



**NAVAL  
POSTGRADUATE  
SCHOOL**

**MONTEREY, CALIFORNIA**

**THESIS**

**DEFINING THE ROLE OF PUBLIC HEALTH IN  
DISASTER RECOVERY: AN EVALUATION OF STATE  
PUBLIC HEALTH PLANNING EFFORTS**

by

Nicholas E. Davidson

March 2013

Thesis Advisor:  
Second Reader:

Lauren Fernandez  
Anke Richter

**Approved for public release; distribution is unlimited**

THIS PAGE INTENTIONALLY LEFT BLANK

<b>REPORT DOCUMENTATION PAGE</b>			<i>Form Approved OMB No. 0704-0188</i>
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.			
<b>1. AGENCY USE ONLY (Leave blank)</b>	<b>2. REPORT DATE</b> March 2013	<b>3. REPORT TYPE AND DATES COVERED</b> Master's Thesis	
<b>4. TITLE AND SUBTITLE</b> DEFINING THE ROLE OF PUBLIC HEALTH IN DISASTER RECOVERY: AN EVALUATION OF STATE PUBLIC HEALTH PLANNING EFFORTS		<b>5. FUNDING NUMBERS</b>	
<b>6. AUTHOR(S)</b> Nicholas E. Davidson			
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Naval Postgraduate School Monterey, CA 93943-5000		<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
<b>9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> N/A		<b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b>	
<b>11. SUPPLEMENTARY NOTES</b> The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. government. IRB Protocol number ____N/A____.			
<b>12a. DISTRIBUTION / AVAILABILITY STATEMENT</b> Approved for public release; distribution is unlimited		<b>12b. DISTRIBUTION CODE</b> A	
<b>13. ABSTRACT (maximum 200 words)</b> There is very little to direct public health planning for long-term disaster recovery. This research surveyed plans from nine hurricane-prone states to determine the extent to which those plans comply with recently published standards from the Centers for Disease Control (CDC) in 2011. An abstraction form was devised to score each plan and to document novel or innovative components within each plan. Results indicate poor compliance with the CDC standards; 79 percent of the assessments of individual preparedness components resulted in a score of zero (on a scale of zero to four). Particularly notable was a lack of planning for continuity of operations and the insufficient plans for advising residents and partner agencies as to the plans and locations for providing services after a disaster. A complicating factor was the general lack of acceptance, by public health, of the fact that public health recovery should be focused on restoring community services instead of simply restoring operations of public health agencies. This research identifies smart practices that can be adopted by public health agencies in an attempt to ensure a robust level of recovery preparedness.			
<b>14. SUBJECT TERMS</b> Public health, recovery, disaster preparedness, abstraction, planning, continuity of operation, Center for Disease Control and Prevention, hurricanes, hurricane recovery, hurricane Katrina, hurricane Rita, South Carolina, Department of Health and Environmental Control			<b>15. NUMBER OF PAGES</b> 91
			<b>16. PRICE CODE</b>
<b>17. SECURITY CLASSIFICATION OF REPORT</b> Unclassified	<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> Unclassified	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> Unclassified	<b>20. LIMITATION OF ABSTRACT</b> UU

THIS PAGE INTENTIONALLY LEFT BLANK

**Approved for public release; distribution is unlimited**

**DEFINING THE ROLE OF PUBLIC HEALTH IN DISASTER RECOVERY:  
AN EVALUATION OF STATE PUBLIC HEALTH PLANNING EFFORTS**

Nicholas E. Davidson  
Public Health Preparedness Director, South Carolina,  
Department of Health and Environmental Control, Region 2  
M.S., University of South Carolina, 1999  
B.S., McGill University, 1997

Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES  
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL  
March 2013**

Author: Nicholas E. Davidson

Approved by: Lauren Fernandez  
Thesis Advisor

Anke Richter  
Second Reader

Harold A. Trinkunas  
Chair, Department of National Security Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

## **ABSTRACT**

There is very little to direct public health planning for long-term disaster recovery. This research surveyed plans from nine hurricane-prone states to determine the extent to which those plans comply with recently published standards from the Centers for Disease Control (CDC) in 2011. An abstraction form was devised to score each plan and to document novel or innovative components within each plan. Results indicate poor compliance with the CDC standards; 79 percent of the assessments of individual preparedness components resulted in a score of zero (on a scale of zero to four). Particularly notable was a lack of planning for continuity of operations and the insufficient plans for advising residents and partner agencies as to the plans and locations for providing services after a disaster. A complicating factor was the general lack of acceptance, by public health, of the fact that public health recovery should be focused on restoring community services instead of simply restoring operations of public health agencies. This research identifies smart practices that can be adopted by public health agencies in an attempt to ensure a robust level of recovery preparedness.

THIS PAGE INTENTIONALLY LEFT BLANK

# TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	PROBLEM SPACE .....	3
B.	BACKGROUND .....	5
1.	Lessons from Hurricane Katrina .....	5
2.	Public Health Challenges as a Result of Katrina .....	5
a.	<i>Healthcare Infrastructure Challenges</i> .....	6
b.	<i>Sheltering-Related Challenges</i> .....	8
c.	<i>Overarching Issues in Katrina</i> .....	9
C.	RESEARCH QUESTION .....	10
II.	LITERATURE REVIEW .....	13
A.	RECOVERY DEFINED.....	14
B.	AN AUSTRALIAN SOLUTION .....	16
C.	PROGRESS TOWARD RECOVERY .....	17
1.	Gaps in Recovery Planning.....	19
2.	The Need for Recovery .....	21
D.	SUMMARY .....	22
III.	METHOD .....	23
A.	SAMPLE AND DATA COLLECTION.....	23
B.	DATA ANALYSIS.....	23
C.	ANALYTICAL ASSUMPTIONS.....	27
IV.	ANALYSIS .....	29
A.	ANALYTICAL CONTENT.....	29
B.	INTERPRETATION OF THE TERM “RECOVERY” .....	29
C.	LACK OF RECOVERY PLANNING .....	31
D.	IDENTIFICATION OF NEED AND MONITORING .....	33
1.	Function 1 Analysis: Identification of Need and Monitoring .....	34
2.	Function 2: Recovery Operations.....	38
3.	Function 3: Corrective Actions to Mitigate Future Incidents .....	39
4.	Overall Performance by Function .....	40
E.	NOVEL PLANNING COMPONENTS .....	43
F.	SUMMARY .....	43
V.	DISCUSSION .....	45
A.	PLANNING FOR THE EXTREME .....	45
B.	KEY CONCEPTS .....	46
1.	An Absence of Recovery Plans.....	46
2.	Funding-oriented Planning .....	47
3.	Poor Overall Performance .....	47
4.	Innovation in Public Health Preparedness .....	49
C.	LESSONS LEARNED.....	49
1.	Limitations to Interpretation .....	50

2.	Areas of Future Study .....	50
3.	Applicability Elsewhere.....	51
D.	RECOMMENDATIONS.....	52
1.	U.S. Implementation of an Australian Solution .....	52
2.	Opposition to Public Health Recovery Planning.....	54
3.	A Threatening Move? .....	56
E.	SUMMARY .....	58
APPENDIX A.	ATTACHMENT 1: ABSTRACTION FORM INSTRUCTIONS PUBLIC HEALTH PLAN REVIEW: THE ROLE OF PUBLIC HEALTH IN RECOVERY OPERATIONS .....	61
APPENDIX B.	ABSTRACTION FORM PUBLIC HEALTH PLAN REVIEW: THE ROLE OF PUBLIC HEALTH IN RECOVERY OPERATIONS .....	63
APPENDIX C.	ATTACHMENT 3: NOVEL PLAN COMPONENT AND POTENTIAL SMART PRACTICES .....	67
	LIST OF REFERENCES.....	71
	INITIAL DISTRIBUTION LIST .....	75

## LIST OF FIGURES

Figure 1.	Results of the Abstraction Process by Function and by State.....	33
Figure 2.	The Prevalence of Abstraction Scores for Function 1 .....	40
Figure 3.	The Prevalence of Abstraction Scores for Function 2 .....	41
Figure 4.	The Prevalence of Abstraction Scores for Function 3 .....	42
Figure 5.	The Prevalence of All Abstraction Scores .....	48

THIS PAGE INTENTIONALLY LEFT BLANK

## **LIST OF ACRONYMS AND ABBREVIATIONS**

AHSTO	Association of State and Territorial Health Officials
CASPER	Community Assessment and Public Health Emergency Response
CDC	Centers for Disease Control
COOP	Continuity of Operations Plan
DHS	Department of Homeland Security
ESF	Emergency Support Function
FEMA	Federal Emergency Management Agency
MRC	Medical Reserve Corps
NDRF	National Disaster Response Framework
NOHD	New Orleans Health Department
NSDR	National Strategy for Disaster Resilience

THIS PAGE INTENTIONALLY LEFT BLANK

## ACKNOWLEDGMENTS

Above and beyond all others, I would like to thank my wife, Holly Davidson. Holly has taken care of everything during my trips to NPS, as well as during my hours and days in my office attempting to complete my thesis research. My wife is the kindest and most giving person I have ever met; she would do anything for me. I appreciate her unwavering support in my pursuit of this degree. My daughter, Hannah, also deserves many a thank you for understanding that I occasionally had to do school work instead of throwing a ball or shooting off a model rocket. Hannah, you are wise beyond your years and you make me proud at every turn.

I must also thank my employer, the South Carolina Department of Health and Environmental Control, for allowing me time and access to documents. Special thanks go to my supervisor, Matt Petrofes, for allowing me to take numerous trips to NPS and to work from remote locations many times. Additional appreciation also goes to Dr. John Simkovich, who encouraged me to submit my application for the NPS program, and to Dr. Richard M. Learner for supporting and recommending my selection into this program.

My thesis advisor, Lauren Fernandez, tolerated my numerous drafts and provided me with numerous comments that went a great way toward making this a readable thesis. My second reader, Anke Richter, helped me turn many pages of rambling thoughts into a coherent collection of research and findings.

My parents, Larry and Christine Davidson, helped to make me the person I am. Thank you; I would not be the person I am without your guidance and support.

THIS PAGE INTENTIONALLY LEFT BLANK

## I. INTRODUCTION

The Centers for Disease Control and Prevention (CDC) rather succinctly noted many of the challenges that the national public health system must address in the next five to 10 years if it is to be ready for reacting to healthcare emergencies. These include improving adequate surge capacity within public health, devising more, and better, methods of assisting vulnerable populations and improving the ability to respond to specific health hazards.<sup>1</sup> While this is useful information to have at a federal level, similar information does not exist regarding challenges or improvement that states could make to existing plans, specifically those plans involving the recovery phase of a health-related disaster. The federal government has just recently begun to focus planning efforts on long-term recovery. In 2009, the federal government charged, via presidential directive, all levels of government to plan for recovery from disasters that have health implications but not until March 2011 did any guidance exist as to how to conduct that planning.<sup>2</sup>

Disasters have devastating effects on the lives of people and the economies of the local, state, and federal governments. Worldwide, between 1970 and 2010, disasters are estimated to have killed 3.3 million people and caused damages that are estimated at \$2.3 trillion with an upward trend in recent years.<sup>3</sup> In the United States, hurricanes, the costliest disaster, are estimated to cause \$10 billion in average annual damage.<sup>4</sup>

In 2005, hurricane Katrina struck the Gulf Coast of the United States with intense fury. Katrina was the costliest hurricane on record and ranked third in the number of

---

<sup>1</sup> Centers for Disease Control and Prevention [CDC], *Public Health Preparedness: Strengthening CDC's Emergency Response* (Washington, D.C.: Centers for Disease Control and Prevention, 2009), 6–7.

