

July 2011, as a result of EPA's ongoing collaboration with the National Institute on Minority Health and Health Disparities on environmental justice, both organizations jointly announced environmental health disparities research funding. As structured, resulting research from this effort will help both organizations meet their individual mandates through projects that help elucidate the science of health disparities and inform the development of policy and interventions.

CONCLUSION

The race to eliminate health disparities is on the fast track given the new policy initiatives, and the communities we serve are expectant. At a March 2010 Symposium, this expectation was echoed in observations by community advocates that the federal government's approach to health protection is fragmented and that EPA alone cannot resolve their issues. By way of responding to their requests for more collective action, EPA has begun reaching out to its federal partners to work together toward addressing health

and environmental issues in their communities. Moving forward, it is an act of progress if we invest time and energy during the developmental stages of these initiatives to create a work environment that promotes collaboration across federal agencies on new initiatives and programs, coordination between partners on existing programs, and achieves the important goal of leveraging scarce fiscal resources across programs to reduce health disparities in our overburdened communities. ■

*Onyemaechi C. Nweke, DrPH, MPH
Charles Lee*

About the Authors

Onyemaechi C. Nweke and Charles Lee are associated with the Office of Environmental Justice, US Environmental Protection Agency, Washington DC.

Correspondence should be sent to Onyemaechi C. Nweke, DrPH, MPH, MC 2201A, Office of Environmental Justice, Office of Enforcement and Compliance Assurance, 1200 Pennsylvania Ave., NW, Washington, DC 20460 (e-mail: nweke.onyemaechi@epa.gov). Reprints can be ordered at <http://www.ajph.org> by clicking on the "Reprints/Eprints" link.

This editorial was accepted September 1, 2011.

At the symposium "Strengthening Environmental Justice Research and Decision Making: A Symposium on the Science of Disproportionate Environmental Health Impacts," held in Washington, DC, March 17–19, 2010, participants identified research and scientific needs to advance the ability of the US Environmental Protection Agency (EPA) to address environmental justice (EJ) concerns and social disparities in environmental health. Recommendations were made on new ways of conducting scientific inquiry designed to inform environmental decision-making

doi:10.2105/AJPH.2011.300377
Note. The views expressed in this article are those of the authors and do not necessarily represent those of the US Environmental Protection Agency. No official agency endorsement should be inferred.

Contributor statement

C. Lee provided overall direction for the editorial. O. Nweke and C. Lee conceptualized ideas and reviewed drafts of the manuscript. O. Nweke led the writing and coordinated reviews of the manuscript.

Acknowledgments

The authors gratefully acknowledge the insightful comments from Heather Case, MPH, MBA, and Arati Tripathi, JD, on the final draft of this manuscript.

References

- Clinton WJ. Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. 59 FR 7629. February 24, 1994.
- US Environmental Protection Agency. *EPA's Action Development Process: Interim Guidance on Considering Environmental Justice During the Development of an Action*. Washington, DC: US Environmental Protection Agency; 2010.
- US Environmental Protection Agency. Draft Plan EJ 2014. Available at: <http://www.epa.gov/compliance/ej/resources/policy/plan-ej-2014.pdf>. Accessed June 27, 2011.
- Solar O, Irwin A. *A Conceptual Framework for Action on the Social Determinants of Health*. *Social Determinants*

of Health Discussion Paper 2 (Policy and Practice). Geneva, Switzerland: World Health Organization; 2010.

- US Department of Health and Human Services. Healthy People 2020. The vision, mission, and goals of Healthy People 2020. Available at: <http://www.healthypeople.gov/2020/default.aspx>. Accessed June 23, 2011.
- US Department of Health and Human Services. National Partnership for Action to End Health Disparities. Available at: <http://minorityhealth.hhs.gov/npa>. Accessed August 21, 2011.
- US Environmental Protection Agency. Memorandum of understanding on environmental justice. Available at: <http://www.epa.gov/compliance/ej/resources/publications/interagency/ej-mou-2011-08.pdf>. Accessed August 22, 2011.
- Office of Minority Health. Federal collaborative on health disparities research. Available at: <http://minorityhealth.hhs.gov/fchdr>. Accessed August 22, 2011.
- US Department of Health and Human Services. National prevention, Health Promotion, and Public Health Council. Available at: <http://www.healthcare.gov/center/councils/nphpphc>. Accessed August 21, 2011.
- US Environmental Protection Agency, Housing and Urban Development, Department of Transportation. Partnership for sustainable communities Brownfields Pilots—Boston, Massachusetts. Available at: http://www.epa.gov/brownfields/sustain_plts/factsheets/psc_fs_boston_ma.pdf. Accessed August 22, 2011.

