

Testimony of Aaron (Ari) Bernstein to the Subcommittee on the Environment
United States House of Representatives Committee on Oversight and Reform

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Chairman Rouda, Ranking member Comer, members of the subcommittee, thank you for the opportunity to testify at today's hearing on climate change and health. My name is Ari Bernstein, I am a pediatrician at Boston Children's Hospital and Harvard Medical School in Boston. I am the co-director of the Center for Climate, Health and the Global Environment at the Harvard T. H. Chan School of Public Health and the Assistant Faculty Lead of the Harvard Global Health Institutes' Climate and Health Initiative. I also serve on the Executive Committee of the American Academy of Pediatrics National Council on Environmental Health.

I have three points I want to make clear this afternoon about climate change and the health of our children. First, fossil fuels have damaged the climate and the damaged climate has already exacted a heavy toll upon our children's health. Second, one of the best, if not the best prescriptions I or anyone could write to fix what ails our children would be to prescribe the necessary actions to reduce fossil fuel use and other sources of greenhouse gas emissions. And third, we must decarbonize lest we commit one of the greatest moral transgressions conceivable: stealing our children's future.

In my work as a pediatrician, I am regularly confronted with the human face of climate change – an ill child. Asthma, infectious diseases, and mental are just some examples of how climate change impacts our children's health.

Asthma

Asthma causes a child's airways to clamp down making it difficult to breathe and few things terrify a parent more than watching their child struggle to breathe. I have cared for children with severe asthma and time and again recall that this disease, which afflicted far fewer than 5% of children when I was born, now afflicts 1 in 10 American children, and substantially more children who are poor or African American. Our genes haven't changed in the past 50 years but our environments have.¹

Asthma can be a tremendous emotional and financial burden to families. In total, asthma has been estimated to cost the United States economy more than \$80 billion each year.² Climate change stands to make asthma yet more burdensome. First, exposure to hot air can trigger asthma attacks.³ Higher temperatures spur the formation of ground level ozone, or smog, which is well known to cause asthma exacerbations.⁴ The American Lung Association in its 2019 State of the Air Report notes that ground level ozone in 17 of the 25 United States cities with the most ozone pollution fared worse in the past 3 years likely due to higher temperatures.⁵

Particulate matter, another form of air pollution, also contributes to asthma flares. Particulate matter refers to particles suspended in air and categorized by their size. Children who breathe more particulate matter are more likely to need emergency medical care, use their inhaler more often, miss school more often, and die from asthma.⁶ Particulate matter exposure also makes it

more likely for children to get sick with pneumonia, as the inflammation these particles cause allows infections to take root.⁷

Wildfires also release immense amounts of particulate matter pollution. Climate change has expanded forest area burned in the United States, having roughly doubled it since 1984.⁸ Last year's fires in California were the deadliest on record. The air quality in the San Francisco Bay Area was the worst in the world for days⁹ and the particulate pollution stretched across the entire continent all the way to Massachusetts.¹⁰

Insect borne disease

Lyme disease is the most common vector borne disease in the United States with an estimated 300,000 cases each year, mostly in children, and climate change is poised to make it worse.^{11,12} Lyme is of great concern in communities where it is prevalent. While the disease most often is caught early and effectively treated, it can spread if left unchecked to involve the heart, joints, and nervous system. You can imagine, if you haven't seen it for yourself, what I have seen more times than I can remember: the worry on a parent's face who looks at their child and sees half their face in paralysis from a Lyme infection and wondering if it will ever get better.

As temperatures have warmed, the black legged tick that transmits Lyme has moved into new territory, reaching northwards where it previously was not found.¹³ These ticks also transmit anaplasmosis and babesiosis. Babesiosis can cause severe, and potentially life-threatening illness in vulnerable individuals, including young children. Its incidence has increased exponentially over the past 5 decades.¹⁴

Warming temperatures and heavier rainfall have raised concern that climate change may also promote the spread of mosquito borne diseases, especially dengue, zika, and chikungunya. Zika virus infection during pregnancy can cause brain and other nervous system defects. Based on data obtained by the Center for Disease Control and Prevention, perhaps 1 in 7 children born to mothers infected with zika virus during pregnancy have developmental disabilities and/or nervous system birth defects.¹⁵ Each of these children is likely require 1 to 10 million dollars in healthcare services. A zika virus outbreak in the continental United States could easily cost over a billion dollars to manage.¹⁶

Where people travel has a major influence on where these diseases occur but also influential is where the *Aedes* mosquitos that transmit disease can survive. Research has shown that *Ae. aegypti* is likely to shift its range in this century owing to climate change,¹⁷ and so we can expect they will continue to provide unwelcome surprises.

Mental health

Children who witness their home go up in flames or get washed away in a storm are likely to have persistent symptoms of trauma, anxiety and possibly depression. This makes the growing influence of climate change on wildfires, severe storms, and hurricanes relevant to the mental health of teenagers.

Rates of mental health disorders, including depression and anxiety, are rising in American adolescents. More disturbingly, teen suicide rates have been climbing for more than a decade and

female adolescent suicide is the highest it's been in 40 years. Child admissions to hospitals for suicidal thoughts doubled between 2008 and 2015.

