GLOBAL BLUEPRINTS FOR CHANGE

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The Global Blueprints for Change contain guidance for working together to improve the capability to identify indicators of physical, social, enterprise, and environmental vulnerabilities throughout the world and to select and implement realistic solutions to reduce them towards acceptable levels.

Theme A: LIVING WITH NATURAL AND TECHNOLOGICAL HAZARDS
Topic A.8: Reducing the impact of natural and Technological Disasters on Public Health

"Improving the Capacity to Deliver Public Health Services After Disasters"

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IMPROVING THE CAPACITY TO DELIVER PUBLIC HEALTH SERVICES AFTER

DISASTERS

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INTRODUCTION

Throughout history, mankind has lived under the threat of natural disasters. In recent years disasters have taken millions of lives and caused untold human suffering and property damage, as well as setbacks to development efforts. Indeed, the situation is growing worse. Vulnerability to natural disasters is rising due to rapid population growth especially among the urban poor, unplanned urbanization, and the concentration of industry and infrastructure in disaster-prone areas (1,2). More than 25% of the world's population lives in areas that are at high risk for natural disasters. The world at present has 90 "super-cities" with populations of more than two million, 64 of which are located in highly seismic zones and the majority comprised of

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large concentrations of the highly vulnerable urban poor. Because of the potentially massive adverse impact of natural disasters on human settlements, the Global Alliance for Disaster Reduction sponsored an International Workshop on disaster Reduction on 19-22, 2001 and the development of "Global Blueprints for Change" that contain guidance for a global scientific, technical, and political effort to reduce the impact of such catastrophic acts of nature. Specific themes include 1) improving the capacity of each country to mitigate or prevent the effects of natural disasters; 2) devising appropriate guidelines and strategies for applying existing scientific and technical knowledge to reduce natural disasters; 3) fostering scientific endeavors aimed at closing critical gaps in knowledge in order to reduce loss of life, injuries, and property damage; 4) disseminating technical information related to the assessment, prediction, and mitigation of natural disasters; and 5) developing ways of assessing, predicting, preventing, and mitigating natural disasters through programs of technical assistance and technology transfer, demonstration projects, and education and training tailored to specific disasters and locations, and to evaluate the effectiveness of these efforts.

The Global Alliance for Disaster Reduction has explicitly emphasized the importance of the health sector by commissioning the production of this report under the theme "Reducing the Impact of Disasters on Public Health". The severity of natural disasters is often measured by the numbers of deaths and injuries recorded. However, the health implications of such calamities extend much further than these conventional indicators. For instance, during the past 10 years, more than 422 million people have been affected in some way by floods, earthquakes, typhoons, cyclones, or hurricanes. Of these, approximately 650,000 have been killed, 47 million have been left homeless and financial losses exceeded $400 billion (3).

For public health professionals, these general statistics have implications far beyond the initial impact of a disaster. When water and sanitation services are disrupted and populations are rendered homeless, the long-term health risks can be myriad and include the following: exacerbation of chronic conditions such as diabetes, heart disease and hypertension; nutritional deficiencies; communicable diseases; environmentally-related illnesses (e.g., injuries, toxic exposures, and hyperthermia); and mental health disorders).

Shoaf and Rottman (4) point out that natural disasters affect the public's health in one of four ways: through direct impact on the health of the population; through direct impact on the health care system; through indirect effects on the population's health; and through indirect effects on the health care system. These categories provide a useful paradigm for discussing what we do and do not know about how to minimize the effect of a natural disaster on the public's health.

Direct Impact on Health

Morbidity and mortality attributable to physical injury is the most obvious direct impact that a natural disaster has on public health. Noji (5) notes that approximately 300 natural disasters occur each year which result in approximately 250,000 deaths each year. In the past twenty years, close to 3 million people have died as a result of disasters.

Death and Physical Injury

Mortality and morbidity associated that result from physical injuries that occur during or in the immediate aftermath of a disaster can most easily be determined to be "caused by" the index disaster. To identify the disaster as the immediate or indirect cause of mortality or morbidity that is associated with chronic or acute disease involves various levels of value judgements that are generally neither recognized or acknowledged.

