



Position paper

Responding to the Impact of Climate Change on Adolescent and Young Adult Health: A Position Paper of the Society for Adolescent Health and Medicine and the International Association for Adolescent Health

Society for Adolescent Health and Medicine and the International Association for Adolescent Health

Keywords: Climate change; Adolescent health; Young adult health; Environmental justice; Youth advocacy; Health professional advocacy; Equitable climate strategies; Sustainable development goals

ABSTRACT

The Society for Adolescent Health and Medicine and the International Association for Adolescent Health recognize that climate change impacts multiple dimensions of health and well-being for adolescents and young adults. According to the World Health Organization, climate change is one of the top 10 health threats facing humanity. No aspect of adolescent health is spared from the consequences of climate change: food and housing insecurity, heat-related morbidity and mortality, water-borne diseases, infectious diseases, including sexually transmitted infections and HIV, mental health disorders, gender-based violence, conflict, internal displacement, and migration are all impacted. Vulnerable populations, such as adolescents and young adults, and those living in lower- to middle-income countries and environmental justice communities, are the ones whose health will be most affected. The Society for Adolescent Health and Medicine and the International Association for Adolescent Health call for urgent action in alignment with the United Nations Sustainable Development Goals and the Convention on the Rights of the Child to avert the irreversible consequences of climate change. Health professionals and health-care organizations can and should help lead global climate action along with youth, supporting mitigation and adaptation strategies that protect young people. Adolescent health professionals and organizations must advocate for climate justice and equitable resources, urge health systems to mitigate their adverse impacts on the environment, advocate for health organizations to focus on green investments, be leaders in climate education of the next generation of adolescent health professionals, and focus research on equitable strategies to reduce climate harms.

© 2024 Society for Adolescent Health and Medicine. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

Society for Adolescent Health and Medicine (SAHM) and International Association for Adolescent Health (IAAH) Positions

1. An accountable rights-based approach to prevention, mitigation, and adaptation must be the essential framework for achieving global climate change goals.

2. Policy makers and health systems must ensure that youth whose lives are disrupted by climate events have access to services necessary to ensure their health and well-being.
3. International, national, and regional adolescent health and medicine organizations must engage in urgent advocacy on climate change. Collaboration with youth-led organizations and a focus on health, equity, and justice are essential components of this advocacy.
4. Health facilities and health systems must minimize their adverse climate impact and promote sustainable health-care delivery and working environments.

International Association for Adolescent Health.

Conflicts of Interest: The authors have no conflicts of interest to disclose.

5. Professional health-care membership organizations, as well as entities that employ health professionals who care for adolescents and young adults (AYA), should pursue environmentally responsible investment strategies.
6. Health professionals must have training and education on climate change and its impact on adolescent and young adult health.
7. Further research is needed to identify effective and equitable strategies to support climate-related solutions that minimize adverse health effects for AYA.

Methods

This position paper was based on a comprehensive review of the scientific literature, review of existing practice guidelines for education, and a consensus opinion among the international multidisciplinary group of expert coauthors. Drafts of the positions and the paper were reviewed by youth consultants. The paper was further reviewed and approved by the International Association for Adolescent Health (IAAH) Council and by the Society for Adolescent Health and Medicine (SAHM) Board of Directors.

Statement of the problem

Due to human activity, global temperatures have reached $>1^{\circ}\text{C}$ above preindustrial levels, leading to environmental and climate changes posing immediate and worsening threats to human health, well-being, and survival [1,2]. Climate change affects people of all ages, but AYA are at particular risk during a critical time in their biological, emotional, and social development. Today's AYA will experience a seven-fold increase in climate events, such as heat waves, flooding, and droughts, in their lifetime [3]. In the setting of widespread environmental injustice, the impact of these events will not be felt equally: many youth live in areas less resilient to natural disasters and have fewer resources to adapt and respond to such traumatic disruptions. Climate change can thus act as a threat multiplier, especially for those with chronic or pre-existing conditions, adversely affecting the health of the most vulnerable AYA.

Health effects of climate change for AYA have been documented extensively by international scientific bodies and governmental agencies [4–6]. These include adverse effects on AYA mental health, increased incidence of infectious disease, deleterious implications for reproductive health, increases in heat-related and respiratory illness, and deteriorating nutritional status due to food and water insecurity and diminished supplies. Climate change undermines other aspects of AYA well-being including connectedness, positive values, and contributions to society; safety and supportive environments; learning, education, and employability; and agency and resilience [3].

One of the top three causes of mortality in AYA is accidents. AYA have the potential to experience accidental injury due to increasingly frequent severe climate events. AYA can experience unintentional injuries from heat-related events, such as drownings, and/or intentional events, such as assault or suicide [7]. AYA living in areas where there is limited green space, and limited access to water, are especially vulnerable due to urban heat island effects [8]. Heat-related mortalities have been well-documented. Increases in temperature, prolonged elevation of

temperatures, and worsening of air quality have led to more asthma exacerbations and allergic symptoms [9]. Air pollution is a mix of hazardous substances, both human made and natural, and has a significant negative impact on AYA health. Particulate matter 2.5 has been noted to reduce lung function in AYA, which in turn affects lung health in adulthood [10].

