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# Protecting Children's Environmental Health in a Changing Climate: A Model Collaboration of the Maternal and Child Health Section and the Environment Section of APHA

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## Abstract

**Purpose** The complexities of modern civilization, coupled with challenges including systemic racism and climate change-related impacts, compel public health professionals to break down silos and collaborate towards the shared goals of protecting the wellbeing of current and future generations. This article highlights the growing collaboration between the Maternal and Child Health (MCH) and the Environment (ENV) Sections of the American Public Health Association (APHA) as members bring their collective focus to the protection of children's and pregnant people's environmental health.

**Description** The MCH Section and the Children's Environmental Health (CEH) Committee of the ENV Section are collaborating on efforts to: inform key stakeholders—including public health and health care professionals, child care professionals, families, and youth—about environmental hazards and climate change impacts to children's and pregnant people's health and wellbeing; and provide tools and guidance about how to best protect these groups and how to advocate for climate action. The CEH Committee embraces a health equity paradigm and intentionally centers environmental, racial, and social justice as integral to effective children's health and climate change initiatives.

**Assessment** Projects to date include multiple joint sessions about children's environmental health and climate change at APHA's annual meetings, publications and various children's environmental health tools and resources, including a toolkit and lesson plan that equips public health professionals to provide guest lectures at their local high schools on climate change and health, and educational materials for caregivers on extreme heat, wildfires, and ticks and mosquitos.

**Conclusion** This collaboration could serve as a replicable model that can be applied to other interdisciplinary efforts seeking strategic partnerships to address complex health issues.

## Significance

Children and pregnant people are especially vulnerable to environmental health hazards and climate change exacerbates these risks, posing a significant public health threat to children and future generations. Tackling these complex issues requires working across sectors and disciplines, including within the field of public health, towards systems change. The MCH and ENV Sections of APHA have been developing relationships and effective collaboration to improve children's health and address the climate crisis. This initiative may inspire and serve as a model for additional cross-section collaboration of public health professionals devoted to affecting transformative change for maternal and child health and health equity.

**Keywords** Children · Environmental health · Climate change · Maternal and child health · Environmental justice · Collaboration

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## Purpose

The world in which today's children live has changed tremendously from that of previous generations, driven by explosive growth in technology, globalization, population, and material goods. These developments were accompanied by continued expansion of built environments, industrialization of our food production, rapid increase in the manufacture, use, emissions, and disposal of man-made chemicals, increasing urbanization, and the increasing extraction and combustion of fossil fuels. These changes impact the environment and maternal and child health, especially in communities of color (Black, Indigenous, Latino/a/x, and Asian and Pacific Islander communities) and in low income and marginalized communities.

Environmental factors are not the sole contributors to a child's risk of disease. However, exposures to many environmental hazards are preventable, and the return on prevention investment in terms of health care costs, productivity, and co-benefits are significant, if not morally and ethically imperative. In addition, today's children face a future of increased health risks and uncertainty due to climate change. Climate change impacts increase environmental health threats and exacerbate environmental injustices and health disparities. In order to achieve meaningful improvements in health and wellness, public health professionals must find ways to collaborate to address complex intersectional issues across social and environmental determinants of health.

This article highlights a successful and replicable model of interdisciplinary, cross-sectional collaboration among members of the American Public Health Association (APHA). This partnership is yielding new insights and opportunities to fill research, practice, and policy gaps to protect the health of today's children and that of future generations.

## Children's Environmental Health in a Changing Climate

Advances in medicine, public health, and sanitation in the U.S. led to a significant decline in childhood infectious diseases, reduced maternal and infant mortality, and increasingly long life spans over successive generations (Perrin et al., 2014); although due to racist policies and systems, these measures lagged and continue to lag for people of color (Arias et al., 2022; Ely & Driscoll, 2022; Hoyert, 2022; Paterson & Witherspoon, 2022).

In addition, despite the overall advances, over the past 30–40 years, neurodevelopmental conditions and chronic diseases—such as cancer, diabetes, and chronic lung or

kidney disease—have been increasing among children (Child and Adolescent Health Measurement Initiative, 2020; National Cancer Institute, n.d.; Perrin et al., 2014). Chronic exposures to environmental hazards—such as pesticides, lead, ground level ozone, particulate matter, and endocrine-disrupting chemicals—increase the risks of adverse birth outcomes and adverse childhood health and developmental outcomes (American Academy of Pediatrics Council on Environmental Health [AAP COEH], 2019; U.S. Environmental Protection Agency [EPA], 2017). Children are at increased risk of exposure to, and harm from, certain environmental hazards due to their unique physiological and behavioral traits and circumstances (AAP COEH, 2019, Chap. 3).

