Guidance Notes on Recovery

HEALTH

Supplementary Edition

On 24 January 2017, the International Recovery Forum 2017 was organized in Kobe, Japan, with the theme "Build Back Better Towards Resilient and Healthy Communities". Substantive discussions held at the Forum provided further inputs towards the finalization of this publication.

IRP was established following the Second UN World Conference on Disaster Reduction in Kobe, Hyogo, Japan, in 2005 to support the implementation of the Hyogo Framework for Action (HFA) by addressing the gaps and constraints experienced in the context of post-disaster recovery. After a decade of functioning as an international source of knowledge on good recovery practice, IRP has been focusing on more specialized role as an "international mechanism for sharing experience and lessons associated with build-back-better". In the context of the Priority Four of the Sendai Framework for Disaster Risk Reduction 2015-2030, IRP seeks to strengthen its global position as a recognized provider of information, including lessons and best practices in the field of build back better in recovery, rehabilitation, and reconstruction. Its vision, mission and goals reflect this specific focus

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Introduction

Management of post-disaster recovery requirements in the public health and health sector often presents a formidable challenge for planning staff. Any failure to properly or adequately address health and recovery needs in an effective and efficient manner may threaten impacted individuals' life and well-being, and may also generate secondary challenges and issues that undermine greater redevelopment progress. Provisions targeting health sector recovery are thus prioritized in the Sendai Framework for Disaster Risk Reduction 2015-2030 as they also have been in the Sustainable Development Goals (SDGs) and the Paris Agreement. Moreover, the Disaster Risk Management (DRM) agenda has dramatically elevated the prominence of global health security, thereby recognizing its influence on community and national resilience.

The work of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction was completed in 2016. This working group was established by the United Nations General Assembly in its resolution 69/284 for the development of a set of possible indicators to measure global progress in the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030. Within the adopted definitions of the terminologies, "Recovery" is defined as below:

"The restoring or improving of livelihoods and health, as well as economic, physical, social, cultural and environmental assets, systems and activities, of a disaster affected community or society, aligning with the principles of sustainable development and "build back better", to avoid or reduce future disaster risk" (https://www.unisdr.org/we/inform/publications/51748).

Purpose
The materials contained in this supplementary document complement those found in the existing *IRP Guidance Note on Recovery – Health.* The discussions and case studies contained herein portray an expanded and oftentimes fresh perspective on many of the issues found in the original guidance note on several new and emerging issues for which there exist best practices and lessons learned. These experiences, information, technologies, and tools that have been captured since the original 2011 launch of the health-focused recovery guidance note are significant, providing the reader with an up-to-date picture of health sector recovery inclusive of the economic, social, cultural, environmental, technological, and other challenges and constraints. Because community health needs are rarely afforded ample consideration in the recovery and redevelopment visioning process, an acute need to expand awareness and inform recovery stakeholders persists. The purpose of this supplement therefore parallels the original document in that it seeks to support recovery planners in their efforts to more effectively manage recovery planning, decision-making, and resource allocation with an informed perspective that focuses on building back better.

Audience

Like other documents in the IRP Recovery Guidance Note series, the principal target audience of this supplement is the policymakers, planners, and implementers of local, regional and national government collectively interested or engaged in facilitating a more responsive, sustainable, and risk-reducing recovery process. Special attention is placed on informing the actions and efforts of disaster management professionals and health sector advocates. These materials recognize and encourage a bridging of efforts between the health sector and the broader disaster management community such that planning and implementation of pre- and post-disaster recovery planning and operational efforts may continue to evolve. Moreover, it is hoped that a more informed health sector recovery stakeholder community will serve to close the gaps that remain and ensure future opportunities to build back better in health sector recovery are maximized.

Content

The materials provided in this supplement include experiential narratives, technical descriptions, program assessments and analyses, and other case-based knowledge captured since 2010 from which new strategies and actions may be derived. Because the body of knowledge in the health sector is still growing at a rapid pace, these materials should not be considered exhaustive or exclusive. They should, however, be addressed in concert with the existing ideas and options presented in the original document rather than in place of them. Together, these two documents offer a more complete menu of options for decision-makers.

The experiences and lessons learned presented in this document are classified according to three overarching issues:

- Integrating Health in Recovery Processes
- Preparing to Build Back Better Towards a Healthier Community
- Strengthening Health Systems in the Context of Disaster Recovery

This supplement incorporates common and lingering challenges in health sector recovery that have not been addressed previously in the Guidance Note series. These issues (and the respective sub-issues contained within each) were identified by the IRP Secretariat and IRP members through a series of consultations and discussions. Exploratory activities assessed and documented health sector recovery in light of advancements in and changes to a number of global frameworks and agreements, and considered the documented observations, reports, and feedback from a wide variety of governments and communities that were either impacted by disasters or that pursued pre-disaster recovery planning.

In keeping with the format of the original document, materials are presented as a "menu of options" illustrated with one or more relevant case studies. Case-based materials have been compiled by the IRP Secretariat by means of desk review,

working-group meetings, conferences, and report submission.

While certain activities or projects presented in this supplement have met with success in a given context, it should be noted that there is no guarantee that similar activities will generate the same results across all contexts. Cultural norms, socioeconomic contexts, gender relations, and myriad other factors will influence the process and outcome of any planned activity. The following case studies are therefore intended not as prescriptive solutions that are applied wholesale but rather as experiences that inspire action, that generate contextually relevant ideas, and where appropriate, that planners may adapt to their unique needs. It is worth noting that health sector recovery efforts stand to benefit in terms of success when the following two prerequisite conditions are met:

- A mandate or policy exists by which an established governmental institution (e.g. Ministry or Department of Health) is tasked with the development and management of Health Sector Recovery; and
- A national-level disaster recovery framework or pre-disaster recovery plan that addresses health sector recovery is in place.

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Chapter

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Integrating Health in Recovery Processes

Disasters impact the physical and/or mental health of affected populations both directly and indirectly. While all people are susceptible to the health-related impacts of disasters, these impacts are typically magnified among members of vulnerable groups (e.g., children, the elderly, pregnant and lactating women, and people with disabilities). The most obvious effects present in the immediate aftermath of the event following direct hazard exposure, but it is not uncommon for indirect effects to be delayed weeks, months, or even years. Moreover, the indirect effects can have far greater impacts than those that occur directly, and are most often the result of disrupted access to equipment, services, facilities, and pharmaceutical supplies that are required for both preventative and treatment-focused healthcare. Post-disaster deterioration of living conditions and the mental and physical stresses associated with such circumstances can exacerbate pre-existing health conditions and also cause additional health problems to emerge. In some situations, these indirect impacts have resulted in a 'secondary disaster' with a distinct set of impacts and response and recovery requirements. An explicit focus on health is therefore required by those tasked with pre- or post-disaster recovery planning to not only ensure any lost health and health sector capacity is regained as quickly as possible, but also to limit second-order impacts. The importance of building back better is recognized in this approach in that healthier communities are generally more resilient to the shocks and stresses imposed not only by disasters but also to periodic disease outbreaks, social stresses, and other emergent issues that threaten physical and psychological well-being. Recovery planning that recognizes health sector needs also promotes improvement and modernization of the physical infrastructure and social mechanisms according to which health-specific development indicators are measured.

Topics: Emergencies with Health Consequences; Preventing and Controlling Epidemics and Diseases; Early Recovery in Health Sector through Emergency Response; Universal Health Coverage in Post-Disaster Phase

1.1 Emergencies with Health Consequences

An emergency with health consequences can be any situation (or the imminent threat thereof) that involves a scale of illness, injury, or adverse health conditions that threaten to or actually exceed established management capabilities. Emergencies with

health consequences may be the result of a natural or technological hazard, a breakdown in social order (e.g., conflict), a terrorist or criminal attack, or the occurrence of a disease outbreak, epidemic, or pandemic. A public health emergency (PHE) is an example wherein the emergency is characterized by the degree to which risk to human life and/or health has increased, inclusive of permanent or long-term disability. Declaration of a public health emergency is oftentimes required by statute to trigger the release of government funds and resources and to initiate emergency protocols. Resilience to public health emergencies is established through several means including the active surveillance, information collection, management, and sharing, enhanced surge capacity, personnel training, and others. Planners must consider that public health emergencies may arise out of an increase in requirements, a decrease in capacity, or a combination of the two.

The onset of a public health emergency is not always obvious, and in fact there may be disagreement about whether or not a situation or an outbreak constitutes such a designation. However, as highlighted by the 2014-15 global Ebola outbreak, a single case can trigger the need for widespread action. Once a public health emergency has been identified, resources (e.g. funding, staff, facilities) may need to be redirected away from core public health programs to address the emerging or ongoing event, which may in turn cause a reduction in standard public health capacity. Planners must try to understand how and when a public health emergency exists within the context of their public health system, and then use this knowledge to plan for contingency resources, staff training needs, and other related factors. An explicit focus on health in pre - and post-disaster recovery planning helps to answer many of these questions.

Hospitals are often the focus of management efforts during emergencies with health consequences, including those caused by emerging infectious diseases and pandemics. The dramatic increase in populations seeking care can quickly overwhelm institutions that seek to operate near full capacity during non-emergency times. Such outbreaks further impact capacity when health sector employees, including doctors, nurses, administrators, and those in support positions, are themselves infected and therefore unable to work. Supply chains may not be able to replenish expended equipment, medications, and other consumable health resources, resulting in shortages that impact care. Without proper planning for anticipated needs, including the existence of stockpiles, even those communities with robust operational capacities may find themselves overwhelmed during a rapid-onset event.

There have been several public health emergencies that occurred in recent years following the emergence of pathogens, both known and unknown, including Severe Acute Respiratory Syndrome (SARS), anthrax (both weaponized and naturally-occurring), avian influenza (H5N1), swine flu (H1N1), and Middle-East Respiratory Syndrome Corona Virus (MERS-CoV). Many of these events had global implications, and at times, impacted countries across multiple continents simultaneously. Nations must ensure that their public health planning efforts predict (or perhaps assume) that

new pathogens, whether of natural or man-made origin, will continue to emerge and trigger emergencies with health consequences.

Planning Questions and Considerations

➢ Do there exist regulations that guide minimum standards for health sector preparedness?
➢ Are health care personnel adequately protected from exposure during contagious disease outbreaks?
➢ Are healthcare workers supported in their efforts to establish personal disaster resilience such that absenteeism during disaster response and recovery is minimized?
➢ Do response and recovery plans and protocols enable adequate surge capacity?
➢ Have decisions regarding health care facility siting, construction materials, design considerations, and infrastructure dependencies occurred cognizant of known hazard risk?
➢ Are plans in place to quickly recover damaged or lost healthcare capacity, including impacts on sector-dependent critical infrastructure?
➢ Do recovery plans adequately incorporate disaster risk reduction measures and sector enhancement/improvement opportunities?

Case Studies

Case 1: Developing a National Ebola Recovery Strategy, Sierra Leone

Sierra Leone is one of three countries that were severely impacted by the 2014/15 Ebola outbreak. This event overwhelmed and subsequently decimated the country's public health and medical capacity, and likewise inflicted devastating socio-economic impacts. Over 8,000 infections were recorded in Sierra Leone, of which more than 3,000 resulted in death. Health personnel faced particularly high risk of exposure, and at least 295 health care workers were counted among the infected (of which 221 died, including 11 specialized physicians). Health care personnel were already strained prior to the outbreak at a ratio of 17.2 personnel per 10,000 people, but post event this ratio dropped to only 3.4 per 10,000 (far below the recommended minimum of 25 workers per 10,000 people served). This epidemic illustrated the manner in which a public health emergency stifles capacity to manage all other diseases faced by the public health system, including much more widespread diseases like malaria. Mortality and morbidity rates from these non-Ebola illnesses increased as a result, and thus indirectly contributed to the epidemic's overall toll. A concerted international response that involved the national government, community-based resources, and a range of bilateral and multilateral stakeholders was needed to bring the outbreak to manageable levels.

The intricate links that exist between healthcare sector recovery and the overall health of the economy become starkly apparent in this event given the hyper-focus of impacts on the health sector itself. Economic growth rates in Sierra Leone slumped

following the onset of Ebola despite very strong rates of growth experienced in the two preceding years (15.2% in 2012 and 20.1% in 2013). Coupled with a decline in global iron ore prices, the economy suffered a double shock and growth rates subsequently dropped to only 7% in 2014 (1% excluding iron ore), which contrasts highly with the projects of 11.3% that were made at the beginning of that year. In 2015 these impacts increased dramatically, with an estimated 23.5% economic contraction having taking place. Other indicators of financial decline associated with the outbreak include an increase in rates of inflation, a 13.5% depreciation in currency exchange rates, a dramatic decrease in the national trade balance (from US$362.3 million in 2013 to only US$6.8 million in 2014), and a doubling of the fiscal deficit (to 3.8% of GDP).

The Government of Sierra Leone led the development of the National Ebola Recovery Strategy, which was linked to a recently inaugurated national development strategy (Agenda for Prosperity 2013–2018). A participatory process was pursued in development of the recovery strategy, with input drawn heavily from a newly-formed Ebola Recovery Working Group comprised of representatives from the public and private sectors, development partners, and other NGO and civil-sector stakeholders. Input was drawn from a wide variety of national and international health sector representatives, and several impact assessments were conducted. Through these efforts, the following priority actions were identified:

1. Achieving and maintaining a caseload of zero cases;
2. Implementing immediate recovery priorities, with a special focus on restoring access to basic healthcare, reopening and running of schools in a healthy environment, providing social protection support, and revamping the private sector (including agriculture activities); and
3. Transitioning back into the national development strategy (Agenda for Prosperity 2013-2018).

The recovery strategy relies on the New Deal for Engagement in Fragile States for implementation. The New Deal, to which Sierra Leone is a signatory, is a guide for fragile states to attain and sustain resilience. Its emphasis on country ownership, strengthening institutions, capacity building, and the effective use of government resources dovetail with the objectives and highlights of the report.

By limiting further spread of the disease, treating the remaining infections, and focusing recovery efforts on rebuilding the nation's overall health and medical capacity, Sierra Leoneans' health-related outcomes improved. Recovery efforts likewise enhanced response capacities to enable more effective treatment of the ongoing and future outbreaks of Ebola and other diseases, and strengthened health sector coordination both within Sierra Leone and between the country and its neighbors in the region.

Lessons

- Health recovery must address the toll of disease outbreaks on healthcare workers.
- Management of a public health emergency may negatively impact the provision of or access to preventative medicine, medical treatments, and other care unaffiliated with the emergency itself.
- Recovery strategy formulation can help to guide ongoing development of health sector capacity.
- Recovery planning should consider risk management, financing, and transitions.

Source: Government of Sierra Leone. 2015. National Ebola Recovery Strategy for Sierra Leone: 2015-2017. July. http://bit.ly/2rhCBPW.

Case 2: Forging Partnerships to Improve Recovery During PHEs, USA

Health sector recovery may be guided, influenced, or perhaps constrained by legal implications during and after a public health emergency (PHE). Clarification of statutory authority relative to issuance and enforcement of a quarantine is one area where legal concerns are often raised by governmental or health sector professionals during such events. Those tasked with managing the response and/or the recovery to PHEs (or events with involvement of health-related issues) must be capable of taking prompt action and issuing definitive orders to contain and address the ongoing emergency. The presence of an effective legal structure is therefore critical, preferably in advance of the onset of emergency conditions. Unfortunately, many countries do not have or adequately maintain such instruments and mechanisms. When the United States became one of 24 countries impacted by an outbreak of severe acute respiratory syndrome (SARS) in 2003, legal ambiguities constrained the initial response and recovery efforts.

In order to improve the management of future PHEs, the American Bar Association (ABA), a nongovernmental voluntary organization dedicated to improving the legal profession in the United States, partnered with the US Centers for Disease Control and Prevention (CDC). The purpose of this partnership was to raise awareness among lawyers about public health emergencies and to urge them to participate in efforts to develop an effective legal framework. The ABA policy-focused House of Delegates first adopted a recommendation that calls on bar associations and lawyers to increase their awareness of and participation in PHE response and recovery efforts. The ABA and CDC each agreed to work together with the public health and legal communities to develop cooperative approaches that further strengthen the nation's legal response and recovery capacity in PHEs, including the emerging bioterrorism threat. ABA served as a necessary leader in a community of over 400,000 legal professionals, prompting state and local bar associations to train lawyers in the legal issues surround PHEs.

One of the first manifestations of this partnership was the launch of a Community Public Health Legal Preparedness Initiative that supports lawyers and public health officials in the conduct of workshops to inform communities about the legal aspects of PHE response and recovery. The partnership and this associated initiative consequently led to a new and growing community of public health lawyers and other legal professionals that are knowledgeable about health-related legal issues. Additionally, the CDC now distributes a special "Public Health Law News" on a monthly basis to help guide emerging public health legal needs. Efforts to develop an appropriate legal framework, including the creation and updating of laws and statutes, was initially constrained in the United States by the fact that public health response is primarily addressed at the local level and according to state law. In recognition of this, the ABA and CDC developed a Model State Emergency Health Powers Act, which has since been incorporated into at least 33 states' legal systems.

Lessons
- Government planners should work with legal professional associations to promote the advancement of public health law.
- Developing a partnership between governmental public health agencies and the legal community, whether before or during a PHE, can significantly improve the process by which necessary legal authorities are established.
- Local communities may benefit from guidance on establishing legal frameworks for health sector response and recovery.

Source: McDonough, Molly. 2004. Disaster Planning. ABA Journal. November. http://bit.ly/2rhQDAS.

Case 3: Assessing the Status of Hospital PHE Preparedness, China

The ability to detect emerging public health emergencies (PHEs), and the capacity to manage such events once detected, are dictated by both the adequacy of hospital facilities and the training afforded to public health and staff. Early detection can quell an outbreak before it spreads unabatedly, and can drastically limit the economic and human impacts sustained in the affected communities. In order to understand the degree to which a community or country is resilient to such events, and thus the baseline by which emergency planning may be initiated, there must exist mechanisms and protocols by which standard capabilities assessments are conducted.

The Government of China elected to develop and conduct such an assessment in four representative provinces in order to establish a national health preparedness baseline. In 2004 and 2005, four-hundred hospitals were surveyed using a questionnaire that explored a number of PHE preparedness topics. The standardized survey instrument considered eight distinct capacity drivers, inclusive of the following:

Area 1: Hospital PHE preparation
Area 2: Response to PHE in community
Area 3: Stockpiles of drugs and materials

Area 4:   PHE detection and identification
Area 5:   Procedures for medical treatment
Area 6:   Laboratory diagnosis and management
Area 7:   Staff training
Area 8:   Risk communication

Of the 400 facilities surveyed, all provided responses. Most (93.3%) maintained command centers and designated personnel for PHE. Only about one fifth (22.9%) reported having included community organizations in PHE training efforts. Virtually all respondents (97.4%) could transport needed health staff to a PHE, though only half (53.1%) had evaluated their pharmaceutical stockpiles and about two-thirds (61.5%) had evaluated their supply chains. Half (55.5%) had developed surveillance systems, and a full three-quarters (74.6%) further monitor situations as they develop. Physicians in four-fifths (80.2%) of the surveyed hospitals reported up-to-date knowledge of their institution's PHE protocol. An example of how such surveys help to focus needs is the emergence that while 97.4% of respondents follow strict laboratory regulations, only about 33.5% have protocols to process suspected samples. Furthermore, only 59.0% could isolate and identify salmonella and staphylococcus and less than 5% could isolate and identify human avian flu and SARS.

Lessons
- A national-level or distributed assessment of public health and medical facilities is instrumental in the development of pre- and post-disaster recovery plans in the health sector.
- Pre- and post-disaster investment in hospital and public health infrastructure should address not only regular operational needs but also those expected to arise in a PHE.
- The existence of diagnostic facilities is not necessarily an indicator of PHE preparedness.
- Emergency plans must be cognizant of the special public health needs that arise in PHEs, and should promote communication and cooperation with other response and recovery stakeholders.

Source: Li, Xingming, Jianshi Huang, and Hui Zhang. 2008. An Analysis of Hospital Preparedness Capacity for Public Health Emergencies in Four Regions of China: Beijing, Shandong, Guangxi, and Hainan. BMC Public Health. V.8. http://bit.ly/2r646vu.

Case 4: Assessing Readiness of Non-Urban Physicians, USA

A vast expansion of disaster preparedness efforts followed after the 9/11 terrorist attacks in the United States. Due in part to a bioterrorism attack involving Anthrax that followed soon after the precipitous attacks in New York City and Arlington, VA, special emphasis was placed on preparedness of the public health systems which were recognized as a critical player in such incidents. A series of epidemics and pandemics that have occurred since that time, including SARS, H1N1, H5N1, Ebola, and others, have only served to redouble such efforts. Unfortunately, the gains from these efforts

are not uniform. While well-funded urban communities have seen significant improvements, the same cannot be said in many suburban and rural areas. These non-urban communities with less-developed public health capacities have found efforts to organize preparedness and planning and to develop the training and capabilities of health care providers to be particularly challenging. Key among these challenges has been a lack of clarity on how much assistance may be required.

