Journal of Applied Research on Children: Informing Policy for Children at Risk

Volume 12
Issue 1 *Environmental Justice and Climate Change*

Article 11

2021

Pediatric Climate Change Advocacy: A Call to Action for Health Care Providers

Pragya Rai
pragya312@yahoo.com

John I. Sutter
jisutter@optonline.net

J Gary Wheeler

Robert G. Byron
rgbyron@gmail.com

Lori G. Byron
SCL Health, lori.byron@gmail.com

Recommended Citation

Rai, Pragya; Sutter, John I.; J Gary Wheeler; Byron, Robert G.; and Byron, Lori G. (2021) "Pediatric Climate Change Advocacy: A Call to Action for Health Care Providers," *Journal of Applied Research on Children: Informing Policy for Children at Risk*: Vol. 12: Iss. 1, Article 11.
DOI: https://doi.org/10.58464/2155-5834.1460
Available at: https://digitalcommons.library.tmc.edu/childrenatrisk/vol12/iss1/11

Pediatric Climate Change Advocacy: A Call to Action for Health Care Providers

Acknowledgements

The views and examples provided are those known to the authors and represent diversity in advocacy by pediatricians. They are not the extent of the pediatric activism effort, nor do they necessarily represent the official position of the AAP.

Pediatric Climate Change Advocacy: A Call to Action for Health Care Providers

Pragya Rai MD, FAAP
Lori Byron MD, MS, FAAP
John I. Sutter MD, MS, FAAP
J. Gary Wheeler, MD, MPS, FAAP
Robert G. Byron, MD, MPH, FACP

"It should be our aim to discover neglected problems and, so far as in our power, to correct evenly and introduce reform."
--Isaac Abt, first American Academy of Pediatrics (AAP) president

Abstract

Climate change already besieges us. Using specific examples, this paper highlights the impacts of climate change affecting children today, particularly those who disproportionately experience those impacts, and beseeches pediatricians and other healthcare professionals in all types of practice settings to engage in climate change advocacy. Examples of organizational, educational, legislative/policy, and cooperative/community advocacy are provided. Pediatricians have been quick to recognize the threat of climate change, but broader engagement is needed from all health professions.

Introduction

Climate change has become an integral, albeit often unrecognized, part of our lives. Pediatricians and other physicians have witnessed the effects of climate change on child health both globally and in our backyards. In 2013, a 9-year-old girl died from an asthma exacerbation in the United Kingdom.[1] In August 2020, a 16-year-old Arkansas football player suffered heatstroke during football practice and died several days later with liver and multisystem organ failure.[2] The 2020 wildfire season on the West Coast resulted in 14 direct deaths, of which 2 were children, a 13-year-old boy in Oregon and a 1-year-old toddler in Washington.[3] In February 2021, an 11-year-old boy in Texas died from carbon monoxide poisoning after his family's trailer lost electricity when the power systems failed during an intense cold spell.[4]

Each of the cases listed above can be connected to climate change. In the case of the young girl with asthma, on December 16, 2020, for the first time in history, air pollution was listed by the court in the United Kingdom as "having made a material contribution" to her death. This landmark ruling came about after the child's mother started her battle with the judicial system to bring awareness of the devastating effects of air pollution on her daughter's health. She suffered from multiple asthma exacerbations and seizures and ultimately lost her life.[1]

The concept that climate change is a result of human behavior has already reached the dictionary, with climate change defined as "a change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels" by Lexico.com.[5] The phenomenon of climate change affecting health can present via myriad climate events affecting children, as we highlight below. That we are witnesses to these events calls for us to report them and lead the effort, as trusted voices, to mitigate the climate crisis.

This work should be done in partnership with the very children we wish to support, such as young people like Greta Thunberg, twice nominated to receive the Nobel Peace Prize for her climate activism.

Climate Change and Children's Health

The full impact of climate change on children's health has not been measured, but multiple effects are well described. Warming temperatures from climate change are increasing the frequency of extremely hot days and heatwaves,[6] both in the United States and globally, leading to more heat-related health conditions, including death. Depending on the region of the world, heat and cold waves, fires and drought, floods, more intense storms, and extreme precipitation events are occurring, leading to hyper- and hypothermia, drowning, trauma from wind, forced relocation, and other consequences to children. Similarly, the health sequelae of climate change can present in varied forms, for example respiratory disorders such as asthma and allergic diseases, infectious diseases including vector-borne diseases such as Lyme disease, water-borne diseases such as gastrointestinal diseases of childhood, and mental health disorders like post-traumatic stress disorder and depression with natural disasters.[7]