Children and pregnant people of color, and who live in under-resourced communities, face increased risk of harmful exposures because they are more likely to live near major roadways with high levels of traffic-related air pollution, polluting industrial facilities, and hazardous waste sites. They are also more likely to live in substandard housing and attend or work at child care facilities and schools with health and safety concerns, such as mold, poor indoor air quality, and lead-based paint hazards. Furthermore, despite the overwhelming evidence that demonstrates the significant physical and mental health benefits of being outdoors in nature, children of color and children from families with low income disproportionately lack access to safe, green spaces (American Public Health Association [APHA], 2013).

The segregation and disinvestment in communities of color result in lack of resources and social supports, reduced opportunity, and increased stress, which compound these environmental harms. These vulnerabilities are heightened by the myriad impacts associated with climate change, a global phenomenon that disproportionately threatens the youngest and poorest children and families (Patz et al., 2007; Zhang et al., 2007). Climate change directly harms children via injury, death, displacement, and mental health struggles from the rising heat index, extreme weather, and other climate-related disasters. In addition, the impacts of climate change increase air and water pollution, soil contamination, and infectious diseases (Perera & Nadeau, 2022). People of color and people living in poverty disproportionately shoulder the burdens of climate change, and the intergenerational inequities (Thiery et al., 2021) are a stark wake up call for urgent, aggressive, and equitable climate action to protect children's health.

## Maternal and Child Health (MCH) and Environment (ENV) Sections' History of Work and Collaboration on Children's Environmental Health

The Maternal and Child Health (MCH) Section was established in 1921 to support research, programs and policies that improve the health and wellbeing of women, children and youth. The Section has a longstanding interest in environmental issues, including childhood lead and other poisonings, Superfund site contamination, radiation and nuclear war, secondary smoke exposure, and maternal occupational exposures. They have supported five APHA statements on lead exposure adopted over a thirty-year period (APHA 1989, 1990, 1997, 2005, 2008).

In 1995 the chair of the MCH Section, Dr. Deborah Klein Walker, in dialogue with leadership of the Environment (ENV) Section, led efforts to establish an Environmental Issues in MCH Committee within the MCH Section. Originally chaired by a MCH Section member, the Committee later had an ENV Section member as co-chair. In the same year both sections participated in the passage of the APHA resolution, *Environment and Children's Health* (APHA, 1995), and the Needleman Award was established. This award, sponsored by the MCH Section and The Alliance to End Childhood Lead Poisoning, was initiated in honor of Dr. Herbert L. Needleman, a pediatrician, researcher, and public health advocate whose groundbreaking efforts linked environmental lead exposure to cognitive deficits in children. The award recognized public health advocates who led efforts to protect children from environmental lead exposure and was presented at the APHA Annual Meeting between 1995 and 1999. After that, the MCH Section did not prioritize environmental issues until 2016 when the newly established Children's Environmental Health Committee of the Environment Section invited the section to collaborate.

The Environment (ENV) Section, born in 1911, is a community for public health professionals working to create, restore, and sustain healthy environments for all through research, practice, and advocacy. The section aims to: advance the field of environmental health as a vital component of public health; engage in equitable partnerships to address environmental racism; support the public in their ability to find, understand, and use environmental health science; and advocate for scientifically informed programs and policies that protect environmental health and promote environmental justice. Children's environmental health has been an integral part of the section's overall environmental health efforts. To further increase these efforts, in late 2015 several members formed the Children's Environmental Health (CEH) Committee. The founding members felt that this was timely considering the upcoming 20th

anniversary of Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks, which requires all federal agencies to assign a high priority to addressing health and safety risks to children, coordinate research priorities on children's health, and ensure that their standards consider special risks to children.

The CEH Committee's mission is to increase awareness and promote collaborative efforts aimed at reducing environmental risks to children's health in areas where they live, learn, play, and work; it includes in the definition of children's environmental health the exposures and outcomes across the stages of preconception, prenatal, infancy, early childhood, and youth. The committee upholds the values of diversity, equity, justice, accessibility, and inclusion in all activities. The Committee developed an APHA policy statement, *Protecting Children's Environmental Health: A Comprehensive Framework* (APHA, 2017), to help inform and mobilize coordinated preventive efforts of agencies, public health practitioners, policymakers, community-based and environmental justice organizations, health economists, communication leaders, and researchers. The policy statement is the first in APHA's database to describe children's health specifically and comprehensively in relation to their environment, and it provides solution-oriented strategies that address environmental injustices and health disparities and emphasizes the importance of the partnerships required to meet them.