<sup>2</sup> Centers for Disease Control and Prevention [CDC], *Public Health Preparedness Capabilities: National Standards for State and Local Planning* (Washington, D.C.: Centers for Disease Control and Prevention, 2011), 20–22.

<sup>3</sup> World Bank and the United Nations, *Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention* (Washington, D.C.: World Bank and United Nations, 2010), 10.

<sup>4</sup> Roger Pielke, Joel Gratz, Christopher W. Landsea, Douglas Collins, Mark A. Saunders, and Rade Musulin, “Normalized Hurricane Damage in the United States: 1900–2005,” *Natural Hazards Review* 9, no. 1 (2008): 29.

deaths.<sup>5</sup> Katrina displaced 780,000 people, destroyed 200,000 homes and killed more than 1500 people.<sup>6</sup> From a healthcare perspective, Katrina damaged 141 hospitals (30 of which had to stop operations) in Louisiana, destroyed numerous clinics that served the low-income population, and affected public water systems statewide.<sup>7</sup> The recovery was slow in coming to the community; two years after the storm, six of the hospitals were still not operational, five of which were in New Orleans.<sup>8</sup> It took 27 months to reopen the only hospital located in heavily affected Cameron Parish.<sup>9</sup> While the recovery phase in a major natural disaster is expected to take months and years, communities are often left to cope with the aftermath once the response phase concludes.<sup>10</sup> This research examined state public health plans in an attempt to determine what governments have planned to do to lessen the physical and economic costs by preparing for the recovery phase of a disaster.

Government agencies have historically focused largely on only the short-term recovery efforts; this must come to an end. While useful and necessary, we must also begin to dedicate efforts to long-term planning because the ever-increasing costs of disasters mandates that we begin to think long-term.<sup>11</sup> More comprehensive planning efforts could make for a more efficient and timely response, especially since increased disaster risk management has been shown to reduce the costs of disasters.<sup>12</sup> Costlier

---

<sup>5</sup> Eric S. Blake and Ethan J. Gibney, *NOAA Technical Memorandum NWS NHC-6: The Deadliest, Costliest, and Most Intense United States Tropical Cyclones from 1851 to 2010 (and Other Frequently Requested Hurricane Facts)*, (Miami, FL: National Weather Service, National Hurricane Center, 2011), 5–7.

<sup>6</sup> Robin Rudowitz, Diana Rowland, and Adele Shartzter, “Health Care in New Orleans before and After Hurricane Katrina,” *Health Affairs* 25 (2006): 397.

<sup>7</sup> Louisiana Recovery Authority, “Hurricane Katrina Anniversary Data for Louisiana.” Louisiana Recovery Authority, accessed November 11, 2011, <http://www.lra.louisiana.gov/index.cfm>.

<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

<sup>10</sup> Business Civic Leadership Center, “What does a Successful Recovery Look Like?” Business Civic Leadership Center, accessed November 12, 2011, <http://bclc.uschamber.com/document/what-does-successful-recovery-look>.

<sup>11</sup> Ibid.

<sup>12</sup> World Bank, “G20 Urges Actions to Counter Rising Costs from Natural Disasters,” news release, World Bank News, June 16, 2012, accessed January 10, 2012, <http://www.worldbank.org/en/news/2012/06/16/g20-urges-action-counter-rising-costs-natural-disasters>.

disasters and shrinking government funds both point toward the need for the best use of limited resources. The fact that Congress appropriated \$2.1 billion in additional Medicaid funding to supplement the payouts from Gulf Coast states to evacuees that were suffering effects from Katrina is an illustration of the prolonged suffering and the long-term need for health-related assistance.<sup>13</sup> There have been some initial calls for additional public health preparedness activities related to disaster recovery planning, but relatively little has been done to provide actionable information to states. While residents frequently overlook the role that social services like public health play in their daily lives, these services “are the glue that holds everything together.”<sup>14</sup>

#### **A. PROBLEM SPACE**

Public health is highly competent when it comes to routine events such as vaccinating children for school or responding to a case of whooping cough. Public health is capable of ramping up resources to provide nurses to work in shelters or experts to answer phone calls about the threat of contagious disease during and immediately after a disaster. The challenge comes when public health must sustain personnel-intensive efforts for weeks and months after a disaster (e.g., providing community assessment teams, staffing field health clinics, coordinating social service efforts) while continuing to operate health departments in areas that likely have fewer resources and greater need.

Public health at the state level has clear rules for immunizations and nursing practice in shelters and has reasonable planning guidance for emergency response, but the guidance is sparse and relatively untested in regard to post-disaster recovery operations. Long-term recovery planning is relatively new to all levels of government. The most recent guidance has just begun to lay the groundwork for public health recovery planning.

Without clear and consistent guidance, the thousands of autonomous health departments will continue to independently plan for recovery operations to the extent they deem necessary. While differences between plans are expected in order to account

---

<sup>13</sup> U.S. Government Accountability Office [GAO], *September 11: HHS Needs to Develop a Plan that Incorporates Lessons from the Responder Health Programs*, GAO-08-610 (Washington, D.C.: U.S. Government Accountability Office, 2008), 11.

<sup>14</sup> Business Civic Leadership Center, “What does a Successful Recovery Look Like?”

for variability between communities, local health departments should also be working from a set of specific goals, objectives, and guidance to adequately cope with the unique challenges presented by long-term disaster recovery efforts. As used in this plan, short-term recovery encompasses activities like life saving, sheltering, identification of health needs, community stabilization, and other tasks that typically take days or, potentially, a couple weeks. Long-term recovery typically lasts for months to years and includes reestablishing or rebuilding healthcare facilities, case management for behavioral health needs, and mitigation strategies to decrease such damages in future disasters.<sup>15</sup> Many health departments have no recovery plan at all, other than to rely on the often short-term guidance provided in their emergency operations plans. The ability of public health to respond in long-term recovery scenarios could be hampered by the lack of strong, well-reasoned plans that have been developed from best, or at least smart, practices. An inadequate response in a community with compromised infrastructure, fewer services, and residents in need means a slower recovery, greater human suffering and a greater death toll.

This research will discuss these challenges in the following manner. This research will begin to determine what hurricane-prone states are planning for, what commonalities exist in the plans, and what unique plans have arisen from the disaster recovery experiences of those states. A review of obstacles presented by hurricane Katrina is used to illustrate the dynamics of a disaster requiring significant public health recovery actions, and this is followed by defining the research question. An overview of existing literature will explain what is known about the level of state public health preparedness, identify gaps in our knowledge, and provide information as to how such preparedness is done outside the United States. A detailed examination of the method will explain how state public health plans were collected, analyzed, and compared. The Analysis chapter will illustrate the areas in which states align with existing planning guidance as well as areas that are unique or novel and, therefore, bear further investigation and planning. The

---

<sup>15</sup> U.S. Dept. of Homeland Security [DHS] and Federal Emergency Management Agency [FEMA], *National Disaster Recovery Framework Strengthening Disaster Recovery for the Nation* (Washington, D. C: U.S. Dept. of Homeland Security, Federal Emergency Management Agency, 2011), 7–8.

Discussion will summarize findings, make conclusions about the implications of the findings and offer recommendations as to the next steps in public health preparedness planning.

## **B. BACKGROUND**

### **1. Lessons from Hurricane Katrina**

In 2009, the *National Health Security Strategy* tasked all levels of government with the “inherent responsibility” to plan for the recovery from health incidents.<sup>16</sup> This research aims to study the plans of numerous states that have experienced disaster recovery first-hand, to determine common as well as unique plan elements that can better guide the role of public health and, consequently, improve the readiness of public health to fulfill its “inherent responsibility.” In researching the literature on this topic, hurricane Katrina is frequently referred to because it is the most recent and likely the best-documented example of a devastating hurricane with significant recovery components. Because of this, it is useful to understand some of the challenges faced by public health after hurricane Katrina.

### **2. Public Health Challenges as a Result of Katrina**

For the purposes of this analysis, the scope of public health’s responsibilities in a disaster was assumed to be composed primarily of those items which are listed in the recently released *National Disaster Recovery Framework*.<sup>17</sup> Depending on the scope of the disaster, the responsibilities include, the provision of traditional public health services (disease surveillance, community needs assessment, gap-filling primary care services, etc.) as well as the assurance of services that are typically provided by the profit and non-profit healthcare sector.<sup>18</sup>

---

<sup>16</sup> U.S. Dept. of Health and Human Services [HHS], *National Health Security Strategy of the United States of America* (Washington, D.C.: U.S. Dept. of Health and Human Services, 2009), 6.

<sup>17</sup> DHS and FEMA, *National Disaster Recovery Framework*, 52–54.

<sup>18</sup> *Ibid.*

The losses to the health infrastructure were immense. Those losses included hospitals and clinic sites of all kinds, medical records, and pharmacies as well as the loss of staff (by death or evacuation) to provide the services.<sup>19</sup> Such instances were a manifestation of a system in collapse.

*a. Healthcare Infrastructure Challenges*

Healthcare challenges after Katrina were dominated by service interruptions due to infrastructure loss; these losses were staggering and the recovery was slow. Of the 2258 hospital beds that existed prior to hurricane Katrina, only 625 (nearly a 75 percent reduction) were available and staffed two years after the storm.<sup>20</sup> Four years after the storm, only four of the 10 hospitals in Orleans Parish had reopened.<sup>21</sup>

The public health sector had a similarly difficult experience. The New Orleans Health Department (NOHD) operated 20 full-service primary medical clinics and 13 other specialty clinics prior to the storm.<sup>22</sup> By 2009, although catering to a population 25 percent less than that before the storm, the NOHD was operating three full-services sites and four specialty clinics.<sup>23</sup> Clearly, the decrease in services is not proportional to the decrease in the demand for services. Additionally, the Louisiana public health lab lost three of its four branch facilities after the storm and the main branch will never reopen because its facility in downtown New Orleans was flooded beyond repair and building will be destroyed.<sup>24</sup> Numerous environmental concerns and the ability to handle them in a timely manner also arose: potable water, safe food supplies, waste and wastewater

---

<sup>19</sup> *Post Katrina Health Care: Continuing Concerns and Immediate Needs in the New Orleans Region: Hearing before the Subcommittee on Oversight and Investigations of the Committee on Energy and Commerce, House of Representatives, 110th Cong., 1st sess. (2007), serial no. 110–17, 6.*

<sup>20</sup> *Post-Katrina Recovery: Restoring Health Care in the New Orleans Region: Hearing before the Committee on Oversight and Government Reform, House of Representatives, 111th Cong., 1st sess. (2009), 151.*

<sup>21</sup> *Ibid.*

<sup>22</sup> *Post-Katrina Recovery*, 150.

