

Speaking with One Voice: Lessons Learned on Effective Communication of Environmental Health Risk

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INTRODUCTION

ESTABLISHED IN 2011, the National Environmental Health Partnership Council (NEHPC) is a strong and thriving consortium of leaders, including those from nearly 20 national environmental and public health-focused organizations. NEHPC's mission is to expand and sustain awareness, education, policies, and practices related to environmental health. It represents many facets of environmental health—from protecting children, the elderly, and the public from harmful environmental exposures to building the capacity of environmental health professionals; from representing state, territorial, county, local, and tribal environmental health officials to academics shaping educational programs at the beginning of the workforce pipeline to frontline community-based partners. This broad scope provides the Partnership Council an optimal vantage

point from which to learn from the fields' successes, as well as to identify where it could benefit from additional research, support, and resources. Moreover, in routinely bringing together environmental health partners from across the country, the NEHPC serves as one example of an important convening body, fostering open communications across diverse groups from the larger environmental health community, building our environmental health capacity through knowledge gained from diverse perspectives and areas of expertise. This fosters collaborations across a variety of regional and national organizations, and an end result is a deepening of our collective impact.

This article focuses on a factor central to the Partnership Council's work and vital to the field of environmental health: raising awareness of environmental health issues. The Partnership Council defines environmental health as, "the branch of public health that focuses on the relationships between people and their environment, promotes human health and well-being and fosters healthy and safe communities. Environmental health is a key part of any comprehensive public health system. The field of environmental health works to advance policies and programs to reduce chemical and other environmental exposures in air, water, soil and food to protect people and provide communities with healthier environments."¹ While this definition is second nature to public health practitioners, it is not well understood by the general public in the United States. The evidence presented throughout this article demonstrates that the disconnect between the environmental health profession and the people it serves affects the field's ability to advance important environmental health metrics.

In this era of complex information and uncertainty, it is critical to clearly communicate the importance of

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¹National Environmental Health Partnership Council. "Environmental Health Playbook: Investing in a Robust Environmental Health System." 2017. <https://nchh.org/resource/nehpc_environmental-health-playbook_investing-in-a-robust-environmental-health-system/> (Last accessed on March 15, 2021).

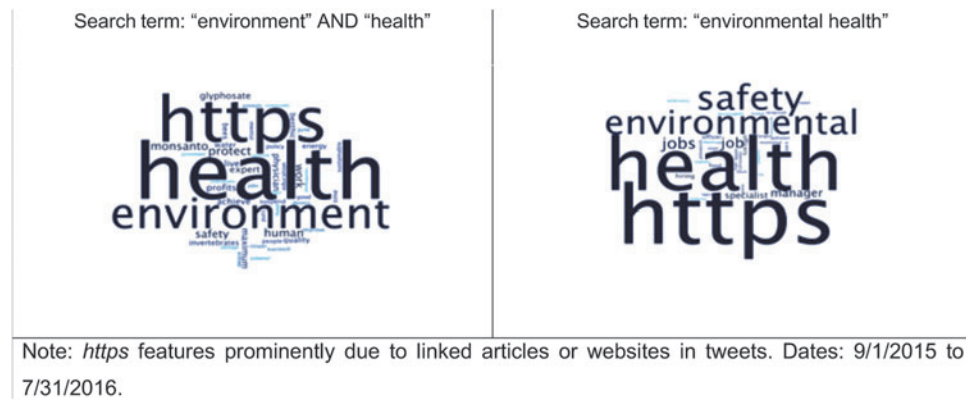


FIG. 1. Wordclouds of Twitter results. `https` features prominently due to linked articles or websites in tweets. Dates: September 1, 2015, to July 31, 2016. Color images are available online.

environmental health to audiences that include governments, policymakers, the private sector, the media, scientists, professional organizations, and the general public.² We begin with an illustrative example of professional and lay language surrounding the field and then discuss the sustainability of the field as a whole. We offer tools and considerations for more effective communication and examine the disconnect at different levels of environmental health discourse. We conclude with a summary of opportunities for action and practical applications of these insights.

