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Health Care Facility Climate Change Resiliency

Workshop Report

Pan American Health Organization

World Health Organization

REGIONAL OFFICE FOR THE Americas

National Institutes of Health

Institut national de santé publique Québec

HEALTH CARE FACILITY CLIMATE CHANGE RESILIENCY WORKSHOP REPORT

HEALTH CARE FACILITY CLIMATE
CHANGE RESILIENCY WORKSHOP

MONTRÉAL, QUÉBEC, CANADA

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CONTENTS

1 INTRODUCTION AND OVERVIEW

In addition to their primary roles in treating illness and injuries, health care facilities provide a first line of defence in protecting individuals and communities from the impacts of climate change. However, recent events demonstrate that health facilities can be vulnerable to climate hazards through impacts on infrastructures (e.g., buildings, equipment), services and on the health of patients and staff.

The expected impacts of climate change and growing risks from current climate variability mean that health care facilities need to take measures to increase their resiliency. The opportunity exists for health care officials to identify current and future climate risks and use evidence-based information in planning health care facility infrastructure, improving operations, and developing emergency preparedness plans.

The Pan American Health Organization (PAHO) collaborated with Health Canada, the National Institute of Environmental Health Sciences (NIEHS), the Canadian Coalition for Green Health Care, the Institut National de Santé Publique Québec (INSPQ) and Synergie Santé Environment to convene international experts for the ***Health Care Facility Climate Change Resiliency Workshop*** held in Montréal, Québec, Canada on September 8, 2015. The workshop brought together 33 experts from 8 countries to:

- Share information on existing climate change resiliency tools for health care facilities
- Share examples of tool implementation, best practices for application, challenges encountered and suggestions for effective use
- Discuss opportunities for future collaboration in efforts to enhance health care resiliency to climate change impacts

This report presents the workshop results. It includes summaries of presentations made on climate change health care resiliency tools from different countries and examples of their application. It also captures key recommendations made by workshop participants regarding collaborative actions needed to enhance health care facility resiliency in the Americas. Proposed next steps for PAHO are included at the end of the report. The Workshop Report and a Workshop Primer that was developed to inform discussions at the event are available on the PAHO website at http://www.paho.org/hq/.

2 GROWING RISKS FROM CLIMATE CHANGE TO HEALTH CARE FACILITIES IN THE AMERICAS

The Intergovernmental Panel on Climate Change (IPCC) presented key risks from climate change for North, Central and South America including the following[1]:

- Wildfire impacts on ecosystems, property, and human health
- Heat-related human mortality
- Flood impacts and landslides due to extreme precipitation including property and infrastructure damage; water quality impairment, health impacts, and supply chain ecosystem and social system disruption
- Impacts on water availability in semi-arid and glacier-melt-dependent regions and Central America
- Decreased food production and food quality
- Spread of vector-borne diseases to higher altitudes and latitudes

Each of these climate hazards can pose significant threats to the operation of health care facilities in the region. For example, In August 2015, Tropical Storm Erika struck a number of the Leeward Islands in the Caribbean. The storm caused at least 31 deaths in Dominica making it the deadliest event since Hurricane David in 1979. During Erika, at least 15 inches (380 mm) of rain fell at the Canefield Airport resulting in extensive mudslides and flooding. A total of 890 homes were destroyed or left uninhabitable and 14,291 people were rendered homeless. Fully 80% of the island was left without out power. Damages to the island are estimated at $482.8 million (2015 USD) setting back development in the country by at least two decades.

Health services in Dominica were significantly impacted by Tropical Storm Erika. Almost two weeks after the storm 10 of 53 health facilities did not have a water connection and 14 did not have solid waste collection. Water supply remained an urgent need in specific health facilities and a focus of disaster response efforts.

KEYNOTE PRESENTATION ON IMPROVING HEALTH CARE SECTOR RESILIENCE

Scott Slotterback
Health Care Without Harm

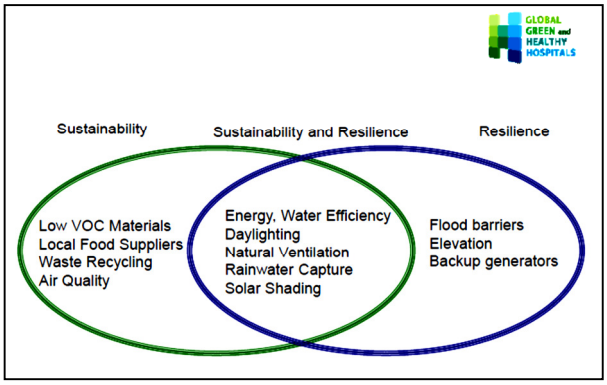
Mr. Slotterback led off his presentation by noting that climate change is a health issue now. Extreme weather events are increasing worldwide but many health care systems are not adequately resilient and are failing when needed the most. While hospitals contribute to the problem of climate change given their

[1] IPCC, 2014: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

large carbon footprint, the health sector can play a leading role in the solution. He cited numerous examples from multiple countries of how hospitals are impacted by climate change, what they are doing to become resilient to these impacts, and discussed the synergies between sustainability and resilience actions.

A project of Health Care Without Harm, the Global Green and Healthy Hospitals Initiative (GGHH) is a worldwide virtual community of over 500 members, representing over 20,000 hospitals and health centers, dedicated to reducing the ecological footprint of health care operations while promoting environmental and public health in their communities. In June 2015, the Lancet Commission on Health and Climate Change released an updated report that supports these major objectives for the health care sector.

Through its 2020 Health Care Climate Challenge, GGHH serves as a platform for hospitals, health systems and heath organizations seeking to implement the following goals: (1) reduce greenhouse gas emissions for buildings, purchasing and transportation (2) improve resilience to extreme weather events and (3) advocate for public understanding of climate change and health issues and policy changes that improve environmental health. Actions to increase environmental sustainability and resiliency of health care facilities can achieve important synergies. GGHH community members are charting progress in achieving measurable outputs, while sharing best practices and finding solutions to the challenges they share. The aim is to build a culture of health systems that reduce their resource use and improve their resilience so that they may function well under stress, adapt successfully, and be self-reliant in a changing climate.



3 SUMMARY OF WORKSHOP PRESENTATIONS

CLIMATE CHANGE RESILIENCY TOOLS FOR HEALTH CARE FACILITIES

CANADA

Health Care Facility Climate Change Resiliency Toolkit in Canada

Linda Varangu
Canadian Coalition for Green Health Care

Climate change compromises the ability of public health programs and health facilities to provide high quality services to Canadians. Ms. Varangu summarized the mandate of the Canadian Coalition for Green Health Care which includes undertaking environmentally-sustainable health care research, education and promotion, providing sustainability support and programs for practitioners nationally, and convening international expertise toward development of collaborative solutions to address the impacts of climate change on health delivery service.

In order to help Canadian health care facilities increase their resiliency to climate change,
the Canadian Coalition for Green Health Care, with support from Health Canada and the Nova Scotia Department of Environment, developed the *Health Care Facility Climate Change Resiliency Toolkit* (http://greenhealthcare.ca/resiliency/). The toolkit can be used to increase awareness of climate change impacts to health care facilities in Canada, assess facility resiliency to climate change and identify adaptations that help facilities become more resilient. It includes a facilitator presentation, an online resiliency questionnaire, and best practices and resources for adaptation.

The Health Care Facility Climate Change Resiliency Toolkit will help the Canadian health sector plan for the challenges posed by climate change. A number of facilities have begun taking actions to adapt using the toolkit and, by doing so have become important agents of change for reducing fossil fuel emissions, improving resiliency to extreme weather events and advocating for public understanding of climate change and health.