<sup>23</sup> *Ibid.*

<sup>24</sup> Lynn Goldman and Christine Coussens, *Environmental Public Health Impacts of Disasters: Hurricane Katrina: Workshop Summary* (Washington, D.C: National Academies Press, 2007), 17–18.

disposal, and safe housing.<sup>25</sup> For instance, 40 public water systems were still requiring customers to boil their water two months after the disaster.<sup>26</sup>

As with the physical well-being of Gulf Coast residents, similar losses and problems occurred with mental health services. Of the eight mental health outpatient clinics operated by the Metropolitan Human Services District prior to Katrina, only three were operational one year later.<sup>27</sup> In large part due to the damage and eventual closure of the Charity Hospital in downtown New Orleans, the number of inpatient psychiatric beds fell from 462 to 160.<sup>28</sup>

These facts are a sign of a system whose services decreased due to more than, and by a much greater percentage than, the decrease in population in the area. The community noticed the decrease in services, yet public health was widely criticized for its inaction and it appears to have been an opportunity for visible progress on which public health did not capitalize. In a study from the Kaiser Foundation, 40 percent of those surveyed stated that reinstating medical services and facilities was a top priority for them and that they saw little to no progress toward that end.<sup>29</sup> Undoubtedly, the ability to reestablish operational facilities is somewhat tied to a robust pool of staffing resources;<sup>30</sup> however, since there appeared to be less available research in this area, this research did not focus on staffing challenges.

The catastrophic nature of the disaster was such that there was bound to be damage to the extent that care at those facilities would be compromised. A complicating factor was that the residents who needed care after the storm were the same people who were already vulnerable prior to the storm due to unstable housing, food, or other living

---

<sup>25</sup> Goldman and Coussens, *Environmental Public Health Impacts*.

<sup>26</sup> U.S. Environmental Protection Agency [EPA], Office of the Inspector General [OIG], *EPA's and Mississippi's Efforts to Assess and Restore Public Drinking Water Supplies after Hurricane Katrina* (Washington, D.C.: U.S. Environmental Protection Agency, Office of Inspector General, 2006), 7.

<sup>27</sup> Rudowitz, Rowland, and Shartzter, "Health Care in New Orleans," 401.

<sup>28</sup> *Ibid.*

<sup>29</sup> *Post Katrina Health Care*, 224.

<sup>30</sup> Association of Public Health Laboratories, "Louisiana PHL Finds Recovery Slow Going," *APHL Minute* 6 (November-December, 2006), 1, Association of Public Health Laboratories, accessed January 12, 2013, [http://www.aphl.org/AboutAPHL/aboutphls/Documents/Louisiana\\_PHL\\_2006.pdf](http://www.aphl.org/AboutAPHL/aboutphls/Documents/Louisiana_PHL_2006.pdf).

situations.<sup>31</sup> This is also true in the case of the mentally ill. Services for the mentally ill have typically received less attention and funding and, in the case of Katrina, the overall mental health of survivors seems to be degrading.<sup>32</sup>

One of the 10 essential services<sup>33</sup> of public health is ensuring (preferably, but not absolutely, through the private healthcare network) access to care. The facility damage and destruction created a situation where residents did not have access to care.<sup>34</sup> Residents did not have the ability to connect to services and those who were displaced from homes, families, and friends did not have a support system that they could rely on for assistance.<sup>35</sup> The New Orleans area is known as an area, more so than most communities, where the poor use the emergency department and other emergency clinics for their primary care.<sup>36</sup> Such a system, particularly during a state of disaster, recovery resulted in long wait times and limited capacity at the surviving facilities.<sup>37</sup>

#### ***b. Sheltering-Related Challenges***

The long-term sheltering after hurricane Katrina presented unique challenges for public health. More than 500,000 people stayed in shelters at least one night and 250,000 residents were still in shelters after 14 days.<sup>38</sup> Nearly all of the same societal issues that are present in a community also exist in a shelter, although in a much more concentrated manner. For instance, nearly 50 percent of shelterees presented to the shelter with a sign of an acute illness (rash, diarrhea, etc.); nearly 60 percent presented with a chronic illness (high blood pressure, diabetes, asthma, etc.); approximately 12

---

<sup>31</sup> *Post Katrina Health Care*, 218.

<sup>32</sup> *Post-Katrina Recovery*, 151.

<sup>33</sup> Centers for Disease Control and Prevention [CDC], “Ten Essential Public Health Services.” Centers for Disease Control and Prevention, December 2010, accessed November 15, 2011, <http://www.cdc.gov/nphsp/essentialservices.html>.

<sup>34</sup> *Post-Katrina Recovery*, 1–2.

<sup>35</sup> *Post Katrina Health Care*, 218.

<sup>36</sup> *Post-Katrina Recovery*, 1–2.

<sup>37</sup> *Ibid.*

<sup>38</sup> Daksha Brahmhatt , Jennifer L. Chan, Edbert B. Hsu, Hani Mowafi, Thomas D. Kirsch, Asma Quereshi P. Gregg Greenough, “Public Health Preparedness of Post-Katrina and Rita Shelter Health Staff,” *Prehospital and Disaster Medicine* 24, no. 6 (2009): 500.

percent had a diagnosed mental illness or disorder; and 11 percent reported being substance abusers within the last year.<sup>39</sup> While not all of these individuals will need direct care, their issues can still complicate an already difficult sheltering situation.<sup>40</sup>

In a normal day, those illness rates are challenging but the problems are exacerbated in a temporary shelter because the available resources may not be of the same quantity or caliber. One comprehensive study of shelters in Texas, established for Katrina evacuees, found that shelter staff were not prepared for the health needs of residents,<sup>41</sup> and, in greater than 75 percent of cases, staff were not able to identify clinical markers used to indicate the potential for a disease outbreak.<sup>42</sup> From a strategic perspective, only 37 percent of shelters had a method to screen for health issues, and only 55 percent of clinic health managers had received public health information pertinent to the shelter.<sup>43</sup> Such lack of readiness has the potential to result in increased spread of illness and a greater burden on the response structure that is already compromised by attempting to cope with the disaster itself.

It is clear that, because public health staff were physically scattered and often not present in, or available to, shelters, the ability to monitor for the spread of communicable disease and to prevent, detect, and stop disease outbreak was greatly hampered in the Gulf States.<sup>44</sup>

*c. Overarching Issues in Katrina*

Hurricane Katrina was so comprehensive in its destruction that the problems appeared to exist everywhere. However, the organizational structure of the inextricably linked public health and healthcare systems (with funding at the heart of the problem) did appear to play a recurring role. Residents of low socioeconomic status

---

<sup>39</sup> Joshua R. Vest and Adolfo M. Valadez, "Health Conditions and Risk Factors of Sheltered Persons Displaced by Hurricane Katrina," *Prehospital and Disaster Medicine* 21, no. 6 (2006): 56.

<sup>40</sup> Ibid.

<sup>41</sup> Brahmhatt et al., *Public Health Preparedness of Post-Katrina*, 504.

<sup>42</sup> Ibid., 502.

<sup>43</sup> Ibid.

<sup>44</sup> Brahmhatt et al., *Public Health Preparedness of Post-Katrina*, 501.

typically relied on a hospital-focused system (e.g., Charity Hospital) that had little redundancy when it was destroyed.<sup>45</sup> No supplemental appropriations were approved by Congress that would have allowed the Centers of Disease Control or the Health Resources and Services Administration to assist.<sup>46</sup> In fact, a series of disasters since 9/11 have illustrated the limitations in public health and healthcare funding mechanism.<sup>47</sup>

### **C. RESEARCH QUESTION**

Using recently established, general guidance regarding the objectives of public health disaster recovery planning as a tool, what can an analysis of existing plans in the southeastern U.S. elucidate about the extent to which states have adopted the recovery guidance that would assist in public health planning for disaster recovery? These findings can be used to better define the recovery role for public health and, consequently, to improve the readiness of public health to fulfill its inherent responsibility.

To provide for those in need or even to request and direct disaster funding in a post-disaster recovery scenario, public health must be able to quickly respond with substantial resources. The problem that this research will address is that the role of public health in disaster recovery is not well defined and, therefore, public health may not be prepared to deliver services during a recovery. This research will attempt to better define that role by examining existing public health plans to determine the extent to which these plans address recovery. It will also search those plans for new and different elements that could clarify public health expectations and objectives, such that public health can more efficiently and effectively deliver services during a recovery.

It is quite common for public health to participate in post-disaster operations, but when the damages are so extensive, such as after a large and powerful hurricane, public health must also be ready to be part of the rebuilding effort. But, how does public health

---

<sup>45</sup> *Post-Katrina Recovery*, 1–2.

<sup>46</sup> Sarah Lister, *Hurricane Katrina: The Public Health and Medical Response* (Washington, D.C.: Congressional Research Service, 2005), 22.

<sup>47</sup> *Ibid.*, 4.

go about doing so and on which tasks does it focus? To date, public health has received very little specific guidance. This research will begin to determine what hurricane-prone states are planning for, what commonalities exist in the plans, and what unique plans have arisen from the disaster recovery experiences of those states.

THIS PAGE INTENTIONALLY LEFT BLANK

## II. LITERATURE REVIEW

This literature review includes publications of the U.S. government, universities, professional associations, non-profit research corporations, journals, and completed theses. Significant resources were located through ProQuest and PubMed as well as the Homeland Security Digital Library at the Naval Postgraduate School. In addition, Google Scholar was also heavily utilized, particularly for access to government publications. Because of the changes in public health preparedness since 9/11, very few sources were used from prior to 2001. The majority of references in this thesis came from 64 sources. Given that an assessment of the level of preparedness, as compared to established standards, is critically important to this research, this literature review is heavily dependent on government publications.

Since September 11, 2001, public health has significantly improved its ability to respond to disasters, thanks in part to an influx of preparedness funds; however, the list of threats to which public health must respond is rapidly increasing.<sup>48</sup> The 200 year-old system known as public health has a new set of responsibilities related to national health security to which it must adapt.<sup>49</sup> In 2009, the *National Health Security Strategy* tasked all levels of government with the “inherent responsibility” to plan for the recovery from health incidents.<sup>50</sup>

The 2011 *National Preparedness Goal* furthered the theme of recovery by stating that our goal should be, “A secure and resilient Nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk.”<sup>51</sup> The document continues by stating that we can only achieve that goal through a recovery process that includes

---

<sup>48</sup> CDC, *Public Health Preparedness Capabilities*, 2.

<sup>49</sup> HHS, *National Health Security Strategy*, 44.

<sup>50</sup> *Ibid.*

<sup>51</sup> U.S. Dept. of Homeland Security [DHS], *National Preparedness Goal* (Washington, D.C: U.S. Dept. of Homeland Security, 2011), 1.

(among other items) the restoration of health in the community.<sup>52</sup> Not only must public health be prepared to act quickly after a disaster so that systems are rapidly established to determine the need for long-term health monitoring, but recovery plans and procedures, if established prior to a disaster, can result in a quicker and faster recovery.<sup>53</sup>

This literature review will define the concept of recovery, contrast how Australia interprets recovery with how the U.S. does, discuss the progress that the U.S. has made in recovery, examine gaps in recovery planning, and establish the need for planning for public health recovery efforts.

## **A. RECOVERY DEFINED**

The available literature is replete with discussion and research about incident response (even in public health), but only recently has significant attention been focused on disaster recovery.<sup>54</sup> The definitions of recovery are numerous, but *Presidential Decision Directive 8 (National Preparedness)* defines recovery as:

...those capabilities necessary to assist communities affected by an incident to recover effectively, including, but not limited to, rebuilding infrastructure systems; providing adequate interim and long-term housing for survivors; restoring health, social, and community services; promoting economic development; and restoring natural and cultural resources.<sup>55</sup>

More directly applicable to the public health community is the CDC's definition of recovery: the ability to collaborate with community partners (e.g., healthcare organizations, business, education, and emergency management) to plan and advocate for the rebuilding of public health, medical, and mental/behavioral health systems to at least a level of functioning comparable to pre-incident level and improve levels where possible.<sup>56</sup> This is the definition on which this research will focus, for it comes from the

---

<sup>52</sup> DHS, *National Preparedness Goal*.