Wildfires illustrate climate's health harms to children. Climate change is a major contributor to increased wildfires, both in intensity and acreage burned. While not discounting the role of longstanding forest management practices of suppressing fires, the increasing temperatures caused by climate change add to the problem due to stressed forests, decreased moisture from drought and more transpiration, and more intense attacks from pests due to increased range and less winterkill. Children are particularly susceptible to airborne contaminants, breathing more per kilogram of weight than adults. Thus, it is expected that the health effects of wildfire smoke affect children more than adults.[8] Pratt et al estimated that the number of emergency room (ER) visits in children with asthma due to exposure to ozone generated by wildfire emissions was more than 2000 visits annually in the US.[9] California set the single-day record in 2018 for school closures due to wildfire and wildfire smoke, affecting over 1 million schoolchildren.[10]

Wildfire smoke travels for thousands of miles and can affect faraway regions. For example, forest fires in Canada in July 2002 resulted in a 30-fold increase in fine airborne particles in Baltimore, nearly 1000 miles downwind.[11] News media reported smoke from wildfires traveling from California to the East Coast in August 2018 and July 2021,[12] and again to the East coast and beyond to Europe in September 2020.[13,14] A recent study published in *Nature* provides evidence that wildfire particulate matter (PM) may be more toxic than equal doses of PM from other sources, can have a more significant impact on respiratory health, and cause an increase in respiratory hospitalizations.[15] The 2018 World Health Organization (WHO) report, *Air Pollution and Child Health: Prescribing Clean Air*, concluded that air pollution is a leading threat to child health, accounting for almost 1 in 10 deaths in children under 5e years of age. Worldwide, 98% of children under 5e in low- and middle-income countries are exposed to PM2.5 levels above WHO air quality guidelines. This number drops to 52% for children in high-income countries.[16]

The California fires of 2018 illustrate the disproportionate impact of wildfires on the poor and children of color. With fewer resources, many found themselves homeless or less able to access medical care for conditions related to smoke inhalation. Using census tract information across the United States, investigators have shown that Native American, Hispanic, and Black families have significantly greater vulnerability to wildfires.[17]

Extreme cold also affects children. Some studies suggest that climate change contributes to the weakening of the jet stream, which could lead to extreme winter storms in regions that normally do not experience them,[18] as occurred in the southern US in February 2020. The record winter storm that hit Texas in February 2021, caused power outages, food and water shortages, road vehicle accidents, carbon monoxide poisoning, and deaths from hypothermia.[19] This raises questions regarding the resiliency of current infrastructure to withstand the adversity of climate change.

Although an evolving field, anthropogenic climate change may be affecting the intensity and destructive potential of tropical storms .Hurricanes such as Hurricane Harvey and Hurricane Katrina led to displacement of children and families, increases in serious emotional disorders linked to poverty,[20] inability to obtain life-saving medical therapy such as dialysis due to flooded facilities, increased exposure to mosquitos and associated diseases (Zika, West Nile),[21] and increased waterborne diseases such as infections with *Vibrio*, *Escherichia coli*, norovirus, and hepatitis A.[22]

Not discussed in this article are other climate-related events, such as drought, dust storms, and flooding from heavy rain. Further, there are likely many as-yet-unknown consequences to children, as the scientific literature continues to document the effects of climate change on human health.[6] While it is easy to associate worsening asthma and wildfire exposure, it is less well-known and harder to comprehend that climate change affects children in utero, leading to increased risk for low birth weights, intrauterine growth retardation, and prematurity. Fetal programming and epigenetic changes during development, with exposure to heat and air pollutants, may lead to long-term adverse effects as children grow, due to increased predisposition to several conditions such as neurodevelopmental disorders, adverse birth outcomes, congenital heart disease, obesity, and others.[23]

Issues of Equity

Climate change already affects the social and environmental determinants of health at a global scale, impacting populations who have contributed the least to the problem.[24] Although climate change impacts everyone, children, people of lower socioeconomic status, and people of color disproportionately experience adverse health sequelae and have fewer available resources for adapting to the changing climate.[25-27] A recently published article in *Pediatrics* proposed that climate change be included as a social determinant of health.[28] Social determinants of health (SDOH) are “conditions in the places where people live, learn, work, and play that affect a wide range of health and quality-of life risks and outcomes.”[29] Similar to other SDOH--such as food insecurity, housing instability, violence exposure, structural racism, poverty, and immigration-related stressors--climate change worsens health, increases health care costs, disproportionately impacts vulnerable communities, and intensifies the effects of other SDOH.

