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Part One

Roles of Governments and Markets

Facilitating Continuity of Healthcare after Disasters: What Do We Know?

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Abstract The provision of healthcare is one of the major challenges following a disaster. This was evidenced following devastation caused by Hurricane Katrina in 2005. Consequences of the Katrina disaster illustrate the need to give more attention in disaster planning to redeveloping and sustaining health infrastructures. Numerous recommendations concerning the health infrastructures were put forth following the Hurricane. These include recommendations offered for improving health planning, disaster communications, medical materials and information resources, health policies, and administrative and human resources. As the recommendations suggest, disasters disrupt the lives of both patients and their providers. Physical and social needs impact health and chronic disease management, not merely medical emergences. Many of the problems related to provision of care identified following Hurricane Katrina, the Haitian earthquake and other disasters can be addressed with appropriate attention to healthcare issues during pre-disaster planning and networking. These recommendations have not been a focus of disaster planners.
Key words Disasters, Healthcare, Resilience, Chronic disease, Continuity of care

1 Introduction

The focus of planners is usually on addressing immediate health needs that emanate directly from a disaster. As research suggests, however, there are chronic health needs in populations affected by disasters that require continuity of care, which are often not considered. This article examines research findings in this area. A case study of research on the Hurricane Katrina disaster is presented and consideration is given to the applicability of recommendations offered for the Gulf Coast to other types of disasters and regions. First, an overview is provided of disasters research. Attention then turns to issues of continuity of care, with a focus on findings from research on the Katrina disaster. Consideration is next given to the unique features of the Katrina disaster and constraints that make some of the recommendations for the Gulf Coast less applicable to other disaster situations. The article ends with a brief discussion of elements in the report that are relevant to a variety of disasters and regions around the world and how they can help improve quality of care for both emergent and chronic healthcare needs following disasters.

2 Natural and manmade disasters

According to climatologists and disaster researchers, there are two main types of natural disasters, namely: meteorological (hurricanes, floods, droughts, wildfires) and geological (earthquakes, volcanoes, tsunamis). There are also other events that either intentionally or unintentionally cause severe threats to the public health and well being which are not natural. When these events have human origin they are described as man made disasters (Cassidy, 2009).

Man-made disasters are caused by human action, negligence, error, or system failure. Man-made disasters can in turn be categorized as technological or sociological. Technological disasters are the result of technology failures, such as engineering or design malfunctions, transport tragedies, or environmental catastrophes. Sociological disasters have a strong human motive, such as criminal acts, stampedes, riots and wars (Cassidy, 2009). The Bhopal gas release and the Chernobyl nuclear accident are two technological examples of man-made disasters. Forest fires in California, which were intentionally set, and the conflicts in Mali, Darfur and Kosovo are examples of sociological disasters.

Either type of disaster can affect each region of the earth, however, there are differences in frequency and severity of occurrences (Pritchard, 2007). For instance, earthquakes, floods, volcanoes and windstorms create disasters that are prominent in the Americas. Asia is more prone to earthquakes, cyclones and typhoons. Europe has experience more volcanoes and droughts. Some countries in Africa

are prone to floods, droughts and earthquakes. Overall, the earthquake, floods, hurricanes and volcanoes are the natural disasters that affect the most regions. See Table 1.

Table 1 Prevalence of disasters by region

Disasters by Regions	Hurricanes 1900-2009	Floods 1800-2005	Droughts 1930-2007	Wildfires 1950-2010	Earthquakes 2000-2010	Volcanoes 2004-2010	Tsunamis 1524-2010
Africa	13	16	21	44	5	120	1
Asia	46	72			50	400	8
Europe	11	26	40	1	4	120	3
North America and Caribbean	71s	11	9	9	17	161	9
South America	34	13	45	3181	23	200	50
Australia	5	7	4	5	16	3	10

Sources:

The Most Deadly 100 Natural Disasters of the 20th Century
Http://www.disastercenter.com/disaster/TOP100K.html
Disaster Types and Impacts
Http://www.housingreconstruction.org/housing/sites/housingreconstruction.org
/files/Disaster%20Types%20and%20Impacts.pdf

The ten most destructive natural disasters in North America have been Hurricanes. Hurricanes occur more often and have the most devastating effects in North America (Gibson, 2008). As Charvériat (2000) points out in her work, hurricanes also ravage Latin America and the Caribbean more often than any other disaster. Africa as a continent is largely spared devastation from the hurricanes of the Caribbean and North America regions, the floods and earthquakes of South America and Asia, and the ice storms of Europe. However, it is worth mentioning that Mozambique unlike most African countries is prone to hurricane, disastrous floods and cyclones. It is also worth noting that Africa, as a continent, has had more than its share of man-made disasters. In comparison to human conflicts on the continent, natural hazards combined account for only 3 percent of disaster deaths in Africa (Dodson, 2008). It suffices here to note that all regions are subjected to disasters and should have plans in place for the continuity of human health and wellbeing.