<sup>53</sup> GAO, *September 11: HHS Needs to Develop a Plan*, 11.

<sup>54</sup> White House, *National Security Strategy* (Washington, D.C.: White House, 2010), 40; DHS and FEMA, *National Disaster Recovery Framework*, 110.

<sup>55</sup> U.S. White House, *Presidential Policy Directive 8: National Preparedness*, (2011), 6.

<sup>56</sup> CDC, *Public Health Preparedness Capabilities*, 22.

guidance document that will be used to evaluate existing public health plans.<sup>57</sup> It is distinct from an emergency management perspective that focuses on financial assistance and it is a total community perspective dedicated to the recovery of social systems that support the community.

The recent (September 2011) publication of the *National Disaster Recovery Framework* (NRDF) is a substantial step forward in planning for recovery operations. Not only does it establish core principles<sup>58</sup> and factors that are necessary for a successful recovery,<sup>59</sup> but it also establishes a “recovery support function” (RSF) entitled Health and Social Services and outlines the general responsibilities of federal agencies within that RSF.<sup>60</sup> While the NDRF does provide a good framework for planning for recovery operations, it is not intended to provide instruction to public health; therefore, it does little to provide specific information to assist planners in guiding public health operations.

The literature is somewhat enigmatic when it comes to the time frame that is defined by recovery. FEMA attempts to define long-term recovery, although with only slightly more specificity, as intended to:

Restore or build a healthy, functioning community that will sustain itself over time, while taking advantage of opportunities to rebuild stronger, smarter communities and mitigate against future disasters. If done without organized planning, once rebuilt, many opportunities for long-term improvement are lost.<sup>61</sup>

Ahlers, Howitt, and Leonard, in recent work from Harvard, advocate that not only should nations plan for the potential of conducting recovery operations, but one should expect that significant recovery will be inevitable, thereby making recovery planning a

---

<sup>57</sup> CDC, *Public Health Preparedness Capabilities*, 22.

<sup>58</sup> DHS and FEMA, *National Disaster Recovery Framework*, 110.

<sup>59</sup> Ibid.

<sup>60</sup> Ibid.

<sup>61</sup> Ibid.

critical part of preparations prior to a disaster.<sup>62</sup> Australia is one nation that has taken steps to ensure that has taken significant steps toward preparing for disaster recovery.

## **B. AN AUSTRALIAN SOLUTION**

The United States is not the only country that faces these challenges. Australia is a nation that must deal with a wide variety of disasters—with hundreds of governments, spread over an area approximately the size of the continental U.S. Between 2009 and 2011, Australia has experienced record setting and numerous bush fires and floods, which killed hundreds of people. Additionally, Australia is not immune to cyclones and other severe storms. In 1989, Australian government published a series of manuals known as the *Australian Emergency Management (AEM) Manual* series; these were called “skills reference manuals.” The series began as a set of instructions on skills necessary for emergency responders during a disaster scenario (e.g., boat operation in flood rescues, land search operations and map reading/navigation). In 1996, more manuals were added, to cover a greater range of skills necessary for disaster responses.

In 2011, Australia published the *National Strategy for Disaster Resilience* (NSDR). The NSDR recognized that the risks for natural disaster were increasing and that the vulnerability of the nation was being elevated by a variety of factors.<sup>63</sup> In contrast to much of the federally based catastrophic planning in the U.S., the Australian *Strategy* concluded that it was unusual for a disaster to be of a scale that it was beyond the capacity for the ability of a state (or territory) to handle.<sup>64</sup> Furthermore, the *Strategy* called for a “shared responsibility” by local communities (and even households and individuals) in responding to and recovering from disasters.<sup>65</sup>

To ensure greater trickle-down implementation of the concepts within the *Strategy*, the Australian Emergency Management Institute expanded on the series of

---

<sup>62</sup> Douglas Ahlers, Arnold M. Howitt, and Herman B. Leonard, “Preparing in Advance for Disaster Recovery,” *Global Is Asian*, no. 12 (2011, October–December): 40.

<sup>63</sup> Council of Australian Governments, *National Strategy for Disaster Resilience* (Canberra, Australia: Council of Australian Governments, 2011), 1.

<sup>64</sup> *Ibid.*

<sup>65</sup> *Ibid.*, 2.

manuals by publishing the AEM Handbook series. The two handbooks (*Disaster Health*<sup>66</sup> as well as *Community Recovery*<sup>67</sup>) are designed for planners and those involved in recovery programs and activities; they are specifically intended for the benefit of the public health and the healthcare setting by helping communities with recovery.

The Australian policy of the development of guidance manuals has allowed the government to develop standardized, yet highly specific, practices for recovery operations. The Australian government highly touts the benefits of psychological care after a disaster. Instead of simply training healthcare responders in the skills of psychological first aid, applicable in the immediate aftermath of a disaster, the *Disaster Health Manual* promotes the common operational adoption of psychological recovery skills that become more useful in the weeks to months after a disaster.

In the U.S. there are over 440,000 public health workers nationwide;<sup>68</sup> municipal and county governments have a host of emergency responders. While all responders have the same basic training, responders also have locally refined skills and techniques that are honed to their specific area of the country. For example regardless of geographic location, all nurses are trained to heal people in the same way and all fire fighters are trained to fight fires in similar manners. However, when a disaster happens those same fire fighters and nurses (and disaster planners), be they from resource-heavy cities of two million people or from rural towns of two thousand, they do not have a set of guidelines to which they can refer, which would ensure that they are all fulfilling similar tasks toward the same *goal*.

### **C. PROGRESS TOWARD RECOVERY**

The U.S. preparedness community does seem to have some recognition that a public health disaster presents significant consequences: the number of fatalities may be

---

<sup>66</sup> Australian Emergency Management Institute, *Disaster Health Handbook 1* (Mt. Macedon, Victoria (Australia): Australian Emergency Management Institute, 2011).

<sup>67</sup> Australian Emergency Management Institute, *Community Recovery Handbook 2* (Mt. Macedon, Victoria (Australia): Australian Emergency Management Institute, 2011).

<sup>68</sup> Melissa Taylor Bell and Irakli Khodeli, "Public Health Worker Shortages," *Trends Alert: Critical Information for State Decision-Makers* (2004, November): 4, Council of State Governments, accessed January 18, 2013, <http://www.csg.org/knowledgecenter/docs/TA0411HealthWork.pdf>.

large and many threats (contagious pathogens) have yet to be discovered.<sup>69</sup> A frequently cited and recent public health event of significance is the H1N1 pandemic flu virus from 2009. The response to the event has been heralded as a success in that public health was able to quickly determine the virus type, design an appropriate vaccine, distribute the vaccine, and provide timely and accurate information to the public.<sup>70</sup> While this response can be thought of as a type of recovery from an event, scenarios like this (involving immediate, post-event consequence management) are typically as far-sighted as the literature addressed.

Unlike H1N1 influenza, the health effects and, therefore, the appropriate remedial actions necessary in disaster response and recovery, are not always immediately obvious. The *National Health Security Strategy* addresses the fact that the health effects to the responders of the World Trade Center collapse on 9/11 were not apparent until months and years later.<sup>71</sup>

Equally as difficult to address has been the aftermath of hurricane Katrina; many residents of coastal Louisiana and Mississippi have still not returned and many of the residents continue to suffer from a variety of complex psychosocial illnesses.<sup>72</sup> To compound the effects on individuals affected by disasters, there is no funding mechanism to provide help in disaster recovery for costs that are not covered by Medicaid or private insurance.<sup>73</sup>

Recently, the Deepwater Horizon oil spill in the Gulf of Mexico highlighted gaps in procedures for transferring the public health caretaker role from emergency responders to those agencies and organizations most appropriate to handle long-term management. There was very little transition, from the health services provided by EMS in responding to problems like difficulty breathing due to oil films, to the services provided by public

---

<sup>69</sup> DHS, *National Preparedness Goal*, 4.

<sup>70</sup> RAND Corporation, *The Public Health System a Decade after 9/11: Key Successes and Continuing Challenges* (Santa Monica, CA: RAND Corporation, 2011), 1.

<sup>71</sup> HHS, *National Health Security Strategy*, 44.

<sup>72</sup> *Ibid.*

<sup>73</sup> *Ibid.*

health, such as dealing with the community health threat and long-term health impacts of petroleum exposure.<sup>74</sup> These challenges, from psychosocial to funding-related, illustrate that the public health needs are numerous in a recovery environment.

### **1. Gaps in Recovery Planning**

A common thread throughout the literature is that researchers and government officials are beginning to recognize that public health recovery is important, but that role has hardly been defined. While RAND says it well: “All sectors of society...must recognize their roles in a public health emergency, including preparedness, response and recovery,”<sup>75</sup> it is blatantly obvious from the literature that public health has yet to address (if one is generously minded) or has ignored (if one is critical) the recovery component.

In interviews conducted post-Katrina with numerous government officials, RAND researchers found that there was significant disagreement about the role that public health should fulfill in an emergency. Furthermore, the same interviews indicated that there was no consensus as to whether public health should play the lead role in such a disaster recovery. Even those who were supportive of the lead role concept for public health were troubled because, “there was no plan for public health to undertake that function, nor was there necessary support or funding.”<sup>76</sup> Other researchers have found that the public health recovery actions have been focused only around infrastructure restoration instead of providing services that can enable a community to redevelop long-term.<sup>77</sup>

Unfortunately, there are important documents within the discipline of public health from our “leaders” that have yet to give attention to the role of public health within the recovery phase. One would think that a report on strengthening public health preparedness would address recovery. While the report from the CDC does include a

---

<sup>74</sup> CDC, *Public Health Preparedness Capabilities*, 4.

<sup>75</sup> RAND Corporation, *The Public Health System a Decade After 9/11*, 1.

<sup>76</sup> Jeanne S. Ringel, Anita Chandra, Kristin J. Leuschner, Yee-Wei Lim, Nicole Lurie, Karen A. Ricci, Agnes Gereben Schaefer, Molly Shea, Lisa R. Shugarman, and Jeffrey Wasserman, “Lessons Learned from the State and Local Public Health Response to Hurricane Katrina” (working paper, RAND Corporation, Santa Monica, CA, 2007), 22.

<sup>77</sup> David Abramson, Richard Garfield and Irwin Redlener, *The Recovery Divide: Poverty and the Widening Gap among Mississippi Children and Families Affected by Hurricane Katrina* (Columbia, NY: Columbia University Mailman School of Public Health, 2007), 1.

section on “Response and Recovery,” the only mention of recovery within the section is in reference to the title of the section and to the need to protect response and recovery workers.<sup>78</sup> The CDC report only highlights those recovery activities that are, at most, linked to short-term disaster functions (e.g., pharmaceutical dispensing and the provision of acute phase disaster medicine).<sup>79</sup>

The CDC report is not the only example of disregard of anything other than short-term recovery operations. A report by the Association of State and Territorial Health Officials (ASTHO) is consistent with other literature reviewed here in that there is little recognition, even within the public health discipline, of the role of public health in a recovery or even of the need to prepare for the recovery role.<sup>80</sup> The 2008 ASTHO report, in the Response and Recovery section, practically ignores recovery, although it does name disaster recovery last in a list of areas identified by their member organizations as needing improvement.<sup>81</sup> The items that address recovery (such as medication distribution) are appropriate for a discussion of short-term consequence management; there is no discussion of long-term recovery.