Events caused by extreme climate change can lead to evacuation, displacement, loss of homes, and even loss of ways of life. These events are disproportionately felt by the young and the poor. For children who depend on medical technology for survival, simply losing electrical power presents life-threatening situations. In other scenarios, families return to homes seeded with mold, dampness, ash, dust, and toxins, creating a hazardous environment for everyone, especially children, and more so if they already suffer from chronic health conditions. The devastating effects of Hurricane Katrina in Louisiana and Mississippi in 2005 are still being felt by those there at the time. Not only did 1800 people lose their lives, but 800,000 housing units were destroyed during the storm.[30] Children lost their homes, pets, and family members, and

many were separated during the turmoil. Such climate-related disasters lead to anxiety, post-traumatic stress disorder, and chronic mental health problems, especially among children, according to the American Psychiatric Association.[31]

Organizational Advocacy

Large organizations, whether government, nonprofits, or businesses, have significant impacts when they implement actions. They can normalize new behaviors and energize activists with their financial and organizational support. The American Academy of Pediatrics (AAP) engaged early on the climate problem, recognizing that children are often the first victims of climate change. The AAP provides a platform for supporting advocacy roles for their members, forms collaborations with other climate groups, and is helping to pave a route for essential climate-related health education. In addition, pediatricians have initiated multiple outreach programs building on climate-centered activities in their communities. The capacity to do this work exists in most professional health care provider associations through existing structures, and by members who can be contributors with their existing knowledge and recognition as thought leaders. Several professional organizations are already engaged in these efforts.

Advocacy through Education for Health Care Professionals and Families

Advocacy traditionally begins with the collection of data and education of both communities and their leaders. Without a clear understanding of issues, mitigation cannot move forward. The importance of education regarding climate change cannot be understated. Empowering health care professionals with knowledge and skills will help transition education to families and in the community. In this regard, the AAP continues to work on expanding education for providers and families alike. In 2015, the AAP released its policy revision recommending work to promote medical educational opportunities regarding the effects of climate change on the environment and child health.[26] A 2017 video by the AAP's chief medical officer, entitled *Our Children, Our Future: Why the AAP is Leading on Climate Change and How Pediatricians Can Help,* has been widely viewed in pediatric circles.[32]

Under the auspices of the AAP, the Council on Environmental Health and Climate Change (COEHCC) seeks to lessen children's environmental health risks and exposures. The AAP's COEHCC publishes the "Green Book," *Pediatric Environmental Health,* which covers pediatric environmental health problems, including the effect of climate change on child health.[33] Pediatric Environmental Health Specialty Units (PEHSUs),[34] overseen by the AAP, are a national network of 10 regional sites with experts on the impacts of environmental hazards on children. The units conduct research and provide resources for professionals and families on topics such as air pollution, wildfire smoke, instructions for return to home after hurricanes, and climate mitigation. The PEHSU National Classroom offers a wide range of courses pertaining to topics ranging from air quality to climate change to environmental health.

The incorporation of climate education in medical school and residency program curricula has been supported by many pediatricians and amplified by keen interest from premedical and medical students and residents volunteering to assist in these endeavors. Several academic pediatricians are working with their institutions and the Global Consortium on Climate and Health Education on this effort. Through the American Board of Pediatrics (ABP), a self-assessment module (Maintenance of Certification, MOC 2)[35] on Climate and Children's Health is currently available for board recertification--thought to be the first climate change module available by a medical specialty board. The ABP will soon have a clinical practice quality improvement module to incorporate climate change and health into well-child visits (MOC 4).

In the past year, several climate-related articles, each emphasizing the health impacts of climate change, were co-authored by AAP members. One described a situation in India and the global public health crisis created by climate change.[36] Another, in *Pediatrics*, described climate change as a social determinant of health.[28] Yet another emphasizes the importance of incorporating climate change in resident education.[37] In one case, a pediatrician joined with medical students to discuss the importance of including climate education in medical school teaching.[38] Maibach et al highlighted the power of health professionals to influence policy, especially when working in unison.[39]

Discussing climate change during pediatric visits is within the scope of practice and recommended by the AAP.[26] However, minimal data exists on addressing climate change during pediatric visits. Recently published work in two separate pediatrician practice settings suggested that such information would be well-received.[40,41] Further research in additional locales should explore the perspectives of parents and pediatric providers regarding the importance of discussing climate change during visits, which topics would be the most meaningful to address, and barriers and facilitators for climate change discussions. Pediatricians should be a valuable source of information for health and safety during climate crises and education on disaster preparedness. The AAP provides material for parents to help address and support climate change, such as *AAP Links Global Warming to the Health of Children*[26] and *How Climate Change Affects Children: AAP Policy Explained.*[42] A framework on recommendations for integrating climate change into the flow of pediatric primary care visits was published in July 2021 by several pediatricians and is a source of referrals and resources for families.[43]

Advocacy at the Policy and Legislative Level

Policy change, either at the legislative or regulatory level, is often recognized as the most effective lever in addressing change because of its normalization of new behaviors and its more dramatic, societal impact compared to incremental change accomplished by one-on-one educational efforts. Advocacy by medical societies helps motivate policymakers to respond to public health threats. In 2007, the AAP became the first major medical organization to issue a policy statement on Climate Change and Health.[44] In 2017, the AAP was a founding member of the Medical Society Consortium on Climate and Health, which brings together medical societies representing over 600,000 health practitioners[45] and has significantly elevated the conversation between the American public and policymakers about the harmful health effects and solutions for the climate crisis.

