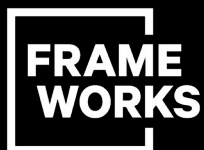




Climate Change and Early Childhood: A Science-Based Resource for Storytellers



INTRODUCTION

Climate change is altering the environments in which young children develop in significant ways. When these changes happen in early childhood, they fundamentally affect how the brain, immune, and all other biological systems develop. This has immediate effects for young children and families and lifelong impacts on health and wellbeing.

Most people haven't encountered research about the intersection of climate change and early childhood development, let alone been exposed to the growing research base that shows the ways these issues are connected. Getting this information into stories can expand understanding of the ways that climate change is affecting human health and wellbeing and generate support for the solutions required to address and prevent the harm it is causing.

This is an urgent situation, particularly for communities of color and low-income communities who are most exposed and least resourced to respond to the adversities that climate change is creating. However, this challenge gets very little attention and remains largely hidden and invisible.

This research-backed resource provides a new frame on climate change, focusing on its impact on young children. Leveraging popular media to raise awareness about this intersection is critical to improving the health and well-being of the nation's youngest children. Given the power of Hollywood to raise awareness of critical issues through storytelling, this resource was designed as a tool to use as you think about the stories you are telling and the audiences you are reaching.

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The Stakes¹

While climate change affects everyone, its effects are especially significant during **prenatal development** and from **0-5 years of age**. Research shows that not only do the effects of climate change have lifelong impacts, but these effects can persist over multiple generations.

Developing biological systems are sensitive to the environment:

In young children, biological systems—including the brain, immune, and metabolic systems—are interconnected and influenced by a child's environment.

The environment in which young children develop is made up of experiences and exposures:

These biological systems are constantly reading the environment and develop in response to what they read. Environments can contain experiences and exposures that fuel positive development (resources and opportunities) and those that derail healthy development (sources of significant adversity).

There are specific times when developing biological systems are particularly sensitive to environments: The prenatal period and early childhood are two such times.

Developmental environments shape a wide range of outcomes for young children and the adults they become: This includes physical and mental health, learning, and social and emotional wellbeing.

Climate change is affecting these developmental environments: These effects are both *direct* (e.g., breathing in toxic smoke from forest fires caused by drought and high temperatures) and *indirect* (e.g., floods from extreme weather events causing stress in families and other caregivers, which can have negative effects on the relationships that affect development).



The Impacts¹

Climate change is having particularly significant effects on three aspects of the developmental environment:



Air



Water



Temperature



Air

Climate change is **increasing temperatures** and creating droughts that make forests drier and more flammable. This results in larger, more frequent, and more intense wildfires.

WHAT DOES THIS MEAN FOR CHILDREN'S DEVELOPMENT?

Wildfires generate very small particles that travel in the air for thousands of miles and affect the health of children over a large geographical area. When children breathe in this contaminated air, less of it is trapped in their noses compared with adults, and more of it winds up in their lower lungs, where it can trigger inflammation and cause pneumonia or bronchitis. This can also cause asthma or make asthma worse in children who already have it. These small particles can also cross from the bloodstream into children's brains, where they can cause issues with learning and mental health. This also increases the risk of Alzheimer's and other causes of dementia later in life. Wildfire smoke is also linked to an increase in preterm births and low birth weight, which result in increased rates of infant mortality, respiratory infections, ADHD, autism, anxiety, and depression. The smoke from wildfires can also damage children's DNA, leading to immune system disruptions and conditions such as heart disease and cancer.

Water

Climate change is causing **droughts** and more **frequent and intense extreme weather events** like hurricanes, typhoons, cyclones, and extreme rainstorms ('rain bombs'). These events cause flooding, storm surges, and landslides, which cause water to pass over roads, farmlands, and industrial areas. When this happens, chemicals (heavy metals and gasoline, heating oil), agriculture waste, bacteria, pesticides, PFAS (per- and polyfluoroalkyl substances) get into the water supply. Extreme weather events also damage housing and infrastructure, displacing families and causing major adversity.



WHAT DOES THIS MEAN FOR CHILDREN'S DEVELOPMENT?

