

Primary Health care and Disasters—The Current State of the Literature: What We Know, Gaps and Next Steps

Lynda Redwood-Campbell, MD, CCFP, FCFP, DTMH, MPH;¹ Jonathan Abrahams, MPH, Grad Diploma (Population Health), BSc;²

1. Associate Professor, Department of Family Medicine, Faculty of Health Sciences, McMaster University, Hamilton, Ontario Canada
2. Coordinator, Risk Reduction and Emergency Preparedness, Health Action in Crisis, World Health Organization, Geneva, Switzerland

Correspondence:

Lynda Redwood-Campbell, MD, CCFP, FCFP, DTMH, MPH
Department of Family Medicine
Faculty of Health Sciences
McMaster University
CANADA L8P OA1
E-mail: redwood@mcmaster.ca

Keywords: disaster; gaps; lessons learned; literature; primary health care

Abbreviations:

DDR = disaster risk reduction
HEM = Health Emergency Management
PHC = primary health care
WHO = World Health Organization

Received: 10 January 2011

Accepted: 11 February 2011

Online publication: 2 September 2011

doi:10.1017/S1049023X11006388

Abstract

Introduction: The 2009 Global Platform for Disaster Risk Reduction/Emergency Preparedness (DRR/EP) and the Hyogo Framework for Action 2005-2015 demonstrate increased international commitment to DRR/EP in addition to response and recovery. In addition, the World Health Report 2008 has re-focused the world's attention on the renewal of Primary Health Care (PHC) as a set of values/principles for all sectors. Evidence suggests that access to comprehensive PHC improves health outcomes and an integrated PHC approach may improve health in low income countries (LICs). Strong PHC health systems can provide stronger health emergency management, which reinforce each other for healthier communities.

Problem: The global re-emphasis of PHC recently necessitates the health sector and the broader disaster community to consider health emergency management from the perspective of PHC. How PHC is being described in the literature related to disasters and the quality of this literature is reviewed. Identifying which topics/lessons learned are being published helps to identify key lessons learned, gaps and future directions.

Methods: Fourteen major scientific and grey literature databases searched. Primary Health Care or Primary Care coupled with the term disaster was searched (title or abstract). The 2009 ISDR definition of disaster and the 1978 World Health Organization definition of Primary Health Care were used. 119 articles resulted.

Results: Literature characteristics; 16% research papers, only 29% target LICs, 8% of authors were from LICs, 7% clearly defined PHC, 50% used PHC to denote care provided by clinicians and 4% cited PHC values and principles. Most topics related to disaster response. Key topics; true need for PHC, mental health, chronic disease, models of PHC, importance of PHC soon after a natural disaster relative to acute care, methods of surge capacity, utilization patterns in recovery, access to vulnerable populations, rebuilding with the PHC approach and using current PHC infrastructure to build capacity for disasters.

Conclusions: Primary Health Care is very important for effective health emergency management during response and recovery, but also for risk reduction, including preparedness. There is need to; increase the quality of this research, clarify terminology, encourage paper authorship from LICs, develop and validate PHC-specific disaster indicators and to encourage organizations involved in PHC disaster activities to publish data. Lessons learned from high-income countries need contextual analysis about applicability in low-income countries.

Redwood-Campbell L, Abrahams J: Primary health care and disasters—The current state of the literature: What we know, gaps, and next steps. *Prehosp Disaster Med* 2011;26(3):184–191.

Introduction

The increased number of disasters and people affected, coupled with the threats from climate change have drawn national and international attention to the risks of disasters and what can be done about them. Community, national, and international participants are more aware of the importance of taking action before disasters occur through disaster risk reduction (DRR), including emergency preparedness efforts, as well as through disaster response and recovery. The international community has strived to develop new

and improved approaches to disaster response, recovery, disaster risk reduction, and emergency preparedness. A Primary Health Care (PHC) strategy (*Health Emergency Management or HEM*) is one possible method by which improved health emergency management may occur.¹

Recent developments and initiatives have contributed to an improved strategy for health emergency management in general. Humanitarian reforms aimed at making the international response to disasters more consistent and predictable, have given rise the Cluster approach, including the Global Health Cluster, which is lead by the World Health Organization (WHO) and a number of other health-related clusters such as Protection, Early Recovery, Nutrition and Water, Sanitation and Hygiene. Other initiatives include the Hyogo Framework for Action (HFA) 2005-2015, (which identifies strengthening of disaster preparedness as one of the five priority areas for building the resilience of nations and communities to disasters) and the 2009 Global Platform for Disaster Reduction conference which emphasized the increasing commitment of the international community to DRR and emergency preparedness. The scope of the Pan American Health Organization's Program for Disaster Preparedness and Response over the past three decades has expanded to include disaster risk reduction, including concerted efforts to make health facilities safer and better prepared to respond to disasters. The World Disaster Reduction campaign on Hospitals Safe from Disasters and the allied 2009 World Health Day theme have given prominence to health issues in the disaster risk reduction community and helped draw attention to the health sector's role in DRR and emergency preparedness. This has led to the establishment of the global thematic platform on disaster risk reduction for health. These developments all contribute to the improvement of HEM and how PHC can contribute to this process needs to be better understood.

