

PERSPECTIVE

After the Tsunami — Facing the Public Health Challenges

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The tsunami that struck 11 countries in South Asia on the morning of December 26, 2004, resulted in a natural disaster of apocalyptic proportions. The sheer scope and severity of destruction have prompted extraordinary international attention and support for survivors on the coastal rims and the islands in the Bay of Bengal and the Indian Ocean. The devastation wrought by the tsunami was catastrophic — more than 150,000 people dead, tens of thousands of people missing, thousands of miles of destroyed coastline, and loss of livelihood for millions of distraught survivors.

The task facing the international community as it attempts to provide relief is equally extraordinary. It is extremely difficult to reach many of the distressed communities, the short-term emergency needs are enormous, and the longer-term needs for rehabilitation and reconstruction have not even been quantified.

Although this catastrophe was unusually vast, it was a classic natural disaster in several ways. First, it is not yet complicated by war or terrorism. Indeed, both civil conflicts that were under way in the affected region, in northern Sri Lanka and in Aceh, Indonesia, have quieted in the midst of this mass distress. The situation in Aceh, however, appears to be fluid. Early reports that the various armed parties and government forces were working together to bring aid to the populations in need are now being overtaken by news of increasing tension with international relief agencies.¹ In the event that government hostility to outside help begins to interfere with the relief effort, this disaster could become a complex emergency.² Second, the clinical and epidemiologic profile of this disaster is similar to that of a cyclone or hurricane with resultant flooding. The causes of death were drowning and blunt trauma, and the injuries among the survivors arise from complications of near-drowning and trauma. Third, the short-term public health needs

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Refugees Reaching for Food at a Refugee Center in Batticaloa, Sri Lanka.

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of the surviving population are familiar (albeit massive): water, sanitation, food, shelter, and appropriate medical care administered to persons remaining in place and the thousands who are living in self-settled displaced communities.

These problems represent the bread-and-butter work of international relief organizations. Fulfilling immediate needs on such a massive scale represents, in large part, a challenge of logistics and coordination. The most densely affected areas were Aceh Province in Indonesia (where more than 107,000 people died) and the coastal regions of Sri Lanka (site of more than 47,000 deaths). Areas near Aceh continue to pose difficulties to aid agencies because of the broad reach of the devastation and the inaccessibility of several regions. The major public health priorities of ensuring the availability

of clean water, adequate sanitation, emergency food rations, and temporary housing are not technically complex, but accomplishing these goals in such a large geographic area presents tremendous challenges in terms of coordination (to identify the needs in each locale and determine who will do what to meet them) and logistic capacity (for transporting and delivering the necessary goods). Projections by the World Health Organization that the number of casualties might double with the spread of communicable diseases are sobering.

As more and more relief organizations arrive on the scene daily, coordination and communication become ever more crucial. International nongovernmental organizations, while often like-minded, tend to be fiercely independent. The largest of these groups have established clear operational profiles and strong capacity for interagency coordination in the field. But several hundred diverse organizations have gathered in Indonesia and Sri Lanka, and it is difficult to coordinate their efforts. The groups that were working in the region before the tsunami are in a good position to set up emergency operations and provide guidance to new arrivals.

Each aid organization has developed its own logistics capacity to support its particular competencies, and the larger organizations can bring large amounts of supplies to large populations relatively rapidly. But this tsunami destroyed feeder roads, harbors, beaches, and regional air strips throughout tremendous areas at the same time as it rendered millions of people suddenly dependent on external support. In the face of an event of this scale and abruptness, only the lift-and-transport capacities of the U.S. military came close to meeting the demand for reconnaissance, evacuation, and supply. Although many relief organizations prefer to maintain strict operational separation from military groups to ensure local perceptions of their neutrality, the clear impossibility, in this instance, of reaching trapped and isolated populations without military support may have made such cooperation a practical imperative.

Characterizing the health priorities in a disaster is less complex than overcoming the logistic obstacles. Lessons have been gleaned from previous large-scale humanitarian crises about the provision of aid and the mitigation of epidemics. One ongoing effort to quantify and standardize the aid we provide in large-scale public health emergencies is the Sphere Project, which has resulted in the Sphere Standards for Humanitarian Assistance³

— measurable minimum standards in five key sectors: water supply and sanitation, nutrition, food aid, shelter, and health services. Experience from Sphere and studies in disaster management have helped to debunk several persistent misconceptions about disasters — including the notion that dead bodies spontaneously spread epidemics. Although there may be compelling cultural and religious incentives to bury or incinerate the dead quickly, there is no evidence that corpses contribute significantly to epidemics after a disaster.

