SAFE HOSPITALS

A Collective Responsibility

A Global Measure of Disaster Reduction

Pan American Health Organization
Regional Office of the World Health Organization

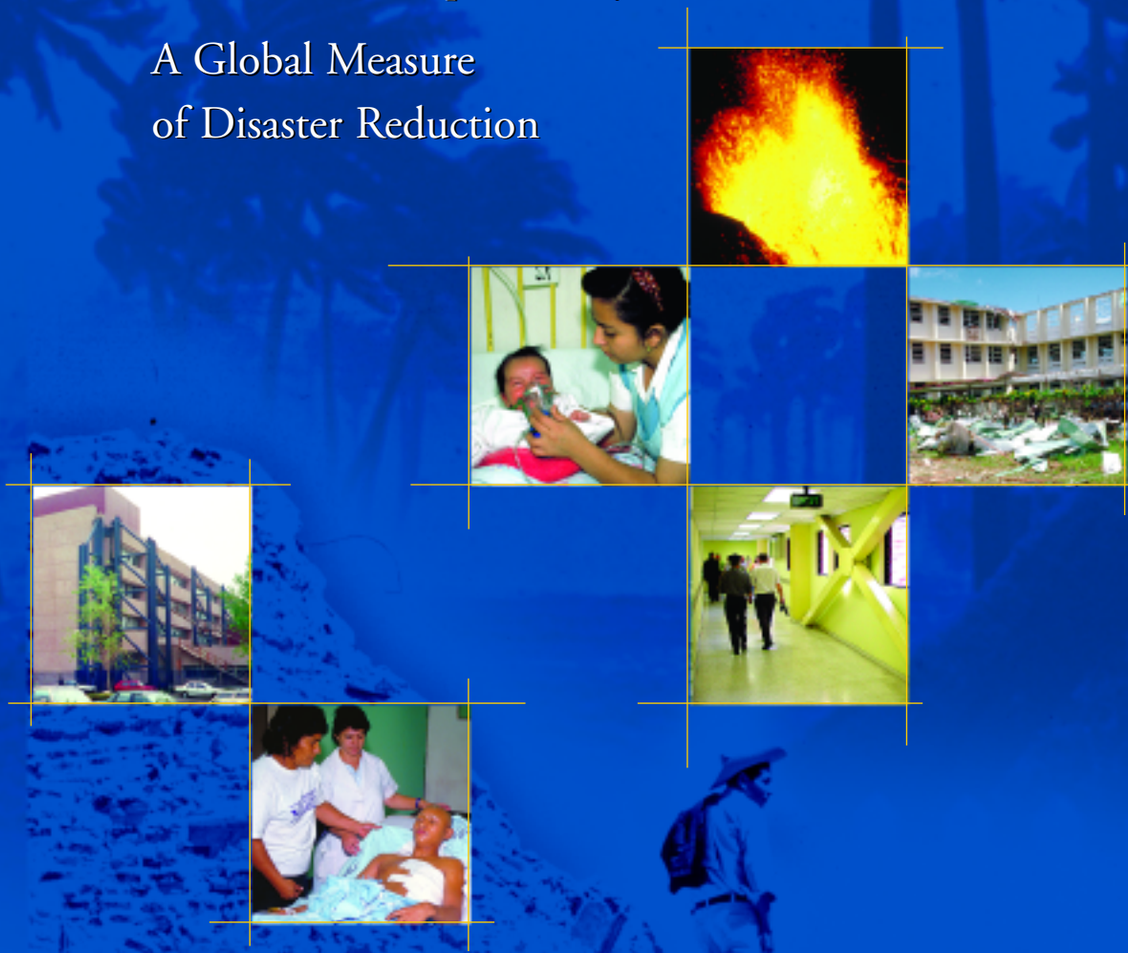
World Health Organization

www.paho.org/disasters
www.who.int/hac

SAFE HOSPITALS

A Collective Responsibility

A Global Measure of Disaster Reduction



Pan American Health Organization
Regional Office of the
World Health Organization

PREFACE

Disasters brought about by natural hazards are, first and foremost, thought of in terms of their human consequences. The physical and emotional losses they cause have moved us to aspire for a safer world. A disaster remains primarily a social and health issue.

The 1994 World Conference on Natural Disaster Reduction in Yokohama, Japan prompted a more far-sighted approach, stressing the economic link between disasters and sustainable development. It is now well recognized that disasters do affect the GNP of developing countries and reduce their prospects for growth. Disasters have become an economic issue.