In keeping with its mission statement and the 2017 children's environmental health policy statement, the ENV Section's CEH Committee is deeply committed to engaging other partners in this cross-cutting topic, and its strategic plan identified the MCH Section as its priority partner. In 2016 the committee founder and chair, Leyla McCurdy, reached out to the MCH Section chair, Dr. Deborah Allen, who welcomed the opportunity to partner. The MCH Section endorsed the CEH Committee's APHA policy statement, and they agreed to host the first MCH-ENV Sections' joint session, titled *Children at Risk: A Life Course Approach to Environmental Hazards*, at the 2017 APHA Annual Meeting (Etzel et al., 2017). The MCH and ENV Section chairs co-moderated the session. Thereafter, several MCH Section members joined the CEH Committee. The MCH Section also included environment issues as one of its three priority topics in its strategic plan in 2017.

Members of both sections continued to collaborate, and organized additional joint scientific sessions for APHA's Annual Meetings over the period 2019 to 2022: *Protecting Our Children: Climate Change, Children's Health and Equity* (Tait et al., 2019), *Deregulation and Inaction Harm Children First: How to Shift the Paradigm to Prioritize Children and Future Generations* (Reed et al., 2020), *The Year of Living Dangerously: Climate Justice and Children's*

Health (Bole et al., 2021), and Climate Justice and Children's Health: Inspiring Youth to Advocate for Climate Action (Witherspoon et al., 2022). In addition, during the 2022 Annual Meeting the CEH Committee organized a joint ENV-MCH Sections' networking and engagement meeting, Coffee Talk - What's Next in Advancing Children's Environmental Health. Links to the descriptions of these joint sessions can be found on the CEH Committee website (<https://bit.ly/APHA-CEH>).

The CEH Committee has been very active since its inception, including holding monthly full committee meetings and meetings of the project workgroups, which have led to the development of several fact sheets and a variety of other resources and a committee website where the materials are housed. One workgroup focuses on integrating children's environmental health into health professionals' curriculum and practice. Members of this workgroup, with input from the full CEH Committee, created and published critical competencies in children's environmental health (Del Rio et al., 2023). The workgroup is currently developing performance indicators which, along with the competencies, will be presented at the 2023 APHA Annual Meeting, as an ENV-MCH Sections' joint session.

The CEH Committee accomplishes these results due to the active participation of its members from both the MCH and ENV Sections, some of whom belong to both sections. To further enhance this collaboration and expand the cross-sectional work, members representing both sections formed a workgroup and launched an initiative called the *ENV and MCH Cross-Section Collaboration to Advance Children's Environmental Health*. The workgroup organized a series of cross-section meetings between November 2021 and April 2022 to build relationships and identify common interests so they could plan future projects together. The participants discussed action steps to increase engagement of the MCH Section and ENV Section members in cross-section activities and to stimulate innovative collaborations among them to address children's environmental health issues. During these meetings, a strong cross-cutting interest in the impacts of climate change to children's health and pregnant people emerged as the framework for further collaborative activities, and participants explored a wide range of ideas for possible action steps. Building on the feedback from the meeting participants, the ENV-MCH cross-section workgroup conducted a needs assessment to identify the gaps in the field of climate change with respect to maternal and children's health, identified two focus areas ripe for cross-sectional collaboration, and initiated two projects.

The first project is titled *Climate Change and Youth Education*. Its purpose is to disseminate and support APHA's *Climate & Health Lesson Plan for Grades 9–12*, which was developed by ENV members and is based on the existing

curriculum created by the National Institute of Environmental Health Sciences (NIEHS, 2016). The project team developed a collection of tools to encourage use of the lesson plan, including resources designed to: promote the lesson plan; recruit public health professionals to serve as guest speakers at their local high schools; assist public health professionals with reaching out to schools and teachers; facilitate effective implementation of the lesson plan; and provide follow-up actions and activities for public health professionals who implement the lesson plan. The CEH Committee partnered with the APHA Center for Climate, Health, and Equity (CCHE) to launch the Climate and Health Youth Education Toolkit on its webpage (<https://apha.org/Topics-and-Issues/Climate-Change/Education>) in March 2023, and organize a webinar titled *Climate Justice and Children's Health: Inspiring Youth to Advocate for Climate Action*, featuring the toolkit. The CEH Committee and CCHE are continuing collaboration to engage the public health community and a wide range of partners to educate and inspire youth about actions they can take to protect themselves and their communities from health impacts of climate change. Their work will be presented at the 2023 Annual Meeting at a session organized by the CEH Committee and APHA's CCHE.

