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Authors Index

A		G	
A. Kumara swamy	820	G.Srinu	558
A. Sridhar Raj	170	GAO Shi-lei	916
AI Wei	881	GAO Wen	928
AKHTAR Muhammad Junaid Usman	118	GE Shao-hu	936
AKILLI Husniye	809	GE Zhong-quan	936
Alex Brown	143	Geraldine Kennett	155
ANAND Eshwar Ventrapragada	303	GU Zhi-jun	423
Ananya Samajdar	381	GUO Hong-ling	351
Anup Chakraborty	565	GUO Qiong-jie	778
Arie Halachmi	463	H	
Asok Kumar Mukhopadhyay	829	HAN Hong	747
B		Harvey L. White	3
B.P.C. Bose	670	HE Yan-fang	644
BAI Yang	187	Herand Ron Zargarian	722
BAI Yang	312	Hiba Khodr	841
BALKARAN Sanjay	23	HUANG Lin-jia	375
C		HUANG Rong	733
C. V. RAGHAVULU	133	HUANG Yan-fen	411
CAO Xue-yan	657	J	
CEPIKU Denita	118	JARBANDHAN DB (Vain)	954
Ch. Parandamulu	948	Jessica Y. Lau	694
Chakauya Rumbidzayi	101	JI Hua-qiang	249
CHEN Can	437	JIA Chen	747
CHEN Guang	589	JIANG Xian-jin	650
CHEN Hong-bo	866	JIN Hai-he	702
CHEN Min-zhi	866	JIN Jiang-jun	502
CHEN Shao-gang	514	JIN Xiao-chi	430
CHEN Shao-gang	52	JIN Yue-qin	64
CHEN Xiao-lin	778	Joanne Gram	266
CHEN Xiao-zhen	544	Joshua Franzel	143
CHEN Yan	231	K	
CHEN Yi-si	64	K. ARJUN Rao	948
CHENG Shao-pei	943	Kalu N. Kalu	681
CHI Zhen-he	176	Kamaruddin Adulsomad	664
D		Khalil, Samihah	401
D. Paul SUGANDHAR	849	L	
DONG Fan	193	LEI Xu-chuan	367
DONG Shun-xiang	716	LI Chun	478
DONG Yue	520	LI Dan	615
DU Fei	582	LI Hong-quan	709
E		LI Hua-qiang	589
ENDO Tetsuya	573	LI Jing-wen	860
F		LI Shi-yong	629
FAN Zheng	249	LI Shui-jin	754
FEI Yu	418	LI Su-lei	453

LI Wen-li	872	SHI Hong-ping	259
LI Xin	909	SHI Li-li	770
LI Xing-min	41	SHI Qin-fen	894
LI Yuan	922	SONG Jin-lin	430
LI Zhuo-fan	199	SONG Yang	187
LIANG Jian	702	Sueli Dey	565
LIAO Xin	638	SUN Rong	203
LIU Bin	589	SUN Teng	446
LIU Chun-fang	514	SUN Xiao-jun	909
LIU Hong-xia	259	SUO Li-ming	615
LIU Lan-hua	507	T	
LIU Ru-bing	855	TANG Xiang-yan	332
LIU Xiu-hua	535	TANG Zhi-wei	582
LIU Zhen	638	TONG Xing	760
LIU Zhi-yong	231	TU Ding-wen	888
LIU Zhi-yong	733	TU Huo-ming	244
LU Jie	367	U	
LUO Min	860	Ubaldo COMITE	297
LUO Ruo-yu	888	Uma Medury	93
LUO Ting-ting	71	W	
M		Wallace Swan	393
MA Jie	785	WANG Jun-jie	187
MAO Ying	901	WANG Jun-jie	312
MENG Hua	463	WANG Luo-zhong	485
MUKONZA Ricky Munyaradzi	101	WANG Mao-yuan	589
MUPA Li-se	799	WANG Qing-dan	609
N		WANG Qiu-ju	540
Nandita Kaushal	76	WANG Si-qi	589
P		WANG Zhi-hui	418
P. VISHNU Dev	948	WEI Hong-ying	629
P. Mohan Rao	820	WU Chun-hua	596
Payel Sen	107	WU Fang-fang	272
PENG An-ya	520	WU Jin-na	52
PENG Peng	41	WU Shuai	210
Pichetwut Nillaor	664	WU Wei-jun	332
Prabhat Kumar Datta	551	WU Xin-hui	321
Q		WU Xin-ye	34
QI Fan-hua	272	WU You-fu	249
QI Ming-yue	224	X	
QIN Ying	485	XI Yan-le	909
QIU Si-jia	799	XIAO Ming-zheng	321
QUE Tian-shu	494	XIAO Ping	326
R		XIE Mei	770
Raymon R. Bruce	14	XIONG Jie-chun	216
Roland V. Anglin	694	XU Feng-qi	866
Roopinder Oberoi	281	XU Guang-jian	855
S		XU Jia-liang	526
Salihu, Abdulwaheed A.	401	XU Jie	238
Samihah Khalil	664	XU Jun	722