Has the pendulum shifted too far? Are disasters now primarily seen as economic challenges? Are the health consequences and social losses merely one of the financial line items that make up the overall cost of the damage?

Disasters are setbacks to sustainable economic growth as well as human and health tragedies. These aspects are interdependent and cannot be dissociated. Protecting critical health facilities, particularly hospitals, from the avoidable consequences of disasters, is not only essential to meeting the Millennium Development Goals, but also a social and political necessity.

Mirta Roses Periago
Director
Pan American Health Organization

Photo: Victor Rojas, PAHO/WHO

A PRIORITY

A SOCIAL NECESSITY

A COLLECTIVE RESPONSIBILITY

keeping HOSPITALS SAFE

Protecting critical health facilities, particularly hospitals, from the avoidable consequences of disasters, is not only essential to meeting the Millennium Development Goals, but also a social and political necessity in its own right.




Photo donated to PAHO/WHO

The vulnerability of a hospital is **more than a medical issue**

Disasters such as the earthquakes in Turkey (1999), Gujarat, India (2001) and Bam, Iran (2003) or the cyclones in Grenada, Haiti and the Philippines (2004) call to mind images of a large number of injured victims awaiting medical treatment and make-shift facilities operating under war-like conditions on the grounds of a severely damaged hospital. However, the medical impact of a damaged health facility runs far deeper. Health services facing the challenge of resuming treatment of normal medical emergencies and providing routine care must, at the same time, offer follow-up care to the disaster victims. As the issue of mass casualties fades from the international conscience (sometimes in a matter of days) and the initial groundswell of support ebbs, an even greater segment of the population will be affected, just when the country needs all its strength to recover.

A larger public health issue

Hospitals and other health facilities, especially in developing countries, offer more than medical care to the sick. The hospital's role in preventive medicine is essential. Hospitals host many public health reference laboratories, contribute to the diagnosis and prevention of HIV and AIDS, signal the early warning of communicable diseases, serve as resource centers for public health education and are magnets for research.

The long-term impact of the loss of these public health services on the Millennium Development Goals (MDGs) far exceeds the impact of delayed treatment of trauma injuries. This hidden impact is difficult to quantify in financial terms, and consequently overlooked.

Photo: Jorge Jenkins, PAHO/WHO

A socio-political issue

For any community, the main hospital or health center has a significance far beyond other critical facilities such as power plants, airports or firefighting stations. Together with schools, it has a symbolic social and political value.

The emotional repercussions of losing a hospital can lead to a loss of morale and a sense of insecurity and social instability, which have not yet been fully appraised or understood. This is particularly true in small countries with just one hospital to serve the entire population. Once the public realizes that the loss may have been avoidable and that disaster mitigation measures were both possible and affordable, it will not be quick to forgive or tolerate a political failure to act.

The loss of patients in health facilities or the death of children in schools strikes a particularly sensitive emotional chord. Hospitals are expected not only to provide good medical care but also to ensure the safety of their particularly vulnerable clientele[1]. The fact that a hospital is occupied 24 hours a day/seven days a week by a population that is entirely dependent makes it almost impossible to organize a quick evacuation if and when it is needed.

1 In a public opinion survey carried out by El Salvador's Institute of Public Opinion following the 2001 earthquakes, respondents cited hospitals and blood banks as two of the three public facilities whose survival must be guaranteed in the wake of disasters in order to continue providing critical services.

Hospitals that Fail Raise Social and Economic Concerns

The 1999 earthquake in Turkey left more than 44,000 people injured. Most were either medically evacuated to far-away health facilities because of damage to nearby hospitals or were treated outdoors on the grounds of the closest hospital or clinic, because it was either destroyed or perceived to be unsafe.

The 2001 earthquakes in El Salvador left 1,159 dead and 8,122 injured. Nineteen hospitals (63%) were damaged and six were completely evacuated. Three years after the earthquake, patients at the hospital San Rafael in the capital were still being admitted in temporary facilities (tents or containers).

Photo: Jorge Jenkins, PAHO/WHO

An economic issue

A sophisticated hospital represents an enormous investment and its destruction poses a major economic burden for society. Few social facilities concentrate such expensive equipment in such a small space. Today, the cost of the building and physical infrastructure alone is just a small fraction of the total cost of modern health facilities. The cost of non-structural elements in most facilities is appreciably higher than the stucture itself.[2]

The use of temporary facilities such as field hospitals—which by and large have proven an ineffective alternative to safe hospitals—cannot compensate for the loss of a hospital. They are exorbitantly expensive to deploy and maintain at a time when resources are overstretched. Witness the example of relief efforts in Bam, Iran, where the cost to mobilize 12 international field hospitals[3] was estimated at more than US$10 million,[4] close to the amount needed to repair critical health services affected by the earthquake.

