

Insidious Trends and Social/Environmental Justice: Public Health's Challenge for Responding to Hazard Events

Global climate change, proliferation of nuclear and other weapons of mass destruction, unsanitary conditions in developing nations, freshwater shortages in much of the world, food insecurity, and many other global threats remind us that the world's population of more than seven billion faces daunting challenges. On top of these recognizable threats are five insidious trends that place political and economic pressure on public health's ability to respond to hazard events. After describing the trends, I assert that the pressures they create disproportionately impact disadvantaged populations and illustrate this with an example of the senior population. I then suggest three positive steps that I believe public health should and will take to be effective despite the trends.

INCREASING BUDGET CONSTRAINTS

Doing more with less has reached the status of a mantra as computers, communication devices, more databases, and a few smart people replace multiple seasoned staff, an appropriate budget, and time to contemplate and analyze issues. Efficiency and cost savings may appear reasonable to budget-conscious managers and elected officials until a disastrous event occurs. Postevent, we are likely to learn that the scientific and management "failure" was caused by a lack of investment in personnel, an inability to maintain and update equipment and data, and a lack of time to consider different designs and evaluate results. Recent history tells us that industry and government respond to hazard events by infusing resources only until the threat no longer seems imminent and the political pressure has faded. Examples are the government and

industry responses to the Gulf oil spill (2010), the nuclear power failures at Fukushima-Daiichi (2011), and Hurricanes Katrina (2005), Irene (2011), and Sandy (2013). The decisive steps to dramatically reduce the likelihood of equally severe or worse consequences from such events still have not been undertaken.

INCREASING SHORTAGE OF QUALIFIED ANALYSTS

Some of the most qualified scientists and managers are leaving both government and business service.¹ There is a documented shortage of skilled workers,² especially those who work with hazardous nuclear, chemical, and biological agents. An inexperienced or shorthanded staff can make mistakes when systems are not functioning as expected or when timely decisions are critical. Even experienced personnel should be systematically kept up to date and challenged with training drills. Unfortunately, because workers' time is expensive, too little training time is built into work schedules. For example, my research group was asked to prepare a classroom-based curriculum to help bus drivers with terrorist threats. When transportation companies calculated the cost of training tens of thousands of bus drivers in a classroom setting, they balked. They opted instead for a 25-minute video, a solution that saved them money but could not substitute for four hours of in-class training. Many industries dealing with hazardous materials are especially faced with a skilled worker shortage. For instance, the nuclear industry has begun to address their own labor shortage by signing an agreement with the US Navy to place naval personnel in their skilled positions.³

INCREASING SECURITY AND HEALTH CHALLENGES

New biological, chemical, and physical agents can be beneficial, but not always. There is pressure to quickly bring these products to market because of economic competition and fear that new science cannot be protected from cyber and other forms of theft. Can the impact of scientific research with public health implications be properly evaluated when security concerns and economic pressure limit external review and review time? Of particular concern are nanoparticles. While touted by some as a panacea to health and commerce,^{4,5} many scientists and the public at large fear the implications of encouraging the widespread use of nanoparticles before time-consuming testing. The same concerns hold for fracking, genetically modified organisms, and other new technologies. The public health verdict on these and other new technologies is not in, and it may not be for decades.

PREDICTING AND MANAGING ACUTE HAZARD EVENTS

Despite the overall reduction in mortality across much of the globe, natural and anthropogenic hazard events stimulate public fear, provide a deep reservoir of events for risk-amplified mass media stories, and contribute to reducing public trust in the ability of private and governmental agencies to manage hazards.⁶ Environmental scientists are expected to produce simulation models that can quickly and accurately predict where and when hazard events will occur. Public safety and health personnel are expected to predict the likely consequences of the event, and to

efficiently manage risk reduction and response. Unfortunately, predicting the precise time, location, and magnitude of a single event is fraught with a high degree of uncertainty. When forecasts fail to precisely predict a hazard event, scientists lose both credibility and funding. In Italy, seven scientists were prosecuted and sentenced to prison because they failed to adequately warn the public about an earthquake.⁷ Was their failure to forecast a low-probability, high consequence event a crime, or was their conviction the result of unrealistic expectations? Unfortunately, we will have many opportunities to find out. For example, between June 8, 2014, and June 23, 2014, as I was rewriting this editorial, I found information about eight natural hazard events in Afghanistan, Brazil, Cape Town, China, Colombia, Germany, Nebraska, and Nepal that killed approximately 150 and required the evacuation of about 350 000 people.⁸