Through interviews with primary sources from the Katrina response, the RAND report has gone farther than others to name specialty areas in disaster recovery, such as the involvement from partner agencies in decision-making, need assessment, and resource matching, where public health is lacking in progress, yet where it has the expertise and, arguably, the capacity to lead a long-term disaster recovery mission.<sup>82</sup>

Most recently, government reports have provided a call to action while simultaneously chastising health-oriented disaster response capacity by concluding that officials are better able to manage threats [since 9/11], but that more must be done to

---

<sup>78</sup> CDC, *Public Health Preparedness*, 31.

<sup>79</sup> *Ibid.*

<sup>80</sup> Association of State and Territorial Health Officials, *Public Health Preparedness: Six Years of Achievement* (Arlington, VA: Association of State and Territorial Health Officials, 2007), 6.

<sup>81</sup> *Ibid.*

<sup>82</sup> Ringel et al., “Lessons Learned from the State and Local Public Health Response.”

ensure that communities are more resilient post-disaster.<sup>83</sup> Not only must public health ensure the resilience of communities, but systems must also be resilient under the worst conditions.<sup>84</sup> Recent objectives and standards have been established for plan development to revive and repair public health and healthcare services after a disaster, and these same guidance documents also call for a system to ensure a smooth transition from response operations to short- and long-term recovery.<sup>85</sup> Thus, far, the CDC's *Public Health Preparedness Capabilities: National Standards for State and Local Planning* and the *National Health Security Strategy*, upon which the CDC document is based, are the sole documents that go so far as to detail preliminary health-related recovery objectives.

## 2. The Need for Recovery

Among public health professionals, debate exists as to what extent public health staff should (or can) supplement frontline healthcare staff,<sup>86</sup> as to what constitutes the special medical need population,<sup>87</sup> and as to what role public health plays in a disaster. In 2011, the CDC developed 15 public health preparedness capabilities, one of which is “community recovery.”<sup>88</sup> In that planning document, *Public Health Preparedness Capabilities: National Standards for State and Local Planning*, the CDC dedicated a section to outlining the public health responsibilities in recovery.<sup>89</sup> Additionally, this document begins to define broad elements that are essential to public health recovery planning. Finally, this document is an attempt to better define and direct public health planning efforts which, thus far, have not been sufficient for providing services during a prolonged recovery.

---

<sup>83</sup> HHS, *National Health Security Strategy*, 44.

<sup>84</sup> *Ibid.*

<sup>85</sup> DHS and FEMA, *National Disaster Recovery Framework*, 110; HHS, *National Health Security Strategy*, 44.

<sup>86</sup> *Ibid.*

<sup>87</sup> *Ibid.*

<sup>88</sup> CDC, *Public Health Preparedness Capabilities*, 2.

<sup>89</sup> *Ibid.*, 22–24.

The general responsibilities that need to be fulfilled during disaster recovery, although not yet time-tested in the field and quite general in nature, have been recently enumerated;<sup>90</sup> further research is needed to determine the specific roles that public health plays in achieving those goals and objectives.

#### **D. SUMMARY**

The lack of comprehensive public health recovery efforts, such as has been seen after hurricane Katrina, tend to expose the inadequacies in a healthcare system, compound existing physical and mental health problems in the community, and result in a secondary disaster within the health and social service system.<sup>91</sup> Unfortunately, solving this issue is complicated. The U.S. Chamber of Commerce asks, “So to answer the question, ‘what does a successful recovery look like,’ there is no simple or single answer. Every disaster is unique, as is every community.”<sup>92</sup> However, planning is key in all phases, for without advanced planning it is difficult to implement the necessary public health recovery actions.

Vast resources exist regarding public health preparedness and response, but there is an incredible dearth of information on public health recovery or, more specifically, the role of public health during disaster recovery. The limited literature that does exist involves essentially extending daily public health services to, at most, days and weeks post-disaster with little or no attention paid to long-term disaster relief and recovery.<sup>93</sup> Due to a lack of research and subsequent guidance for state and local public health departments, an assessment needs to be made to determine the extent to which public health officials are prepared to cope with the situations that may be directed their way after the more traditional responders leave the “scene.”

---

<sup>90</sup> DHS and FEMA, *National Disaster Recovery Framework*, 110; CDC, *Public Health Preparedness Capabilities*.

<sup>91</sup> David Abramson and Richard Garfield, *On the Edge: Children and Families Displaced by Hurricane Katrina and Rita Face a Looming Medical and Mental Health Crisis* (Columbia, NY: Columbia University Mailman School of Public Health, 2006), 2.

<sup>92</sup> Business Civic Leadership Center, “What does a Successful Recovery Look Like?”

<sup>93</sup> CDC, *Public Health Preparedness*, 4–5.

### **III. METHOD**

Little is known about the level of adoption of recent (March 2011) disaster recovery planning guidance published by the CDC.<sup>94</sup> The research surveyed state public health plans to determine the extent to which existing plans addressed disaster recovery. Specifically, this research examined public health plans to determine the level of incorporation of planning elements from the CDC guidance.

#### **A. SAMPLE AND DATA COLLECTION**

Public health emergency operations plans, state ESF-8 plans, and any recovery-specific plans were requested of each state's public health preparedness director via an email or written letter when requested by this researcher. In order to ensure a high response rate, each state was informed that this research would not, in the body of the thesis or in any associated documents, attribute findings to any particular state. To ensure anonymity, each state was assigned a random letter; the data analysis only uses those letters when referring to the readiness of states or to the contents of a state plan. The only reference to specific states was to name those states (Gulf of Mexico and Atlantic states from Texas through Virginia) that were included in the request for plans. Plans were received from 100 percent (all nine) of the states from which plans were requested.

#### **B. DATA ANALYSIS**

This study analyzed state public health plans and state ESF-8 (emergency support function) plans. The analysis focused on public health recovery plans (to the extent they existed). In states without public health recovery plans, the emphasis was placed on state public health emergency plans and state ESF-8 plans because state public health plans are typically written by, or have significant involvement from, state public health agencies.

The methodological challenge was to review preparedness plans written in a variety of formats by different states and compare them to the CDC planning standards. An abstraction form (see Appendix A and B) was developed against which all of the state

---

<sup>94</sup> CDC, *Public Health Preparedness*, 22–26.

public health plans were analyzed. The form was designed to document the extent to which plans incorporated the recently identified CDC capabilities and identify new and different functions and tasks in the plan that are outside those items which have been identified at in the CDC document. The CDC standards document,<sup>95</sup> from which the scoring matrix was based, is a document that was designed in part, to give planning guidance for a five-year grant cycle that began in July of 2012. In a sense, it is quite unreasonable to expect that state plans would have already incorporated CDC-recommended tasks and elements into their plans. At the same time, there is no other document that details the elements that should be included in a public health recovery planning process. For consistency, all abstractions were performed by the author of this thesis.

An a priori version of the abstraction form was first tested on two plans prior to being revised and then used to assess all plans. In addition to rating the plans on characteristics defined by CDC, this research left open the possibility that tasks or elements may be identified in existing plans that had not been envisioned by the CDC. The abstraction form allowed for the addition of such tasks or elements with the use of the same scale to judge the extent to which the plan provided details of that component. The abstraction form was also used to capture any general comments or notes about the plan that could be useful in the analysis or discussion.

While the plans that were reviewed are well-established plans and are likely very comprehensive in relation to traditional (immediate) public health response, the threshold set by the CDC, and that which was used by this abstraction tool, was relatively high. In addition, the plans were focused on the recovery portion of a response and tended to include items that would only be part of a robust and well-developed recovery plan.

To ensure the fair application of this abstraction tool, the wording of the tasks and elements was strictly applied during analysis. If a component (an individual item against which the public health plan was being compared) contained two or more distinct parts, and the plan addressed fewer than all of the parts, then the plan was assessed a score of

---

<sup>95</sup> CDC, *Public Health Preparedness*, 22–26.

zero for that component. For example, if the CDC guidance stated that plans should address the continuation of services with particular attention to the needs of at-risk individuals, it would not have been acceptable to state that the component had been addressed if it did not address at-risk individuals in relation to the continuation of public health services. In a similar vein, the inclusion of lists of supporting emergency support function (ESF) agencies (health and medical, transportation, public utilities, etc.) was not seen to constitute compliance with the planning element that was described as the identification of the sectors that can support the recovery effort. In other words, simply listing support agencies was not deemed as an attempt to meaningfully identify entities that could support aspects of the recovery phase of a disaster; such as list is, at most, a starting point but certainly not specific to any process like recovery.

The CDC defines, within the community recovery capability, the following terms; this abstraction technique used the same terms.

- **Function:** describes the critical items that need to occur to achieve a capability (community recovery).
- **Tasks:** the steps that need to occur to accomplish the function.
- **Elements:** resources a jurisdiction needs to have, or have access to, in order to successfully perform a function and the associated tasks.

This research considered tasks and elements as functionally identical for the purposes of abstraction. Tasks are actions that must occur, and elements are resources that must be in place, but both are used to ensure that a function is accomplished.

Each of the tasks and elements were listed, in an abbreviated fashion, in the abstraction form. Because the inclusion of the plan components was not a simple yes/no answer, a scale was used to determine the extent to which the component was incorporated into the plan. The scale allocated a range of points, between zero and four, based on the extent to which the plan being reviewed included the task or element.

Scale:

- **0 points:** Made no mention of the task or element in the plan.
- **1 point:** Made mention that the jurisdiction would employ the task or element in the plan but gave no additional details.

- 2 points: Made mention of the task or element and included few, if any, details. Any details were limited to general description and did not mention specific methods, agencies, departments, locations, or staff.
- 3 points: Made mention of the task or element and then included substantial and specific details, including specific resources, agencies, locations, or staff.
- 4 points: Dedicated an entire section of the plan to addressing how (via methods, procedures, etc.) the jurisdiction would implement the task or element.

After the data was collected and scored, it was placed into a scoring matrix from allowed for the analysis of the data. Analysis included the number of states that addressed the various CDC components, the prevalence of various scores among the CDC functions, and a score for each of the states. The states were randomly assigned a letter designator (A, B, C, etc.) in order to ensure the anonymity that was promised to the states when requesting the plans.

The analysis divided the discussion of those 14 components into two groups. First, components for which there appears to be some recognition of relevance or importance, by the subject states, and second, components for which the importance has yet to be recognized or addressed. Figure 1 in the analysis divides these components into these two groups. For the purposes of this research, if two or more states (greater than 20 percent of those states assessed) addressed any component, then that component was categorized as having had some relevance to the states. Two was chosen as the threshold because if only one state addressed a component, it could more likely be due to some geographic, political, etc., factor that could limit the applicability to other states. If only one state, or no states, addressed the component, it was grouped into the discussion of those components for which the states had little to no recognition. Certainly there are numerous reasons that any particular state may not have addressed a component (lack of relevance to the state, insufficient time to incorporate a new concept, etc.), but it is outside the scope of this research to examine the reasons that explain the level of preparedness of each state individually.

### C. ANALYTICAL ASSUMPTIONS

This research assumed that hurricane-prone states would have a reasonably strong need to prepare for catastrophic disasters as well as the recovery effort that follows and these states might also regularly revise their plans. Therefore, plans were collected from states with a high potential for hurricane impacts: southeastern U.S. states bordering the Gulf of Mexico and Atlantic Ocean from Texas through Virginia. These states have all experienced greater than 10 hurricane landfalls, have accounted for over 87 percent of all hurricane strikes since 1851,<sup>96</sup> and they represent nine of the 10 states that have experienced more than 20 billion-dollar weather disasters since 1980.<sup>97</sup> The states were selected because of their potentially high levels of preparedness, but such sampling presents bias that such states could likely be more closely aligned with existing federal emergency public health guidance and could have more comprehensive plans than states who have not experienced a major disaster in recent years.