The direct costs related to the loss of a hospital in a disaster (buildings, equipment and supplies and temporary substitute facilities) are only part of the equation. There are also indirect costs, and ECLAC and PAHO have begun to study these. A lack of medical services can also

2 See the 2002 PAHO/WHO publication *Principles of Disaster Mitigation in Health Facilities* (full text at www.paho.org/disasters; click on Publications Catalog).
3 These foreign facilities arrived too late to provide life saving care, and for the most part, remained for too short a time to address the ongoing needs of the population.
4 Based on OCHA data and WHO estimates.

adversely affect the economic and business recovery process, although the extent to which this occurs is not yet fully appreciated, probably underestimated and rarely addressed in determining reconstruction priorities.

Wind and Water Wreak Havoc on Hospitals

Photo courtesy of Tony Gibbs

Hurricane Ivan struck the small Caribbean nation of Grenada in the West Indies in September 2004. It was the strongest hurricane on record occurring this close to the equator. The second most important hospital in Grenada (the country has only two), the Princess Alice Hospital, lost most of its roof.

Barely 10 days later, Tropical Storm Jeanne unleashed its fury on Haiti, the poorest country in the Western Hemisphere. The La Providence Hospital, which lies below sea level, is a 60-year-old facility and the only public hospital available to serve more than 250,000 people in the province of Artibonite. Jeanne's torrential rains left the hospital under two meters of water and mud, killing some patients. No patient could be admitted or receive any surgical care until a 100-bed Red Cross field hospital was airlifted from Norway.

Photo courtesy of Claude de Ville de Goyet

A Population Left Without Access to Health Care

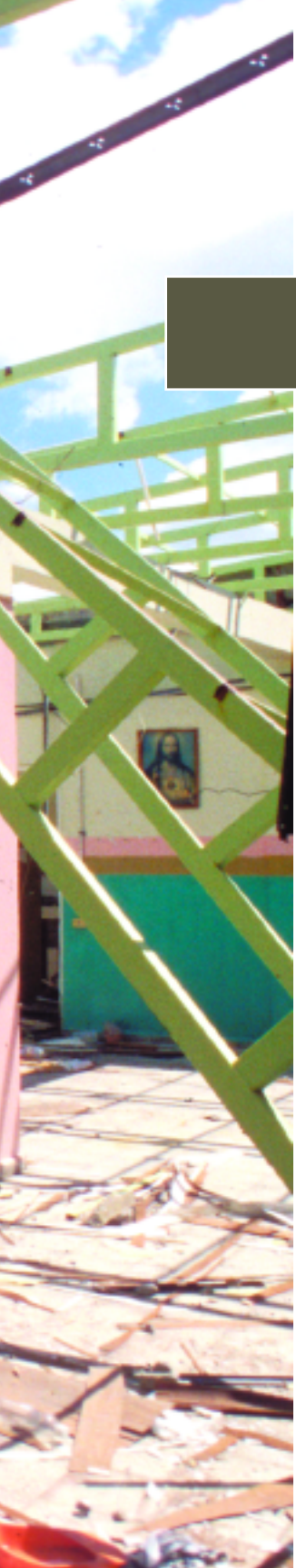
In Gujurat, India, a massive 7.9 magnitude earthquake killed 20,000 and injured 30,000 in 2001. In the most affected district, Kutch, all health facilities collapsed.

In Bam Iran, the 2003 earthquake left a death toll of 26,271 and tens of thousands injured. Bam's two hospitals and all health centers were destroyed or severely damaged. Nearby hospitals were overwhelmed. Within 36 hours, an estimated 8,000 injured were evacuated to hospitals[5] across the country's 13 provinces. Foreign field hospitals began arriving after three days and provided routine health care. Most of these mobile hospitals left within a few weeks or months. Restoring critical health services, at a cost of US$10.7 million, is expected to take several years.

Photos courtesy of Claude de Ville de Goyet

5 See the 2003 WHO/PAHO *Guidelines on the Use of Foreign Field Hospitals in the Aftermath of Sudden-impact Disasters* (full text at www.paho.org/disasters; click on Publications Catalog).