USA

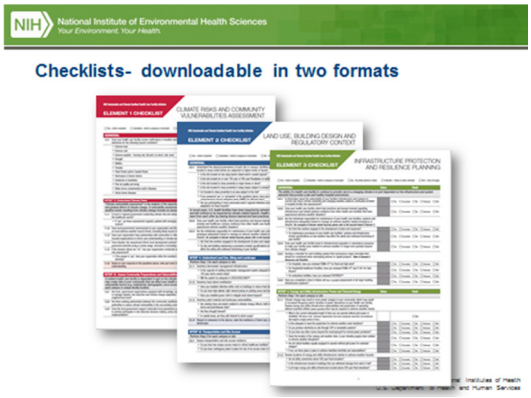
The US Sustainable and Climate Resilient Health Care Facilities Initiative

Dr. John Balbus
National Institute of Environmental Health Sciences

Dr. Balbus began his presentation by providing an overview of the impacts of climate change on human health in the US. To

help prepare for these impacts, *the US Health Care Climate Resilience Guide and Toolkit* (toolkit.climate.gov) was created as an initial component of the 2013 President's Climate Action Plan. The Plan included a recommendation for the Department of Human Health and Services to take action to promote sustainable and resilient health care facilities as part of public-private partnerships with the health care industry.

A Guide and Toolkit were developed for health sector officials for use to improve the climate resilience and sustainability of a spectrum of health care facilities. Hazard vulnerabilities addressed by the resources include planning, structural, non-structural and organizational. The toolkit helps health sector officials prepare for climate change impacts based on a 5-element Framework for Climate Resilient Health Care Settings. The elements include: 1) climate risks and community vulnerability assessments, 2) land use, building design and regulatory context, 3) infrastructure protection and resilience planning, 4) essential clinical care service delivery and 5) environmental protection and ecosystem adaptation. Checklists and searchable case studies linked to the framework elements are included to further assist health care facility officials assess site and infrastructure vulnerabilities and identify needed adaptations. The Guide and Toolkit will be disseminated, pilot tested and evaluated between September 2015 and September 2016.



PAHO

SMART HOSPITALS

Shalini Jagnarine
Pan American Health Organization

The loss of health care services during emergencies and disasters significantly lessens the possibility of saving lives and reducing morbidity. Indirect costs of the loss of health care services to people following disasters amounts to billions of dollars. In an attempt to reduce the vulnerability of health facilities, PAHO launched the Safe Hospitals Initiative. Ms. Jagnarine described the objective of the initiative which is to protect the operation of hospitals during emergencies and disasters so they may continue to function and provide appropriate and sustained health care services.

A key element in the progress towards achieving safe hospitals has been the application of the Hospital Safety Index (HSI) – a rapid and low-cost diagnostic tool for assessing the probability that a hospital will remain operational in emergencies and disasters. The evaluation provides

information about a hospital's strengths and vulnerabilities and suggests actions required to improve the safety and emergency and disaster management-capacities of the hospital. This tool has been used in over 3,500 hospitals around the world since it was first published in 2008.

Due to increasing risks from climate change, the Smart Hospital Initiative in the Caribbean was launched to aid health facilities in becoming more sustainable and disaster resilient. The Toolkit includes the HSI, a Baseline Assessment Tool, a Green Checklist, a Cost Benefit Analysis Tool and a Sustainability Construction Guide Annex. Users are able to mitigate the impact of climate change by reducing greenhouse gas (GHG) emissions and lower their health care facility's operational costs through reduced water and energy consumption while also enhancing patient/staff comfort through improved indoor environmental quality and occupant conditions. In phase 1 of the project, pilot hospitals from St. Vincent and the Grenadines and St. Kitts applied the tool and retrofitted their respective facilities with great success. The initiative has raised much awareness and interest globally. Phase II, with the continued support of the UK Department for International Development, (DFID), will expand use of the tool to health facilities in 4 Caribbean countries including Grenada, St. Lucia, St. Vincent and the Grenadines, and Dominica.

WHO

WHO Operational Framework to Build Climate Resilient Health Systems

Elena Villalobos Prats
World Health Organization

Elena began her presentation by stating that the WHO Climate Change and Health Work Plan (2014-2019) requires actions to provide policy and technical support to assist health facilities address climate change including efforts to enhance resilience to climate risks, provision of environmental services (including access to electricity, clean water and sanitation, and waste management) and reduce GHG emissions.

The World Health Organization has developed the "Operational Framework for Building Climate Resilient Health Systems" (http://who.int/globalchange/publications/building-climate-resilient-health-systems/en/) to enhance the capacity of health systems to protect and improve population health in a changing climate. The framework objectives are to guide health sector professionals in efforts to understand and effectively prepare for climate change health risks, identify health functions that need to be strengthened to increase climate resiliency and support health decision makers identify roles and responsibilities for efforts to prepare for climate change.

FIGURE 3: Ten components comprising the WHO operational framework for building climate resilient health systems, and the main connections to the building blocks of health systems

The World Health Organization supports a comprehensive approach to building health care facility resilience that is (1) informed by a national or regional level climate change vulnerability and adaptation assessment and (2) includes service delivery and monitoring based upon senior management climate-informed decisions related to the six building blocks of health systems.

A useful resource for undertaking this approach is the WHO/PAHO guidance document "Protecting Health from Climate Change: Vulnerability and Adaptation Assessment" available at http://www.who.int/globalchange/publications/vulnerability-adaptation/en/

Complementary projects also being implemented by the WHO focus on increasing access to modern energy services at health care facilities, providing guidance in the area of water, sanitation and hygiene (WASH) in health facilities and a initiatives to reduce greenhouse gas emissions of health system's operations.

APPLYING THE TOOLS: CASE STUDIES OF TOOL DEVELOPMENT AND USE IN THE AMERICAS

MEXICO

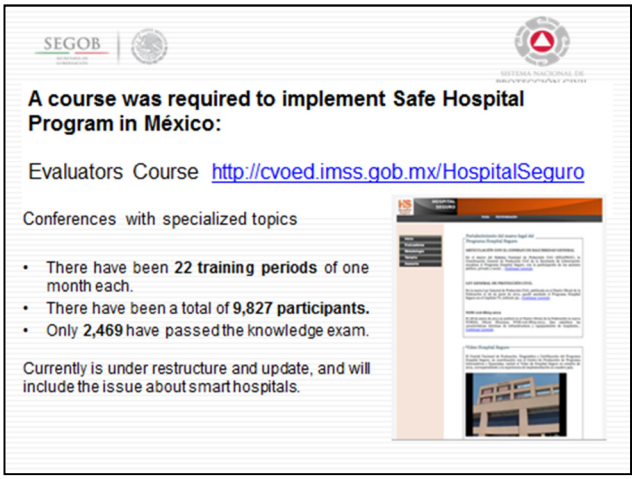
Safe Hospital Program in Mexico

Irma Hernández Olivas
Mexican Social Security Institute

Ms. Hernández Olivas led off her presentation by introducing the Safe Hospital Program in Mexico which is closely linked to the United Nations Office for Disaster Risk Reduction (UNISDR) Sendai Framework for Disaster Risk Reduction 2015-2030.

One of the seven global targets under this framework is to reduce disaster damage to critical infrastructure and disruption of basic services among health and educational facilities, including through developing their resilience by 2030.

An evaluators' course (http://cvoed.imss.gob.mx/HospitalSeguro) was developed for the Safe Hospital Program in Mexico and is accredited by the National Committee for Evaluation, Analysis and Safe Hospital Certification. Mexico has modified its legal framework to strengthen the validity and permanence of the Safe Hospital Program.