The concept of bridging HEM and PHC is relatively new. Van Damme *et al* (1) suggested that an adapted strategy combining characteristics from PHC and emergency medical assistance would have to be developed, recognizing that emergency medicine is not synonymous with the broader concept of health emergency management. Strengthening health systems based on PHC principles can provide the basis of community-centered health emergency management, while strengthening health emergency management offers protection of the health system and public health.

The concept and importance of PHC was re-emphasized in the 2008 World Health Report.² This report has re-focused the world's attention on the renewal of PHC as a set of values and principles for all sectors. Evidence from high income countries suggests that access to comprehensive PHC improves health outcomes. The literature also supports the concept that an integrated approach to primary care can improve health in low income countries.³ This global re-emphasis of PHC recently necessitates the health sector and the broader disaster community to think about HEM from the perspective of primary health care.

Primary health care, PHC, as defined in the World Health Report 2008, may be depicted as a strategy to organize health systems and society to promote health which is embedded in a set a values and principles for guiding the development of health systems. This includes; universal coverage for all people to have access to health care, people-centered services which focuses health service delivery at a community level, healthy public policies from all sectors aimed at improving health and effective

leadership of the health system which promotes participation of all components of society to address public health needs.²

Understanding both how PHC is perceived and understood in the literature and what key disaster topics related to PHC are being published is an important step to be able to lay the foundation of a PHC strategy for disaster risk management.

The objective of this literature review was to document two areas. First, how in the general published literature are disasters and PHC and primary care being conceptualized. Second, to document what topics and lessons learned are being published regarding disasters and primary health care. These results will help to develop an understanding of how we comprehend PHC in the context of disasters and the relationship between PHC and health emergency management as well as identify key lessons learned, gaps and future directions.

Methods

This literature review was conducted by searching online scientific and grey literature databases. These included the following: *Medline*, *Embase*, *PubMed*, *Reliefweb*, *National Library of Medicine (NLM)*, *Central American Network for Disaster Health Information (CANDHI)*, *SCIRUS*, (scientific database), *Federal Emergency Management Agency (FEMA)*, *AccessUN*, *PAIS*, *National Fire Protection Agency*, *CINHAL*, (Cumulative Index to Nursing and Allied Health Literature), *WHO regional databases* and the internet (via Google Scholar). *Primary Health Care* or *Primary Care* coupled with the term *disaster* was searched in either title or abstract fields. However, in some grey literature sources the terms were searched as a keyword because more restrictive searches revealed negligible search results. This process revealed a large pool of potential articles as of June 2009.

From the potential articles, redundancies were excluded as well as those that did not follow the 2009 International Strategy for Disaster Risk Reduction (*ISDR*) definition of *disaster* or the 1978 World Health Organization definition of *Primary Health Care* or *Primary Care*. Due to the common usage of emergency in medicine, the term 'emergency' elicited mostly unrelated results and therefore was not used. National Library of Medicine and Reliefweb searches were restricted to English text limits due to diversity of languages offered within these databases. Overall, 119 articles were retrieved via the search criteria.

Results

How PHC/PC is Conceptualized

The terms *Primary Health Care* and *Primary Care* are very often used interchangeably in almost all of these articles. Only 7% (8/119) clearly defined the term primary health care or primary care in the context of the paper.

Fifty percent (59/119) of the papers use the term primary health care and primary care to mean the *care provided by certain clinicians*, most commonly physicians in high income countries (89%). Forty four percent describe primary health care and primary care by *the actual activities that were done* such as act as gatekeeper, immunizations, prescriptions, and provision of basic medical services. Twenty one percent describe a set of *attributes that the system* would provide like accessibility, continuity, utilization and also level of care. *Community oriented care* as a concept was only discussed in four papers.

Only 4% (5/119) of papers emphasized the values and principles of primary health care, including human rights and social justice, for guiding the development of health systems.

Total Number Articles	% Articles Targeting LIC	% Authors from LIC	% Research Papers (excluding case reports)	% of Research Papers with LIC Focus
119	29% (35/119)	8% (10/119)	16% (19/119)	42% (8/19)

Redwood-Campbell © 2011 Prehospital and Disaster Medicine

Table 1—Characteristics of articles retrieved (LIC = low income country)

These were highlighted in examples of large international organizations as well as the US-based community health center (CHC) models.