Photo: Julio Vizcarra, PAHO/WHO



Reducing the vulnerability of a hospital **is achievable!**

The best argument for demonstrating that it is possible to have safe hospitals is that some developing countries, with greater vision than actual resources, are actually accomplishing this.

Reducing the vulnerability of a building is not a black or white issue. There are many shades of gray and levels of protection that must be considered. While some degree of loss may occur in the most extreme events, no hospital should be allowed to collapse, killing staff and patients in an earthquake, or lose its roof and equipment cyclone after cyclone.[6]

Levels of protection

Keeping hospitals operational in normal times consumes nearly two-thirds of all public health care spending in Latin America and the Caribbean. This alone is a compelling reason to protect these critical facilities at the following levels:[7]

6 One Caribbean hospital lost its roof to hurricanes ten times over a 35-year period!
7 See the 2003 PAHO/World Bank publication *Protecting New Health Facilities from Natural Disasters* (www.paho.org/disasters; click on Publications Catalog).

Life protection is the minimum level of protection that every structure must comply with. It ensures that a building will not collapse and harm its occupants. Many hospitals in developing countries do not comply with this basic requirement. However, years ago this was also the case in developed countries. In the 1971 San Fernando, California earthquake, more than 90% of the deaths occurred in hospitals. **Investment protection** involves safeguarding infrastructure and equipment. From a health point of view, protecting the investment means that repairs can be made more rapidly, leading to much faster rehabilitation. Post-disaster reconstruction can be a very long process. **Operational protection** is meant to ensure that health facilities can function in the aftermath of a disaster. This is the optimal level of protection for the most essential hospitals.

Photo courtesy of Claude de Ville de Goyet

Making hospitals safe from natural disasters requires the multidisciplinary expertise of a variety of experts, from engineers to architects to administrators and others. Specialized engineering skills are required to design or evaluate the structural elements, which include the load-bearing components that make a building stand—columns, beams and the walls that strengthen the

infrastructure. The failure of a hospital's non-structural elements, including non-load-bearing walls, windows, ceilings, fixtures, appliances and equipment, can also be severe. Even minor non-structural damage can appear threatening, leading to unnecessary evacuation and delayed reoccupation of the hospital. The functional elements of a hospital include the physical design (the site, external and internal distribution of space, access routes), maintenance and administration. These are critical to ensuring that hospitals continue operating when most needed.

Improving the safety of existing facilities

The need to reduce the non-structural vulnerability of existing facilities is now widely recognized in many countries in Latin America

Photo: Jorge Jenkins, PAHO/WHO

and increasingly in other regions of the world, and further progress is more a matter of awareness and attitude than of science or money. Since the mid-1980s, earthquake-prone countries including Chile, Colombia, Costa Rica, Ecuador, India, Mexico and Peru have been retrofitting (as the process of correcting unacceptable structural and non-structural weaknesses is called) hospitals. Although it would be extremely expensive and disruptive to retrofit all existing hospitals, the most critical areas (operating theatres, blood banks, etc.) of selected facilities should be targeted.

Disaster Mitigation Measures Pay Off

Health centers in the Cayman Islands were virtually undamaged by Hurricane Ivan's strong winds, torrential rains and storm surge. The behavior of retrofitted facilities in actual disasters, such as the East Point Clinic, confirms that this approach is technically and politically feasible and effective in saving lives and reducing the disruption of essential services. Most of the disruption in retrofitted facilities was due to non-structural damage and unnecessary evacuation.

Photo courtesy of Tony Gibbs

Does retrofitting actually protect patients, reduce losses and allow operations to continue? The only irrefutable argument is how the structure behaves in an actual earthquake. Several examples have been particularly well documented.

Costa Rica, 1990

An ambitious program to retrofit five major hospitals was underway in Costa Rica when a 6.8 magnitude earthquake struck in 1990. The partial retrofitting of one hospital is credited with saving the facility and its occupants. In other hospitals, those parts of the facility that had already been retrofitted came through the quake in excellent condition, while other parts which had not yet been reinforced showed evidence of structural failure, even though allegedly they had been designed to withstand an even stronger seism. Non-structural damage was concentrated in the buildings or departments that had not yet been retrofitted. The savings far exceeded the cost of retrofitting.

The documented experience gained from the behavior of retrofitted hospitals in actual disaster situations confirms that this approach is technically and politically feasible and effective in terms of saving lives and reducing a disruption of essential services. Public confidence in the safety of its health facilities should receive more attention.