Climate change has a significant impact on the psychological health and well-being of AYA as well. AYA experience significant increases in post-traumatic stress disorder, anxiety, and depression after climate disasters. Extreme weather events not only evoke negative feelings of distress and helplessness but can exacerbate other mental health illnesses [11].

Climate impacts can be intensified depending on people's race, ethnicity, income, migration and/or refugee status, and geographic location. The effects of climate change can vary depending on where AYA live and the extent to which they experience inequities, such as fragile infrastructure, lack of access to high quality health care, and poverty [12]. Marginalized groups and those living in lower- to middle-income countries (LMIC), are often living in areas that have contributed least to global warming, are already suffering from structural injustices, such as poverty, racism, and harmful policies, which are worsened by climate change, exacerbating existing disparities. As effects of climate change become more extreme, millions of young people may be exposed to conflict, forced to migrate, or become refugees, leaving them less connected to their communities, more stressed, and vulnerable to additional harms to their health and well-being [2]. Immediate action to slow or halt climate change can mitigate and avert the consequent health harms.

The Intergovernmental Panel on Climate Change has stated “The severity of climate-related health risks is dependent on how well health systems and professionals can protect people”[4]. Recognizing that climate change affects multiple dimensions of health and well-being for AYA, SAHM, and IAAH adopt the following positions calling for urgent action to address the climate crisis.

Position 1: An Accountable Rights-Based Approach to Prevention, Mitigation, and Adaptation Must be the Essential Framework for Achieving Global Climate Change Goals

The United Nations Sustainable Development Goals (SDGs), UN Convention on the Rights of the Child, and the UN Conference of Parties (COP) all provide rights-based and global health frameworks for addressing climate change priorities. The frameworks call for all nations to achieve accountable goals and to address disparities and inequities within their countries. They include economic, environmental, and social dimensions of sustainable development. Nearly every SDG goal is affected by, and has an impact on, climate change with implications for mitigation and adaptation strategies [13,14].

The Convention on the Rights of the Child has explicitly protected the rights of children and adolescents (0–18 years) since its adoption in 1989 [13,14]. Human rights frameworks have been proposed for climate negotiations, as these strategies bring attention to standards of ethical behavior and individual welfare against which nations' actions can be evaluated and held accountable. However, global climate change has threatened progress toward goals for children's rights and for global health

and well-being [14,15]. COP28, the official COP of the United Nations Framework Convention on Climate Change, was momentous in organizing its first ever Health Day and Climate-Health Ministerial meeting, prioritizing health in the climate negotiations and highlighting the interdependence of climate action and SDGs [16]. Using the SDGs and human rights frameworks to formulate climate change policies would prioritize preservation of current and future AYA health, well-being, and safety.

Position 2: policy makers and health systems need to ensure that youth whose lives are disrupted by climate events have access to services necessary to support their health and well-being

The lives of AYA in environmental justice (EJ) communities (countries and communities with low- and lower-middle-income economies, indigenous communities, and/or communities of color) are disproportionately disrupted by climate change events [17]. Root causes of climate-related vulnerabilities, such as racial bias/discrimination (red-lining policies), economic inequality, unequal political power and access, legacy pollution (factories and/or landfill sites built near and in communities of color), resource extraction and colonial legacies, and community resilience, must be addressed [17]. To address existing vulnerabilities, a framework is needed that incorporates both climate resiliency and EJ in climate change and health policies. Climate resiliency is the ability to prepare for, protect against, and recover from the impacts of climate-related events; EJ represents fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws and policies [18]. Governments and health systems contribute to cumulative impacts of environmental pollutants found in EJ communities and have an important role to play in regulation of those impacts [19]. Multiple strategies should include climate-specific financial aid, increased funding and technical assistance for mitigation and adaptation initiatives for national health systems in LMIC, accountability for and action to immediately reduce excess emissions especially in higher-income countries, and meaningful collaboration with EJ populations [19]. Successful mitigation and adaptation in the LMIC and EJ communities require global solidarity in recognizing the interconnectedness of all countries and the need for everyone to act.

Climate change is an important contributor to forced internal and international migration. The complex mechanisms by which climate change can affect migration vary depending on geographic, cultural, political, and social context. AYA who are ethnic minorities, are living in EJ communities, and/or are living in conflict zones are already at higher risk of exposure to negative health impacts, including exploitation, child or early marriage, lack of access to health-care services, disruptions in their family unit, and disruptions in education. Climate change can further exacerbate these existing disparities, increasing negative health consequences for AYA and preventing them from achieving their full potential [20].

