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Population Vulnerabilities, Preconditions, and the Consequences of Disasters

HAVING SPENT MORE THAN THREE DECADES WORKING ON THE FRONT lines of public health, primarily providing direct medical care or developing programs for medically underserved children in rural and urban environments in the United States, I came to the field of disaster preparedness and response sporadically and hesitantly. After leading international disaster response teams and deploying mobile medical units in response to US disasters, my familiarity with respect to these challenges was purely programmatic and technical. What has been surprising and, to a large extent, disconcerting, has been an appreciation developed since 2001 of the complexity and inadequacy of societal preparation for, mitigation of, and recovery from very large-scale disasters.

In a perfect illustration of our nation's proclivity for postevent crisis response and our resistance to longer-term planning and system investment, the nation put a rush order on developing a massive bureaucracy designed to fast track new systems for preventing and responding to terrorism and large scale natural disasters. FEMA and many other agencies were incorporated into the new Department of Homeland Security, billions of dollars were appropriated and, seemingly, a substantial focus on disaster prevention and management was emerging in the aftermath of the attacks on the World Trade Center in New York City.

What actually materialized, however, in the frantic push to create new systems, has, so far, failed to provide credible, cost-effec-

tive, evidence-based systems of disaster preparedness and response. Overall, I suspect that the government efforts spurred on by the attacks of 9/11 represent not only an extraordinary level of spending, but also a lack of accountability that is virtually unprecedented in recent US history.

In fact, after watching—and working among—the efforts to respond effectively to the disasters precipitated by Hurricanes Katrina and Rita, and the subsequent flooding of New Orleans, it is clear that much needs to be done in all aspects of this field. But perhaps no challenge is more pressing than coming to grips with the realities facing families whose “disaster risk profile” is exacerbated by vulnerabilities that include long-term income fragility, social marginalization, or chronic illness.

PRECONDITIONS AND PUBLIC HEALTH

Questions around preconditions and disaster consequence vulnerabilities among affected populations may be seen from the broad perspectives of public health. And in a certain sense, “all roads lead to public health implications.” Fragile buildings and infrastructure, poor roads, insufficient transportation systems, reduced access to clean water and food, or limited availability of good medical care are among the preconditions that, even prior to a disaster, create ongoing public health consequences. When disaster affects such populations, however, the impact is far greater and the response and recovery more complex than is the case for populations with greater resources. Any number of examples can effectively illustrate this point. Resource-rich communities have the ability and capacity to construct buildings that are relatively earthquake resistant, including advanced materials and construction strategies such as diagonally trussed skeletons. Such buildings may sustain much higher earthquake force levels than less sophisticated construction in developing countries. An example of the latter was the 1976 earthquake that struck Guatemala at a Richter force of 7.6, killing as many as 25,000 people, injuring 80,000 and leaving nearly 1.5 million homeless. Buildings made from simple stone and adobe simply could not with-

stand a quake that might have shaken—but not destroyed—buildings constructed with earthquake-resistant materials and designs.

Similar demonstrations of the relationships between preconditions and disaster consequences have been consistently seen after the recent earthquakes in Pakistan and China, the cyclone that struck Myanmar (Burma), and numerous other catastrophic events. The formula remains the same: preconditions related to a wide range of vulnerabilities affect morbidity, mortality, and marginalization of populations affected by disasters.

Obviously, the same formula is applicable to disparate conditions in the United States, particularly when looking at resource-rich versus resource-poor communities. Conditions in economically disadvantaged rural communities, for instance, can present an array of precondition-related vulnerabilities highly reminiscent of circumstances seen in developing countries. Working in rural Arkansas some years ago, our medical teams confronted the consequences of inordinately high rates of fires in houses that were poorly constructed wood-frame dwellings, without central heating. Families would use portable wood or kerosene burning stoves to provide warmth. Such heaters were subject to falling over, flying embers, toxic fumes, and other problems that could lead to medical conditions like asthma and bronchitis or actually start fires that, in turn, would lead to high rates of burn and smoke injuries among residents.

Other preconditions that regularly lead to increased disaster vulnerability may be seen in disadvantaged communities. One particularly important factor is the capacity to move people or rescuers in the event of a major disaster. The evacuation of a large population being threatened by an impending hurricane, for instance, presents special challenges when the communities in question have limited resources. Citizens without access to private vehicles would be entirely dependent on public transportation systems. If the latter systems are not available, the possibility of timely, effective evacuations becomes considerably more difficult so that communities are at far greater risk. Similarly, the effective movement of responders in a disaster-affected area is

dependent on access via roads and other modalities of rapid movement such as boats and aircraft. Interestingly, national surveys conducted by the Marist Institute for the National Center for Disaster Preparedness at Columbia University's Mailman School of Public Health and the Children's Health Fund show that people generally expect help to arrive promptly, no matter what the conditions. The 2007 survey showed that 33 percent of individuals expect help to arrive within one hour of a call to "911"; approximately two-thirds expected a response within two or three hours.

The impediments to providing routine but essential services to disadvantaged individuals suggest challenges that become greatly magnified in a major disaster scenario. When I worked as a physician in rural Arkansas, making house calls to treat bedridden patients was routine. After clinic hours, aides would accompany physicians to the homes of patients who needed care, but were unable to get to the office in town. When the weather was good and the roads were dry, getting to the patient was not a problem. But during the rainy season, the unpaved, ungraveled country roads would turn to mud. Our pick-up truck or clinic car simply could not make it through; so patients who may have truly needed medical care were unable to get these and other essential services. This is precisely what happens in any poor community—domestically or internationally—and is a situation that can paralyze response efforts following a major catastrophe.