Making new health facilities safe

Ensuring that all new hospitals meet the most stringent and modern safety requirements is feasible and cost-effective and will directly contribute to achieving the MDGs. Incorporating disaster mitigation measures into the construction of new health facilities is a matter of political will rather than an issue of cutting-edge scientific knowledge or an unlimited budget. Politicians respond to public demand and awareness.

The issue of hospital safety must be introduced at an early stage in political discussions and negotiations with the financing sources, and during the planning process, in the selection of a site and of course, in the formulation of detailed architectural and engineering

El Salvador, 2001

Photo: Miguel Gueri, PAHO/WHO

The 286-bed Benjamin Bloom Children's Hospital in El Salvador's capital, San Salvador, was seriously damaged in a 1986 earthquake and was repaired adhering to anti-seismic norms. Fifteen years later when major quakes once again struck in 2001, this hospital suffered mostly cosmetic damage.

Photo: Armando Waak, PAHO/WHO

Photo courtesy of Claude de Ville de Goyet

specifications. This is true for all infrastructure built in disaster-prone areas, but more so for complex structures such as hospitals. "Unanticipated" safety concerns that are expressed late in the process are generally more costly. Likewise, disaster risk reduction experts must be involved early on and the process of check consulting or peer review should become standard. These practices are commonplace following major disasters, but it has been more difficult to sell the idea to countries that have not experienced a recent disaster. Our memory and a political commitment fade rapidly!

The absence of a catastrophic failure of a hospital is a non-event and receives scant public attention. And unfortunately, many success stories are not documented. These successful examples cannot be credited to any one single action but rather to conceptual improvements made over time in lengthy planning and implementation processes.

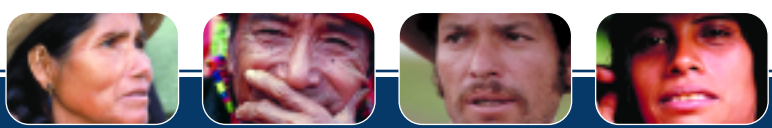


Photo courtesy of Claude de Ville de Goyet

Mitigation: more than just a return on investment

Reducing the vulnerability of hospitals to natural hazards is first and foremost a social issue, not an economic one. Improving health, well-being and safety should not be conditioned on a financial return. If this were the case, the treatment of cases of HIV and AIDS or the care of the elderly or the "economically unproductive" could hardly be justified.

The financial cost of disaster mitigation

Full protection against all natural hazards is almost impossible from a technical standpoint and would be unreasonably expensive. Protection always involves compromise. The cost of reducing vulnerability depends on several factors. One is the nature of the hazard. It is comparatively more expensive to protect critical infrastructure against earthquakes than it is to protect them against floods and more so than against wind damage (hurricanes and cyclones).

The cost of disaster mitigation measures also varies according to whether a hospital is under construction or already built. Including earthquake safety considerations in plans for new facilities can add around 2% to the total cost (infrastructure and equipment). The earlier safety measures are integrated into the process, the more economical they are. On the other hand, retrofitting existing facilities to withstand

Photo: Armando Waak, PAHO/WHO

earthquakes, for example, can cost an average of 8-15% of the total cost of the facility.

Good maintenance can go a long way toward minimizing non-structural and functional vulnerability.[8]

The financial cost of ignoring disaster mitigation

The UN Economic Commission for Latin America and the Caribbean (ECLAC) developed a methodology for estimating the cost of disasters. The loss of a hospital, public or private, has direct and indirect costs:

- The direct costs include the infrastructure, equipment, furniture and supplies.
- The indirect costs include unforeseen expenses (temporary solutions such as field hospitals, increased risk of outbreaks due to the loss of laboratory and diagnostic support, the loss of income normally generated by the services, etc.)

It has been clearly demonstrated that it costs almost the same to build a safe hospital as it does to build a vulnerable one.

Photo PAHO/WHO

8 For reference purposes, the recommended annual maintenance budget is 4% of the hospital cost. The cost of a complete engineering survey of the vulnerability of a facility is up to 0.3% of its value.

Not included and difficult to assess are the costs associated with a decline in the population's well-being due to interrupted services, the impact on overall recovery and the disincentive for external investment and reconstruction. The direct and indirect costs far exceed the investment that would have been necessary to prevent them.