In 2019, to support climate and health education, and action at the state level, the AAP's COEHCC convened a network of climate advocates.[46] There are currently AAP Chapter Climate Advocates in each of the 50 states plus the District of Columbia and Puerto Rico. Fifteen chapters have now passed a climate resolution or position paper highlighting the importance of climate change and child health for that AAP chapter, and 17 have formed climate committees. Chapter advocates strive to inform the state's pediatricians, the public, and families about climatic harm to child health. They collaborate with other climate groups working to transition us to a carbon-free economy. An excellent example is the Virginia Chapter of the AAP, which, beginning in 2015, was the first medical society in the state to support state-level climate legislation. Their efforts, along with those of the Virginia Clinicians for Climate Action (VCCA) and other organizations, culminated in the passage of the Virginia Clean Economy Act in 2020,

which commits Virginia to 100% clean energy by 2050, according to Dr. Samantha Adhoot, Pediatrician and Chair of the VCCA.

Some advocates have communicated with elected officials and other pediatricians to create awareness of priority legislative bills in their state and actively testified; energy issues affecting climate have been added to AAP chapters' legislative blueprints in several states. (Blueprints provide elected officials, members, and the public with the organization's legislative priorities.) The advocates' program, unique among the medical societies, has received media recognition, with STAT News running a story in December 2020,[47] CBS Morning News on February 2021,[48] and an article published in *AAP News* in April 2021.[49] Recent examples of pediatricians' proactive stance on climate change include the opinion piece before the 2020 elections to encourage the public to consider climate policies as they chose candidates, signed by a pediatrician from every state.[50] On the AAP website is *Transition Plan: Advancing Child Health in the Biden-Harris Administration,* which includes recommendations for committing to the Paris climate agreement, promoting environmental justice, and implementing stronger air quality standards.[51]

Numerous pediatricians serve in appointed and career positions in federal, state, and local governments. Additionally, several have been elected to state legislatures. Dr. Lisa Reynolds of Oregon[52] was elected a state representative in November 2020; action on climate change was one focus of her campaign. Other AAP members serving in state legislatures include Sen. Richard Pan of California,[53] Rep. Yadira Caraveo- of Colorado,[54] and Rep. Beth Listone of Ohio.[55] In addition, pediatrician advocates now serve on the San Diego (CA) Air Quality Board[56] and the Yampa Valley (CO) Sustainability Council[57] due to their public work on climate through their AAP chapter. These individuals work in leadership positions to influence local and state decisions that impact climate change-related measures, emphasizing equity and issues related to disparities and damage mitigation.

Collaborative and Community Advocacy

Alone, no single organization can move public policy or engagement. Collaboration with partners is vital within and outside of the medical profession. Clinicians for Climate Action groups exist in 17 states, providing a platform for health care professionals to act on climate. Pediatricians helped found or currently manage over half of these groups. Each focuses on those aspects of climate change most relevant to its state or region, often with an emphasis on children's health. Partnerships of pediatricians with community leaders, other health care professionals, and other organizations who work for environmental and climate justice and decarbonization of energy amplify the influence of work that they do.

After discovering that 9000 trees had been purposely felled in Puerto Rico, a Puerto Rican advocate and her AAP chapter began educating on the climate-mitigating and hurricane-abating benefits of trees. Motivated in part by the ongoing research showing that lung damage persists several years after exposure to wildfires, Montana's AAP Climate Committee recently received grants to promote the EPA Air Quality Flag Program in schools across the state, especially in rural and Native American communities. This will also increase public awareness of the effects of poor air quality and climate change.[58]

North Carolina's Museum of Life and Science recently invited local pediatricians to work with them on a National Oceanic and Atmospheric Administration grant addressing heat mapping

and the environmental injustice and health risks from heat islands in different neighborhoods. Rutgers University asked the New Jersey chapter of the AAP to assist on a map-overlay project regarding drought, pollen, and other climate-related factors affecting health in the state. An Arkansas pediatrician recently helped revise the Arkansas Department of Health assessment manual to reflect climate and health issues.[59] In Georgia, a pediatrician initiated a sustainability club to develop more environmentally sound practices in local healthcare settings and began working with pharmacy colleagues on pharmacy waste. Other pediatric efforts to increase awareness of climate change have included a climate change film screening by an AAP chapter, arranging a climate art exhibit at a local children's museum, and creating a local climate badge for Girl Scouts.