Humanizing Science at the US Environmental Protection Agency

and adequately address environmental justice stakeholders' concerns about the environment, sustainability, and health inequalities. As a co-organizer of the symposium, I analyze these EPA recommendations and propose a new framework to address them that supports environmental justice at the EPA—the Environment Health and Society Research program.

When environmental scientists can demonstrate that pollution, environmental degradation, and ecosystem damage affect social groups unevenly, their research may generate much larger interest

and may lead to more support for remediation. This approach to environmental research "humanizes the science [and] can be a galvanizing force, a lightning rod for scholarship and action."¹ Furthermore, when affected citizens actively participate in the process to better understand science and inform policy responses, better decisions emerge as a result. The symposium participants echoed this need for humanizing science at the EPA. Representatives from community-based organizations stood at the podium on the last day of the symposium and offered

to partner with the EPA to implement a plan to achieve this aim, challenging the EPA to try something different.

For the EPA to bring about greater progress for EJ over the next decade, some aspects of the underlying scientific enterprise at the EPA—those that serve as a foundation for environmental decision-making—need to change. Not only do the EPA’s research questions and scientific products need to change, but the manner in which the EPA conducts its science-related activities must change as well.

SYMPOSIUM OBSERVATIONS

The EPA prides itself on using the best available science to inform environmental decisions as it carries out its mission to protect the public’s health and the environment. The symposium brought together a diverse audience composed of community and EJ leaders, researchers, and agency scientists to share their perspectives on the state of the science on EJ and disproportionate environmental impacts. Furthermore, it was an opportunity to explore how multidisciplinary science can be best applied to develop improved analytical and decision frameworks that can be used by the EPA and other federal, state, and local governments to better quantify and characterize disproportionate environmental health impacts on minority and low income populations. Given the diversity of perspectives in the room, there were tensions between participants who felt the need to study these issues further and those who wanted the EPA to act on what is already known.

Despite these tensions, agency scientists and representatives from impacted communities and

EJ organizations benefited from interacting and participating in the same science discussions. For some agency scientists it was valuable to learn directly from community leaders about how environmental health problems disproportionately affect minority populations and the extent to which EPA policies and regulations were or were not successful on the ground. Whereas the EPA can promulgate standards to protect public health, it is usually left to individual states to implement programs. A regular evaluation of the functioning of EPA policies and programs is needed—particularly when aimed at addressing environmental inequities. Community input into the evaluation process is also critical.

Symposium discussions indicated that citizens living in impacted communities were unaware of existing EPA research and current initiatives, such as the Urban Waters initiative, and the range of science-related activities that the EPA engages in from the more visible and frequent target of community complaints, enforcement, and permitting decisions. These other science-related activities (e.g., air and water quality standard setting, policies on how to conduct exposure assessment, and the development of research agendas) are also citizen-input opportunities that will improve the environmental decision-making process.

PARTICIPANTS’ RECOMMENDATIONS

Symposium participants learned during the state-of-the-science sessions that the causes of (and contributors to) disproportionate environmental and health impacts and burdens are complex, and the solutions involve political, social,

and biomedical dimensions. Multiple factors (i.e., social, psychosocial, economic, physical, chemical, and biological determinants) contribute to disproportionately high and adverse human health or environmental impacts. Social science disciplines, such as social epidemiology, indicate that the EPA needs to look more at upstream factors (i.e., social processes that ultimately produce the disparities in risks and health outcomes). This is especially important given that emerging evidence demonstrates that social context may enhance the toxic effects of single and multiple environmental contaminant exposures. Symposium participants were concerned that the EPA had not prioritized research on vulnerability, particularly the social and cultural aspects of it in the agency’s research programs. Participants therefore recommended that the EPA develop and adopt a new scientific research approach that would lead to a more holistic understanding of the environment and public health. This new approach should include the development and implementation of a multimedia approach to cumulative contamination exposures in communities facing environmental justice issues.