Dehydration: In droughts, children don't have adequate access to drinking water, which can lead to dehydration. Dehydration in early childhood can cause vomiting, diarrhea, and problems with cognition. It can damage organs like the kidneys and brain and lead to organ shut down which can be fatal.

Food production: Drought affects food production. Lack of access to adequate food causes undernutrition or malnutrition which leads to muscle breakdown and disruptions in brain development. It can also stunt growth, which has effects on physical and mental health and cognition across the lifespan.

Water contamination: If children drink or bathe in contaminated water, pathogens can get into the intestines and bloodstream where they affect developing biological systems. Drinking water contaminated with chemicals such as lead, PFAS, or gasoline can directly affect the developing brain and lead to long-term problems with physical health, learning, memory, and behavior.

Stress and trauma: In extreme weather events, parents and other caregivers can be affected directly (through physical injury or death from drowning) or indirectly (through loss of jobs or housing or stress from displacement). The stress and trauma from the injury or death of a caregiver or from displacement and unpredictability can cause changes in developing brain architecture and may lead to higher rates of mental health disorders, including anxiety and PTSD. 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 post-traumatic stress disorders. This can then impact children's development 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.

Temperature

Climate change is increasing the temperatures in developmental environments, which has a wide range of effects including, and extending beyond those mentioned above.

WHAT DOES THIS MEAN FOR CHILDREN'S DEVELOPMENT?

Fetal development: High temperatures can disrupt fetal development by reducing blood flow in the placenta, and causing dehydration and inflammation that can lead to stillbirth, preterm birth, and low birth weight. Being born too early or too small can cause a higher risk of dying in infancy, more respiratory infections and asthma, and increased rates of cardiovascular disease and diabetes, long-term intellectual disabilities, ADHD, anxiety, and depression.

Overheating: Children, especially infants and toddlers, do not sweat as much as adults in extreme heat, which limits the body's ability to cool itself and can lead to muscle breakdown, kidney failure, seizure, coma, or even death in extreme cases.

Sleep disruption: Heat can affect development by disrupting normal phases of sleep. Sleep deficits in infancy from high temperatures increase the likelihood of emotional and behavioral challenges, disrupted language development, and reduced problem-solving skills. Disruptions in sleep can also lead to more problems with obesity that can persist into adulthood. Sleep disruptions can also increase rates of metabolic disease and cancer across the lifespan.

Learning loss: Heat can disrupt learning by making it hard for children to focus and by increasing the number of missed school days. This disrupted learning, even in early childhood, can lead to losses in learning and economic productivity extending into adulthood.

Mosquitos and pollen: Increased temperatures are also driving up the number of mosquitos and expanding the geographic areas where they live. This leads to increases in diseases like Lyme, malaria, and Dengue that can cause fever, meningitis, arthritis, dehydration, and even death. In addition, higher temperatures cause plants to make more pollen, which causes more children to develop allergies and asthma.

Science is revealing a set of concrete solutions that can mitigate the effects of climate change on development.



The Solutions¹

The effects of climate change on early childhood development can feel overwhelming, but there is more to science than just doom and gloom. Science is revealing a set of concrete solutions that can mitigate the effects of climate change on development. These solutions can be translated into hopeful narratives that inspire—rather than depress—people. Pairing these solutions with a sense of urgency around the need to address the ways that climate change is affecting young children can help drive action. Assuring that children have developmental environments that allow them to thrive now and later is about doing things to protect them from the ways that climate change is threatening their developmental environment. It's also about working to address the root cause of these environmental changes. Many of these solutions have positive effects across multiple parts of the developmental environment (e.g., decreasing heat also improves air quality). Key solutions include:

Air:

Prepare for wildfires and their effects: Before fires occur, having high-quality air filters in place in schools and early care centers ensures that these systems are ready to operate during and after fires. Creating and using existing early warning systems for wildfires and poor air quality allows cities and towns to prioritize the notification and evacuation of pregnant people and young children.

Prescribe fires: Incorporating methods like prescribed burns into fire suppression practices reduces wildfire risk by removing large amounts of dead wood, trees and plants sitting in forests. Removing the debris that fuels forest fires makes fire less frequent and extreme. There are also new cost-effective and environmentally friendly fire-retardant gels that can be applied to wildfire-prone vegetation to prevent wildfires from occurring.