A survey was used to assess non-urban physicians' prior experience with and self-confidence in treating PHEs involving chemical, biologic, radiologic, nuclear, and explosive (CBRNE) weapons. The response rate was approximately 30%. Of those who returned surveys, most reported having never seen nor treated a case involving a CBRNE agent, and therefore lacked confidence in their ability to diagnose or treat such cases. On the other hand, many reported a willingness to participate in state-led plans to manage such incidents despite the fact that almost half had not participated in any related training. Recognizing their skills deficiencies, several respondents expressed interest in participating in training as long as it was conducted in a manner that accommodated their time-constrained schedules (e.g., through small-group workshops or CD-ROM rather than participation in formal training courses.)

This assessment identified several issues requiring attention. At the most basic level, it was determined that health licensing boards were not maintaining accurate contact information for physicians, which was discovered when almost one-third of the surveys were responded undeliverable. Accurate contact information supports inclusive pre-disaster planning efforts and becomes even more critical during response and recovery efforts. It was also determined that little has been done to populate and maintain a roster of physicians with experience that would address the response and recovery needs of a PHE, most notably those involving CBRNE agents. In non-urban areas where health personnel are much more limited, the need for such a resource is pronounced. Thirdly, the non-urban physicians demonstrated little preference for web-based communication and likewise education on PHE management when compared to their urban counterparts. While it may only be the case that non-urban physicians are less responsive to Web-based surveys, it could also be that they avoid web-based communication channels including when used for risk communication. A fourth finding indicated that all health care providers, not only those who are physicians, are likely to face these limitations in terms of experience with certain PHE-related issues.

Lessons
- Urban and non-urban public health professionals may differ significantly with regards to PHE preparedness.
- Even those practitioners with some PHE preparedness may have little to no direct past experience in managing the response and recovery needs of a PHE.
- Assessments that seek to identify PHE training needs should also consider communication preferences including communications channels, methods, and communicators.

- Non-urban physicians may be willing to participate in regional response plans. However, planners should evaluate which communication methods are most appropriate given the practitioners' preferences.

Source: Hsu, C.E., F. S. Mas, H. Jacobson, R. Papenfuss, E. T. Nkhoma, and J. Zoretic. 2005. Assessing the Readiness and Training Needs of Non-Urban Physicians in Public Health Emergency and Response. Disaster Management and Response. V.3. N.4. Pp. 106-111. http://bit.ly/2qtNvD5.

Case 5: Initiating an Information System for PHE Response, China

It is believed that the SARS outbreak first began in China. Due to a lack of awareness of and knowledge about this pathogen, many healthcare workers in China became infected in the course of treating their patients. This occurred on account of several factors including inadequacy of detection systems, insufficient knowledge about the pathogen itself, and deficient personnel protection protocols. Many workers' family members were subsequently infected, and the disease ultimately spread throughout Asia and elsewhere in the world at a surprisingly rapid pace. By the time the outbreak had been brought under control, 8,445 cases were reported worldwide. Of these, 5,327 (63%) occurred in China. After-action reporting found that the lack of any coordinated system or scheme by which information could easily be shared among national and international partners had greatly hampered containment efforts.

China ultimately utilized a number of public health interventions to bring the SARS outbreak under control. However, the initial confusion surrounding the disease was problematic, and this resulted in spreading over much wider geographic ranges. Information management weaknesses were exposed as a result of these problems, specifically with regards to surveillance, information collection, contact tracing, and reporting. There was also very little centralization of information, and that which did occur did not happen in a timely manner.

The management of infectious disease outbreaks requires dedicated preparedness planning, vigilance of the public health system, strong national and international disease surveillance mechanisms, and effective interdisciplinary partnerships. Information is key to each of these components, and information technology can be utilized to enhance the management and sharing of information before, during, and after an outbreak has occurred. Following the 2003 SARS outbreak, the Government of China sought to strengthen its PHE response capabilities by developing a Public Health Emergency Response Information System (PHERIS) that better facilitated disease surveillance, detection, reporting, and response. The project, which was completed in 2005, included three phases:

1. Fully containing the SARS outbreak and ensuring that the lessons thereof were captured in order to better the requirements of a national public health information system. Because a SARS-specific web-based information system had been created during the outbreak, there was much to draw from that experience.

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2. Build a national computer network infrastructure capable of supporting public health data exchange, and establish a disease surveillance system that enabled online reporting for all health emergencies. A network was constructed that connected health administrative agencies, CDCs, and health care organizations at the national, province, city, county, and village levels. In addition to allowing for reporting, this system provided a knowledge platform for sharing of information among all health sector providers.
3. Implement information sharing and coordination among relevant organizations so that future public health emergencies are handled more efficiently and effectively.

Development of the information network required establishment of both the underlying infrastructure and the software and systems to enable effective systems operation. Localities are able to connect using a multitude of methods, including fiber optic cables, digital microwave, satellite communication, cellular data, and landline dial-up.

The PHERIS system is now operational, and includes four major components. These include:

1. A surveillance system that enables recognition of public health emergencies;
2. A command center where emerging threats are assessed, from which alerts are issued, and where decisions are made;
3. An action system by which Command Center orders are operationalized; and
4. A supporting system that helps to ensure each of these processes and activities are properly undertaken.

With such a system in place, the likelihood that emerging threats are identified and addressed early in the outbreak is increased. As such, future outbreaks may be much more limited in their scope, and public health staff may be better informed of personal protective measures they must take in order to protect the system of response itself.

Lessons
- Poor information sharing puts health sector workers at unnecessary risk.
- Information management can benefit greatly from a nationally-coordinated information technology solution.
- Support systems that focus on the effective operation of information management systems can increase their efficacy.
- Particular attention should be paid to developing countries that have relatively fewer resources to deal with public health emergencies.

1.2 Managing Chronic Diseases and Controlling Epidemics

Individuals suffering from a chronic diseases or conditions (e.g., asthma, diabetes, renal failure, cancer, and HIV) are among the most vulnerable populations during and even long after the occurrence of a major disaster event. A loss of access to treatments, medications, or specialized care upon which these individuals depend can easily lead to life-threatening conditions. Disasters often impact access to health care when there is damage to or loss of public health infrastructure and facilities (including access to those facilities, regardless of whether the facilities themselves have been affected), a loss of health professional and support personnel, or a loss or depletion of medical supplies and/or pharmaceutical stocks. Because the loss of treatment or care options so quickly and acutely translates to grave secondary impacts for members of this and other vulnerable groups, maintained access throughout all recovery phases is paramount to limiting the disease-related mortality of the greater disaster-affected population.

Infectious disease outbreaks, which may be locally-based or part of a larger epidemic or pandemic, are particularly threatening following a disaster and are likewise influenced by the condition and capacity of health and medical infrastructure. Under normal conditions, effective disease control and prevention requires a robust infrastructure generally consisting of trained professionals, surveillance and detection protocols, information collection and dissemination systems, adequate testing and treatment facilities, public communication capabilities, and many other factors. Disasters can disrupt any or all of these, increasing risk from new and existing pathogenic threats in the process. Common post-disaster conditions include poor access to hygiene, dense living quarters, exposure to the elements, elevated psychological stress, unhygienic food storage and preparation, all of which can further exacerbate disease transmission. Fatalities linked to post-disaster illness and a lack of access to healthcare may even become a greater threat to health and life than the first-order exposure to the causative hazard itself (e.g., drowning, trauma, suffocation).

Planning Questions and Considerations
➢ What are the day-to-day dependencies of medically vulnerable populations?
➢ What measures, if any, have been taken to increase the resilience of facilities and resources upon which those with chronic diseases or conditions depend for their survival?
➢ Are there backup resources either within or outside the planning area that can be tapped to replace or support damaged or destroyed health infrastructure (e.g., mobile dialysis units).
➢ Do stockpiles of supplies and medications allow for surge-demand, or are they more closely matched to day-to-day non-disaster needs?
➢ Are systems in place to provide supportive care to those with chronic diseases or conditions in temporary, interim, or transitional shelter? Is there a means for identifying and tracking such needs following a disaster-related disruption of the affected population?

> ➢ Do recovery plans prioritize the resumption or introduction of measures that enable the identification and resolution of conditions that contribute to disease transmission, including vector control, monitoring of nutrition and hydration sources, and collection and disposal or treatment of human waste?

Case Studies

Case 6: Clinical Decision Support System (CDSS), Chinese Taipei

In a non-disaster setting, individuals face a wide spectrum of injuries and illnesses that require intervention by a health professional. These interventions seek to reduce the morbidity and mortality and produce more positive outcomes for the population served in terms of life expectancy and quality of life. Key to these interventions is the controlled clinical setting in which informed decision making is possible, most notably with regards to access to patient history and the doctor-patient relationship. Moreover, it is the ability to detect deterioration in health or other underlying conditions, both of which are often enabled by the presence of a previously-established baseline, that is critical to positive outcomes.

In times of disaster, including the period of long-term recovery when health facilities have been impacted or when populations have been disrupted, these established systems which support decision-making are often unavailable or inadequate. Health professionals may be making decisions based on very little baseline data and may therefore find themselves unable to recognize whether a condition is one of deterioration, improvement, or something else altogether. Even moderately-impacted medical capacity is therefore diminished in its efficacy, including those situations where impacted populations are relocated out of impacted areas.

Researchers in Taiwan have developed a decision-making support system that uses statistical models and analysis to improve practitioner capabilities in light of incomplete information. The Clinical Decision Support System (CDSS) is based on a software system that systematically integrates expert opinions and sampling information in order to furnish decision-makers with the support they need to make higher-quality clinical decisions. The system provides practitioners with patient-specific assessments or recommendations to help them make treatment decisions. CDSS is an interactive system that consists of three major components: a dialog subsystem, a database subsystem, and a model base subsystem. The system itself puts the data entered into models and provides method options. The decision-maker manipulates the models and data in order to examine various scenarios and their consequences. Information inputs include:

1. *Prior information, including*:
   a. Lifetime: the expected lifetime of the subject.
   b. Initial date: the birthdate.

    c.   Decision time: the actual time for decision makers to make the decision of whether maintaining the status quo or undertaking a risk reduction action.

    d.   Cost of failure: the cost or loss once the failure actually occurs.

    e.   Cost of risk reduction action: the cost for undertaking the risk reduction action.

    f.   Risk reduction factor: the fraction of the original function of the physiological system that the risk reduction action can retrieve.

    g.   Cost of collecting information: the cost of collecting the failure data.

    h.   E {Scale Factor}: the expected value of the initial factor.

    i.   SD {Scale Factor}: the standard deviation of the initial factor.

    j.   E {Deterioration Rate}: the expected value of the deterioration rate.

    k.   SD {Deterioration Rate}: the standard deviation of the deterioration rate.

2. *Sampling information*: The sampling information is for inputting the observed failure data.

3. *Decision*: The decision part provides the optimal decisions that are suggested by the CDSS.

In addition to allowing for the input of information, CDSS is able to notify the decision-maker when collecting additional information is no longer desirable or necessary (e.g., it would not change the expected outcome).

Lessons

- A lack of patients' historical data and case histories will impede health workers' decision-making capabilities.
- Information is valued in terms of the degree to which it can reduce the uncertainty surrounding clinically-based decision-making. The costs of uncertainty are measured according to the probability that a treatment based on existing information will be wrong and by the consequences of an incorrect decision.
- It is possible to support post-disaster decision-making in the clinical setting by providing decision-analysis tools.

Case 7: Tracking Medical Prescriptions through Okusuritecho, Japan

Following the 2011 Great East Japan Earthquake, affected members of the population with medical conditions experienced great difficulty in finding access to necessary health services and facilities. The primary obstacles to their efforts included physical separation from their provider or the needed resources (e.g., due to evacuation), limited availability of pharmaceutical supplies, and an inability to travel to their

hospital of choice due to lack of access to a car or other vehicle, or because access was blocked due to roadway damage.

In Japan, there is a long-standing practice by which physicians and pharmacists record patients' treatment and other health information in a notebook that is provided to and maintained by the patient. This *Okusuri-techo,* as it is called, is a personal medical history journal. Patient information is therefore maintained by the patients themselves, and may be taken to any medical visit to help the doctor or pharmacist better understand the nature and progress of current and past treatments, the kinds of medicines the patient has had in the past, and quantity of medicine that is needed.

Following the Earthquake, the Okusuri-techo tradition had the effect of replacing much of the patient information that had been lost when clinics were damaged or destroyed. By serving as a redundant source of medical information, even those patients that were evacuated to an area where they were unable to meet with their regular physician or facility were able to receive informed medical care. Additionally, health professionals that arrived from outside the impacted area to support the ongoing response and recovery were able to access patients' journals and immediately understand their medical history and the progress of past and ongoing treatment.

Use of these journals among the population is widespread because there no added cost to the patient (costs are included in basic dispensing or medical fees).

Lessons
- Patients with chronic diseases or conditions will suffer if their health information is lost or becomes inaccessible following a disaster event.
- Outside health staff that travel to the impacted area will have better success in treating patients if they have the patients' medical histories to base or validate their treatments.
- Instituting a system of patient maintenance of medical records not only establishes information redundancy, it enables patients to manage their own medical information needs in times of disaster when they may need to travel far from their standard health provider or when their standard health provider is inaccessible.

Source: Japan Pharmaceutical Association. 2012. Case Study on the Usage of Okusuritecho during the 2011 Great East Japan Earthquake. June. http://bit.ly/2C5tYLS. (In Japanese); Immuno-Corporation. 2013. Pharmacy Business. http://bit.ly/2kVDFoM.

Case 8: Chronic Disease Management Following Hurricane Katrina, USA

Prior to Hurricane Katrina striking in 2005, health preparedness and response models were focused on the perception that bioterrorism was the primary threat to public safety. As such, mass-casualty response was emphasized, and this translated to a focus on tertiary health care (Emergency departments and hospitals) over standard

clinical public health facilities. Following the hurricane, continuity in the provision of care for patients suffering from chronic diseases or conditions, especially those who were evacuated, became a major challenge. It was estimated at the time that between as many as 74% of the population had one or more diagnosed chronic illness. These cases relied not on tertiary care, but rather on primary care facilities and systems to meet their needs. As such, it was determined that the community health center (CHC) infrastructure, which provides health care to the under or uninsured in the area that was impacted, became the cornerstone of health response and recovery among those with chronic health problems.

Following Hurricane Katrina, many of the CHCs were severely damaged or destroyed. Many had disaster preparedness plans in place, which were regularly updated and exercised. However, these plans were found to have only rarely included provisions for managing surges of patients seeking treatment or care of chronic diseases or conditions. Examples of the types of conditions that presented following the disaster that overwhelmed these facilities include: mental health issues, diabetes mellitus, hypertension, respiratory illness, end-stage renal disease, cardiovascular disease, and cancer.

Lessons
After-action reports identified a number of strategies that had proven effective in managing the post-disaster management of patients suffering from chronic diseases or conditions. These actions were grouped according to whether they have pre- or post-disaster implications, and include:

Pre-disaster
- Patient education and preparedness: Basic safety information; awareness of health care options; location of shelters; improved health literacy regarding medications; communication regarding stocking special dietary needs and medications
- Evacuation: Communication regarding contents of evacuation "Kit," including medications; transportation options for the indigent; plan for special populations (e.g., dialysis, nursing home); culturally and linguistically appropriate public announcements
- Special needs shelters: Widely distribute location and requirements; pre-register patients; train staff and hold drills
- Health care provider and organization preparedness: Back up medical records; stockpile necessary supplies; ensure communication capabilities within and between organizations post-disaster; address health care staff needs, as they are personally under duress; develop strong local networks across institutions responsible for disaster response and recovery, health care support institutions (e.g., pharmacies) and community-based support and relief organizations

Post-disaster
- Provider-patient communication: Collect multiple means of emergency patient contact information, including one contact outside the local area; record patient disaster plans (e.g., where they might seek shelter); use multiple media outlets (e.g., TV, radio, internet) to disseminate information both pre- and post-disaster; establish a toll-free number outside the local area for patient use; train staff on the use of emergency communication devices and on their expected role in disaster through frequent drills; disseminate medical/medication information at basic needs distribution points
- Volunteer coordination: Maintain registry of volunteers and match them with local entities (conducted at designated local entity charged with medical relief); ensure timely credentialing of healthcare volunteers and waive or reduce fees
- Management of donations: Funnel medications and medical supplies through designated local entity charged with medical relief; improve communications between donors and local groups (when possible, pre-disaster); discourage sending of expired medications; utilize local networks to share surpluses

Source: Arrieta, Martha I., Rachel D. Foreman, Errol D. Crook, and Marjorie L. Icenogle. 2008. Insuring Continuity of Care for Chronic Diseases Patients After a Disaster: Key Preparedness Elements. American Journal of Medical Science. August. Pp. 128-133. http://bit.ly/2pBB834.

1.3 Early Initiation of Heath Sector Recovery

Among the greatest challenges that are faced by health sector professionals as relief transitions to recovery is the length of the transition itself. An extended period of response can severely impede the much-needed rapid resumption of public health services. Planners can nonetheless address many of the longer-term recovery needs during the early recovery phase by strategically timing the introduction of key recovery initiatives such that the process becomes a phased one. While it is important to address immediate health-related needs early after response has begun, other activities may also be undertaken with the aim to restore health services to or ideally to improve them beyond their previous status. While large-scale reconstruction and development programs may be delayed for some time, health and other components of critical infrastructure can and should lead the redevelopment process given they represent the core of wraparound services upon which long-term recovery success is built. Cognizance of disaster risk reduction and resilience initiatives, opportunities for modernization, expansion of service reach, and other factors can all benefit from a concerted intersectoral effort to prioritize planning on these defined critical infrastructures. Pre-disaster recovery planning efforts will contribute greatly to any reductions in recovery delays that are achieved. Early recovery activities in the health sector will prepare the community for other aspects of economic and social resilience, and will help to define the manner in which future development occurs.

Planning Questions and Considerations

➢ Are future (long-term) health sector needs incorporated into present-day recovery and reconstruction plans?

➢ How can reconstruction address pre-existing health sector deficiencies (e.g., health professional shortages, quality of equipment and services, geographic access to the population served)?

➢ How can recovery of the health sector best be integrated with recovery in other sectors, such as energy or transportation, to improve overall health and medical care for the populations served?

Case Studies

Case 9: Analyzing Policy Processes in Health Care Recovery, South Sudan

Southern Sudan's post-colonial history is characterized by decades of civil conflict that have claimed some two million lives and displaced more than four million people. In 2002, however, peace negotiations between the Government of Sudan (GoS) and the Sudan People's Liberation Army/Movement (SPLA/M) led to a Comprehensive Peace Agreement (CPA) that was signed on January 9, 2005. The CPA established a complex institutional framework for the government inclusive of the creation of a semi-autonomous region in the south administered by the Government of Southern Sudan (GoSS). Among these new responsibilities was administration of social services. Despite a disruption in the peace process that started when SPLA/M leader John Garang was killed in a helicopter crash on July 30, 2005, the GoSS was formally established in October of that same year. Ongoing political events, including the parallel crisis in Darfur, unclear management of oil revenues, repeated violations of the CPA, and a slow start to recovery activities, have repetitively threatened success of the peace process. From a health perspective, the stunting of development efforts has had a stifling effect, leaving Southern Sudan among the most disadvantaged countries in the world. Maternal mortality is 1,700 deaths per 100,000 live births; child mortality is 250 deaths per 1,000 live births; life expectancy is 42 years; only 6% of births are attended by skilled health personnel, and access to vaccines is minimal.

The WHO health system model was used to analyze post-conflict reconstruction of the health sector. This system works by identifying and assessing stewardship, financing, resource generation, and service provision as key health system functions. In addition to seeking reductions in morbidity and mortality through the expansion of essential health services coverage, responding to the needs of beneficiaries, and ensuring an equitable financial contribution system, the health sector reconstruction process in southern Sudan aims to contribute to the broader peacebuilding efforts of the UN and its partners. In fact, the role that of social services play in peacebuilding efforts was explicitly highlighted in the UN-led "Sudan Unified Mission Plan." This plan stated that the people of Sudan would "need to see a lasting peace dividend quickly, with the provision of basic social services (including water, health and education) . . ." in order to achieve wider development goals, (UN, 2006, p. 57).

The Plan highlighted a number of building blocks that may be used to drive early and effective recovery in the health sector. These include:

- S*tewardship*: A quintessential function of government authorities, stewardship refers to leadership of the health system with regard to establishment of its overarching objectives, policies, strategies and regulations, as well as monitoring and evaluation. This was of critical importance in South Sudan as there existed no legitimate government authority. However, the function of stewardship can be lost or pooled among multiple stakeholders.
- *Financing and generation of resources*: A health system needs a supply of human resources, infrastructure, and drugs.
- *Service delivery*: Similar to other post-conflict settings, southern Sudan opted to contract out the bulk of service provision to NGOs. Contracting out, although debated can enhance the efficiency and equity of service provision.

Lessons
- Health sector recovery must be initiated and progress maintained even in the presence of confounding factors and/or setbacks given the profound implications of failing or nonexistent health resources on the populations served.
- Sustained investment in both the assessment and planning of recovery activities is key to recovery success. This can be achieved through several means including early initiation of procurement capacity, instituting funding instruments able to quickly disburse resources; and streamlining the governance structures and procedures adopted by health recovery financing mechanisms (and adapting them to the local context).
- Context, actors and processes have a strong influence on policy outcomes, as do interactions between key institutions.

