



SAFE + GREEN = SMART

A Model Policy for SMART Health Facilities

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FOREWORD

The Caribbean is a highly hazard-prone region. Hurricanes Gilbert, Ivan and Tomas are stark reminders of how the direct and indirect impact of weather-related disasters can significantly disrupt access to health services and the sector's ability to provide care. However, today it also is becoming increasingly clear that the health sector itself is one of many contributors to the impact of climate change, making it imperative to step up efforts to reduce the environmental footprint and increase the resiliency of its health facilities.

The **SMART** Health Facilities Initiative is an important step in this direction. The Pan American Health Organization (PAHO) is spearheading this initiative in an effort to ensure that health facilities in the Caribbean are both safe and green.

While there is broad support for the principles of smart health facilities, there are very few actual policies at the national level that call for a shift away from the traditional disaster response model to one that proactively seeks to minimize the health impact of a disaster through climate adaptation, mitigation and preparedness. This publication aims to guide the health sector in developing a policy on **SMART** health facilities, a policy that forms an integral part of the health agenda of PAHO's Member States; is backed up by earmarked resources in the national budget; and counts on committed leadership at the highest level of government.

We encourage health authorities throughout the Caribbean to begin the process of developing a policy on **SMART** health facilities, seeking to strike a balance between safety and an environmentally-sustainable setting, thereby reaching for the goal of health facilities that are climate-smart and disaster-resilient, that protect the lives of patients and staff and that continue to function when they are most needed.





Section I

DEFINING THE PROBLEM

The Vulnerability of Health Facilities to Natural Hazards

According to data provided by PAHO/WHO Member States, 67% of their health facilities are located in disaster risk areas. In the last decade, nearly 24 million people in the Americas lost health care for months, and sometimes years, due to the damage directly related to disasters. On average, a hospital out of service in the Region leaves approximately 200,000 people without health care and the loss of emergency services during disasters sharply reduces the chance to save lives.¹ Many countries in the Caribbean have only one referral hospital.

The vulnerability of health facilities in disaster situations cannot be underestimated. There is a widely held expectation that health facilities are prepared to deal with emergency situations. However, the impact of past earthquakes and hurricanes in the Americas has proven that hospitals and other health facilities are indeed vulnerable. Many have been left unable to function and provide not only emergency services but also routine medical care and public health services. During the San Fernando, California earthquake of 1971, for instance, four hospitals were damaged so severely that they were no longer operational, at the time they were most needed. The majority of deaths occurred in two of the hospitals that collapsed. It was an ironic feature of that earthquake that the most hazardous place to be in San Fernando was in a hospital!² In the 1985 earthquake in Mexico, 5,826 hospital beds were lost either to the direct impact of the quake or because of the need to evacuate the three largest health institutions in Mexico City—the Social Security Institute’s National Medical Center, the Hospital General and the Hospital Juarez. Most striking were the collapse of the obstetric complex (six floors) and the medical residences (eight floors) of the Hospital General and the collapse of the 12-story central tower of the Hospital Juarez. Many patients as well as doctors and nurses, who were among the nation’s best prepared to respond to mass casualties, lost their lives.

In addition to the need to build new and retrofit existing health facilities so that they are structurally sound, there is growing recognition of the need to reduce the non-structural vulnerability of exist-

The loss of a health care facility is more than a medical issue. It is a larger public health issue, a social and political issue, and an economic issue.

Source: Safe Hospitals: A Collective Responsibility, a Global Measure of Disaster Reduction. Pan American Health Organization. Date? 2005?

1. Pan American Health Organization, Progress Report on National and Regional Health Disaster Preparedness and Response, <http://www.paho.org/english/gov/cd/CD47-inf4-e.pdf>.
2. Pan American Health Organization, Disaster Mitigation Guidelines for Hospitals and Other Health Care Facilities in the Caribbean. http://www.preventionweb.net/files/1948_VL206305.pdf. Accessed on March 7 2013.

ing facilities. This is particularly true in hospitals, where between 85-90% of the facility's value resides in architectural finishes, mechanical and electrical systems and the equipment and supplies contained in the building.³ A building's non-structural elements include architectural elements (such as ceilings, windows and doors), medical and laboratory equipment, and lifelines (mechanical, electrical and plumbing). Considerations related to the equipment and lifelines focus on their location and whether they are anchored properly. The reinforcement of non-structural elements can significantly reduce hurricane-related risks for the health facility and its occupants.

The Vulnerability of Health Facilities to Climate Change and Variability

Health facilities in the Caribbean are vulnerable to climate change and variability. Climate-related hazards create risks that disrupt the delivery of health services. Extreme weather events (such as storms, floods, drought, etc.) create emergency situations that damage infrastructure, compromising access to critical resources (e.g., food and water) and the safety of patients, visitors and staff. The effects of climate change can increase the risk of some infectious diseases (vector-, water- and food-borne, new and emerging) and worsen air quality.

Rising sea levels, together with coastal erosion and saltwater intrusion, increase the intensity of tropical storms and hurricanes and disrupt rainfall patterns and the freshwater supply, representing a significant threat to countries in the Caribbean. The anticipated negative health impacts of climate change include worsening of sanitary conditions due to a limited water supply during droughts or contamination of water supplies as a result of floods—conditions that favour the spread of water and vector-borne diseases like malaria, dengue and diarrheal diseases, as well as heat stress in vulnerable groups (such as the elderly).

When health facilities are destroyed or damaged by climate-related disasters, their ability to provide emergency care to victims and ongoing health care for their communities is very limited. It is, however, noteworthy that national and regional climate change policies in the Caribbean have not articulated a suite of responses to the impact of climate change and climate variability on health facilities. Most, if not all, of these policies focus on the impact of climate change on diseases. The Caribbean Regional Framework for Achieving Development Resilient to Climate Change, for instance, only seeks to disseminate information and promote the adoption of practices to prevent and/or reduce exposure to vector-borne diseases resulting from increased temperatures, extreme rainfall and flooding.

Climate Change and Reducing Disaster Risk

Climate change considerations can be integrated with disaster risk reduction (DRR) in cities. DRR efforts—already familiar to many—may be used as a platform from which to develop climate change adaptation plans. In practical terms, disaster risk reduction and climate adaptation can be integrated in many instances, although cities should also consider incremental or gradual changes in climate that affect government operations or community life in less immediate and visible ways than conventional disasters.

Source: *Guide to Climate Change Adaptation in Cities*. World Bank, 2011.

3. Pan American Health Organization, Principles of Disaster Mitigation in Health Facilities (Washington, D.C., 2000). <http://www1.paho.org/english/ped/mitigation3.pdf>.