This implies that this research will provide a more positive view of the general level of recovery planning than may be true throughout the U.S. Additionally, as the major catastrophic disasters in these states have been hurricanes (with associated tornados and flooding), there may be elements of preparedness (earthquakes, fires, flooding, etc.) that are de-emphasized, but which could lead to different response and recovery actions to public health recovery preparedness that might be seen in other states. While it is possible for these biases to exist, much of recovery planning is blind to the nature of the disaster so many of the findings of this research can be applied to all states.

This research did not account for planning efforts that may be in other plans (those of state emergency management agencies, for instance) unless it was specifically directed toward public health. Recovery-specific information from ESF-8 plans was, for the most part, included because even though the public health agency does not “own” the plan, public health typically does take responsibility for the tasks in ESF-8 plans and the plans are either written by public health or the operations are at least led by public health.

---

<sup>96</sup> “Hurricane Strikes by State,” *Wall Street Journal*, August 24, 2011, accessed October 16, 2012, [http://online.wsj.com/public/resources/documents/st\\_HURRICANES110820110824.html](http://online.wsj.com/public/resources/documents/st_HURRICANES110820110824.html).

<sup>97</sup> CDC, *Public Health Preparedness*, 13.

Public health in one of the surveyed states did not use a separate public health emergency operations plan (EOP) and, instead, relied on the planning efforts contained within the ESF-8 plan.

Plans and, more specifically, annexes or appendices such as those that apply to pandemic flu, tend to include some of the more basic of the CDC tasks and elements (such as the provision of medical and behavioral services). However, these were not included in the analysis for this research if they seemed specific to such an annex or appendix and if there was no indication that this planning was pervasive across other hazards or could be generally applied to the agency's level of readiness for disaster recovery. However, if the planning referred specifically to recovery, it was included in the analysis.

Certainly, there is significant planning around and preparedness for more traditional post-disaster public health actions, such as re-entry guidelines and sheltering procedures. While those actions clearly occur after a disaster, they are not necessarily part of long-term community recovery and they certainly are not pervasive across recovery activities related to all hazards. This research, like the CDC guidance, focused on systemic planning components that are vital to all recovery operations. Similarly, no particular focus was paid to any specific hazard (e.g., hurricane, tornado, biological attack); the elements critiqued in the abstraction tool are easily transferrable across disasters that result from most any hazards.

While some states submitted various standard operating procedures (SOPs), those plans were not included in the analysis unless they very clearly included aspects that were specific to recovery. For instance, some SOPs provided plans, in great detail, concerning the activation and use of staff but which contained nothing related to the recovery phase of a disaster. Much information may be contained in agency SOP, but just as likely is that the SOP is operationally-focused and would not contain such recovery-specific information. The review of SOPs that were supplied by some states reflected both extremes.

## IV. ANALYSIS

### A. ANALYTICAL CONTENT

This analysis was structured to analyze each of the three functions that the CDC guidance uses to group the components of the recovery planning process. Plans were evaluated first on the extent to which they addressed:

- Function 1 (identification of need and monitoring) emphasized the need for “a collaborative effort within a jurisdiction that results in the identification of public health, medical, and mental/behavioral assets, facilities, and other resources, which either need to be rebuilt after an incident or which can be used to guide post-incident reconstitution activities.”<sup>98</sup>
- Function 2 (recovery operations) addressed the “recommendation that jurisdictions should have an integrated plan as to how post-incident public health, medical, and mental/behavioral services can be coordinated with organizations responsible for community restoration.”<sup>99</sup> And,
- Function 3 (corrective actions to mitigate future incidents) addressed the “recommendation that jurisdictions should have a monitoring and evaluation plan for recovery efforts.”<sup>100</sup>

Results are shown in Figure 1. In order for states to learn from established planning efforts and incorporate them into existing plans, this analysis will often mention processes, techniques, or resources that resulted in high scores for states in the abstraction process. While such featured items may not necessarily be “best practices,” they are, at least, helpful or promising practices which other states are using to increase their preparedness for recovery.

### B. INTERPRETATION OF THE TERM “RECOVERY”

Very obvious from review of the data and that which may have significantly affected how state public health plans addressed recovery is that the way in which recovery was defined (explicitly or implicitly) within the plans differed greatly.

---

<sup>98</sup> CDC, *Public Health Preparedness*.

<sup>99</sup> *Ibid.*

<sup>100</sup> *Ibid.*

Traditionally, disaster recovery has been defined in a way that related to the disaster assistance provided to states and individuals by the Federal Emergency Management Agency (FEMA). Specifically, a traditional definition tends to refer to the restoration of a community through providing financial assistance to property owners so that they can rebuild. Such a definition is still quite relevant to emergency management, but it less directly relates to public health actions after a disaster. It is not surprising to find state public health agencies using this same definition because much of the response framework adopted by public health has come from the participation in the ESF structure that is at the core of emergency management agencies nationwide.

Equally as relevant for a definition of recovery is that which is commonly used in private industry related to data recovery. The goal for businesses after a disaster, which affects how they define recovery, is understandably focused on the recovery of data or records and on the recovery and resumption of the organization in order to return to a successful business model. The use of the term recovery in this manner was also found among the plans, undoubtedly because public health agencies, like any other organization, has a need to recover essential records and resume normal business as soon as possible.

More recently, and particularly as it relates to public health, recovery has been used to relate to the concept of whole-community recovery that focuses less on direct assistance and more on the long-term stability of community support mechanisms. The CDC defines community recovery as:

...the ability to collaborate with community partners, (e.g., healthcare organizations, business, education, and emergency management) to plan and advocate for the rebuilding of public health, medical, and mental/behavioral health systems to at least a level of functioning comparable to pre-incident levels, and improved levels where possible.<sup>101</sup>

However, the adoption of this definition is not yet visible in the plans.

---

<sup>101</sup> CDC, *Public Health Preparedness Capabilities*, 22.

### **C. LACK OF RECOVERY PLANNING**

Two plans had recovery definitions that directly reflected the goals of the CDC guidance. It was not surprising these two states were two of the three with the highest scores during the abstraction process. These plans correctly note that the responsibility of public health does not cease with the end of the response or when the immediate threat subsides. One of the state plans notes that long-term recovery may last for years and will involve the development of unique services. The other plan states that recovery is a long-term endeavor with functions that go beyond both the traditional response phase and the demobilization of resources. Certainly, a high level adoption of CDC definitions must play a significant role in the extent to which a state incorporates components consistent with CDC guidance.

The majority of the plans included an intermediate level of adoption of the community recovery definition. Quite common in the public health plans is the reference to long-term recovery as it appears in ESF-8 plans of the state emergency management agency, while, at the same time, referring in their own plans to recovery as the demobilization and devolution of staff and resources to their original locations and uses. Such a mention would tend to infer that these public health agencies are relying on emergency management (or other ESF agencies) to deal with the intricacies of community recovery while focusing their own efforts on the return to normal operations.

Two of the plans seemed to have radically different interpretations of recovery than that conveyed by the CDC. The commonality in these two plans was that they focused almost exclusively on the fact that recovery is the return to normal operations. While the return to normal is a worthy goal for a single organization, it is not one that tends to embrace the community recovery concepts contained within the recent CDC guidance. One state intended to transition into recovery operations once the immediate threat disappears or when the threat can be handled better through normal operations. Such a view largely rejects the concept that recovery is, in and of itself, an operational period that requires significant resources when a threat (albeit of a different nature) is

quite clearly present to the community. The direct threat to the agency may have subsided, but recovery opens up an entirely new challenge for public health within the community.

At first glance, the other state that addressed recovery very differently seemed to be highly prepared for recovery because of the presence of a standalone recovery plan. However, what is very clear is that this recovery plan was entirely devoted to the recovery of agency operations, not directed toward community recovery. This recovery plan was indeed a continuity of operations planning (COOP) plan; this plan referred often to recovery as COOP. While COOP is inherent in preparedness, this is clearly not the intent of the CDC guidance. Interestingly, while several of the CDC tasks related to COOP, this plan was poor in its ability to correlate with the CDC guidance. The plan was very heavy in its focus on detailed procedures for restoring business operations to normal. Plans from this state focused heavily on recovery operations as those which provide assistance to property owners in restoring the status quo.

None of the public health agencies in the states from which plans were requested indicated that they have a recovery plan. However, the lack of a specific recovery plan by no means indicated that the states failed to address recovery in the other plans that they provided. Some plans included specific sections on recovery, and some interspersed recovery concepts throughout the plan. What is clear is that, to date, public health in these states has left the role of development of a recovery plan, per se, to the state emergency management agencies.

**D. IDENTIFICATION OF NEED AND MONITORING**

**Abstraction Results by State**

Task or Element	A	B	C	D	E	F	G	H	I	Total	# of states with score of:				
<b>Function 1: Identification of need and monitoring</b>											<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>
Plans for community assessment and monitoring	1	2	1	2	1	0	4	2	1	14	1	0	3	4	1
Identification of essential services	4	4	0	0	0	0	0	4	0	12	2	0	1	0	6
Identification of vital documents for essential services	1	1	4	0	0	0	0	3	0	9	1	1	0	2	5
Strategies to repair or rebuild public health and sanitation infrastructure	0	3	0	3	0	0	0	1	1	8	0	2	0	2	5
Alternate worksites	0	0	3	0	0	0	0	4	0	7	1	1	0	0	7
Plans to engage business, educational and social service sectors to support the restoration of health services	0	0	0	0	3	0	2	0	1	6	0	1	1	1	6
Procedures to guide the long term provision of medical and behavioral health services	0	1	1	0	0	1	2	0	1	6	0	0	1	4	4
Collaboration processes with community organizations	0	0	0	0	0	0	2	1	1	4	0	0	1	2	6
Identification of the sectors that can support the recovery effort	0	3	0	0	0	0	0	0	0	3	0	1	0	0	8
Protocols to identify legal authorities for the credentialing of non-jurisdictional clinicians	0	0	0	0	0	0	1	0	0	1	0	0	0	1	8
Scalable work force plan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Social distancing procedures for staff	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Processes to facilitate partner sectors to develop continuity of operations plans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Regularly scheduled meetings to promote collaboration between and with partner sectors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
<b>Function 2: Recovery Operations</b>															
Plans for the provisions of physical and behavioral health services with a particular focus on at-risk populations	0	0	0	0	0	0	4	1	0	5	1	0	0	1	7
Plans to inform the community of the availability of physical and behavioral health services and case management services with a particular focus on at-risk populations	0	0	0	0	0	0	4	0	0	4	1	0	0	0	8
Plans for the notification of the community via community partners of the health agency's plans for restoration of impacted services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Partnerships with health professionals and social networks to educate constituents regarding health interventions being recommended by public health	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Behavioral health training for the Medical Reserve Corps or other volunteer training programs.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
<b>Function 3: Corrective actions to mitigate future incidents</b>															
Post-incident assessment and planning as part of the after action report process	1	1	0	0	0	0	1	1	0	3	0	0	0	4	5
Plans for the implementation of corrective actions	1	1	0	0	0	0	1	0	0	2	0	0	0	3	6
Collection of community feedback to determine corrective actions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Engagement of educational, medical, behavioral health and environmental health sectors to solicit feedback and recommendations for improved community access to health services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
<b>State Totals</b>	<b>8</b>	<b>16</b>	<b>9</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>21</b>	<b>17</b>	<b>5</b>						

NOTE: Tasks/elements in **bold** are those that were identified by two or more states.