XU Wan-su	326	ZHANG Xiao-dong	916
XUE Xiao-dong	375	ZHANG Xiao-wei	778
XUE Xiao-dong	901	ZHANG Zhen	360
Y		ZHANG Zhen	446
Y. PARDHASARADHI	849	ZHANG Zhen	602
YANG Cong-kun	629	ZHAO Chun-xia	338
YANG Hong-tao	453	ZHAO Guo-qin	224
YANG Jing	922	ZHAO Jian-hui	326
YANG Jun	791	ZHAO Juan	244
YANG Lin	791	ZHAO Shu-rong	52
YANG Xiao-fan	203	ZHAO Shu-rong	943
YANG Yi-fan	520	ZHAO Xin-feng	478
YI Cheng-zhi	739	ZHAO Xin-feng	754
YI Xiao-li	872	ZHAO Yan-xia	193
YU Jing-xi	622	ZHONG Yi	785
YU Lai-lei	182	ZHOU Lu-yao	46
YU Yu	894	ZHOU Mei-duo	430
Z		ZHOU Xian-yong	589
ZHAN Xun	716	ZHOU Yang-jing	360
ZHANG Dao-jie	916	ZHU Si-qin	609
ZHANG Fang-shan	216	ZHU Xiao-ning	345
ZHANG Hai-bo	760	ZHU Xiao-ning	544
ZHANG Han-yu	872	ZHU Xiao-ning	602
ZHANG Jian-ming	199	ZHU Xiao-ning	622
ZHANG Jia-xin	345	ZHU Xiao-ning	638
ZHANG Li	727	ZHU Xiao-ning	71
ZHANG Ming-jun	34	ZHU Xiao-ning	727
ZHANG Xian	657		

Contents

Part One Roles of Governments and Markets

Facilitating Continuity of Healthcare after Disasters: What Do We Know?	Harvey L. White	3
A Theory of Ethics & Governance as Imperative Regimes of Regulated Freedom	Raymon R. Bruce	14
The Ineffectualness of Parliamentary Oversight and Accountability Models: Implications on Public Participation and the Passing of Quality Legislation in South Africa	BALKARAN Sanjay	23
Government Regulations and NPOs' Participation in Emergency Management —Taking American Public Policy for Example	ZHANG Ming-jun WU Xin-ye	34
The Research on Government Credit Problems of China during the Social Transformation Period		
.....	PENG Peng LI Xing-min	41
Research on the Distribution of Innovation Sources in Chinese Local Government Innovations: Taking Hangzhou as Example	ZHOU Lu-yao	46
The Empirical Research on the Relationship between China's Stock Market and Macro Economy		
.....	ZHAO Shu-rong CHEN Shao-gang WU Jin-na	52
Innovation and New-type Industrial Policies: In the Case of Renewable Energy in China		
.....	JIN Yue-qin CHEN Yi-si	64
Building Public Trust in Local Government in Transition China	ZHU Xiao-ning LUO Ting-ting	71
An Insight into Energy Crisis in India	Nandita Kaushal	76
Public Value Approach: A Post—New Public Management Perspective	Uma Medury	93
Is Devolution a Panacea for Governance Challenges? Views and Perceptions on Zimbabwe's Devolution of Power Debate	MUKONZA Ricky Munyaradzi Chakauya Rumbidzayi	101
Whither Community Participation: Community Development Society in Urban West Bengal		
.....	Payel Sen	107
Decentralization Process in Irrigation Sector in Punjab of Pakistan		
.....	AKHTAR Muhammad Junaid Usman CEPIKU Denita	118
Regulatory Institutions in India: Some Issues	C. V. RAGHAVULU	133