The second project was titled *Climate Change Advocacy*. The project team develops and shares tools for public health professionals and other community stakeholders that include key advocacy and action steps to address climate change and children's and pregnant people's health. The team identified a gap in educational materials, particularly for early care and education/child care providers, and they developed fact sheets for this audience about relevant topics, including extreme heat and ticks and mosquitos. Members also developed a fact sheet for caregivers about wildfires and children's health. These tools are important because many caregivers and stakeholders are passionate about advocating for children's health. These tools equip them to become advocates for climate action and environmental health and justice strengthening those movements and mitigating anxiety through empowerment.

The CEH Committee website hosts the tools and resources developed from both of these projects. The project teams also share the resources with the APHA community through multiple avenues, including posting to APHA's online community platform (LEAD), securing coverage in APHA's monthly newspaper (The Nation's Health), and presenting and performing outreach to public health professionals attending the 2022 APHA Annual Meeting. They also share the resources through the CEH Committee members' wide network of partners, and developed digital media campaigns for broader dissemination. Colleagues have provided positive and enthusiastic feedback. Several new MCH

and ENV Section members joined the CEH Committee and the project teams after learning about the efforts.

The CEH Committee members, its workgroups, and the project teams continue to meet and expand their membership and goals. They focus on dissemination of their existing resources, development of new materials, and continued collaboration to adapt and address emerging children's environmental health issues relevant to both sections.

## Discussion

The ENV-MCH cross-section collaboration has been productive in bringing two sections together to work collaboratively towards a shared mission. Since children's environmental health is a cross-cutting topic, this approach can be used to engage other APHA sections in the CEH Committee's initiative. The approach can also serve as a model for other such interdisciplinary collaborations. The APHA Intersectional Council's Climate and Health Committee already recognizes it as such and invited Leyla McCurdy to present it as a model for cross-section climate and health activities at their roundtable session organized for APHA's 2022 Annual Meeting.

Several factors have contributed to the success of this cross-section collaboration, one of which is a core group of leaders who are passionate and committed to serve as champions in a sustained manner. These leaders have been successful in making the case by presenting evidence-based information and earning the trust of the leadership and the membership of both sections and beyond. In addition, these leaders are experienced conveners who listen to members, engage them in children's environmental health priorities that resonate with them, and encourage them to lead projects, while mentoring and supporting them. Mentoring other members, especially early career professionals, has been critically important for the sustainability of the committee, the committee's initiatives, and the cross-section membership engagement and expansion.

The CEH Committee leaders are continuously recruiting new members. Members address the challenges of maintaining an active and efficient membership via multiple strategies, including leveraging existing APHA outreach mechanisms, providing mentorship and leadership opportunities to early career professionals, optimizing team size and workload distribution, aligning projects with members' existing work, leveraging synergies between current projects, and establishing regular meetings to strengthen relationships.

A number of members serve on multiple project teams, and the teams are kept abreast of each other's efforts. This regular and open communication facilitates natural

synergies between the projects to maximize efficiency and to cross-catalyze their work. For example, the *Climate Change Advocacy* team will develop fact sheets that are relevant to youth, which can be incorporated with the Climate & Health Youth Education Toolkit for high school students. Coordination across projects not only deepens the meaningful impacts of both teams, but it also increases the potential for more networking among members.

The CEH Committee is the only APHA committee that has its own website, where workgroup leaders can quickly post completed resources in one convenient and publicly accessible location. The ENV web page on APHA's website links to the CEH Committee website. This link validates the committee's work and helps to drive more visitors to the site.

## Conclusion

Children's health is a shared value because children's environmental health is everyone's health. APHA created Generation Public Health, a movement working towards a vision of creating the healthiest nation in one generation. To achieve this vision, public health professionals across all APHA sections, special primary interest groups, and caucuses should adopt a maternal and children's environmental and climate health lens, one that aggressively works to eliminate root causes of health disparities—racism, poverty, and other forms of structural marginalization.