Characteristics of Articles Retrieved

Table 1 describes the characteristics of the articles retrieved. Only 29% target low income countries where disasters are more common and 16% included research.

Topics and Lessons Learned

There is strong support in the literature for the importance of primary health care (as widely described) in preparedness, response and recovery.^{4–9} These comments originate from a variety of countries, high income to low income including the United States, Armenia, and Pakistan.^{5–9} Primary health care often has been described as a very important component of the health sector with respect to health needs during disaster, and therefore should be incorporated in the planning for response to these events.

The majority of the literature related to PHC and disasters stems from disaster response, with less specific literature focusing on DRR, preparedness and recovery. Table 3 summarizes the most common themes encountered from the primary health care literature.

Preparedness—In terms of preparedness, there are some examples in the US¹⁰ and the United Kingdom^{11, 12} that using current PHC infrastructure can help build capacity for community disaster risk reduction and for disaster response (The community health center example in the US and primary care trusts in the UK). Also, building infrastructure for surge capacity in the primary health care system including employing strategies that are not normally used has been described.^{13, 14} Examples include surge capacity of the known health care providers, but also consideration of roles of lay people in the health response, as well as alternate models of care like the Canadian example of home based hospital care.¹⁵

Response—Strong messages for disaster response include the need for mental health^{16–39} and chronic disease interventions^{5, 10, 16, 33, 40} soon after the disaster and during conflicts, primary care team roles needing to be modified during disasters,¹⁸ and the importance of identifying vulnerable groups^{41–48} in disaster-affected communities. Models of care described include the use of mobile clinics,^{49, 50} the advantage of using distant sites to provide clinical care, and the importance of Disaster Medical Assistance Teams (DMAT)⁴² and army hospitals⁹ focusing on mostly primary health care services and only dedicating a smaller part of the work to other services like surgery.

Recovery—Utilization patterns of primary health care facilities after a disaster have been demonstrated to be elevated for periods

of longer than a year.^{13,20,31,51,52} This increased utilization pattern is not just related to servicing the needs of the injured, but also reflects the psychosocial needs of those who were affected by the disaster. Other rebuilding concepts include how to best rebuild health facilities, to integrate risk reduction into recovery and reconstruction, and to rebuild the health system using a PHC-centered approach.

Health care reform in Mexico before and after the 1985 earthquake is an example of how cuts in health care programs are not inevitable in response to emergencies or disasters. Soberon *et al* describe the importance of a universal and equitable health system when the majority of a population is in need.⁵³ This resonates with the emphasis on a PHC approach.

Bremer, using the 2001 Gujarat earthquake experience, considers how assigned indicators (the eight elements of the PHC system based on the 1978 Alma Ata) for measuring the level of health care, together with the assessments of vulnerability may improve disaster preparedness and management.⁵⁴ In addition to mapping disaster prone areas and identifying vulnerabilities, documenting strengths of the health care system were crucial to the strategic development of preparedness and relief. In the US primary health care facilities have access to the 'primary care facility and program assessment guide' to determine needs for disasters.⁵⁵

Discussion

Literature

The literature, although arguably not often methodologically strong, (Table 2) does however highlight the importance of primary health care in HEM. A limitation of this review is that it targeted mostly the published and available literature. This may represent publication bias. Since much of this literature and lessons learned in disasters are often not published formally, perhaps most important lessons are still waiting to be shared.

The term 'disaster' as defined by ISDR 2009 was used as a search term. The term 'emergency' was not used because it elicited a large number of unrelated topics. When 'health emergency management' was searched with 'primary health care', no reference sources were found.

The lack of clarity about the terminology, for both the term *primary health care* and *health emergency management* is a challenge. For example, the terms primary health care and primary care are often used interchangeably and the definitions and conceptual understanding about what PHC is still varies in the literature and in practice. This is despite the Alma Ata declaration and the 2008 World Health Report, where PHC is clearly defined as a health system based on clear managerial and organizational structure. Components of PHC differ considerably as demonstrated by Haggerty *et al*, where >25 operational

Level of Evidence*	Number of Papers in this Category
Level A: Well conducted RCT	0
Level B: Well conducted case control, uncontrolled RCT, observation studies with high potential for bias, case series or reports, conflicting evidence with more support	33 (14/33 case reports)
Level C: Expert opinion/policy/framework	13
Number of articles meeting criteria for scientific level of evidence	46/119

Redwood-Campbell © 2011 Prehospital and Disaster Medicine

Table 2—Level of Evidence (n = 119)*taken from Hadorn DC *et al*⁶³

definitions of attributes have been described.⁵⁷ The term “primary care” has also been defined in various ways. When primary care is distinguished from PHC, the definition of primary care usually refers to care provided by certain clinicians including a set of activities that primary care ‘does’ and a level of care as an entry point into the system. Primary care is often more closely associated with the PHC principle of person-centered care which also provides comprehensive and integrated responses and continuity of care.² Recent literature in the field of primary health care has called for greater clarity when specifying PHC in terms that allow for more standardized measurement and rigorous evaluation.³ A method to improve this situation is to encourage publication of literature using the WHO definitions of primary health care as the standard by which PHC and primary care is described in the literature.