Source: Cometto, Giorgio, Gyuri Fritsche, and Egbert Sondorp. 2010. Health Sector Recovery in Early Post-Conflict Environments: Experience from Southern Sudan. Disasters. 34(4): 885–909. Oxford. http://bit.ly/2pBGOKp.

Case 10: Health System Recovery Through Early Recovery Cluster, Philippines

The Philippines was struck by super-typhoon Haiyan (also called Yolanda) in 2013. The storm caused widespread coastal flooding throughout 41 provinces, resulting in the death of over 6,300 people and reports of over 1,000 more that remain missing. The Government of the Philippines made a disaster declaration on November 11, 2013, three days after the event began.

In order to best address the coordination of international response and recovery assistance, the Government of the Philippines adopted the United Nations cluster system. The Philippines Department of Health (DOH) assumed lead-agency status for

the Health cluster, with the WHO serving as co-lead. A National Emergency Health cluster activated during early response was replaced by the Health Sector Rehabilitation and Reconstruction Coordination Group (HeRRC) Group in May of 2014, about six months post impact. The HeRRC Group reported to the DOH through the Disaster Management and Rehabilitation Taskforce for Yolanda. Through this taskforce, DOH participated in several recovery clusters organized under a newly-formed Office of the Presidential Assistant for Rehabilitation and Recovery (OPARR), and these include infrastructure, resettlement, and social services. HeRRC served to increase coordination between the various health sector stakeholders and the overall rehabilitation effort that was ongoing.

The Philippine National Disaster Risk Reduction and Management Plan recognizes the overlap between response and recovery efforts. In the case of Haiyan, this period of overlap lasted from February until July of 2014. Just one month after the initial declaration, however, OPARR was established, thereby initiating official recovery planning and coordination efforts. With this organizational structure established, the international community was much better able to initiate recovery transition efforts, and in fact many in the international humanitarian community felt that transition occurred in earnest as early as February of 2014 despite that the Government of the Philippines did not transition officially until July of that year. This high degree of coordination is partially credited with enabling the national emergency response health cluster to transition into the Health Sector Rehabilitation and Reconstruction Coordination Group.

There are several indicators that highlight the benefits gained through a smooth and early transition from response to recovery following Haiyan. For example, many nongovernmental organizations demobilized and departed relatively early because local authorities had reassumed the delivery of health services. This transfer occurred as early as the fourth month of recovery, at which point the number of functional health facilities had increased. An increase in local health capacity attained through the provision of training and long-term health programming had also contributed to this early and effective transition. An IASC evaluation later found that this transition contributed to several positive outcomes, including a shift in the victim's needs from relief to early recovery; the implementation of program approaches that better accommodate longer-term recovery versus shorter-term relief needs; and the early demobilization of structures and systems focused on response, including the closure of response clusters. The transition process was not without fault, however, and it was noted that the rapid nature of the process created tension between international and government health workers.

Lessons
- Recovery activities may begin immediately after a disaster. However, the official transition from response to recovery is important and the ability of participating stakeholders to perform this transition effectively and at the

- most appropriate time can positively or negatively impact the recovery activities that follow.
- Transition from response to recovery can create tension between international and domestic workers, especially in the health sector, because it is common for health workers to develop strong sentiments of responsibility for the still-affected population.
- Because health sector activities and outcomes are so deeply intertwined with other recovery sectors, there is great benefit to be gained by involving representatives from the governmental health authority in other recovery sector coordination groups (clusters or otherwise).

Source: WRPO. 2013. Rebuilding Health System in Areas Hit by Yolanda Key to Region's Recovery. WHO Website. http://bit.ly/2q7lsro.; Gocotano, Allison, Lester Sam Geroy, Ma Rowena Alcido, Miguel Manuel Dorotan, Gloria Balboa, and Julie Lyn Hall. 2015. Is the Response Over? The Transition from Response to Recovery in the Health Sector Post-Haiyan. Western Pac Surveill Response Journal. Oct-Dec. 6(Suppl 1). Pp. 5-9. http://bit.ly/2r5T7PE.

Case 11: Anticipating Water and Sanitation Needs, Sri Lanka

Context: The 2004 Indian Ocean Tsunami (26 December) remains the most devastating natural disaster to affect Sri Lanka. A series of tsunami waves struck 13 of the country's 15 coastal districts. Of the countries affected in this event, Sri Lanka was among the most heavily impacted with almost 32,000 people confirmed dead and over 21,000 injured. Water supplies and sanitation systems were heavily disrupted by the coastal flooding that occurred. The initial and urgent need to provide potable water and reliable sanitation systems to the internally-displaced persons that had moved to temporary camps did not subsist when these same individuals moved into transitional facilities. This need persisted for months, only to begin anew when the transition to more permanent sites for resettlement began.

After-action reporting found that there were many challenges encountered in establishing the provision of water and sanitation in the different phases of recovery. A lack of established solutions to what amounted to recurrent issues was key among the problems cited. Ultimately, it was the coordinated effort of governmental and non-governmental organizations that led to a positive outcome, but the process was not without fault and it was noted that having plans in place prior to the disaster that could have anticipated and perhaps guided the necessary provision of water and sanitation resources in facilities more effectively. For instance, it was found that prioritization of programs focused on well cleaning in the vicinity of temporary and transitional camps can be an effective way to reduce the need for tanker supply services. Many of the internally displaced persons were able to limit their use of tanker water for drinking and cooking by using well water for other purposes. Effective management of sanitation needs was a major challenge that could have been better managed through anticipatory planning. Many camps had far too few toilets to meet the needs of the populations housed on site, which resulted in significant risk to health. The situation was ultimately managed by increasing the rate

at which septic tanks were emptied using gully tankers. NGOs provided movable temporary toilets to further alleviate the unmet needs. Programs focused on hygiene education by health authorities and garbage removal through local government and NGO partnership also contributed to managing needs and limiting disease transmission. It should be noted that in spite of the high number of fatalities directly associated with the tsunami itself, not a single death was attributed to water-borne diseases in the recovery period that followed.

In the three-year period that followed the event, the Government of Sri Lanka addressed the challenges that had been noted by taking the following actions:

- Developed an emergency preparedness plan for each district.
- Establishing special Ministries for Disaster Management and Resettlement of internally displaced persons.

Lessons
- The transition from response to recovery must be methodical and well-coordinated in order to promote sustainability.
- The existence of an emergency preparedness plan helps to greatly increase the effectiveness of relief and early recovery efforts, and to ensure that there exist coordination mechanisms to guide the efforts of those involved.
- Pre-disaster recovery planning helps to speed up post-disaster recovery efforts in many areas inclusive of health sector recovery. Having good plans and strategies in place will increase the likelihood that NGO assistance and resources are properly utilized (and thus are not wasted).
- The government must play a central and immediate role in coordination of early recovery activities. Following this disaster, many early recovery activities were implemented with little to no coordination due to a lack of any such structure.
- Temporary water supply facilities should be increased to meet anticipated disaster needs. This might include any combination of water tankers, plastic tanks, small package treatment units, chemicals for disinfection, and others
- Low cost temporary sanitation systems can be introduced in an emergency situation, as well as in early recovery as transitions are occurring. Local authorities may be provided with gully tankers to avoid unnecessary sanitation-based health crises.
- Widespread knowledge among response and recovery officials about health and hygiene can greatly limit or even fully prevent illness and death from water-borne diseases.

Source: Fernando, W. B. G., A. H. Gunapala, and W. A. Jayantha. 2008. Water Supply and Sanitation Needs in a Disaster: Lessons Learned Through the Tsunami Disaster in Sri Lanka. Desalination. Vol 248, No 1-3. Pages 14-21. http://bit.ly/2q8PAST.

1.4 Universal Health Coverage (UHC) in Post-Disaster Phase

Access to quality health care including personal ability to afford such care is among the greatest of human needs. Despite the great importance of universal health coverage (UHC), it is an issue that is rarely addressed to an adequate degree (if at all) in the recovery planning process. This is particularly troubling as recovery often affords a unique if not rare opportunity to further strengthen health systems including towards provision of equitable or universal coverage. For the affected population, many of whom have seen their health either directly or indirectly impacted by the event, healthcare remains a principal need. Health problems can impede their ability to achieve recovery, whether due to an inability to return to work or to simply address their own or their dependents' needs. Without adequate coverage, their recovery outlook in all areas will decrease markedly. This is not to say that the achievement of UHC is a simple task that merely requires inclusion in a plan. However, the windows of opportunity for groundbreaking change that typically follow disasters may present the best likelihood of tangible progress in this area. UHC is known to contribute greatly to community resilience because a healthy and strong community relies on healthy and strong residents.

Planning Questions and Considerations
➢ Are gaps in healthcare among different population groups known?
➢ Do pre- and post-disaster recovery plans consider how the transition from response to recovery will impact access to health care among the impacted population?
➢ How can public-private partnerships contribute to the advancement of UHC through disaster recovery planning?
➢ What obstacles stand in the way of comprehensive healthcare reform, and how might a disaster help to alleviate such obstacles?

Case Studies

Case 12: Mandating UHC as Basic Human Right under the Constitution, Nepal

Nepal was struck by a massive earthquake in 2015. The Government of Nepal used this event, which was the worst natural disaster to befall the country in more than 80 years, to draft a new constitution. Under this new authority, access to basic health coverage was deemed a fundamental human right. The actions that have been taken to incorporate such language in the constitution itself has been viewed as the beginning of progress towards Universal Health Coverage (UHC) in Nepal.

The nation's new constitution instituted a democratic federal republic governmental structure, and divided the country's land area into seven administrative provinces. Doing such creates both advantages and disadvantages in the UHC pursuit. While federalism is likely to decentralize efforts, thereby fostering greater local accountability and credibility, it also threatens to create inequity among the provinces

according to distribution of wealth. When it comes to quality of healthcare, economic divides can mean diminished access to and quality of healthcare for more impoverished people. A second issue relates to the delivery of health care itself. Prior to release of the new constitution, facility-based health coverage was the norm, however Nepal aims to adopt a population- and community-based approach. This may have the effect of bringing healthcare closer to the recipients themselves and thus improve upon the former approach; however, it may also result in some unintended negative outcomes such as the closure of poorly located health posts with few patients where remote and sparsely-populated communities will lose access to certain services.

A pilot of this new arrangement was conducted in Nepal's Dolakha Province, which included many of the areas that were most severely affected by the 2015 earthquake. The Nepalese Ministry of Health led the pilot with help from a nonprofit healthcare partner Possible. A then-year contract was signed between these two partners on January 19, 2016, and immediately afterwards methods were introduced that seek to further improve UHC access including such increased outpatient care, emergency care, surgical services, and the use of Electronic Health Records.

Lessons
- Major disasters may provide an opportunity to fundamentally overhaul a nation's healthcare system.
- Planners must be aware of unintended consequences of changing health care systems including the loss of access among vulnerable populations.

Source: Simkhada, Padam, Pramod R. Regmi, Puspa Raj Pant, Edwin van Teijilingen, and Brijesh Sathain. 2015. Stipulating Citizen's Fundamental Right to Healthcare: Inference from the Constitution of Federal Republic of Nepal 2015. Nepal Journal of Epidemiology. V. 5. No.4. Pp. 516-517. http://bit.ly/2r04RqG.

Case 13: Promoting UHC Through Public-Private Partnerships, Zambia

Zambia is a geographically large landlocked country that shares borders with eight other countries. These two aspects of its physical profile have major implications on the country's management of public health and the control and prevention of disease. Experience has shown that the health of its own population of 14 million people is likely to be affected by an epidemic in any of its neighboring countries. Coupled with regular influx of cross-border refugees, Zambia's health management is regionally-influenced. The vision behind Zambia's national health strategy is to enable a nation of healthy and productive people through the establishment of a health system that is based on the following principles:

- Primary health care
- Equity of access
- Affordability
- Cost effectiveness

- Accountability
- Partnerships
- Decentralization, and
- Leadership

The primary emphasis is on universal coverage, including convenient, equitable access to cost-effective and high-quality health services. In considering both emergent and longstanding trends in the socioeconomic and health sectors, strategy development has noted several factors as being highly influential on population health. Three of these are linked in a particularly close manner to many post-disaster recovery efforts, including:

- Environment: 80% of conditions that healthcare workers observe in their patients are related to poor water quality or supply, inadequate sanitation, inadequate food safety, problems related to housing conditions and related amenities, and climate change.
- Nutrition: Lack of access to healthy nutrition, including malnutrition, contributes to increased morbidity and mortality, and is a factor in as much as 52% of all deaths in children under 5 years of age. Stunting is present in 45% of children.
- Education and literacy: Poor quality of or access to education deprives individuals of the necessary knowledge and skills to effectively access and understand health information, including that which is relevant to healthy life choices and preventive health care. Literacy deficiencies can impact vulnerable populations to a greater extent, as is true in Zambia where only 64% of urban-dwelling women are literate (as compared to 82% of men.)

In order to better address healthcare deficiencies in the country, partnerships are being formed with private corporations, NGOs, and traditional health practitioners. An agreement between the Churches Health Association of Zambia (CHAZ) and the Government of Zambia is one example, established in order to enhance healthcare access. Church administered services like those provided by CHAZ are increasing, estimated at the present time to represent as much as 30% of all health services in Zambia (second only to the Zambian government).

The forming of partnerships does come with associated risk. For instance, there have been instances where policy changes made by partnering corporations or NGOs have resulted in the misalignment of expectations between the various partners. Sustainability has also been challenging, as private and NGO partners may struggle to collect the resources needed to administer their programs or facilities. In such cases, the government is not always able to continue the services that are interrupted.

Lessons
- Recovery offers an opportunity to better address many of the obstacles that prevent healthcare access

- Public–private partnerships can help to expand access to healthcare, especially in resource-constrained countries.
- The national government can provide leadership and guidance to its partners in both recovery and in non-disaster times.
- Private corporations are often willing to fill critical and commercially-viable gaps. These partnerships can increase healthcare options and alleviate healthcare facility, there by strengthening the efficiency and quality of services.

Source: National Academies of Sciences, Engineering, and Medicine. 2016. Approaches to Universal Health Coverage and Occupational Health and Safety for the Informal Workforce in Developing Countries. Workshop Summary. Washington, D.C. http://bit.ly/2pMOWXO

Case 14: Ensuring UHC Through Health Care Reform, China

Context: From 1950 to 1980, the Government of China provided basic health care to almost all citizens through a public health network and rural and urban health schemes. However, by 1980, the rural health scheme had collapsed and the urban health scheme was failing on account of increasing medical costs and the rising inefficiency of the state enterprises that provided the bulk of supporting funding. The weakened state of healthcare that resulted from these simmering problems became a major contributory factor in the 2003 SARS outbreak that so badly impacted the country. It was this event that galvanized public demand for an improved UHC scheme.

The Government of China released a blueprint for health system reform in 2009. This plan focused on improving health care quality and efficiency and consisted of four major sectors:

1. New rural cooperative medical schemes (NCMS);
2. Urban employee-based basic medical insurance scheme (UEBMI);
3. The urban resident-based basic medical insurance scheme (URBMI); and
4. A system ensuring the stable supplies and prices of drugs.

These four sectors are supported in a number of ways, including:
- An increase in government funding (especially for primary healthcare providers)
- The introduction of solid strategies and policies
- Human resources support
- Introduction of new regulations
- Information

These provisions vastly improved access to UHC in China, and by 2011 the NCMSs provided access and coverage for 97% for rural populations. As early as 2010, target population coverage for the UEBMI had reached 92%, while such coverage reached 93% for the URBMI. UHC establishment was attributed to several factors. The first of

these was that China had established UHC prior to becoming a high-income country. A second factor was that China had adopted a strategy of providing shallow yet widespread coverage before expanding across the greater national population. For instance, when the NCMS and UEBMI schemes were first introduced, they only covered in-patient needs, with out-patient services being added at a later time. Thirdly was the fact that there was very strong public support, including much needed funding, in order to drive UHC establishment forward. And finally, the Government of China capitalized on a number of social and political characteristics that are unique to the country in order to better promote UHC, including the introduction of subsidies and the delegation of financial and political responsibilities to local governments.

Lessons
- Strong social support is vital to UHC establishment.
- The government must introduce a UHC scheme that compliments the culture of its country and that is cognizant of the social and political context.
- UHC programs should closely track and adapt to urbanization and industrialization efforts.
- A gradual expansion may increase the success of implementation efforts.

Source: Hao, Yu. 2o15. Universal Health Insurance Coverage for 1.3 Billion People: What Accounts for China's Success? Health Policy. V. 119, No.9. September. Pp. 1145-1152.; http://bit.ly/2r7Fva9.; Meng, Qingyue and Shenglan Tang. 2010. Universal Coverage of Health Care in China: Challenges and Opportunities. World Health Report (2010). Background Paper 7. http://bit.ly/2qhyAKN.

Case 15: Providing Health Services for the Uninsured, Argentina

The 2001 economic crisis in Argentina led to a dramatic increase in the number of people living in poverty, resulting in greater inequality notably with regards to healthcare access. Several health indicators declined as a result, including those pertaining to child and maternal mortality, especially in the poorest geographic areas.

The Government of Argentina responded by implementing the Maternal-Child Health Insurance Program, which was called "Plan Nacer." This program sought to introduce changes to the national system of healthcare in order to increase coverage of basic services among the uninsured population and likewise to allow healthcare governance to become more efficient and effective. It focused on results-based financing at the national, provincial, and provider levels, linking funding to the achievement of three specific indicators:

1. Enrolment in the program
2. Effective delivery of priority health services, and
3. Health outcomes.

The program helped to strengthen much-needed national government stewardship in light of the decentralized arrangement that exists in the federalized system that exists in Argentina. Legally-binding contracts were established between the national

government and the provinces, and between the provinces and health service providers, in order to formalize the effort. The agreements include robust monitoring and evaluation, including external and internal audits and impact evaluation. Results from such evaluations of the program's initial years, which were conducted in two different provinces, are showing positive results including an increase in the probability that expectant mothers will seek their initial prenatal care visit prior to the thirteenth week of pregnancy. The number of prenatal visits also increased, and women benefited from an improved quality of care as measured by increases in the likelihood of vaccinations and ultrasounds. These improvements correlated with healthier births and an increase in average birth weight. Similar gains were also noted among children under the age of five, who were benefitting from an increase in the prevalence of well-baby checkups.

Lessons
- Drastic reforms are not always necessary for program success.
- Strategies for improving health indicators include the strategic use of financing to enroll and maintain contact with target populations, creating intergovernmental contracts that have built-in enforcement mechanisms, and the use of a results-based approach that provides incentives.
- Shifting from a traditional, input-based financing scheme to a results-based financing approach may help to increase access to basic health services and strengthen health system governance. This can be complemented by sound health information systems, monitoring and evaluation tools, clinical protocols, measures to increase program sustainability, standardization across all regions, equity across provinces, and establishment of a standardized priority-setting process that includes clinical and cost-effectiveness studies and social validation mechanisms.

Source: Cortez, Rafael and Daniela, Romero. 2013. Argentina – Increasing Utilization of Health Care Services Among the Uninsured Population: The Plan Nacer Program. The World Bank. UNICO Studies Series 12. http://bit.ly/2r7mAwc.

Preparing to Build Back Better towards a Healthier Community

Chapter

2

It is imperative that disaster-impacted countries apply the "Build Back Better" principle at every stage of recovery and reconstruction. Resilience is one component of this, and involves the incorporation of disaster risk reduction measures into the planning and design of physical and social restoration works, inclusive of those focused on health. Building back better also involves the improvement and modernization of existing conditions, which in the case of healthcare includes such things as improved access, expansion of facilities and services, greater use of technology, and other factors.

Disaster-impacted countries and communities are typically much better equipped to build back better if they have taken steps to strengthen their recovery capacity and decision-making effectiveness prior to the onset of disaster. This is encompassed by the pre-disaster recovery planning process, whereby planners not only consider solutions to recovery and reconstruction needs likely to arise but also look at ways that chronic community health concerns may be addressed in the post-disaster setting. The planning process may include assessment of health care capacities and challenges, strategies for long-term delivery of care (in the context of promoting community resilience), and options for financing. Planners must consider the impact that recovery actions will have on the efficiency and effectiveness of health system delivery at all nodes within the healthcare network whether publicly or privately managed.

Whether or not pre-disaster recovery planning has been conducted, planners must consider these same issues in their post-disaster planning efforts as well. Disasters can impact a nation's public health systems in a wide variety of ways, in each case impacting the provision of services and resources differently. Planners must consider the staff, facilities, funding, information, supplies, energy, transportation, and many other dependencies as they formulate the community's or the country's post-disaster outcomes.

Topics: Using PDNA and PCNA Tools for Recovery Planning; Promoting Community Resilience; Providing Psychosocial Support and Mental Health Services; and Ensuring Safe Hospitals and Infrastructures.

2.1 Using PDNA and PCNA Tools for Recovery Planning: Health

The involvement of many different stakeholders in the assessment process can lead to differing interpretations of what is needed, and thus divergent and perhaps opposing priorities for action. As the health sector represents a massive segment of the national economy and impact economic and social sectors differently, there is an acute need for wide representational input in the assessment process. Moreover, as it is rare that the desired trajectory for health sector recovery is to recreate what previously existed, proposals for fundamental change are the norm. Settling such differences can negatively impact basic health services delivery during the course of recovery at the exact time that health and medical needs among the affected population are greatest. It is in this context that the assessment of damages, losses, and needs occurs.

