

▶ DIRECT FROM U.S. EPA OFFICE OF RESEARCH AND DEVELOPMENT



Megan
Christian, MPH



Emily
Trentacoste, PhD

Environmental Health Challenges: Common Priorities Across Disciplines, Practical Tools, and Opportunities for the Future

*Office of Research and Development
U.S. Environmental Protection Agency*

Editor's Note: The National Environmental Health Association (NEHA) strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, NEHA has partnered with the Office of Research and Development (ORD) within the U.S. Environmental Protection Agency (U.S. EPA) to publish two columns a year in the *Journal*. ORD is the scientific research arm of U.S. EPA. ORD conducts research for U.S. EPA that provides the foundation for credible decision making to safeguard human health and ecosystems from environmental pollutants.

In these columns, authors from ORD will share insights and information about the research being conducted on pressing environmental health issues. The conclusions in these columns are those of the author(s) and do not necessarily represent the official position of U.S. EPA.

Megan Christian is a biologist and translational scientist with U.S. EPA's ORD within the Office of Science Advisor, Policy, and Engagement. Emily Trentacoste is a biologist and special assistant to senior leadership in U.S. EPA's ORD

Overview
Public health and healthcare professionals often view environmental health priorities through different lenses and at different scales. Differences include clinical, occupational, community, and ecological health perspectives, and whether the focus is on preventive actions, risk evaluation, or preparedness and response. Public health and healthcare practitioners are also often on the front lines of discovering and addressing public or individual health concerns related to environmental issues.

Identifying areas of mutual interest between public health and healthcare practitioners can foster improved understanding and coordination across sectors, as well as enhance our combined ability to identify and address environmental health challenges. This column will provide 1) an overview of environmental health challenges common to public health and healthcare practitioners, 2) identify a selection of tools and resources to address these challenges, 3) highlight the impact of COVID-19 in amplifying identified challenges, and 4) discuss opportunities for

professional communities to address common priorities.

Environmental Public Health Challenges

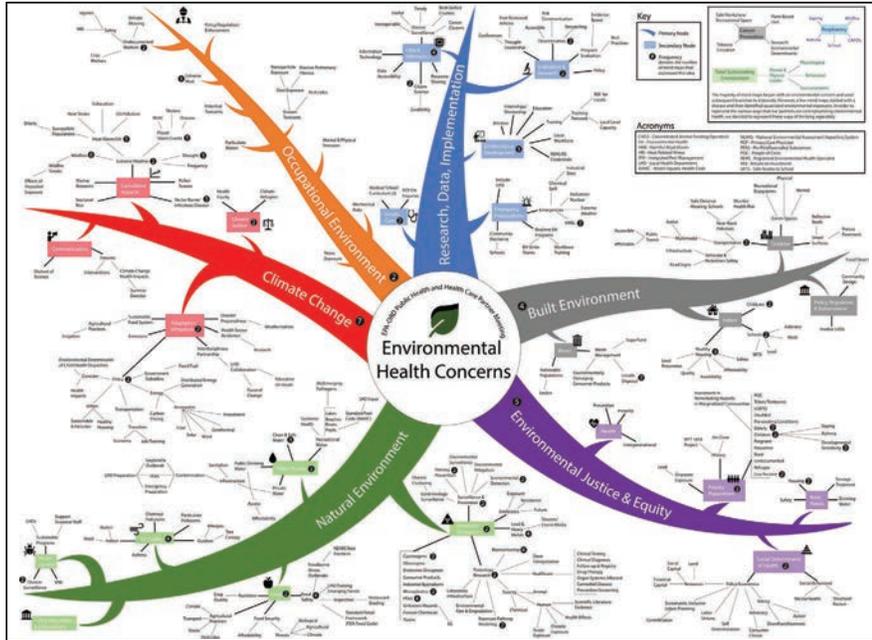
During summer 2020, the Office of Research and Development (ORD) within the U.S. Environmental Protection Agency (U.S. EPA, 2021a) convened a multiday, virtual workshop with public health, healthcare, and healthcare system practitioners to discuss environmental health priorities within their fields. The workshop provided a bridge across diverse healthcare sectors and allowed participants to understand how environmental and public health challenges are perceived from different professional perspectives and to learn how others are working to address these issues.