Similarly, the terms related to health emergency management are not always clear. The key words; emergency, disaster, crisis, risk, humanitarian action, risk reduction, mitigation, preparedness, response, recovery, rehabilitation, reconstruction, hazard and vulnerability are not clearly defined when used in the literature.

In terms of disasters, there is a large body of experience in primary health care which is not documented, or if it is reported, is largely inaccessible. Many health personnel from government and non governmental organizations (NGOs), for example, have experiences working in PHC or primary care disaster settings. Although this has improved with the advent of the internet, the NGO community, governments and others involved in the health sector in disaster risk reduction, preparedness, response and recovery must be encouraged to share these experiences.

Open and available publication is the only way to make lessons identified in evaluations and reports easily accessible to the global community. Another limitation is that the articles were sometimes limited to English in certain databases. Future reviews might find benefit in searching other languages in greater detail, with the example of Spanish language articles originating in Latin America as one further option.

Not unexpected was the observation that although low income countries are most affected by disasters, the majority

of published literature still reflects experiences in high income countries. In addition, most of the studies and documents do not include adequate representation of authors from low income countries. This is not unique to the topic of disaster primary health care.⁵⁶ There may be multiple reasons for this imbalance such as inadequate research partnerships between high and low income countries, lack of funding and time for researchers in low income countries and possibly lack of experience, expertise, and mentorship in health research. In order to hear the message and experiences of colleagues in low income countries, the research community needs to be cognizant of the importance of working in partnerships with colleagues from the north and south in true collaboration.

The missing pieces

The literature describes primary health care and medical assistance in disasters as concepts that have not, as of yet, been brought together effectively. The challenge has been that they have been conceived as fundamentally different models of providing health care. The reality in disaster situations is that both are needed together.^{3,58} A description of the possible synergies between the four strategic areas of the PHC renewal process and humanitarian health action is described in the World Health Organization Health Action in Crisis annual report.⁵⁹ Humanitarian Health Action has also been considered as part of the PHC renewal strategy in this document.

The literature does not reflect an extensive conceptualization of PHC for emergencies and disasters. On the other hand, the disaster literature is reporting the importance of PHC as part of the disaster response and DRR and emergency preparedness agenda. This development, combined with the reality of more than 1.3 billion people being faced with emergencies and humanitarian crisis, makes a strong case for the re-examination of PHC in disasters and emergencies and creates an opportunity to ask how to best bridge PHC and Health Emergency Management, and especially emergency medical assistance.

Most of this literature did not overtly describe the link between primary health care initiatives and the values and

Health Emergency Management Theme	PHC care Theme/Subtheme	Key points in literature
Response	Specific health issues/ diagnosis/ patterns of illness	Mental health ^(16–39) and chronic disease ^(5,10,16,33,40) overwhelmingly described as most important interventions soon after disaster.
Response	Service delivery	Models of care; use of distant sites, DMAT ⁽⁴²⁾ and army hospitals ⁽⁹⁾ emphasizing the importance of PHC, mobile services, ^(49,50) the need for more clinical guidelines and evaluations of clinical effectiveness.
Response	Team characteristics	Health care team role needs to be different during disaster response. ⁽¹⁸⁾
Recovery (rebuilding)	Building back health facilities and restoring services	Rebuilding the structures and functionality of health system, including with links for referral within the health system.
Recovery	Service utilization	Increase utilization of PHC system for up to a year after disaster. ^(13,20,31,51,52)
Preparedness (disaster response planning) and response (disaster needs assessment)	Vulnerable groups	NACHC (US National Association of CHCs) strong push to support CHC in disaster preparedness for vulnerable group ^(42,53) increase funding, changing insurance for health care workers, reinstate statutory construction authority, enact changes to Medicare law etc. Important to identify people with vulnerabilities, including poverty, lack of access to health care, children's needs, underserved ⁽⁴³⁾ , HIV ⁽⁴¹⁾ in planning in high-risk children ^(44–48)
Preparedness and needs assessments	Using PHC indicators to assess vulnerability	Mapping disaster prone areas using the eight elements of PHC ⁽⁵⁴⁾
Preparedness/Response planning	Using current PHC infrastructure to determine how to plan for disaster response- good examples of this is high-income countries where PHC is strong	CHC (USA example) not normally used to emergency planning, but aware of need to increase capacity to do this. Primary Care Trusts-UK example- how the PCT can be integral to planning for emergencies ^(10–12,64,65)
Preparedness (disaster response planning)	Surge capacity	Very important to plan surge capacity in PHC- may employ strategies not normally used-ex. Home based hospital care ⁽¹⁵⁾ , not just MDs, lay nurses etc. ^(13,14)
Preparedness	Training needs	CHC physicians report training needs with respect to emergency roles/responsibilities, decontamination and containment, personal preparedness. ⁽¹⁴⁾ Effective mental health training and consequent change of practice of PHC staff; part of humanitarian assistance in Sri Lanka in LIC after disaster. ⁽¹⁷⁾ Training programs provide enhanced surge capacity ⁽⁶⁶⁾ North American family medicine residency programs for international health
Preparedness (response planning)	Lessons learned from history—pandemics	Using 1918 influenza pandemic for contemporary planning- physicians roles in pandemic planning. ⁽⁶⁷⁾
Disaster Risk Reduction in Recovery	Health systems strengthening in recovery	Window of opportunity ⁽⁵³⁾ after disaster or during stability to build in DRR/EP concepts into health reform platforms.