Post-Disaster Needs Assessment (PDNA) and Post-Crisis Needs Assessment (PCNA) are tools that support disaster-impacted governments in their planning efforts and the prioritization and resources that follows. PDNA and PCNA processes synthesize damage and loss assessments with assessments of human recovery needs. In the case of health sector recovery, impacts to the associated infrastructure and systems are very closely linked to the impacts sustained by the affected population. These processes are led and owned by the affected country's government, with the assistance of a multi-disciplinary, multi-agency team comprised of the World Bank, GFDRR, UN Agencies, regional IGOs, and other relevant stakeholders. Short, medium, and long-term recovery and reconstruction needs are addressed, as are opportunities to mainstream disaster risk reduction in the post-disaster recovery and reconstruction plans that follow.

Questions
- Who at the national and local levels will be involved in the assessment process, and who is responsible for undertaking those assessments within departments and organizations?
- Do communities have the necessary financial, human, and technical resources to ensure that health sector recovery is addressed in post-disaster assessments?
- Do assessment protocols address health-specific data and information requirements, or are they narrowly focused on immediate relief and response operations?
- Are the private and nonprofit sectors adequately integrated into and engaged with the assessment process?

Case Studies

Case 16: Using PDNA to Understand Health Data, Nigeria

Heavy rain caused flooding throughout Nigeria in 2012, resulting in 363 fatalities, 581 injuries, and a total of 3,891,314 people affected (of which 387,153 were displaced).

Public health was impacted in several ways, including widespread loss potable and sanitary water access, high-density conditions among those who were displaced, decreased access to health services, increased malnutrition, and an increase in the transmission of communicable diseases. A comprehensive needs assessment was required to fully grasp the situation such that planning for health sector recovery might be possible.

To address assessment needs, the Government of Nigeria initiated a PDNA in concert with partners in the international sector including the World Bank, the United Nations, and the European Union. The PDNA included a Human Recovery Needs Assessment. The assessment revealed that the flood event had not resulted in significant direct public health impacts despite the level of risk that had been posed. However, many people were affected by secondary impacts related to a decrease in availability of health services that resulted from overcrowding of health facilities, a lack of access to medicine, and increased costs of health services.

Early implementation of the PDNA contributed significantly to the effectiveness of recovery planning efforts. The sector-by-sector breakdown of flood damages afforded by the assessment enabled the Nigerian government to prioritize and focus recovery actions and goals, thereby limiting further public health impacts.

Lessons
- Sector-specific assessment data enables governments to speed up the decision-making process, and increases the effectiveness of those decisions relative to public health outcomes.
- Partnerships are essential to PDNA implementation.

Source: Saghir, Jamal. 2014. Assessing Post-Disaster Needs in Nigeria. The World Bank. Stories of Impact. http://bit.ly/2pNCebh.; Federal Government of Nigeria. 2013. Nigeria: Post-Disaster Needs Assessment 2012 Floods. http://bit.ly/2qhMH2G.

Case 17: Using PDNA to Enhance Recovery Planning Coordination, Nepal

The 2015 earthquake in Nepal caused considerable physical damage, including to the nation's public health and medical infrastructure. In addition to 8,702 people who were killed as a result of direct impact by the event, destruction of more than 400 public health facilities and 16 private health facilities further threatened the life and health of the affected population. The Nepal Ministry of Health, in conjunction with public health authorities at the local level, worked together to assess health sector needs and plan for long-term recovery.

Several PDNAs were conducted in the course of developing a comprehensive recovery strategy, several of which pertained to public health. The Nepalese Ministry of Health and Population led the effort focused on health needs, identifying a wide range of issues in the process. This effort included five states:

1. Creating scope of assessment (drafting project timeline, drafting scope of work, and identifying assessment toolkits)
2. Conducting field visits, led by senior officials from the Ministry of Health and Population, in the 14 most heavily-affected districts.
3. Performing data compilation, cleaning and analysis.
4. Estimating recovery needs (a process that involves quantifying the losses from the event with potential limitations due to assumptions that had to be made in the process)
5. Drafting, consulting on, and finalizing the report

Certain health issues merited dedicated PDNAs, such as one specific to tuberculosis conducted by the National Tuberculosis Center (NTC) in cooperation with health-focused organizations like WHO. This particular effort measured the damage sustained by tuberculosis prevention and treatment facilities and systems, and included a damage and loss assessment, a qualitative questionnaire, and the development of a recovery framework. While longer-term impacts of PDNA efforts are not yet known, the shorter-term benefits are already emerging including those associated with the NTC effort. For instance, the recovery from this and other issues is progressing in a more coordinated and credible manner, and the PDNA itself has provided a platform for cooperation between the Nepalese government and other IGOs engaged in recovery as ongoing reconstruction efforts progress.

Lessons
- Sector-specific PDNA can provide more detailed information as required for unique recovery topics.
- The product of the PDNA effort provides an effective platform for stakeholder cooperation.

Source: World Health Organization. 2015. Nepal Earthquake 2015. Reporting Period (3 July – 3 August). Health Cluster Bulletin #8. August 6. http://bit.ly/2qiYde1.

2.2 Promoting Community Resilience

The quality of public health and community resilience are intimately linked. Experience with past disaster events indicates that pre-disaster community health is closely correlated with the presence of a health crisis after the event (and the magnitude of such an event, if it occurs). Individuals in poor health or who have not taken necessary prophylactic measures typically face more severe consequences when health systems and facilities are disrupted than those who are healthy. Additionally, those with pre-existing conditions or who are in poor health often require more time and resources to address their health needs in the aftermath of a disaster. These individuals are dependent on one or more components of the public health system; therefore, vulnerability of that infrastructure equates to vulnerability of the individual. Interruption in the availability of chronic disease management services, for instance, may translate to increased illness or death among those who

depend on those services. Community resilience efforts that pursue measures to reduce the health sector impacts of disasters cannot alleviate health-related risks entirely, but they can greatly improve the expected health outcomes of both healthy individuals and those with chronic conditions or diseases.

There are other mechanisms by which community resilience pertaining to health may be increased as well. The promotion of healthy lives and lifestyles, for instance, helps decrease post-disaster health-specific needs, given individuals are much less likely to fall ill or stress already-strained health facilities. Education and training enables individuals and communities to further minimize post-disaster healthcare needs, thereby enabling the recovering health sector to focus on the most high-priority cases.

Questions
- ➢ What do the health indicators of the target population (of the health sector) suggest about the resilience of this group?
- ➢ Is healthy living promoted in the community, and do members of the community take steps to reduce their own reliance on the public health sector for treatment and/or survival?
- ➢ What impact would a loss of services, disaster-related or otherwise, have on the health and well-being of the population served?
- ➢ Has continuity of operations planning been performed by health sector facilities to ensure that service recipients' needs continue to be met in the event that the facility (or its supply chain) are impacted by a disaster or other precipitating event?

Case Studies

Case 18: Leveraging Community Contributions in Health Sector Recovery, USA

Following the 2009 H1N1 pandemic, local health departments in New Orleans, Louisiana, altered the manner in which public health emergencies are managed such that health sector resilience to future events is increased. Health sector resilience was first highlighted after the region was impacted by Hurricane Katrina in 2005. Facilities began partnering with community-based organizations when it became apparent in Katrina's aftermath that poor minority populations were suffering more significantly than those in other groups. The strong relationships these CBOs had established with their target audiences provided an effective means by which health risk and emergency information was more effectively distributed during disasters, and it helped to ensure the needs of these same individuals were reflected in any response and recovery plans that were generated.

When H1N1 struck, a New Orleans public health agency began working with city government officials to spread vital information and improve vaccine access in diverse communities. Together with CBOs this agency was able to produce more culturally-appropriate messages and secure access to more effective venues (e.g., local

churches) for prophylactic treatment (e.g., vaccination clinics). In another community, public health officials worked with vaccination clinics, homeless clinics, social clubs, and other community groups in order to better understand the communication preferences of community members to better share health-related information.

Health sector vulnerability at the community level was found to be highly-dependent, in part, on the concerns of local health departments (e.g., the number of full-time employees (FTEs) available to conduct outreach and build partnerships). The link between their resilience and that of the individuals they serve was measured using a model for public health system performance that included the following elements:

- The Macro-Level Environment (social, cultural, economic, and political forces that directly or indirectly influence the existence and functioning of the public health system)
- Mission (goals of the public health system and how they are operationalized)
- Structural Capacity (informational, organizational, physical, human, and fiscal resources that fuel public health practice)
- Processes and Outputs (modes of identifying and prioritizing population health issues as well as designing, executing, and evaluating interventions to address them)
- Outcomes (short- and long-term changes in population health)

This framework can be used to measure the performance of an entire public health system, a specific organization, or an individual intervention, specifically looking at the following:

- External triggers that motivate local health departments and the community to engage
- Organizational culture that validates and prioritizes community collaboration
- Material resources that procure time, place, and people for interaction
- Community partners who welcome the chance to team up

Lessons
- Communities can increase the resilience of individual community members by making long-term investments in community engagement
- Public health organizations can partner with community organizations in order to identify and address health sector vulnerabilities
- Collaboration can alleviate system stresses associated with budgetary restrictions

Source: Schoch-Spana, M., T.K. Sell, and R. Morhard. 2013. Local Health Department Capacity for Community Engagement and its Implications for Disaster Resilience. Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science. V.11, N.2. Pp. 118-129. http://bit.ly/2r85Ipe

Case 19: Initiating Community Partnership Projects, Australia

The Government of Australia Attorney General initiated eight "Jurisdictional Community Partnership Projects" between 2006 and 2010 in order to increase citizen disaster resilience among culturally and linguistically diverse (CALD) communities. Projects focused on building partnership initiatives empower individuals and diverse populations to take responsibility and make choices that are collective in their resilience benefits for the nation as a whole. Concurrent efforts were undertaken to gain insight into the cultural and linguistic variables that contribute to community disaster vulnerability and to identify opportunities to draw on the wealth of relevant experience and skills these communities possess. Projects were locally based and involved community consultation and educational activities developed through the partnerships that had been created (between emergency management organizations and CALD communities). New relationships and linkages emerged from these projects, many of which continue to build community awareness and disaster resilience through knowledge sharing, mutual understanding, greater volunteerism and participation, and increased interaction they foster.

Assessment of these partnerships found that the success of CALD community engagement was typically contingent on public sector partners taking the following actions:

- Allocating resources and developing systems and skills to engage with communities
- Developing partnerships with communities in order to gain community input into the development, implementation and review of policies, programs and services
- Providing information and support in ways that are culturally appropriate
- Evaluating outcomes and providing feedback to communities

Lessons
- Projects focused on improving the partnerships that exist between the public sector and diverse communities can help lay the foundation for sector-specific resilience efforts.
- Incorporating multicultural profiles into organizational processes and workplace culture promotes the public sector values of excellence, professionalism, innovation and respect.

Source: Government of Western Australia. 2014. Engaging Culturally and Linguistically Diverse Communities: A guide for the Western Australia Public Sector. Department of Local Government and Communities; Office of Multicultural Interests. July. http://bit.ly/2qIUWJ9.; Council of Australian Governments. 2011. National Strategy for Disaster Resilience. Commonwealth of Australia. http://bit.ly/2rgZIqx.

2.3 Supporting Psychosocial and Mental Health Services

Community and individual health is greatly influenced by the psychosocial and mental health of the affected population. Disasters can have profound detrimental impacts on people for a number of reasons including the loss of a family member or friend, exposure to terrifying circumstances (including near-death experiences), a lost sense of security (oftentimes resulting from displacement), and other factors. Fear, panic, anger, disorientation, and other emotions and senses are all symptoms of the collectively-termed "post-traumatic stress disorder (PTSD)" that is common among disaster victims. While treatment of PTSD and other psychosocial and mental health needs is the topic of another guidance note (IRP Recovery Guidance Note: Psychosocial), health sector recovery is directly supportive of efforts to repair and replace the infrastructure (facilities, practitioners, supplies, etc.) upon which these services depend. Moreover, the quality and resilience of the health sector itself has a significant influence over the tendency of impacted individuals to suffer from PTSD and other related effects following a disaster, as do the conditions that exist in its aftermath. Psychosocial support following disasters is often a very long-term endeavor that is interlinked with many other recovery sectors, most notably that of the health sector that provides the foundation for support. Pre- and post-disaster recovery planning efforts alike must therefore consider how health sector recovery enables and likewise improves the outcomes of psychosocial and mental health recovery.

Questions
- Are there networks or associations through which partnerships with the mental health practitioner community may be formed?
- Do resources exist to support planning for psychosocial recovery among relevant stakeholders in the community (e.g., K-12 schools, NGOs serving vulnerable populations, government social services offices)?
- Has recovery planning involved the mental health practitioner community in pre- and post-disaster recovery planning?
- Is psychosocial recovery considered in response and recovery assessment protocols?
- Are there additional members of the community that may be tapped and likewise trained to support psychosocial recovery activities?

Case Studies

Case 20: Delivering a Community Based Integrated MHPSS, Haiti

Context: Following the 2010 earthquake in Haiti there existed widespread mental health and psychosocial support (MHPSS) needs among the affected population. Victims affected by PTSD suffered a range of effects including depression, anxiety, and an increased propensity towards committing acts of violence (including to their own family members). Prior to the earthquake, access to mental health services was already in very short supply given that there existed only 0.2 psychiatrists and 0.04

psychologists per 100,000 people. Rural populations had almost no access given that most mental health providers were based in the capital Port-au-Prince. Those of lower educational and economic status typically used the services of traditional practitioners for their mental health needs, including herbalists and voodoo priests. Christian churches were another source of mental and emotional health needs.

After the disaster, of the roughly 2.8 million people that were affected (1.5 million of which became homeless), approximately 190,000 people in Port-au-Prince alone exhibited symptoms of PTSD. Half of those families in displacement camps had at least one member experiencing headaches, sleeping problems, anxiety and fatigue, while almost a third had a family member suffering one or more major distress indicators (panic attacks, serious withdrawal, or suicide attempt). Unfortunately, the already-deficient mental health infrastructure was further depleted by the destruction of their facilities and the death of practitioners. This included a large number of nongovernmental organizations.

By focusing international funding and support on the recovery of the public health infrastructure, many providers of mental health services were able to quickly resume their activities. Dutch international NGO (INGO) Cordaid is one such organization. Cordaid supported the community-based recovery efforts of providers of mental health and psychosocial support services in order to resume service delivery and promote capacity building among providers. The intervention was the product of participation in a Cross-Cluster Working Group on MHPSS that was directed by UNICEF and the International Organization for Migration (IOM). WHO led this working group and actively partnered with the Haitian Ministry of Public Health and Population (MPHP) to support MHPSS interventions.

There were four stages involved in this particular intervention, including:

1. Development of manuals for community psychosocial workers and non-specialized healthcare providers
2. Training of the two groups group targeted by the training manuals developed in Stage 1
3. Delivery of the community-based MHPSS intervention by the trained psychosocial workers
4. Mental health consultations by trained healthcare providers for people with more severe mental health problems.

This program was implemented between October 2010 and June 2012 in five departments throughout Haiti. In total, 190 psychosocial workers were trained and assigned to providing community-based MHPSS services. Another 115 non-specialized healthcare providers were also trained and equipped to manage mental health treatment in general healthcare. A review conducted after 18-months of implementation had passed found that the level of well-being of direct beneficiaries improved and level of distress was reduced in all five departments.

Lessons

- Impacts to the health sector may have a significant detrimental effect on the ability of a disaster impacted community to address mental health and psychosocial needs.
- High levels of PTSD can translate to elevated demand on health infrastructure due to the symptoms that are commonly exhibited by sufferers.
- Victims that cannot access public health facilities may turn to traditional medicine, much of which is unregulated and uses unproven methods
- Examination of past efforts can help guide the design of new interventions in terms of understanding the context and the extent to which existing intervention may be built upon.
- In settings with poor resources, a community-based integrated intervention can help to increase access to mental health and psychosocial support services.
- Training of non-specialized healthcare providers can help to expand access to mental health and psychosocial services, but this should be accompanied by successful cooperation with government agencies, the existence of administrative policies that promote the integration of mental health care into general health services; the existence of motivated and incentivized nonspecialized healthcare providers, and means for supervision of the non-specialized healthcare providers by mental health professionals.

Case 21: Strengthening Mental Health Services during Recovery, Peru

Huancavelica is Peru's poorest and least developed region. Its 475,000 inhabitants, who live predominantly in scattered rural communities, have suffered centuries of marginalization and ethnic and cultural discrimination. From 1980 until 2000, Huancavelica's residents were among the most heavily impacted by the conflict between the Government of Peru and the Maoist insurgent guerilla organization Sendero Luminoso (the Shining Path). PTSD was prevalent among the population due to the constant threat of or direct experience with torture, sexual violence, execution of family members, forced displacement, and kidnapping that they faced. The conflict likewise affected the quality of community and national infrastructure, including that which supports health care.

The NGO Medicos del Mundo (MDM) first intervened in Huancavelica after an earthquake struck in August of 2007. While there were fewer fatalities there than had occurred in the coastal areas, there was significant physical damage. MDM focused its recovery assistance on reconstructing eight health care facilities ('centros de salud') and on supporting the small, local mental health team that was providing post-disaster assistance. While working with this team, MDM staff discovered that no

mental health care facilities existed in the region. By alerting this fact to the regional authorities, mental health care was prioritized on the government health agenda.

In order to highlight the need for a joint assessment of mental health care in the region, and to develop ideas for a new regional mental health system, MDM organized an initial participatory assessment that included social organizations, government institutions, and other stakeholders. The event was strategically timed to coincide with the Government of Peru's implementation of an extensive decentralization policy that gradually transferred health care control and budgets to the regions. Two three-day seminars that were led jointly by MDM and the head of the mental health unit of the local Health Directorate were conducted. A plan of action that was negotiated with the health authorities to ensure technical, administrative and political support to the process was the product of these efforts.

In November 2008, one year after the earthquake, a collaborative agreement was signed between MDM and the regional government of Huancavelica, the Regional Health Directorate and the District Hospital, with the backing of the Ministry of Health, and the Pan American Health Organization (PAHO). This event triggered the redesign and improvement of mental health care with the goal of strengthening the structure of primary health care services.

Unfortunately, these efforts were not seamless. Results-Based Financing (RBF) processes that attempt to assign resources based on patients attended, the severity of diagnosis, the average length of each intervention, and other medically-focused measures have not translated well to the mental health context and budgets have been in disarray as a result.

Lessons

- When disasters occur in areas that have a history of violence or conflict, health sector recovery needs to pay special attention to mental health and psychosocial care infrastructure.
- Impoverished areas, where mental health and psychosocial needs tend to be the greatest, are often bereft of facilities providing needed services.
- There is immense value in designing intervention plans locally, through participatory processes that involve all interested stakeholders.
- Results-based policy planning that is designed with other fields of medicine in mind, such as for surgery or orthopedics, and that is focused on clinical diagnoses and expected expenses that can be attributed to patient and diagnosis, may not be appropriate or effective for formulating mental health solutions.

Source: Kohan, Irina, Pau Perez-Sales, Maria Huamani Cisneros, Rolando Chirinos, Ruben Perez Langa, Miryam Rivera Holguin, Blanca Sid, and Arturo Silva. 2011. Emergencies and disasters as opportunities to improve mental health systems: Peruvian experience in Huancavelica. Intervention. http://bit.ly/2qq7zTA.

Case 22: Using Lay Counselors to Serve the Mental Health Needs, Sri Lanka

When a tsunami struck Sri Lanka on December 26, 2004, the northern and eastern coastal areas were more heavily impacted than other parts of the country. These areas had also been heavily affected by more than three decades of ethnic conflict. The Tamil people that live predominantly in the country's north and east had previously experienced violence and displacement, including one event in October of 1995 in which almost half a million Tamils fled their villages and began moving south. As a result of this mass exodus a large number of people moved into less developed areas with much poorer infrastructure such as Kilinochchi and other towns in the Vanni region. People were forced to live under trees and in makeshift tents. The psychological effects of these events were significant.

Annai Illam, an NGO focused on mental health needs, introduced training for lay counselors that was conducted in Tamil. Training was a significant challenge given that Tamil-language teaching resources were scarce. Annai Illam translated relevant material to alleviate the need. Culture was a second problem, as counseling in the region is traditionally given by the community elder or leader, and intimate conversations laden with emotional content are unusual. Moreover, most people are unwilling to discuss family issues with strangers.

This program allowed a group of inexperienced young people with little to no specialized skills to form an effective mental health and psychosocial counseling service. The project ultimately evolved and developed into a multifaceted organization that provides comprehensive counseling and psychosocial help to the people of the Vanni region. The cultural sensitivity and perseverance exercised by staff at Annai Illam, which holds deep historical ties with the community that originated after the 1996 exodus, helped counselors to overcome these challenges and help the service recipients following the 2004 tsunami.

In the days following the tsunami, Annai Illam had grown into a bona fide counseling institution, and was in fact the only provider in the Vanni region. During the first week of 2005, two groups of seven counselors each were sent to the most affected areas. Post-tsunami counseling interventions began in public schools, where many victims had sought refuge. Counselors met with victims both individually and in groups to ensure that a range of settings were available to those who needed help. Separate groups were formed for women, men, and children.