Furthermore, risk assessment practices were critiqued. Participants suggested that the risk assessment paradigm should be restructured to account for multi-level stressors that result in cumulative impacts in US communities and populations. Recommendations included consideration of qualitative approaches in risk assessment and the use of multidisciplinary teams in environmental health research. EPA scientists need to recognize that concepts such as population vulnerability (increased risk of exposures

to environmental pollutants or adverse health outcomes resulting from social conditions) and health disparities are interrelated and must be studied within the risk assessment paradigm. Environmental and health assessments used to support regulations or policies should also consider impacts on culture and social conditions, of particular importance to ethnic minorities and tribal populations. Health Impact Assessment was highlighted as a better approach than one strictly relying on risk assessment.

Prioritization of research needs and evaluation of science programs at the EPA is often conducted by individuals of similar background and social standing as scientists at the EPA. Citizen input is not a regular feature. Regarding EJ research needs, the main venue for community input has occurred through the health and research subcommittee of the National Environmental Justice Advisory Committee (NEJAC). However, that subcommittee was disbanded several years ago. Symposium participants recommended that the EPA implement a system for regularly integrating perspectives from impacted communities in the development of the EPA’s scientific research agendas as well as in data collection, conduct of exposure and risk assessments, and risk management decisions and not simply as part of public comment periods. Most, if not all of the participants said that they would like a research workgroup reinstated within the NEJAC.

Strong recommendations were made regarding the involvement of affected communities in conducting research: to ensure that results be disseminated in an effective and understandable manner and that research recommendations be reviewed by the

community. Symposium participants wanted to see an increase in EPA-funded and supported community-based participatory research (CBPR) as well as transdisciplinary research, with a specific focus on studies that benefit disadvantaged, underserved, and environmentally overburdened communities or groups. CBPR² and community originated and owned research³ are two approaches that support participation of communities as equal partners in research so that their perspectives are incorporated in the design of as well as the policies and intervention programs that may result from that research.

Collaboration with other federal government agencies on research, policymaking, and other kinds of actions to address environmental health disparities was also recommended. It was noted that current government approaches to promoting and managing health are fragmented. Agencies need to work together to formulate solutions for communities, and agencies should integrate EJ in all their activities. For example, comments were made about the need to strengthen interagency efforts to address environmental health disparities. The US Department of Health and Human Services National Partnership for Action to End Health Disparities and the Federal Collaboration on Health Disparities Research were noted as opportunities for partnership with the EPA.

Many recommendations were made regarding building science capacity inside and outside the EPA. Programs are needed, with federal government support, to increase technical and scientific capacity in communities and among community-based EJ organizations. This capacity building can help the public to address environmental health issues and to effectively

participate in environmental health decision-making. Capacities of minority academic institutions (MAI) should be developed to further enhance their participation in scientific research and workforce training. For instance, the EPA and other federal agencies could help MAI institutions provide training opportunities for minority students in scientific disciplines relevant to address environmental justice. Finally, participants stated that EPA and Office of Research and Development staff and scientists must develop the capacities and skills to conduct research and other science-related activities in partnership with impacted communities. This step must include diversifying the EPA's technical and scientific expertise in the social sciences. For example, EPA staff and risk assessors need training on effective outreach, dialog, and interaction with communities to build collective efficacy and social capital instead of typical one-way risk communication.