Meaningful progress requires funding, capacity, a trained workforce, engaged leaders, the political will to establish and promote protective policies, and innovative collaborations, such as the one the authors present in this article. More partnerships, both within public health and across sectors, will promote the systems-level changes needed to reduce environmental and climate change-related health harms and provide all people with an equal chance at a healthy and rewarding life.

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## References

- American Public Health Association (1989). Reducing Health Risks Related to Environmental Lead Exposure [policy statement]. <https://www.apha.org/Policies-and-Advocacy/Public-Health-Policy-Statements/Policy-Database/2014/07/29/12/59/Reducing-Health-Risks-Related-to-Environmental-Lead-Exposure>.
- American Academy of Pediatrics Council on Environmental Health (2019). Children's unique vulnerabilities to environmental hazards. In R. A. Etzel & S. J. Balk (Eds.), *Pediatric Environmental Health* (4th ed., pp. 17–31).
- American Public Health Association (2017). *Protecting children's environmental health: A comprehensive framework* [policy statement]. <https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2018/01/23/protecting-childrens-environmental-health>.
- American Public Health Association (2013). *Improving health and wellness through access to nature* [policy statement]. <https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/08/09/18/improving-health-and-wellness-through-access-to-nature>.
- American Public Health Association (2008). Calling for a Global Ban on Lead Use in Residential Indoor and Outdoor Paints, Children's Products, and All Nonessential Uses in Consumer Products [policy statement]. <https://www.apha.org/Policies-and-Advocacy/Public-Health-Policy-Statements/Policy-Database/2014/07/24/14/45/Calling-for-a-Global-Ban-on-Lead-Use-in-Residential-Indoor-and-Outdoor-Paints>.
- American Public Health Association (2005). Protecting Children from Overexposure to Lead in Candy and Protecting Children by Lowering the Blood "Level Of Concern" Standard [policy statement]. <https://www.apha.org/Policies-and-Advocacy/Public-Health-Policy-Statements/Policy-Database/2014/07/09/15/15/Protecting-Children-from-Overexposure-to-Lead-in-Candy>.
- American Public Health Association (1997). Responsibilities of the Lead Pigment Industry to Support Efforts to Address Lead Poisoning [policy statement]. <https://www.apha.org/Policies-and-Advocacy/Public-Health-Policy-Statements/Policy-Database/2014/07/08/17/55/Responsibilities-of-the-Lead-Pigment-Industry-to-Support-Efforts-to-Address-Lead-Poisoning>.
- American Public Health Association (1990). Occupational Lead Poisoning [policy statement]. <https://www.apha.org/Policies-and-Advocacy/Public-Health-Policy-Statements/Policy-Database/2014/07/07/14/25/Occupational-Lead-Poisoning>.
- Arias, E., Tejada-Vera, B., Kochanek, K. D., & Ahmad, F. B. (2022). Provisional life expectancy estimates for 2021. *Vital Statistics Rapid Release; no 23*. <https://doi.org/10.15620/cdc:118999>. National Center for Health Statistics.
- Bole, A., Witherspoon, N.O., Sifuentes, J., York, M., Abbinett, J. (2021, October). The Year of Living Dangerously: Climate Justice and Children's Health. [Collaborative Session]. *American Public Health Association Annual Meeting and Expo*, Denver, Colorado, U.S. <https://apha.confex.com/apha/2021/meetingapp.cgi/Session/64734>.
- Child and Adolescent Health Measurement Initiative (2020). [Indicator 1.9: Number of current or lifelong health conditions, nationwide] [National Survey of Children's Health 2020]. Data Resource Center for Child and Adolescent Health supported by the U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau (MCHB). Retrieved August 21, 2022, from <https://www.childhealthdata.org/>.
- Del Rio, M., Lasley, P., Kauth, T. L., Bare, J. M., McCurdy, G., L. E., & Etzel, R. (2023). Critical competencies in children's environmental health. *Journal of Environmental Health*, 85(6), 26–29.
- Ely, D. M., & Driscoll, A. K. (2022). Infant mortality in the United States, 2020: Data from the period linked birth/infant death file. *National Vital Statistics Reports, 71 no 5*, <https://doi.org/10.15620/cdc:120700>. National Center for Health Statistics.