Protecting Health from the Impact of Climate Change

PAHO/WHO has committed to support the efforts of Member States to:

- launch campaigns to raise awareness about climate change.
- reduce the health sector's carbon footprint.
- assess vulnerability to climate change and develop adaptation options based on these assessments.
- prepare health professionals to implement effective adaptation interventions.

Source: Pan American Health Organization. Resolution CD51.R15. 51st Directing Council. 2011. Online at <http://bit.ly/17mRMrG>.

As climate variability and climate change are becoming increasingly observable and as science points to an increase in the number of hazard-related events in the Caribbean, it makes good sense to protect these critical facilities at the levels of life protection; investment protection; and operational protection.

Damage to Health Facilities from Disasters

A report prepared by the UN Economic Commission for Latin America and the Caribbean estimates that the Region lost more than US\$ 3.12 billion in one 15-year period due to damage to health infrastructure. Indirect losses are estimated to be significantly higher when

measuring the increases in health care costs for the millions that have been left without health services for a prolonged period of time.⁴

In the Caribbean, hurricanes have severely damaged hospitals in Dominica, Jamaica, Montserrat, and St. Kitts. Hurricane Gilbert prompted the evacuation of some hospitals in Jamaica in 1988. There are also many examples of Caribbean hospitals and other health facilities that were flooded because they were located in vulnerable areas and/or poorly maintained. Table 1 summarizes the damage caused by Hurricane Tomas to health facilities in St. Lucia.

Table 1: Impact of Hurricane Tomas (2010) on health facilities in Saint Lucia

Region	Population served	% of total population served	Description of damage to facilities	Cost of damage (in USD)
Gros Islet	13,033	8	Damage to the roof of the small operating theatre in Gros Islet Polyclinic.	2,950
Dennerly	13,351	8	Unable to function and out of commission. There was damage to the roof and flooding.	4,914,818
Micoud	15,758	10	The interior of the Micoud Health Centre was flooded.	3,460
Vieux Fort	27,092	17	Although the health facility continued to function, as a result of flooding there was no running water for several days, due to a lack of water storage facilities. The fence of the Laborie Health Centre was damaged.	30,000

4. UN/ECLAC, Economic Impact of Natural Disasters in Health Infrastructure, Report to the International Conference on Vulnerability Reduction in Health Facilities. (Mexico, 1996).



Region	Population served	% of total population served	Description of damage to facilities	Cost of damage (in USD)
Soufriere	19,034	12	Soufriere Hospital suffered damage because of a badly leaking roof. Damage to the road infrastructure made access to the facility nearly impossible.	314,352
			Etang Health Centre was badly damaged due to a leaking roof.	91,352
Anse La Raye	19,957	7	Jachmel Health Centre – damage to the roof.	76,352
Castries	52,788	33	The paediatric ward of the Victoria Hospital suffered damage due to leaking water. The X-Ray department was heavily flooded. The Mental Wellness Centre was blocked by a fallen wall. The Entrepot Health Centre suffered damage to its roof.	192,000
TOTAL				US\$5,642,257

Source: UNECLAC. Saint Lucia: *Macro socio-economic and environmental assessment of the damage and losses caused by Hurricane Tomas: a geo-environmental disaster; towards resilience.* <http://bit.ly/1c0rgDN>.

Grenada’s Richmond Home for the Elderly

In 2004 Hurricane Ivan badly damaged Grenada’s Richmond Home for the Elderly, which also accommodates psychiatric patients. The entire roof of the three-story main building collapsed (the top floor had housed female patients). When this occurred, the Richmond Home had approximately 100 residents, but over the course of the next six months, some 30 residents died. Although one death was the direct result of collapsing structures during the storm, most of the deaths came about as a result of the increased stress faced by the elderly living in unsanitary cramped conditions following what must have been a traumatic event.

Ten months later, Hurricane Emily (a category 1 event) struck Grenada, causing significant damage to the temporary roof that was installed after Hurricane Ivan. When Emily struck, not all of the damage from Hurricane Ivan had been repaired. In particular, the nurses’ quarters had not been returned to full use, and the repairs that had been made, were emergency repairs and not intended to withstand future hurricane events.

At this point, there was general agreement that future repairs and retrofitting should aim to meet standards for a geriatric home to retain its functionality for the medium term (5-10 years). These standards should also be suitable for the long-term alternative use of the facility for other institutional purposes after the geriatric home is relocated to a more suitable site.

Source: Pan American Health Organization. <http://bit.ly/1fS2Gn>. Accessed on May 13 2013.

The Cost of Damage to Health Facilities in the Caribbean

During the past several decades there has been a major increase in the costs of natural disasters across the globe. This is reflected in the huge jump from US\$53.6 billion in losses in the 1950’s to US\$620.6 billion between 2000 and 2008.⁵ This global upward trend in losses is no different from what has occurred in the Caribbean, which has also seen a similar pattern in losses from disasters.

5. Kunreuther, Michel-Kerjan et al. *At War with the Weather: Managing Large-Scale Risks in a New Era of Catastrophes.* (Cambridge, Massachusetts: MIT Press, 2009).



For Caribbean countries, the impact of natural hazards is particularly pronounced, given the size of the countries and their GDP. For the purpose of comparison, Hurricane Katrina, which is often used as a benchmark for a significant catastrophic event, accounted for less than a 1% of the U.S. GDP. On the other hand, Hurricane Ivan (2004) resulted in more than a 200% loss to the GDP of the Cayman Islands and Grenada. It has become clear that beyond the immediate and tragic loss of life, catastrophic events can also unleash a set of circumstances that hinder a government's ability to effectively finance its immediate recovery and longer-term redevelopment processes. This impact has a further reverberating effect on the wider economy of the country, whilst also exacerbating the level of poverty among survivors.

The Cost of the 2010 Earthquake in Haiti

Damage to all social sectors: US\$553.3 million

Damage to the health sector: US\$273.7 million

Damage to 49.4% of the social sector.

Thirty of Haiti's 49 hospitals were damaged and the health care system's ability to provide services was permanently affected. During the first eight days following the earthquake, there was no local blood supply available. The buildings housing Haiti's National Centre for Transfusions and the National Blood Safety Program had been destroyed.

Governments are often challenged with the task of financing post-disaster recovery efforts. Whilst dealing with the fiscal demands of relief operations, such as ensuring the availability of emergency assistance and sourcing funding for shelter, food and medical attention for displaced persons, governments also must contend, simultaneously, with the challenge of mobilising sufficient resources to undertake the medium- to long-term recovery and reconstruction process. This can include tasks that range from clearing debris to restoring critical services. The above expectations are often precariously balanced with the need for governments to subsidise the reconstruction of private assets such as the homes of displaced low-income families, all of which must be accomplished in an environment of dramatically declining revenue.