AYA forced to leave their country to escape war, persecution, and natural disaster, are internationally known to be “refugees” and deserve special consideration when developing climate change and health policies; however, there is inadequate formal recognition and support for the climate-related nature of their

migration. Although the Global Compact for Safe, Orderly, and Regular Migration offers a framework for handling climate migration, the 1951 Refugee Convention and its 1967 Protocol does not define a specific category of “climate refugees” or “climate migrants” for individuals forced to leave their countries due to climate change [21–23]. The convention’s lack of clarity related to health and environmental factors and its weak enforcement mechanism have led to uncertainty concerning its applicability to individuals forced to migrate due to climate change. In the absence of clear legal protections, governments, international organizations, and health-care organizations must develop best practices that respond to changing human settlement patterns associated with climate change [24]. Multi-stakeholder engagement and collaboration is necessary to invest in and build resilient communities and health systems that will protect AYA health. Community organizations, civil society groups, nongovernmental organizations, and local as well as national government health ministries need to collaborate to develop international protocols that address forced migration, protecting AYA rights to safety and health.

Position 3: international, regional, and national adolescent health and medicine organizations must engage in urgent advocacy on climate change. Collaboration with youth-led organizations and a focus on health, equity, and justice are essential components of this advocacy

Health-focused organizations must urgently engage in advocacy to address climate change and collaborate with and support AYA in doing so. Leading medical organizations, including the American Academy of Pediatrics and the American Medical Association, have committed to fighting climate change; more than 200 health journals have called on governments to take urgent action [6,25,26]. It is incumbent upon all health-care groups to bring the force of their advocacy to bear—via legislation, regulation, news outlets, social media, and marketing—to achieve adoption and implementation of climate-related policies to protect the health and well-being of AYA across the globe. Policies should incorporate a restorative justice perspective and support increased use of green energy and decreased use of fossil fuels.

AYA are at the forefront of climate advocacy and provide valuable insight into their generation’s experience. Globally, youth are using public protest campaigns and lawsuits to challenge governments to protect their rights to health and a healthy environment [27,28]. Their voice is essential to holistically address the climate crisis [27]. AYA organizations, such as the UN Climate Change Conference of Youth, Fridays for Future, Earth Uprising, Climate Is Health Campaign, and Re-Earth Initiative, have led calls for action internationally, nationally, and regionally. They have adopted a human rights approach in tackling the climate crisis, centered on ideas of justice and equity [27,29].

Meaningful engagement and funded participation of AYA in high-level discussions and roles is necessary when developing policies and programs [27,30]. AYA representation should also include youth living in the LMIC and in EJ communities. The United Nations Youth Advisory Group for Climate Change is an example of AYA participation at a high level in developing climate change policies. The advisory group was created under the patronage of the UN Secretary General, creating the first ever system-wide youth strategy, which serves as a mechanism for the Secretary General to hear youth perspectives and

recommendations focused on accelerating the climate action agenda [31].

It is important to advocate for climate-related disclosure and education for all stakeholders, especially AYA in high-risk settings, to help them recognize, process, and respond to climate change risks and opportunities. Health-care professionals can help AYA creatively express their concerns, overcome traumas, and develop climate change solutions through multiple platforms accessible to and focused on AYA [27]. Governments and community organizations can provide funding and other resources to support AYA and AYA-based organizations using their voices to protect their health and their environment.

Position 4: all health systems must minimize their adverse climate impact and promote sustainable health-care delivery and working environments

The health-care sector is a large contributor to climate change and should play a major role in climate mitigation efforts. Globally, the sector produces 4.4%–4.6% of greenhouse gases, employs 170 million workers, represents 10% of world gross domestic product, and spends \$8 trillion a year [32–34]. Implementing decarbonization in such a large sector requires leadership, alignment, and collaboration with global climate efforts. International organizations, such as the World Health Organization, the Pan American Health Organization, the COP meetings, and the World Bank have called upon health infrastructure, including health ministries and facilities, to be more sustainable and use greener technologies [35–38]. Over 60 countries and many international organizations made commitments to climate resilient and low-carbon health systems [39]. Organizations, such as World Health Organization; the National Academies of Sciences, Engineering, and Medicine in the US; the National Health Service in the UK; and HealthCare Without Harm, a nonprofit, international advocacy organization, have built frameworks to achieve these goals based on the Greenhouse Gas Emissions protocol, an international standard for corporate accounting and reporting of emissions [36,40,41]. Strategies for sustainable health care include using 100% clean, renewable energy; zero emissions buildings and infrastructure; zero emissions, sustainable transport, and travel; support for climate-resilient agriculture and sustainably grown, healthful foods; low-carbon pharmaceuticals; sustainable waste management; and greater health system effectiveness [40,41].

