

Global Connectivity: A Blessing and a Curse

The bad news about SARS has been well documented: it is a totally new virus with no human immunity, it spreads rapidly and its effect is highly variable, causing mild illness to death. The good news is that within the two-and-half-month period since the identification of SARS, the medical and public health community has developed a diagnosis for the illness, isolated the pathogen, sequenced the coronavirus gene responsible and begun developing a commercially viable vaccine. The speed of scientific discovery has been exceeded only by the speed of communication to an anxious public. As of 11:00 a.m. EST, April 24, 2003, a Google news search listed 75,200 articles from 4,500 news sources on the SARS outbreak. By 7:00 p.m. EST, 80,400 articles were listed, an increase of 5,200 articles in 8 hours.

Having spread the word about the seriousness of the SARS outbreak, some in the media are now trying to undo what they have done: they are calling for the public not to overreact. Yet, the fear and near panic that the relentless coverage of the SARS outbreak has produced is, to some extent, understandable. SARS could be a public disaster in the making, even though the risk at this time of contracting SARS is still very small, in particular for those in countries reporting few cases. Many of us fear increased risk, and by miscalculating our risk, we are afraid more often than is necessary. We determine risk by the amount of knowledge we have of the threat and how it can affect us. When the threat runs its course, we learn whether it was a disaster – a personal disaster if I am affected; a public disaster if many are affected.

Events become disasters when they cause substantial cost to our community. Admittedly, this is an anthropocentric view of events, which implies malevolence unjustified for natural events but fully justified for acts of terrorism. Disasters have health, economic and social costs. Health costs include both physical and mental impairment; economic costs result in damage to infrastructures or the suspension of commercial activity; and social costs include the disruption of social and political institutions. The threat of a disaster rather than the event itself can produce fear. As seen with SARS: fear impairs our health, and as the empty shopkeepers in Beijing know all too well, can impair commerce.

Even though we have no mathematically precise way of

calculating disaster risks or forecasting disaster costs, we can lay out the elements that should be included in a rough calculation of both. Four sets of properties determine the overall cost of a disastrous event:

1. the threat itself – its energy or viability
2. the environment exposed to the threat
3. our social/political structures to detect the threat
4. our social/political structures to counteract the threat

The amount of energy contained in a threat and the chances the event will occur raise the likelihood of producing a cost to us. At the extreme end of energy potential is the threat of a large asteroid or comet impacting on earth. Objects two kilometers in size hit the earth several times per million years, so the threat, although infrequent, contains enough energy to be a global catastrophe. At the low end of energy potential is an ice storm. In between, we can locate epidemics, volcanoes, earthquakes, tsunamis, hurricanes, tornados, floods, fires and droughts. Hurricanes or earthquakes are arguably the most frequent in some areas, and thus the most likely of the disastrous events to occur, at least somewhere; an asteroid impact is probably the least frequent. The frequencies of other threats may be ordered between these extremes and depend on location. Biological hazards leading to epidemics, although similar in many respects to other hazards, are in a class alone: they are the only hazards that can propagate directly through living organisms. Not only are living organisms affected by biological agents, they are the carriers of the hazards, meaning that the reach of biological agents is extensive. Moreover, short of a large asteroid collision, biological hazards may be the most lethal of all disasters – the Spanish Flu, in 1918, killed about 30 million people.

On June 30, 1908, a small asteroid smashed into the remote countryside of Siberia: the Tunguska asteroid produced a Hiroshima scale explosion. The cost was minimal in loss of life and property since the closest inhabitant was 20 miles away from the explosion. Had the Tunguska asteroid hit Moscow, the city would have been destroyed. Where the environment is heavily populated and built up, the cost of a disaster, even with minimal energy, like an ice storm, can be substantial. Moreover, if these heavily populated

areas are built over faults, near active volcanoes, near shorelines, or on hillsides, their vulnerability is increased. Biologic hazards thrive in populated areas. Epidemics can only occur when there is a sufficient concentration of people or animals to harbor and to transmit pathogens. High-energy threats affecting highly vulnerable environments produce high costs and are counted as the most devastating disasters. It should come as no surprise that those living in highly vulnerable environments increase their risks.

But both risks and costs can be reduced by early detection of the threat, provided we can act on the early warnings. SARS is an unprecedented case of swift detection and action for a biologic hazard. Hurricane forecasting, earthquake and volcanic prediction, biologic surveillance are all detection systems that we have built to buy us enough time to take corrective action, minimizing our cost. Uninterrupted tranquility is rare in history. The story of civilization is the story of disasters. Only since the Enlightenment have we come to believe that we can manage risk, that we can prevail over the hazards once attributed to malevolent or vengeful forces beyond our control. We have built disaster response systems employing workers with many different skills. First responders put out fires, rescue buried victims, treat infected patients, feed and clothe the homeless. We have a whole class of managers and coordinators who direct resources to plan for, to respond to and to recover from the destruction of disasters. Our systems to counteract threats reduce cost and lower the risk of individual loss.

Still, we have significant cost every year in life, health and property. More and more we walk in fear of the next catastrophe. The effects of technology on the natural environment and the consequences of population growth increase the energy in the threats we face and our vulnerability to these threats. Overuse of antibiotics is producing disease resistant strains of pathogens. Global connectivity is a blessing and a curse. We can rush aid to stricken areas, but we can also spread virulent diseases within their incubation periods before we detect them. The concentration of wealth throughout the globe has created areas of immense poverty that are breeding grounds for disasters – both natural and man-made. The wealthy nations are no longer isolated, either physically or economically, from what happens in the poorest regions of the poorest countries of the world.

Actual risk and cost reduction requires a heavy invest-

ment in detection and in the resources to counteract disasters, not just in our own community, but also in the world's. But money alone will not prepare us for the disasters to come. We need social and political structures that can be activated across national boundaries to plan for and respond to disasters of all kinds. As we have seen with SARS, national interests can be barriers to effective detection and response. Issues of cooperation across national, religious or political boundaries are complicated. But we face what game theorists call a "prisoner's dilemma." If everyone acts to maximize individual benefits, the payoff for all is smaller than if everyone sacrifices a little bit and cooperates.

Issues of financing and cooperation for disaster planning and response are long-term projects. An issue that can be addressed immediately to help alleviate public fear is improving risk communication. Among many disaster response managers, especially public health leaders, is the growing awareness that inaccurate information about a threat can also lead to significant costs. Authoritative, clearly communicated information about the nature of the threat, about its risks of affecting a given population and reasonable measures to take, dispel general anxiety about the threat. As our experience with SARS shows, aggressive action may be necessary to counteract the emerging threat of biological agents in our world community. Our experience also shows that the rationale for action must be abundantly clear to all, for misunderstanding of the threat may cause excessive fear, leading to economic and social costs if actions are ill advised, or equally as bad, may cause non-compliance because individuals do not understand the need for action. The SARS outbreak and its repercussions are clearly warnings of things to come. If we succeed in limiting this outbreak, we can congratulate ourselves and return to business as usual: or, we can heed the warning and start preparing for the next disaster.

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