

Growing Up in a Warming World

How climate change is affecting the availability and safety of water in the developmental environment

Climate change is affecting the experiences and exposures that shape early childhood development. These changes are having both direct and indirect effects on the development of children's biological systems. Direct effects include things like exposure to toxic air from wildfire smoke—which is leading more children to develop asthma¹ and making symptoms worse for those who already have the condition—and droughts resulting from increased temperatures that can lead to dehydration, heat stress, and heat stroke, which can cause organ dysfunction such as kidney failure.^{2,3} Indirect effects come from experiences like being displaced by flooding, which causes stress in caregivers and can have negative effects on the relationships that shape healthy development.⁴ Both these direct and indirect effects are the result of climate change.

Climate change's impacts on the availability and safety of water have significant effects on children in the moment and across their lifespan. These effects may even occur intergenerationally through epigenetic mechanisms—chemical “tags” our body places on genes that are responses to experiences and exposures.⁵ Fortunately, science is helping us better understand these effects while also informing new solutions and maximizing the impact of existing solutions that are already being successfully implemented by communities and cities around the world.

By protecting children from the ways that climate change is introducing risks into developmental environments, working to prevent future harms by investing in improvements to current systems and infrastructure, and addressing the root causes of climate change by reducing greenhouse gas emissions and limiting the burning of fossil fuels, we can support the health and well-being of all children and their caregivers.

Droughts: Climate change is increasing temperatures worldwide, resulting in more frequent and prolonged droughts.⁶ Droughts limit children's access to drinking water, which can lead to dehydration. In early childhood, dehydration can cause vomiting, diarrhea, and problems with cognition, and it can damage critical organs like the kidneys and brain. In extreme cases, dehydration can lead to organ shutdown, which can be fatal.³ Droughts also negatively affect food production, leading to food shortages that can result in undernutrition and malnutrition. This can stunt growth, cause muscle breakdown, and disrupt brain development, with effects on physical and mental health and cognition that persist across the lifespan.⁷

Extreme weather events: Climate change is also increasing the frequency and intensity of extreme weather events like hurricanes, typhoons, cyclones, and extreme rainstorms (“rain bombs”).⁸ These events cause flooding, storm surges, and landslides, which cause water to pass over roads, farmlands, and industrial areas, pushing pollutants including heavy metals and gasoline, heating oil, agriculture waste, bacteria, pesticides, and PFAS (per- and polyfluoroalkyl substances) into the water supply.⁸ If children drink or bathe in this contaminated water, pathogens can get into the intestines and bloodstream where they affect developing biological systems.⁴ Drinking water contaminated with chemicals such as lead, PFAS, or gasoline can directly affect the developing brain and may lead to long-term problems with physical health, learning, memory, and behavior.⁹

Extreme weather events can affect caregivers and young children directly through physical injury or death from drowning, and they also have indirect effects. When extreme weather damages housing and infrastructure, it can cause significant stress by temporarily or permanently displacing families and leading to unpredictability and job loss. In children, this stress and trauma can change developing brain architecture and may lead to higher rates of mental health disorders, including anxiety and post-traumatic stress disorders (PTSD).¹⁰ Caregivers themselves can experience a range of adverse mental health effects as a result of displacement from extreme weather events and flooding, including anxiety, depression, suicide, and PTSD.¹¹ This impacts children by affecting a caregiver's ability to provide basic needs, like food or housing, as well as daily structure, routine, and responsive caregiving that are critical in promoting healthy development.¹²

Unequal exposure to water-related climate risks: The negative developmental impacts of climate change's effects on water are not evenly or randomly distributed; they flow through and are amplified by longstanding inequities in housing, urban planning, community infrastructure, and economic opportunity. This creates more exposure for children and families living in poverty and in current neighborhoods that have been shaped by discriminatory housing and zoning practices such as redlining, a policy that denied access to favorable mortgages to residents of areas deemed “hazardous for financial investment” because of higher concentrations of Black residents.¹³ Because of a longstanding lack of investment in previously redlined neighborhoods, often combined with residents of those neighborhoods being denied political power, those areas today are less equipped to withstand the effects of extreme weather events, and residents are more likely to be forced to leave their homes when these events occur.⁴ They are also less likely to have access to green space and adaptive technologies such as green roofs that help mitigate the effects of extreme wet weather or drought.¹⁴ Neighborhoods that have experienced chronic under-investment also tend to have limited access to clean, readily available water when the local water supply may be contaminated or less available, often because infrastructure, regulatory, and sanitation systems have not been adequately updated, enforced, or maintained over time.¹³ When these systems fail, communities are forced to navigate complex tasks like developing bottled drinking water distribution plans, including in cases like Jackson, Mississippi, when torrential rains pushed the already strained drinking water system to failure.¹⁵

Protecting Children and Addressing Root Causes

Ensuring that all children have developmental environments that allow them to thrive—both now and across their lifespan—requires implementing existing solutions and developing new ones at three key levels:

- 1. PROTECT: Immediate actions should be taken** to reduce harm from extreme weather events, such as implementing early warning systems that enable evacuations before storms occur.
- 2. ADAPT: Resources should be allocated toward improving current systems, services, and infrastructure** to better withstand droughts and extreme wet weather events, including updating sewer systems and water storage facilities by repairing existing aging infrastructure.
- 3. PREVENT: To avoid further warming of developmental environments, we must work to address the root cause of our planet's rapid warming** through actions like decreasing our reliance on fossil fuels and investing in renewable energy sources.

Many communities and cities in the US and around the world are already successfully implementing solutions that are having positive effects across multiple parts of the developmental environment. For example, planting trees and other vegetation to decrease flooding can also improve air quality and positively affect children's immune systems and mental health. Installing permeable pavement decreases storm runoff and lowers temperatures in developmental environments, which can improve children's sleep and increase their ability to play outdoors comfortably.¹⁶

By protecting children from the ways that climate change is introducing risks into developmental environments, working to prevent future harms by investing in improvements to current systems and infrastructure, and addressing the root causes of climate change by reducing greenhouse gas emissions and limiting the burning of fossil fuels, we can support the health and well-being of all children and their caregivers.

For an in-depth exploration of how water shapes children's development environments, read the full working paper from the Early Childhood Scientific Council on Equity and the Environment, “[A Cascade of Impacts: The Many Ways Water Affects Child Development.](#)”

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