Through a mind mapping exercise and workshop discussions, six high-level environmental health concerns were identified as priority challenges to both public health and healthcare professionals (Figure 1). Although not exhaustive, the six areas represent high-level environmental health topics that can impact both public health and healthcare professionals:

- **Climate change** concerns include physical impacts on health (from extreme weather events, increased prevalence of vector-borne diseases, and decreased access to clean water), climate justice and disproportionate impacts, cumulative impacts, adaptation and mitigation, and communication.
- **Environmental justice and equity** address equitable access to basic needs (including clean water and air, food, safe housing and

FIGURE 1

Master Mind Map of Environmental Health Concerns for Public Health and Healthcare Practitioners



Source: U.S. Environmental Protection Agency, 2021a. A larger and zoomable version of this figure can be found at www.epa.gov/system/files/documents/2021-10/public-health-health-care-partner-workshop_master-mind-map.pdf.

tal justice and equity were also identified as cross-cutting issues in addition to being one of the six areas of concern.

Tools and Resources to Address Challenges

Actionable information and resources can assist public health and healthcare professionals in addressing environmental health concerns. Federal and state agencies play a role in developing and sharing information with partners, including tools and resources, that can be used to analyze and identify solutions to environmental health concerns. These tools range in their scale, intended uses, and target audiences. Table 1 highlights several U.S. EPA-ORD tools and resources that can aid practitioners from different disciplines in addressing the six common environmental health areas of concern. Some tools can be used directly by public health and healthcare practitioners, while others are intended for use by partners with whom these practitioners collaborate and consult. Additional U.S. EPA-ORD tools can be found on the ORD Science Models and Research Tools (SMaRT) Search website (U.S. EPA, 2021b). Figure 2 offers a case study of how two of these tools were applied to address an environmental health challenge.

Impacts of the COVID-19 Pandemic Public Health Crisis

Rather than decreasing in importance, environmental health priorities and challenges were heightened during the COVID-19 pandemic. People spent more time at home, increasing the importance of the home-built environment, and often more time in the natural environment and green spaces (Centers for Disease Control and Prevention, 2021). Environmental equity and justice issues—including access to clean and healthy housing, drinking water, food, internet, medical care, and green spaces—became more evident. Occupational health needs, especially for essential workers, were central. The COVID-19 pandemic also heightened the need to access research, data, and tools to quickly identify and implement solutions.

The intensification of environmental health challenges during the COVID-19 pandemic highlights the importance of continued cross-sector and cross-disciplinary discussions and collaborations on environmental health issues during nonemergency times. These interac-

environment, and healthcare) and consideration for disproportionately impacted communities (i.e., those who bear an unequal burden of risk, exposure, or impact), such as low income, minority, and tribal communities, and for vulnerable populations (i.e., those who are most susceptible to impacts from harmful environmental exposures), such as children and older adults.

- **Built environment** pertains to developed indoor and outdoor environments on which the public depends for daily life, including transportation systems, infrastructure, green spaces, urban development, office spaces, homes, schools, childcare facilities, public indoor spaces, and waste development and management. Public health concerns include indoor air quality, exposure to environmental contaminants, and community design.
- **Natural environment** refers to outdoor spaces, such as forests, parks, gardens, or even individual backyards, where public health concerns include air and water quality, presence of hazardous substances, vector-

borne pest control, food safety and security, and environmental policy and enforcement.

- **Occupational environment** includes the potential for harmful workplace exposures (e.g., toxicants, extreme heat, loud noises, and particulate matter), mental and physical stressors related to specific work environments and fields, occupational training, access to personal protective equipment, and enforcement of policy and regulations.
- **Research, data, and implementation** refers to access to critical information, research, and data for environmental public health challenges and the ability to analyze data, translate results, and implement strategies and solutions to address challenges. Having adequate research, data, and implementation practices better support emergency response efforts, workforce development, and healthcare practices and communications.

Lead, children's health, mental health, and community design were identified by public health and healthcare practitioners as cross-cutting issues that are related to, or impacted by, factors across the six areas. Environmen-