Costs Related to Climate Change and Variability

Health facilities use a great deal of energy because of how they are run and the large number of people that use them. In fact, hospitals expend about double the amount of energy per square foot as office buildings. Therefore, health facilities have a significant carbon footprint.⁶

Not only are utility costs high, the resources used to pay for energy consumption could be put to better use to improve health services. In the U.S., it is estimated that health care organisations spend nearly \$8.8 billion⁷ on energy each year to meet patient needs. Every dollar a non-profit health organisation saves on energy has an impact on operating margins: it is equivalent to increasing revenues by \$20 in hospitals or \$10 in medical offices.

The cost of energy in the Caribbean is among the most expensive in the world: in 2006 it cost between US\$0.24-0.37 per kilowatt hour as compared with US\$0.08 per kilowatt hour in the U.S.⁸ In the face of this reality, Table 2 describes the challenges faced in Guyana.

6. A carbon footprint is the amount of carbon dioxide created from everyday activities. Carbon dioxide, the most plentiful greenhouse gas, 'traps' the sun's heat and contributes to global climate change.
7. U.S. Energy Information Administration. *Commercial Buildings Energy Consumption Survey*. 2003. Adjusted for inflation to 2008 dollars.
8. Cleantech. *Huge renewable energy potential - but funding and regulatory obstacles*, <http://bit.ly/1SPi1EN>. Accessed on May 2013.



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Table 2: Categorization of Energy Supply in Health Facilities in Guyana

Category	Description	Examples	Typical Loads	Challenges
I. Grid-connected	Connected to the national grid (or similar large grid). Usually a large load.	GPHC, New Amsterdam, Linden, Blood Bank, Reference Lab, Warehouse.	<ul style="list-style-type: none"> air conditioning full service lab refrigerators x-ray machine 	<ul style="list-style-type: none"> Expensive (\$0.25-\$0.30 per kilowatt hour) Power quality issues Reliability problems
II. Quasi-Grid	Connected to IPP, or locally-operated grid. Medium loads.	Mahdia and other similar interior district and regional hospitals.	<ul style="list-style-type: none"> small laboratory lighting radio, computer refrigerators 	<ul style="list-style-type: none"> Expensive (more than \$3 per kilowatt hour) Very poor power quality Not available 24 hours a day
III. No-Grid	No grid electricity available. Remote facilities. Small loads.	Hinterland health clinics and NGO offices.	<ul style="list-style-type: none"> lighting radio vaccine refrigerator 	<ul style="list-style-type: none"> Generators are expensive PV systems have not been sustainable

Source: USAID (2007) Powering Health: Improving energy services at health facilities in Guyana.

Health facilities will achieve multiple gains by integrating disaster risk reduction with low carbon energy use, adaptation and environmental protection. Investing in these efforts has financial and social benefits, including behavioural changes, in addition to those related to health. In light of these issues, PAHO/WHO is working towards the goal of health facilities that are not only safe but also 'green.'

Progress is Being Made

For more than a decade, PAHO/WHO's disaster program has been working to address the safety of health facilities and to promote comprehensive mitigation policies so that losses, such as those experienced at the site of the Juárez Hospital in Mexico and in a host of Caribbean countries, would not occur again.

One of the most widely used tools to achieve this end is the Hospital Safety Index, developed through a lengthy process of dialogue, testing and revision, initially by the Pan American Health Organization's Disaster Mitigation Advisory Group (DiMAG) and later with input from other specialists in Latin America and the Caribbean. The Hospital Safety Index assesses the likelihood that a hospital can remain functional during disaster situations.

When the Hospital Safety Index was used to assess hospitals and health facilities region-wide, one-third of the assessed facilities had a safety score that revealed potential risks for patients, hospital staff, and the facility's ability to function during and after a disaster. Weaknesses in both functional and non-structural issues (e.g. risk of damage to roofs, water and gas supplies, etc.) tended to be the predominant cause of increased vulnerability.

In the Caribbean, the Hospital Safety Index was applied in 45 hospitals and 59 small facilities in St. Kitts and Nevis, Grenada, Montserrat, Saint Vincent and the Grenadines, Anguilla, Dominica and Barbados. Based on the results and recommendations from the evalua-



Hospital Safety Index at a Glance

- A rapid, reliable and low-cost diagnostic tool.
- Easy to apply by a trained team of engineers, architects and health professionals.
- Results take into account the safety level of structural, nonstructural and functional components.
- 145 items or areas are assessed.
- Health facilities fall into one of three safety categories: High, Average and Low.

Source: PAHO (2013). <http://safehospitals.info/>.

tion team, 15 facilities have begun to make needed improvements. Preliminary results from the application of the Hospital Safety Index in Bolivia, Ecuador, and Peru suggest that non-structural factors such as architectural features, basic installations, and equipment contribute more to vulnerability than structural factors. The results also point to the importance of having a legal framework for action to reduce vulnerability.⁹ The best argument for demonstrating that it is possible to have safe hospitals in the Caribbean is that a few of the countries, with greater vision than actual resources, are actually accomplishing this.

The SMART Hospitals Initiative in the Caribbean builds on the Hospital Safety Index, and aims to bridge the gap between environmental performance or climate-proofing and hazard resilience and disaster risk reduction in health facilities.

However, the best design criteria for safe hospitals are not always the most beneficial for climate adaptation and mitigation and therefore, it is necessary to develop higher design and construction standards for new hospitals, incorporating lower energy and water use to help withstand expected climate variability and change. Energy efficiency must be combined with disaster resiliency. Countries need to be smart about what is useful, needed and cost effective.

In this context, the construction of safe, disaster-resilient health facilities must take into account the risk of climate change and climate variability and the need for a reduced environmental footprint, with the ultimate goal not only of protecting the lives of patients, staff and other occupants, but also of ensuring that such facilities continue to operate after a disaster. Fortunately, the knowledge of how to build safe hospitals not only exists, but also is readily available.

9. Pan American Health Organization, "New PAHO Tool Measures Hospital Safety," *Disasters: Preparedness and Mitigation in the Americas* (December 2008), <http://bit.ly/15sqTt>. Accessed on August 21 2013.