Recognizing that health care is a contributor to climate change, which is adversely impacting AYA health, and acknowledging that health care has an ethical imperative to protect AYA health are essential to decarbonization.

Position 5: professional health-care membership organizations, as well as entities that employ health professionals who care for AYA, should pursue environmentally responsible investment strategies

More than 1,500 entities representing more than \$40 trillion in assets, including Harvard University, the City of Baltimore, and the Ford and MacArthur Foundations, have pledged to stop investing in fossil fuel companies; however, the health-care sector is lagging [42]. Retirement and pension fund investments in fossil fuel companies represent approximately 28% of indirect greenhouse gas emissions in health-care [43]. Health-care membership organizations and societies, along with health-

care professionals who care for AYA, can support climate mitigation by pursuing and advocating for environmentally responsible investment strategies, which include divesting from fossil fuel companies and pursuing environmental, social, and governance investing that uses standards to screen potential investments for their positive contributions to society and the environment.

Health-care professionals have advocated for divestment from companies whose products harm health, such as withdrawal by retirement and pension funds from tobacco companies in the 1980s [42]. Health-care professionals can urge their institutions and health-care organizations to pursue investments on their behalf that align with their beliefs and send a clear message to AYA and to industry that health care is committed to protecting AYA health and their future [43].

Position 6: health professionals must have training and education on climate change and its impact on adolescent and young adult health

Education on climate change, and its impact on health and health systems, is an essential element of clinical care, workforce competencies, public health service delivery, health advocacy, policy, and research. Nevertheless, according to a survey conducted in 2020 by the International Federation of Medical Students Association, climate change is taught in only 15% of medical schools worldwide; and in 12% of these schools, climate health teaching activities are led by students and not faculty members [44].

Climate education is a key mitigation and adaptation strategy that must meet the diverse needs of all participants, including health systems, health educational institutions, primary and secondary schools, and higher education. A 2020 study found that climate education was a more effective way to reduce emissions than any other solution, noting education allowed individuals to make personal connections to climate change solutions [45]. A 2022 study noted that the lack of education on how climate change impacts health caused significant distress in young people [46]. In 2020 the Royal College of Psychiatrists found that half of the youth they were seeing were distressed by climate change [47]. In 2021 at COP26, Education and Environment ministers committed to including climate change education in all educational institutions—to fill knowledge gaps, teach skills, and instill values needed to participate effectively in climate action—and to improving mental and physical health for youth [48].

The Global Consortium on Health and Climate Education, an organization dedicated to creating a global climate-ready health sector, developed an evidence-based set of core concepts and curriculum on climate change and health that can be integrated into medical education for health professionals to prevent, mitigate, adapt, and respond to health impacts of climate change [49]. The curriculum focuses on five competencies: knowledge and analytic skills, collaboration and communication, policy, public health, and clinical practice. Using such a framework, health professionals would be able to screen for climate change-related vulnerabilities, provide anticipatory guidance, and participate in advocacy at the community, school, and governmental levels along with engaging in meaningful youth interactions [50].

Education must be adaptable, reflecting changes occurring in the climate. The traditional and experiential knowledge (TEK) of

Indigenous peoples provides generational knowledge on the impacts of climate change on health. TEK is not monolithic but represents place specific experiences and relationships with the land along with knowledge systems and approaches used to learn how to respond to their specific needs. Planetary health is interconnected in TEK, and education based on this principle is essential to understand the changing environment and the consequences to AYA health. Education based on TEK is centered on lived experiences, practice, and shared meaning and knowledge creation. Incorporating TEK into traditional western teaching can be used to facilitate a better understanding of the complexities of the climate effects on AYA health [51].

Increasing professional capacity in climate change and health supports health professionals in developing climate-resilient health systems along with developing the skills to partner with non-health sector stakeholders for necessary responses to climate risk.

Position 7: further research is needed to identify effective and equitable strategies to support climate-related solutions that minimize adverse health effects for AYA

Numerous global studies and reports have established the health impacts of climate change, and the need for policies to protect AYA health and well-being from the effects of climate change. However, documented interventions with evaluations are scarce. One review of 25 papers examined whether climate change factors were incorporated into mental health and psychosocial support interventions for adolescents in humanitarian settings and concluded there was little attention paid to climate-related stressors [52]. Only one adolescent study was found that had a mental health intervention due to a climate event [53]. Other commenters highlighted the need for large scale interventions because of the possible mental health impact on children forced to migrate due to climate-related events [54] and urged incorporation of measures that tackle “eco-anxiety” in mental health and psychosocial support interventions due to the increased frequency of climate-related emergencies.

Often communities or governments are not identifying the health co-harms (direct adverse impacts) of climate change. One study of adolescents affected by heat at school in South Africa described school-based interventions to achieve ‘thermal comfort’ for students, citing a previous study in Costa Rica where the installation of air conditioning systems had improved learning outcomes [55,56]. The authors reflected that people have seen heat stress as a daily nuisance that needed to be tolerated rather than as a climate phenomenon that deserved targeted intervention.