Advocacy Using Social and Earned Media

Amplifying educational or action messages has always been a part of advocacy to increase community acceptance of behavior change and apply pressure on policy leaders. The use of different forms of online social communication is growing. For instance, from 2005 to 2013, the percentage of US adults online who claimed to use social networking sites increased from 8% to 72%. Online social activities are increasingly important for how people consume news and information about various important social issues. Most adults in the United States (62%) get news on social media.[60] Pediatricians have used social media as an apt platform for climate change advocacy and education. A documentary from Mothers and Others for Clean Air featuring Georgia pediatricians discusses the need to start conversations on health impacts from climate change.[61] Pediatrician advocates frequently get invited to sit on public panels about renewable energy, climate, and equity, and speak on podcasts,[62] radio,[63] and Facebook[64] events. Climate conversations in other formats include TedX[65] and Pecha Kucha[66] nights, traditional presentations, and opinion pieces[67] in newspapers. Nevada pediatrician Debra Hendrickson's children's book, *A Burning House,*[68] is soon to be published, as is Georgia pediatrician Elizabeth Bechard's *Parenting in a Changing Climate*.[69] Conversations continue on Instagram, such as the August 2020 California National Resources Defense Council interview of a pediatrician climate advocate,[70] as well as through individual blogs, such as the PediaBlog,[71] Dr. Plastic Picker,[72] and The Aspiring Green Pediatrician.[73] A group of "climate tweetiatricians" use Twitter (#climatechangeskidshealth) to spread climate messages. To educate and advocate, Individual pediatricians maintain websites such as the San Diego Pediatricians for Clean Air[74] and the Washington State Pediatricians for Climate Action.[75] Combatting media misinformation has become a critical activity for all those using social media, as climate change skeptics operate in these same spaces. Doing so safely has also become a challenge and an important skill for those working in social media.[76]

Climate Change Advocacy as an Imperative for Health Care Providers

Healthcare providers render the first line of care to children; they are thus afforded a unique opportunity to lead in optimizing health as children are one of the populations most vulnerable to the effects of climate change. Pediatricians have advocated for policies and legislation related to gun safety, food insecurity, domestic violence, vaping, and child abuse. Therefore, it is only right that they bring the detrimental effects of climate change on children to the forefront. Pediatricians can incorporate climate change into clinic visits and treatment decisions, in addition to being climate advocates in the public sector. The preceding examples illustrate the many efforts already underway, but engagement by the broader provider community is needed to meet the health challenges both now and in the future.

Summary

The urgency of climate change can no longer be denied. This urgency calls for action at all levels. We can adopt and promote personal solutions for ourselves and our patients such as using active transport (walking, biking, or promoting public transportation, especially powered by electricity), eating a plant-based diet, and reducing waste. However, at this time, the global health impacts of climate change demand that we advocate together for stronger policies that benefit health care for generations to come, that decrease hunger and poverty, that represent justice and equity, and that promote peace and stability. Children have contributed the least to the public health emergency of climate change, yet they are among the most affected by the devastation it wreaks both now and in the future. Therefore, it is important that all health care providers come together to speak for children's right to a just and livable planet.

References

1. Marshall C. Air pollution death ruling: what comes next? *BBC News*. https://www.bbc.com/news/science-environment-55352247. Published December 17, 2020. Accessed August 9, 2021.

2. Muck J. Piggott football player, 16, dies. *Arkansas Democrat Gazette.*. https://www.arkansasonline.com/news/2020/aug/16/piggott-football-player-16-dies/. Published August 16, 2020. Accessed August 9, 2021.

3. Chappell B, Treisman R. At least 14 people killed in West Coast wildfires; some 500,000 evacuated In Oregon. National Public Radio. https://www.npr.org/2020/09/10/911389505/at-least-7-people-killed-in-west-coast-wildfires-dangerous-winds-forecast-to-eas. Published September 10, 2020. Accessed August 12, 2021.

4. Gonzalez JR. Conroe boy's death following February's arctic blast confirmed as carbon monoxide poisoning. *Houston Chronicle.* https://www.houstonchronicle.com/neighborhood/moco/news/article/Conroe-boy-s-death-confirmed-as-carbon-monoxide-16172711.php, Published May 12, 2021. Updated May 13, 2021. Accessed September 19, 2021.

5. Lexico.com. Definition of climate change. https://www.lexico.com/definition/climate_change. Accessed November 4, 2021.

6. Wuebbles DJ, Fahey DW, Hibbard KA, et al.. Executive Summary. In: Climate Science Special Report: Fourth National Climate Assessment. Washington, DC: US Global Change Research Program; 2017;1:12-34. https://science2017.globalchange.gov/chapter/executive-summary/. Accessed August 12, 2021.

7. Patz JA, Frumkin H, Holloway T, Vimont DJ, Haines A. Climate change: challenges and opportunities for global health. *JAMA*. 2014;312(15):1565-1580. doi:10.1001/jama.2014.13186.

8. Holm SM, Miller MD, Balmes JR. Health effects of wildfire smoke in children and public health tools: a narrative review. *J Expo Sci Environ Epidemiol*. 2021;31(1):1-20. doi:10.1038/s41370-020-00267-4.