- Etzel, R., Rubin, L., Gray, K., Lichtveld, M. (2017, November). Children At Risk: A Life Course Approach to Environmental Hazards [Collaborative Session]. *American Public Health Association Annual Meeting and Expo*, Atlanta, Georgia, U.S. <https://apha.confex.com/apha/2017/meetingapp.cgi/Session/52012>.
- U.S. Environmental Protection Agency (2017). *NIEHS/EPA Children's Environmental Health and Disease Prevention Research Centers Impact Report: Protecting children's health where they live, learn, and play* (EPA Publication No. EPA/600/R-17/407). [https://www.epa.gov/sites/default/files/2017-10/documents/niehs\\_epa\\_childrens\\_centers\\_impact\\_report\\_2017\\_0.pdf](https://www.epa.gov/sites/default/files/2017-10/documents/niehs_epa_childrens_centers_impact_report_2017_0.pdf).
- Hoyert, D. L. (2022). Maternal mortality rates in the United States, 2020. *National Center for Health Statistics Health E-Stats*. <https://doi.org/10.15620/cdc:113967>.
- National Cancer Institute. (n.d.). *Surveillance Epidemiology and End Results Program. SEER\*Explorer*. All Cancer Sites Combined, Long-Term Trends in US Cancer Incidence, 1975–2019, All Races (including Hispanic), Ages < 20. Retrieved September 3 (2022). from <https://seer.cancer.gov/statistics-network/explorer/application.html>.
- National Institute for Environmental Health Sciences (2016). A student exploration of the impacts of climate change on human health in the United States. Retrieved April 10, 2023, from <https://www.niehs.nih.gov/health/scied/teachers/cchh/index.cfm>.
- Patterson, J., & Witherspoon, N. O. (2022). *The racism that upends the cradle: Black children caught in the syndemic crosshairs. The Chisholm Legacy Project* & Children's Environmental Health Network. <https://cehn.org/our-work/environmental-justice/racism-that-upends-the-cradle/>.
- Patz, J. A., Gibbs, H. K., Foley, J. A., Rogers, J. V., & Smith, K. R. (2007). Climate change and global health: Quantifying a growing ethical crisis. *Ecohealth*, 4(4), 397–405. <https://doi.org/10.1007/s10393-007-0141-1>.
- Perera, F., & Nadeau, K. (2022). Climate change, fossil-fuel pollution, and children's health. *New England Journal of Medicine*, 386(24), 2303–2314. <https://doi.org/10.1056/nejmra2117706>.
- Perrin, J. M., Anderson, L. E., & Van Cleave, J. (2014). The rise in chronic conditions among infants, children, and youth can be met with continued health system innovations. *Health Affairs*, 33(12), 2099–2105. <https://doi.org/10.1377/hlthaff.2014.0832>.
- Reed, G., Sullivan, M., Witherspoon, N.O., Koman, P. Woodruff, T.J. (2020, October). Deregulation and inaction harm children first: How to shift the paradigm to prioritize children and future generations. [Virtual Collaborative Session]. *American Public Health Association Annual Meeting and Expo*. <https://apha.confex.com/apha/2020/meetingapp.cgi/Session/61146>.
- Thiery, W., Lange, S., Rogel, J., Schlessner, C. F., Gudmundsson, L., Seneviratne, S. I., Andrijevic, M., Frieler, K., Emanuel, K.,

- Geiger, T., Bresch, D. N., Zhao, F., Willner, S. N., Büchner, M., Volkholz, J., Bauer, N., Chang, J., Ciais, P., Dury, M., & Wada, Y. (2021). Intergenerational inequities in exposure to climate extremes. *Science*, *374*(6564), 158–160. <https://doi.org/10.1126/science.abi7339>.
- Tait, V.F., Wilson, S, Mahmud, S. (2019, November). Protecting our children: Climate change, children’s health and equity. [Collaborative Session]. *American Public Health Association Annual Meeting and Expo*, Philadelphia, Pennsylvania, U.S. <https://apha.confex.com/apha/2019/meetingapp.cgi/Session/58586>.
- Witherspoon, N.O., McCurdy, L., Canate, T., Matta, N. (2022, November). Climate Justice and Children’s Health: Inspiring Youth to Advocate for Climate Action. [Collaborative Session]. *American Public Health Association Annual Meeting and Expo*, Boston, MA, U.S. <https://apha.confex.com/apha/2022/meetingapp.cgi/Session/65890>.
- Zhang, P., & Hiller, J. E. (2007). Climate change and disability-adjusted life years. *Journal Of Environmental Health*, *70*(3), 32–36.

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