Whether natural or man-made disasters, human health is affected. Disasters have made it painfully obvious that some aspects of health infrastructures globally are not functioning very well and warrant improvement. Perhaps better disaster planning for healthcare is the answer!

3 Disaster planning for healthcare

The health aspects of disaster planning generally focus on incident-based mass casualty and trauma management (Hammond, 2005). Hospitals and other healthcare facilities are expected to provide emergency medical treatment during the disaster. Treatment of acute injuries, identification and management of environmental hazards, and prevention of the spread of infectious diseases are paramount medical concerns during a disaster (Ford, et al., 2006). Less immediate, but equally important, is the need to provide continuity of care to patients with chronic conditions (cardiovascular disease, diabetes, asthma, HIV/AIDS, end stage renal disease, chronic lower respiratory diseases, cancer, etc.) (Labarthe, 2005; Mokdad, et al., 2005). Arrieta, et al., (2008) highlight two critical reasons why more attention should be given to chronic diseases during a disaster:

First, populations with chronic diseases (CD) are more vulnerable to the immediate health risks and longer-term stressors associated with disasters. Second, disaster-related shock and disruption in the medical management of CDs can produce both short and long-term complications, from impacting the glycemic control of patients with diabetes to increasing the risk of myocardial infarction for those with pre-existing cardiovascular disease (p.13).

Those most affected are the poor, young, elderly, underserved and others who are dependent on

the public health infrastructure (Gruppen, 2003). Continuity of care for pre-existing diseases can be a matter of life or death for them (Halpert, 2008). More often than not, redeveloping and sustaining an infrastructure for continuity of healthcare has not been an intricate aspect of disaster planning (Ford, et al., 2006).

4 Health implications of natural disasters

Burckle (2008) asserts in his work that the public health infrastructure is the first to be destroyed and the last to be restored after a disaster. The results have serious health implications. The Australian Red Cross (2006) posits that the poor, the elderly, children and other groups with the greatest need for continuity of care are most affected by natural disasters. Even though countries like China, India and Brazil have growing middle and upper class populations, the vast majority of the citizens rely on the local public health infrastructure (Australian Red Cross, 2006). Large percentages of the populations in North America and Europe are also dependent on the public health infrastructure for primary care. The same is true for other regions as well. Thus, when the health infrastructure is diminished by disasters, public health suffers as well. Health in under resourced communities is affected the most.

Researchers have found that low resourced communities are hit harder by natural disasters than those with abundant resources and their healthcare infrastructures are more vulnerable (Gruppen, 2003; Rodríguez, Quarantelli and Dynes, 2007). In this regard, the level of impact, intensity and extent of diseases after disasters are determined primarily by the level of development and sustainability of a region's infrastructure. Noji, et al. (1997) highlight how long-term health effects of a disaster are mostly a result of the healthcare infrastructure capacity to provide continuity of care to the affected population. The health infrastructure in less prepared and under-resourced regions either in technologically advanced or less advanced countries is impacted the most.

The impact on the health system may range from short-term delays to permanent disruptions of care. Both make it difficult for people to be treated for illnesses resulting from disasters and chronic conditions. The long-term health implications range from death associated with disaster related injuries to inaccessibility of prescriptions to a worsened state of existing chronic diseases. Each emanates from a lack of continuity of care, which can be a concern for both technologically advanced or less advanced regions.

Noji(2005) cites the Los Angeles county disaster in the US during the North ridge earthquake as an example of this concern in a technologically advanced country. The disaster precipitated an increase in cardiovascular diseases and post-traumatic stress disorders (PTSD). In their work on Asia, Kokai et al. (2004) also note increased levels of PTSD after disasters such as earthquakes and cyclones. When the healthcare infrastructure does not facilitate treatment for this disorder, affected individuals continue to suffer increased levels of stress, which make their bodies more susceptible to other diseases and exacerbate existing illnesses (Ursano, et al., 1995;Norwood, et al., 2000).