Part Two Human Resources, Public Services and Social Security

The Professionalization of Subnational Government Employees: The Role of Public Sector Retirement Plans	Alex Brown Joshua Franzel	143
The Impact of Training Practices on Individual, Organisation and Industry Skill Development		
.....	Geraldine Kennett	155
A New Performance Management Framework for Public Administration in the 21 st Century		
.....	A. Sridhar Raj	170
China's Public Policy on Social Security—From Perspective of Pension	CHI Zhen-he	176
Philosophical Paradigm Transformation of China Planning: From Subjectivity to Inter-subjectivity?		
.....	YU Lai-lei	182
Research on the Fundamental Path to Optimize Democratic Evaluation System for the Government's Leading Cadres in China: The Application of 360-degree Feedback Based on Competency Model		
.....	BAI Yang WANG Jun-jie SONG Yang	187
Social Benefits Evaluation of New Rural Residential Construction Based on AHP in China		
.....	ZHAO Yan-xia DONG Fan	193
Research on the Realization Ways of Basic Public Service Equalization in China's Urbanization Process		
.....	ZHANG Jian-ming LI Zhuo-fan	199
A Study of Social Organizations to Meet the Demand of Urban Poverties: Based on the Survey Data Analysis of Shanghai Y District	SUN Rong YANG Xiao-fan	203

The Role of Non-profit Organizations in Public Services Provision in Contemporary China: A Multi-case Study	WU Shuai	210
An Empirical Investigation of Components of Responsible Conduct of Chinese Local Civil Servants —An Analysis Based on Survey Questionnaires to the MPA Students.....	XIONG Jie-chun ZHANG Fang-shan	216
Cross-boundary Cooperation in Public Service: Based on the Case Study of Beijing.....	ZHAO Guo-qin QI Ming-yue	224
A Collaborative Mechanism Study on Plural Subjects of Rural Public Goods Supply in China.....	CHEN Yan LIU Zhi-yong	231
Policy Research on Promotion Employment Rate for the Youth in China—Based on a Survey in Y District of Shanghai.....	XU Jie	238
The Research of Public Sector Human Resource Competency Model Construction	TU Huo-ming ZHAO Juan	244
A General Introduction to PR Development in China from 2006 to 2010.....	JI Hua-qiang WU You-fu FAN Zheng	249
Study on Relief System of Administrative Contract in China	LIU Hong-xia SHI Hong-ping	259
Changes in United States Public Service Retirement.....	Joanne Gram	266
Research on the System of Competition-for-posts.....	QI Fan-hua WU Fang-fang	272