Climate change and providing healthcare

Climate change is not just a threat to health – it also threatens healthcare. Hurricane Maria devastated Puerto Rico in the fall of 2017. Among its many casualties was the main factory that supplied small volume IV fluid bags to the continental United States. The factory was back in service and near or at full capacity about a month after the storm hit, and yet, hospitals around the nation were still grappling with IV fluid bag shortages well into 2018. Doctors had to triage which patients were sick enough to merit use of scarce IV fluids or to receive oral rehydration therapy instead, as would be used in a developing nation. Because of the shortage, physicians were forced to push medicines through a syringe rather than use an IV pump to allow for steadier and slower medication delivery. This led to adverse reactions to medications, particularly in children, that result when certain medicines are given too quickly.

Hurricanes, like Maria, as well as other extreme weather events include severe storms, heatwaves and droughts are expected to become ever more dangerous as climate change unfolds. These extreme weather events can, as was the case with Maria, interrupt the supply of critical medical supplies. They also can knock out power supplies which puts people who rely on electricity for breathing machines, dialysis, or other medical devices at risk. More than 80% of recent power outages that affected >250,000 people were caused by extreme weather events.

Power outages also makes healthcare delivery in hospitals and clinics more difficult. Hospitals have back-up power, but typically only enough to cover a modicum of services and experience with hurricanes Sandy, Katrina, and Harvey have shown that even if the power is on, getting people in and out of hospitals and healthcare settings, including staff, can be difficult.

Solutions

Thankfully, actions that address climate change favor child health. Turning to cleaner and renewable sources of energy will allow children to breathe easier. Asthma often results from pollutants released into the air when fossil fuels are burned. 1 in 5 children who develop asthma in the United States can blame their disease on breathing NO₂ alone. NO₂ comes predominantly from burning fossil fuels and in cities, burning gasoline and other liquid fossil fuels may account for 80% of nitrogen dioxide emissions.¹⁸ Fossil fuel combustion is a primary source of the chemicals needed to form ozone and particulate matter.

Better air quality can also come from less resource waste. Buildings consume ~40% of all energy in the United States. More energy efficient buildings can substantially reduce energy use and associated air pollution. Between 2000 and 2016, green certified buildings in the United States saved \$6.7 billion in energy costs and averted 30MT of CO₂. At the same time green buildings prevented hundreds of deaths, about 11,000 asthma attacks, 21,000 lost days of work, and 16,000 lost days of school.¹⁹

In our actions to combat climate change, we can target obesity and diabetes, two of the biggest threats to our children's health, with obesity itself perhaps leading to our children living shorter

lives than their parents for the first time in United States history.²⁰ More active transport and better access to high quality and affordable public transportation and less time sitting in cars can burn calories and lower carbon. Eating more fruits and vegetables and less red meat will promote healthier body weight, curtail colon cancer risk, and help forestall diabetes.²¹ As particulate matter exposure has been associated with diabetes, cutting back on burning gasoline and diesel in vehicles and coal in power plants will be a key part of making more time outdoors healthy.²²

Particulate matter has many further effects on health including risk of preterm birth. Just over 3% of all premature births in the United States are attributable to particulate matter pollution. Physical and mental disabilities associated with preterm births caused by air pollution have been estimated to cost more than \$4.33 billion each year and extended hospital stays for these premature infants adds an additional cost of roughly \$760 million a year.²³ Burning less fossil fuel may improve pregnancy outcomes. Green building may be most beneficial to the most vulnerable. Individuals who move from conventional to green low-income housing show marked improvements in health symptoms.²⁴

The list of other mitigation measures, such as increasing access to greenspace, is long and can address a broad swath of child health outcomes including infectious diseases and mental health disorders. But many have rightly asked about the costs of climate mitigation. Time and again, in study after study, actions such as those described above confer health benefit value that exceed the costs of transition.²⁵⁻²⁸ All too often, the health benefits that accrue with climate actions are left off the table, and even when they are considered, they most often only include benefits associated with reductions in a few diseases in adults and ignore benefits to children.

I know that in many communities across this nation, families face great hardship should the calls to reduce our reliance on fossil fuels take hold and the fossil fuel industry declines. And so I cannot underscore enough that any plan to decarbonize our economy must plan for the welfare of the families and children in these communities, where poverty is already too common and opportunity scarce. We cannot leave anyone behind.

I will conclude my testimony by emphasizing that when all measures of cost are taken, and all the noise around the causes and consequences of the ongoing rise of greenhouse gases in the atmosphere settles, the truth will remain: we are damaging the climate and in so doing we are damaging our children's future. One day, our children – and their children - will look us in the eye and ask what we did to protect their world. If we fail to act decisively on climate change as a nation, we will have stolen all our children's futures.

We know that every step we take to tackle climate change creates major health benefits for all, and especially the most vulnerable, including children. When we act to tackle climate change we will have cleaner air, cleaner water, and safer places for us to live, work and play. We will have more forests to enjoy and parks to play and stay cool in. We will see fewer asthma attacks and suffer less heart attacks and strokes; and we will be safer living in more resilient communities and have less stress, anxiety and fear of losing homes or even lives. We will live longer, healthier lives. We can all do so much more in our lives, in our homes, our communities, our schools, in city halls and even here, in the halls of Congress. Our children are counting on us. After all, it's their lives and their futures at stake.

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