Hospitals Already Under Construction: a Special Case

Although the 2003 earthquake in Bam, Iran destroyed two of the city's hospitals, it spared the frame of a new facility under construction at the time. However, the fact that the non-load-bearing steel infrastructure withstood the quake's force was no guarantee of how well the completed structure would fare.

A review of the building's projected strength by Iranian authorities led to significant structural reinforcements. The cost of these measures is not known, but it should fall somewhere between the cost of planning for the inclusion of disaster mitigation measures in a new facility and the cost of retrofitting the hospital once it was already in operation.

Photos courtesy of Claude de Ville de Goyet

Is disaster mitigation cost-effective?

Another way to frame this question is: would the Ministry of Health save money in the long-run by reducing the vulnerability of its health infrastructure?

Clearly in a country with a moderate-to-high frequency of natural hazards, integrating risk management into the planning of new hospitals (and any other infrastructure) is highly cost-effective. It protects the capital investment and makes development more sustainable.

The cost-effectiveness of retrofitting all existing installations is another issue. Assuming for the sake of argument, that retrofitting represents 10% of the hospital's total value, then at least one of every ten hospitals should be spared from total destruction during its projected lifetime to justify the cost-effectiveness in financial terms, statistically an unlikely event. The cost-effectiveness of strengthening pre-existing facilities also may seem unjustified, particularly if safety and health are viewed merely in terms of a financial return on investment. Retrofitting is best applied on a selective basis to the most critical facilities.

Photo: Jorge Jenkins, PAHO/WHO

Safe hospitals: **one of the best indicators of global disaster reduction**

The global disaster community has come together for a second World Conference in Kobe, Japan to increase the profile of disaster risk reduction and craft a Plan of Action for 2005-15.

Why should the global multisectoral Plan of Action include a strong focus on mitigating disaster damage in hospitals and health facilities? Hospitals are much more than just another "critical" facility. Their importance extends far beyond the role they play in saving lives and safeguarding public health in the aftermath of disasters. Health facilities are powerful symbols of social progress and a prerequisite for economic development. There are compelling reasons for all sectors to pay special attention to reducing the physical vulnerability of all health facilities.

Social value	Hospitals, like schools, have a unique symbolic value for communities.
Vulnerability of occupants	Hospitals are occupied 24 hours a day/7 days a week by a highly vulnerable population that cannot be evacuated easily.
Economic impact	In addition to the high density of expensive equipment, hospitals should remain functional to stimulate economic recovery and encourage investment.
Public health	Hospitals, and in particular their diagnostic services, are essential for the surveillance and control of potential outbreaks of disease.
Medical care	Hospitals must remain operational when they are most needed to treat mass casualties caused by disasters.

Reducing the vulnerability of existing health facilities is an expensive challenge for developing countries, one that can only be met gradually. However, protecting new, yet-to-be built facilities is feasible and cost-effective. Today, there is no excuse for failing to ensure that new hospitals are safe.

Photo: Julio Vizcarra, PAHO/WHO

It is the collective responsibility of all sectors and a basic political and social obligation to ensure that all new health facilities are built to resist natural hazards and remain operational when they are most needed. Without reducing the vulnerability of health infrastructure, meeting the MDGs will remain an elusive goal.

Pan American Health Organization

Regional Office of the
World Health Organization

Read more about disaster mitigation

Publications on Disaster Mitigation from PAHO/WHO

Guidelines for Vulnerability Reduction in the Design of New Health Facilities, 2004

Protecting New Health Facilities from Natural Disasters, 2003

CD-ROM *Disaster Mitigation in Health Facilities*, 2001

Disaster Mitigation for Health Facilities: Guidelines for Vulnerability Appraisal and Reduction in the Caribbean, 2000

Principles of Disaster Mitigation in Health Facilities, 1999

Lecciones Aprendidas en América Latina de Mitigación de Desastres en Instalaciones de Salud: Aspectos de Costo Efectividad (Lessons Learned in Latin America on Disaster Mitigation in Health Facilities). Available in Spanish only. 1997

Disaster Mitigation Guidelines for Hospitals and other Health Care Facilities in the Caribbean, 1992

www.paho.org/disasters

Click on Publications Catalog

Publications on Disaster Mitigation from WHO and the Government of Nepal

Guidelines on Non-structural Safety in Health Facilities, 2004

Guidelines for Seismic Vulnerability Assessment of Hospitals, 2004

Non-structural Vulnerability Assessment of Hospitals in Nepal, 2003

A Structural Vulnerability Assessment of Hospitals in Kathmandu Valley, 2002