CHALLENGES FOR ENVIRONMENTAL HEALTH MESSAGING

The field of environmental health is not well understood outside the professional sphere. From the public's standpoint, this can be illustrated by the type and frequency of words used when discussing "environmental health" and those used when discussing "environment and health." Tweets pulled from keyword searches in those groupings reveal the extent of the disconnect between the professional and public understanding of environmental health.

As can be seen in the resulting wordclouds below, "environment and health" are frequently used in tweets around sustainability or topics relating to the health of the environment (as opposed to environmental health or the environment's influence on health). However, a search of "environmental health" clearly draws from members of this profession (Fig. 1). In fact, the wordcloud from this search suggests the source tweets are job postings or discussions of jobs. From an even broader perspective, media stories analysis shows that only 10% of terms pertaining to environmental health are actually described as environmental health topics.³ These examples provide a window into an important divergence between how

professionals speak about environmental health and how the public and media understand environmental health.

The public's awareness of the mission of environmental public health agencies is generally lacking.⁴ That is, at least, until some tragic event raises awareness of its existence, such as the devastation associated with Hurricane Katrina and its impact on health more than a decade ago.⁵ Even in these instances, however, the critical role that environmental health plays is often lost in a sea of messages about local, state, and federal agency involvement. This is largely because the role of public health agencies is frequently subordinate to frontline emergency response (e.g., ensuring medical and public health protections are in place as the frontline emergency responders move people from dangerous conditions). While environmental health plays a vital role in high-profile missions by ensuring ongoing public health safety, this work is largely invisible to the general public.¹¹ Multisectoral collaboration is sometimes ineffective because public health professionals are assumed to be impractical researchers and not action takers.⁶ This, combined with the multiple layers of bureaucracy and a host of other issues, makes communicating environmental health risks challenging.

More often than not, environmental health leaders face economic, legal, scientific integrity, and other challenges as they wrestle to find the important balance of communicating the right message at the right time, all while considering the unknowns that may exist. Here, too, the involvement of numerous agencies with varying missions and their necessary and complementary activities involve messages that sometimes diverge. These divergent messages across agencies can result in a confused and

²Peter Calow. *Handbook of environmental risk assessment and management*. (Wiley-Blackwell, 1998).

³Moira O'Neil, Adam Simon, Abigail Haydon, and Nat Kendall-Taylor. "The Media Narrative of Environmental Health." *FrameWorks Institute*, 2012. <<https://www.frameworksinstitute.org/publication/the-media-narrative-of-environmental-health/>>. (Last accessed on March 15, 2021).

⁴Kim Krisberg. "Public Health Messaging Helps Public Understand Environmental Health: Toolkit Available." *The Nation's Health* 45 (2015): 1–12.

⁵Sandra Quinn. "Hurricane Katrina: A Social and Public Health Disaster." *American Journal of Public Health* 96 (2006): 204.

⁶Emilie L'Hôte, Andrew Volmert, Catasha Davis, and Leann Down. "Public Health Reaching Across Sectors." *FrameWorks Institute* (2019): 8. <<https://www.frameworksinstitute.org/publication/public-health-reaching-across-sectors-mapping-the-gaps-between-how-public-health-experts-and-leaders-in-other-sectors-view-public-health-and-cross-sector-collaboration/>> (Last accessed on March 15, 2021).

distrustful public.⁷ Numerous examples of this reality play out in the media on a weekly basis and include the safety of artificial turf, perfluoroalkyl substances in drinking water, and radiofrequency radiation related to cell phone use.