The literature on disasters also indicates that epidemics of communicable diseases do not always occur after large-scale floods. In the past three decades, epidemics of water-borne illnesses, such as cholera and shigella dysentery, have been uncommon after floods and natural disasters; they are quite common, however, in large displacement centers and refugee camps.⁴ Other common communicable diseases such as acute respiratory infections and measles result in high mortality in populations that are under stress — particularly among children younger than five years of age — when they are living in large refugee camps.⁵

Indeed, it is not the disaster but the artificial, crowded communities often created in their aftermath that serve as a substrate for the spread of communicable diseases. Unfortunately, for reasons of convenience and circumstance, disaster-relief tactics have often involved treating people in large refugee camps; but if such crowding can be avoided or if best practices for reducing the spread of disease can be followed in such camps, the chances are improved for preventing epidemics. The downside to a strategy of assisting people who are more dispersed is obvious: scale and efficiency are reduced, and it is more difficult to make epidemiologic assessments. Relief organizations and communities must balance the need for the accessibility of a population against the public health threats associated with large displacement camps.

Short-term interventions should focus on supplying the recommended 20 liters of water per person per day and ensuring that there are adequate, culturally appropriate sanitation facilities to avert outbreaks of cholera, dysentery, and hepatitis A; targeted measles vaccination in unvaccinated populations, with vitamin A supplementation when indicated; control of vector-borne illnesses such as malaria and dengue through early treatment and mosquito-control measures; early diagnosis and treatment of acute respiratory infections, particularly among infants and young children; the delivery

of adequate amounts of culturally appropriate emergency rations; and epidemic surveillance to detect the early appearance of communicable diseases.

The effectiveness of these emergency interventions will be difficult to measure, but it should be reflected in the minimization of excess mortality and the prevention of epidemics. A key measure of a humanitarian crisis is crude mortality of more than 1 per 10,000 per day. The primary difficulty in measuring crude mortality in Indonesia and Sri Lanka involves the estimation of the denominator, or the total population at risk. The rapidity with which relief groups can collect and report these data will be one indicator of effectiveness: it will demonstrate that the groups have reached and accounted for the populations at risk and can sustain an ongoing assessment of the impact of their interventions.

Whereas most flood-related disasters cause substantial numbers of deaths but relatively few injuries, the force of this tsunami has created a great need to reestablish curative medical facilities and provide treatment and evacuation for thousands of people with severe traumatic injuries and soft-tissue infections. Although many relief organizations operate in war zones, their medical programs focus on population-based health interventions, such as immunization, prenatal care, and primary health care. Comparatively few medical professionals in these organizations have training in — or equipment for — extensive wound débridement, orthopedics, or amputation. Fortunately, in many of the affected regions, skilled local physicians have survived; once their clinical sites can be restored to functionality and supplies can be delivered, these physicians can provide this type of care. It is therefore essential that mobile medical programs and temporary field hospitals be converted rapidly into programs that rebuild and renovate damaged hospitals and health centers — rather than becoming parallel systems that might undermine the reconstruction of local systems.

The longer-term recovery and rehabilitation needs in the affected areas are more poorly understood than the short-term needs, but they may be even more important. Many of the large relief agencies have substantial capacity for both relief and development, but effecting a transition from relief activities to sustainable and meaningful reconstruction activities is neither a simple nor a straightforward task. Whereas delivering emergency aid may be logistically challenging, the long-term challenges are more strategic in nature. Relief organizations must rise above their independent and individual-

istic perspectives to work with local governments, communities, and civic structures in reconstruction and the reestablishment of municipal services, health systems, and livelihoods.

The restoration of livelihoods presents a major hurdle for long-term recovery. Many of the devastated communities already had high levels of poverty, and the population in the coastal areas is chiefly composed of subsistence workers — fishermen or farmers — who have little to return to. The reconstruction of communities and the maintenance of civil society hinge on people's regaining their ability to work and generate income — a complex and poorly understood dynamic that will take years to play out and that will be affected by the psychological distress of the survivors.

Whereas a relatively straightforward set of protocol-based interventions has been developed to meet emergency physical health care needs, psychological stress in the aftermath of a disaster and its long-term effects are only beginning to be understood. Hundreds of thousands of survivors are experiencing grief, loss, and guilt. Previous experience suggests that the psychological trauma of the tsunami will impair individual and community coping abilities for a long time to come. Interdisciplinary teams from international relief groups may need to work with national nongovernmental organizations from each country in devising strategies for intervention and support. The engagement of local leaders in this process will be important in restoring a sense of agency and in shoring up local institutional integrity.