INCREASING GLOBAL CONNECTEDNESS

Fukushima, the Gulf of Mexico oil spill, and Chernobyl demonstrate that hazard events do not respect political boundaries. Some of the most vulnerable places in the world lack the scientific and organizational capacity to understand risk data and implement policies to protect their populations and assets. Increasing global interconnectedness requires that information about environmental and occupational health risks and their management be diffused so that vulnerable populations and neighboring states are effectively informed and kept updated. An example of this was the creation of a group to study hazard and

crisis management from industrial accidents along the Danube River.⁹ The group, along with the 1989 Basel agreement about the movements of hazardous waste, offers a model of how governments and their populations will be kept informed about health and environmental risks that do not respect political boundaries.

SOCIAL AND ENVIRONMENTAL JUSTICE

Social and environmental justice are long-standing themes in this journal.^{10,11} If we assume that income inequalities will not go away anytime soon, and that the world population will continue to age and a large proportion will face significant health challenges, it becomes clear who will disproportionately suffer from the insidious trends described above. The elderly, disabled, children, and selected racial and ethnic minorities, especially those who live in economically distressed environments and lack political power, will bear the brunt of the trends' negative consequences.

Consider the example of seniors, many of whom are poor, have physical disabilities, and most of who do not live in group quarters. After controlling for region of event, public health studies show that the relative risk of seniors dying as a result of earthquakes, fires, floods, heat and cold waves, influenza and many other biological agents, and tornadoes is two to 10 times higher than the risk for the 18- to 64-year-old population. The likelihood of death from one of these events increases substantially as seniors move into the 75-year-old and older age group and again when they reach 85 years of age.¹² While public health and

other communities have given considerable attention to hospitals, nursing homes, assisted living, and other congregate facilities to address vulnerable populations during hazard events,^{12,13} their efforts will not reach the vast majority of seniors. Many seniors may need to shelter in place because they cannot or will not evacuate, perhaps because they live where there is no access to public transportation, do not have access to a functioning personal vehicle or, if they do, can no longer drive it. Some may simply be too disabled to relocate. Given the trends described above, the resources and expertise to plan for and deal with this population when a major event occurs are unlikely to be available.¹⁴

PUBLIC HEALTH RESPONSES

Public health as a field and public health professionals in particular have been remarkably resilient over the years. I would expect no less going forward.¹³ While public health may continue to lose financial resources, we have increasing access to vital information and the expertise of our colleagues because of ever-improving communication tools.⁵ We can contact experts from all over the world via the Internet, as long as they, too, are connected. Our challenge is to strengthen these linkages by finding ways to overcome language barriers, incompatible technologies, and politics. Second, we need more interdisciplinary training opportunities so that the public health workforce has a broader scope of knowledge and knows how to access to a larger pool of experts. For example, my graduate course in environmental planning

and management typically draws students from more than five different schools and departments. It is a lynchpin course in a multidisciplinary certificate program designed to enlarge the cadre of tomorrow's broadly trained experts. Third, we need to train our personnel in informed decision-making and develop tools and expert linkages that can help reduce uncertainty.^{15,16} For example, we can work with meteorologists who build simulation models that more accurately estimate the path and duration of storms, and with state and local governing bodies to help them evaluate the consequences of building in high risk areas or failing to upgrade building codes. We must work with planners and first responders to be sure all areas have up-to-date evacuation and shelter-in-place plans that can be put into effect for hazard events.

In summary, public health needs to substantially increase our access to a global network of scientific experts, build a more broadly trained pool of public health workers and experts, and broaden our use of tools that increase the certainty of the recommendations we make to decision-makers. These three positive steps will make public health more effective in shaping the decisions made around hazard events,¹⁷ decisions that are both informed and take into account social and environmental justice. ■

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