Case Example: Environmental Health Messaging with Radiofrequency Radiation

In May 2018, the National Institutes of Environmental Health Science National Toxicology Program (NTP) released its final report on radiofrequency radiation (RFR) exposure related to cell phone use.⁸ The study found an increased risk of rare heart tumors (schwannomas) and brain cancers (malignant gliomas) primarily in male rats. Some evidence of risk was observed in female rats, but those findings were less clear. In response to these findings, the industry was quick to make clear that the RFR exposures considered in the NTP study were related to older equipment and exposure levels that were not comparable to cell phones in use today. The Food and Drug Administration (FDA) response noted the limitations of the NTP study and said that it must be weighed in relation to the entire body of information on the subject. The FDA is charged with ensuring the safety of electronic equipment, such as cell phones, but relies on the Federal Communications Commission (FCC) for setting standards for safe RFR exposure limits. Along with the NTP and other organizations, the FDA's public statement advised that the "findings should not be directly extrapolated to human cell phone use." Other groups, including public health agencies, have messages on their websites that address the safety of cell phone use, including for children. Those messages suggest effective ways to reduce exposure to low-dose nonionizing radiation from cell phones, including use of speaker phones and corded headsets, and storing phones away from the body when not in use. Each organization's message varies in tone and recommendation. This lack of cohesion presents an ongoing challenge for the general public as it struggles to make evidence-based decisions to safeguard the health of the entire family. Local public health agencies in coordination with national agencies should procure a unified message to help the general public understand environmental health risk more effectively.

⁷Maida Galvez, Richard Peters, Nathan Graber, and Joel Forman. "Effective risk Communication in Children's Environmental Health: Lessons Learned from 9/11." *Pediatrics Clinics of North America* 54 (2017): 33–46.

⁸National Toxicology Program. "Toxicology and Carcinogenesis Studies in Hsd: Sprague Dawley SD Rats Exposed to Whole Body Radiofrequency Radiation at a Frequency (900MHz) and Modulation (GSM and CDMA) Used by Cell Phones." 2018. <https://ntp.niehs.nih.gov/ntp/htdocs/lt_rpts/tr595_508.pdf?utm_source=direct&utm_medium=prod&utm_campaign=ntpgolinks&utm_term=tr595> (Last accessed on March 15, 2021).

Increasing awareness about the impact of the environment on health is essential for designing policies that sustain our planet and ourselves. An informed public (encompassing youth, families, patients, advocates, community partners, industry, and more) that is meaningfully involved, interested, and solutions-oriented can help drive public policy.⁹ The messaging obstacles mentioned in the preceding section, along with resource limitations, present unique challenges toward achieving these goals. Given this, it is not surprising that environmental health services vary from one state to another in quantity, quality, and organization. A recent report found that only 60% of states provide information for the public on environmental health services and only 52% of the services available provide a link online.¹⁰ The public often learns about environmental health services through others in the public, often at forums.

Economic evidence of a field's impact is essential for its sustainability. Environmental health interventions remain rooted in prevention and provide benefits by improving health status, increasing economic productivity and reducing expenditures (e.g., medical). According to the report, "Value of Environmental Health Services: Exploring the Evidence," there is a need for more economic research demonstrating the benefits of environmental health interventions.¹¹ Until this connection is scientifically documented, it remains challenging for environmental health practitioners to convince decision makers and influencers about its economic benefits.¹² The report also provides evidence that investment in environmental health services is more effective in reducing deaths compared with provision of health care.¹³ The field's success depends on its ability to effectively communicate its achievements in planning, saving money, and reporting, leading to a key set of actions to improve the health of all communities across the United States.¹²

⁹World Health Organization. "Water Quality: Guidelines, Standards and Health." 2001. <https://www.who.int/water-sanitation_health/publications/who/wa/en/> (Last accessed on March 15, 2021).

¹⁰American Public Health Association. "Protecting the Health of Children: A National Snapshot of Environmental Health Services." 2019. <<https://www.apha.org/topics-and-issues/environmental-health/child-health>> (Last accessed on March 15, 2021).

¹¹National Environmental Health Partnership Council. "The Value of Environmental Health Services." 2016. <https://www.apha.org/-/media/Files/PDF/topics/environment/EH_Values.ashx> (Last accessed on March 15, 2021).

¹²World Health Organization. "Use of Economic Tools. Bonn, Germany." 2012. <http://www.euro.who.int/_data/assets/pdf_file/0016/231532/e96937.pdf> (Last accessed on March 15, 2021).