Create fuel breaks: Fuel breaks are open green spaces and parks around places where people live, where the organic materials that fuel wildfires are maintained at lower densities. These areas can prevent wildfires from spreading and reaching communities and provide an area for firefighters to safely stage defensive operations.

Water

Improve the resilience of current water systems: Green infrastructure includes a variety of greenspaces that reduce runoff, filter out stormwater pollutants, and preserve water for times of drought. Gray infrastructure focuses on repairing or installing new sewer systems, holding tanks, water lines, flood barriers, and other physical structures to maximize the efficiency of systems and decrease the chance that waterways will be polluted or flooded.

Install smart surfaces: Pervious pavement technologies, including porous asphalt, permeable pavers, and porous grid pavers with turf or gravel, allow rain to reenter the ground, reducing pollution, stormwater runoff, and flood risk and recharging groundwater (the process by which water moves downward from surface water to groundwater to re-enter the aquifer).

Temperature

Install alternative surfaces: The structures of buildings, sidewalks, and roads can increase the temperatures in cities. Redesigning those structures can bring temperatures back down. Smart surfaces include reflective roofs and pavements, porous pavements, green roofs, solar photovoltaics, trees, and a combination of these surfaces.

Grow and restore natural sinks to absorb carbon: Both blue carbon ecosystems (mangroves, salt marshes, and seagrass meadows) and forests effectively trap and store carbon and can lower temperatures. Restoring these natural carbon sinks that have been depleted and creating new sinks are both ways of decreasing community temperatures.

Plant trees and increase public greenspaces in cities: Strategic tree and vegetation planting in cities reduces ambient and surface temperature in surrounding areas. Planting trees near buildings provides shade, which lowers temperatures and AC costs. Greening schoolyards or shading them with tents lowers temperatures for children and allows them to exercise outdoors, improving physical and mental health, with beneficial effects on learning.





The Players

WHO IS AFFECTED:

Very young children: Children ages zero to five.

Older children: Climate change has longer-term effects on children 5-15 and beyond.

People who are pregnant: Pregnancy is a time of rapid development. And many of the ways that climate change is affecting development are experienced during this time.

Caregivers of young children including parents, child care providers, educators, and others in the community: These adults often are also impacted and can provide invaluable perspectives about what young children are experiencing.

Communities of color and low-income communities:

These groups of people often live in areas where the impacts of climate change are most intensely felt (heat, water contamination, etc.) and, therefore, where young children are at greatest risk. Often these communities can be displaced as a result of these impacts. Further, even when solutions have been enacted, these investments tend not to be made in communities of color and low-income communities.

Other ways of positioning issues can open up thinking, increase understanding, and build support for solutions.

OTHERS INVOLVED:

Firefighters, medics: These are the people who work in emergency services and are in the trenches of natural disasters. They have seen firsthand that these disasters are made more frequent and severe by climate change, and have seen the effects of these events on young children and families. These people are also involved in mitigating the negative developmental impacts of these events.

Pediatricians: Medical professionals have knowledge of what young children are experiencing and provide scientific validation about the ways in which changes in the environment (water, air, temperature), challenge development, and lead to issues with health and wellbeing.

Local government officials and community leaders: Community leaders could be motivated to serve their community because of what they experienced or learned about the effects of climate change. They might be working to put policies in place and make changes that enable their community to be better prepared and able to protect children from the ways that climate change is affecting development. For e.g., leaders could be taking action to mitigate the effects of pollutants in the local water supply by demanding investment in gray and green infrastructure.

Indigenous communities: From the perspective of mitigating solutions that already exist, indigenous communities have, for centuries, been using methods like prescribed burns.

Scientists, architects, etc.: These characters could be depicted using their expertise to design solutions, address problems, and mitigate the effects of climate change on young children.





Framing²

The FrameWorks Institute conducts research on framing and narrative to uncover effective ways of talking about social issues and advancing support for solutions. Framing research shows that even though there is science that connects the dots between climate change and early childhood development, facts and rational arguments about the strength of this science won't shift people's thinking or change behavior. But stories do have the power to connect climate change and early childhood in ways that boost understanding and motivate action.