The number and severity of deaths and physical injuries vary with the type of disaster. We know, for example, in the case of earthquakes deaths result almost exclusively from the collapse of buildings and other man-made structures. To the extent that buildings and structures are built to withstand the physical force of earthquakes, the number of deaths is reduced. The United States and particularly California has been most successful in reducing the number of deaths directly attributable to earthquakes. Following the magnitude 6.7 Northridge earthquake of January 1994, only 33 deaths were directly attributable to the earthquake itself (6). Similarly following the magnitude 7.1 Loma Prieta earthquake of October 1989, less that 60 deaths were directly attibutable to the earthquake (7). In contrast a magnitude 5.9 earthquake in January 1999 in Colombia resulted in nearly one out of every 250 persons being killed in a community of 250,000 (8). A 7.7 magnitude earthquake in the Philippines in 1990 resulted in 389 fatalities and 695 injuries, with a case-fatality rate of 36% and an estimated injury rate of 703 per 100,000 population (9). Tornados and thunder-storms in Alabama in 1994 resulted in 47 fatalities and 422 injuries, with 144 persons seeking hospital-based medical care (10). In tornados in Arkansas in 1997, the American Red Cross reported 26 fatalities and 400 nonfatal injuries that were treated at area emergency departments (11).

Using data from 21 of 42 hospitals and 5 of 19 coroners' offices where recruitment was attempted, McNabb et al (12) reported that Hurricane Andrew resulted in 17 deaths and 445 injuries, including 8 injuries associated with anxiety. The eruption of Mount St. Helens resulted in 32 missing, 31 deaths, and a clear increase in visits to emergency rooms and hospital admissions in the six week period after the eruption, with persons with prior respiratory problems being at greatest risk (13).

Other parts of the United States and other countries have yet to seriously invest in developing and enforcing building standards that would maximize life safety and minimize deaths in the event of a serious earthquake (e.g., Turkey, Taiwan, Greece El Salvador and Colombia).

Deaths could also be reduced by relocating settlements away from the areas where active faults exist. The United States has been no more successful in discouraging development on active faults (e.g., Hayward fault) than have other countries. The U.S. has been somewhat more successful in encouraging communities who are repeatedly affected by major floods to relocate out of flood plains.

Unlike deaths, physical injuries attributable to earthquakes, at least in the United States, are not exclusively or primarily caused by the structural collapse of buildings or other structures.

Injuries following recent California earthquakes occurred because non-structural objects such as furniture, lights or other objects fell on the victim, because the force of the earthquake caused the victim to fall, or because of actions the victim took (e.g., running, jumping) that put them at risk of injury (14). One way to reduce injuries during earthquakes is to encourage pre-disaster preparedness activities which include bolting or attaching non-structural objects to reduce the likelihood that they will fall and instructing persons in vulnerable areas to engage in behaviors during and immediately after a disaster which will minimize their risk of earthquakes. Identification of which activities and behaviors are appropriate differs with the disaster and the environment in which the disaster occurs. For example, in cultures where building codes are non-existent, weak or not enforced, running from a building during an earthquake may well be the best thing to do, but in countries where building codes have been developed and enforced, running out of a building or jumping out a window generally may increase the risk of physical injury. Emergency responders and public health personnel in California see the clash of cultures following disasters where a substantial proportion of the population has immigrated from Central and South America where the propensity for buildings to collapse during or after an earthquake is much greater than in the United States. Having witnessed the effect of such collapses, immigrants leave buildings during an earthquake and are properly skeptical when public officials attempt to persuade them that buildings are safe to live in.

We need to recognize that most immediate search and rescue and medical care following a disaster is done by community members, and plan accordingly by providing better training in first aid. Nguyen and colleagues (15) found that while many people thought they knew how to perform first aid, in fact, most had not had a formal course within the recent past.

The emphasis here is on developing preparedness plans which acknowledge the disaster and culture in question, while simultaneously attempting to reduce the extent to which the man-made environment increases rather than decreases the risk to public health. No culture has been successful at developing and disseminating preparedness plans throughout the population. Populations are generally most receptive to suggestions that can mitigate or reduce future risk in the period immediately after a disaster, the so-called “window of opportunity.” Nonetheless, we must continue our efforts to increase the general level of preparedness and awareness within populations at risk. This requires that political units recognize natural disasters as a major threat to their existence, move disaster preparation and mitigation higher on the political agenda, and invest a greater share of resources in anticipating and minimizing the risk from disasters.