The evaluators' course has been completed by 9,827 participants since 2006 from which 2,469 have passed the knowledge exam. Since that time, 531 hospital assessments have been undertaken. Of those, 30 facilities were found to be in the lowest class of safety, some with irreparable structural damage. Three hospitals were demolished, one was closed, and 176 hospitals have implemented actions to improve resiliency based on assessment recommendations through a $1.5 billion (USD) investment. The Safe Hospital

Program is now being transformed to emphasize the use of renewable energy and measures to reduce the carbon footprint of facilities. Further, efforts aim to establish financing systems for strengthening existing hospitals, integrate local, regional, and national risk maps, develop standards and measurement systems and continue health care disaster management training.

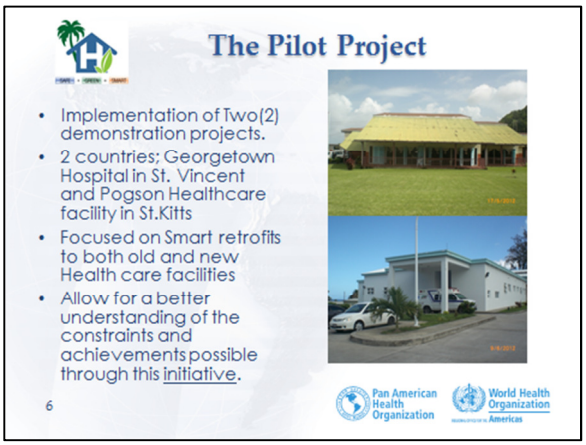
ST. VINCENT AND THE GRENADINES

SMART Hospitals in St. Vincent and the Grenadines

David Latchman
Government of St. Vincent and the Grenadines

Mr. Latchman began his presentation by reporting that small island developing states (SIDS) in the Caribbean contribute less than 1% of global greenhouse emissions but often experience devastating impacts from climate change. St. Vincent and the Grenadines, a country with a population of 107,000, no international airport and less than 50 health facilities, has recently suffered hundreds of millions of dollars in damages as a result of hurricane Thomas in 2010 ($288 M) and floods in 2011 ($400 M) and 2013 ($400 M). It is critical that health care facilities in the Caribbean and globally - some of which are very large emitters of GHG emissions and themselves affected by the increase in the magnitude and frequency of extreme weather events - are safe and sustainable or "smart".

In 2011, the Georgetown Hospital in St. Vincent and Pogson Hospital in St. Kitts and Nevis were retrofitted using the PAHO SMART Hospitals Toolkit. Key components of the initiative were the cost-benefit analysis for a proactive approach to resiliency and community engagement to increase local awareness. The Georgetown Hospital was rebuilt in 2013 to address issues identified during the application of the Safe Hospital Index, a component of the SMART Toolkit. Repairs included strengthening of the building structure, installing solar panels, improving physical access and appearance, modifying designs to allow for natural lighting and airflow, and upgrading plumbing and electrical services including installation of a back-up generator. All retrofits were accomplished according to local and international specifications and standards and led to significant improvements in the roof, windows, doors, and building strength, and in patient and staff satisfaction. A key plan for the future is the implementation of a SMART health care facility certification course to validate facility efforts.

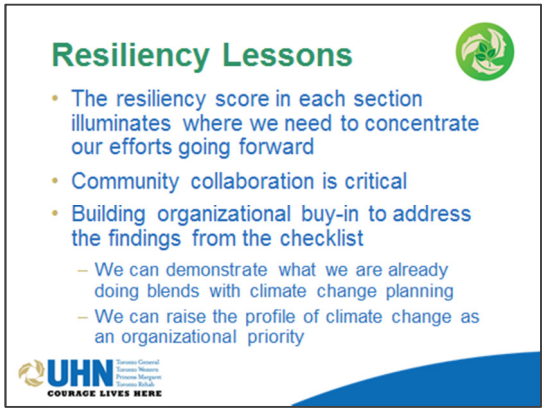


CANADA

Taking the Lead on Climate Change Resiliency Planning in Canadian Hospitals

Kady Cowan and Stewart Dankner
University Health Network

As the largest hospital group in Canada and a founding member of the Canadian Coalition for Green Health Care, the University Health Network (UHN) took the initiative to apply the Canadian health care facility resiliency assessment tool (See Linda Varangu's presentation summary). Ms. Cowan and Mr. Dankner described how with senior management support, UHN completed the Canadian toolkit assessment checklist to identify climate risks, vulnerabilities and dependencies faced by the UHN facilities and to determine how to address them. Given the focus on climate change risks, the assessment process brought diverse experts together to participate in the process through creation of a working group. A final resiliency score was generated from the assessment which identified where future resiliency efforts should be concentrated. Moving forward a plan has been developed to act upon the information from the assessment process. The results will help provide strategic direction for master planning, capital planning and upgrades to the facilities. The working group will continue to meet and provide recommendations to the Emergency Management Committee of UHN.



Key lessons learned through the assessment process included the usefulness of a quantitative resiliency assessment score, the importance of building organizational buy-in to address findings, the effectiveness of community collaboration, the benefit of understanding how climate change can blend into existing planning and the need to raise the profile of climate change as an organizational priority.

USA

USA Health Care Facility Climate Change Resiliency

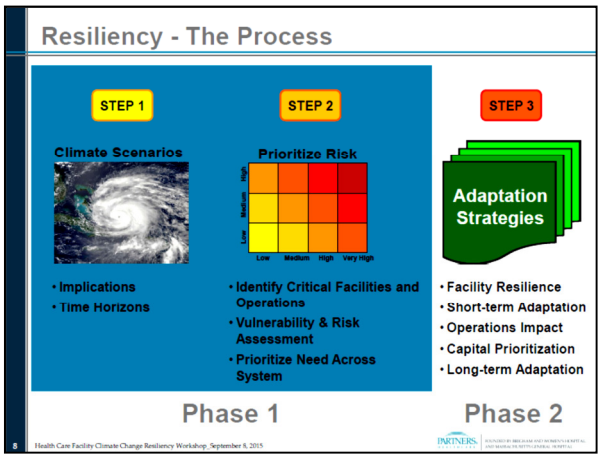
Monica Nakielski
Partners HealthCare

Ms. Nakielski began her presentation by introducing Partners HealthCare, a not-for-profit health care system in Massachusetts committed to patient care, research, teaching, and service to the community locally and globally. A leader in promoting a healthy environment and optimizing the care of patients and the well-being of employees while conserving resources, Partners has made a strategic shift from a culture of treatment to one of prevention. Partners has made commitments under national and international campaigns (the Healthier Hospitals Initiative and the 2020 HealthCare Climate Challenge) to protect public health from climate change, implementing a new approach for improving environmental health and sustainability in the health sector. Since 2008 Partners HealthCare has been committed to reducing overall energy consumption through a master energy plan for all its affiliated hospitals and facilities. It is improving health care delivery through a sustainability strategy that engages patients, employees and the community to support and maintain a safe and healthy environment

while managing costs and leveraging resources and return on investments.