¹³National Environmental Health Partnership Council. "The Value for Environmental Health Services: Exploring the Evidence." 2016. <https://www.apha.org/-/media/files/pdf/topics/environment/eh_values.ashx?la=en&hash=6F6BE07BDA09712818CF5489941CF8169B2598ED> (Last accessed on March 15, 2021).

Case Example: Online Discussion During the Flint Water Crisis

To help design effective health communication, studying prior well-publicized environmental health events can offer insight. Evaluating trends in communication, both in the professional and public spheres, yields a better understanding of what messaging does and does not work. General website tracking, information about the volume and timing of calls/inquiries, social media posts, and views and event attendance can all enhance our understanding of how public health information is being consumed. What data are useful, available, and readily accessible will vary depending on the nature of the problem being addressed, but it is important to consider these various sources to better match messages to audiences.

An exploratory study of descriptive data around online communication during the Flint Water Crisis highlights some opportunities for enhanced messaging strategies. By delving into counts and timing of tweets (and other Twitter metrics) and news mentions, we can begin to see a pattern emerge. Among blogs, forums, news sources, and Twitter, the Sysomos platform identified 6 million mentions of the Flint Water Crisis (search term: Flint) from September 1, 2015, to July 31, 2016. Of those mentions, the overwhelming majority were on Twitter, which makes sense given the nature of the data (5.4 million or 90% of mentions; tweets being much shorter and easier to post than the other categories being measured). Further investigation of these numbers indicates that interest in Flint was localized to a few areas (Fig. 2). As would be expected, user profiles from Michigan were heavily represented in the Twitter mentions as well as major broadcast media centers, such as California and New York.

Investigating Twitter users' "authority" (i.e., the level of influence a user has, partly measured by the number of followers) and how users are engaging with the topic sheds further light on the subject. Most users had low- to medium-level authority (36% low authority, 63% medium authority), which means that, overall, the people discussing this topic were not the high-impact "social influencers" and online celebrities. Furthermore, most people (87%) tweeted about the topic once and were re-tweeting, as opposed to creating an original tweet or replying to a tweet (57%, 39%, and 5%, respectively). These data suggest that people are prone to echo messages that resonate; if environmental health officials can communicate the right message at the right time, the audience could very well amplify it. Layering these count data onto a time series adds nuance to the picture. It is not surprising that news and Twitter mentions seem to spike around major events. It is nonetheless important to recognize and potentially capitalize on that information since they represent important opportunities to enhance the public's understanding of environmental health.

When large charitable or political events (e.g., Justice for Flint or Michigan's State of the State; Fig. 3) are scheduled around an environmental health topic, professionals can anticipate a corresponding uptick in the online conversation. Furthermore, using the value of "Fairness Between Places" that has been identified as the most effective in drawing the public's support toward the field of environmental health will amplify even further any environmental health messaging.¹⁴

RECOMMENDATIONS FOR EFFECTIVE ENVIRONMENTAL HEALTH MESSAGING

There is an opportunity to proactively evaluate messaging campaigns for the multiple audiences and messaging platforms that exist. Messages could be developed and evaluated under the paradigm of comprehensive solutions, rather than focus on any particular crisis. For example: The U.S. Environmental Protection Agency awarded more than \$100 million to Flint to address lead hazards in a special, one-off funding award; however, the general lead budget for the whole country is less than \$11 million. (Note: \$21 million was also allocated to the U.S. Centers for Disease Control and Prevention for a health registry in Flint.) Tragic, highly publicized events garner financial support beyond the norm, but general operations that could proactively address underlying causes are often less well known and less well financed.

Evaluating the effectiveness of messaging is critical to creating a long-term, consistent, and successful strategy. Before launching a communication strategy, however, it is useful to identify a target audience and assess the best way to reach it. This planning could lead to an increased understanding of the target audience's beliefs, interests, characteristics, values, and influencers to develop more effective messaging.¹⁵ In an age where any given message can be amplified in an online community or die in obscurity, it is ever more crucial to match the message to the audience.