Lessons
- With proper training, lay people in the affected area can provide the needed manpower to address health recovery staffing needs.
- Capacity building efforts need to be aware of and take steps to address cultural sensitivities.
- Programs formed to address emergency health needs can become a permanent part of the community's health capacity with sufficient support..

Case 23: Providing Psychological First Aid (PFA), Japan

The tsunami that struck following the 2011 Great East Japan Earthquake left a stark defining line between those areas that were virtually untouched and those that were devastated. For schools, this often resulted in classroom environments where traumatized students were placed together with those who were unaffected. Teachers voiced concern that there could arise tension and inequality with regards to affected students' mental and psychological health and recovery.

Soon after the disaster, affected children began demonstrating signs of distresses that included increased injuries, weakened immune system responses, and increased prevalence of obesity. By 2013, the recovery environment remained unresolved and this had the effect of stunting psychological recovery (and in some instances caused a worsening of conditions). Many children endured stresses associated with the death of their parents, siblings, or other family members, from the divorce of their parents, from one or more of their parents' unemployment, and other reasons.

Researchers also found that many teachers were also affected by the mental health stresses of the event, which were exacerbated by their interactions in the classroom. Many had suffered losses in the tsunami, yet felt they were expected to take a caretaker role for children who were likewise affected. Some teachers whose children had perished in the tsunami were faced with teaching other peoples' children that were the same age as theirs had been. Most teachers were concerned that they were not equipped to manage the necessary support required of traumatized students.

The Japanese NGO Care Miyagi supported psychosocial support in schools by focusing their efforts on helping students and teachers that had been affected. Their program sought to change the environment in which these children and teachers interacted, without eliminating the interaction that was otherwise an important and positive part of the recovery process. Care Miyagi conducted a series of workshops that provided teachers with skills to address the psychological first aid (PFA) of their students. Because PFA can be practiced by those without professional mental health certifications, it was appropriate for and welcomed by the participating teachers that otherwise felt unsure of their efforts. The program provided teachers with a much more solid understanding of how they can provide effective and appropriate psychological supports to the students that need it.

Lessons
- Many cases involving mental health and psychosocial needs do not need to tax the traditional health infrastructure as long as there are appropriate alternate resources to provide that care.

- Teachers often provide psychosocial care for their students given the role they play in each student's daily life; providing teachers with a basic set of skills following a disaster will help them to greatly improve the services they are already providing in an informal manner.

Source: Tokyo Development Learning Center. 2013. Training of Trainers (ToT) on Psychological First Aid (PFA). 9 December. http://bit.ly/2DOKWyt

2.4 Ensuring Safe Hospitals and Infrastructures

Like all components of community infrastructure, hospital facilities themselves are often directly impacted by the disaster event. If hospital facilities are vulnerable, there is a three-fold risk that is faced by the community served. First, at any given time the hospital structure itself will house a large community consisting of patients, employees, visitors, and other individuals whose lives depend on the integrity of the structure. For patients with significant health problems, it is not only the physical structure but also the uninterrupted provision of needed supplies and services, each of which has its own dependencies (e.g., electricity, medication, trained operators), upon which their life saving and sustaining needs depend. The second risk associated with hospital facility vulnerability stems from the role that hospitals play in the community's emergency response capacity. Injuries sustained by those that are directly impacted by the disaster event become much more serious if the health facilities built to address those injuries are damaged or destroyed. And third, in the post-disaster setting, the regular health and emergency needs that have little or nothing to do with the disaster will continue unabated, and so in fact the demand for hospital and health services is only likely to increase (especially if an epidemic or outbreak of a transmissible pathogen occurs). Hospitals increase their resilience through a mix of structural and nonstructural disaster risk reduction measures, including siting, construction design and materials, staff training, emergency protocols, supply chain strengthening and the use of redundant and duplicative resources, among others. While resilience is best applied prior to the onset of a disaster, recovery affords a community or country the opportunity to implement disaster risk reduction measures that limit the expected impact in future disaster events.

Questions
➢ Given the full range of expected hazards, are hospital and health facilities ideally located?
➢ Given the current and anticipated future health needs of the community, are hospital facilities properly sized, sited, supplied, and staffed?
➢ Should facilities be centralized or decentralized given the demographics and physical location of the individuals served?
➢ Are health staff, including support and administrative staff, personally resilient to disasters such that they will be able to continue working in the event of a disaster including in the long period of recovery to follow?

Case Studies

<div style="background-color:green">Case 24: Categorizing Health Infrastructure for Systematic Usage, Japan</div>

Several large hospitals were damaged or destroyed when the Great Hanshin-Awaji Earthquake struck Japan in 1995. Small and medium-sized health facilities became inundated by patients in the disaster's aftermath as a result of the reduction in capacity. Assessments conducted during the recovery from this event prompted Japan's hospital community to strengthen the resilience of their health infrastructure and to establish a system whereby that infrastructure was split into two distinct categories:

1. First aid stations that provide basic medical support
2. Hospitals that treat those with medical conditions

When the nation was struck by an earthquake and tsunami in March of 2011, almost all medical facilities located outside of tsunami-inundation zone continued providing efficient medical support to the affected population. In addition to having taken the step to divide services according to need, the structural integrity measures those facilities had applied prevented overall capacity loss.

Although the system of dividing the health and medical infrastructure into two categories was generally considered effective in its outcomes, there were challenges that remained. For instance, in the immediate aftermath of the disaster, patients tended to favor hospitals and private clinics over first aid stations. Health workers postulated that people assumed it was better to receive treatment in more robust facilities than in first aid stations that were believed to be undersupplied and lacking in proper medical equipment. Despite the underuse of first aid stations, staff felt that these facilities held significant intrinsic value in that they provided a first line of defense in the event of disease outbreak, and were equipped to provide medical attention to evacuees suffering from chronic illnesses.

There were several cases where hospital facilities were in fact impacted by the earthquake and/or tsunami. Assessments found that in these situations where the associated medical capacity was lost, patients suffering from both acute and chronic conditions continued to flood and thus overwhelm other hospitals and clinics. Based on these and other assessment efforts, a new disaster medical strategy was created in Tokyo. The main goals of the strategy are as follows:

1. *Disaster Phases must be Clarified:* Six disaster classifications were established in order to better organize short- and long-term recovery needs. These phases include:
   a. *"*Immediately after the disaster" (up to 6 hours post-event)
   b. "Super acute phase" (from 6 to 72 hours post-event)
   c. "Acute phase" (from 72 hours to 1 week post-event)

    d.   "Sub-acute phase" (from 1 week to 1 month post-disaster)
    e.   "Chronic period" (between 1 and 3 months post-disaster)
    f.   "medium to long term" (more than 3 months post-disaster)
2. *Structural Resilience Measures Must Continue*
3. *Roles of Medical Institutions and Medical Aid Stations must be Clarified*

Lessons
- Response and recovery plans should acknowledge the role health facilities play in each response and recovery phase, and furthermore they should consider how the transition from response to recovery will impact hospital operational strategies (from self-sustaining and proactive to a more organized, supported arrangement).
- Hospitals must plan for increased demand, including that which is caused by the loss of other facilities, a break in supply chains, and a loss of human resources.
- Hospitals should centralize decision-making during times of emergency.
- Hospitals and medical facilities should establish relationships with response and recovery authorities prior to a disaster in order to better secure the resources and funding that may be needed during patient surges.
- Appointing a Disaster Medical Coordinator at the municipal level can increase the effectiveness of information management (including information sharing).
- Pharmaceutical and supply stockpiling can help to address supply chain failures and increases in demand that typify the early days of a disaster.

Source: All Japan Hospital Association. 2011. Great East Japan Earthquake and Our Activities. http://bit.ly/2rdWjw8.

Case 25: Assessing Health System Vulnerability, China

Hainan is a small island province along the southern end of China's coastline that has significant natural hazard exposure from cyclonic storms, floods, earthquakes, tsunamis, and fires. Air and sea transportation systems, which remain the only means of egress and ingress on the island, are likely to be insufficient in the event of a future disaster. This vulnerability has promoted an increased focus on developing self-sufficiency measures for disaster response and recovery, including for emergency health needs.

It is critical that a community or country accurately understand the capacity of their health system to address disaster response and recovery needs. The ability to identify capacity gaps and likewise to understand improvement priorities is highly dependent on the quality of the assessment system itself. Several systems drawn from the international body of knowledge were used to assess vulnerability and needs in Hainan. These include:

- The Environmental Vulnerability Index developed by the South Pacific Applied Geosciences Commission, which is commonly used to evaluate island nation vulnerability.
- The Environmental Sustainability Index developed by Yale and Columbia University, which is capable of evaluating capacity according to the performance and quality of the environmental system, vulnerability reduction efforts, social and institutional capacity, and global stewardship.
- The Disasters Risk Index developed by the UN Environment Program (UNEP) Division of Early Warning and Assessment and GRID-Geneva as part of the collaborative plan "Global Risk and Vulnerability Trends per Year (GRAVITY)".
- The Vulnerability Evaluation Framework developed by the Harvard University John F. Kennedy School of Government which looks at human learning and adaptability

Research and development in emergency management practices has enabled a shift in evaluation systems that favor qualitative measure such that more precise, quantitative reporting is becoming the norm. Assessment is also focusing more on the goal of disaster prevention, monitoring, and early warning rather than on relief and recovery. Measures of vulnerability increasingly factor in the human influence on environmental and other systems, and the human-environmental interface, rather than relying completely on measures of natural and environmental forces that were presumed to be inevitable. Out of all of this has emerged a recognition that pre-disaster response and recovery planning, most notably that which enables prevention and vulnerability reduction, is far preferable to over-reliance on relief and response efforts.

Lessons
- Efforts to plan and build resilience into health infrastructure requires accurate assessment of risk and vulnerability.
- Health sector stakeholders should consider a range of assessment measures in identifying vulnerabilities and capacity gaps.

Source: Li, Min, Chuanzhu Lu, Wei Son, Junhong Miao, Yiping Ding, Longhe Li, Leilie Zhang, Nin Zhao, Bijiang Hu, and Yunjun Zhang. 2011. Significance of Vulnerability Assessment in Establishment of Hainan Provincial Disaster Medical System. Asian Pacific Journal of Tropical Medicine. 594-596. http://bit.ly/2qqF4XJ.

Case 26: Structural and Non-structural Mitigation in Health Facilities, Iran

Iran's location in the highly active Alpine-Himalayan seismic belt has resulted in several destructive earthquakes in recent decades. These events have caused thousands of deaths and significant physical and economic devastation. The Government of Iran has developed a comprehensive hazard mitigation plan to address the risk posed by seismicity.

A major focus of this plan has included the equipping of healthcare facilities with structural and nonstructural mitigation enhancements in order to increase both physical strength and systems resilience. In order to ensure that the most effective measures were being implemented both across all facilities and on a facility-by-facility level, a vulnerability and risk assessment was conducted at 110 hospitals throughout Tehran. Measures included the following:

- Construction material
- Construction type
- Quality of construction materials
- Seismic vulnerability of the structure
- Existence of specific structural problems (e.g., soft-story, vertical irregularity)
- Existence of specific non-structural problems (e.g., lack of emergency exits, lack of safe shelters)

Standards for seismic risk reduction, including both structural and nonstructural options, were applied to the outcome of this assessment, and a comprehensive disaster management plan was developed. Three main factors remained at the forefront of this assessment in terms of developing those plans, including:

1. The human factor: The medical team (doctors and nurses), technical teams (technical staff and support staff), patients, children, and visitors
2. Medical equipment
3. Disaster and non-disaster services

Resilience building plans considered two phases of activity, namely:

1. Planning for needs
   a. Mitigating structural risks
   b. Mitigating non-structural risks
   c. Educating and training of personnel
   d. Creating emergency shelters
   e. Establishing the disaster management system in each centre
   f. Protecting the medical equipment and patient's documents
   g. Providing preparedness measures
2. Conducting the Plans
   a. Structural vulnerability investigation and evaluation
   b. Establishment of the emergency information
   c. Evacuation procedures
   d. Taking the safety measures into account
   e. Establishment of the rescue and relief operation procedures
   f. Protecting the patients and personnel
   g. Structural and engineering cases

Lessons

- Recovery planning and mitigation planning must be similar in their goals with respect to disaster risk reduction if long-term resilience is to be established.
- Recovery planning in healthcare facilities needs to compress and ideally eliminate response given the acute need for health services as a component of community emergency response itself. As such, facilities assessments need to consider structural and nonstructural factors including the human and other dependencies of the health system itself.

Source: Nateghi-Alahi, Fariborz and Yasamin O. Izadkhah. 2004. Earthquake Mitigation in Health Facilities in Mega City of Tehran. 13ᵗʰ World Conference on Earthquake Engineering. August 1-4. Vancouver. Paper No. 3116. http://bit.ly/2rp1V4c.

Case 27: Integrating Spatial Resilience in Recovery, Italy

L'Aquila, in the Abruzzo region of Italy, was struck by a magnitude 6.3 earthquake on April 6, 2009. The event caused 308 deaths, 1,500 injuries, and damaged approximately 100,000 buildings (leaving over 67,000 people homeless). In the recovery period that followed this earthquake, a massive physical reconstruction effort was required, including for the recovery of health facilities. The nature of impacts did not always permit for in-situ reconstruction, and as such several new settlements were created. For each of these new settlements, alternations and/or expansion of wraparound services was required, and health services were chief among these needs.

Post-recovery assessments found that the resettlement process was marked by problems due to a lack of coordination between government agencies, insufficient involvement of community networks in the recovery planning process, and deficient consideration of spatial planning needs in the new settlement areas. The result of these shortfalls was that: 1) Construction was unnecessarily delayed in and around the city, which extended the period that residents faced uncertainty and that they were forced to remain in temporary shelters; and 2) The new settlements that were created were characterized as having insufficient facilities and services. These two factors had the combined effect of motivating victims to look for their own alternative housing options, which decreased the degree to which recovery operations were coordinated and outcomes were controlled.

The main criteria for relocation sites are typically characterized as follows:

- Low hazard risk
- Proximity to infrastructure
- Land tenure ownership

In the case of L'Aquila, resettlement zones were sited in conservation lands or farmland that were isolated and far from the city services on which the effective population depended. In addition to health facilities, this also included churches,

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schools, markets, and others. While there were communities that bounced back quickly, several had problems meeting even the most basic needs including shelter and employment. So severe were these siting issues and the lack of wraparound services that some of the new settlements were completely abandoned.

Post-disaster studies found that the tendency to abandon the established resettlement sites was correlated to the presence of fewer urban facilities in the settlement and greater travel distances to the L'Aquila's urban core. It was determined that planners prioritized the supply of basic services, but failed to address other community needs in a manner that met residents' expectations.

Lessons
- What constitutes recovery for an affected person is not a singular concept. Planners need to understand expectations with regards to wraparound services, including access to health facilities as well as other needs like livelihoods, social engagement, and more.
- The wraparound services themselves act as an incentive for displaced populations to seek and remain in planned resettlement areas. Without them, people will seek alternative locations on their own, even if the outcome of those actions do not conform to community recovery strategies and goals.
- Services and facilities do not only contribute to the community's function; they also promote social cohesion, accumulation of up social capital, and general satisfaction among residents.

Source: Contreras, Diane. Thomas Blaschke, and Michael Hodgson. 2017. Lack of Spatial Resilience in a Recovery Process: Case L'Aquila, Italy. Technological Forecasting and Social Change. http://bit.ly/2rpl3Px.

Chapter

Strengthening Health Systems in Recovery

3

Health systems have a defined set of critical needs, including staff, funding, data, information, equipment, protocols, management, supplies, transport, communications and many others. The resilience of a health facility is therefore contingent upon the ability of maintaining reliable access to or the presence of each of these needs in the face of internal and external stresses. The task of maintaining reliable continuity of operations whether for a public health facility, program, or service, requires understanding of a complex set of interdependencies that extends far outside the community itself and which is dependent on a great number of human, physical, financial, and information-based inputs that disasters have a propensity to disrupt. Moreover, disaster response and recovery itself places new requirements and thus stresses on the operations of these facilities, and therefore force them to adjust the manner in which health services are delivered.

In a successful recovery operation, the manner in which health facilities adapt to changing needs has the effect of not only meeting those needs, but improving the overall breadth and depth of those services for the time to come. As communities address the disaster impacts sustained during the planning for and conduct of recovery operations, there needs to be thoughtful consideration about how each of the disaster experiences, the relationships formed, and recovery resources accessed may be leveraged to not only resume health care services but also to improve them (including with regards to their resilience and sustainability). Healthcare is a broad field and thus the material in the base Guidance Note on Health Recovery and this supplementary edition cannot address each directly. However, the cases presented describes health systems in terms of six core components or "building blocks", which include: Governance and Leadership; Service Delivery; Human Resources; Health Information Systems; Health System Financing; and Medical Products and Technologies.

Topics: Governance and Leadership; Service Delivery; Human Resources; Health Information Systems; Health System Financing; Medical Products and Technologies

3.1 Governance and Leadership

Public health is a fundamental function of government that impacts every citizen personally and plays a key role in advancing development across several key indicators.

It represents a major source of employment and is often a primary driver of the political agenda. For many vulnerable populations, especially the very young and the very old, the quality and availability of and access to the system itself is perhaps their members' single most important concern. It is for these and many associated reasons that the full magnitude of importance afforded this particular sector of modern society is all but universally understood. Regardless of whether healthcare systems are public or private in their arrangements, or whether they are decentralized or not, governments at all administrative levels have an important role to play in their establishment, management, regulation, oversight, and in the case of disasters, recovery. High-quality healthcare is unachievable without the presence of good governance and effective leadership. These traditional government roles dictate the all-important policy frameworks within which healthcare facilities operate. Accountability of this system is an intrinsic part of good governance, and stems from the development of relationships with each of the various health stakeholders (individuals, households, communities, businesses, insurance providers, unions, banks, governments, NGOs, and other entities that have the responsibility to finance, monitor, support, deliver and use health services. Coordination of and collaboration with these many stakeholders on the long-term goals relative to disaster and non-disaster needs, including that which relates to integration of disaster risk reduction, are among the many governance and leadership responsibilities that governments must assume in planning for health sector recovery. The importance of the sector demands that governance and leadership be prioritized in the planning process, and that political dynamics, health policies, and legal frameworks each address governance needs as it does the need for resilience itself.

Questions
➢ What government agency or ministry is best suited to provide governance and leadership support for pre- and post-disaster recovery planning in the health sector?
➢ How effective is the current legal framework in supporting the recovery needs of the health sector?
➢ How well-informed are government leaders and lawmakers in terms of health sector resilience and recovery needs?
➢ What capacity exists at the government level to lead health sector recovery planning and operations?

Case Studies

Case 28: Adopting a "Health in All Policies" Approach to Recovery, New Zealand

Health in All Policies (HiAP) is a relatively new term that refers to the aim of collaborating across different sectors, such as transportation, housing, public safety, and education, to achieve common health goals. It reaffirms the role of public health in addressing policy and is intended to be an opportunity for the public health sector to engage a broader array of partners. The 2013 Helsinki Statement on HiAP stated

that, "Health for all is a major societal goal of governments and the cornerstone of sustainable development". The Canterbury (New Zealand) District Health Board has been leading a HiAP work program for several years, which began with a major policy-level health impact assessment on an urban development strategy. Other projects have joint appointments across agencies, the development of guidelines on working with determinants for local government and the formation of the Canterbury Health in All Policies Partnership (CHIAPP) that enabled joint organizational work plans across agencies. CHIAPP was formed after the 2010 Canterbury earthquake to ensure that health and healthy living are embedded into all aspects of local and provincial government policy development, the planning cycle, and project development.

In 2010, senior management at Community and Public Health (CPH), a Public Health Unit (PHU) for three Canterbury district health boards, had begun training together regularly, learning about HiAP, and discussing how it might apply to the PHU's work. The PHU leadership team recognized that this was an opportunity to 'leapfrog' to the HiAP approach. Canterbury was struck by a series of earthquakes and aftershocks that began on September 4th of that year, and aftershocks occurred for months to follow. There was significant structural damage with 185 fatalities, and over 65,000 injuries. The city center was so badly damaged that it remained closed to the public for more than one year. In fact, approximately 80% of building stock in the city center was destroyed or required demolition, and in outer lying areas an additional 6,000 homes were destroyed. Despite this high level of destruction, many local acute-care hospitals and primary care facilities remained operational. Staffers from the PHU were deployed in the immediate response to deal with water and sanitary health (WASH) issues, infection control, food hygiene and the implementation of emergency health legislation invoked by the country's first disaster declaration. Public health staff collected and analyzed population-based health data.

Immediately after the earthquake, the PHU was restructured in order to prioritize HiAP and support staff in all areas of their work. The New Zealand Ministry of Health provided a one-time grant to support the establishment of a HiAP team within the unit to focus on recovery issues, particularly health promoting urban design. HiAP team members worked closely with, and were part of CHIAPP. In the years that followed the quake, HiAP led to an expansion of the work of public health staff, particularly in their engagement with other agencies. The scope of protection has widened beyond monitoring to include significant input to local and regional policy on issues such as air quality, water quality and building standards. Health promotion staff have created world-leading projects such as the social marketing campaign 'All Right?' which recognizes the importance of mental health in recovery. The HiAP team continues to lead major interagency collaborative projects with the result that public health input into major policy is now routinely sought at an early stage by local and regional government partners.