In 2015, Partners HealthCare initiated actions to increase the resiliency of their health care facility network by developing climate scenarios to identify possible impacts, prioritizing risks through vulnerability assessments and identifying long-term adaptation strategies. Key deliverables for the first phase of this initiative will serve as the basis for the second, implementation phase. Phase One analysis includes:

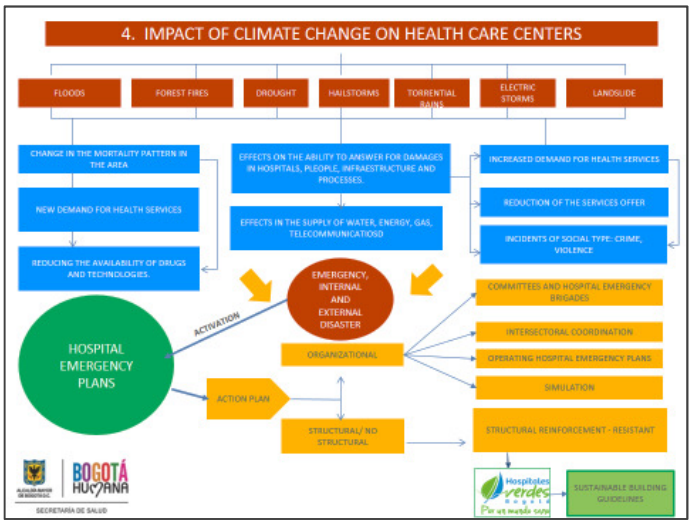
- Modeling future climate scenarios (e.g. storm surge, precipitation, temperature, wind etc) for 30 campuses;
- Developing a standardized vulnerability assessment aligned with current risk criteria and informed by lessons learned from other studies and climate events;
- System-wide risk assessments to identify key vulnerabilities, the need for redundancy, and risks of impact on critical functions and business continuity;
- Identifying key external dependencies such as utilities and transportation infrastructure.



COLOMBIA

District Development Plan Bogotá Humana (2012-2016)

Dr. Mauricio Alberto Bustamante García
Bogotá Secretary of Health



Dr. Bustamante highlighted the objectives of the "Bogotá Humana Development Plan (2012-2016)" which are to combat social segregation and build an inclusive, dignified and equitable city. Health is a central component within the plan as its policy aims to strengthen environmental health and knowledge management, promote healthy spaces and improve environmental health surveillance through interventions relating to air, water, chemicals, food, zoonosis, the built environment and climate change.

Bogotá Humana recognizes climate change mitigation and adaptation as a development priority given the region's vulnerability to climate hazards and socio-economic development barriers to improve the well-being of citizens. As a result, a Bogotá climate change adaptation and mitigation plan was developed as part of the larger district development goals.

To date, Bogotá has had much success with environmental health and climate change initiatives including the following:

- A city-wide vulnerability index that identifies locations that are most affected by the occurrence of extreme climate events, through the risk comparison across time and space;
- An observatory on environmental health that helps direct efforts to reduce risks;
- Improved management of climate change risks through monitoring, assessing impacts of extreme weather events and undertaking changes to public health plans;
- Currently, there are 7 virtual tools for the Secretary of Health to gather information for planning to reduce impacts that occur due to climate change;
- The creation of the 'Green Hospitals' program to reduce negative impacts on the environment and health of the workers, patients and community through the implementation of clean technologies in the health sector. It consolidates environmental responsibility within industry practices, contributing to the strengthening of integrated systems for environmental management and achieving higher quality standards for health care services.

BRAZIL

Dr. Gilberto Alfredo Pucca Junior
Brazil Department of Environmental and Occupational Health

Dr. Pucca Junior led off his presentation by describing the major challenges associated with climate extremes that Brazil has experienced. For example, the 2015 Brazilian drought, described as the worst in 80 years, is ongoing and severely impacting the southeast of Brazil, including the metropolitan regions of Rio de Janeiro and São Paulo, where water scarcity has led to some residents recycling and hoarding water.

Established in 2007, the Brazilian National Plan on Climate Change has the potential for one of the largest reductions in greenhouse gas emissions among all nations. Since its implementation, challenges have been experienced in attempting to integrate environmental health into the existing health system. With more than 30,000 family health care teams acting as agents of health promotion, there have been difficulties shifting to a culture that prioritizes environmental health, especially in a decentralized system of 5,000 cities in many states. To better protect its citizens, 821 municipalities have been identified as being at high risk to disasters and are heavily monitored. There is a need for risk communication instruments to affect change in these high risk areas.

In 2009, the country held a national conference on climate change hosted by the Ministry of Health and coordinated by the Secretary of Health Surveillance. Future plans include development of a national policy on health and the environment, a high level initiative supported by the President.

4 TAKING ACTIONS TO PREPARE HEALTH FACILITIES FOR CLIMATE CHANGE

AWARENESS OF CLIMATE CHANGE AND HEALTH ISSUES AMONG STAKEHOLDERS

Awareness is essential to the adaptation process for managing climate change impacts, increasing health care facility resiliency and reducing vulnerabilities. Health care facility resiliency awareness efforts involve increasing concern for climate change impacts, engaging key stakeholders, creating a positive image of resiliency and attempting to change behaviours.

The Need to Raise Awareness

While climate change has become a global concern, many workshop presenters reported the need to connect the issue of climate change to local health impacts, and to engage health care workers as a means to gain support for climate change resiliency actions. In the United States, the health care sector is one of the fastest growing industries and employs over 18 million workers[2]. However, a major obstacle to health care resiliency can be low stakeholder awareness of health care facility vulnerabilities and of actions that can be taken to adapt to climate change.

Efforts to raise awareness should be directed towards key adaptation policy makers and responsible politicians. Examples of impacts on health care facilities and of benefits of taking adaptive actions are effective communication strategies. The private sector should be engaged in these discussions. Health care facilities rely on private sector innovations and adaptive actions to become more resilient to the negative effects of climate change.

For stakeholders who do not consider climate change impacts on health care facilities a major issue, it will take creative and innovative strategies to change their perceptions and attitudes about risks and vulnerabilities. It was suggested by workshop participants that a key strategy is to link climate change resiliency considerations to other issues such as disaster preparedness or future health care facility infrastructure investments. For example, most of the presenters linked examples of action on climate change resiliency to an existing disaster preparedness framework. In many facilities, support for disaster planning already exists along with budgets and personnel, thus enabling climate change resiliency actions. Pursuing climate change resiliency goals through regular disaster planning can "normalize" these efforts and help raise awareness of current and future threats to facilities from climate change.

Messaging was also highlighted as an important component of awareness raising efforts. By framing the risk around *climate change*, not simply extreme weather events, it is possible to raise awareness of the breadth of impacts at the root of the vulnerability of health care facilities. The language used to communicate with the diverse group of stakeholders needs to be carefully developed and messages appropriately targeted.

[2] National Institute for Occupational Safety and Health (NIOSH) (December 12, 2014). Health Care Workers [webpage]. Retrieved from http://www.cdc.gov/niosh/topics/healthcare/

By raising awareness of the benefits of adapting to climate change (*see Cost-benefit Analysis*) among health sector officials, health care facility staff, politicians, and partners in the private sector, reservations about taking actions to increase climate resiliency of facilities can be overcome.

Awareness Initiatives

Many PAHO nations have started to develop climate change and health initiatives within their countries that have spurred awareness of climate change impacts on health care facilities. These include the development of resiliency toolkits in the United States and Canada and the Smart Hospital Toolkit developed by PAHO and already used in a number of countries. PAHO and WHO have also developed initiatives related to health care and climate change which will be delivered as part of the lead-up to or at the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) in November/December 2015. These initiatives include:

- Development of a web portal which will provide a summary of presentations and reports from this workshop
- Announcements/media releases on the health effects of climate change
- Side-events on climate change and health at COP 21
- Actions by WHO to enhance health sector resiliency under its climate change and health work plan
- Continued efforts to make the Smart Hospital Toolkit available across PAHO nations

Additionally, the health care and sustainability international non-profit organization Healthcare Without Harm and their Global Green and Healthy Hospitals initiative has been leading an international effort to engage health care facilities and create awareness of risks posed by climate change and of needed actions to prepare for the impacts. As part of this initiative, partners can access websites with resources and webinar recordings, join the 2020 Health Care Climate Challenge (https://noharm-global.org/issues/global/2020-health-care-climate-challenge), and be eligible for awards for taking a leadership role in addressing climate change resiliency.