Section II

THE CONCEPTUAL FRAMEWORK OF THE SMART HEALTH FACILITIES POLICY

The policy on **SMART** Health Facilities builds on established principles and priorities that governments in the Caribbean are using to improve the resilience of these facilities. Most of the plans, values and guidelines fall under the umbrella of the regional Safe Hospitals Initiative, which was endorsed by the Ministers of Health of Latin America and the Caribbean at the 27th Pan American Sanitary Conference in 2007. A number of complementary initiatives is underway to strengthen the goal of disaster-resilient hospitals:

- The PAHO/European Commission (ECHO) initiative 'Caribbean Health Services Resilient to the Impact of Emergencies and Disasters,' which aims to improve the capacity of health services to respond to emergencies. One of the expected results is that all large- and medium-size health facilities in the Caribbean are safer.
- PAHO/WHO and the UN Environment Programme (UNEP) have developed a tool to assess vulnerability and climate adaptation. It provides guidance on conducting assessments of current and future vulnerability and health risks stemming from climate change and policies and programmes that can increase resilience, taking into account the multiple determinants of climate-sensitive health outcomes.
- The **SMART** Health Care Facility Initiative, which builds on the Caribbean Hospital Safety Index (see **SMART** Hospitals Toolkit), bridges the gap between environmental performance, climate-proofing, hazard resistance and disaster risk reduction in health facilities. (A higher standard of design and construction as well as energy and water use and service delivery capacity will be established to help withstand expected climate variability and change.) The intended impact of the Smart Health Facility Initiative is to build and/or retrofit climate-smart and disaster-resilient health facilities in the Caribbean.

Under this initiative, PAHO is developing a cost-benefit framework to determine the feasibility of making a health facility 'smart.' Two demonstration projects are underway at the Georgetown Hospital in St. Vincent and the Grenadines and the Pogson Medical Centre St. Kitts and Nevis. Both demonstration projects aim to establish an integrated approach to health facility design, fea-



World Health Day 2008

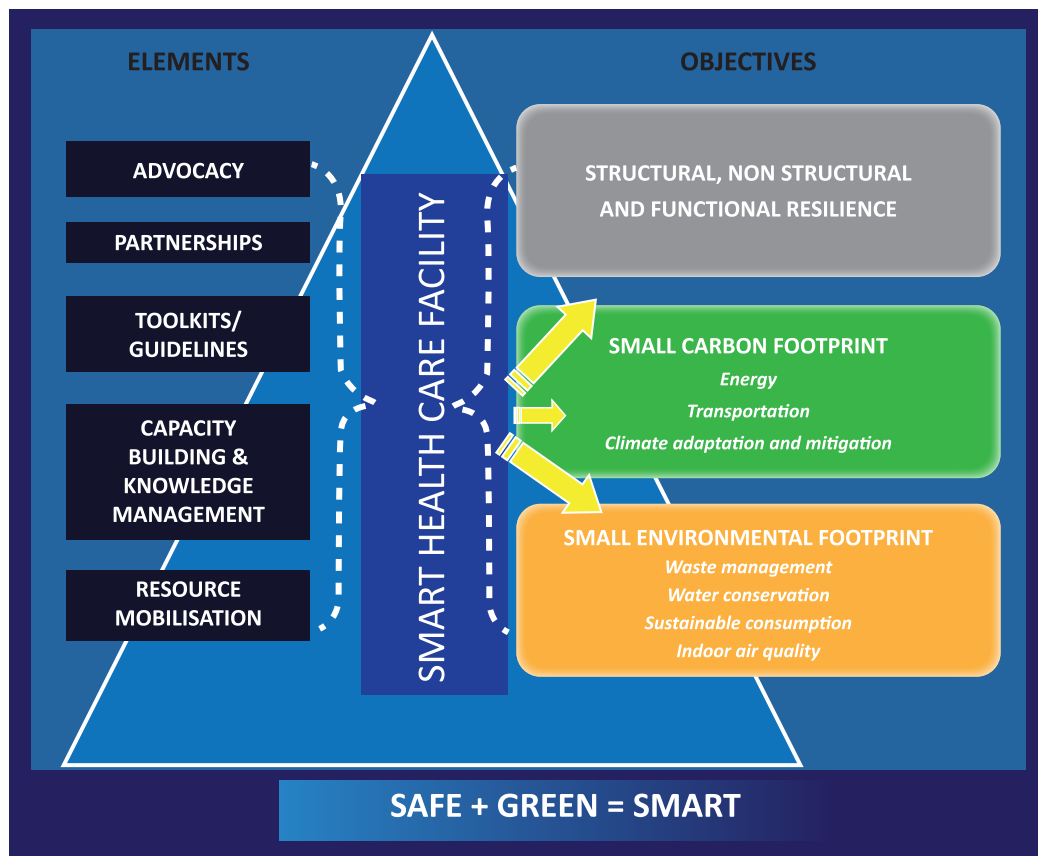
turing both environmentally green and disaster-resilient institutions. The projects' four main target areas include:

1. Preparation of an Annex on **SMART** Health Facilities to accompany national building standards and codes for new facilities.
2. Development of the 'SMART Hospitals Toolkit' to guide implementation of measures to adapt to climate change and mitigate the impact of disasters in existing health facilities.
3. Enhancing national capacity to deliver climate-smart health facilities by conducting training workshops and providing advice and support to strengthen policies.
4. Carrying out demonstration projects of **SMART** health facilities

In the long run, the **SMART** Health Facilities Initiative is expected to yield benefits, including: cost savings on health, utility bills and travel expenditure; reduced greenhouse gas (GHG) emissions; improved air quality; reduced transmissions of airborne infections and aggravation of respiratory conditions; increased productivity; improved staff and patient satisfaction; improved physical access to hospitals and improved access to safe water. The results of the cited demonstration projects will help define a methodology to guide countries on how to conduct a Cost-Benefit Analysis, which is part of the Toolkit under development.

The conceptual framework of the policy on **SMART** Health Facilities is built around three principal objectives as shown in Figure 1.

Figure 1: A Conceptual Framework for the **SMART** Health Facilities Policy



The **SMART** framework is described as follows:

- A **SAFE** health facility is structurally, non-structurally and functionally able to withstand the impact of all types of natural hazards and mitigate the impacts associated with climate change and variability.
- A **GREEN** health facility has a small carbon footprint (through energy efficient operations) and an equally small environmental footprint (through sustainable and sound environmental management practices such as proper waste management; reduced red bag (medical) waste; increased recycling; water conservation; reduced use of materials that may have toxic effects (PVC, cleaning materials, heavy metals in electronics, pesticides, batteries); green landscaping to reduce water use and manage storm water more sustainably; etc.
- A **SMART** health facility (safe and green) will protect the lives and health of patients and health workers; has taken measures to reduce the damage to hospital infrastructure and equipment as well as the surrounding environment; continues to function as part of the health network, providing services under emergency conditions; uses scarce resources more efficiently, thereby generating cost savings; and improves strategies to adjust to and cope better with future hazards and climate change.