Indigenous people’s experience of climate change and the impact of climate change on their lives has been well-documented and contributes to the data on climate change health impacts and responses to these impacts [57]. TEK is acknowledged as legitimate and important to climate change information, including public health interventions, increased surveillance, and adaptation and mitigation strategies [58,59]. The Intergovernmental Panel on Climate Change underscores the importance of TEK, as it is passed from generation to generation, and is flexible and adaptive in changing conditions [59]. Both TEK and western knowledge should be used in developing meaningful mitigation and adaptation strategies, while valuing differences in strategies based on diverse perspectives. The use of

TEK, alongside western science, provides a unique perspective on climate action and research, valuing difference and contradiction over the integration of two perspectives, creating adaptable solutions for the next generations.

Research can help to promote climate-friendly policies by measuring their health benefits, especially for AYA. For example, policies focusing on the transportation sector through investment in public transportation, and improvements in walking and bicycling infrastructure, not only reduce carbon emissions, but increase physical activity, improving mental and physical health for all involved including AYA [60,61]. Documenting the beneficial effects of such policies can strengthen the rationale for adopting and implementing them. Existing risk-reduction frameworks, such as the Sendai Framework for Disaster Risk Reduction (2015–2030), can be used to inform ongoing research that promotes centering adolescent health and well-being in mitigation and adaptation strategies [62]. Integration of AYA voices into research strategies is essential for equitable and just climate action and policies. Research design and data collected need to be reflective of and account for disparities and marginalizing factors that lead to vulnerability, such as gender, race, socio-economics, disability, and geography. Only with a holistic approach to research can equitable and successful climate change interventions be developed.

Summary

Urgent and immediate action is needed by governments and urgent advocacy is needed by health-care organizations and professionals to avert the consequences of climate change for AYA health and well-being. Climate change is having detrimental physical and psychological effects that AYA will experience throughout their lifetimes. Health-care professionals and health-care organizations working with and for AYA health and well-being have a critical role in supporting AYA’s climate advocacy and their resiliency in facing a future dominated by the effects of climate change. Climate action taken now, built on a human rights framework and committed to equity and justice, including remediations and solutions for countries most affected, can mitigate some of the most adverse effects. Professionals working with AYA should elevate the voices of AYA, partnering with them in their work for mitigation and adaptation actions. Health-care organizations and professionals are key to creating a zero-carbon future that can be transformative to the health and well-being of all AYA, ensuring we first do no harm. We should ensure that we are not only making fiscally responsible decisions, but environmentally friendly investments. Health-care organizations and professionals need to advocate for more research, focused on strategies that incorporate protective factors of AYA well-being. As one of the most trusted sources of information, it is incumbent upon us to ensure that every AYA is protected and ensured a healthy tomorrow.

Prepared by:

Sadhana Dharnapuri, M.D.
Interim Division Chief, Division of Adolescent Medicine,
Stroger Hospital, Clinical Associate Professor of Pediatrics,
University of Illinois Health,
Chicago, Illinois
Youth Consultant - Kavi Myers, Oak Park River Forest High
School, Oak Park, Illinois

Fadia S. AlBuhairan, M.D., M.P.H., Ph.D. I.A.A.H., North Africa/
Middle East
President, Arab Coalition for Adolescent Health and Medicine,
Vice President (MENA), International Association for Adolescent
Health, Senior Advisor, Health Sector Transformation Program,
Saudi Arabia, Professor of Pediatrics, Alfaisal University

Joanna D. Brown, M.D., M.P.H. S.A.H.M., U.S.A.
Attending Physician, Division of Adolescent/Young Adult
Medicine, Boston Children's Hospital, Clinical Associate Professor of
Family Medicine, Alpert Medical School of Brown University,
Boston, Massachusetts

Abigail English, J.D. S.A.H.M., U.S.A.
Director, Center for Adolescent Health & the Law, Adjunct
Associate Professor, Gillings Global School of Public Health, UNC
Chapel Hill, Pittsboro, North Carolina

Dr. Preeti M. Galagali, M.D., P.G.D.A.P., F.I.A.P.
Consultant Adolescent Health Specialist and Pediatrician,
Director, Bengaluru Adolescent Care and Counselling Centre,
Rajajinagar, Bengaluru, Karnataka

Nicola J. Gray, Ph.D., F.F.R.P.S., F.R.Pharm.S., F.S.A.H.M.,
S.A.H.M., I.A.A.H., Europe
Vice President - Europe, International Association for Adolescent
Health, Governing Council Member - NCD Child, Trustee - UK
Association for Young People's Health, Senior Lecturer in Pharmacy
Practice, University of Huddersfield, UK