EVIDENCE TO DRIVE ACTION – USE OF TOOLS FOR INCREASING PREPAREDNESS

A number of factors can help convince health care systems' senior management to make climate resiliency a priority. Workshop participants noted that partnering with reputable organizations such as PAHO and WHO can help garner credibility and support from senior managers. Both Partners HealthCare in the United States and the University Health Network in Canada have senior management support for addressing climate change risks to their respective facilities. Some of the incentives described for driving decision makers, health planners, and those responsible for budgets to move forward on this issue are (1) demonstrating the benefits of taking actions through cost-benefit analysis, (2) knowledge of adaptation successes, (3) leadership taken by other health care facilities and (4) broad community consultation and engagement leading to strong support for action.

Cost-benefit Analysis

Cost-benefit analysis is a tool that can help health facility officials and health ministry decision makers determine whether to undertake climate change resiliency actions. It can build the case for the viability of resiliency actions and demonstrate the wise use of limited resources in the health sector. A cost-benefit analysis compares upfront costs of adaptation with the benefits of increased resiliency from the retrofits or from other actions undertaken (e.g.,

improved emergency preparedness, staff training etc). This calculation may include projected reductions in water and energy consumption compared to the costs of maintaining current infrastructure, service and sustainability standards. Results of the analysis will help determine if a project is feasible, worth investing in, and how it ranks against other options for increasing health care facility resiliency. Many workshop participants agreed that such business cases are needed to stimulate action on climate change resiliency.

The PAHO SMART Hospital Toolkit provides an overview of cost-benefit analysis methods for health care facility resiliency and examples of studies to assist hospital administrators, health disaster coordinators, health facility designers and engineers in their project management decision making. However, some workshop participants noted that this methodology might be too difficult to use if resources and expertise within a facility are limited. To address this issue, PAHO plans further tool demonstration projects. The US Toolkit will also include guidance on developing business cases.

Examples of Adaptation Successes

Some health care facilities have demonstrated the value of retrofitting their buildings to build resiliency. After renovations to the Georgetown Hospital in St. Vincent, the facility used 68% less energy and saw a 34% increase in the number of patients. More patients came to the hospital as they were seeking a safer health centre to be treated in. The facility's increased preparedness served it well during a flooding event in 2013; there was no major impact to the hospital, operations remained continuous, water was provided to the community at large due to a water storage surplus built into the system, and power was provided by photovoltaic batteries even though fuel was cut off to the back-up generator. Health facilities, like the Georgetown Hospital, that successfully apply climate change resiliency tools and engage community partners are seen as leaders that prioritize public safety in their operations and activities within the community.

Resiliency Leaders and Champions

Presenters at the workshop highlighted other leaders in the health sector that are addressing climate change risks. For example, the Spaulding Rehabilitation Hospital in Boston, United States included information on projected climate change impacts in the design criteria of the new facility. Identifying and supporting resiliency leaders and champions in each country, and state/province is important for promoting needed actions to build health care facility resiliency to climate change impacts.

Community Engagement

Strong support for action can be fostered by engaging a community to increase resiliency beyond the scope of a health care facility. Developing a Smart Hospital in St. Vincent and the Grenadines involved engagement with a variety of experts as well as community outreach. A town hall meeting was held to launch retrofit activities at Georgetown Hospital and build support for the proposed measures. The meeting provided information on what will be occurring at the hospital, some of the changes envisioned and the ultimate goals of the project. In addition, as part of the cost/benefit analysis component of the project, a questionnaire was sent to 450 community members in St. Vincent and St. Kitts. The purpose of the surveys was to obtain information on views of community members about hospital retrofits and the willingness to pay for services.

TAILORING TOOLS TO FIT LOCAL NEEDS

To ensure wide and sustained use, health care facility resiliency toolkits should be tailored to the needs of users at the local level. Workshop participants agreed that it is key to consider variables such as the size or scale of the health care facilities, resources available to health officials, and the state of existing sustainability initiatives and of existing emergency planning initiatives. Actions can range from local projects revising codes, standards, and regulations to implementing broad initiatives such as a national health facility climate change resiliency accreditation process Innovative approaches can help achieve the flexibility needed to meet different local circumstances. Examples include the use of mobile health units and telemedicine to reach vulnerable populations in Mexico during emergencies. In other areas, facilities are undertaking measures to be able to act as self-sufficient "islands" during disasters.. Effective collaboration between local government, the public and private sector partners helps assure the success of such locality specific actions.

Health Care Facility Size and Tool Use

There is a common need across the Americas for a toolkit specific to, or adaptable to, smaller facilities (e.g. in rural locations, small islands, seniors homes, etc). Such a tool would need to take into consideration unique circumstances and issues that smaller facilities face. The toolkits designed in the US and Canada focus on larger facilities and may need to be adapted to be more suitable for smaller ones. The PAHO Smart Hospital Toolkit was used by many smaller facilities across the Caribbean and could be examined for its applicability to similar sized facilities in other countries. The PAHO Toolkit is divided into smaller components to make it more manageable for officials to complete and then to use for sustainability and resiliency activities.

State of Existing Initiatives

Many presenters at the workshop showcased examples of health care facility resiliency initiatives coupled with activities to enhance sustainability. Health care facilities vary in the robustness of their sustainability initiatives because of concerns about costs. While there may be a general understanding of the link between sustainability and resiliency actions (see *Synergies between Sustainability and Resiliency Actions*), integration of these two objectives can be difficult without a strong sustainability culture at the facility. Similarly, if health care facilities do not have an existing emergency preparedness plan in place, undertaking resiliency initiatives can be more difficult. Health officials in Mexico have explicitly linked efforts to increase resiliency of health facilities through their Safe Hospital Program by linking it to the Sendai Framework for Disaster Reduction (http://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf). Tools designed to help facilities address climate change resiliency need to recognize and support not only resiliency, but also sustainability and emergency preparedness objectives.

EFFECTIVE PARTNERSHIPS TO SUPPORT TOOL USE

A common theme at the workshop was the need to actively engage a wide range of partners with adequate knowledge and expertise when undertaking health care facility resiliency initiatives. The toolkits can provide a convening focus for multiple stakeholders and also help assemble multi-disciplinary expert teams to undertake the actual assessments. In this regard, they can be very useful to help many diverse groups focus on climate change and health risks to facilities and develop effective plans to reduce them. It is important to take an inter-sectorial approach in these activities.

Initiatives to improve resiliency should ultimately aim to involve officials from the federal government, the state and municipalities, along with community groups and the private sector if sufficient resources are available.

Challenges reported by workshop participants included building the assessment team with a diversity of partners (e.g. hospital administrative staff, clinicians, etc.), applying the various steps of the tool and then deciding which partners need to be involved to take the results and implement recommended adaptation options.

Different types of organizations may lead efforts to prepare health care facilities for climate change depending on the country or community. In some countries it might be a private organization that would be the driving force instead of government. In all cases, these initiatives need strong leaders with determination and courage to overcome challenges to the process.

SUPPORTING THE HEALTH CARE WORKFORCE TO PREPARE FOR CLIMATE CHANGE

Health care staff who spearhead the resiliency assessments or use of toolkits are often champions in their facilities and have a good understanding of climate change and health impacts. But these champions need to work with various staff and senior managers who may not have as good an understanding of the issues. Supporting these champions is critical for driving and sustaining actions to enhance climate change resiliency within facilities.

Health Care Worker Training

The health care workforce is on the front lines during response to an emergency and has a critical role to play in building more resilient health care facilities. If empowered and properly trained, workers can help raise awareness of climate change and health risks and the need for adaptation measures among facility leaders and within the broader community. It was noted by participants that all of the tools presented at the workshop could benefit from additional emphasis on supporting and training the health care workforce.