TABLE 1

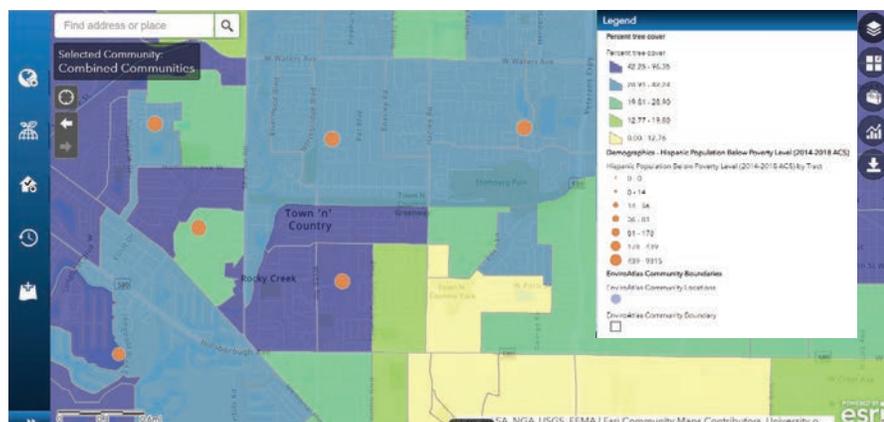
Tools and Resources From the Office of Research and Development (ORD) Within the U.S. Environmental Protection Agency (U.S. EPA) to Help Public Health Practitioners Address the Six Common Environmental Health Areas of Concern

Tool	Environmental Health Uses	Intended Users
Climate change		
Smoke-Ready Toolbox (U.S. EPA, 2021c)	Communicate risks of smoke exposures and provide actions people can take to protect their health	Public health officials, healthcare practitioners
Global Change Explorer (U.S. EPA, 2021d)	Explore various scenarios of future environmental change, including climate change, and access underlying spatial data for adaptation and resilience planning	Federal, state, and city regulatory/permitting authorities, decision makers, planners, natural resource managers, scientists, stakeholders interested in climate change impacts and adaptation, community organizations, environmental consultants
Environmental justice and equity		
EnviroAtlas (U.S. EPA, 2021e)	Consider place-based environmental, demographic, and socioeconomic information to assess health impacts and benefits from nature and stressors	Environmental and public health professionals, researchers, educators, government agencies, nongovernmental organizations
EJSCREEN ^a (U.S. EPA, 2021f)	Identify locations for consideration when developing programs, policies, and activities based on factors related to environmental justice, including minority and/or low-income populations and potential environmental quality issues	Communities, community planners, state and local health and environmental officials, grant writers, educational programs
Built environment		
Storm Water Management Model (U.S. EPA, 2021g)	Analyze and design stormwater runoff solutions, including evaluating gray and green infrastructure strategies, and estimate production of stormwater pollution	Engineers, planners, national/state/local stormwater management teams
Visualizing Ecosystem Land Management Assessments (U.S. EPA, 2021h)	Build in green infrastructure options for consideration in controlling fate and transport of water, nutrients, and toxics under present and future climate scenarios	Communities, land managers, policy makers, scientists, engineers
Natural environment		
EnviroAtlas Eco-Health Relationship Browser (U.S. EPA, 2021i)	Link and identify relationships between human health and ecosystem services	Environmental health researchers and decision makers, environmental educators, human health and ecosystem analysts
Cyanobacteria Assessment Network Application (U.S. EPA, 2021j)	Quickly assess changes in cyanobacteria levels in bodies of water to inform decisions regarding recreational and drinking water safety	Water quality managers, public health officials
Occupational environment		
Environmental Sampling and Analytical Methods Program (U.S. EPA, 2021k)	Access documents, information, and tools that support planning, reporting, and field and laboratory efforts during contamination incident site characterization, remediation, and release	Response community including response managers, field and laboratory personnel
Research, data, and implementation		
CompTox Chemicals Dashboard (U.S. EPA, 2021l)	Search chemistry, toxicity, and exposure information for >875,000 chemicals, including data and models, that can help inform chemical risk assessment and identify chemicals that need more testing	Federal/state governments, health agencies, industry decision makers for chemical risk assessment
Decision Support Tools for Waste Management (U.S. EPA, 2021m)	Access various tools to support planning, mitigation, response, and recovery of a large-scale environmental incident or natural disaster	State/local/tribal/territorial governments, federal decision makers on waste management
Wildfire Smoke and Your Patients' Health (U.S. EPA, 2021n)	Learn about health effects associated with wildfire smoke and actions patients can take before and during a wildfire to reduce exposure	Physicians, nurse practitioners, nurses, asthma educators, other medical professionals

^a EJSCREEN was developed by the Office of Environmental Justice within U.S. EPA and has been used to inform U.S. EPA-ORD tools.