Figure 1. Results of the Abstraction Process by Function and by State

## **1. Function 1 Analysis: Identification of Need and Monitoring**

As shown in Figure 1, Function 1 is clearly covered by the plans in a more comprehensive fashion than either of the other two functions. Eight of the 14 components were addressed by two or more states. Of all of the components examined within this research, the states had the highest cumulative score for the component called, “plans for community assessment and monitoring.” More states (eight of the nine) addressed this component than any other.

The states that covered community assessment monitoring most thoroughly did so by using the community assessment and public health emergency response (CASPER) concept. State G dedicated significant planning effort to community assessment in the form of CASPER teams. While the CASPER concept is not a new one, staffing could be challenging; state G addressed staffing by taking existing epidemiology response teams and, when necessary, augmenting them with existing environmental health teams to form a more functionally robust CASPER team. State B has also addressed assessment of community need through the CASPER concept, but that plan further emphasized that its CASPER team should focus on high-risk groups of individuals, a major focus of numerous components within the CDC guidance.

The identification of essential services was the component that had the second highest cumulative score. In fact, two states (B and H) scored the highest score (a “4”) in addressing this component. Not only did state B provide significant detail in its listing of primary and essential services, but it also stipulated that its medical operation centers, typically most active in the immediate response to a disaster, would also serve a significant role in the recovery phase of a disaster. State B went so far as to list the services, specific to the medical operation centers, which are essential during recovery. State H categorized its essential services into five tiers, based on the urgency of restoring those services. Additionally, state H provided an eight-page methodology by which a public health agency could define its essential services. The lack of essential services planning could significantly impact the readiness of public health to prioritize its actions during recovery.

In relation to the identification of vital documents for essential services, state C categorized its critical assets and records into four priority groups based on the ability of the agency to replace the documents. State C further defined each of the vital documents by divisions within the agency and detailed how those documents would be transported to their alternate location. Such action would not only assist in the disaster evacuation, but would be particularly useful to ensure the continuation of services throughout the recovery phase of an incident. State H divided its vital records into those that are critical to disaster operations (staffing assignment, policies, and procedures, etc.) and those that are administratively critical (personnel, payroll, inventory, etc.).

Public health agencies from only two states paid any significant attention to alternate worksites in their plans. State H includes a comprehensive overview of alternate facility considerations. While the plan does state that the choice of any particular facility is incident-dependent, it does refer to a list of predetermined locations, and it includes a list of logistical considerations that are critical for the selection of a viable facility. An additional benefit of the state H plan is that it includes a detailed seven-page alternate worksite checklist that addresses over 50 parameters in the choice of a facility. The state C plan scored well also, and while it did supply substantial detail, it focused primarily on the relocation of emergency operations center functions and those functions related predominantly to critical operations. The plan does not attempt to serve as a basis from which to relocate all, or significant portions, of operations for an extended period of time.

Most public health plans made little attempt to address “the engagement of business, educational and social service sectors to support the restoration of health services,” but one state did make a substantial effort to do so. Public health in state E has contributed portions to a state emergency management annex that solely addresses strategies to engage the private sector, including non-profits and academic institutions that have no direct governmental connection. Such a plan could go a great distance to engage a community that largely has been outside of the traditional planning environment.

Somewhat surprising was the relative lack of attention to what the CDC describes as, “procedures to guide the long term provision of medical and behavioral health

services,”<sup>102</sup> particularly due to the fact that this component bears reasonable similarity to the core mission of public health throughout the nation. It could be that this mission is so engrained in the daily operations of public health that it is understood to permeate public health activities. Permeate or not, there is little indication among these plans that public health has focused any attention of the need to extend medical and behavioral health services into the disaster recovery phase. It is possible that, if public health chose to develop community recovery plans, that those core public health services, like the long-term provision of medical and behavior services, would be realized in those plans.

Few states made appreciable attempts to address “strategies to repair or rebuild public health and sanitation infrastructure.”<sup>103</sup> A notable exception to this was the State B plan. It dedicated an extensive section of their plan to detailing how they would address each ESF-8-related function. Normally such an effort would not be considered to be recovery-specific, but this portion of the plan essentially serves as a matrix for decision-makers to deal with long-term community recovery issues across multiple hazards and is unique in its inclusion of environmental health issues, as is suggested by the CDC guidance.<sup>104</sup> Included are missions such as post-disaster disease prevention, long-term behavioral healthcare and the rebuilding of public health and healthcare infrastructure.

Three of the states demonstrated evidence of addressing the component entitled “collaboration with community organizations.”<sup>105</sup> State G, in particular, addressed the inclusion of private agencies as well as professional organizations and even went so far as to mention that those entities could provide assistance with epidemiology and environmental health-related services, which are typically core services over which public health retains tight control.

---

<sup>102</sup> CDC, *Public Health Preparedness Capabilities*.

<sup>103</sup> *Ibid.*

<sup>104</sup> *Ibid.*

<sup>105</sup> *Ibid.*

The remaining six planning components within function 1, as identified by the CDC guidance,<sup>106</sup> were each addressed by no more than one plan. One particular component, “identification of the sectors that can support the recovery effort,” was addressed quite well by one state. State B included a detailed list of individuals (by title, not name) within specific organizations that could be of benefit to public health in conducting recovery operations and planning. Aside from this one instance, no other state scored higher than a “1” in any of these six plan components. The explanations could be varied, but of interest is that three of the six components relate to continuity of operations planning (COOP). Few plans included any significant details related to continuity of operations. This may be the case because much of COOP is quite operational and procedural in nature and therefore likely would not be included in plans, which are typically more generic in nature. Of the states that submitted separate COOP plans or that included COOP references in their existing plans, little was covered that would have satisfied the CDC guidance, which clearly indicates that COOP-related items should be addressed in public health plans.

In summary, the identification of essential services was the second most heavily addressed component, yet six of the nine plans made no attempt to discuss elements of COOP, although the three plans that did address COOP did so in a comprehensive manner. While alternate worksites were addressed by two plans, the total disregard for the topics of scalable workforce and social distancing measures for staff is quite remarkable. Of these four components, essential services is likely the most well-addressed simply because public health plans are somewhat accustomed to defining, as part of basic plans, their basic and essential services. Less traditional, and more directly related to the newer COOP concepts, is ensuring that plans are in place to plan for and protect staff from emerging disease threats.

---

<sup>106</sup> CDC, *Public Health Preparedness Capabilities*.

## 2. Function 2: Recovery Operations

Within CDC's function 2 (recovery operations), only one of the five plan components was addressed by more than two states. The plans of one state did address a second component, and was rated a "4" (the highest rating) in the abstraction tool and, thus, deserves further attention here.

The first component ("plans for the provisions of physical and behavioral health services with a particular focus on at-risk populations"<sup>107</sup>) bears much resemblance to the component in function 1 that addresses the provision of medical and behavioral health care. With the additional detail provided in the CDC guidance, this research interpreted that the function 2 component more directly related to a jurisdiction's ability to plan for aiding at-risk populations during recovery. With that interpretation in mind, the state G plan does an excellent job of focusing on at-risk populations. The state G plan makes specific reference to enumerating the at-risk population within the state, engaging organizations that support at-risk populations and developing communication and outreach materials that appeal directly to those populations.

The same aspects of the state G plan that cause it to score well in the first component also cause it to receive a "4" in the second component entitled, "plans to inform the community of the availability of physical and behavioral health services and case management services with a particular focus on at-risk populations." Of particular and direct application to this component is the reference in the plan to the maintenance of regular communication with the at-risk community to determine that its needs are being met also relevant is the pre-disaster development of communication messages specific to at-risk communities and the deployment of surveillance techniques to detect and respond to the needs of the at-risk community.

The remaining three components within function 2 were entirely unaddressed by the nine sets of plans. Two of the three components relate directly to the ability and intention of the public health agency to inform the public of recovery operations. One relates specifically to notification of the public regarding the plans of public health to

---

<sup>107</sup> CDC, *Public Health Preparedness Capabilities*.

restore services, be they at the pre-disaster location or elsewhere. The other relates to education of the public regarding public health interventions that are being implemented or are recommended for members of the public. One cause of the avoidance of these components could be that since recovery has been thought in the past to be simply the return to normal, traditional services, perhaps little thought and attention has been paid to addressing the need to inform and educate stakeholders on the revised, alternate methods and locations for services and interventions that may be necessary in the long-term recovery from a sizable disaster.

The last of the three unaddressed components was behavioral health training for the Medical Reserve Corps (MRC) or other volunteer training programs. The training of the MRC was not addressed in any of the plans, even within the plans that dedicated significant space to the behavioral health services of the public health agency.

Given that only one component in function 2 (recovery operations) was mentioned by more than one state plan, public health desperately needs to focus on recovery operations. Specifically, as emphasized by the CDC guidance,<sup>108</sup> recovery operations entails the communication, either to the public or to partner organizations, of details regarding how, when and where services will be delivered in the altered environment that is presented by the recovery to the disaster. Given the shrinking public health workforce and the need for volunteers to assist with staff-intensive endeavors, such as the deployment of strategic national stockpile efforts, states clearly need to better plan to address training for the Medical Reserve Corps and any other volunteer workforces.

### **3. Function 3: Corrective Actions to Mitigate Future Incidents**

Of the four components within function 3, two were incorporated by more than one plan; the other two components were not included in any of the reviewed plans. No plan scored higher than a “1” in the abstraction tool for any of the components. Even when a plan did address the “inclusion of post-incident assessment in after-action reports” or the “implementation methods for corrective actions related to recovery,” it

---

<sup>108</sup> CDC, *Public Health Preparedness Capabilities*.

made no more than a cursory mention of such items. Furthermore, no plan made any mention of either of the last two components of function 3: “collaboration with community leaders to collect community feedback” and the “engagement of other sectors (business, education, etc.) in providing feedback on the recovery efforts.”<sup>109</sup> While plans typically do address processes for after-action reviews that are intended to evaluate the response phase of the disaster, without a formal recovery plan, it is not surprising that there is little to no mention of recovery as an integral step in the after-action review process.

Function 3 components, composed of after-action assessment, mitigation efforts, and follow-up with other response partners was nearly non-existent in the plans that were reviewed. Public health recovery planning could undoubtedly benefit from focuses on the ability to learn from and implement corrective actions resulting from after-action reviews.