ENVIRONMENT HEALTH AND SOCIETY

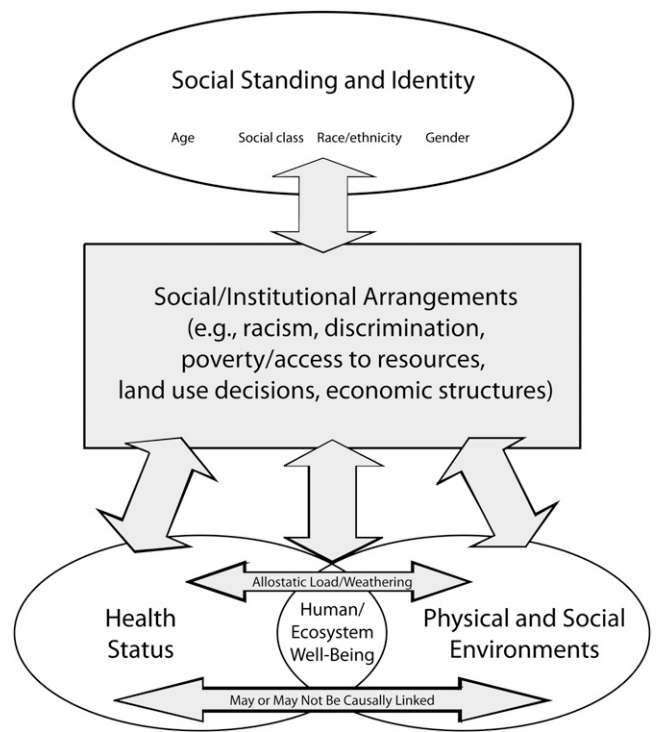
These recommendations show that the EPA's heavy reliance on toxicology, single chemical risk assessment, measurement of individual (human)-level contaminant exposures, and top-down risk communication is not sufficient to make progress toward ending environmental health disparities and environmental injustices. EPA assessments and regulatory decisions that rely exclusively on areas like toxicology and engineering do not fully consider the scope of the human relationship to the environment and the resulting impact on human health. EPA-supported research, assessments, and solutions are rarely aimed at why these hazards are there in the first

place, at who and what systems create and maintain the observed racial/ethnic and class disparities in exposures or environmental degradation, and at what can be done to prevent these hazards from impacting the community. Focusing research and policies on the processes that lead to environmental inequities and then on the measures needed to alter these unjust processes (as opposed to focusing on single cases of environmental inequality) will likely lead to the greatest social and environmental improvements.

Scientific approaches, research, data, methods, and tools used by agency staff to support environmental regulatory decisions, policies, and other interventions need to be better designed to more fully understand and address the complex interactions between so-

cial, natural, and built environmental systems, conditions, and policies that result in unequal environmental health conditions or disproportionate impacts among diverse disadvantaged population groups, communities, neighborhoods, and individuals. The research and science enterprise at the EPA needs to be expanded to include a focus on the root causes of the disparities impacting minority and low-income populations and communities; the research and science-related activities need to be more participatory and more engaged with impacted communities and groups that represent impacted communities.

To address these issues, I propose that the EPA establish a research program entitled Environment Health and Society (EHS). This EHS program would



Source. Adapted from Wakefield and Baxter 2010 model on compounded disadvantage and its impacts on environmental health.¹⁰

FIGURE 1—Environment Health and Society conceptual framework.

seek to understand these complex relationships and develop information, data, and tools that would inform solutions pertaining to environmental and health concerns, especially those relating to inequalities among low-income, minority, underserved, and overburdened populations and communities in the United States.

The EHS program would be informed by several conceptual frameworks published in the last few years that relate environmental justice and health disparities to upstream, structural determinants of health.⁴⁻¹⁰ In particular, the Wakefield and Baxter framework¹⁰ of compounded disadvantage and impacts on well-being offers a comprehensive yet simple diagramming of key concepts for an EHS program (Figure 1). Based on this conceptual framework and review of the literature, research questions to be addressed by EHS are illustrated in the box on this page.

The overarching goals for the program would be (1) improving the scientific basis for environmental regulatory and policy decisions to ensure that everyone is protected from environmental

and health hazards and has equal access to the decision-making process to have a healthy environment in which to live, learn, and work; and (2) transforming how the EPA formulates, designs, prioritizes, conducts, and supports the scientific research enterprise to incorporate more citizen participation (leading to a coproduction of knowledge) and collaborative processes to increase the relevance of science to policymaking.