Communicable Diseases

It is often assumed that disasters inevitably result in the outbreak of communicable diseases. In fact, this rarely occurs (16). After the 1999 earthquake in Turkey, it was widely speculated that their would be outbreaks of cholera and typhoid. In fact, there were no such outbreaks, because Turkey has well-developed public health infrastructure which has resulted in infectious diseases largely being under control. When a country has invested in a good public health infrastructure where children are immunized against infectious diseases during infancy and provision of clean water and proper disposal of excreta is in place, populations are not at high risk of communicable disease after a disaster. Dr. Claude de Ville de Goyet of the Pan-

American Health Organization (PAHO) has consistently pointed out over the years that the emphasis following a disaster, such as the 1999 Turkish and 2001 El Salvador earthquakes, should be on quick restoration of sanitation services and provision of potable water for the affected population. This of course assumes that the affected area has invested in a strong public health infrastructure before the disaster occurs.

Even in countries where the public health infrastructure is less fully developed and infectious diseases still a major cause of morbidity and mortality a quick response from an alert, but incompletely developed, public health infrastructure can reduce the risk of post-disaster outbreaks of communicable diseases. As noted by Shoaf and Rottman (4) both Colombia and Honduras are endemic regions for dengue fever. Yet, immediate surveillance after the 1999 Colombian earthquake resulted in no increase in either classic or hemorrhagic dengue fever while surveillance in Honduras demonstrated a bimodal increase in cases of dengue with a small increase immediately after Hurricane Mitch and a second increase in January 1999.

El Salvador, immediately before the magnitude 7.6 earthquake on January 13, 2001, was already in the midst of an epidemic of rotavirus, and vector control measures to prevent dengue were overdue and a routine immunization campaign was scheduled to eradicate measles. "Instead of causing health authorities to take extravagant and ineffective measures, the earthquakes actually boosted their will to move forcefully and strengthen or resume time-proven control measures: routine and well-planned immunization coverage; water quality control and sanitation; food safety; and vector control" (17).

Acute Diseases

There are a few acute diseases that can be directly caused by a natural disaster. For example, following the Northridge earthquake a small outbreak of coccidioidomycosis occurred in a community in Southern Ventura County, as a result of the release of soil containing spores for *Coccidioides immitis*. Volcanoes and wildfires have the potential of causing both respiratory and ocular problems as a result of ash, smoke and toxic gases. Both heat waves and extreme cold can result in illness (18-19).

Chronic Diseases

The extent to which natural disasters actually exacerbate chronic diseases such as cardiovascular events is unknown. While some studies have found evidence that morbidity and mortality from cardiovascular events increases, others find no support for this hypothesis (20-24).

Psychological Effects

Evidence regarding the extent to which and the types of psychological distress that occur following natural disasters varies across studies. The methods used to measure psychological distress also vary across studies. Often it has been assumed that <u>any</u> evidence of psychological distress equates with diagnosable levels of psychological symptoms with particular emphasis on post-traumatic stress disorder that is directly attributable to the disaster event. In fact, only recently have standardized measures of PTSD been developed and administered to community-based samples following a natural disaster. Most studies have utilized measures designed

specifically for the disaster under study or have depended on standardized measures that were not designed to assess PTSD.

Posttraumatic Stress Disorder

Using measures specifically developed to assess PTSD, low rates of PTSD have been reported following floods, volcanoes, mud-slides, and tornadoes (25-28) where property damage was substantial but other dimensions of trauma thought to contribute to PTSD, such as dead bodies, were not present. Norris and Perilla (25) reported disaster-related PTSD after Hurricane Andrew, Koopman, Classen and Spiegel (29) reported PTSD after the Berkeley firestorm, McMillen, North and Smith (30) reported PTSD symptomatology following the Northridge earthquake. Jones, Frary, Cunningham (31) reported slightly elevated intrusiveness scores among elementary and middle school children following Hurricane Andrew and Goenjian et al (32) found evidence of PTSD among Nicaraguan adolescents following the Category 5 Hurricane Mitch. In contrast, Bourque and colleagues found no evidence of PTSD after either the Loma Prieta or Northridge earthquakes (33-35)

Psychological Distress Other Than PTSD

Although clinical levels of PTSD may be low or non-existent following natural disasters some level of emotional distress is common after a natural disaster (35). Generally, the level of distress does not reach diagnosable levels and the duration of distress is self-limiting, but persons with prior psychological symptoms may be at increased risk of developing elevated levels of anxiety, depression and somatic symptoms (35). Bravo, Rubio-Stipec & Woodbury (36) and Norris and Uhl (37) reported that such symptoms were elevated following, respectively, floods in Puerto Rico and Hurricane Hugo.