If a message is intended for only a professional audience, keeping it within those bounds is as easy as making liberal use of technical shorthand. If the content is meant to reach a broader audience, it is important to consider how that audience would naturally speak about the topic. Furthermore, issuing a message when a topic is already salient can provide an additional signal boost as described above.

¹⁴Adam Simon, Nathaniel Kendall-Taylor, and Eric Lindland. "Using Values to Build Public Understanding and Support for Environmental Health Work." *FrameWorks Institute* (2013): 5–6. <<https://www.frameworksinstitute.org/publication/using-values-to-build-public-understanding-and-support-for-environmental-health-work/>> (Last accessed on March 15, 2021).

¹⁵Centers for Disease Control and Prevention. "CDCynergy Lite." 2010. <<https://www.cdc.gov/healthcommunication/CDCynergyLite.html>> (Last accessed on March 15, 2021).

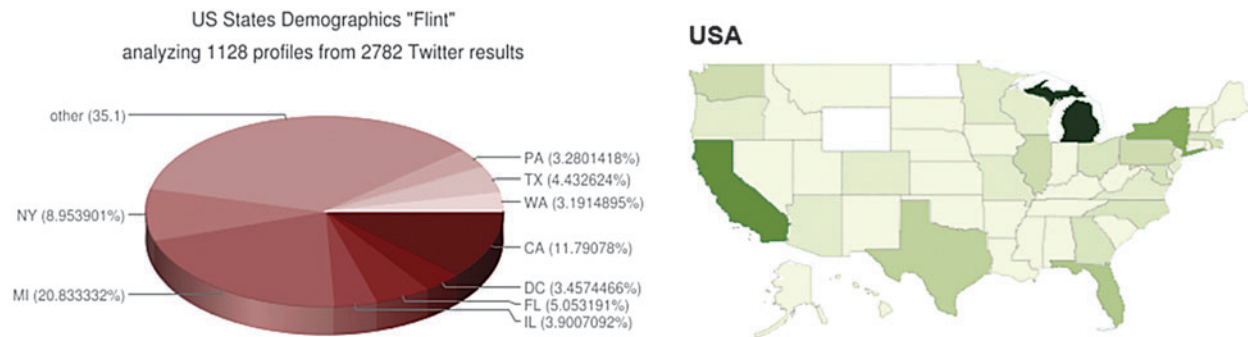


FIG. 2. Concentration of Twitter mentions by state for "Flint," September 1, 2015, to July 31, 2016. Color images are available online.

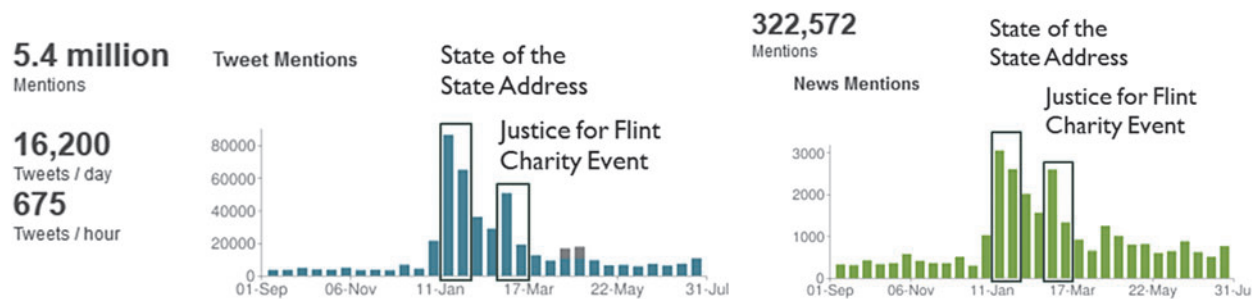


FIG. 3. Events overlaid on news and tweet mentions (search term: Flint). Color images are available online.