FIGURE 2

Case Study Using the EnviroAtlas Eco-Health Relationship Browser



In 2015, the Florida Department of Health in Hillsborough County (2016) conducted a health impact assessment (HIA) to evaluate a proposed policy aimed at promoting public health in a predominately Hispanic/Latino community through improved access to parks and physical activity opportunities. The HIA used the EnviroAtlas Eco-Health Relationship Browser to identify potential health benefits the policy could address. The EnviroAtlas tool was then used to select study areas that would prioritize benefits for vulnerable and low-income populations. EnviroAtlas data on green space and tree cover were used to assess impact predictions and guide recommendations of the proposed policy.

tions build and foster trusted relationships and networks that can be leveraged when public health emergencies arise.

Future Opportunities

Continuing cross-sector and cross-disciplinary conversations on environmental health priorities will enable more information and stakeholders to be engaged when developing solutions to current and future challenges. Opportunities for collaboration include incorporating environmental health in training and workforce development; utilizing workshops, professional meetings, and other platforms to foster cross-disciplinary dialogue; and coordinating across sectors on risk communication.

Environmental health issues of mutual concern could also be used to inform outreach strategies, research directions, and issues for future targeted discussions and collaborations across disciplines. By working together, the environmental health community can develop more impactful and holistic actions to protect and improve our nation's environmental health. 🌱

Acknowledgements: The authors would like to acknowledge Bruce Rodan and Kacey Deener for their review of this column.

Corresponding Author: Megan Christian, Translational Scientist, Office of Science Advisor, Policy, and Engagement, Office of Research and Development, U.S. Environmental Protection Agency, 5 Post Office Square, Boston, MA 02109. Email: christian.megan@epa.gov.

References

Centers for Disease Control and Prevention. (2021). *COVID data tracker: Explore human mobility and COVID-19 transmission in your local area*. <https://covid.cdc.gov/covid-data-tracker/#mobility>

Florida Department of Health in Hillsborough County. (2016). *A health impact assessment of a county parks and recreation fitness policy in Hillsborough County, Florida*. <https://www.pewtrusts.org/-/media/assets/external-sites/health-impact-project/tnc-parks-and-rec-hia-final-report.pdf>

U.S. Environmental Protection Agency. (2021a). *Public health and health care partner workshop: Summary report, summer 2020* (EPA 620/S-21/001). https://www.epa.gov/system/files/documents/2021-07/final_phhc-summary-report_6.10.2021.pdf

U.S. Environmental Protection Agency. (2021b). *EPA science models and research*

tools (SMaRT) search. <https://www.epa.gov/research/epa-science-models-and-research-tools-smart-search>

U.S. Environmental Protection Agency. (2021c). *Smoke-ready toolbox for wildfires*. <https://www.epa.gov/smoke-ready-toolbox-wildfires>

U.S. Environmental Protection Agency. (2021d). *Global change explorer (GCX)*. <https://www.epa.gov/gcx>

U.S. Environmental Protection Agency. (2021e). *EnviroAtlas*. <https://www.epa.gov/enviroatlas>

U.S. Environmental Protection Agency. (2021f). *EJSCREEN: Environmental justice screening and mapping tool*. <https://www.epa.gov/ejscreen>

U.S. Environmental Protection Agency. (2021g). *Storm water management model (SWMM)*. <https://www.epa.gov/water-research/storm-water-management-model-swmm>

U.S. Environmental Protection Agency. (2021h). *Visualizing ecosystem land management assessments (VELMA) model—2.0*. <https://www.epa.gov/water-research/visualizing-ecosystem-land-management-assessments-velma-model-20>

U.S. Environmental Protection Agency. (2021i). *EnviroAtlas eco-health relationship browser*. <https://www.epa.gov/enviroatlas/enviroatlas-eco-health-relationship-browser>

U.S. Environmental Protection Agency. (2021j). *Cyanobacteria assessment network application (CyAN app)*. <https://www.epa.gov/water-research/cyanobacteria-assessment-network-application-cyan-app>

U.S. Environmental Protection Agency. (2021k). *Environmental sampling and analytical methods (ESAM) program*. <https://www.epa.gov/esam>

U.S. Environmental Protection Agency. (2021l). *CompTox chemicals dashboard*. <https://www.epa.gov/chemical-research/comptox-chemicals-dashboard>

U.S. Environmental Protection Agency. (2021m). *Decision support tools for waste management*. <https://www.epa.gov/emergency-response-research/decision-support>

U.S. Environmental Protection Agency. (2021n). *Wildfire smoke and your patients' health*. <https://www.epa.gov/wildfire-smoke-course>