Following the Northridge earthquake, Siegel (35) found that 33% of respondents reported experiencing an emotional injury as a result of the earthquake. None of these respondents had diagnosable levels of PTSD or even elevated levels of PTSD but they did have elevated score on the Brief Symptom Inventory (38).

Suicide

It is sometimes suggested that suicides increase after natural disasters, but there is no documented evidence that that occurs in the United States (39-41).

Emergency responders and relief workers are probably at the greatest risk of psychological distress following a disaster of any kind, and least likely to be provided with access to appropriate services. Psychological distress occurs for a number of reasons. First, first responders such as fire department personnel and public health workers enter a disaster site within minutes of the disaster's occurrence. They often are not relieved for a substantial amount of time. Second, even when relieved, they often re-enter the disaster area without taking sufficient time to rest. And third, as first responders, they are the group that is most likely to be exposed to dead and severely injured persons.

Direct Impact on the Health Care System.

Hospitals, clinics, nursing homes and other sites of medical care are subject to the same destructive forces as the general population. Hospitals, in particular, are sometimes built to a more stringent building code, at least in California, which is designed to maximize structural resistance to collapse and can continue to function in the advent of a disaster. In spite of being built to more stringent codes, 18 hospitals in the Los Angeles County area experienced some degree of structural damage following the Northridge earthquake and the only hospital in Calarca, Colombia, was substantially damaged in the 1999 earthquake (4). Unfortunately, many hospitals in Latin America have been repeatedly been damaged. The JN France Hospital in St. Kitts and Nevis, opened in 1966, has been significantly damaged by hurricanes 10 times (17).

In addition to experiencing damage to the structure itself, hospitals and clinics may experience breakage of water and sewage lines, obstruction of stairways and exits, and damage caused by non-structural objects such as filing cabinets, broken glassware, etc. Broken water pipes created substantial damage to medical facillities and medical records in the Santa Cruz and Watsonville areas following the Loma Prieta earthquake of 1989, and lack of water was a problem following the midwest floods of 1993 (42-45).

During the Northridge earthquake, some medical personnel could not get to their normal work sites because of damaged transportation arteries. When these dislocated personnel attempted to volunteer at hospitals and clinics that they could get to, administrative personnel at these alternative sites were unprepared for them and had no way to ascertain if they were properly licensed or credentialed.

Although Shoaf and colleagues estimated that as many as 8% of Los Angeles County residents were injured after the Northridge earthquake, only 15% of the injured sought medical care and, only a third of those who sought medical care, went to an emergency room or hospital. Furthermore, in spite of the fact that Los Angeles County public health nurses were very active in the community after the earthquake and community clinics were available few persons sought care from these sites. Rather they went to private doctors, neighbors, friends, DMAT teams and veterinarians (46).

Indirect Effects on the Population's Health.

Indirect effects on the population's health include the kinds of things that happen as a result of regular sources of care being unavailable. For example, in Los Angeles County at the time of the Northridge earthquake, 21% of households reported that at least one person in the house was on prescription medications, and 40% had at least one person using a health aid such as spectacles or hearing aids. About 1% of the households in the County had problems getting prescription medicines after the earthquake and 2.6% experienced breakage of health aids (46-47).

RECENT BREAKTHROUGHS IN SCIENTIFIC KNOWLEDGE AND ADVANCES IN TECHNOLOGY

Recent breakthroughs in scientific knowledge and advances in technology, however, now make it possible to mobilize existing resources in order to reduce the tragic human consequences

of natural disasters (48). The science of disaster reduction draws on a wide variety of disciplines and technologies, from seismology to meteorology, from remote sensing satellites to computer information systems, to help manage a disaster relief effort. The major scholarly disciplines associated with disaster reduction have generally been in the physical sciences (e.g., seismology, hydrology, and meteorology) and wind and earthquake engineering. However, physicians, other health professionals, and policy makers also play a key role in reducing the vulnerability of communities to the health and medical effects of disasters. The production of the "Blueprints for Change" have clearly encouraged closer interdisciplinary cooperation among different scientific disciplines. At the World Congress in August 2002, health personnel will have the opportunity to interact with geophysicists, hydrologists, meteorologists, urban planners, social scientists, civil engineers, and other professionals who are involved at all stages of disaster prevention and rehabilitation (49).