Health care staff require training and education opportunities to effectively use the resiliency tools discussed at the workshop.. Even with a robust adaptation plan at a facility, significant challenges arise if workers are not trained on protocols and procedures for reducing health risks and impacts on infrastructures. In one example provided by a participant, health care staff did not know how to use equipment to limit damage to the hospital during a flooding emergency.

In Mexico, concern about civil protection from natural disasters and patient safety is helping drive efforts to improve the management of emergencies, and thus climate change resiliency. Mexico has taken action to integrate a Safe Hospital Program within its national Civil Protection System by engaging a wide range of national and international experts. Hospital safety officials from a variety of disciplines and institutions attended a workshop and completed a rigorous online course moderated and facilitated by national and international experts on the topic. Individuals received certification to undertake assessments of hospitals if they passed the course.

The Pan American Health Organization is currently developing training guidance for health care workers in the Caribbean so they are better prepared for emergency events (e.g. proper use of emergency equipment such as back-up generators). It was noted that training of workers should be done periodically, given high turnover rates in some facilities in the region and given upgrades and improvements to health care

services and infrastructure that can result in training programs becoming outdated. Health facility maintenance guides and health care worker training can help officials and staff remain knowledgeable about information, services and equipment.

Examples of Training Tools for Health Care Workers

A number of examples of ways in which health care workers in PAHO countries have been supported through training tools were shared at the workshop:

1. Raising Awareness

   Videos
   - A promotional video was developed by health sector officials in Saint Vincent and the Grenadines to increase awareness of climate change and health issues by health facility staff. In Mexico, officials have produced videos on preparing for earthquakes and on evacuation from hospitals.

   Web sites and other climate change resources
   - Many countries have web sites that have information and resources on climate change and health issues.

2. Training Sessions

   Webinars
   - Some organizations have offered webinars to increase the awareness of climate change resiliency issues within health care facilities. These include Global Green and Healthy Hospitals and the Canadian Coalition for Green Health Care in Canada.

   Workshops and online training
   - Through its Safe Hospital Program officials in Mexico have trained hospital safety staff through workshops and online programs.

   Train-the-Trainer
   - The Canadian Coalition for Green Health Care in Canada has developed a 'Facilitators Guide' that is designed to provide guidance to individuals undertaking resiliency assessments with the toolkit at their respective facilities.

3. Case Studies

   - Some toolkits (e.g. the US and Canada) offer case studies of health care facilities that have experienced and recovered from climate change related disasters and taken actions to reduce impacts from future events. Many of the case studies provide examples of responses to different types of climate hazards such as flooding, humidity, heat, hurricanes and drought.
   - Case studies should be developed and shared widely among health sector officials in the PAHO region. Examples of impacts and adaptations for different types of health care facilities such as acute care, long-term care and clinics would be useful. Some information could also be obtained from non-PAHO nations.

SYNERGIES BETWEEN SUSTAINABILITY AND RESILIENCY ACTIONS

There are opportunities to achieve synergies between resiliency and sustainability initiatives at health care facilities. For example, facilities are more resilient in an emergency if they are more energy efficient and do not waste food, water and medical supplies. Such facilities will be able to serve their patients and the broader community longer and may even be able to provide food and potable water to some populations in need.

Benefits of Using Renewable Resources

Sustainability and resiliency actions should be viewed as overlapping components of the same adaptation process. The benefits of sustainability are great – examples include reductions in costs to facilities, increased energy and water conservation, reductions in greenhouse gas emissions, improved air quality, and healthier patients, staff and communities. Gundersen Health Systems in the US developed an innovative series of community partnerships, based upon increased use of wind energy, harvesting methane from landfills, and obtaining energy from brewery waste and dairy manure, thus reducing the burden of agricultural waste and moving away from fossil fuels. The area of resource conservation therefore offers broad scope to achieve synergistic outcomes from sustainability and resiliency initiatives in health care facilities, ultimately lowering the costs of the actions taken.

Measures to enhance resource conservation can complement actions to increase resiliency. For example, in addition to constructing a new, high efficiency district energy plant (co-generation of power and thermal energy) after hurricane Allison, the Texas Medical Center elevated essential infrastructure, including a set of bridge walkways between buildings, removed parking lots, established groundwater recharge systems (to handle extreme rain better) and advocated for and participated in a marsh restoration project upstream from the health center campus. A number of these measures acted as redundant initiatives and proved to increase resiliency when the system suffered little to no damage from the 2014 Houston floods.

The US health care facility resiliency toolkit provides information about these important linkages.

Experiences from island nations can help other facilities develop 'island' approaches to their energy needs. Distributed and renewable energy sources are key to achieving energy self-sufficiency. In Mexico, 3000 rural medical units and 12 rural hospitals are using solar panels. In the US, Gundersen Hospital is the first hospital in the country to obtain 100% of its energy from renewable resources. Distributed energy systems enhance resiliency to climate change impacts.

Need to Consider Global and Local Environmental Issues

Workshop participants discussed the need to link health care facility resiliency initiatives to both global and local environmental issues to help garner support for them. Global imperatives such as the need to address the causes and impacts of climate change and events like the upcoming climate change discussions in Paris in November/December 2015 (Conference of the Parties 21) can help stimulate interest in, and awareness of the need for action to enhance health facility resiliency among senior managers. Similarly, identifying local environmental health impacts which may arise from climate change, such as health risks from flooding if the facility is located on a flood plain, will help provide added meaning to the urgency of resiliency actions.

OPPORTUNITIES FOR FUTURE COLLABORATION

Based on the discussions and workshop presentations, the following are opportunities for future collaboration to stimulate action on climate change resiliency within health care facilities across PAHO nations:

A. Climate Change Awareness

- Where possible, health care leaders could show their support for PAHO and WHO in their climate change resiliency efforts leading up to the November/December 2015 climate change talks in Paris (see WHO call to action to protect health from climate change http://www.who.int/globalchange/global-campaign/cop21/en/). This could include sharing PAHO and WHO announcements within their organizations.
- Where possible PAHO nations or regions can encourage their health care facilities to participate in the Global Green and Healthy Hospitals climate change campaign led by Health Care Without Harm and local or regional health care climate change resiliency initiatives.
- The health care sector can further explore how to identify and partner with suppliers who are leaders in climate change resiliency initiatives. For example, some health care businesses are champions for climate change by committing to 100% Renewable Energy (i.e. the campaign - RE 100), while others are providing green leadership by creating less resource intensive products and services.

B. Evidence to Drive Action

- Continue to seek ways to link climate change resiliency with emergency preparedness.
- Seek out leaders from the health care community who would help mobilize interest other facilities.
- Develop business cases for climate change resiliency using clear economic data. These case studies should use consistent information and approaches to demonstrate economic benefits in a comparable manner for a variety of scenarios and conditions.

C. Tailoring Tools to Fit Local Needs

- Develop toolkits more suitable for smaller facilities in US and Canada
- Mobilize complementary regional initiatives within PAHO member nations
    - Existing regional initiatives in geographically or economically similar areas may be additional venues for collaboration.

D. Effective Partnerships to Support Tool Use

- Share stories of how various partnerships helped support climate change resiliency action

- Encourage additional hazard vulnerability assessments to better understand local risks
- Identify health care workforce training needs and mechanisms to deliver training

E. Supporting the Health Care Workforce

- Awareness support
    - Undertake inventory of existing videos and share links to these videos
    - Develop a video to tell a compelling story of climate change resiliency and lives saved
- Resource Sharing
    - Link to the various resources which were discussed and presented at the workshop
    - PAHO climate change workshop web pages
        - PAHO to develop web pages to post workshop results aimed at key end users – risk managers and facility operations staff
        - PAHO to author paper on workshop
        - PAHO to host webinar on workshop
- Develop Tool training sessions as appropriate for local needs, including:
    - Webinars
    - Workshops
    - Onsite training
    - Train-the-Trainer
    - Mentoring
    - Web based training
- Case studies
    - Undertake an inventory of case studies currently available
    - Develop examples of responses to different types of climate change impacts not currently represented
    - Develop examples of responses at different types of health care facilities not currently represented (i.e. Acute care, LTC, clinics
- Continue to seek ways for normalize climate change resiliency within the health care sector

F. Synergies Between Sustainability and Resiliency Actions

- Identify and undertake an inventory of sustainability actions by health care facilities that are also resiliency action. Provide a cost analysis where possible.