Similarly, the participation of local health care providers must be elicited in long-term efforts to reconstruct the health care infrastructure, which has been crippled in many coastal areas. The physical destruction of clinics and hospitals, the deaths of health care workers, and the loss of medical supplies and equipment have resulted in an urgent need for a comprehensive rehabilitation of the health care system. Temporary clinics and the mobile medical programs of foreign relief agencies may be providing duplicative services without supporting the reestablishment of basic community health services. Relief organizations still have much to learn about shifting from short-term medical-aid efforts to productive, sustainable interventions that promote the development of a local health care system.

The public health model for disasters highlights a cycle of preparedness, mitigation, response, and recovery. It is thus crucial to consider what sorts of preparations may prevent a similar disaster in the

future. The Tsunami Warning System is made up of 26 participating member states throughout the Pacific basin. The system has the capacity to provide several hours of early warning of tsunamigenic activity; with sufficient funding and international will, it could be adapted and introduced throughout the Indian Ocean. The larger issue, however, is the development of rapid communication and evacuation systems in remote areas with marginalized populations.

Despite the massive scale of this emergency, we are better prepared than ever to deal with the immediate health threats created by the tsunami. What remains uncertain is the extent to which donors and implementers will be able to support the tran-

sition to long-term rehabilitation and reconstruction; in the past, we have been far less proficient at this second crucial task. Yet we know that the need for long-term success has never been more urgent than it is now.

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Recovering from the Tsunami

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The media reports on the tsunami that hit South Asia the day after Christmas did little to prepare me for what I saw firsthand when I visited Sri Lanka and India. Working as a missionary, I have visited destroyed towns in war-torn Sudan and witnessed deep, grinding poverty in Uganda and Kenya. The challenges in South Asia are as daunting as any I have seen. Flying over the coastline in a helicopter, we saw an unending scene of devastation. All told, more than 150,000 people are dead and over 5 million have been left homeless.

Many of the tragedies we encountered defied simple solutions. At one overburdened hospital, I met an eight-year-old boy with infected leg abscesses. He had spent nine days in a futile search for his family — his parents and siblings had all perished — rather than seek immediate treatment for the injury he received in the initial deluge. Even those who are physically uninjured have sustained severe psychological wounds. Thousands of children will grow up without parents. And the rudiments of normal life — electricity, schools, houses of worship, and a functional economy — will take years to rebuild.

Although the most pressing needs I saw are intimately related to health, medication and medical personnel cannot fulfill them all. Most prominent, in

many areas, the tsunami contaminated wells and destroyed water-treatment plants. Unclean water makes it difficult to prepare food, bathe, or drink. Without pure water, it is impossible to perform many medical procedures. The shortage of potable water increases the chances of an outbreak of cholera, typhoid, or dysentery. Moreover, the large pools of stagnant water I saw along South Asia's coastlines may become breeding grounds for mosquitoes carrying malaria and dengue fever. We have already seen some outbreaks in affected areas. It may be months before we can rule out the possibility of a major epidemic.

Although clean water ranks as the number-one need, adequate shelter, warm clothes, nutritious food, bandages, and medicines such as antibiotics also remain in short supply. Even providing these basic necessities will prove difficult.

Schools, for example, serve as shelters in many devastated areas. One shelter I visited — a camp that housed more than 400 displaced Tamils in Sri Lanka — will have to be emptied of refugees so that classes can begin. Yet people I spoke with there had only begun to make plans for relocating the refugees. If circumstances force these people to sleep in the open, their risk of contracting diseases will skyrocket.

Despite many difficulties, I saw inspiring signs of hope. International relief agencies have done yeoman's work: they have pitched tents, run clinics, and

handed out countless relief packages. Examples of human kindness abound. One doctor we met, a man who had taken care of more than 500 patients in the immediate aftermath of the disaster, had e-mailed a call for help just as the wave swamped his hospital. A team of Scandinavian doctors saw the e-mail and arrived 48 hours later to set up a pediatric ward.

Although the developed world has responded with billions of dollars in aid, damaged roads and crippled railways make the flow of supplies uncertain. Whatever problems may exist in India and Sri Lanka — both of which have moderately strong economies — poorer countries will face even greater hurdles in averting a second wave of death.

Even under the best circumstances, recovering from the tsunami will take years. But the devastation offers a few lessons. First, clean water has emerged as the most pressing medical need; the situation underscores the importance of broad improvement of access to clean water in developing countries. Second, as the Scandinavian doctors showed, individual contributions of medical assistance can rank among the world's most precious and meaningful currencies. And above all, the world's governments should view the tsunami's devastation as a public health crisis. Confronting it will require money, infrastructure, and just as important, the expertise, knowledge, and compassion of countless health care professionals.

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