It is critical to create messages that educate decision makers and inform public policy. The most effective messages give policymakers insight into a state's ability to advance environmental health and alleviate public health threats and how best to direct resources. Promoting healthy families and communities requires a communications strategy that encompasses several aspects of environmental public health: community design, child-care, food safety, water quality, clean air, and sanitation. But the message must center on environmental health: both the potential for crises and the positive influences on the health of families and communities. Messaging to seek support only for environmental risk exposure will continue neglecting other sectors relevant to environmental health. It is critical to work toward a comprehensive vision of environmental health and stress its important influence on our lives. Involving communication scientists routinely in this work from inception to dissemination is critical to achieving our goal of effective messaging. One particular area of success is the advent of U.S. research-based communication centers on climate change, which has successfully applied research-based approaches to effective messaging on climate change. Lessons learned from these centers can provide models adaptable to the larger environmental health community.

MOVING TOWARD AN EFFECTIVE ENVIRONMENTAL HEALTH SYSTEM

There is no one centralized and coordinated environmental health system, but rather a series of systems of-

ferred at different levels of government—federal, state, tribal, and local. The capacity to provide services in each of these systems varies across a range of fundamental areas, including safe drinking water, clean air, chemical and food safety, solid waste management, radiation protection, and healthy and affordable housing, although all share the goal of preventing, reducing, or eliminating the presence of diseases, hazards, exposures, and negative health outcomes.^{16,17}

This lack of a cohesive system complicates the question: "Which entity is responsible for ensuring prevention of certain negative health outcomes during an environmental health crisis as well as during noncrisis periods?" The NEHPC defines an effective environmental health system as one that proactively protects and helps communities attain good health according to the following six tenets¹⁸:

1. Integrated infrastructure to consistently collect, compare, and track critical information over time to identify problems. Real-time data must also be used to inform and educate efforts to plan, execute, and assess environmental health services.

¹⁶Adam Simon, Nathaniel Kendall-Taylor, and Eric Lindland (2013). *Op. cit.*

¹⁷World Health Organization. "Capacity Building in Environment and Health (CBEH) Project. Using Impact Assessment in Environment and Health: A Framework." 2013. <http://www.euro.who.int/__data/assets/pdf_file/0007/190537/e96852-final.pdf> (Last accessed on March 15, 2021).

¹⁸National Environmental Health Partnership Council (2016). *Op. cit.*

2. Well-trained and highly skilled workforce.
3. Ample and sustainable funding from diverse sources to proactively safeguard communities with support by multiple agencies, so that funding is not contingent on any one agency's budget.
4. Policy and programs grounded in evidence-based research.
5. Cross-sectoral partnerships involving all levels of government.
6. Equitable access to environmental health messages and services.

The basic infrastructure for state and local environmental health programs does exist. However, depending on statutory authority, state programs differ, making uniform messaging more challenging. Many states have a Department of Health, which provides environmental public health services with a nonregulatory approach, and an environmental agency, which provides services aimed at complying with state and local laws and regulations. For the most part, funding and resources are provided to each agency consistent with their respective authority.

BRIDGING THE GAP: CONNECTING RESEARCH, POLICY, FINANCING, AND FUNDING

Environmental health is not always a priority area across diverse sectors, including on legislative agendas, but it impacts children and families across the country, especially high-risk communities. Decision makers can become overwhelmed by research that tends to focus on the narrow complex topics, whereas public policy, including environmental health, focuses on the broad aspects of general welfare. Critically important target audiences for environmental health messages include the decision makers and policymakers, who direct resources where they are needed most. While scientists work to share their cutting-edge research, their messages often miss these intended audiences. How diverse audiences gravitate to an issue is reflective of their awareness of the seriousness of the health threat and the media's interest in the subject. A majority of threats remain unnoticed unless, or until, a health outbreak occurs.

A way forward may involve connecting research that leads to policy changes by providing financial and health benefits. Beyond being a matter of sustaining a healthy populace, the economic research suggests that environmental health offers a sound return on investment (Fig. 4). A critical message that must be shared with decision makers is that investing in health and the environment saves lives and saves money. Each dollar spent can yield a return upward of \$100 (e.g., lead paint control can save \$17–\$221 per dollar invested.¹⁹ Asthma programs can save \$71 per dollar invested).²⁰ The desired

¹⁹Elise Gould. "Childhood Lead Poisoning: Conservative Estimates of the Social and Economic Benefits of Lead Hazard Control." *Environmental Health Perspectives* 117 (2009): 1162–1167.