Several countries in the Americas are making strides in efforts to increase the resiliency of health care facilities to climate change impacts. New assessment tools described in this report can enhance actions at the regional and community levels to prepare the health sector for climate change and support the use of evidence-based information in the development of needed adaptations. Significant scope exists to further these efforts through the sharing of information about challenges and opportunities for taking actions. The Health Care Facility Climate Change Resiliency Workshop in Montreal in September 2015 initiated this exchange and offers the foundation for future collaboration in this important area.

APPENDICES

APPENDIX A – WORKSHOP AGENDA

SEPTEMBER 8TH, 2015

9:00 AM – 5:15 PM

MCGILL UNIVERSITY HEALTH CENTRE, GLENN CAMPUS, MONTREAL QUEBEC

ROOM DS1.1427

Workshop Objectives:

- To share information on existing climate change resiliency tools for health care facilities
- To share examples of tool implementation, best practices for application, challenges encountered and suggestions for effective use
- To discuss opportunities for future collaboration in efforts to enhance health care resiliency to climate change impacts

9:00 **Welcome, Introductions and Opening Remarks** *A. Soares*

Morning Session - Moderator (J. Balbus)

9:30 Improving Health Care Sector Resilience *S. Slotterback*

10:15 *Health Break – Snack Provided*

10:30 **Climate Change Resiliency Tools for Health Care Facilities**

- Canada - Health Care Facility Climate Change Resiliency Toolkit in Canada
  L. Varangu
- USA - The US Sustainable and Climate Resilient Health Care Facilities Initiative
  J. Balbus
- PAHO - Health Care Facility Climate Change Resiliency
  S. Jagnarine
- WHO - WHO Operational Framework to Build Climate Resilient Health Systems
  E. Villalobos Prats

Case Study Session 1 - Moderator (A. Soares)

11:50 **Case Studies of Tool Use in the Americas**

- Mexico - Safe Hospital Program in Mexico
  I. Hernandez Olivas
- Saint Vincent & the Grenadines - Smart Health Facilities – "A Real Option"
  D. Latchman

12:30 *Lunch Break – Lunch Provided*

Case Study Session 2 - Moderator (A. Soares)

1:15 **Case Studies of Tool Use in the Americas**

- Canada – Climate Change Resiliency Planning in Canadian Hospitals

K. Cowan & S. Danker

- USA - Health Care Facility Climate Change Resiliency
  M. Nakieleski
- Colombia
  M. Bustamante Garcia
- Brazil
  G. Pucca Junior

2:45 *Health Break – Snack Provided*

Expert Panel - Moderator (J. Balbus)

3:00 **Increasing Health Facility Resiliency - Challenges and Opportunities**
7 *Panelists*

Participant Discussion - Moderator (A. Soares)

4:15 **Opportunities for Future Collaboration**

- What is the best way to facilitate collaboration and support for effective tool use in the Americas?
- In which ways could collaboration with PAHO support the implementation of the Regional Strategy and Plan of Action on Climate Change?

5:15 **Closing Remarks** *A. Soares*

APPENDIX B – WORKSHOP ATTENDEES

AGNES SOARES DA SILVA

BARBARA CRUMB

CÉSAR JOHAN PEREITA VITORIO

CHELSEA PANDELIDIS

DAVID LAPP

DAVID LATCHMAN

DIARMID CAMPBEL-LENDRUN

DIEGO GONZALEZ

ELENA PRATS VILLALOBOS

FABIO DE BARROS EVANGELISTA

GERMAIN CARON

GILBERTO ALFREDO PUCCA JUNIOR

GUADALUPE DE LA LUZ GONZALEZ

IRMA PATRICIA HERNANDEZ OLIVAS

JAMES PATURAS

JÉRÔME RIBESSE

JILL COURTEMANCHE

JOE CIARNIELLO

JOHN BALBUS

JORGE LUIZ NOBRE GOUVEIA

JUDITH HARVEY

KADY COWAN

LINDA VARANGU

LUIS MARTÍNEZ LIÉVANO

MARIA CAROLINA ANDRADE

MARTHA ROBINSON

MAURICIO BUSTAMANTE GARCIA

MEAGAN BRETTLE

MONICA NAKIELESKI

MONTY EMMANUEL

NATHALIE ROBITAILLE

PETER BERRY

SCOTT SLOTTERBACK

SHALINI JAGNARINE

STEWART DANKNER

TINA SARYEDDINE

VIDYA ANDERSON

APPENDIX C – SPEAKER BIOGRAPHIES

Scott Slotterback

As Policy Director, Global Green and Health Hospitals at Health Care Without Harm, Scott Slotterback assures the smooth functioning of the Global Green and Healthy Hospitals network while helping lead its ongoing development. He also plays a central role in building the technical capacity of the Network. Scott Slotterback comes to this role after working for over 30 years on complex building and land use planning projects, including a decade at Kaiser Permanente, where he led teams focused on improving the design and sustainability of over 60 major healthcare buildings. He authored numerous sustainability focused case studies, design standards, white papers, and articles. He also presented sustainability at numerous national and international conferences and served on the Steering Committee that wrote the Green Guide for Healthcare, which became the basis for LEED for Healthcare.

Linda Varangu

Linda Varangu has been working at the intersection of the environment, health, and policy for more than 25 years. She is currently the Executive Director for the Canadian Coalition for Green Health Care, where under her leadership membership has grown to 40% of hospital beds across Canada. Linda has authored numerous manuals, research documents and papers on pollution prevention, energy efficiency and climate change; spoken at national and international conferences and co-founded three environmental corporations. Most recently at the Coalition, Linda leads the development and implementation of the Health Care Climate Change Resiliency Toolkit developed with Health Canada, as well as several health care greenhouse gas reduction projects including the development of a green revolving fund and an energy managers program. Linda has a Bachelor of Science degree in Chemistry and Biology and a Masters in Environmental Engineering.

John Balbus

John M. Balbus, M.D., M.P.H., is the Senior Advisor for Public Health to the Director of the National Institute of Environmental Health Sciences, where he directs the NIEHS-WHO Collaborating Centre for Environmental Health Sciences. He serves as HHS principal to the U.S. Global Change Research Program and also co-chairs working groups on Climate Change and Human Health for the US Global Change Research Program and for the National Institutes of Health. Balbus has served as lead author or reviewer for recent national and international climate change and health assessments, and is co-author of the HHS guide document "Primary Protection: Enhancing Health Care Resilience for a Changing Climate."

Before joining NIEHS, Dr. Balbus was Chief Health Scientist for the non-governmental organization Environmental Defense Fund for seven years. He was also on the faculty of The George Washington University Schools of Medicine and Public Health and Health Services, where he was founding Director of the Center for Risk Science and Public Health and Acting Chairman of the Department of Environmental and Occupational Health. Dr. Balbus received his A.B. degree in Biochemistry from Harvard University, his M.D. from the University of Pennsylvania, and his M.P.H. from the Johns Hopkins School of Public Health.