Jonathan D. Klein, M.D., M.P.H. S.A.H.M., I.A.A.H. U.S.A.
President, International Association for Adolescent Health,
Marron and Mary Elizabeth Kendrick Professor of Pediatrics and
Chief of the Division of Adolescent Medicine, Stanford University,
Palo Alto, California

Adesola Olumide, M.B.B.S., Ph.D., F.W.A.C.P., F.M.C.P.H.
Professor and Consultant Community Physician, Institute of
Child Health, College of Medicine, University of Ibadan and
University College Hospital, Ibadan, Nigeria, IAAH Vice President,
Sub-Saharan Africa Region

Mauricio Agustín Scarpello, M.D., P.E.D., A.D.O.L.E.S.C. M.E.D.,
I.A.A.H., C.O.D.A.J.I.C., Argentina
Vice President - International Association for Adolescent Health
(IAAH) for the Latin American Region. Secretary of the Executive
Council of the Confederation of Adolescence and Youth of Ibero-
America, Italy and the Caribbean (CODAJIC). Member of the Board of
Directors of the Argentine Society for Comprehensive Adolescent
Health (SASIA). Professor at the Faculty of Medical Sciences,
Comahue's University. (Facimed - UNComa)

Eve Shapiro MD, MPH SAHM, USA
Professor Emeritus, University of Arizona, Dept of Pediatrics,
Tucson, Arizona

Youth Consultants:

Kana Hutchins
Walter Peyton High School, Chicago, Illinois
Kavi Myers
Oak Park River Forest High School,
Oak Park, Illinois

Anika Shethia
Yale University, New Haven, Connecticut
Harshita Umesh, M.D., M.B.B.S.
House Surgeon, Bangalore Medical College and Research
Institute, Bangalore, Internal Lead,
YOUNGO Health Working Group

References

- [1] World Meteorological Organization. Past eight years confirmed to be the eight warmest on record [press release]. Geneva: World Meteorological Organization; 2023. Available at: <https://wmo.int/media/news/past-eight-years-confirmed-be-eight-warmest-record>. Accessed July 13, 2024.
- [2] Intergovernmental Panel on Climate Change. Contribution of working group II to the sixth assessment report of the intergovernmental Panel on climate change. In: Pörtner H-O, Roberts DC, Tignor M, et al., eds. *Climate Change 2022: Impacts, Adaptation and Vulnerability*. New York: Cambridge University Press; 2022.
- [3] McGushin A, Gasparri G, Graef V, et al. Adolescent wellbeing and climate crisis: Adolescents are responding, what about health professionals? *BMJ* 2022;379:e071690.
- [4] Intergovernmental Panel on Climate Change. AR6 synthesis report: Climate change 2023 [Internet]. Available at: <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>. Accessed March 20, 2023.
- [5] Romanello M, diNapoli C, Green C, et al. The 2023 report of the *lancet* count-down on health and climate change: The imperative for a health-centred response in a world facing irreversible harms. *Lancet* 2023;402:2346–94.
- [6] Paulson JA, Ahdoot S, Baum CR, et al. Global climate change and children's health. *Pediatrics* 2015;136(5):992–7.
- [7] Parks RM, Bennett JE, Tamura-Wicks H, et al. Anomalously warm temperatures are associated with increased injury deaths. *Nat Med* 2020;26:65–70.
- [8] Bennett CM, Friel S. Impacts of climate change on inequities in child health. *Children* 2014;1:461–73.
- [9] Ziska LH, Makra L, Harry SK, et al. Temperature-related changes in airborne allergenic pollen abundance and seasonality across the northern hemisphere: A retrospective data analysis. *Lancet Planet Health* 2019;3:e124–31.
- [10] Kalhan R, Arynchyn A, Colangelo LA, et al. Lung function in young adults predicts airflow obstruction 20 years later. *Am J Med* 2010;123:468.e1.
- [11] Clayton S, Manning CM, Krygman K, Speiser M. *Mental Health and Our Changing Climate: Impacts, Implications, and Guidance*. Washington, D.C: American Psychological Association, and ecoAmerica; 2017.
- [12] Oppenheimer M, Campos M, R.Warren, et al. Emergent risks and key vulnerabilities. In: Field CB, Barros VR, Dokken DJ, eds. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom and New York, NY: Cambridge University Press; 2014:1039–99.
- [13] Convention on the rights of the child.[Internet]. Available at: <https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-child>. Accessed January 6, 2023.
- [14] Levy SR, Migacheva K, Ramírez L, et al. A human rights based approach to the global children's rights crisis: A call to action. *J Social Issues* 2022;78:1085–97.
- [15] Ahdoot S, Pacheco SE, Council on Environmental Health. Global climate change and children's health. *Pediatrics* 2015;136:e1468.
- [16] COP28 declaration on climate and health. Available at: https://cdn.who.int/media/docs/default-source/climate-change/cop28/cop28-uae-climate-and-health-declaration.pdf?sfvrsn=2c6eed5a_2&download=true. Accessed June 20, 2024.
- [17] Morello-Frosch R, Zuk M, Jarrett M, et al. Understanding the cumulative impacts of inequalities in environmental health: Implications for policy. *Health Aff* 2011;30:879–87.
- [18] O'Brien K, Eriksen S, Schjolden A, Nygaard L. What's in a word? Conflicting interpretations of vulnerability in climate change research. Oslo, Norway: Center for International Climate and Environmental Research; 2004.
- [19] Environmental Protection Agency. Learn about environmental justice. Available at: <https://www.epa.gov/environmentaljustice/learn-about-environmental-justice>. Accessed March 22, 2024.
- [20] US Global Change Research Program. The impacts of climate change on human health in the United States. Washington, DC: USGCRP; 2016.
- [21] Global Compact for migration. Available at: <https://refugeemigrants.un.org/migration-compact>. Accessed March 22, 2024.
- [22] 1951 Refugee convention. Available at: <https://www.unhcr.org/about-unhcr/who-we-are/1951-refugee-convention>. Accessed June 8, 2024.
- [23] Protocol relating to the status of refugees. Available at: <https://www.ohchr.org/en/instruments-mechanisms/instruments/protocol-relating-status-refugees>. Accessed June 10, 2024.