Part Three Ethics and Integrity

Mapping the Matrix of Corruption—Tracking the Empirical Evidences and Tailoring Responses.....	Roopinder Oberoi	281
The System of Accountability in the Italian Public Administration: A Managerial Approach	Ubaldo COMITE	297
Probity in Governance: Towards Institutional Integrity	ANAND Eshwar Ventrappagada	303
Challenges and Opportunities in Crisis: What is the Role of the Public Leadership?	WANG Jun-jie BAI Yang	312
How Do Chinese Public Leaders Lead: A Literature Comparative Study ...	XIAO Ming-zheng WU Xin-hui	321
The Responsibility of Government for Medical and Health Services	XIAO Ping ZHAO Jian-hui XU Wan-su	326
The Predicament and Reform of the Judicial Review of Administrative Guidance in China.....	WU Wei-jun TANG Xiang-yan	332
Analysis of the Characteristics of Deng Xiao-ping's Thoughts on Administrative Management.....	ZHAO Chun-xia	338
Dual Effects of the Online Political Participation and Government's Response in China	ZHU Xiao-ning ZHANG Jia-xin	345
Characteristics of Ethical Leadership: A Cross-culture's Comparative Analysis	GUO Hong-ling	351
The Administrative Ethical Examination of Dilemmas in China's Old City Reconstruction.....	ZHOU Yang-jing ZHANG Zhen	360
Democratic Conceptions and Regime Support among Chinese Citizens	LEI Xu-chuan LU Jie	367
Study on Countermeasures for Administrative Ethic Disorder of Public Servants in China.....	XUE Xiao-dong HUANG Lin-jia	375
An Assessment of Local Government Accountability: Mechanisms and Their Operation in Gram Panchayats in Two Indian States.....	Ananya Samajdar	381
Integrating New Technologies: The Status of Hybrid, Online and Face-to-face Public Administration Courses.....	Wallace Swan	393

Part Four Budgetary and Fiscal Transactions

Goods and Services Tax (GST): Quest for Building a Sustainable, Equitable and Efficient Revenue Base	Khalil, Samihah Salihu, Abdulwaheed A.	401
Impacts of China's Resource Taxation Reform on the Price Level of the Related Sectors	HUANG Yan-fen	411
Evolution of Central-local Fiscal Relations in China	WANG Zhi-hui FEI Yu	418
The Changes of Power Structure and Public Budgetary Reform in China	GU Zhi-jun	423
Australian Department Budget Documents and Its Enlightenment to Chinese Department Budget	ZHOU Mei-duo JIN Xiao-chi SONG Jin-lin	430
Educating Citizens Online about Budgeting: An Empirical Evaluation of Web—Based Citizens' Guides to the Budget in Local Governments in the U.S.	CHEN Can	437
Township Government's Administrative System Innovation of China in the Post-agricultural Tax Era	ZHANG Zhen SUN Teng	446
Empirical Study on Causal Analysis of Present State of Venture Capital in China	YANG Hong-tao LI Su-lei	453

Part Five Governance

Citizen Participation and City Branding: A Comparative Case Study of Xiamen (China) and Nashville (USA)	Arie Halachmi MENG Hua	463
On the Balance of Elite Democracy and Popular Democracy in Process of Participatory Budget in China: An Empirical Analysis Based on Chinese Cases	ZHAO Xin-feng LI Chun	478
A Study of Trans-department Co-operation Mechanism in the Governance of Public Crisis in China	WANG Luo-zhong QIN Ying	485
A Study on Government's Response to Network Public Opinion Based on the Dimension of Governance	QUE Tian-shu	494
Governmental Informatics: A New Discipline on E-government	JIN Jiang-jun	502
Network Governance and Its Governance Instruments Innovation: Enlightenment and Challenges for China	LIU Lan-hua	507
An Empirical Study on Effecting Factor of Income Disparity between Urban and Rural Residents in China	CHEN Shao-gang LIU Chun-fang	514
The Exploration of Chinese Deliberate Democracy and Local Governance: Experience from the Village's Council in Chengdu City, China	YANG Yi-fan DONG Yue PENG An-ya	520
Study on Governance Structure of the Third Sector's Legal Person	XU Jia-liang	526
A Research about the Cooperation Governance for Social Stability in Transitional China: An Empirical Analysis ...	LIU Xiu-hua	535
Challenges and Expectations of Chinese Governance Model in the Internet Age	WANG Qiu-ju	540
Study on Cloud Allocation of Public Service Resource of Metropolis	CHEN Xiao-zhen ZHU Xiao-ning	544
The Cabinet Form of Metro-city Governance: Lessons from India's West Bengal	Prabhat Kumar Datta	551
ICTs for a Global Civil Society and Facing the Global Challenges	G. Srinu	558
Big Impact through Big Data: Potential of Big Data in the Indian Public Sector	Anup Chakraborty Sueli Dey	565