Canterbury's recovery effort highlighted the value of government-wide sharing of public health expertise such that all agencies consider how their recovery actions

impact health. The HiAP approach enabled public health staff to improve the quality and reach of their work while ensuring a society-wide focus on health equity. Since the earthquake, the HiAP approach has been institutionalized for Canterbury's PHU.

Lessons
- Recovery in the health sector is impacted by and likewise influences all other recovery sectors.
- Formal arrangements to mainstream health recovery interests across all of government benefit pre- and post-disaster recovery planning, as well as general health services provision irrespective of emergency considerations.

Source: Stevenson, Anna, Alistair Humphrey, and Sandy Brinsdon. 2014. A Health In All Policies Response to Disaster Recovery. Perspectives in Public Health. May 2014. Vol 134. N 3. http://bit.ly/2rphmJx.

Case 29: Health Sector Monitoring and Evaluation After Hurricane Katrina, USA

Hurricane Katrina had devastating impacts on the US Gulf Coast communities it struck in August of 2005. The event resulted in displacement of persons on a scale previously unknown in modern American history. Families were scattered throughout the country, resulting in the need for long-term assistance and social support to meet the recovery needs of those who were affected.

Katrina Aid Today (KAT) is a consortium program created and led by the United Methodist Committee on Relief (UMCOR) that handled individual and household recovery case management services for disaster victims. The multi-state program that included nine partner agencies, 134 sub-agencies and organizations, and 16 field offices, was operational from October of 2005 to March of 2008. During this time, its staff coordinated social services using a model developed in the aftermath of the September 11, 2001 terrorist attacks in New York and Washington, DC. KAT used a system that included an online database, standardized forms and reports, technical and programmatic support, and the case management services provided by agencies to identify and track victims' needs.

KAT's purpose was to assist victims in meeting their recovery needs. It maintained its own internal monitoring and evaluation (M&E) services that focused on ensuring that the goals and objectives of the interagency project itself were being met in an effective and transparent manner. It was presumed that transparency would foster continued changes through the program design, best practices, and lessons learned in an accountable and responsible way.

One of the greatest strengths of this government-funded program is that the broad interagency efforts provided many advantages in terms of monitoring over a singular agency approach. Multiple agencies working together were much better able to meet victims' diverse needs because they could share resources and information much more easily. There were lessons that emerged from this program, such as the fact that

individual agencies participating in the consortium often wish to express their cultural and/or programmatic uniqueness into the otherwise conformity-seeking operational model. By adapting the M&E system individually to their own needs and context (e.g., adding indicators or specific tools for tracking), some of these tensions were alleviated. Data quality was another issue, and there emerged a need for data management specialists. Monitoring for disaster recovery programs like KAT is rooted in data content and quality. Its availability has the potential to inform results-based performance management in real time. Monitoring data collected from an urgent disaster recovery program before, during, and after implementation is therefore vital to determining progress and for evidence-based decision making. The case management data that came out of the KAT program provide a baseline for future comparisons. Furthermore, future evaluations of disaster recovery programs can draw upon the information produced when assessing their own program operations.

Lessons
- Utilization of formative and summative recovery program evaluation approaches can support understanding of key issues, capacity building, and short- and long-term programming.
- The implementation of an interagency monitoring program, regardless of scope or size, must be flexible and adaptable to accommodate the differences in participating organizations and agencies.
- Monitoring and evaluation systems are best developed ahead of time, but it is still possible to develop interagency systems in real time as long as learning and evolution take place.

Source: Janis, Amanda, Kelly M. Stiefel, and Celine C. Carbullido. 2010. Evolution of a Monitoring and Evaluation System in Disaster Recovery: Learning from the Katrina Aid Today National Case Management Consortium. L. A. Ritchie & W. MacDonald (Eds.), Enhancing disaster and emergency preparedness, response, and recovery through evaluation. New Directions for Evaluation, 126, 65–77. http://bit.ly/2rekYAY.

Case 30: National Government Recovery Planning Assistance, USA

The United States Federal Emergency Management Agency (FEMA) created the National Disaster Recovery Framework (NDRF) in order to provide an avenue for planning support to disaster-impacted local communities. Failures in past disasters revealed a prevalent need for guidance in disaster impacted communities that had little to no experience with disaster recovery planning, yet wished to remain in control of their own recovery effort. Long-term disaster recovery assistance had previously been provided through the National Response Plan, but it was felt that this assistance was both too short-term in its focus and overbearing for the assisted communities. The NDRF helps communities by providing them with the information and guidance they need, particularly in largescale or catastrophic incidents without being overbearing or overwhelming. It has a flexible structure that allows recovery stakeholders at all levels to work together under the direction of the local disaster recovery planning team. It also compartmentalizes organizations, people, and

resources into focused functional groups. The NDRF assists these communities by defining:

- Core recovery principles
- Roles and responsibilities of recovery coordinators and other stakeholders
- A coordinating structure that facilitates communication and collaboration among all stakeholders
- Guidance for pre- and post-disaster recovery planning
- The overall process by which communities can capitalize on opportunities to rebuild stronger, smarter and safer

The NDRF structures its support along six unique lines of assistance termed Recovery Support Functions (RSFs). In addition to Health and Social Services, the RSFs include: Community Planning and Capacity Building; Economic Recovery; Housing; Infrastructure Recovery; and Natural and Cultural Resources. Each RSF is chaired by an appropriate lead agency from the national government that coordinates the assistance of other primary and supportive national government stakeholders whose work pertains to the particular area of focus. RSFs also serve to bring together recovery partners in the local and regional government levels, and the private and NGO sectors including many that are not typically involved in emergency management but whose work is critically needed in recovery. The support work provided, which is administered through the help of an on-call NDRF Cadre that includes facilitators, liaisons, mitigation experts, and others, is financed through the US Government's disaster relief fund.

The NDRF supports local primacy in recovery planning by facilitating and supporting local recovery leaders and governance structures rather than replacing them altogether. NDRF staff provide facilitation services that tend to be more flexible, context based, and collaborative in approach than is typically seen in Federally-supported response assistance. The assistance provided is scalable and based on recovery needs that are assessed at the start of the NDRF deployment. When coordinating agencies are activated to lead an RSF, primary and supporting agencies and organizations are expected to be responsive to the function-related communication and coordination needs. Healthcare is an economic driver in many communities, and when impacted this sector's recovery becomes critical to most communities' overall recovery success. Social services have a major impact on the ability of a community to recover. The support of social services programs for at-risk and vulnerable children, individuals, and families affected by a disaster can promote a more effective and rapid recovery. The Health and Social Services RSF outlines the Federal framework to support locally led recovery efforts to address public health, health care facilities and coalitions, and essential social service needs. Displaced individuals in need of housing will also need health and social services support.

The Coordinating Agency for the Health and Social Services RSF is the Department of Health and Human Services. Primary Agencies include the Corporation for National

and Community Service (which leads several community-based social programs); Department of Agriculture; Department of Commerce; Department of Homeland Security; Department of Housing and Urban Development; Department of the Interior; Department of Justice; Department of Labor; Environmental Protection Agency; and the Federal Emergency Management Agency. The Supporting Organizations include the American Red Cross; Department of Education; Department of Transportation; Department of the Treasury; Department of Veterans Affairs; National Voluntary Organizations Active in Disaster; and the Small Business Administration. The objectives of this RSF are to:

- Complete assessment of community health and social service needs, prioritize those needs, including accessibility requirements based on the whole community's participation in the recovery planning process, and develop a comprehensive recovery timeline.
- Restore health care public health, and social services functions.
- Restore and improve the resilience and sustainability of the health care system and social service capabilities and networks to promote the independence and well-being of community members in accordance with the specified recovery timeline.

Lessons
- National governments can support local recovery without taking over the recovery process by formalizing supplemental support services.
- The existence of a national-level recovery framework helps to clarify the roles of all recovery stakeholders.
- Health sector recovery requires the support of a broad range of national government departments or ministries. Coordination of that assistance can be effectively managed by a health-focused national-level agency.

Source: US Department of Homeland Security. 2011. National Disaster Recovery Framework: Strengthening Disaster Recovery for the Nation. Federal Emergency Management Agency. http://bit.ly/2rre34O.

Case 31: Leveraging Support from NGOs and Multilateral Agencies, Nepal

Governments assume a key role in ensuring DRR is incorporated into recovery planning when they establish supportive legislative frameworks prior to the onset of disaster. When there are weak or nonexistent mechanisms to manage or guide recovery planning and/or operations, the challenge of integrating DRR becomes pronounced. Following the 2015 earthquake in Nepal, the lack of an effective legislative or policy framework resulted in many missed opportunities.

Recovery governance deficiencies in Nepal are primarily the result of decades of political unrest and internal conflict that the country has suffered. Recent developments that led to the replacement of Nepal's centuries-old monarchy with a

federal republic, and the drafting of an interim constitution and holding successful elections in 2008, enabled the process of building institutional frameworks to begin. However, as one of the world's poorest countries, with a population that is highly vulnerable to the impacts of shocks and stresses including disasters, the timeline for capacity building is a long-term one.

Disasters in Nepal were managed in an ad-hoc manner until ratification of the Natural Disaster Relief Act (also known as the Natural Calamities Act) in 1982. This action led to the establishment of Central, Regional, District, and Local Level Natural Disaster Relief Committees, as well as a system for allocating disaster relief funds. The Act also set out clear organizational responsibilities that gave the Ministry of Home Affairs responsibility for the formulation of national policies and their implementation; preparedness and mitigation activities; immediate rescue and relief work; data collection and dissemination; and the distribution of disaster relief funds. This Act remains in place with only minor amendments having been made since it was passed. Despite the existence of a functioning statutory authority, governance in recovery remains a major problem. In a 2013 article, Robert Piper, a United Nations development aid coordinator, wrote about his humanitarian assistance work in Nepal: "After five years of working on this in Nepal, I have come to recognize that addressing Nepal's vulnerability to natural hazards is first a governance problem." This indicates some of the dynamics of governance of DRR in post-conflict Nepal and the dynamics of power and influence of the various stakeholder groups that underlie these policy outcomes. There has emerged a proliferation of NGOs and non-state actors focused on DRR in Nepal, and this only increases the need for good governance and leadership.

A shift towards 'governing beyond the state' wherein transnational networks take the lead role in disaster management should not translate to 'governing without the state.' In fact, the state must remain the center of political power in disaster management efforts. Governments and local institutions are regarded to be the most important actors in disaster management, yet DRR is very much a global agenda which is being driven in poorer countries by international organizations and funded by donors. While donor support may be very valuable in areas such as disaster management where state expertise may be lacking or capacity is weak, it may also simultaneously present a challenge for government 'ownership', as there may be a 'latent' power evident in the way donor partners prioritize global agendas.

Lessons
- Settling the governance struggles and policy processes that hinder DRR can present a formidable challenge.
- Outside actors should not attempt to take over the efforts of the impacted government, but rather provide supportive assistance. Donors have considerable influence in terms of development agenda-setting – however the impacted government often knows what interventions will enjoy the greatest long-term success.

- In the absence of state level expertise and capacity, international and national NGOs do play an important role in the DRR implementation; however, the state must remain the center of political power.

Source: Jones, Samantha, Katie J. Oven, Bernard Manyena, and Komal Aryal. 2014. Governance Struggles and Policy Processes in DRR: A Case Study from Nepal. Geoforum Vol.57. Pp. 78–90. http://bit.ly/2qrRb6G.

Case 32: Integrating Health and Development Policies, Malawi

With a per-capita gross national product of roughly $340 (2015), Malawi ranks among the world's five poorest countries (second-poorest when global purchasing power parity is taken into account). The country also has one of the lowest life expectancies (57 years) due to the ongoing HIV/AIDS pandemic. Malawi has adult HIV prevalence rates of almost 11%. Health is thus not only an important factor in development, it is a dominant driver. As such, the country offers a prime example of why health and development policies must be integrated.

Malawi's poverty made it an ideal candidate for external debt relief under the Highly Indebted Poor Countries (HIPC) Initiative (the World Bank (WB) and International Monetary Fund's (IMF) international poverty reduction policy to relieve debt and provide low-interest loans to poor countries in return for national governments' commitment to specified economic and governance milestones.) In December of 2000, the IMF and WB Executive Boards approved US $643 million in HIPC debt relief for Malawi. Conditions included:

- Preparing and implementing a full Poverty Reduction Strategy Paper (PRSP)
- Making progress in implementing the National AIDS strategy [NSF], in particular by establishing a fully staffed, functional and autonomous National AIDS Control Secretariat, and implementing an effective Behavior Change Communication Strategy.

Development funding was thus linked to the government taking leadership of health policy, specifically in regards to the response to and recovery from the HIV/AIDS pandemic. The PRSP, therefore, needed to include a long-term plan of action. Significant debt is often an obstacle to investments in health, so the forgiven debt represented an opportunity for increased public health sector spending. In order to drive the health agenda, the HIPC agenda required that the government meet certain completion point triggers related to HIV/AIDS treatment and control in order to receive full funding as promised.

Among the many programs and products to emerge from these efforts is a shared health governance model wherein the public health and the development communities are both keenly aware of the need to integrate policies to combat HIV/AIDS and poverty simultaneously. One approach has been the linking of poverty reduction policies like the Poverty Reduction Strategy Paper (PRSP) process with

national HIV/AIDS programs. The PRSP process has supported NSF accountability, participation, access to information, funding, resource planning and allocation, monitoring, and evaluation. The principle health sector and economic indicators and budget allocations for HIV/AIDS were assessed, and these indicators have been made part of a new conceptual framework called Shared Health Governance (SHG). SHG seeks congruence among the values and goals of different groups and actors to reflect a common purpose. Under this framework, global health policy should encompass:

1. Consensus among global, national, and sub-national actors on goals and measurable outcomes;
2. Mutual collective accountability; and
3. Enhancement of individual and group health agency.

Indicators to assess these elements included:

1. Goal alignment;
2. Adequate resource levels;
3. Agreement on key outcomes and indicators for evaluating those outcomes;
4. Meaningful inclusion and participation of groups and institutions;
5. Special efforts to ensure participation of vulnerable groups; and
6. Effectiveness and efficiency measures.

Through its PRSP process, the Malawi government identified HIV/AIDS as a central problem in all four priority areas that threatened previous development gains (sustainable pro-poor economic growth, human capital development, improvement in the quality of life of the most vulnerable, and good governance) while undermining all efforts to fight poverty. HIV/AIDS therefore required urgent attention and became a major cornerstone of Malawi's PRSP process. The PRSP process appears to have supported accountability for NSF resources. However, the process may have marginalized key stakeholders in doing so, potentially undercutting the implementation of HIV/AIDS Action Plans. People living with HIV/AIDS, rural women, and parliamentarians each believed they were excluded from the PRSP process.

Lessons
- Linking public health and development at the policy level can increase the access of the sector's various stakeholders to much needed public funding.
- Development indicators with a public health basis are a means by which government agencies may be prompted to take a leadership role in health sector governance.
- Leaders must ensure that all key stakeholders are afforded the chance to participate in the process.
- Social marketing may be necessary to convince the public that funding on health sector capacity building is worthwhile.

3.2 Service Delivery

Governments and the societies they govern are alike in their dependency on the functioning of various infrastructure systems and components. Disasters, however, have a tendency to impact the functioning of these systems because of their prevalence, spatial distribution, and complexity. Some components of infrastructure, termed *critical infrastructure*, are of such great importance to a functioning modern society that there exists no acceptable level to which the services they provide may be interrupted. Even in the earliest moments of disaster response, there will be efforts made to restore these critical infrastructure components - even if only to a partial level of functioning. But this is rarely sufficient and calls for a return to maximum capacity will soon follow. There are mechanisms by which the impacted services may be recreated in the midst of a major disaster response, but few of these are permanent solutions. For instance, generators may be utilized to replace electricity provided by damaged power plants. Trunked radio systems based on trailers may be used to replace damaged mobile cell phone towers. And in the case of health facilities, there are mobile hospitals and clinics and shelter-based aid. The goal of this phase, however, is life saving and sustaining, and not the provision of routine and preventative health care. These goals, as such, run counter to many of the actions taken in the long-term recovery phase. While it is true that not every component of infrastructure needs to be maintained at levels achieved during non-disaster times (given the special conditions that are likely to exist in a period of response), this will not be the case for the health facilities that actually see a surge in service needs. But there exist protocols that help to alleviate pressure, such as the automatic cancelling of all routine and non-emergency procedures and appointments until the emergency phase has passed and hospital capacity has returned to normal. The disaster itself ultimately dictates which components of critical infrastructure, health included, become important in the emergency period of the disaster.

Questions
➢ What protection and planning measures are needed to ensure that health facilities can remain operational in the short- and long-term periods following a disaster?
➢ Are procedures in place to enable shifting patient intake during the immediate response, short-term recovery, and long-term recovery such that emergency and non-emergency needs are most appropriately met?
➢ Has the public health workforce been given sufficient information and support to be able to continue providing critical healthcare services in the aftermath of a disaster?
➢ Is the public health workforce trained in the unique procedures and management structures that typically exist in the post-disaster setting?

> ➢ Are mechanisms in place to recruit, process, and place volunteers in order to address post-disaster surges in health needs?
> ➢ How can the various community stakeholders (NGOs, businesses, faith—based organizations, civic organizations) support health sector capacity? How can these organizations and individuals become more involved in the pre- and post-disaster planning processes?
> ➢ What strategies can be promoted to better facilitate information sharing among public health care providers at all levels during and after disasters?

Case Studies

Case 33: Increasing Access to Medicines through Mobile Pharmacies, Japan

Pharmacies are a critical node in the healthcare system both during and after disasters, especially for those with chronic conditions or diseases that require medication. Local pharmacies were among the many healthcare facilities that were damaged or destroyed in the 2011 Great East Japan Earthquake, and reports emerged in the days and weeks following the event of people succumbing to chronic noncommunicable diseases because of a break in the pharmaceutical supply chain[1]. Even though many pharmacists were able to continue providing basic support for those who were affected by the disaster, supplies remained low and access was decreased.

Based on lessons learned in this event, a group of pharmacists in Japan's Miyagi Prefecture developed a `mobile pharmacy` concept. The mobile pharmacy is essentially a vehicle-based pharmaceutical service. Licensed pharmaceutical staff on board are able to fill prescriptions with the full inventory of medications and supplies they maintain on board, and they are able to bring them to the requesting patients directly. The vehicle is equipped with multiple redundant and complimentary power sources, including a solar panel. In order to address the difficult conditions of a post-disaster setting, the vehicle is equipped with supplies and resources that increase the resilience of the vehicle itself and that of the staff on board (e.g., radio communications, sleeping quarters, a refrigerator, a sink, and a toilet.)

Since it was first developed, mobile pharmacy services have been implemented in other prefectures, including Oita and Hiroshima. Several of these were deployed to Kumamoto Prefecture after a large earthquake struck in 2016. Each of these vehicles helped thousands of victims address their pharmaceutical needs in the months that they were deployed.

Lessons
- Health sector resilience may require innovative solutions, most notably those that address situations where primary facilities are damaged or destroyed.

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[1] World Health Organization. 2012. The Great East Japan Earthquake: A Story of a Devastating Natural Disaster, A Tale of Human Compassion. http://bit.ly/2qUdNy6.

- Members of the affected population with medical needs, whether pre-existing, related to the disaster, preventive, or otherwise, may not be able to access health facilities. Solutions that enable services to be delivered to the patients' locations can relive a significant amount of pressure from the health sector's response and recovery requirements.

Source: Oita Pharmaceutical Association. 2014. Mobile Pharmacy. http://bit.ly/2pNh9Tw. http://www.oitakenyaku.or.jp/manage/wp-content/uploads/2014/09/Mobile-Pharmacy.pdf; Yomiuri Online. 2016. Mobile Pharmacy Car "Mobile Pharmacy" to Save Victims in Kumamoto. May 31. http://bit.ly/2qyKxKa.

Case 34: Building Medical Facility Resilience Through Recovery, USA

When Hurricane Sandy struck the northeastern coastline of the United States, a storm surge inundated many parts of Manhattan Island in New York City. The New York University Langone Medical Center, which includes seven hospitals and dozens of clinical facilities, a medical school, and medical research facilities, was flooded with over 15 million gallons of water. The facility had an emergency plan in place that included releasing all medically-stable patients, cancelling elective surgeries, and closing emergency departments. Sewer openings were covered and sealed, flood protection measures were deployed, and water pumps were strategically deployed. Despite these efforts, water breached the buildings, and because all of the buildings on the medical campus are connected at the basement level, flood waters traveled easily throughout the system causing havoc. Equipment was destroyed, emergency power was knocked out, and 322 patients (several of whom remained in critical condition) required emergency evacuation.

