associated with WNV, is anticipated to be small in magnitude, changes in case counts could be indicative of greater rates of other types of mosquito-borne illnesses.



### HOW CAN CLINICIANS HELP REDUCE RISKS TO CHILDREN?

- Educate patients and caregivers about [appropriate measures for avoiding exposures to ticks and mosquitos](#), including wearing long-sleeves and long pants, or proper application of insect repellants.
- Teach them about how to identify early symptoms of illness, including erythema migrans rash and other characteristics.
- Remain current on [tick bite treatment protocols](#) and [localized disease rates](#).