Redwood-Campbell © 2011 Prehospital and Disaster Medicine

Table 3—Themes: Primary health care and disasters (CHC = Community Health Center)

principles of human rights, social justice or health equity as described in the World Health Report 2008.² When this link was identified, it was predominantly by some of the large international organizations.^{2, 4, 10, 59} Community health

centers in the United States, by nature of their mandate to serve low income and medically underserved communities, identify equity as a key for the provision of primary healthcare in preparing and responding to disasters.¹⁰ The healthcare

reform in Mexico after the 1985 earthquakes emphasized the importance of a universal and equitable health system through an ambitious primary care program.⁵³ Interesting also is the fact that few publications described the humanitarian principles as the basis of either the work being done or the paper being written.

Given the nature of disasters and conflict and primary health care needs, the humanitarian principles and the WHO values of health equity, health of communities, reliable health authorities and participation, these should be the foundation of all primary health care initiatives related to disasters. How to actually integrate these concepts into decision making, programming and service delivery in health and social sectors at all levels is the next step.

There continues to be a lack of 'multidisciplinary' and 'multi-sector' co-authorship' in the literature. The majority of papers published are case reports from the provider experience, navigating the system during a disaster. If these articles, for example, included the combined perspectives of different types of health care providers, policy makers, health planners, government and educators, the lessons learned, links to policy, legislation and education would be much stronger. Instead, these experiences are fragmented without the holistic or larger perspective often demonstrated.

The applicability of lessons learned from high to low income countries is salient and requires consideration. It appears that some lessons learned from high income countries could sometimes be applied to low income countries, but would need to be evaluated for that specific context. It is still unclear as how to best support primary health care in a country or region with weak primary health care systems. Priorities could be tested with a Delphi consensus of colleagues in low income countries but key disaster indicators for PHC need to be identified and validated with how to best integrate HEM as a key element of the PHC approach.

Developing PHC Specific Disaster Indicators

In order to measure the impact of a disaster on the primary health care system, the Gujarat paper demonstrates how indicators can be developed based on the eight elements of the Primary Health Care system.⁵⁴ These eight elements include; education, local disease control, expanded program for immunization, mother and child family planning, essential drugs, nutrition and food supplies, treatment of diseases and safe water/sanitation. This allows a broad evaluation and assessment of public health. The challenge to date is that the specific indicators representing each of the elements need to be tailored to a disaster setting and then subsequently to the specific context. For example, indicators that may be included for PHC for the disaster context may include: mental health indices, chronic disease rates, and number of primary

health workers and lay health workers educated and trained for rapid response to disasters. Identifying 'disaster related PHC indicators' testing and validation in different settings would allow for the objective measurement of disaster impact on PHC system but it would also significantly contribute to implementation, monitoring, and evaluation of disaster risk reduction, preparedness response and recovery in meeting the health needs of disaster-affected communities.

The International Disaster Response; The PHC Need

There is a very clear message in the literature. If the emergency medical response is not available within the first days after a sudden-impact disaster, then the disaster response for health should focus predominantly on supporting community needs and PHC capacities.^{6,7,11,33,42,49,58,60-62} This has implications for foreign medical teams which are often delayed. Good local infrastructure is needed to support safe and reliable hospitals and other health facilities that will function after the disaster. Restoring access to PHC or primary care services is a priority in health emergencies and disasters and in periods of stability by some international organizations.⁴

How the international community supports primary health care needs will vary and will depend on the context of the affected country. For example, the disaster health response should aim to support and strengthen the current PHC system by capacity building and working with local health care providers in existing community health structures rather than 'importing' international 'care.' An international community that supports locally defined PHC through principles of risk reduction, preparedness and response contributes to a more resilient community.