EHS would reach the goals through a five-point plan:

1. Apply integrated transdisciplinary and community-based participatory research approaches with a focus on addressing multimedia, cumulative impacts, and equity in environmental health and environmental conditions.
2. Create mechanisms to incorporate perspectives from community-based organizations and community leaders into EPA research agendas and engage in collaborative partnerships with them on science and research to address environmental justice.
3. Leverage partnerships with other federal agencies on issues

of research, policy, and action to address environmental health disparities.

4. Build and strengthen the technical capacity of EPA scientists to conduct research in partnership with impacted communities and translate research results to inform change.
5. Build and strengthen the technical capacity of community-based organizations and community environmental justice and health leaders to address environmental health disparities and environmental sustainability issues.

The EHS program would be staffed by an interdisciplinary team and would include both extramural and intramural research. EHS would link with existing EPA research programs as well as EPA environmental media-specific program and regional offices to address their science needs relevant to environmental justice.

CONCLUSIONS

Under the current administration, environmental justice has received

significant attention. In fact, the EPA has stated that environmental justice is a top priority for the agency and is now incorporated into the agency's strategic plan as a crosscutting strategy. To put this priority into action, the EPA has launched an initiative called Plan EJ 2014. This new initiative references recommendations from the symposium, including science activities, and embraces the proposed EHS framework. We need to go even further, however. Critiques of the EPA and recommendations on science from the symposium are not much different from those of previous EJ research conferences (e.g., "Equity in Environmental Health" hosted by the EPA, the Agency for Toxic Substances and Disease Registry, and the National Institute of Environmental Health Sciences in August 1992). The EPA has a real opportunity to turn this around. Instead of individual research projects, we need a comprehensive, bold, concentrated research function at the EPA that specifically focuses on addressing social inequalities in environmental

Environment Health and Society Research Questions

1. What are the complex interactions between social, natural, and built environmental systems, conditions, and policies that result in unequal environmental health conditions or disproportionate impacts among (diverse) disadvantaged population groups, communities, neighborhoods, and individuals?
2. How do current systems of environmental governance create or sustain or exacerbate disproportionate environmental burdens experienced by socially disadvantaged populations and communities?
3. Who and what drives current and changing patterns of social inequalities in environmental health?
4. How does environmental inequality arise and why does it persist? What is the role of institutionalized racism (ideology), economy of industrial development and production (industrial location, racialized division of labor, suburbanization, and blocks to exit and economic restructuring)?
5. How do the following processes contribute to and create environmental inequalities among certain populations and communities: suburbanization, land use planning, residential segregation, exclusionary zoning, banking systems (mortgage guarantees), transportation policies, housing policies, property speculation?
6. What is the role of systemic economic inequalities, uneven regional development in creating and or maintaining inequalities in environmental health and distribution of environmental hazards and environmental quality?
7. What new strategies can be developed for alleviating systemic drivers of racial and socioeconomic disparities in environmentally mediated health outcomes (environmental health) and access to healthy environments?

conditions and environmental health. Institutionalizing a program for science to support environmental justice such as the EHS is a key to integrating environmental justice throughout the EPA's research and science-related activities. ■

Devon Payne-Sturges, DrPH

About the Author

Devon Payne-Sturges is with the National Center for Environmental Research at the US Environmental Protection Agency, Washington, DC.

Correspondence should be sent to Devon Payne-Sturges, DrPH, Assistant Center Director for Human Health, ORD/National Center for Environmental Research, 1200

Pennsylvania Avenue NW, Mail Code 8723P, Washington, DC 20460-0001 (e-mail:payne-sturges.devon@epa.gov). Reprints can be ordered at <http://www.ajph.org> by clicking the "Reprints/Eprints" link.

This editorial was accepted September 2, 2011.

doi:10.2105/AJPH.2011.300369

Note. The views expressed in this editorial are solely those of the author and do not represent official US Environmental Protection Agency policy.

