
Climate Change, Health Sciences, and Education

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The late James P. Grant, who served as Director of UNICEF from 1980 to 1995, spoke of “the silent emergency,” embodied in the “daily tragedy of millions of children caught in the relentless downward spiral of poverty, population, and environmental degradation.”¹ Were he alive today, he would undoubtedly have placed climate change, a silent emergency of enormous consequence, at the center of this vicious spiral. Indeed, the profound disruption of the earth’s ecosystems has replaced environmental degradation as the operative term.

The scholarly papers in this special issue of the *American Journal of Preventive Medicine*^{2–13} document in sobering detail that the direct and indirect effects of climate change on public health are more complex and pervasive than any other issue confronted by public health professionals. Facing that complexity and pervasiveness will be essential to developing and deploying successful strategies for protecting public health in a time of global climate change as it exacerbates the impacts of continued population growth, and the growing scarcity of water, cropland, and other resources essential to ecologic health, as well as greater demands for equity and economic prosperity.

Most scientific advances in the modern era have come from the application of a Cartesian reductionist approach to the study of nature, with its distinctions between parts and wholes and the isolation of individual causes and effects. This approach to the study of nature and biological systems dominates education in the health and environmental sciences and has, with patience, yielded many good results. Yet, a purely reductionist approach to the many health effects of climate change is stymied by their variety and complexity; with direct and indirect impacts at global, regional, and local levels, many of which are only beginning to be recognized and comprehended. An understanding of complex systems with multiple interactions and feedbacks like the challenges described in this issue of *AJPM* requires a systems-based approach that does not fail “to see the forest for the trees.”

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This has several implications for education. The first is that education on the health effects of climate change must be rooted in an appreciation of the climate–public health relationship as part of a dynamic and complex whole that has impacts through the ecology of disease, general health, vulnerable communities, food security, water, biodiversity, and other channels.

A second implication is that education about climate change and health needs to address not just the public health community, but policymakers, non-health trained scientists, non-scientifically trained professionals, and the general public. Each audience requires an education tailored to its needs and scientific abilities (or lack thereof). Thus, for example, educators must consider injecting (1) climate change ecology into health sciences training, (2) health sciences into other sciences addressing climate change, and (3) both climate change science and health sciences into educational activities directed at other target communities such as environmental law and political science. Developing and carrying out such education will require new partnerships among public health, climate change scientists, and education specialists experienced with each audience.

The public health community brings certain advantages to systems education relative to other players. Public health has for decades recognized the interconnectedness of human health and the environment and has pioneered interdisciplinary approaches that connect biomedical research with the physical and life sciences and social and behavioral sciences. The need to educate the public about risk reduction and behavior change on issues as varied as influenza and AIDS has stimulated the development of methods to communicate scientific data to the public.

In contrast, many environmental professionals examine only nonhuman systems and overlook health issues entirely. Climate change scientists are a mix of systems thinkers (few), interdisciplinary people (some), and disciplinary thinkers (most), and with few exceptions, have no experience with effective public education efforts. Climate change scientists need both direct education themselves and the tools to educate their peers and students. The existing expertise and capacity of the public health community needs to be developed in the climate change–science community. Some steps have been made along this road by, for example, the

UN Intergovernmental Panel on Climate Change in its periodic reports.¹⁴

Many policymakers and the public typically struggle with scientific uncertainty (weather forecasts excepted) and make health trade-offs that are often at odds with objective, quantitative, probabilistic thinking. High risks are accepted in some areas of life, while little or no risk is tolerated in other areas. The educational demands of issues where behavior affects primarily the decision-maker, such as whether to wear a seatbelt or a helmet, compared to an issue where the consequences of individual action are spread across distant communities over long time periods are significantly greater. Still, the public health community is experienced in making recommendations and decisions in the face of uncertainty and including the multiple key determinants of a given problem.

Education about health consequences of climate change is only part of the challenge. Environmental and health professionals need to be educated to understand and communicate about the health consequences of an impaired environment and the ecologic consequences of unhealthy human behaviors. This is the base underlying the systems approach that we propose.

Climate change calls on the public health community to build on all the lessons of the past and lead new efforts to work with others outside their community in research, in the development and deployment of strategic responses, and in the provision of education aimed at diverse communities. Some of the authors and papers in this issue of *AJPM* illustrate that just such a response is beginning to get underway.

In moving to more specific recommendations on education, we must recognize that even the most thoughtful scholars, such as those authoring these articles, are still only beginning to comprehend the full complexity and pervasiveness of the health effects of climate change. Still, interdisciplinary groups and multi-stakeholder groups are coming together and have developed some constructive recommendations.

Participants drawn from health, environmental, and policy communities at the 7th National Conference on Science, Policy, and the Environment: Integrating Environment and Human Health (January, 2007) organized by the National Council for Science and the Environment (NCSE) recommended a number of approaches to include environmental health and climate change in health sciences education. Some of the most interesting were:

- Increase the number of questions on certification and board examinations about environmental health, including emerging climate change issues.
- Faculty and students from various academic backgrounds should collaborate in a multidisciplinary/

transdisciplinary approach to environmental health education.

- Academic institutions should create incentives for faculty to develop expertise to incorporate environmental health and ecology into curricula.
- Federal agencies such as the NIH, the Environmental Protection Agency (EPA), and CDC should increase training grant funding for the development of leaders to become experts in the field of environmental health and climate change.
- Faculty should use community-based approaches in teaching environmental health and develop environmental health modules that emphasize ecology and climate change.
- Medical and nursing schools should include education in human ecology and environmental health and the clinical aspects of climate change such as heat stroke in residency programs.
- Government agencies and private donors should increase funds for centers of environmental health excellence to support a network of health professionals who are experts in environmental health, ecosystems, and climate change.
- Special efforts should be made to recruit trainees from low-income communities and communities of color that are at greatest risk from the health effects of climate change.

Similar recommendations were made for bringing health into environmental education, emphasizing the critical importance of systems thinking to make the links among climate change, alterations of the ecosystem, and the impact of these changes on human health. The urgency of the issues demands new ways of thinking about the use of K–12 education to lay the foundation for a greater understanding of the environment and its relationship to human health. The Sarbanes–Reed *No Child Left Inside Act of 2008* is an example of the legislation needed to support the education of a new generation of stewards of the environment.¹⁵

Last, but far from least, we wish to recognize the transcendent issue of human population growth, which coupled with a desire to share in the affluent quality of life that most of us in the West enjoy, is a significant driver for greenhouse gas production and climate change. The education of health and environment professionals in demography, population control measures, and the barriers to reducing fertility rates is an essential component of climate change mitigation.

The complexity and pervasiveness of the health effects of climate change require tailored and widespread education efforts targeted to health, climate change, policy, and public communities. This will not be easily or quickly accomplished and requires the participation of many communities supported by significant resources. The experience and expertise of the public health community makes it uniquely qualified to lead

such efforts. We are optimistic that this issue of AJPM demonstrates that such leadership is emerging.

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