9. Pratt JR, Gan RW, Ford B, et al. A national burden assessment of estimated pediatric asthma emergency department visits that may be attributed to elevated ozone levels associated with the presence of smoke. *Environ Monit Assess*. 2019;191(suppl 2):269. doi:10.1007/s10661-019-7420-5.

10. Chalupka S, Anderko L. Climate change and schools: implications for children's health and safety. *Creat Nurs*. 2019;25(3):249-257. doi:10.1891/1078-4535.25.3.249.

11. Sapkota A, Symons JM, Kleissl J, et al. Impact of the 2002 Canadian forest fires on particulate matter air quality in Baltimore city. *Environ Sci Technol*. 2005;39(1):24-32. doi:10.1021/es035311z.

12. Silverman H, Guy M, Sutton J. Western wildfire smoke is contributing to New York City's worst air quality in 15 years. CNN. https://www.cnn.com/2021/07/21/weather/us-western-wildfires-wednesday/index.html. Published July 21, 2021. Accessed July 23, 2021.

13. Calfas J. Smoke from California wildfires is reaching the East Coast: here's what that means for the air near you. *Time*. https://time.com/5364151/california-wildfire-smoke-east-coast/. Published August 10, 2018. Accessed October 22, 2021.

14. Freedman A. Western wildfire smoke nearing Europe, may be on an around-the-world journey. *Washington Post*. https://www.washingtonpost.com/weather/2020/09/16/wildfire-smoke-reaches-europe/. Published September 16, 2020. Accessed October 22, 2021.

15. Aguilera R, Corringham T, Gershunov A, Benmarhnia T. Wildfire smoke impacts respiratory health more than fine particles from other sources: observational evidence from Southern California. *Nat Commun*. 2021;12(1):1493. doi:10.1038/s41467-021-21708-0

16. World Health Organization. Air pollution and child health: prescribing clean air.https://www.who.int/publications-detail-redirect/air-pollution-and-child-health. Published July 10, 2018. Accessed October 22, 2021.

17. Davies IP, Haugo RD, Robertson JC, Levin PS. The unequal vulnerability of communities of color to wildfire. *PLoS One*. 2018;13(11):e0205825. doi:10.1371/journal.pone.0205825.

18. Cohen J, Pfeiffer K, Francis JA. Warm Arctic episodes linked with increased frequency of extreme winter weather in the United States. *Nat Commun*. 2018;9(1):869. doi:10.1038/s41467-018-02992-9.

19. Despart Z, Serrano A, Lamm, S. Analysis reveals nearly 200 died in Texas cold storm and blackouts, almost double the official count. *Houston Chronicle*. https://www.houstonchronicle.com/news/houston-texas/houston/article/texas-cold-storm-200-died-analysis-winter-freeze-16070470.php. Published April 1, 2021. Updated April 2, 2021. Accessed October 22, 2021.

20. McLaughlin KA, Fairbank JA, Gruber MJ, et al. Serious emotion disturbance among youth exposed to Hurricane Katrina two years post-disaster. *J Am Acad Child Adolesc Psychiatry*. 2009;48(11):1069-1078. doi:10.1097/CHI.0b013e3181b76697.

21. Chowell G, Mizumoto K, Banda JM, Poccia S, Perrings C. Assessing the potential impact of vector-borne disease transmission following heavy rainfall events: a mathematical framework. *Philos Trans R Soc B Biol Sci*. 2019;374(1775):20180272. doi:10.1098/rstb.2018.0272

22. Liang SY, Messenger N. Infectious diseases after hydrologic disasters. *Emerg Med Clin North Am*. 2018;36(4):835-851. doi:10.1016/j.emc.2018.07.002.

23. Pacheco SE. Catastrophic effects of climate change on children's health start before birth. *J Clin Invest*. 2020;130(2):562-564. doi:10.1172/JCI135005

24. Watts N, Amann M, Arnell N, et al. The 2020 report of The Lancet Countdown on health and climate change: responding to converging crises. *The Lancet*. 2021;397(10269):129-170. doi:10.1016/S0140-6736(20)32290-X.

25. World Health Organization. Climate change and health. https://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health. Published February 1, 2018. Accessed October 22, 2021.

26. American Academy of Pediatrics Council on Environmental Health. Global climate change and children's health. *Pediatrics*. 2015;136(5):992-997. doi:10.1542/peds.2015-3232.

27. Levy BS, Patz JA. Climate change, human rights, and social justice. *Ann Glob Health*. 2015;81(3):310-322. doi:10.1016/j.aogh.2015.08.008.

28. Ragavan MI, Marcil LE, Garg A. Climate change as a social determinant of health. *Pediatrics*. 2020;145(5):e20193169. doi:10.1542/peds.2019-3169.

29. Centers for Disease Control and Prevention. Social determinants of health: know what affects health. https://www.cdc.gov/socialdeterminants/index.htm. Published May 6, 2021. Last reviewed September 30, 2021. Accessed October 22, 2021.