This framework represents a seamless set of activities and interventions—from preparedness to mitigation; planning to prediction; and response to recovery—all directed towards achieving disaster resilience; adapting to climate change; reducing the carbon footprint; and improving environmental sustainability. Through this ongoing process, Caribbean health facilities, in collaboration with governments and civil society, can plan for and reduce the impact of:

- a) **Disasters** - Appropriate actions at all points in the process will lead to greater prevention, mitigation, and climate adaptation measures and strengthen the role of the health facilities' disaster risk management committees.
- b) The **environmental footprint** - Appropriate environmentally sound actions include the greening of operations,¹¹ climate proofing and instituting best practices such as the use of less-toxic personal care (fragrance free, for example) and clinical products; removing metals (mercury, lead, cadmium) from pharmaceuticals; etc.
- c) The **carbon footprint** - Actions include energy-efficient equipment and energy conservation, through proper building design, etc.

As noted in Figure 1, this framework will be delivered through: advocacy; partnerships; toolkits and guidelines; training; and resource mobilisation. Chapter 3 on developing a policy on SMART Health Facilities provides more in-depth information about these elements and how they will help to achieve the policy's objectives.

Figure 2 represents the operationalization of the policy on **SMART** Health Facilities.

11. For example: water conservation; less toxic environmental services and maintenance products (e.g. paints, sealants, finishes; green cleaning chemicals; enhanced recycling programs; lawn and garden care; pest control; and greening of transportation (e.g., post "No Idling" signs at emergency room entrance and loading dock, offer priority parking for car pooling).



Figure 2 - Operationalising the Smart Health Facility Policy



The **SMART** Health Facilities Initiative represents a paradigm shift—away from the traditional disaster response model to one that proactively seeks to minimize the health impact of a disaster through climate adaptation, mitigation measures (including climate-proofing and reduction of the environmental footprint) and preparedness. Consequently, it is essential that this health policy is incorporated into the Member State’s political agenda; that it is backed by earmarked resources in the national budget; and that it has the leadership and support of the highest levels of government.





Section III

A MODEL FOR DEVELOPING A POLICY ON SMART HEALTH FACILITIES

Purpose of the Policy

The policy on **SMART** Health Facilities provides a platform for integrating initiatives currently underway that seek to make facilities **SAFE** (structural and non-structural resilience to disasters) and **GREEN** (a small environmental footprint).

Committing to the following will contribute to making Caribbean health facilities '**SMART**':

- Becoming resilient to the risks related to climate change and variability and natural hazards.
- Proper management of critical resources (e.g., pharmaceuticals, food, transportation, medical supplies and equipment) based on climate change considerations.
- Committing to sustainable environmental practices such as water and energy conservation, promoting active transportation, and local food procurement.
- Engaging in ongoing communication, education and awareness to bring about behavioural changes.

Becoming SMART

A **SMART** health facility commits to sustainable practices such as water and energy conservation, active transportation that is environmentally friendly and helps reduce greenhouse gas emissions, and local food procurement. By investing in these areas, health care facilities can reduce operating costs and increase resilience in the community.

Policy Guidelines

The following parameters will guide development of the **SMART** Health Facilities Policy:

- The policy will be implemented within the framework of existing PAHO and Ministry of Health work programmes.
- The policy does not require renegotiations or amendments to existing strategic partnerships that national Ministries of Health and/or PAHO have with public and private sector agencies, other civil society organisations, and regional and international organisations.
- Although the policy may generate new funding requirements, Ministries may consider reallocating existing sectoral budgets and identifying new funding sources.
- The policy will contribute to the national government's priorities and directives in disaster risk reduction, adaptation to climate change, and sustainable environmental management.

- The policy will have a cost-neutral impact on households.
- The policy will help safeguard health facilities, which are important assets of a country's critical infrastructure, and ultimately contribute to national security.
- The policy may be submitted to the PAHO Directing Council for endorsement.

The **SMART** Health Facilities Policy is based on a number of PAHO/WHO initiatives taking place nationally, regionally and internationally. Importantly, the policy advances the building of safe and green health facilities; the use of technical guidelines and toolkits that have been tested regionally and internationally; and the application of knowledge and information through advocacy and training for sound decision making.

Components of the Policy on SMART Health Facilities

The policy statement comprises a vision statement, the purpose and the objective. The impact outcome of this policy will be the sustainable development of the Caribbean health sector.

The components of the policy include:

Vision

Enhance health gains from sustainable development investments and decisions in health care.

Policy Goal

To ensure that everyone receives safe, effective, high quality health care in structurally and non-structurally safe and green health care facilities.

Policy Objective

To build SMART health care facilities that are resilient to disasters and climate change and which are climate resilient and environmentally friendly.

The **SMART** Health Facilities Policy:

- Is only as effective as the degree to which other areas and sectors, such as operations and maintenance, disaster management organizations, planning, finance, public services and architecture and engineering, are involved in determining the vulnerability of health facilities and addressing these concerns.
- Must adhere, in design and construction, to building codes, fire safety guidelines and other risk-reduction measures.
- Must reduce the non-structural and functional vulnerability of existing facilities through greening and energy-efficient strategies.
- Must enact legislation and earmark financial resources to renovate and retrofit the most critical facilities to increase protection levels and safeguard the health workforce, patients and their families in these facilities.