Though it has been noted that the African region is not prone to many of the natural disasters that affect other areas, when events such as floods and droughts occur, the effects are often more devastating because of corresponding increases in prevalent diseases (i.e., HIV/AIDS and Malaria), especially during migration, displacement and loss of health services (Disease Control Priorities Project, 2006). As Walsh (2010) points out in his work, the disruption of continuity of care has serious health consequences for less fortunate communities everywhere. The 2010 earthquake in Haiti, for example, made this low resource country's challenge in controlling the prevalence of HIV/AIDS, TB and other chronic diseases much greater. For instance, the lack of basic vaccinations for children is forecasted to result in more illness among all age groups from a variety of diseases (Walsh, 2010).

The effects of the Haitian earthquake are likened to the Mozambican floods and Indonesian tsunami. And as illustrated below, it can also be compared to the New Orleans hurricane disaster. In contrast, effects of the 2010 earthquake in Chile were far less severe because of the country's well-developed infrastructure. Moreover, the impact of disasters in each instance can be judged by the type of infrastructure resources the community had in place and the numbers of people that were affected (Goodman, 2010). The final death toll in the Chile disaster, according to authorities, was 525 victims and 25 people missing (Sebsecretaria del Interior, 2011). In contrast, the Haitian government

reported that the its 2010 earthquake death toll has reached 230,000 (BBC News, 2010)

The devastating health repercussions of the Haitian disaster are attributed to a poor health infrastructure, poor economic status, lack of communication and the general state of unpreparedness during the disasters (Marcus, 2010). Chile's stronger infrastructure prevented deaths and is allowing it to recover more rapidly from the earthquake.It experienced less human suffering, even though the magnitude of the earthquake it experienced was much stronger than the one in Haiti, (Edlin, 2009).

Alfred Sommer (2010), dean emeritus of the Johns Hopkins Bloomberg School of Public Health, describes the disaster situation in Haiti as a"Tragedy of individual Haitians risks overshadowing chronic health problems."That is, he notes, the focus on those being rescued stimulated an outpouring of aid but Haitians, like the inhabitants of most poor countries, face an array of health problems every day that emanate from malaria, tuberculosis, AIDS and other preventable diseases. Those problems now put Haitians, with their further-weakened public-health system, at even greater risk of new waves of disease—perhaps cholera or typhoid—that could kill thousands more.

The 2010 Haitian tragedy, as Sommer describes it in his work, is the failure to invest in building the health infrastructure for addressing chronic diseases. Consequences of the 2005 Hurricane Katrina disaster represent a similar tragedy. They also illustrate that redeveloping and sustaining health infrastructures should be a focus in every disaster plan, even in highly developed nations. Failure to do so will likely result in unmet health needs during disasters even in a highly developed nation like the United States.

5 Unmet health needs during the katrina disaster

Hurricane Katrina required the evacuation of more than 1.5 million people along the Gulf States in the summer of 2005. It crippled the health infrastructure, leaving thousands of displaced resident without access to primary healthcare. Numerous healthcare facilities, community-based organizations and pharmacies were ruined by the hurricane. Nationally funded community health centers, the primary care provider for many medically underserved Gulf Coast residents, sustained approximately $65 million in damages. Eleven centers were completely destroyed, 80 experienced severe damages and many were left with only very limited capacities. Some hospitals were severely damaged or destroyed, including Charity Hospital of New Orleans. Also adversely affecting healthcare delivery were the evacuation and displacement of an estimated 6,000 physicians and as many as 100,000 other health and social service providers. The loss of patients' medical records to flooding and wind damage also affected access to appropriate healthcare (Berggren and Curiel, 2006;Arrieta, et al., 2007).

As Arrieta, et al. (2008) discerned, providing continuity of care for chronic diseases in affected and displaced persons became a major post-storm challenge. Those affected with one or more chronic illness diagnoses after the Katrina disaster were estimated to range between 41%and 74% of the population. Healthcare providers also reported a significant increase in mental illness. Against this scenario, Arrieta and her colleagues posed "primary, rather than tertiary, care" as the most effective healthcare model to address most disaster patients' needs. They suggested that rapid redevelopment of the infrastructure of community health centers would be the most effective mechanism for delivery of primary healthcare needed by disparate populations after disasters along the Gulf Coast.