30. Reid K, Peer A. 2005 Hurricane Katrina: facts, FAQs, and how to help. *World Vision*. https://www.worldvision.org/disaster-relief-news-stories/2005-hurricane-katrina-facts. Published November 25, 2019. Accessed October 22, 2021.

31. American Psychiatric Association. How extreme weather events affect mental health. https://www.psychiatry.org/patients-families/climate-change-and-mental-health-connections/affects-on-mental-health. Accessed October 22, 2021.

32. Tait VF. Our children, our future: Why the AAP is leading on climate change and how pediatricians can help. https://www.youtube.com/watch?v=wyTkEp-GNq8. Published April 26, 2019. Accessed October 22, 2021.

33. Etzel RA, Balk SJ, eds. *Pediatric Environmental Health.* 4th ed. Itasca, IL: American Academy of Pediatrics; 2018.

34. Pediatric Environmental Health Specialty Units. About PEHSU. https://www.pehsu.net/. Accessed October 1, 2021.

35. American Academy of Pediatrics California Chapter 2. ABP MOC part 2 "climate change" module. https://aapca2.org/climate/. Accessed October 22, 2021.

36. Shah S. Climate change is here: a pediatrician's perspective on the public health crisis. *in-House*. https://in-housestaff.org/climate-change-is-here-1656. Published February 20, 2020. Accessed October 22, 2021.

37. Philipsborn RP, Sheffield P, White A, Osta A, Anderson MS, Bernstein A. Climate change and the practice of medicine: essentials for resident education. *Acad Med*. 2021;96(3):355-367. doi:10.1097/ACM.0000000000003719.

38. Rabin BM, Laney EB, Philipsborn RP. The unique role of medical students in catalyzing climate change education. *J Med Educ Curric Dev*. 2020;7:2382120520957653. doi:10.1177/2382120520957653.

39. Maibach E, Frumkin H, Ahdoot S. Health professionals and the climate crisis: trusted voices, essential roles. *World Med Health Policy*. 2021;13(1):137-145. doi:10.1002/wmh3.421.

40. Ragavan MI, Marcil LE, Philipsborn R, Garg A. Parents' perspectives about discussing climate change during well-child visits. *J Clim Change Health*. 2021;4:100048. doi:10.1016/j.joclim.2021.100048.

41. Lewandowski AA, Sheffield PE, Ahdoot S, Maibach EW. Patients value climate change counseling provided by their pediatrician: the experience in one Wisconsin pediatric clinic. *J Clim Change Health*. 2021;4:100053. doi:10.1016/j.joclim.2021.100053.

42. McCarthy C. How climate change affects children: AAP policy explained. https://healthychildren.org/English/safety-prevention/all-around/Pages/Climate-Change-Policy-Explained.aspx. Updated September 6, 2021. Accessed October 22, 2021.

43. Philipsborn RP, Cowenhoven J, Bole A, Balk SJ, Bernstein A. A pediatrician's guide to climate change-informed primary care. *Curr Probl Pediatr Adolesc Health Care*. 2021;51(6):101027. doi:10.1016/j.cppeds.2021.101027.

44. Shea KM. Global climate change and children's health. *Pediatrics*. 2007;120(5):e1359-e1367. doi:10.1542/peds.2007-2646.

45. Medical Society Consortium on Climate and Health. https://www.amwa-doc.org/wp-content/uploads/2017/08/Updated-Consortium-Mission-Roles-Responsibilities.pdf. Updated 2017. Accessed October 22, 2021.

46. American Academy of Pediatrics. AAP Chapter Climate Advocates. https://www.aap.org/en/patient-care/climate-change/aap-chapter-climate-advocates/. Updated June 15, 2021. Accessed October 22, 2021.

47. Chakradhar S. New pediatrician network puts spotlight on climate change's effects on children. *STAT*. https://www.statnews.com/2020/12/18/new-pediatrician-network-puts-spotlight-on-climate-changes-effects-on-children/. Published December 18, 2020. Accessed October 22, 2021.

48. CBSMiami.com Team. From asthma to premature births: pediatricians seeing impacts of climate change in children. https://miami.cbslocal.com/2021/02/08/pediatricians-seeing-impacts-climate-change-children/. Aired February 8, 2021. Accessed October 22, 2021.

49. Wyckoff AS. Pediatricians' voices grow louder on climate's impact on child health, equity. *AAP News*. Published April 22, 2021. Accessed October 22, 2021.

50. I Heart Climate Voices. Pediatricians' Rx: vote for climate leaders. https://medium.com/i-heart-climate-voices/pediatricians-rx-vote-for-climate-leaders-95455d369c98. Published October 7, 2020. Accessed October 22, 2021.

51. American Academy of Pediatrics. Transition plan: advancing child health in the Biden-Harris Administration. http://services.aap.org/en/advocacy/transition-plan-2020/. Accessed October 22, 2021.