Shalini Jagnarine-Azan

Shalini Jagnarine-Azan is a Civil Engineer specializing in the design of building structures and practicing mainly in the Caribbean. She was awarded her M.Sc. with Merit from Imperial College London in General Structural Engineering. Her engineering career has included assignments with C.G. Murray Limited, a Consulting Design Firm in Trinidad and Tobago, in the design of medium scale residential, commercial and industrial buildings in Trinidad and Guyana; Tank-Weld Special Projects, a specialist construction Company in Jamaica in the construction of large scale infrastructure projects and Peter Jervis and Associates Limited, a prominent design firm in Jamaican, in the design of large scale residential and commercial projects throughout Jamaica, as well as projects in Haiti and St. Vincent and the Grenadines.

She is a Chartered Engineer, a member of the Institution of Structural Engineers and serves on the Committee of the IStructE Caribbean Regional Group. She is currently Vice-Chair of the Committee and an Ambassador for IStructE. Eng. Jagnarine-Azan is also a Consultant with the Emergency Preparedness and Disaster Relief Unit (PED) at PAHO specialising in Disaster Risk Reduction. Her work with this Unit has involved Humanitarian Relief and Disaster Response and she formed part of the emergency response teams for Typhoon Haiyan (Yolanda) in the Philippines and the 'Christmas Floods' in St. Vincent and the Grenadines and Saint Lucia.

Her work with PED includes the development of technical materials specifically aimed towards improving the resilience of the Health Sector, including input in the '*Smart Hospitals Toolkit*', '*Hospital Administrator Post Disaster Checklist*' and '*Hospitals Don't Burn! Hospital Fire Prevention and Evacuation Guide'.*

Elena Villalobos Prats

Elena Villalobos Prats is responsible for capacity development and country support in the climate change and health team at the World Health Organization Headquarters in Geneva. Elena has qualifications in law, international development, gender and equity, and disaster response. She also has extensive experience in managing NGO development projects in Asia and South America. In her current position at WHO, Elena is responsible for implementing the components of the WHO workplan on climate change and health relating to capacity building. These include generating technical guidance and supporting countries in developing the health component of National Adaptation Plans, providing training and technical support for vulnerability and adaptation assessments, and providing project management and technical support to health adaptation projects supported by different donors.

Irma Patricia Hernández Olivas

Irma Hernández Olivas holds a BSc. at the National Autonomous University of Mexico and has over 27 years of work experience at the Mexican Social Security Institute. Starting in 2007, she has worked in the Special Health Projects Division of the National Medical Services as the Technical Coordinator of the Safe Hospital Program and, since then, has acted as the Technical Secretariat of the Technical Advisory Group of the National Committee of Evaluation, Diagnosis and Certification of this Program. She has participated in the development of numerous documents and tools for the implementation of the Safe Hospital Program in Mexico including the online evaluations course, the evaluations visit protocol, a program practical guide and brochure, videos on "hospital evacuation in critical areas" and of "Safe Hospital Program in Mexico", etc. She is an organizing committee member of the International Forum on Safe Hospitals from Disasters and a member in a variety of

Safe Hospital Program working groups including one responsible for General Law of Civil Protection which was tasked to update the Mexican Official Norm (NOM-016-SSA3-2012), a law that aims to regulate the minimum characteristics in construction and equipment in hospitals and the Hospitals Certification according to Joint Commission International criteria that is applied by the Mexican General Health Council.

David Latchman

Mr. David Latchman is currently the National Health Planner in the Ministry of Health, Wellness and the Environment in St. Vincent and the Grenadines. He is the Project Manager for the 10th European Development Fund supported projects for the Modernization of the Health Sector in St. Vincent and the Grenadines. David was instrumental in the establishment the first Smart hospital initiative in the Caribbean with of assistance from WHO/PAHO and UK Aid. He is the National Focal Point for a PAHO/WHO and DFID funded project supporting a second phase of the Caribbean Smart Hospital Initiative Programme in four countries.

Kady Cowan

Kady has been a sustainability innovator at University Health Network (UHN) since 2007, responsible for the design and delivery of multi-modal environmental management programs and strategies to protect human health and the environment. Program areas include; energy efficiency and conservation, waste reduction and recycling, climate change resiliency, sustainable transportation and local food. By putting behaviour change theory into practice Kady transforms everyday activities into opportunities to improve the sustainability of healthcare for the long-term. Before coming to UHN, she worked in the environmental not-for-profit sector doing research and community engagement program design, as well as environmental research for provincial policy. As chair of the Canadian Coalition for Green Health Care, Kady is advancing thought leadership and facilitating a national dialogue on the many benefits of green health care.

Stewart Danker

Stewart Danker is the Director of Facilities and Support Services University Health Network at the Toronto Rehabilitation Institute. He takes a committed lead to create and promote a vision of excellence in supporting UHN's corporate mission and goals in ensuring the hospital facilities meet the legislated requirements of medical, mechanical, electrical and emergency response system repairs and maintenance. Leads the Toronto Rehabilitation Facilities and Support Services group development and implementation of quality improvement policies, procedures and processes, which are aligned with UHN corporate standards and enhance operational effectiveness and program efficiency.

Stewart Danker has presented various articles on Energy Awareness and Conservation in Canada and the United States. Stewart Dankner was an organizing member of the Greening Healthcare Strategy Group as well as participating in various Provincial Energy monitoring and verification groups. Stewart Dankner has sat on many Healthcare Business Continuity teams to ensure compliance and liability issues are addressed from a functional and operational view.

Monica Nakieleski

Monica Nakielski is a Project Manager, Sustainable Initiatives at Partners HealthCare. Monica and the Partners Sustainable Initiatives team are responsible for providing vision and leadership in the development and implementation of the Partners sustainability strategy encompassing energy, waste, chemical, product supply chain and food. Nakielski earned her MBA from the Simmons School of Management and a BS in Medical Microbiology and Immunology from the University of Wisconsin - Madison. Prior to Partners HealthCare, Nakielski led a management consulting firm specialized in sustainability. She was a management consultant and lead for sustainability at Palladium, (formerly Balanced Scorecard Collaborative) where Nakielski partnered with Fortune 1000 clients to make the link between sustainability principles and strategy, planning and alignment, performance management and communications and reporting.

Dr. Gilberto Alfredo Pucca Junior

Dr. Gilberto Alfredo Pucca Jr. graduated in Dentistry with specialisation in public health, holds a master's degree in Epidemiology from the Paulista School of Medicine of the Federal University of São Paulo (1998) and a PhD in Health Sciences from the University of Brasilia. He has acted as the coordinator of National Oral Health within the Department of Primary Care of the Ministry of Health and continues to work as an Associate Professor, within the Department of Dentistry, Faculty of Health Sciences at the University of Brasilia. Dr. Gilberto Pucca Jr is currently the Director of the Department of Environmental Health within the Secretariat of Worker Health of the Ministry of Health.

Dr. Mauricio Bustamante García

Dr. Mauricio Bustamante García is a medical doctor speciasing in General Surgery and Management Health Services, with two graduate degrees in health service management, one of them being at the Andalusian School of Public Health. Dr. Bustamante García has over 10 years' experience as a hospital manager including at the University Hospital of the Samaritan among other hospitals. He temporarily occupied the position of Secretariat of Health of Cundinamarca, and was appointed as Deputy Minister of Health in 2000. He was then appointed Executive Director of the Andean Health Organization, an international organization he led from 2001 to 2006. Dr. Bustamante García has worked as a consultant and advisor to international health systems, a professor at several Latin American universities, a board member of several health institutions, an external consultant to the Pan American Health Organization in Washington and as the Director of Regional Projects and Cluster as SOSICAN 2007 - 2009 (Andean Community - European Union). He has authored several publications in the field of health, integration and health reforms. Most recently, he was appointed as the District Health Secretary by the Mayor of Bogóta.