²⁰Centers for Disease Control and Prevention. "National Asthma Control Program: An Investment in America's Health." 2018. <https://www.cdc.gov/asthma/pdfs/investment_americas_health.pdf> (Last accessed on March 15, 2021).

end result is an overall improvement in public health while providing the basis for fundings and policy change. As per the recommendations of the NEHPC, to achieve meaningful implementation of environmental health in all policies requires coordinated efforts across city, state, and federal agencies working together with diverse partners to champion:

1. Prevention: by strengthening protections for healthy environments by enabling federal, state, local, and tribal governments to promote resilient, equitable, and healthy communities.
2. Response: measuring environmentally related disease outcomes; funding and supporting peer-reviewed research.
3. Action: strengthening the environmental health workforce; educating the public to make informed decisions that prevent and reduce exposures.²¹

SPEAKING WITH ONE VOICE TO CHAMPION HEALTHY ENVIRONMENTS FOR ALL

To effect change, the NEHPC recommends that state and local agencies meet with their constituents to better understand their environmental health needs and priorities. Additionally, community members need to be engaged in developing and implementing environmental health communications.²² Community involvement of that nature could be a step toward communication that is the best match for the intended audience.

Public sentiment is one of the underlying mechanisms for policy change. Additional perspectives can serve as a bridge between science and the public, or science and policy. This is as true in environmental health as any other area of scientific inquiry. For example, it has been argued that nonscientists need to be key messengers in this conversation. It asserts that it is time for philosophers, playwrights, economists, and comedians to join the dialogue about the single greatest environmental health challenge of our time.²³ Scientists are rightfully focused on conducting science, but they need assistance when it comes to communicating with nonscientists. Translating the science into real-world case stories and solutions is necessary to elevate the field of environmental health.

Bringing together diverse perspectives *to speak with one voice*, we can affect change at the local, regional, and

²¹National Environmental Health Partnership Council. "How Climate Affects Your Health." <<https://apha.org/Topics-and-Issues/Environmental-Health/Partners/National-Environmental-Health-Partnership-Council/Investing-in-Environment-text>> (Last accessed on March 14, 2021).

²²American Public Health Association (2019). *Op. cit.*

²³Fred Pearce. "Destruction from Climate Change Will Be Worse, Much Worse, Than You Think." *The Washington Post*, 2019. <https://www.washingtonpost.com/outlook/destruction-from-climate-change-will-be-worse-much-worse-than-you-think/2019/02/21/8cd6ea02-24cd-11e9-ad53-824486280311_story.html>. (Last accessed on March 13, 2021).