52. Oregon State Legislature. Representative Lisa Reynolds. https://www.oregonlegislature.gov/reynolds. Accessed October 22. 2021.

53. California State Senate. Dr. Richard Pan. https://sd06.senate.ca.gov/. Accessed October 22, 2021.

54. Colorado General Assembly. Representative Yadira Caraveo. https://leg.colorado.gov/legislators/yadira-caraveo. Accessed October 22, 2021.

55. Ohio House of Representatives. Representative Beth Liston. https://ohiohouse.gov/members/beth-liston. Accessed October 22, 2021.

56. San Diego Pediatricians for Clean Air. Dr. Dan Spencer appointed as physician member of the San Diego County Air Pollution Control District, Hearing Committee. https://sdpediatriciansforcleanair.com/dr-dan-spencer-appointed-as-physican-member-of-the-san-diego-county-air-pollution-control-district-hearing-committee. Published July 24, 2021. Accessed October 22, 2021.

57. Yampa Valley Sustainability Council. Board Member Katie Durrwachter-Erno. https://yvsc.org/our-team/#ourboard. Accessed October 22, 2021.

58. Air quality flag program: coming to a school near you. Montana Health Professionals for a Healthy Climate Newsletter, Volume 9, June 2021. https://www.montanahphc.org/uploads/4/3/5/9/43591125/june_2021_newsletter.pdf Accessed October 22, 2021.

59. Arkansas Department of Health. State.health.assessment.2020: Arkansas's big health problems. https://drive.google.com/file/d/1TtRZQOcf5bUh2-Ed0NQfimkmdYeQBgvX/view?usp=sharing&usp=embed_facebook. Published 2020. Accessed October 22, 2021.

60. Brenner J, Smith A. 72% of online adults are social networking site users. Pew Research Center. https://www.pewresearch.org/internet/2013/08/05/72-of-online-adults-are-social-networking-site-users/. Published August 5, 2013. Accessed October 22, 2021.

61. Mothers & Others for Clean Air. Film: Planet prescription. https://www.mothersandothersforcleanair.org/planetprescription/. Accessed October 22, 2021.

62. Healthy Children. How can kids help stop climate change? http://radiomd.com/show/healthy-children/item/44558-how-can-kids-help-stop-climate-change. Aired April 20, 2021. Accessed October 22, 2021.

63. Moen M. WI doctors encouraged by Biden's environmental moves. Public News Service. https://www.publicnewsservice.org/index.php?/content/article/72946-1. Published January 27, 2021. Accessed October 22, 2021.

64. Georgia Clinicians for Climate Action. Top docs. https://www.facebook.com/watch/?v=256225472754453. Accessed August 14, 2021.

65. Kulus K, Mahowald J. Climate change Is making you sick. TEDx Talks. https://www.youtube.com/watch?v=ZuggeGR9kmI. Posted October 30, 2020. Accessed October 22, 2021.

66. Byron L. Another tool in the toolbox. PechaKucha Bozeman. https://www.youtube.com/watch?v=Awo3TLhu8bk. Posted May 17, 2019. Accessed October 22, 2021.

67. Saltzman H. Lesson from the pandemic is to prioritize clean air. *Salt Lake Tribune*. https://www.sltrib.com/opinion/commentary/2020/04/17/hanna-saltzman-lesson/. Published April 17, 2020. Accessed October 22, 2021,

68. Hendrickson D. *A Burning House: Children's Health in the Warming World*. https://www.aburninghouse.com. Accessed October 22, 2021.

69. Bechard E. *Parenting in a Changing Climate*. Schenectady, NY: Citrine Publishing; 2021.

70. Maher K. National Resource Defense Council Instagram. Published online August 4, 2020. https://www.instagram.com/p/CDfMsA8pwxd/. Published August 4, 2020. Accessed May 5, 2021.

71. Climate change is on the ballot. The PediaBlog. Published October 14, 2020. https://www.thepediablog.com/2020/10/14/climate-change-is-on-the-ballot/. Accessed August 14, 2021.

72. Dr. Plastic Picker–a personal plastic-picking blog: fighting ocean plastic pollution one piece at a time. https://drplasticpicker.com/. Accessed October 22, 2021.

73. The Aspiring Green Pediatrician. #ClimateChangesKidsHealth. https://crocodile-asparagus-dbly.squarespace.com. Accessed October 22, 2021.

74. San Diego Pediatricians for Clean Air. https://sdpediatriciansforcleanair.com/. Accessed October 22, 2021.

75. Pediatricians for Climate Action. https://www.pedsforclimateaction.org. Accessed October 22, 2021.

76. Macauley R, Elster N, Fanaroff JM, American Academy of Pediatrics Committee on Bioethics, Committee on Medical Liability and Risk Management. Ethical considerations in pediatricians' use of social media. *Pediatrics*. 2021;147(3):e2020049685. doi:10.1542/peds.2020-049685.