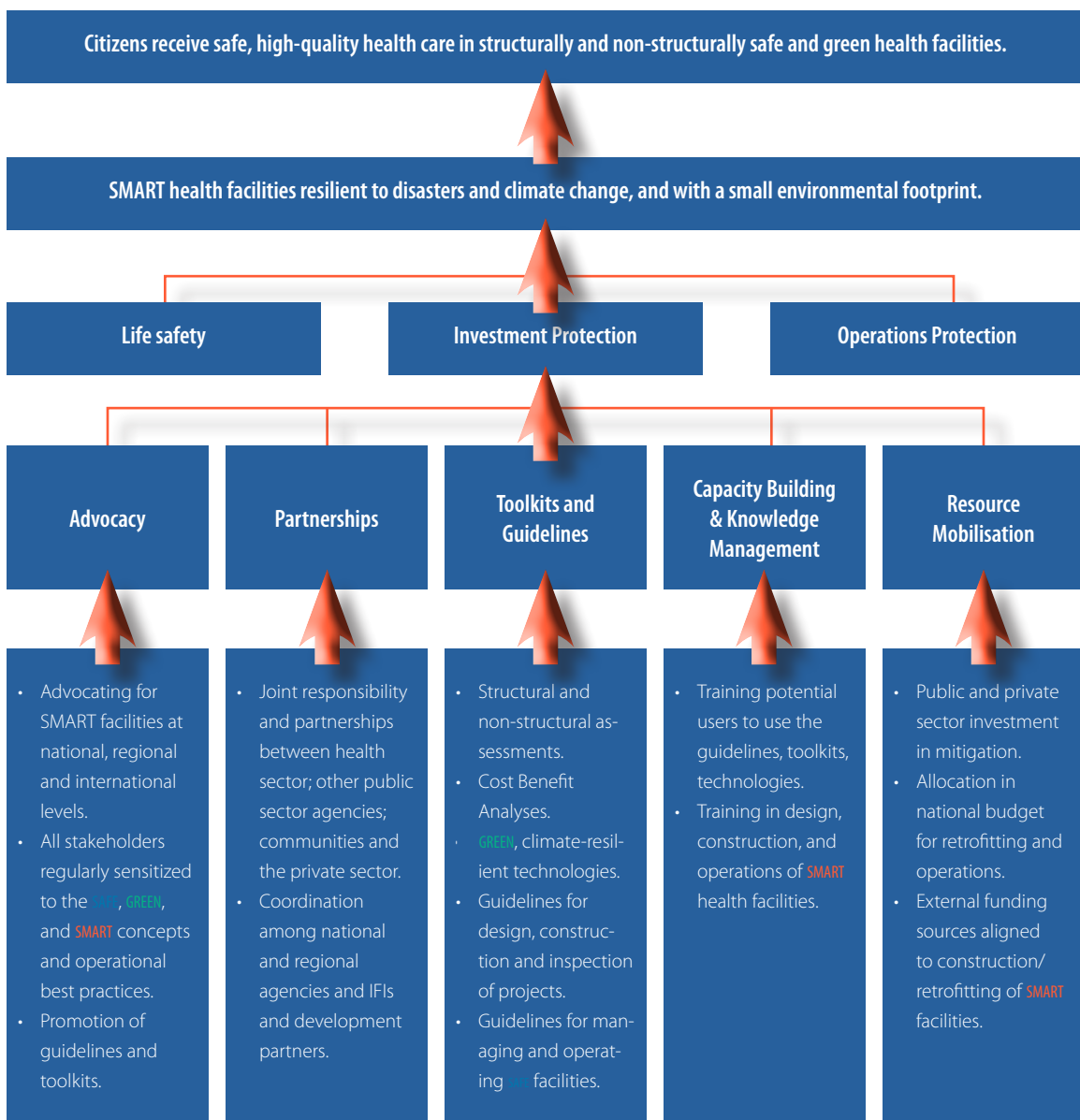
Commitment of the Health Sector

The health sector will ensure that its practices, the products it consumes, and the buildings it operates do not harm human health and the environment and are resilient to climate change and hazard events.

In consideration of the limited resources available to the health sector in the Caribbean, the long-term costs of mitigating the structural and non-structural vulnerability of health facilities will far outweigh the short-term investment, helping to ensure health facilities continue to function in disaster situations and sustain limited losses of health assets. The use of appropriate energy-efficient and other green technologies and processes can further reduce these costs.

Figure 3 maps the development of a SMART Health Facilities Policy.

Figure 3: Mapping the SMART Health Care Facility Policy



The Policy's objectives will be achieved through:

- a. **Advocacy** – all stakeholders in the health sector, including: policy makers; other public sector agencies; communities; and the private sector are regularly sensitised to the SAFE, GREEN and SMART concepts and operational best practices and over time, become satisfied users of the facilities.
- b. **Partnerships** – a SMART health facility is the joint responsibility and outcome of partnerships between the health sector; disaster management offices; other public sector agencies (e.g. planning and public works; environment and sustainable development, etc.); communities in which health facilities are located and the nation in general; the private sector (contractors, engineers, other service providers); and bilateral agencies providing sources of funding.
- c. **Toolkits and guidelines** – PAHO has developed a comprehensive suite of tools and guidelines for use by health administrators, technical advisors and other professionals whose responsibilities include the management, design, construction and inspection of health facility projects. National health authorities, planners, and funding institutions must use these guidelines and tools when developing projects for the construction of new health facilities or the retrofitting of existing facilities.
- d. **Capacity building and knowledge management** – Just as all stakeholders should be regularly reminded of the need for SMART health facilities, training must be provided regularly to the potential users of the guidelines and tools. Potential targets for training include, among others:
 - i. Initiators of health facility construction projects:
 - Public sector (Ministry of Health, Health Services Authorities etc.)
 - Private sector
 - Civil society
 - Municipal governments
 - Ministries of Finance
 - ii. Executors and supervisors of health facility construction projects:
 - Ministry of Health; Ministry of Works; Ministry of Finance
 - Government offices or independent agencies in charge of enforcing building standards
 - Subcontractors entrusted with hospital management
 - Subcontractors entrusted with the management, quality control, design and/or execution of the project
 - Private sector
 - iii. Financing bodies in charge of funding health facility construction projects:
 - Government
 - Public sector bodies that have identified the need for new facilities
 - Ministry of Health, in tandem with the Ministry of Finance
 - International sources: development banks and bilateral and multi-lateral donors
 - Nongovernmental organizations
 - The private sector (including private banking)
- e. **Resource Mobilisation** - The main challenge to mobilising resources for SMART Health Facilities lies in convincing countries of the importance of incorporating prevention and mitigation measures during the allocation of resources for infrastructure investments. One reason



is the belief that these measures will significantly increase the cost of the initial investment, thereby affecting eventual profits or health budgets. This reticence on the part of governments and the private sector alike is aggravated when financial resources are scarce or expensive, forcing mitigation projects down the list of priorities. In fact, just the opposite is true: protecting the costly investment demands high safety and performance standards.

The cost of mitigation measures that increase the structural integrity of a health facility will increase total construction costs by no more than 1-2 percent.¹² If the cost of the non-structural elements (which account for about 80 percent of the total cost of the facility) is added, the incorporation of mitigation measures into the construction of a new health facility accounts for less than 4 percent of the initial investment.¹³

The cost of preventive maintenance is not high if it is considered part of the normal operating budget of a facility.¹⁴ Proper maintenance not only reduces the degradation of the health facility but can also ensure that public services such as water, gas, and electricity, and non-structural components such as detailing, roofs, doorways, etc., continue to function properly during an emergency.