- [24] World Health Organization. Report by the Director General: Promoting the health of refugees and migrants: global action plan, 2019–2023 [Internet]. Geneva: World Health Organization. Available at: <https://www.ama-assn.org/press-center/press-releases/ama-strengthens-commitment-combatting-climate>. Accessed May 23, 2023.
- [25] Atwoli L, Baqui AH, Benfield T, et al. Call for emergency action to limit global temperature increases, restore biodiversity, and protect health. *BMJ* 2021;374:n1734.
- [26] Arora R, Spikes ET, Waxman-Lee CF, Arora R. (2022, February 1). Platforming youth voices in planetary health leadership and advocacy: An untapped reservoir for Changemaking. *Lancet Planet Health* 2022;6:e78–80.
- [27] Our Children's Trust. Youth v. Gov. Available at: <https://www.ourchildrenstrust.org/>. Accessed July 5, 2024.
- [28] Gasparri G, Tcholakov Y, Gepp S, et al. Integrating youth perspectives: Adopting a human rights and public health approach to climate action. *Int J Environ Res Public Health* 2022;19:4840.
- [29] Kowasch M, Cruz JP, Reis P, et al. Climate youth activism initiatives: Motivations and aims, and the potential to integrate climate activism into ESD and transformative learning. *Sustainability* 2021;13:11581.
- [30] United Nations. Youth in Action.[Internet]. Available at: <https://www.un.org/en/climatechange/youth-in-action/youth-advisory-group#:~:text=Convened%20under%20the%20auspices%20of,action%2C%20and%20drive%20forward%20all>. Accessed July 2, 2024.
- [31] Protecting the planet and its people: healthcare's climate action roadmap [internet]. Geneva: World Economic Forum; 2021. Available at: <https://www.weforum.org/agenda/2021/06/healthcare-climate-action-roadmap/>. Accessed June 18, 2023.
- [32] Healthcare without harm [internet]. Available at: <https://healthcareclimateaction.org/>. Accessed July 25, 2023.
- [33] Eckleman MJ, Huang K, Lagasse R, et al. Healthcare pollution and public health damage in the United States: An update. *Health Aff* 2020;39:01247.
- [34] WHO guidance for climate resilience and environmentally sustainable health care facilities [Internet]. Geneva: World Health Organization; 2020. Available at: <https://www.who.int/publications/i/item/9789240012226>. Accessed February 23, 2024.
- [35] World Resources Institute. Greenhouse Gas protocol [Internet]. Available at: <https://www.wri.org/initiatives/greenhouse-gas-protocol>. Accessed June 12, 2024.
- [36] Sustainable health agenda for the americas 2018–2030 [Internet]. Pan American Health Organization; World Health Organization. Available at: <https://www.paho.org/en/sustainable-health-agenda-americas-2018-2030>. Accessed July 5, 2024.
- [37] Joint commission sustainable healthcare [Internet]. Available at: www.jointcommission.org/our-priorities/sustainable-healthcare. Accessed July 5, 2024.
- [38] Balbus J. Observations from COP27: Health care is becoming a bigger part of the climate change solution. *Environ Health Perspect* 2022;130:121001.
- [39] Climate-smart healthcare. Low-carbon and resilience strategies for the health sector [internet]. Washington, DC: International Bank for Reconstruction and Development/The World Bank; 2017. Available at: <https://documents1.worldbank.org/curated/en/322251495434571418/pdf/113572-WP-PUBLIC-FINAL-WBG-Climate-smart-Healthcare-002.pdf>. Accessed March 15, 2024.
- [40] Global road map for healthcare decarbonization [Internet]. Healthcare without Harm Climate-Smart Healthcare Series. Annex C: Interventions. Available at: <https://healthcareclimateaction.org/roadmap>. Accessed March 15, 2024.
- [41] Lipman J. Invest-divest 2021: A decade of progress towards a just climate future [Internet]. C40. Cities; Stand.earth; Institute for Energy Economics and Financial Analysis; Wallace Global Fund. 2021. Available at: <https://divestmentdatabase.org/wp-content/uploads/2021/10/DivestInvestReport2021.pdf>. Accessed November 10, 2023.