Part Six Emergencies and Catastrophic Events

New Dimension of Leadership and Organization Strategy—In the Case of City of Kamaish, Iwate Prefecture, Recovery Support from the Great East Japan Earthquake	ENDO Tetsuya	573
A Study on Behavior of Network Group Using Qualitative Simulation Based on QSIM Algorithm in the Context of Public Crisis	TANG Zhi-wei DU Fei	582

The Early Warning Model and Resolving Mechanism of Social Conflicts Based on TRIZ	
..... CHEN Guang ZHOU Xian-yong WANG Si-qi LI Hua-qiang WANG Mao-yuan LIU Bin	589
Crisis Management and Government Function Transformation	WU Chun-hua 596
Study on Emergency Risk Management from Perspective of Chinese Unexpected Public Events	
..... ZHANG Zhen ZHU Xiao-ning	602
Establishment of Chinese Government Emergency System from Perspective of Multi-element Joint Action.....	
..... WANG Qing-dan ZHU Si-qin	609
Research of Relative City Social Risk and Its Evaluation Mechanism	LI Dan SUO Li-ming 615
Research on Social Change in Wenchuan Earthquake.....	YU Jing-xi ZHU Xiao-ning 622
Research on the Blocking Mechanism of the Transformation from Group Unemployment to Mass Incidents in China	WEI Hong-ying YANG Cong-kun LI Shi-yong 629
Study on Changing of Food Industry Development Model for Food Safety Issues in China.....	
..... ZHU Xiao-ning LIAO Xin LIU Zhen	638
Research on Overcapacity Risk of Chinese Steel Industry—Taking ANSTEEL for Example.....	HE Yan-fang 644
Food Security Countermeasures from the Perspective of the Crisis Management in China—An Empirical Study	
..... JIANG Xian-jin	650
Analysis on Network Public Opinion Factors and Government Guiding Strategy in Public Crisis Events in China...	
..... CAO Xue-yan ZHANG Xian	657
How to Use the Local Administrative Organizations to Reduce Casualties from Natural Disasters and to Create a Sustainable Disaster Management: The Case of Nakorn Sri Thammarat Province.....	
..... Pichetwut Nillaor Kamaruddin Adulsomad Samihah Khalil	664
Organization for Disaster Management in India.....	B.P.C. Bose 670

Part Seven Networks and Partnerships

All That Glitters: Competing Narratives and Transaction Costs in Complex Collaborative Environments.....	
.....Kalu N. Kalu	681
Reimagining Collaboration: The Case of Local and Community Economic Development in the United States.....	
.....Roland V. Anglin Jessica Y. Lau	694
Study on Local Government IT Resources Sharing Model Based on Cloud Computing	
.....JIN Hai-he LIANG Jian	702
The Mechanism of the Internet Society Order and Its Monitoring System	LI Hong-quan 709
An Analysis of Media Resonance' Impact on Public Policy Agendas—A Case Study of “Sanya Customer Fleeing Gate”	DONG Shun-xiang ZHAN Xun 716
The Global and Local Roles of Non-governmental Organizations in Resolving Public Problems.....	
.....XU Jun Herand Ron Zargarian	722
A Dimensional Analysis on “Social Stability—Public Concern” of Government Administration in the Case of Internet Mass Disturbances	ZHU Xiao-ning ZHANG Li 727
Micro blog: New Means for the Work of Government Public Relations.....	HUANG Rong LIU Zhi-yong 733
Analysis on the Evolution Mechanism of Mass Emergency Network Opinion	YI Cheng-zhi 739
A Study of the Strategies of the Political Participation of Micro-blog in the Background of Web2.0	JIA Chen HAN Hong 747
Structuring the Strategic Partnership Mechanism between the Government and Citizens in the Network Era in China	LI Shui-jin ZHAO Xin-feng 754
Structure and Evaluation of Self and Mutual Rescue Capacity of Local Residents in Disaster: An Empirical Study in Jiangsu Province	ZHANG Hai-bo TONG Xing 760
Research on the Effect of Diffusion of Information for Official Microblog of Local Government in China.....	
.....SHI Li-li XIE Mei	770
Study on the Role of NGOs under the Interest Expressing Mechanism for Group Event in Chinese Western Region	CHEN Xiao-lin GUO Qiong-jie ZHANG Xiao-wei 778