The hurricane had a devastating impact on the vast medical system which served a large population from the New York City metropolitan area. The plumbing, mechanical and electrical systems were overwhelmed by flood water; the main kitchen was destroyed. Many of the specialized pieces of equipment, including those used to diagnose and treat cancer and other conditions, were damaged beyond repair. The recovery process began within hours but lasted nearly a year. To support recovery, the US Government provided the medical center with an initial $149 million that covered emergency repairs and other expenses incurred as a result of the event. To pay for the permanent recovery work, an additional $982 million in government funding was budgeted. The funding provisions required, however, that the medical center take measures to ensure that facilities were resilient to future disasters.

In the years since the disaster, the medical center has instituted a comprehensive mitigation plan that centers around robust and redundant systems that are designed to protect the campus, and more importantly, the people who rely upon the medical center, from future storms. New generators are in place and positioned twenty feet above expected flood elevation in order to drastically increase the likelihood that services would not be interrupted in future events as they were in Hurricane Sandy. The electrical, plumbing and air handling systems that were housed in the lower levels

have been elevated to the first floor along with the new diagnostic machines that replaced those that had been destroyed. IT systems were moved to a higher floor as well, and there is now a back-up storage facility in an offsite location. A flood barrier system that will protect the entire campus is under construction. There is also a new Energy Building under construction that will have the capacity to power to the entire campus.

Lessons
- Government investments in the resilience efforts of health facilities, even those that are private or nonprofit, can greatly increase the likelihood that availability and access to health services will continue even after major disasters.
- Health facilities should identify and assess the degree to which their operations depend on the continuity of municipal or private utility services, and take action to develop their own redundant and duplicative services to reduce those dependencies.

Source: Federal Emergency Management Agency (USA). 2016. Restored, Revitalized, Resilient: NYU Langone Medical Center. FEMA Website. http://bit.ly/2pNwgMF.

3.3 Human Resources

Health facilities rely on the services of highly trained and oftentimes certified or licensed practitioners. Even support staff require significant training and experience to perform their jobs. As such, most of these facilities are only as resilient as the individuals they employ. While it is common for facilities to utilized physical mitigation measures to protect the structures and perhaps even the contents of those structures including the workers themselves, it is not as common for that action is taken to protect or otherwise increase the resilience of employees once they leave their job. This might include standard personal disaster preparedness measures like:

- Protecting one's home and possessions from hazard risk
- Making family communication, evacuation, and reunification plans

- Ensuring adequate stores of food and water are maintained
- Finding alternate means for childcare or work travel.

Even when a hospital, clinic, pharmacy, or health facility escapes direct physical impacts, it is often the case that staff are confronted with damage or destruction to their homes, the prospect of being unable to meet the life sustaining needs of their families (including care for children or for adults with functional needs), or simply an inability to get from their home to their place of employment. If employees with critical responsibilities or simply a large percentage of all employees are unable to report to work, it is unlikely that the facility can continue to provide services to the affected population. Health facilities can minimize their downtime by providing

employees with preparedness training and support in advance of a disaster and having the systems in place to assist them in a disaster's aftermath. It can be difficult for a facility to accurately gauge staff vulnerability given privacy concerns and the tendency of individuals to believe they are more prepared than they actually are. Facilities must also take action to ensure they can support their employees' salary needs, even if the facility is damaged for a short period of time. If workers are not paid during interruptions they are likely to look for employment elsewhere, leaving the facility short-staffed once operations come back up on line.

Many public health agencies and stakeholders address capacity shortfalls through the use of mutual aid agreements. However, in large-scale disasters, partners are often impacted themselves and unable to honor requests for assistance. When the human resource needs exceed those that are available, there will be people whose needs go unmet. Retaining the healthcare workforce following disasters is therefore something facilities see as a critical component of their own resilience.

Questions
- ➢ Do hospital and clinic emergency management plans include protocols for employee support during disasters (e.g., on-site shelter, emergency transportation, family support)?
- ➢ Are public health staff provided with the information and resources required to develop personal and family resilience?
- ➢ Have facilities identified critical staff positions and designated those positions as such on job descriptions?
- ➢ Do protocols exist to manage succession of critical positions and to backfill vacancies?
- ➢ Do mutual aid agreements exist with neighboring jurisdictions or regions to support human resource shortfalls?
- ➢ Is training provided to the community on topics of health response and recovery in order to reduce the reliance on the limited cadre of trained professionals?

Case Studies

Case 35: Including Disaster Medicine into Health Training, Nepal

Health issues arise in all disaster events with very few exceptions. The public health communities assume a leadership role in managing health needs during the response to and recovery from disaster events. Within this context, doctors, nurses, medical technicians, and other public health workers must be adequately prepared to handle the work that will be expected of them when a disaster occurs. While some of this is the same or similar to the work they perform on a day-to-day basis, much of it is unique to the disaster scenario, and all work regardless of its novel nature is expected within a high-stress, time-constrained, and resource-poor environment.

In order to assess the disaster public health response and recovery capacity of health workers in Nepal, researchers from Prince of Songkla University conducted an industry-wide study in 2016. Research focused on nurses at both government-run and nongovernmental hospitals. Three hundred ninety-five nurses were selected at random and given a survey instrument, of which exactly 300 returned completed responses. Questions collected data on demographics and knowledge about earthquake-related medical needs.

The survey outcome revealed two significant findings. First, it found a high degree of variability in terms of the level of knowledge that nurses have regarding disaster medicine and emergency response needs. Almost half (47%) of respondents reported feeling they were not ready to face a future disaster, and only about one-seventh (14%) had either read books or searched the internet for information related to disasters. In fact, the even more commonly-encountered concepts associated with emergency medicine, such as triage, were unfamiliar to many of the nurses surveyed. Nurses at government-run hospitals showed a higher degree of knowledge about emergency response and disaster medicine than those at privately-run facilities. These findings matched those of a study previously conducted in Israel and Jordan that indicated nurses working in military or university hospitals had a higher degree of disaster-medicine knowledge than their private sector counterparts. Another positive sign was that the surveyed nurses' knowledge about recovery needs was much higher.

Lessons

- The skills and knowledge required of health staff during emergencies and disasters is oftentimes very different from that which they use during routine operations.
- Effective day-to-day operations may not be an accurate indicator of disaster health capacity.
- Health staff needs specialized training in order to be able to manage the unique response and recovery needs that arise during disaster, including those related to procurement, patient surges, facility damage, emerging diseases, and complex trauma.

Source: Basnet, Pritika, Praneed Songwathana, and Wipa Sae-Sia. 2016. Disaster Nursing Knowledge In Earthquake Response and Relief Among Nepalese Nurses Working in Government and Non-governmental sector. Journal of Nursing Education and Practice. V. 6. http://bit.ly/2qYouzw.

Case 36: Utilizing Community Health Workers in Disaster Recovery, USA

Lay Health Workers can play a pivotal role in improving disaster response and recovery because of their potential to supplement doctors, nurses, and medical technicians during times of surging demand. In addition to providing increased capacity, the assistance of lay workers can help to build lasting relationships of trust among all health sector stakeholders. An innovative approach to health care reform in the United States has utilized the assistance of lay health workers to improve both health care access and outcomes in a manner that is more cost-effective than other

options. Established lay health worker roles focus primarily on helping patients understand health-related issues, improving patient access to needed health services, and increasing patient compliance with medical directives. These activities can take place in a clinical setting or as part of a broader community education and outreach effort. Although there are a number of different types of lay health workers, the version with the greatest potential in this area is the Community Health Worker (CHW). Recent research has found that CHWs serving in their home communities have had the added benefit of improving emergency management planning and disaster recovery capacity in those communities before and following natural and technological disasters.

Expanded disaster-related training of CHWs can increase social capital and enhance community resilience. In addition to training that provides basic competency in advocacy, outreach, peer support, mediation, and communication, supplemental training may be provided on the following disaster related skills and knowledge:

- Planning and implementation of educational outreach to build knowledge of emergency management issues, promote disaster preparedness, and enhance community resilience
- Identification, prevention, and management of chronic diseases and conditions associated with or aggravated by natural and technological disasters
- Understanding essential elements in the recognition, intervention, and referral of psychosocial problems associated with the disaster experience
- Educational outreach, chronic disease management, and psychosocial support

Evaluations of CHW training programs have shown positive impacts in terms of recipients' health outcomes in a wide variety of areas (including cancer, diabetes, cardiovascular disease, and hypertension). Studies have also revealed that the involvement of CHWs in both health promotion and screening, early intervention, and the management of chronic disease can significantly lower health care costs for those already affected by health problems. In addition, research has demonstrated that CHWs' interventions targeting underserved and marginalized populations in a culturally sensitive and community-based approach can make a positive contribution to reducing socioeconomic disparities in the morbidity and mortality associated with chronic diseases and other health conditions.

Lessons
- Many of the basic capabilities and skills held by CHWs are well-suited to address community members' disaster preparedness, survival, and recovery.
- The support that CHWs provide in terms of educating the public about disaster preparedness through their outreach efforts can drastically reduce recovery requirements of the formal public health systems.

- CHWs can reduce disaster related health needs by addressing long-term preventive health of the populations they serve, and can help to build social capital among the populations, thereby increasing community resilience.
- CHWs and other lay health workers can contribute to post-disaster recovery by acting as "boots on the ground," serving as a link between the community and emergency response and recovery officials.
- Identifying resources and connecting the community with needed services is vital during and after disasters, as is facilitating effective communication between community members and emergency management authorities.

Source: Nicholls, Keith, J. Steven Picou, Joycelyn Curtis, and Janel A. Lowman. 2015. The Utility of Community Health Workers in Disaster Preparedness, Recovery, and Resilience. Journal of Applied Social Science. V.9. N.2. Pp. 191–202. http://bit.ly/2qY0E78.

Case 37: Staff Shortages Following CBRN Events, Japan

Among the highest priorities of the healthcare community is taking steps to enhance the capabilities of local hospitals prior to a disaster such that the facility is able to manage staffing shortages. When events include patients that are impacted by a chemical, biological, radiological, or nuclear (CBRN) event, or if the hospital itself is affected, staffing shortages may be pronounced due to the fear of actual or perceived threats to health and safety.

Japan was struck by such a disaster on March 11, 2011, when a tsunami impacted the Fukushima Daiichi nuclear power plant (NPP) in Fukushima Prefecture. The triple disaster of an earthquake, tsunami, and radiological event resulted in an increase in demand for hospital services at the same concurrent to a spike in hospital absenteeism. In the Soso district, which is located only 15km north of the power plant, two hospitals experienced catastrophic damage and were unable to continue providing services. However, ten other hospitals were not directly affected yet saw severe impacts to their capacity due to staffing shortages brought on by staff fear. Even prior to the event, the district's health facilities were staffed at only about half the national average. A study conducted in the aftermath of the disaster found that staff shortages began immediately and peaked one month after the disaster.   Overall, less than half (47%) of employees reported to work, with the greatest shortages existing among clerks (38% reported) and nurses (48% reported). Staffing began to recover about 3 months after the disaster, but even 1.5 years later had only reached 85% of pre-disaster capacity.

There were several reasons proposed to explain the unwillingness of staff to report to work. First among these was the fear associated with a life-endangering hazard like radiation. Staff that lived closer to the plant were more likely to have evacuated out of the area entirely. The second proposed reason was the disruption that occurred in wraparound services that staff depended on (food, fuel, transport). A third reason proposed was that staff with children evacuated out of fear that their children would be unfairly exposed (recognizing that many of these staff would have stayed

otherwise). A fourth proposed reason was that stigmatization for having evacuated in the first place prevented many staff from having to face their peers upon their return.

The study proposed that there may exist conditions through which absenteeism in such instances may be minimized, which include:

- There exists information about the hazard that allows staff to more accurately gauge their risk.
- Assurances are made to hospital staff about their own safety and that of their family members, as based on actual protective actions taken.
- Disruptions in wraparound services are minimized whether directly or indirectly.
- Workplace culture is such that even those who leave initially are welcomed back upon their return.

If planners have knowledge of the anticipated staffing shortage, they can better plan for contingency plans that replace the staff lost early in the event. In Japan, the health support teams dispatched were insufficient to address the shortages that existed. Approximately 380 disaster medicine assistance teams (DMATs) with 1,800 members entered the disaster area, bit this number was far below what was actually needed given hospital staff absenteeism. The study found that sufficient human resource support is important not only for maintaining hospital functions in those that only experienced staffing shortages but also for achieving early recovery in hospitals that were damaged or destroyed.

Lessons
- Staffing shortages may extend for months, or even years, following events where staff have evacuated with their families outside of the disaster area and thus far from their workplaces.
- Intensive short-term human resources support from external sources might be needed to avoid delays in short-term hospital function recovery. Such assistance should not be limited to physicians and nurses but rather should include support staff (like medical clerks and paramedics). Support also needs to be divided proportionally among public and private hospitals.
- Support staff showed less willingness to return than health staff, and as such facilities should make specialized staffing plans for each staff category.

Source: Ochi, Sae, Masaharu Tsubokura, Shigeaki Kato, Shuichi Iwamoto, Tetsuo Kumakura, Yoshimitsu Inomata, Masahiro Kami, Ryuzaburo Shineha, Yasutoshi Saito, Shinichi Ogata, Tomohiro Morita, Arinobu Hori, Tomoyoshi Oikawa, Antoku Kikuchi, Zenjiro Watanabe, Yukio Kanazawa, Hiromi Kumakawa, and Yoshinobu Kuma. 2016. Hospital Staff Shortage after the 2011 Triple Disaster in Fukushima, Japan - An Earthquake, Tsunami, and Nuclear Power Plant Accident: A Case of the Soso District. PLOS. http://bit.ly/2pZn97I.

3.4 Health Information Systems

Health information is a key component of public health care in both non-disaster times and during the response to and recovery from disasters. It is therefore critical for effective treatment and care that health information is accessible by patients, pharmacies, physicians, and other health staff. Health information needs range from the simple, such as having a prescription refilled, to the highly complex, as would exist if a patient was managing their post-operative care or trying to treat a chronic disease or condition. Access to information during disasters is often compromised on account of several factors, including destruction of one's home or possessions, the need to evacuate away from one's primary care physicians, the closure of or damage to healthcare facilities where those records are kept, the loss of primary and backup medical data storage, and others. Patients will need to access their health information whenever and wherever they need care, so community resilience in the health sector is contingent upon actions and measures that are taken to ensure those requirements are met. Protections come in many forms, including the development of relevant policies and procedures, redundant and offsite storage, web-based patient information storage and access platforms, governance and regulation, human resources development, health education and training, and financing. Among the health information concerns that arise post-disaster is the integration of health data into disaster loss databases in order to allow this data to inform recovery decision-making. Having such capabilities can not only improve individual patient outcomes, it can provide the added benefit of informing planners of the impact on the overall health sector with regards to recovery needs.

Questions
- ➢ Do standards or requirements exist that promote usage of electronic information storage among health practitioners?
- ➢ Do national and local incident management systems consider health information in assessment and reporting processes?
- ➢ Are there public facilities or resources that may be used to help store, organize, and distribute health data and information that supports response and recovery?

Case Studies

Case 38: Using Affordable IT for Routine Health Information, Myanmar

Emergency managers and recovery planners need specific information in order to effectively and accurately assign and operationalize response and recovery activities. However, a lack of access to Routine Health Information Systems (RHISs) in developing countries has hindered the abilities of officials in many of these countries to effectively coordinate and manage post disaster medical requirements in response and recovery. When Cyclone Nargis struck Myanmar in 2008, killing over 138,000 people, the many humanitarian agencies that responded could not establish unique identifications (IDs) of the towns and villages in the cyclone-affected areas that would have allowed them to effectively coordinate intra- and interagency response activities.

These unique IDs are called Place Codes. The Government of Myanmar Ministry of Home Affairs had published a list of standard names of the places at different levels of the administrative hierarchy; however, duplicate names and different ways of spelling in the names made the use of unique IDs essential in data collection and analysis. Although the standard names and unique IDs were stored and matched in a Place Code database, a lack of coordinates tied to the codes made the mapping of activities difficult. In order to alleviate these problems, steps were taken to identify and enter coordinates directly into the Place Codes database and to enable multiple users from different humanitarian agencies to view and update the data as needed.

Considering the significance of local capacity during the early stages of disaster response, RHISs at local, provincial/state and national levels should be strengthened in order to ensure these systems are capable of providing up-to-date information that supports the planning, organization, and monitoring of response and recovery activities. Those tasked with managing RHISs can define data according to the Sphere Project's Humanitarian Minimum Standards as well as those specific requirements that local agencies encounter or identify. In the case of Nargis, the free version of Google Earth was installed on users' computers. Windows-Appache-MySQL-PHP (WAMP) server, which was also free, was installed on the administrator's computer and served as the web server to the users. Coordinates were obtained by panning the selected village feature on an overlay map in the Google Earth to get to the fixed center-mark of the view. At the same time, the village name could be selected from a drop-down list on the web browser, and the user could update the coordinates for the village in the database.

Lessons
- Place codes allow humanitarian actors to merge/compare and analyze their data with other organizations' data, and hence they promote information sharing and cooperation among the organizations involved.
- Preparing RHISs for disasters can be guided by key RHIS-strengthening frameworks; and disaster preparedness must be incorporated into countries' RHISs.
- Mechanisms must be established in non-disaster times and maintained between RHISs and information systems of non-health sectors for exchanging disaster-related information and sharing technologies and cost.

Source: Aung, Eindra, and Maxine Whittaker. 2013. Preparing Routine Health Information Systems for Immediate Health Response to Disasters. Health Policy and Planning. V.28. N.5. Pp. 495-507.
http://bit.ly/2qR3ucQ.

Case 39: Creating and Managing a Hospital Disaster "Wiki", USA

The North Carolina Area Health Education Center (AHEC) Information and Library System (ILS) has been involved in disaster preparedness, response, and continuity of service planning for over forty years. Each of the nine AHEC regional offices, which work with hospitals and health care practitioners, contains a library or has an on-staff

librarian. In 2013, the program was supporting 35 hospitals throughout the state. In 2000, the program launched the AHEC Digital Library, which enabled online access to the program's many resources. This includes current medical literature and other sources of health information contained in electronic full-text journals, books, and databases. While access to some of the material requires a fee-based license, links provide free access to clinical and educational tools on a wide variety of health topics. Among these is a wiki on Disaster Preparedness and Response, and it is on this network's foundation that the continuity of service planning for disasters in many of the state's hospital libraries rests.

A wiki is a website that allows for collaborative editing of its content and structure by its users. The creation of the AHEC Disaster Preparedness and Response wiki stems from and is informed by the work that is conducted to select resources for the AHEC Digital Library's Disaster Collection. Just as e-mails or resources are forwarded to the wiki with questions or comments, the same e-mails may have comments, questions, or suggestions for linking to the newly created North Carolina AHEC librarians' disaster resources wiki. An example of the workflow would be as follows:

- This AHEC Digital Library Director forwards an e-mail from the listserv to the wiki with a message to evaluate a resource for inclusion in the disaster collection.
- The AHEC Digital Library Research Assistant receives an e-mail alert that a new page has been added to the wiki.
- After evaluation, the research assistant posts a brief assessment of the resource.
- Depending on final decision, resources will either be added to the AHEC Digital Library's Disaster Collection or just to the wiki for librarians to access.

The wiki is organized into four main sections:

1. Education Resources
2. Planning Resources
3. Communication and Social Media
4. News

There is also a growing list of links that provide access to updates and other information on salient topics. For instance, at the end of 2012, influenza was a leading topic. This page was not designed to be a comprehensive collection of influenza resources but rather one that expands upon the topics highlighted on the DISASTER-OUTREACH-LIB listserv. The collection of links was divided into five sections, including:

1. Information for the Public
2. Tools for Tracking the Flu
3. National Preparedness
4. Lessons Learned

5. Webinars

The Planning Resources section contains two subtopics: general planning resources and those targeted towards a specific type of event such as hurricanes or pandemics. There are 50 pages in the general planning section with links to resources about crisis standards of care, resilient cities, and individual provider preparedness. There are 27 resource pages for specific types of disasters grouped by hazard.

Lessons
- Wikis are an inexpensive and easily-accessible way to promote health-related disaster preparedness, response, and recovery information.
- The user-driven nature of wikis enables them to draw from a much larger, representative sample of members in the health stakeholder communities.
- The online nature of wikis improves the reach of many health-related resources.

Source: Schell, Mary Beth. 2013. Disseminating Disaster Health Information: Three Trial Projects. Journal of Hospital Librarianship. V.13, No.3. Pp. 291–297
http://bit.ly/2qYFbIw

Case 40: Tapping Health Librarians as Disaster Information Specialists, Canada

Librarians are charged with preserving the library collection and ensuring library continuity of operations following adverse events including natural disasters. An information specialist is an individual with duties related to that of a librarian, but which includes the management of data and secured files, the analysis of data, communicating with stakeholders, and training in some instances. Disaster Information (DI) Specialists are information specialists that conduct outreach in the community, providing information services to emergency managers and other disaster workers.