Conclusions

This review of literature found a relatively limited number of references which relate PHC to the broad field of disasters. The literature consistently reports that PHC is an important aspect of effective health disaster response and recovery, as well as disaster risk reduction for health and emergency preparedness. PHC therefore needs to be given more prominence in strengthening of health emergency management. There is a need to increase the quality of research related to disasters and primary health care which would be assisted by clarification of terminology and to encourage paper authorship from low income countries. There is also still a need for organizations involved in PHC for disasters to publish findings in sources that are accessible. Developing PHC specific indicators related to disasters and validating these indicators will help to reduce risks, strengthen emergency preparedness and make disaster response and recovery more effective, thus improving health outcomes for people at risk of emergencies, disasters and other crises.

References

1. Van Damme WI, Van Lerberghe WI, Boelaert M: Primary health care vs. emergency medical assistance: A conceptual framework. *Health Policy Plan* 2002;17(1):49-60.
2. World Health Report 2008. Primary health care: Now more than ever. Available at: http://www.who.int/whr/2008/whr08_en.pdf. Accessed May 2010.
3. Macinko J, Starfield B, Erinoshio T: The Impact of Primary Healthcare on Population Health in Low and Middle Income Countries. *J Ambul Care Manage* 2009;32(2):150-171.
4. Perrin P, Primary health-care services International Committee of the Red Cross (ICRC),2006.
5. Millin MG, Jenkins JL, Kirsch T: A comparative analysis of two external health care disaster responses following hurricane Katrina. *Prehosp Emerg Care* 2006;10(4):451-456.
6. Kazzi AA, Langdorf MI, Handly N, White K, Ellis K: Earthquake epidemiology: The 1994 Los Angeles earthquake emergency department experience at a community hospital. *Prehosp Disaster Med* 2000;15(1):12-19.
7. Hlady WG, Quenemoen LE, Armenia-Cope RR, Hurt KJ, Malilay J, Noji EK, et al: Use of a modified cluster sampling method to perform rapid needs assessment after hurricane Andrew. *Ann Emerg Med* 1994;23(4):719-725.