References

1. Boone CG. Environmental justice as process and new avenues for research. *Environmental Justice*. 2008;1(3):149–153.
2. Freudenberg N, Israel B, Pastor M. Strengthening community capacity to participate in making decisions to reduce disproportionate environmental exposures.

Am J Public Health; 2011;101(suppl 1):S123–S130.

3. Heaney CD, Wilson SM, Wilson OR. The West End Revitalization Association's community-owned and -managed research model: development, implementation, and action. *Prog Community Health Partnersh*. 2007;1(4):339–349.

4. Gee GC, Payne-Sturges DC. Environmental health disparities: a framework integrating psychosocial and environmental concepts. *Environ Health Perspect*. 2004;112(17):1645–1653.

5. Krieger N. Theories for social epidemiology in the 21st century: an ecosocial perspective. *Int J Epidemiol*. 2001;30(4):668–677.

6. Habermann M, Gouveia N. Environmental justice: an ecosocial health

approach. *Rev Saude Publica*. 2008;42(6):1105–1111.

7. Morello-Frosch R, Pastor M Jr, Porras C, Sadd J. Environmental justice and regional inequality in southern California: implications for future research. *Environ Health Perspect*. 2002;110(suppl 2):149–154.

8. Morello-Frosch R, Shenassa ED. The environmental "riskscape" and social inequality: implications for explaining maternal and child health disparities. *Environ Health Perspect*. 2006;114(8):1150–1153.

9. Schulz AJ, Williams DR, Israel BA, Lempert LB. Racial and spatial relations as fundamental determinants of health in Detroit. *Milbank Q*. 2002;80(4):677–707.

10. Wakefield SEL, Baxter J. Linking health Inequality and Environmental Justice: Articulating a Precautionary Framework for Research and Action. *Environmental Justice*. 2010;3(3):95–102.

A Renewed Commitment to Environmental Justice in Health Disparities Research

Today, environmental justice and health equity have come to represent powerful principles of fairness. They demonstrate the potential to promote issues of equality in our public policies as they affect diverse population groups and establish the predicate for positive change in those communities.

In many ways, challenges faced by the environmental justice community and efforts in the health disparity communities have paralleled those of the civil rights movement. Both endeavors focused on addressing the issues of racism and poverty, the threats of toxic pollution and unsafe environments, democracy, and the compelling need to achieve equity in providing basic social goods and services. Although much of the early activities of environmental justice research have examined the disproportionate distribution of hazardous facilities located in marginalized communities, the principles in both movements have broadened to include interventions on the social and economic processes involved in perpetuating environmental

health injustices.¹ Environmental justice and health disparities reduction activities extend beyond traditional notions of environmental pollution or health care issues to addressing population health, employment, working conditions, food security, transportation, zoning laws and land use, and, ultimately, the organization of our nation's programs and policies. The foundation of both movements determines the extent to which they ensure equal opportunities to all citizens to obtain access to goods and services—conditions that are critical to functioning in a just and productive society. This includes the extent to which communities are exposed to healthy environments, provided with resources to achieve social capital, satisfy member needs, and cope with societal challenges.

THE IMPACT OF POVERTY

Across regions of the United States, there is evidence of geographic variation associated with disparities in health status. Regions with concentrated poverty have a higher probability of their

populations exhibiting fair or general poor health, exhibiting poor mental health, and having high prevalence of diabetes, hypertension and stroke.² Impoverished communities, especially those with segregated racial and ethnic minority populations, are also at greater risks living in settings of environmental degradation, hazardous waste, and toxins that negatively impact health.³ These communities are characterized by an overall lack of community resources and the economic power to improve these conditions on their own. The impacts of poverty and the burden of environmental degradation are most evident in the three regions that rank the lowest across the nation in terms of life expectancy and poor outcomes. Marlboro County, South Carolina, an impoverished rural community with approximately 29 000 residents has an average life expectancy of 69.6 years, one of the lowest in the country. Approximately 31% of the residents are living below the national poverty level. There are high unemployment rates, and more adolescents aged 15 to 17 year are referred to the criminal justice