Framing research shows that certain tropes can lead to unproductive thinking about young children and climate change—they distract, activate fatalism and helplessness, advance stereotypes, and depress support for the actions necessary to protect children and assure healthy development. Other ways of positioning issues can open up thinking, increase understanding, and build support for solutions. Here are some of the ideas FrameWorks research has found to be effective:

Solutions-framing is powerful. This means that while showcasing the ways climate change is urgently challenging healthy early development, it's important to also feature actions that can be taken to protect children from the adverse effects of climate change and prevent further threats. Stories that present climate change as a "crisis" and paint the issue as dark and dire can push people to tune out and disengage because they make people feel afraid, depressed, or overwhelmed. Illustrating solutions to what are presented as urgent and important problems can convey a sense that positive change is possible.

It is helpful to steer clear of the idea that climate change is 'just happening.' This is a strong cue for fatalistic thinking which puts people in a place where they see no viable solutions and quickly disengage from the issue. Instead, it is useful to illustrate that people have agency and that there are actors making decisions driving this problem that can be made differently to address it.

Vulnerability framing can backfire. Labeling individuals and communities as “vulnerable” has been found to activate stereotypes of groups and cue people’s fatalistic thinking. Positioning kids and communities of color as vulnerable, (even though all these groups are at greater risk from the environmental threats of climate change) can advance stereotypes. For example, othering neighborhoods and communities can activate stereotypes of communities of color—one such example is even implicitly suggesting that a solution is for Black people to just move into ‘nicer (whiter) neighborhoods’ to avoid the environmental challenges created by climate change. It’s better to think about the resources necessary to protect people and tell stories about resilience, rather than focus on risk and vulnerability.

The how is powerful. Most people haven’t encountered research on the intersection of climate change and young children’s development. An explanation can help show how cause leads to effect and can make complex or abstract ideas more concrete. FrameWorks Institute research shows that explanation can help people recognize injustice and embrace meaningful approaches to solving problems.

Community and collective responsibility build support for solutions. It helps to advance a positive role for communities in buffering against the effects of climate change on early development. This can help offset the tendency to heap responsibility on the shoulders of parents by establishing a wider sense of collective responsibility, while also being clear that caregivers can do things to improve outcomes and protect healthy development. Communities should be depicted as places with assets; even—and maybe especially—those communities disproportionately affected by climate change.



Conclusion

The science is clear: climate change is affecting the development of children’s brains and other biological systems with both immediate and lifelong effects on health and well-being. Larger, more frequent wildfires, droughts and more intense weather events, and excessive and prolonged heat are occurring with increasing frequency. These are no longer future threats; they are affecting children and families today. Yet most people don’t know about these threats nor the solutions that exist. Recognizing the power of popular media to elevate awareness and inspire action, *Too Small to Fail* commissioned this report to present the science and the solutions, along with relevant framing guidelines, to content creators. We hope you find it helpful in your storytelling.

For more information, please [contact info@toosmall.org](mailto:contact_info@toosmall.org).

Notes

1. The science in The Stakes, The Impacts, and The Solutions sections is the result of research syntheses that have been done by the [Center on the Developing Child](#), [The National Scientific Council on the Developing Child](#), [The Early Childhood Scientific Council on Equity and the Environment](#), and the [C-CHANGE center](#) at Harvard University.
2. This framing science is drawn from 25 years of research that the FrameWorks Institute has done on this and connected issues. www.frameworksinstitute.org

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ABOUT FRAMEWORKS

The FrameWorks Institute is a nonprofit think tank that helps mission-driven organizations communicate in ways that build public will to support progressive change. It applies rigorous social science methods to study how people understand social issues and develops evidence-based techniques for explaining those issues more effectively. Since 1999, it has conducted pioneering research on effectively communicating a wide variety of scientific and social issues, such as early childhood development, climate change and immigration.

In 2015, it was named one of nine organizations worldwide to receive the MacArthur Foundation's Award for Creative and Effective Institutions. Learn more at www.frameworksinstitute.org.

ABOUT TOO SMALL TO FAIL

Too Small to Fail, the early childhood initiative of the Clinton Foundation, surrounds families with early language and learning opportunities, and supports parents and caregivers with resources to talk, read, and sing with young children from birth to help prepare them for success in kindergarten and beyond.