Policy Strategy

The elements of the policy strategy include:

- a. Assessing existing hospitals and health facilities in terms of structural, non-structural and functional vulnerability.
- b. Advocating for construction of new hospitals or health facilities that can withstand any emergency or disaster.
- c. Planning for renovations and retrofitting of existing facilities to ensure their resilience, safety and continuous operations in times of emergency and disaster.
- d. Introducing green and climate-resilient technologies and methods that reduce the environmental and carbon footprint, with immediate health and economic benefits.
- e. Sensitizing all stakeholders, including civil society, to the social and economic significance of safe and green health facilities.

'Greening' Strategies for a SMART Health Facility

- **Energy efficiency:** Reduce hospital energy consumption and costs through efficiency and conservation measures.
- **Green building design:** Build hospitals that are responsive to local climate conditions and optimized for reduced energy and resource demands.
- **Alternative energy generation:** Produce and/or consume clean, renewable energy onsite to ensure reliable and resilient operation.
- **Transportation:** Patient and community use of public transport; site health facilities to minimize the need for staff and patient transportation.
- **Food:** Provide sustainably grown local food for staff and patients.
- **Waste:** Reduce, reuse, recycle, and compost; employ alternatives to waste incineration.
- **Water:** Conserve water; avoid bottled water when safe alternatives exist.

12. Pan American Health Organization, Principles of Disaster Mitigation in Health Facilities, (Washington D.C., 2000). <http://www1.paho.org/english/ped/mitigation3.pdf>.

13. Pan American Health Organization, Report to the International Conference on Vulnerability Reduction in Health Facilities. (Mexico, 1996).

14. Pan American Health Organization, A World Safe from Natural Disasters: The Journey of Latin America and the Caribbean. (Washington, D.C., 1994). www.paho.org/English/Ped/ws-chapter6.pdf. Accessed on July 27 2013.



Implementing the Policy

Implementing the SMART Health Facilities Policy will require, above all, political and financial commitment. It also requires that the Ministries of Health take leadership, by:

- a. Assigning a specific entity in each Ministry of Health to develop a disaster risk reduction programme.
- b. Including a sub-programme on SMART Health Facilities as part the risk reduction programme.
- c. Expanding the mandate of the 'Safe Hospitals' Committee, under the coordination of the Ministry's Disaster Coordinator, to become a SMART Committee.
- d. Actively supporting a campaign on SMART Health Facilities:
 - i. Involving a variety of partners including (a) stakeholders within and beyond the health sector; (b) national and international financial institutions and (c) other key contributors.
 - ii. Sharing and implementing best practices on practical and significant progress towards the SMART Health Facilities Initiative at the country level.
 - iii. Encouraging assessment of disaster vulnerability in existing health facilities to develop long-term plans.
- d. Ensuring that financing is available to implement, at a minimum, the priority recommendations identified following application of the Hospital Safety Index.
- e. Encouraging external agencies that finance the construction of new health facilities to incorporate the principles set out in this policy.
- f. Encouraging Ministries of Finance and Public Works to ensure that the cost of a Check Consultant¹⁵ is incorporated into the tender documents.
- g. Collaborating with other public and private sector agencies to introduce green and climate-resilient technologies and methods to achieve immediate health and economic benefits in the health sector.
- h. Inserting this policy into other relevant national policies and strategies and, where appropriate, ensuring that it is incorporated into the government's legislative agenda.

At the regional and international level, PAHO will champion the strategy with agencies such as the Caribbean Community Climate Change Centre; the Caribbean Disaster Emergency Management Agency (CDEMA); the Caribbean Community (CARICOM); the Organization of Eastern Caribbean States (OECS); the Caribbean Development Bank; the World Bank; and the Inter-American Development Bank.

The objectives and elements of the Policy on SMART Health Facilities are applicable beyond the health sector. These objectives and elements can be used to make other critical infrastructure, such as schools and tourism plants, 'SMART'. Indeed, the Government of the British Virgin Islands has already applied the tools and guidelines to the educational sector and discussions are now underway to use these same building blocks in the tourism sector and communities.

15. A Check Consultant provides an independent technical inspection of plans, calculations, building requirements and all associated works related to planning a new hospital or critical facility. A highly qualified person or team, completely independent of the builders, must perform the inspection. This will improve the detection of errors. The Check Consultant acts as support and does not replace the Contractor's project manager. The Check Consultant(s) in charge of the technical inspection of the project must be engineers or other professionals who have proven experience, broader than that of the project manager, in each of the areas to be monitored. Funding for the Check Consultant should come from the financier of the planned facility. The Check Consultant acts on behalf of the client of the Health Facility (eg, the Ministry of Health) and not the contracting authority and/or the project management.



Monitoring, Evaluation and Reporting

PAHO is currently developing a Toolkit to help achieve SMART health facilities. The guidance document comprises a number of tools that include:

1. The Hospital Safety Index¹⁶

The Hospital Safety Index is a tool that helps to determine the probability that a hospital or health facility will continue to function in emergency situations, based on structural, non-structural and functional factors. An Evaluation Team uses a standardized Checklist to assess the level of safety in 145 areas of the hospital. The Safety Index score places a health facility into one of three categories of safety, helping authorities determine which facilities most urgently need interventions:

- Category A is for facilities deemed able to protect the life of their occupants and likely to continue functioning in disaster situations.
- Category B is assigned to facilities that can resist a disaster, but in which equipment and critical services are at risk.
- Category C designates a health facility where the lives and safety of occupants are deemed at risk during disasters.

Calculating the safety score allows health facilities to establish maintenance and monitoring routines and look at actions to improve safety in the medium term. Periodic application of the Hospital Safety Index can be used to monitor and evaluate the extent to which the health facility is safe.

2. Baseline Assessment Tool (BAT)

The Baseline Assessment Tool was designed to achieve cost savings by reducing the consumption of good and supplies, saving on energy and water costs, increasing efficiency of operations, using resources efficiently, creating favorable working conditions, generating community goodwill, avoiding future liability problems and educating the users of health facilities about the value of caring for the environment.

The BAT includes criteria for selecting an appropriate health facility that can be made 'smarter.' This is followed by a Patient/Occupant Satisfaction Survey to determine the satisfaction of patients and staff with: a) the general building; b) air quality; c) ventilation; d) acoustics; and e) lighting. Another section covers the baseline information required to conduct the assessment. The areas covered in the checklist include: energy; water; condition of the property; waste; indoor environmental quality; fire safety and egress; accessibility; and gross floor area. The BAT can be applied periodically to gauge the health facility's progress towards becoming 'smarter.'

3. The GREEN Checklist and Discussion Guide

The GREEN Checklist provides an indication of improvements that Caribbean hospitals and health facilities can make in their daily operations to reduce their environmental and carbon footprint. The Green Checklist identifies areas that can conserve resources, cut costs, increase efficiency in operations and reduce a hospital's carbon emissions.