The health sector's importance is clearly seen after sudden-impact natural disasters. When community members have been trained in simple first aid, they can effectively reduce the numbers of serious casualties and deaths that occur before outside help arrives from the state or federal governments. Because health facilities and services must continue to function after a disaster strikes, health facilities should be constructed to withstand the effects of a natural disaster and should be equipped with emergency generators, extra supplies, and equipment. The complete disruption of water and basic environmental sanitation services during disasters is another major concern of the health sector. In crowded conditions, such a disruption increases the risk of communicable disease transmission--fortunately a rare occurrence following natural disasters in the United States. These hazards can be minimized if public health officials work closely with municipal public works staff to establish a response system that reduces the risk of water contamination (and, therefore, waterborne and vector-borne diseases) and that includes the safe disposal of excreta and solid waste as part of routine emergency preparedness planning.

The situation at the present time regarding how society deals with natural disaster risk is in many ways not unlike the period in the mid-19th century, when the great public health programs that made up the "Sanitary Revolution"--piped water and sewage disposal--began to be implemented in the large cities. These sanitary measures depended on the following:

- a scientific understanding of the causes of disease (in the case of the disasters, the causes of natural hazards)
- the availability of technical means to eliminate or mitigate environmentally-related diseases (disasters), and a knowledge of the costs of protective measures
- a widespread public belief that diseases (disasters) are not random, and that mitigation or prevention is possible
- the political will and opportunity to act

It can be expected that when these same four conditions are achieved regarding natural hazards, disaster protection schemes will begin to be implemented on a very much increased scale. At the present time, the first two of these conditions have been met, and the third--public belief in the possibility of mitigation--is steadily increasing as each successive disaster is shown to have been caused not so much by the natural phenomena as by an avoidable failure of community disaster

preparedness and mitigation activities. As a result of this understanding, countries in both the developed and developing worlds have begun to implement measures to reduce the risk of future disasters.

The public health field has already helped reduce the human impact of natural disasters (50). Results of epidemiologic research on disasters have formed the scientific basis for increasingly effective prevention and intervention strategies to decrease mortality in several disaster situations (48). For example, epidemiologic studies of tornadoes have resulted in changes in local housing and land-use regulations regarding the danger of mobile homes and have formed the basis of weather-service safety guidelines issued to citizens in tornado-prone parts of the country (51*)*. The results of epidemiologic studies have also been used to reduce the magnitude of measles outbreaks in refugee camps since 1985 and (52) to reduce the mortality rates observed in Hurricanes Hugo (1989) and Andrew (1992). Epidemiology has allowed us to target specific interventions to prevent specific disaster-related health effects (e.g., improved warning and evacuation before flash floods and tropical cyclones [53], the identification of actions that building occupants should take during earthquakes [54], and the identification of ways to avoid injuries during the clean-up following hurricanes [55]). Epidemiology has also discovered ways to help local communities develop better emergency preparedness programs and to measure the effectiveness of disaster prevention and preparedness programs.

POTENTIAL HEALTH-SECTOR CONTRIBUTIONS TO THE ALLIANCE FOR DISASTER REDUCTION

Although the public health community has helped prevent injury and death during recent disasters, it has the potential to do much more (56). The World Congress on Disaster Reduction provides a timely framework for a wide variety of public health projects and activities designed to prevent or reduce the human impact of natural disasters. These include the following:

1. Promoting the "Alliance for Disaster Reduction." Health authorities should collaborate in their efforts to bring to the attention of politicians and other high level policy makers the public health consequences of health emergencies, the actions that can be taken immediately to save lives in such emergencies, and the need to improve local disaster response capabilities. Specifically, officials who design government policies related to disaster planning and response must integrate specific health and medical issues into the overall disaster planning efforts.