- [42] AMA to protect human health from the effects of climate change by ending its investments in fossil fuel companies (divestment). American Medical Association; 2017. <https://www.aaphp.org/resources/Divestment%20of%20Fossil%20Fuel%20Investments%20AMA%20June%202017.pdf>. Accessed November 23, 2023.
- [43] Verney P. Tide may be turning for tobacco as CalPERS reveals its 2001 divestment is finally making money. *Responsible Investor*. 2020. Available at: <https://www.responsible-investor.com/tide-may-be-turning-for-tobacco-as-calpers-reveals-its-2001-divestment-is-finally-making-it-money/>. Accessed November 24, 2023.
- [44] Omrani OE, Dafallah A, Paniello Castillo B, et al. Envisioning planetary health in every medical curriculum: An international medical student organization's perspective. *Med Teach* 2020;42:1107–11.
- [45] Cordero EC, Centeno D, Todd AM. The role of climate change education on individual lifetime carbon emissions. *PLoS One* 2020;15:e0206266.
- [46] Diffey J, Wright S, Uchendu JO, et al. "Not about us without us" – the feelings and hopes of climate-concerned young people around the world. *Int Rev Psychiatr* 2022;34:499–509.
- [47] Sanson A, Bellemo M. Children and youth in the climate crisis. *BJPsych Bull* 2021;45:205–9.
- [48] Kocubovski M, Ristovska G, Petrova A, et al. Review of policies and actions on tackling global climate change - COP26 - is this the last chance? *Arch Pub Health* 2023;15:5–15 [Internet].
- [49] Sorensen C, Campbell H, Depoux A, et al. Core competencies to prepare health professionals to respond to the climate crisis. *PLOS Clim* 2023;2:e0000230.
- [50] Gauthier SJ. Changing degrees: Incorporating the impacts of climate change on health into pediatric residency education and practice. *Yale J Biol Med* 2023;96:227–32.
- [51] NESTEROVA Y. Rethinking environmental education with the help of indigenous ways of knowing and traditional ecological knowledge. *J Philos Educ* 2020;54:1047–52.
- [52] Devonald M, Vintges J, Jones N. Supporting adolescent mental health in humanitarian settings: To what extent do interventions consider climate change and its intersectional impacts? *Intervention* 2022;20:81–97.
- [53] Mah AYJ, Chapman DA, Markowitz EM, Lickel B. Coping with climate change: Three insights for research, intervention, and communication to promote adaptive coping to climate change. *J Anxiety Disord* 2020;75:102282.
- [54] Rygaard NP. Climate change, migration, urbanization, and the mental health of children at risk in the European union: A discussion of the need for large scale interventions. *Eur Psychol* 2021;26:204–11.
- [55] Chersich MF, Scorgie F, Wright CY, et al. Climate change and adolescents in South Africa: The role of youth activism and the health sector in safeguarding adolescents' health and education. *S Afr Med J* 2019;109:615–9.
- [56] Porras-Salazar JA, Wyon DP, Piderit-Moreno B, et al. Reducing classroom temperature in a tropical climate improved the thermal comfort and the performance of elementary school pupils. *Indoor Air* 2018;28:892–904.
- [57] Ford JD. Indigenous health and climate change. *Am J Public Health* 2012;102:1260–6.
- [58] Doyle JT, Redsteer MH, Eggers MJ. Exploring effects of climate change on northern plains American Indian health. *Clim Change* 2013;120:643–55.
- [59] Abram N, Gattuso J-P, Prakash A, et al. Framing and context of the report. In: Portner H-O, Roberts DC, Masson-Delmotte V, et al., eds. *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*. Geneva: IPCC; 2019:73–129.
- [60] Younger M, Morrow-Almeida HR, Vindigni SM, Dannenberg AL. The built environment, climate change, and health: Opportunities for co-benefits. *Am J Prev Med* 2008;35:517–26.
- [61] UNICEF child friendly cities initiative [Internet]. Available at: <https://www.childfriendlycities.org/>. Accessed May 23, 2024.
- [62] Aitsi-Selmi A, Murray V. The Sendai framework: Disaster risk reduction through a health lens. *Bull World Health Organ* 2015;93:362.