16. The Hospital Safety Index for Small and Medium-Sized Health Facilities, has been adapted for the Caribbean.



The GREEN checklist can be used regularly to monitor the impact of the improvements that have been made towards becoming SMART. For example, after introducing energy-efficient measures and technologies, the Energy Audit can be used on an annual basis to determine changes in the how the facility consumes electricity. Similarly, a Water Audit is first performed to determine quantity and patterns of potable water use in the facility. After putting water saving measures in place, the same audit can then be used periodically to determine if water conservation measures have made a difference.

4. Cost-Benefit Analysis

The Cost-Benefit Analysis (CBA) framework is an economic tool used to support decision making, since it provides greater understanding of the impact of alternative courses of action in terms of costs and benefits. It involves comparing the value of SMART Hospital interventions and is designed to assess whether the advantages (benefits) of the project exceed the disadvantages (costs).

A simple monitoring and evaluation framework can be developed, based on the periodic use of these tools. The reporting framework must be reflected and incorporated into ongoing disaster management reporting at the national and regional levels, through the:

- Annual Reports of the National Disaster Organisations; Ministries of Health; Pan American Health Organization;
- Reports on the protection of critical infrastructure and the impact of climate change; reports to CDEMA Caribbean Disaster Management Conference.





CONCLUSION

Health care facilities in the Caribbean represent a great social value to communities, offering an essential sense of security. Although the social, political and economic justification for maintaining a health facility's ability to function in the aftermath of disasters is strong enough, there is an even stronger justification within the health sector itself. The cost of running hospitals in the Caribbean represents approximately 70% of the budget of the Ministries of Health, with most of the money going to salaries.¹⁷ In remote areas and in small island nations, frequently there is only one facility of this type; if it is not functioning, this represents a 100% loss. Every day the health sector invests large sums of money in building, remodeling or expanding its health infrastructure.

When the status of the vulnerability of the health sector to disasters was reviewed in 2004¹⁸ in

Nicaragua and Trinidad and Tobago, reports pointed to the fact that low and middle-income countries have demonstrated, through pilot projects, that it is possible to significantly reduce vulnerability to disasters, making health facilities safe, with existing technical and financial resources.

The same is true when it comes to **SMART** health facilities. For the most part, technical and financial considerations are not standing in the way. Making significant advances towards **SMART** health facilities will require committed support from other sectors, a strong political commitment and higher international visibility.

The opportunity to draw attention to the importance of incorporating disaster mitigation climate adaptation measures to contribute to the sustainability of these investments cannot be let pass. Countries are encouraged to recognise the importance of formulating a national **SMART** Health Facilities

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 nonstructural damage and unnecessary evacuation.

Policy and incorporating this policy into the national Health Disaster Management Policy.

Reducing the vulnerability of Caribbean health care facilities is a goal we can achieve.

17. Pan American Health Organization, Report on reducing the impact of disasters in health facilities, (Washington, D.C., 2004). <http://www1.paho.org/english/gov/cd/CD45-27-e.pdf>.

18. Ibid.



SAFE + GREEN = SMART

ACRONYMS

GDP	Gross Domestic Product
UNECLAC	United Nations Economic Commission for Latin America and the Caribbean
USD	United States Dollars
PAHO	Pan American Health Organization
WHO	World Health Organization
USAID	United States Agency for International Development
ECHO	European Commission for Humanitarian Aid and Civil Protection
GHG	Greenhouse gasses
CARICOM	Caribbean Community
OECS	Organisation of Eastern Caribbean States
CDB	Caribbean Development Bank
IADB	Inter American Development Bank
UK	United Kingdom



GLOSSARY

Disaster

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

Disaster Management

A systematic process that includes planning, organization, management, and control of all disaster-related activities. Disaster management is achieved through prevention, mitigation, preparedness, response, rehabilitation, and reconstruction activities.

Disaster Risk Management

The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.

Disaster Risk Reduction

The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Emergency

The affected community generally has the resources to respond to an emergency.

Hazard

A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Mitigation

Activities that aim to lessen the likelihood of damage resulting from hazards. Mitigation of damage is achieved by reducing the hazards, vulnerability, or both. In general, one cannot mitigate natural hazards such as earthquakes and hurricanes.

National Disaster Organisation (NDO)

The NDO in this document refers to the national organizational structure of agencies linked for the purpose of attending to the legal, institutional and operational aspects of disaster prevention and mitigation, preparedness and response and recovery and rehabilitation. The NDO is generally headed by the Governor, Prime Minister or Head of government in the respective country.

Non-structural elements

Elements that do not form part of the support system of the structure. These include architectural elements (such as cladding, interior partitions, ceilings), equipment (such as industrial, medical, and laboratory equipment and furnishings), and systems that are essential for the facility's operation (such as power system, water distribution and drainage, heating and cooling systems, staircases, etc.).

Preparedness

Actions and measures taken to increase the capacity to effectively anticipate, respond to, and recover from damage caused by adverse events. Preparedness is achieved by developing disaster response plans, training concerned personnel, and establishing necessary resources to carry out response activities.

Prevention

Actions aimed at avoiding damage as a consequence of adverse phenomena. Prevention is achieved by eliminating the hazard, the vulnerability, or both.

Public Awareness

The extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards.

Reconstruction

Complete repair of physical, social, and economic damage to a level of safety that is higher than existed prior to an event. Reconstruction incorporates disaster risk reduction measures when restoring damaged infrastructure, systems, and services.

Rehabilitation

Provisional or temporary restoration of essential services (lifelines) in a community affected by a disaster. Rehabilitation is achieved by providing services at pre-disaster levels.



Relationship between risk, hazard, and vulnerability

Risk is the result of the interaction of hazard and vulnerability. This is a dynamic and complex relationship that changes according to the probability of an adverse event occurring at a given time and place with a given magnitude, intensity, and duration, and the predisposition of people, infrastructure, services and goods to be affected by said phenomenon. This relationship can be expressed in the formula $R = H \times V$, where R is risk, H is hazard, and V is vulnerability.

Response

The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.

Risk

Probability of social, environmental, and economic damage occurring in a specific community and in a given period of time with a magnitude, intensity, cost, and duration determined by the interaction between hazard and vulnerability.

SAFE Hospital

A health services facility that remains accessible, is able to function at full capacity, and can depend on its own infrastructure during and after an adverse event.

Structural components

Supporting or load bearing elements of a building, including the columns, beams, load bearing walls, foundations, slabs, etc.

Vulnerability

The risk factor for a person, object, or system exposed to a hazard. This corresponds to the predisposition or level of susceptibility to damage resulting from that hazard.