2. Strengthening human resources and building institutional capacity. In public health departments and development organizations throughout the world, people responsible for emergency preparedness frequently assume other organizational responsibilities as a normal sequence of career development. The result is an almost total lack of "institutional memory" of past disaster experiences. To address this problem, health authorities should develop career public health "tracks" in emergency management. Other activities to strengthen human resources and build institutional capacity may include technical training for health

workers in injury prevention and emergency preparedness and response, efforts to make national level officials more aware of the importance of health preparedness, and community-oriented training programs involving the lay public. A specific priority is to incorporate key principles of emergency preparedness and response into the curricula of institutions such as schools of medicine and public health (57-58). Because prompt response to health emergencies requires close cooperation between different sectors (e.g., health care and civil protection), public health efforts must encourage multi-ectoral emergency preparedness planning.

3. Effective emergency health preparedness and disaster prevention principles and procedures can be sustained only if they are integrated into ongoing health activities at the national, regional, and community levels (59). Technical areas that need targeting include environmental health, public health surveillance, immunization programs, the medical and logistical aspects of mass casualty management, and the development of simple but effective equipment for health response to disaster situations.

4. Improving inter-sectoral and interagency collaboration on preparedness and response. One principal strategy must be to strengthen links between health programs and other sectors involved in preparing for emergencies.

5. Conducting research on the public health consequences of natural disasters. Efforts to improve public health and medical preparedness for disasters are dependent on the results of applied or operational research on the health aspects of disasters. As a part of the overall scientific endeavors of the Alliance for Disaster Reduction, international cooperation in such research should be encouraged. This research should include the development of models that predict the vulnerability of the public to different types of natural disasters. Such vulnerability assessment is also a key tool for identifying populations (e.g., the young, the poor, the disabled, and the elderly) who are at increased risk from disasters.

6. Improved strategies to transfer technology and information. A major goal of the Alliance should be to provide effective channels through which to communicate information and transfer technology; the number of deaths and injuries resulting from disasters can be reduced through greater community awareness of natural hazards and through improved national, regional, and local preplanning for disasters. The network of medical and public health professionals in any country represents an excellent channel through which information and activities concerning disaster prevention, mitigation, and preparedness can be brought to people living in even the most remote areas. Academic institutions also need to determine the best way to disseminate the results of their disaster research to potential "users" (e.g., local health departments, clinicians, politicians, and emergency management officials) who could directly benefit. Researchers also

need to determine what types of research applications are useful to disaster managers and why.

7. Improving communication to and from communities at risk before, during, and after the disaster. At all levels, prompt reporting of and response to health emergencies require functional communication systems and rapid access to relevant information for decision making. The public health community should focus its efforts in three main areas: 1) streamlining communication procedures with other key response organizations; 2) exploring technological alternatives for improved data retrieval (e.g., satellite communication systems and electronic networks such as the Internet); and 3) developing data bases on natural hazards specific to every country, as well as data bases on regional and international resources that are available for immediate emergency assistance.

8. Early warning systems. Such systems consist of the detection and reporting systems that should be in place before disasters occur. There are many parallels between forecasting strategies used in the meteorological sciences and those used in public health surveillance to detect or prevent outbreaks of epidemics. For example, "epidemiologic early warning systems" allow health authorities to prevent isolated cases of diseases from becoming epidemics.

Recommendations for Reducing the Impact of Disasters on Public Health

1) A well-developed public health infrastructure before the disaster occurs.

2) Hazard mitigation and preparedness activities in all relevant facilities before the disaster occurs.

3) Training of non-medical personnel as first responders before the disaster occurs.

4) In place and practiced contingency plans for when a disaster occurs. What happens if you have to evacuate the site? What happens if personnel cannot get to the site? What will be needed “out in the field” away from the site? How do public health issues/problems change over time after the disaster?

5) How do you use the media or other communication methods to disseminate relevant public health information? (60-61).

6) How do you handle convergence of goods, volunteers, etc., many of which you do not want and cannot use? (62-64)

7) In general, persons delivering public health services during and after a disaster will not be doctors or emergency department personnel.

CONCLUSIONS:

Greater concentrations of people, rising population levels and urban poverty across the globe are increasing human vulnerability to disasters and multiplying the adverse public health consequences of disasters when they occur. However, hazards research has shown that the adverse effects of natural disasters are largely preventable. By improving the training of emergency workers, by strengthening the capacity of public health institutions to prevent and respond to disasters, and by conducting more applied and problem-focused natural hazards research, we can further the Alliance's overall goal of minimizing the impact of natural catastrophes on people. International support for a scientific attack on the health and medical problems presented by natural disasters is very much in the spirit of the World Congress on Disaster Reduction.

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