8. Handrigan MT, Becker BM, Jagminas L, Becker TJ: Emergency medical services in the reconstruction phase following a major earthquake: A case study of the 1988 Armenia earthquake. *Prehosp Disast Med* 1998;13(1):35–40.
9. Fernald JP, Clawson EA: The mobile army surgical hospital humanitarian assistance mission in Pakistan: The primary care experience. *Mil Med* 2007;172(5):471–477
10. NACHC, Legacy of a disaster: Health centers and hurricane Katrina one year later. USA: National Association of Community Health Centers, 2006.
11. Hodgkin P, Perrett K: The role of primary care in bioterrorism, epidemics and other major emergencies: Failing to plan is planning to fail. *Br J Gen Pract* 2003;53(486):5–6.
12. Tregoning D: The roles and responsibilities of primary care trusts in emergency planning: A report of a major incident in. *Public Health* 2004;118(2):146–150.
13. Mazowita G: Role for primary care in epidemic surge capacity. *Can Fam Physician* 2006;52:563–564, 570–572.
14. Summerhill EM, Mathew MC, Stipho S, Artenstein AW, Jagminas L, Russo-Magno PM, et al: A simulation-based biodefense and disaster preparedness curriculum for internal medicine residents. *Med Teach*. 2008;30(6):145–51.
15. Hogg W, Lemelin J, Huston P, Dahrouge S: Increasing epidemic surge capacity with home based hospital care. *Can Fam Physician*. 2006;52:563–564.
16. Birketvedt GS, Rafeq MA, Stein B, Ho W, Karson T, Smith D, et al: Impact of the world trade center disaster on blood pressure level and depression in a primary care practice in a hospital in New York city. *Am J Hypertens* 2002;15:92A.
17. Budosan D, Jones L: Evaluation of effectiveness of mental health training program for primary health care staff in Hambantota district, Sri Lanka post tsunami. *Journal of Humanitarian Assistance* 2009.
18. Calderon-Abbo J: The long road home: Rebuilding public inpatient psychiatric services in post-Katrina New Orleans. *Psychiatr Serv* 2008;59(3):304–309.
19. Cerić I, Loga S, Sinanović O, Cardaklija Z, Cerkez G, Jacobson L, et al: Reconstruction of mental health services in Bosnia and Herzegovina. *Med Arb* 2001;55(1):5–23.
20. de Bocanegra HT, Moskalenko S, Kramer EJ: PTSD, depression, prescription drug use, and health care utilization of Chinese workers affected by the WTC attacks. *J Immigr Health* 2006;8(3):203–210.
21. Eisenman DP, Stein BD, Tanielian TL, Pincus HA: Terrorism's psychologic effects and their implications for primary care policy, research, and education. *J Gen Intern Med* 2005;20(8):772–776.
22. Freedy JR, Simpson WM: Disaster-related physical and mental health: A role for the family physician. *Am Fam Physician* 2007;75(6):841–846.
23. Lima BR, Training primary care workers in disaster mental health: The experience in Ecuador, April 6–11, 1987. Natural Hazards Research and Applications Information Center, 1988.
24. Lima BR: Primary mental health care for disaster victims in developing countries. *Disasters* 2007;10(3):203–204.
25. Lima BR, Chavez H, Samaniego N, Pompei S, Pai S, Santacruz H, et al: Seriedad del desastre y alteración emocional: Implicaciones para la atención primaria en salud mental en países en desarrollo Disaster severity and emotional disturbance: Implications for primary mental health care in developing countries. *Panamá; Ministerio de Salud* 2008.
26. Lima BR, Santacruz H, Lozano J, Pais, Luna J: Primary mental health care for disaster victims in Armero, Colombia. *Acta Psiquiatr Psicol Am Lat* 1988 Mar. 34(1):13–32 Spanish.
27. Lima BR, Primary mental health care in disasters, Armero, Colombia: The prevalence of psychiatric disorders. Colorado, USA: *Institute of Behavioral Science, University of Colorado*, 1988.
28. Lima BR, Chavez H, Samaniego N, Pompei MS, Pai S, Santacruz H, et al: Disaster severity and emotional disturbance: Implications for primary mental health care in developing countries. *Acta Psychiatr Scand* 1989;79(1):74–82.
29. Lima BR, Santacruz H, Lozano J, Luna J, Pais S: Primary mental health care for the victims of the disaster in Armero, Colombia. *Acta Psiquiatr Psicol Am Lat* 1988;34(1):13–32.
30. Lima BR, Santacruz H, Lozano J, Chavez H, Samaniego N, Pompel MS, et al: Disasters and mental health: Experience in Colombia and Ecuador and its relevance for primary care in mental health in Latin America. *Int J Ment Health Nurs* 1985–1990;19(2):3–20.
31. Polusny MA, Ries BJ, Schultz JR, Calhoun P, Clemensen L, Johnsen IR: PTSD symptom clusters associated with physical health and health care utilization in rural primary care patients exposed to natural disaster. *J Trauma Stress* 2008; 21(1): 75–82.
32. Prasetyawan VE, Maramis A, Keliat BA: Mental health model of care programmes after the tsunami in Aceh, Indonesia. *Int Rev Psychiatry* 2006;18(6): 559–562.
33. Redwood-Campbell LJ, Riddez L: Post-tsunami medical care: Health problems encountered in the international committee of the Red Cross hospital in Banda Aceh, Indonesia. *Prehosp Disast Med* 2006;21(1):1–7.
34. Satore G, Kelly B, Stain HJ: Drought and its effect on mental health: How GPs can help. *Aust Fam Physician* 2007;36:12–990.
35. Schlenger WE, Jernigan NE: Mental health issues in disasters and terrorist attacks. *Ethn Dis* 2003;13(3):89–93.
36. Stein BD, Myers D: Emotional sequelae of disasters: A primary care physician's guide. *J Am Med Womens Assoc* 1999;54(2):60–64.
37. Ursano RJ, Cerise FP, DeMartino R, Reissman DB, Shear MK: The impact of disasters and their aftermath on mental health. *Primary Care Companion to J Clin Psych* 2006;8(1):4–11.
38. Vollath CC Seidler GH: The Tsunami of 2004: Diagnosis of trauma sequelae in primary care. *Dtsch Med Wochenschr* 2006;131(50):2859–2863.
39. Weisaeth L, Dyb G, Heir T: Commentary on “five essential elements of immediate and mid-term trauma intervention: Empirical evidence” by Hobfoll, Watson et al. disaster medicine and mental health: Who, how, when for international and national disasters. *Psychiatry: Interperson Bio Proces* 2007;70(4):337–344.
40. Hospital helps chronically ill prepare for disaster: CMs make sure eligible patients sign up for shelters. *Hosp Case Manag* 2007;15(8):117–118.
41. Clark RA, Besch L, Murphy M, Vick J, Gurd C, Broyles S, et al: Six months later: The effect of hurricane Katrina on health care for persons living with HIV/AIDS in New Orleans. *AIDS Care* 2006;18(1):59–61.
42. Henderson AK, Lillibridge SR, Salinas C, Graves RW, Roth PB, Noji EK: Disaster medical assistance teams: Providing health care to a community struck by hurricane Iniki. *Ann Emerg Med* 1994;23(4):726–730.
43. Patsdaughter C: From primary care for the underserved to emergency aid for hurricane evacuees: Questions raised and lessons learned. *J Cult Divers* 2005;12(3):75–76.
44. Cicero MX, Baum CR: Pediatric disaster preparedness: Best planning for the worst-case scenario. *Pediatr Emerg Care* 2008;24(7):478–481.
45. EMSC, Office PERC: Preparedness for emergency response to children. USA: EMSC National Resource Center, 2002.
46. Gurwitch RH, Kees M, Becker SM, Schreiber M, Pfefferbaum B, Diamond D: When disaster strikes: Responding to the needs of children. *Prehosp Disast Med* 2004;19(1):21–28.
47. Laraque D, Boscarino JA, Battista A, Fleischman A, Casalino M, Hu YY, et al: Reactions and needs of tri-state area pediatricians after the events of September 11th: Implications for children's mental health services. *Pediatrics* 2004;113(5):1357–1366.
48. American Academy of Pediatrics, Psychosocial issues for children and families in disasters: A guide for the primary care physician. Washington, DC: US. Dept. of Health and Human Services, Public Health Service, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services, 1995.
49. Krol DM, Redlener M, Shapiro A, Wajnberg A: A mobile medical care approach targeting underserved populations in post-hurricane Katrina Mississippi. *J Health Care Poor Underserved* 2007;18(2):331–340.
50. Lane DA: American medical support to Sri Lanka in the wake of tsunamis: Planning considerations and lessons learned. *Mil Med* 2006;171(10):9–23.
51. Soeteman RJ, Yzermans CJ, Spreuwenberg P, Lagro-Janssen TA, van den Bosch WJ, van der Zee J: Changes in the pattern of service utilization and health problems of women, men and various age groups following a destructive disaster: A matched cohort study with a pre-disaster assessment. *BMC Fam Pract* 2008;28(9):48.
52. Dorn T, Yzermans CJ, Kerssens JJ, Spreuwenberg PM, Van Der Zee J: Disaster and subsequent healthcare utilization: A longitudinal study among victims, their family members, and control subjects. *Med Care* 2006;44(6):581–586.
53. Soberón G, Frenk J, Sepúlveda J: The health care reform in Mexico: Before and after the 1985 earthquakes. *Am J Public Health*. 1986;76(6):673–680.
54. Bremer R: Policy development in disaster preparedness and management: Lessons learned from the January 2001 earthquake in Gujarat, India. *Prehosp Disast Med* 2003;18(4):372–384.
55. U.S. Bureau of primary health care, health resources and services administration, public health service, Bethesda, MD, 1994. Available at: <http://bphc.hrsa.gov>. Accessed 22 August 2009.
56. Council on health research for development (COHRED). Making health research work for everyone. Available at <http://www.cohred.org/AHA>. Accessed October 2009.
57. Haggerty J, Burge F, Levesque J, Gass D, Pineault R, Beaulieu M, Santor D: Operational definitions of attributes of primary health care; Consensus among Canadian experts. *Ann Fam Med* 2007;5(4):336–344.
58. Fan SW: Clinical cases seen in tsunami hit Banda ache: From a primary health care perspective. *Ann Acad Med* 2006;35(1):54–59.
59. World Health Organization, Health Action in Crises, Annual Report, 2008.
60. Edwards TD, Young RA, Lowe AF: Caring for a surge of hurricane Katrina evacuees in primary care clinics. *Ann Fam Med* 2007;5(2):170–174.