Application of Personalized Recommendation Services in E-government.....	ZHONG Yi MA Jie	785
Study on Complexion of Cyber Public Opinions with Resonance Effect of Events group: Take the Typical Western Mass Disturbance for Example.....	YANG Jun YANG Lin	791
Evaluation of Governmental Micro Blogs' Influence on Chinese College Students' Online Public Opinions: Based on Agenda Setting Theory.....	QIU Si-jia MUPA Li-se	799
Some Problems about Participatory Irrigation Management: The Case of Antalya Irrigation Associations	AKILLI Husniye	809
Community Policing Experiments in India	A. Kumara swamy P. Mohan Rao	820
Public-Private Partnership for Good Governance.....	Asok Kumar Mukhopadhyay	829

Part Eight Global Developments in Public Administration and Others

Investigating New Public Management Implementation in Lebanon: Ideas and Realities	Hiba Khodr	841
Teaching and Research in Public Administration in Post-globalized World: Challenges and Prospects.....	Y. PARDHASARADHI D. Paul SUGANDHAR	849
An Study on Improving of Hainan Educational Poverty Alleviation Mode.....	LIU Ru-bing XU Guang-jian	855
“BRICS” Public Administration: Challenges and Responses.....	LUO Min LI Jing-wen	860
Review on Chinese Local Government Executive Ability Since 2005	CHEN Hong-bo XU Feng-qi CHEN Min-zhi	866
Studying the Tourist Satisfaction of Convention & Exhibition Based on Structural Equation Modeling —Evidence from 2010 Shanghai Expo	YI Xiao-li LI Wen-li ZHANG Han-yu	872
The Application of Contract Idea in the Process of the Non-administration of Chinese Universities	AI Wei	881
The Local Government Cooperative Behavior Analysis of Western China Economic Growth Mode Transformation	LUO Ruo-yu TU Ding-wen	888
Measuring the Value-added Efficiency of Knowledge Value Chain in Chinese Universities: A DEA Approach	YU Yu SHI Qin-fen	894
Research on the Government Supervision and Management in Public Rental Housing Construction—Chongqing...	MAO Ying XUE Xiao-dong	901
Research on the Problem of International Public Goods Supply Body	LI Xin XI Yan-le SUN Xiao-jun	909
On Chinese Government Functions in Culture Industry Development	ZHANG Dao-jie ZHANG Xiao-dong GAO Shi-lei	916
A New Method of Public Organizational Structure and Behavior Research: SNA and Application.....	YANG Jing LI Yuan	922
The Status and Role of Chinese County Governments in the Safeguarding of Intangible Cultural Heritage: Example from Sichuan Qingshen Bamboo Handicrafts	GAO Wen	928
The Effects of New Public Management Theory on Administrative Practice in China	GE Shao-hu GE Zhong-quan	936
Study on the Countermeasures for Sichuan Natural Gas Industry Strategies from the Perspective of International Energy Security	CHENG Shao-pei ZHAO Shu-rong	943
ICTs and Women Empowerment in India: The Kerala Experience.....	P. VISHNU Dev K. ARJUN Rao Ch. Parandamulu	948
The Administrative Dynamics of Developing Leadership Competencies for the South African Public Sector in a Globalized Environment.....	JARBANDHAN DB (Vain)	954

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 emergencies. 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 (Subsecretaria 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 study¹

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 Morehouse 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.