With a limited infrastructure and personnel, health providers were extremely challenged to meet the medical needs of regular patients as well as those of thousands of displaced individuals. A large proportion of those needs, that went unmet, related to the care of patients with chronic diseases, (Edwards, Young, Lowe, 2007; Mokdad, et al., 2005). What this experience reveals is that rebuilding healthcare infrastructure, as soon as possible, must be an intricate aspect of the disaster plan and a major focus of planning and recovery activities.

The medical information for displaced residents is another issue that surfaced after the Katrina disaster. Many of the displaced patients who had to be treated did not have records of their prescriptions, medications or personal health histories. They were also not able to contact their regular primary care providers to obtain medical information. Communication systems were not operative, power outages were widespread and local transportation was often disrupted(Arrieta, et al., 2008)

Even patients with non-emergent needs (i.e., prescription refills or replacements, follow-up for

previous healthcare concerns, and scheduled out-patient procedures) only options for care immediately after the storm were hospital emergency rooms. Patients with previously stable chronic conditions, who were unable to receive care, often developed emergent needs due to lack of treatment or medication (e.g., the insulin or dialysis dependent). Consequently, the Gulf Coast healthcare infrastructure sustained overwhelming demand in the face of severely diminished capacity (Mokdad, et al., 2005). That this could happen in the United States, with its vast health resources, suggests that citizens with chronic diseases in every nation may be at greater risk during a disaster.

While usual disaster preparation processes were in place before Hurricane Katrina hit, as with other recent disasters (Haitian earthquake and 2004 and 2008 tsunami disasters), because of the sheer magnitude of the damage and population affected, the infrastructure was insufficient or ineffective in each instance. Even though local regional and national (international in the later instances) resources were brought to bear during these disasters, the healthcare needs of many residents were not met (Olson, 2011).

Unmet health needs of population groups with chronic conditions were areas of particular concern following the Katrina disaster. The needs of these individuals overwhelmed healthcare providers. Record numbers of patients were treated by emergency medical services with heart disease, diabetes, and high blood pressure (Fox, 2009). Problems involving the health needs of patients in nursing homes and hospitals who had to be evacuated were also unprecedented.

The immense problem of persistent unmet health needs during the Katrina disaster received national and international attention. Federal funds were made available to study the problem and develop solutions. A federally funded multistate study conducted by researchers at the University of South Alabama (USA) collected a variety of data on the medical needs of individuals with chronic conditions following the Katrina disaster. A summary of the USA Katrina Study design and results are presented below.

6 USA post katrina disaster study[1]

Shortly after Hurricane Katrina hit the Gulf Coast, the University of South Alabama Center for Healthy Communities in partnership with the Regional Coordinating Center for Hurricane Response at the More house School of Medicine sought to delineate mechanisms to limit the worsening gaps in post disaster healthcare and outcomes. The emphasis was on ways to facilitate the management of chronic conditions during disasters. The initial step was to have a dialogue with those affected by the Katrina disaster. A multifaceted methodology was employed to collect data from patients, healthcare service providers, community leaders and health administrators.

Data were collected via interviews, working groups, and electronic communications involving health and social service providers from 34 healthcare organizations on the Mississippi and Alabama Gulf Coast. In addition, focus groups were conducted with 28 patients from Mississippi and Alabama with chronic diseases. Fifty-six representatives from 14 organizations (4 from each organization) were also recruited into the study. Health centers in the region helped recruit patients with chronic diseases. AIDS advocacy groups in Alabama and Mississippi helped facilitate recruitment of patients with HIV/AIDS. The University of South Alabama Institutional Review Board approved the protocol and recruitment materials for the study. A written informed consent was obtained from each study participants (Arrieta, et al., 2008).

A unique cross-section of the affected community was represented in the study. The inclusion of dislocated residents, patients, health and social service providers, community leaders, administrators and first responders as participants in the study yielded insightful post-disaster information about the Gulf Coast health infrastructure and support needed for redevelopment. Participants provided a clear picture of problems encountered that limited access to primary healthcare during the Katrina disaster. What exactly is broken? What lessons might be drawn from this catastrophe? And how applicable are findings and recommendations to other disasters and other regions? The answer to the first question

1 The author was the Director of the University of South Alabama Center for Healthy Communities when the Katrina Study was Conducted.