In the aftermath of disasters, libraries are oftentimes the only resource that disaster victims have to access information related to their recovery, including assistance programs, permitting and land-use regulations, and other topics. Librarians have helped victims to fill out applications for funding, to find assistance information, and to locate the resources needed to rebuild their lives. Librarians have expanded their disaster role even further as social media use has grown. Related tasks have included monitoring, archiving, and analyzing information produced by individuals "on the ground" during disaster response and recovery. As DI specialists, these librarians involved in disaster management of performed the following:

- Created and maintained taxonomies
- Enabled the library to serve as a clearinghouse of knowledge concerning the different aspects of disasters
- Worked with emergency managers to identify high-quality information

- Developed easy-to-use methods of delivering specific content
- Produced annotated bibliographies and syntheses
- Participated in call centers taking questions from the public
- Developed FAQs for local emergency preparedness and response and made them easy to locate
- Assisted in text and data mining, aggregating and compiling information to support public health decision-making
- Shared expertise with those in developing countries through an international network of librarians and archivists

Research on the roles of librarians in past disasters has identified eight categories of librarian services performed during disaster response and recovery, including:

1. Institutional supporters
2. Collection managers
3. Information disseminators
4. Internal planners
5. Community supporters
6. Government partners
7. Educators and trainers
8. Information community builders

Lessons
- There are distinct differences between the disaster-related work of public librarians and that of special librarians, including health librarians. However, librarians in public libraries perform a vital recovery task including that of providing the public access to vital health-related recovery resources.
- As DI specialists make their skills known to members of the disaster workforce, demand will increase for services such as literature searching and information monitoring. A systematic review for a research center on the ethics of disaster research in low and middle-income countries should be conducted.
- A growing body of knowledge drawn from emergency/disaster managers, health specialists and public health workers, mortuary team members, hazardous materials specialists, firefighters and other first responders is required to conduct mitigation, planning, response, and recovery.
- The vast body of relevant disaster information is scattered amongst journals of multiple academic fields from emergency medicine to geology. DI Specialists are a highly effective resource that may be called upon to access that information.
- Information specialists with prior knowledge of appropriate grey literature sources of disaster information, who also have the skills to monitor current news and social media, may be required to support the information needs of disaster workers.

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3.5 Health System Financing

Health infrastructure requires significant investment given the extensive requirements inclusive of specialized facilities for both diagnostics, treatment, and rehabilitation, machines and equipment using the latest technologies, inventories of disposable supplies, specialized vehicles, and vast databases of patient information. As has been stated previously in this guide, health infrastructure is oftentimes damaged or destroyed in disaster events given its size and wide exposure. Effective recovery requires not only a large influx of funding to cover necessary replacement and improvement needs, but also rapid access given health needs are immediate and unceasing.

It can be difficult to calculate the returns on investments made in health sector recovery, especially those related to disaster risk reduction and infrastructure improvement. As such, future disaster recovery efforts must incorporate effective performance measures and recovery managers should commit to tracking them as required. In doing so, the basis of health sector recovery financing will become clearer as long-term development advances. Several funding-related challenges threaten to impede optimal coordination in this sector, with the most significant stemming from inadequate investment in pre-event recovery planning and capacity building. Post-disaster challenges include the complexity associated with processes by which funds reach localities, the multitude of requirements encountered, and the variability in timing of assistance.

Questions
➢ How much financial support is required nationwide on an annualized average basis, and how is this amount distributed among the different regions according to their distinct risk profiles?
➢ How much has local and regional investment reduced recovery financing needs, and have these investments been conducted in a uniform basis from region to region?
➢ What are the expected recovery financing shortfalls in each region?
➢ What mechanisms are in place to assess recovery funding needs early in the disaster, and to manage the distribution of funding once secured?
➢ What pre-disaster recovery funding mechanisms have been put in place, such as the establishment of a disaster recovery fund, the sale of catastrophe bonds, or the maintenance of contingent credit?
➢ What is the worst-case scenario recovery funding requirement, and where would that funding come from?

Case Studies

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Case 41: Establishing a Community Recovery Fund, Australia

The Hunter Central Coast of Australia's New South Wales (NSW) was impacted by a severe weather event on June 8, 2007. The region, which includes Australia's sixth largest city Newcastle, received more than 300mm of rain in many areas, and wind speeds of up to 124 km/hour and a 17.95-meter surf swell. The damage to farms, homes, and infrastructure was severe.

Within six days of the disaster striking, the Australian Prime Minister and NSW Premier announced the provision of an AU$1M Community Recovery Fund. The fund was cost-shared by the state and federal governments and was targeted at affected communities, small business owners, and primary producers. This program bolstered the financial support already provided through the government's Natural Disaster Relief and Recovery Arrangement (NDRRA).

The Community Recovery Fund was managed by a regional recovery advisory committee made up of key community representatives from across the region. Through a consultative process, stakeholders identified needs, which included increased awareness of emergency procedures and processes and information and education opportunities to strengthen the community's sense of safety and confidence in preparedness for future disaster events. The acute shortage of affordable accommodation throughout the region that existed following the disaster was another issue identified as having significant impact on the recovery process. This was a concern prior to the disaster, but escalated significantly afterward. Increased competition for rental properties led to an increase in homelessness.

In the earliest stages of response, a multi-agency command post was established to address recovery issues and an interagency recovery committee was convened. The community recovery fund supported the salaries of three community development workers and provided grants aimed at recovery information, capacity building, economic development, and preservation of cultural heritage.

Lessons
- Community recovery planning and outreach activities should be established at the earliest opportunity. This should include the deployment of community development workers tasked with the planning of information and the conduct of group and neighborhood engagement.
- Neighborhood groups formed early in response can be subsumed into community recovery processes that are funded from a variety of sources.
- All outreach strategies, including the canvassing of neighborhoods, should be carefully developed, implemented, and evaluated.
- Interagency collaboration, coordination of activities, and relationships with a recovery center need to be maintained and supported throughout the event.

- Protocols for interagency information dissemination, briefing, referral, and debriefing need to be formalized and followed.
- Outreach services are important in identifying vulnerable populations and ensuring effective referrals to needed services.
- A broad range of community and social service providers must be integrated into response and recovery processes in order to best harness resources for the community as needed.
- Leadership from grassroots, informal, and community-based organizations might not have skills or knowledge required to effectively link with the "official" disaster recovery services.
- Information forums or briefings may be provided to community agencies to ensure information accuracy and expand the reach of dissemination efforts.
- Strengths-based, solution focused approaches to intervention, and a sound understanding of community development principles, are both essential to facilitating community recovery.

Source: Rowlands, Allison. 2013. Disaster Recovery Management in Australia and the Contribution of Social Work. Journal of Social Work in Disability & Rehabilitation, V.12. N. 1-2. Pp. 19–38. http://bit.ly/2s13ch6.

Case 42: Strengthening MFIs for Health Support, Bangladesh

The coastal zone on Bangladesh's Hatiya Island is among the country's most vulnerable due to a combination of widespread poverty and high hazard exposure. Cyclones, storm surges, and coastal and river erosion are the island's main disaster risk sources. While all of the island's land area is vulnerable, four of its ten administrative unions (small, often rural, municipal units) are particularly at risk; three of which are affected by river erosion (Chorishor, Nolchira, and Shukchor) and one that is affected by cyclones (Jahajmara). These four unions contain over half of the island's population and its territory.

A household survey was conducted in 2008 in Hatiya's four high-risk unions in order to better understand the role of micro-finance institutions (MFIs) in supporting health sector resilience and recovery. There were approximately 10 NGO-based MFIs operating there at the time, seven of which also engaged in other socioeconomic and disaster management-related activities. Most of the MFIs studied had started with a focus on relief and rehabilitation before they gradually shifted towards microfinance and other socioeconomic vulnerability-related issues. Although there are multiple MFIs on the island, the locally-based NGO Dwip Unnayan Sangstha (DUS - translated as Island Development Organization) serves a majority of the clientele. DUS was the first to start a microfinance program on the island. Other organizations include the Association for Social Advancement (ASA), the Bangladesh Rural Advancement Committee (BRAC), the Homeland Association for Social Improvement (HASI), the Health, Education and Economic Development (HEED), Proshika, and the Resource Integrated Centre (RIC). ASA launched its program in Hatiya just after the devastating

cyclone of 1991, providing a housing facility for affected people. BRAC initially supplied health services to the poor and funding for DUS, the local MFI.

More than one-fifth of those interviewed expect health support to be provided throughout the year and not only during the slack season or a disaster. Another fifth demanded an easing of MFI systems on credit and savings delivery. It should be noted that credit acquisition for most people requires months of waiting, attendance at weekly meetings, and regular deposits to savings deposits – steps that the clients find overly burdensome. On the other hand, an overwhelming majority of clients are satisfied with the MFI's support services and acknowledge that they have contributed to disaster recovery and preparedness. Microfinance has helped them to address disaster risk reduction, response, and recovery. The organizations have also helped support the building of cyclone shelters.

Lessons
- MFIs are a valuable source of recovery and DRR funding in communities where there are few disaster financing options available.
- MFIs primarily target poor and vulnerable communities with limited access to credit facilities and that are highly vulnerable to natural disasters. Hence, although the microfinance system and disaster management reflect two different fields of development, there is a recognized association between them.
- Clients with long-standing relationships with MFIs established prior to a disaster tend to have better outcomes during recovery with regards to recovery financing.

Source: Parvin, G.A., and R. Straw. 2013. Microfinance institutions and a coastal community's disaster risk reduction, response, and recovery process: a case study of Hatiya, Bangladesh. Disasters. V.37. N.1. Pp. 165–184. http://bit.ly/2r1WhVI.

3.6 Health Products and Technologies

The assurance of equitable access to high-quality and technologically-current health supplies, pharmaceuticals (including vaccines), machines, and other equipment and resources is a leading concern of planners during both short- and long-term recovery. Those affected by disasters should expect that they are able to meet their health needs in a manner that is cost-effective, maximizes safety, and meets current standards of efficacy. A surge of health needs coupled with disruptions in the health system supply chains oftentimes results in shortages of essential medicines and supplies. Vulnerable populations that rely on the availability of highly-specialized equipment such as those that are manufactured in pediatric sizes, high-value disposables, or items that require specialized maintenance may face unnecessarily high risk to health and life as a result of shortages or problems with availability. Hospitals, clinics, and other health institutions must have procedures in place that ensure inventories are maintained and equipment remains available through the use

of risk control mechanisms including stockpiles, redundancy, duplication, and other measures.

Questions

➢ What medications, supplies, and equipment are likely to be needed in increased quantities following a disaster?

➢ Has a process impact analysis been conducted on the health and medical sector supply chain, and are redundancy, duplication, protection, and other measures in place to address critical areas of need?

➢ Are stockpiles in place to manage medical surges, and are inventory rotation systems in place to ensure that stockpiled items are rotated into circulation prior to expiration?

➢ Do health facilities work with suppliers to ensure there exists resilience in the medical supply chain?

➢ Are there regulations, funds, or other mechanisms in place to ensure equitable and universal access to appropriate medical technologies and pharmaceutical resources during response and recovery?

Case Studies

Case 43: Utilizing UAV to Aid Doctors Combat TB, Papua New Guinea

Papua New Guinea has a tuberculosis (TB) infection rate of 541 cases per 100,000 persons per year, which ranks among the world's highest. It is feared that the rate of infection more remote areas may actually be as high as triple this rate. Médecins Sans Frontières/Doctors without Borders (MSF) launched a mission to help combat TB in the Gulf of Papua region. A major obstacle to their program was the poor condition of the country's transportation network and the harsh climate and geography that together impacted travel mechanics and safety.

To address these problems, MSF elected to use an unmanned aerial vehicle (UAV), also known as a drone, to diagnose TB-infected patients. The type of drone that was used could travel at speeds of up to 68km/h and has a range of 28km in favorable conditions. It could also carry a light payload which included saliva samples collected in these remote communities. The UAV was able to deliver samples to hospitals located in more accessible areas, and if required it was able to deliver the test results back to the rural areas served. All that was required to pilot the UAV was a smart phone.

Increased use of UAVs has created several new opportunities for the assessment of needs and the delivery of assistance, including for the health sector. This is especially helpful in countries like Papua New Guinea where accessibility becomes a significant obstacle to aid. It is hoped that ongoing development will allow delivery of heavier payloads and increased battery life (and likewise range of flight).

It must be acknowledged that there exist a number of obstacles to UAV use in humanitarian interventions. In addition to the widespread association between drone use and the military, which can impede the willingness of participation among the affected population, UAVs require special skills and resources for their operation, they have considerable maintenance requirements, there are ethical and privacy concerns, and the risk of damage or loss is considerable.

Lessons
- UAV use can address problems related to difficult access sand/or safety considerations.
- UAVs are relatively inexpensive in comparison to other options for opening up access to disaster-affected areas.
- UAVs can help to alleviate the time constraints on thinly-spread health professionals.
- Because UAV use is likely to expand in the near future, early adoption of the technology will increase the ease of transition as more comprehensive uses are discovered.
- Legal and ethical constraints associated with UAV use must be addressed prior to their use.

Source: Médecins Sans Frontières. 2014. Papua New Guinea: Innovating to Reach Remote TB Patients and Improve Access to Treatment. MSF Press Release. 14 November. http://bit.ly/2s1CC7V; Smedley, Tim. 2015. Drones' New Missio n: Saving Lives in Developing Countries. The Guardian. January 9. http://bit.ly/2r1PlIj.

Case 44: Using 3D Printers to Provide Medical Supplies, Haiti

Supply chains are highly exposed to the impacts of disasters, and as such it can be a challenge to secure them. The direct physical destruction that disasters inflict on supply chain components, and the indirect impacts that result from loss of or impact to the system's dependencies (communications, transportation networks, upstream and downstream partners), together contribute to the high uncertainty that is associated with procurement of basic health supplies following disasters. Furthermore, the difficulty associated with health equipment repair and replacement of parts only adds to this risk, especially in poor countries where stockpiles and redundancies may not be prevalent.

In order to limit supply chain risk in the health sector, the NGO Field Ready used 3D printers to manufacture several types of medical parts and equipment that were needed following the earthquakes in Haiti and Nepal. 3D printers were used to create a broad range of medical supplies including winged needle holders and umbilical cord clamps (for newborn babies). In Nepal, the printers were used to make tools and equipment including parts needed to repair medical devices and machines, as well as plastic pipe fittings that allowed increased access to water systems. In Haiti, the printers were used to create 165 different prototypes, and several of the items printed were done so at a reduced cost compared to purchasing pre-manufactured

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items. The use of printers has been especially helpful to international humanitarian aid workers who lack local knowledge on supply chains and supply availability prior to their arrival.

Lessons

- When informed by local needs and preferences, 3D printers can provide an effective mechanism to circumvent disaster-impacted supply lines.
- 3D printers can reduce the acquisition cost of certain medical supplies and tools given that logistics represents 60-80% of humanitarian costs.
- 3D printers provide immediate access to medical technologies in remote areas that might otherwise have little means to meet such needs.
- 3D printing technologies can help to foster community engagement, and can help the target population to feel ownership in the design and production of medical supplies.

Source: James, Eric and Laura James. 2016. 3D Printing Humanitarian Supplies in the Field. ReliefWeb. April 1. http://bit.ly/2qVqg3t.

Annex 1: Related Tools and Guidance

The following is a list of recommended resources to further guide readers on the topics discussed in this document. Links are provided.

- Analyzing Disrupted Health Sectors: A Modular Manual (World Health Organization, 2009): http://bit.ly/2rX8Vpj

- Community Assessment for Public Health Emergency Response Toolkit (US Centers for Disease Control and Prevention, 2012): http://bit.ly/2rXjecY

- Emergency Preparedness, Response, and Recovery Checklist: Beyond Emergency Management Plan (American Health Lawyers Association, 2004): http://bit.ly/2qVuec2

- Essential Functions and Considerations for Hospital Recovery (Harvard School of Public Health, 2013): http://bit.ly/2r47w27

- Guidance Note on Disability and Emergency Risk Management for Health (World Health Organization, et. al, 2013): http://bit.ly/2r3j1Vs

- Guidance on Mental Health and Psychosocial Support in Humanitarian Emergencies (World Health Organization, Interagency Standing Committee, 2010): http://bit.ly/2qiRQJh

- Guidelines for Protecting New Health Facilities from Disasters (Pan-American Health Organization, 2003): http://bit.ly/2s2qXp1

- Health and Social Services Recovery Support Function (US Federal Emergency Management Agency, 2011): http://bit.ly/2qiDA2R

- Health Sector Self-Assessment Tool for Disaster Risk Reduction (Pan-American Health Organization, 2010): http://bit.ly/2r4tAcN

- Hospital and Health Facility Emergency Exercises: Guidance Materials (World Health Organization, 2010): http://bit.ly/2r34nxh

- Primary Protection: Enhancing Health Care Resiliency (US Department of Health and Human Services, 2014): http://bit.ly/2qmc80e

- Recovery Toolkit: Supporting countries to achieve health service resilience (World Health Organization, 2015): http://bit.ly/2qq8WA8

- The Health Care COOP and Recovery Planning: Concepts, Principles, Templates, and Resources (Health and Human Services, 2015): http://bit.ly/2qqzv7Y

- Toolkit for Mental Health Services in Primary Health Care (New Zealand Ministry of Health, 2004): http://bit.ly/2r4kUmC

- Trauma-informed: The Trauma Toolkit (Klinic, 2013): http://bit.ly/2qmyMFO

Annex 2: Case Studies Summary

ISSUE / CHALLENGE	TOPIC	COUNTRY (DISASTER)	PRACTICE (Strategy or Action)
Integrating health in the recovery process	Emergencies with Health Consequences	• Sierra Leone (Ebola, 2014/15) • USA (SARS Outbreak, 2003) • China (SARS Outbreak, 2003) • USA (Twin Towers Attack, 2011) • China (SARS Outbreak, 2003)	- National Recovery Strategy Development - Partnership with Legal Experts - Hospital PHE Preparedness Assessment - Practitioner PHE Preparedness Assessment - PHE Information Management Systems
	Managing Chronic Diseases and Controlling Epidemics	• Chinese Taipei (nonspecific) • Japan (Earthquake, 2011) • USA (Hurricane Katrina, 2005)	- Clinical Decision Support Systems - Personal Medical History Journal - Patient Education and Preparedness
	Early Initiation of Health Sector Recovery	• South Sudan (Civil Conflict) • Philippines (Typhoon, 2013) • Sri Lanka (Tsunami, 2004)	- Post-Conflict Analysis of Health Sector Reconstruction - Cluster Approach to Health Recovery - Early Recovery Planning and Coordination
	Universal Health Coverage	• Nepal (Earthquake, 2015) • Zambia (nonspecific) • China (SARS, 2003) • Argentina (Economic Crisis, 2001)	- Constitutional Establishment of UHC - Public-Private Partnerships for UHC - Health Care Reform for UHC - Governmental Insurance Scheme
Preparing to build back better a healthier community	Using PDNA and PCNA Tools for Recovery Planning: Health	• Nigeria (Floods, 2012) • Nepal (Earthquake, 2015)	- Health Focus in PDNA - Stakeholder Participation in Health-Specific PDNA
	Promoting Community Resilience	• USA (Hurricane, 2005) • Australia (nonspecific)	- Long-term Investment in Community Engagement - Partnering with Culturally and Linguistically Diverse Communities
	Supporting Psychosocial Support and Mental Health Services	• Haiti (Earthquake, 2010) • Peru (Earthquake, 2007) • Sri Lanka (Tsunami, 2004) • Japan (Tsunami, 2011)	- Integrated Community-Based MHPSS - Psychosocial Care in Conflict-Affected Areas - Using Lay Counselors - Psychological First-Aid Using Alternate Sources of Care
	Ensuring Safe Hospitals and Infrastructures	• Japan (Earthquake, 1995 & Earthquake and Tsunami, 2011) • China (nonspecific) • Iran (nonspecific) • Italy (Earthquake, 2009)	- Categorizing Health Support Infrastructure - Using Assessments to Identify Vulnerability and Capacity Gaps - Mitigation in Healthcare Facilities - Integrating Spatial Resilience and Ensuring Wraparound Services
Strengthening health systems in the context of disaster recovery	Governance and Leadership	• New Zealand (Earthquake, 2010) • USA (Hurricane, 2005) • USA (nonspecific) • Nepal (Earthquake, 2015) • Malawi (HIV Epidemic, Ongoing)	- Health in All Policies (HIAP) Approach - Health Sector Monitoring / Evaluation - National-Level Recovery Planning Support - Outside Support for Health Sector Recovery - Integration of Health and Development Policies
	Service Delivery	• Japan (Earthquake and Tsunami, 2011 & Earthquake, 2016) • USA (Hurricane, 2011)	- Creative Solutions for Supply Chain Breaks - National Investment in Private Sector Health Infrastructure - Creating a Health Care Service System

			- Building on Existing Arrangements - Utilization of health services for children
	Human Resources	• Nepal (nonspecific) • USA (nonspecific) • Japan (Nuclear Disaster, 2011)	- Incorporating disaster medicine in training - Use of Community Health Workers - Estimating Staff Shortages
	Health Information Systems	• Myanmar (Cyclone, 2008) • USA (nonspecific) • Canada (nonspecific)	- Place Codes to Support Health Recovery Planning - Using Wikis to Disseminate Information - Exploring the role of health librarians
	Health System Financing	• Australia (Severe Storm, 2007) • Bangladesh (Cyclones, Multiple)	- Community Recovery Funding Options - Health Sector Support Through Microfinance Institution
	Health Products and Technologies	• Papua New Guinea (TB Outbreak, Ongoing) • Haiti/Nepal (multiple)	- Use of UAVs to support Health Sector Response and Recovery - Using 3D printers to Address Supply Chain Issues

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