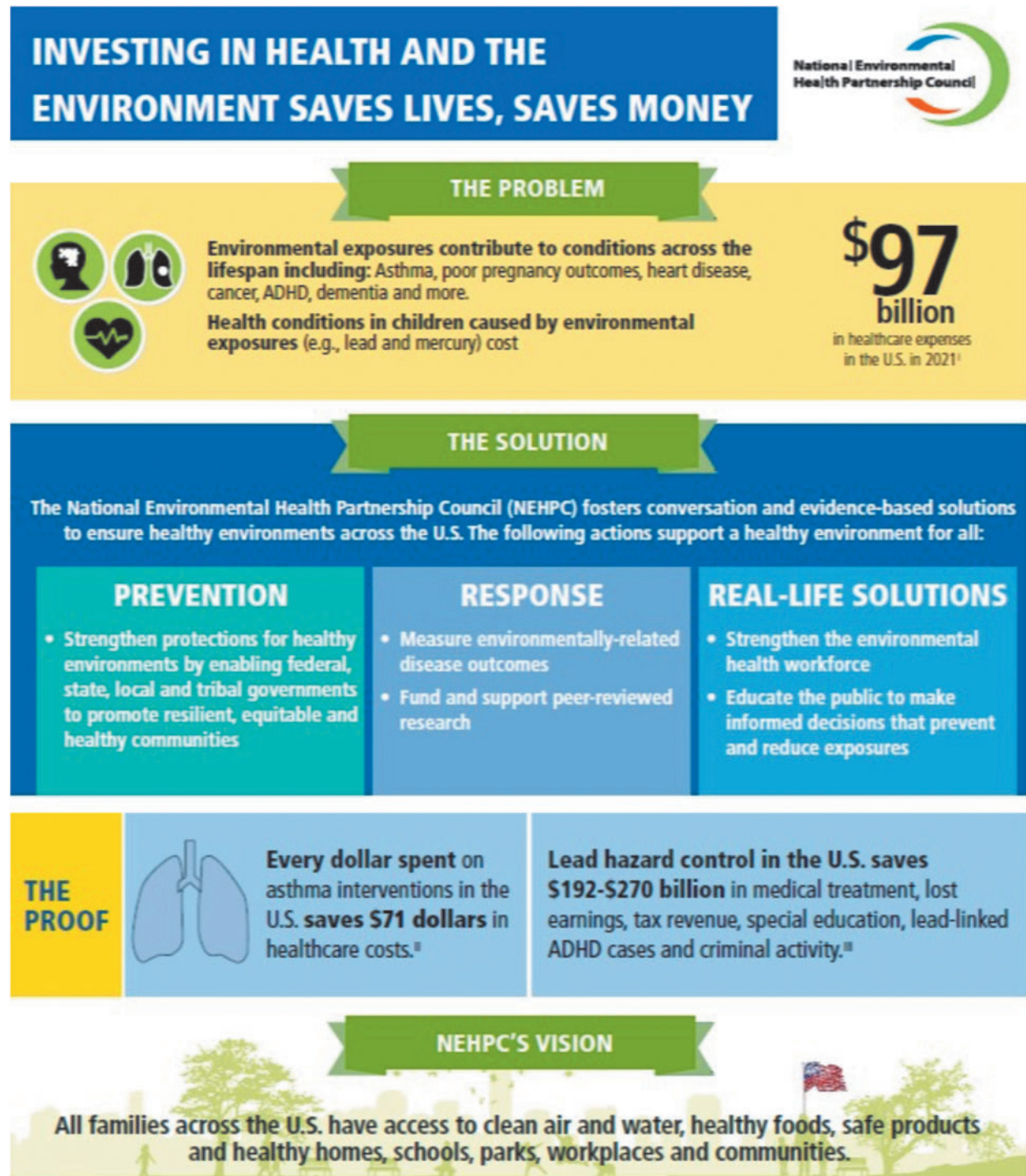


FIG. 4. Case example of the NEHPC messaging. Color images are available online.

national level. Coordination across groups—environmental health professionals, clinicians, scientists, community-based organizations and advocates, and industry—using stronger environmental health messaging is critical to generate support for the field of environmental health as a whole. We need to link health to the environments where families live, learn, eat, worship, and play, rather than responding to a single emergency situation. Likewise, we

tend to focus on potential threats as opposed to potential benefits. Improved messaging can incorporate the positive aspects of environmental health that prevent both acute and chronic health conditions across the life span. The content and wording of environmental health messaging is vital if it is intended to leverage the strongest environmental health tool available: awareness and support from the public and decision makers.

Environmental health professionals can communicate and translate the strong science that gathers the support of the public and decision makers. This can influence public policy and increase the resources available to provide environmental health programs to the people who need them. Some success stories have been a direct result of increased awareness and interest in environmental health policy from the general public, but more work remains to be done.

This article highlights important areas for improvement in our messaging and offers a tactical way forward. We need to unite diverse stakeholders in our pursuit of healthy environments, using language that effectively communicates beyond the circle of public health practitioners. We need to craft our messages in a way that resonates with everyone. It is only by *speaking with one voice* that we can effectively champion healthy environments for all communities.

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This work has not been previously published. It is not under consideration elsewhere. All authors have read and agree with the contents of the submission and have contributed substantially to the work.

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