During the 1985 sub-Saharan drought, which led to one of the world's deadliest famines, movement of individuals to relief centers and supplies to affected parts of the region were substantially affected by road and transportation challenges—sometimes in ways that were unanticipated or counterintuitive. For instance, prolonged drought led to extreme drying of riverbeds that, in turn, lost the capacity to absorb water. In the event of a flash rainfall, rivers would quickly and transiently fill, making crossing virtually impossible.

Other times, the terrain and the weather are not the problems; vehicles are. Economically disadvantaged families who own cars are more likely to have older models in various states of disrepair and regu-

larly not working. If there are not alternative forms of transportation, such vehicles may not be available for pre-disaster evacuation or even for getting to needed medical care.

HURRICANE KATRINA AND THE FLOODING OF NEW ORLEANS

In considering the notion of disaster consequences with respect to Hurricane Katrina and the flooding of New Orleans in 2005, it is useful to put the scenario in some perspective. Thirteen years earlier, Hurricane Andrew struck the south Florida communities near Homestead as a true category 5 storm with an impact zone of approximately 300 square miles. The devastation was ferocious (some \$27 billion of damage, but less than 100 fatalities). In contrast, Hurricanes Katrina and Rita never reached a category 5 at landfall, but caused well over \$100 billion in damages, some 2,000 fatalities, and an impact area of more than 93,000 miles. While the “return to normal” following the 1992 disaster took considerable effort, much of it was focused on structural rebuilding.

In contrast, the gulf areas affected by Katrina were still struggling with recovery three years after the storm. Rebuilding of infrastructure was clearly important, but finding appropriate shelter, permanent housing, and community-based services for displaced populations has become a nearly intractable challenge. Over time, families and individuals with resources found their way to new neighborhoods and rebuilt their connections to schools, health care, and employment. But those who had limited resources prior to the disaster fare far worse, continuing to struggle with uncertainty and growing problems around health, mental health, and identification of employment opportunities.

So, what do we know about the preconditions that affected disaster vulnerability among Katrina survivors? The two states most affected, Louisiana and Mississippi, are routinely cited as having the highest child poverty rates in the United States. Approximately 20 percent of Louisiana’s children lived in families with annual incomes below \$10,000. Schools in both states are also far below national standards

and in New Orleans, most public secondary schools are on state watch lists. Although public transportation systems were highly limited in hard-hit areas prior to the storms, many people in the poorest communities did not own private vehicles. Access to health care in the two states was also problematic with few children having regular access to a primary care medical home.

With destructive, high-powered winds smashing the coastal communities of the gulf states and unprecedented flooding of New Orleans, many health care facilities, including doctors' offices, clinics, and hospitals, were affected. Communities already considered "medically underserved" prior to the disaster became true crisis zones as the demand for medical services soared, while working health care facilities became scarce. An estimated 4,000 physicians left the region from New Orleans alone. Major teaching hospitals, like Tulane Medical Center and Charity Hospital of Louisiana State University, were knocked out of service. This meant that essential medical services, particularly those that focused on subspecialty care, disappeared, leaving patients with unusual or serious conditions in even more precarious states. Medical records were lost, along with the doctors and nurses. The existence of a serious medical or mental health condition prior to the storm made people far more vulnerable to the disaster and its aftermath.

And other conditions and situations also led to increased vulnerability. Some 20 to 25 percent of people in New Orleans either had significant disabilities prior to the storm or were taking care of people with such challenges. Evacuation, sheltering, getting needed caretakers, or assuring a reasonable supply of prescription medications had become exceedingly difficult for people with chronic needs. Similarly, there were great concerns about the frail elderly who were residents of nursing facilities. Impossible to evacuate, these individuals remained in extreme danger throughout.

In another difficult scenario, approximately 60 to 70 children with cancer found themselves without access to their treating oncologists, without their medications, and unable to obtain medical records. Many

of these children ended up transported to Tennessee for treatment by specialists who had no idea what medications these patients were on or where they were in the scheduled protocol time line. This was yet another instance of preexisting medical conditions substantially increasing vulnerability for individuals during and after a major disaster.

RECOVERY AS AN AFTERTHOUGHT

The initial response by government to the widespread disaster in the gulf was a demonstration of mass disorganization and incompetence. Images of people waiting for assistance on the rooftops of submerged houses and countless stories of people stranded and poorly treated in mass congregate shelters were seen virtually immediately around the world. There was simply no hiding from the reality of government failure in the initial response to a major natural catastrophe.

The prolonged recovery from the Katrina disaster is another story. While the failures are rampant and profound, the stories are not on the front pages of newspapers. Yet the case could be made that recovery inadequacies are far more grave than the failures of the initial response. Current recovery problems include prolonged stays for displaced persons in inadequate temporary shelters, exposure to formaldehyde in the trailers, poor or no access to health and mental health services, poor access to schools for children, and lack of employment opportunities for their parents. Tangled bureaucracies of state and federal government, nongovernmental organizations, and special commissions have impeded the development of rapidly implementable plans needed to care for nearly 20,000 families still living in temporary shelters. But the public remains generally unaware of what is happening in the gulf. Here again, the fact is that the remaining displaced families and individuals are poor and predominantly nonwhite.

In effect, we saw conditions in the gulf that amounted to the proverbial “perfect storm”: a major natural disaster striking a highly vulnerable population when government disaster response capacity was ill-prepared to provide effective, coordinated services.

INVESTMENT IS KEY

It is abundantly clear that the public health impact of large-scale disasters is dependent on the degree to which the population affected is at risk or vulnerable prior to the catastrophic event. When health, nutrition, and economic status are suboptimal and when general community conditions lack a basic level of support, the public health consequences of any major disaster are substantially exacerbated. That is why investing in community support systems, income stability, and access to appropriate services should be part of effective and comprehensive disaster planning.