61. Lee VJ, Low E, Ng YY, Teo C: Disaster relief and initial response to the earthquake and tsunami in Meulaboh, Indonesia. *Ann Acad Med Singapore* 2005;34(9):586–590.
62. Smith RA, Traum CC, Poole LH: The provision of primary care during a period of natural disaster or large-scale emergency. *Mass Emerg* 1997.
63. Hadorn DC, Baker D, Hodges JS, Hicks N: Rating the quality of evidence for clinical practice guidelines. *J Clin Epidemiol*. 1996;49(7):749–54.
64. Nicoll A, Wilson D, Calvert N, Borriello P: Managing major public health crises: Lessons from recent events in the United States and the United Kingdom. *BMJ* 2001;323(7325).
65. Ablah E, Tinius AM, Horn L, Williams C, Gebbie KM: Community health centers and emergency preparedness: An assessment of competencies and training needs. *J Comm Health* 2008;33(4):241–247.
66. Puvvula, J, Granados G: Developing an international health area of concentration in a family medicine residency. *Fam Med* 2007;39(9):666–670.
67. Lauer J, Kastner J, Nutsch A: Primary care physicians and pandemic influenza: An appraisal of the 1918 experience and an assessment of contemporary planning. *J Public Health Manag Pract* 2008;14(4):379–386.