#### 4. Overall Performance by Function

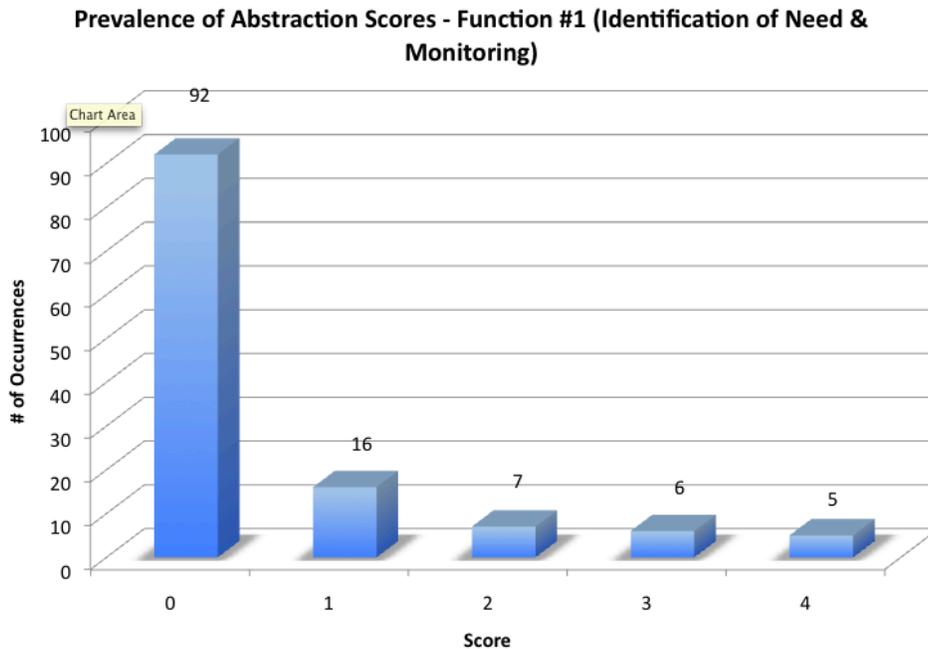


Figure 2. The Prevalence of Abstraction Scores for Function 1

<sup>109</sup> CDC, *Public Health Preparedness Capabilities*.

### Prevalence of Abstraction Scores - Function #2 (Recovery Operations)

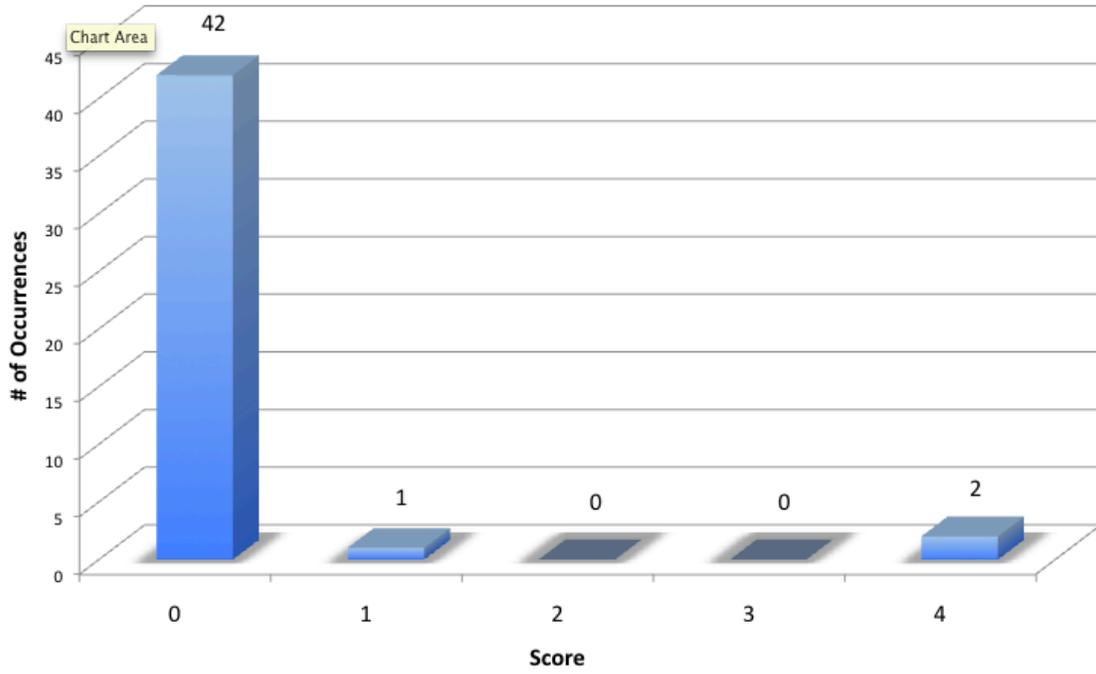


Figure 3. The Prevalence of Abstraction Scores for Function 2

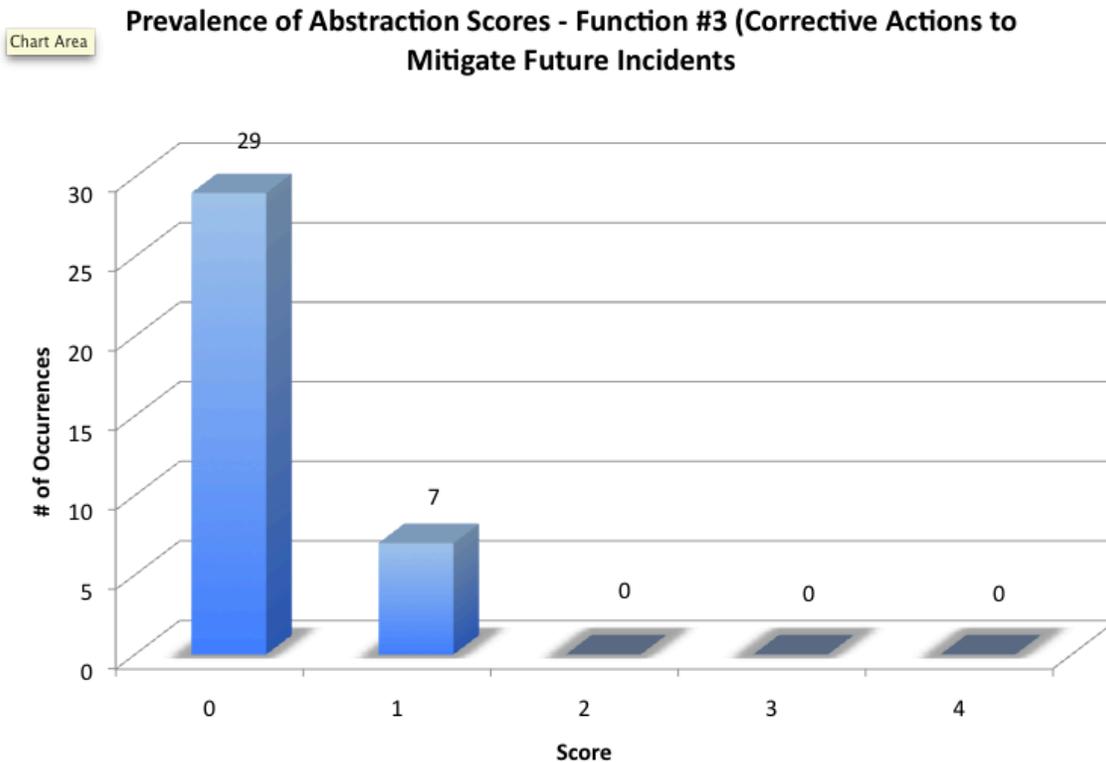


Figure 4. The Prevalence of Abstraction Scores for Function 3

As shown in Figures 2–4, the level of incorporation of tasks and elements from function 1 (identification of need and monitoring) was higher than either of the other two functions. While it is the best, the results illustrate that many of the components went unaddressed by many of the states. Figure 2 shows that of the 126 individual scoring opportunities of all states, 92 (or 73 percent) of the instances were scored as a zero, and only 14 percent were scored as a 2 or higher. While the scores for function 1 were far from impressive, the scores in function 2 (recovery operations) and function 3 (corrective actions to mitigate future incidents) were both substantially lower. In addition, 37 of the 40 scoring opportunities (93 percent) for function 2 were scored as zero, and a mere four percent were scored 2 or higher. Finally, 29 of the 36 scores (81 percent) for function 3 were scored as zero and none of the scores were two or higher.

## **E. NOVEL PLANNING COMPONENTS**

Some states have chosen to develop novel components in their recovery plans. While they may not be relevant to all states and disaster situations, they are presented as potential sources of reference for devising effective recovery plans.

The CDC guidance cannot be expected to have addressed every single attribute, in great detail, that could possibly assist public health in disaster recovery. During the review of state plans, it was quite evident that some states had taken significant planning effort to develop components far beyond what was written in the CDC guidance. One could label such a planning component as “best practice” or as “good practice,” but given that the following components have not be rigorously applied to, and tested in, other states, the following components will be referred to as potential “smart practices.”

Smart practices have been described as those that describe practices that contain some clever component in that they “get something for nothing.” More specifically, smart practices are those tasks and elements that may reap significant benefit to the public health agency at a relatively low cost to the organization.<sup>110</sup> In the state plans reviewed here, smart practices could be thought of as those that strive to create value, locally, with little cost to the jurisdiction. The following components, highlighted from select state plans, are potential smart practices that were unique from the other plans reviewed, are reasonably distinct from the CDC guidance and, therefore, could be useful for other states to examine for potential value in their jurisdictions as well.

For the benefit of all states, the noteworthy examples are detailed in Appendix C.

## **F. SUMMARY**

A number of themes arose during the analysis of these plans. Despite having emergency preparedness plans related to health and medical response, clearly, public health recovery plans are non-existent among the states that were surveyed. While potentially alarming, it does not mean that recovery was not addressed. Often, the

---

<sup>110</sup> Eugene Bardach, *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving*, 3rd ed. (Washington, D.C.: CQ Press, 2009), 1–4.

definition of recovery became the limiting factor; a variety of recovery definitions are used among the plans, many quite different than the CDC concept of community recovery.

Among components within function 1, four are directly related to continuity of operations planning, yet COOP is minimally addressed by the plans. Such a lack of COOP can directly impact the ability of states to focus efforts on core priorities and to re-establish functions post-disaster.

The lack of attention to the vast majority of functions 2 and 3, is very obvious in these plans. Public health focuses heavily on community assessments and surveillance (a major focus of the first function), but the CDC's call to action on recovery activities (function 2) and after-action follow-up (function 3), is something on which public health has yet to dedicate significant effort and resources.

There are obviously a variety of definitions of recovery, and there are also numerous methods by which one could assess the level of state public health readiness for recovery. When comparing state plans to the published CDC guidelines, overall performance was very low. However, some plans excelled in select areas, especially those areas involved in the identification of community need and monitoring. To date, however, no research has attempted to assess state public health plan readiness against the CDC definition of community recovery. This attempt to do so finds no stand-alone public health recovery plans among the surveyed states and a low level of compliance with planning components, particularly those related to recovery operations and post-incident corrective actions, recommended by the CDC.<sup>111</sup> While the Discussion Chapter will speculate on the reasons for these findings, of particular utility to the states will be the novel planning components that can allow states to increase their preparedness by relying on the groundwork that other states have done to benefit long term community recovery.

---

<sup>111</sup> CDC, *Public Health Preparedness Capabilities*.

## V. DISCUSSION

It is very clear from the analysis of the data collected for this research that the level of compliance by state public health agencies with the CDC recovery planning guidance is very low. This may seem surprising to many, particularly after the numerous, high-profile, disasters during the last decade. There are various reasons for this, each of which tends to place public health a step closer in defining its role in recovery.

### A. PLANNING FOR THE EXTREME

Recovery planning is an endeavor that focuses more on the long term than on the near term, more on the unknown needs of communities coping to recover than on the known needs of food, water, and shelter and more on the exceptions to the rule versus on the rule itself. According to Taleb, “Our world is dominated by the extreme, the unknown, and the very improbable (improbable according to our current knowledge)—and all the while we spend our time engaged in small talk, focusing on the known, and the repeated.”<sup>112</sup> As stated earlier, public health is quite capable of preparing for the normal nursing duties that are required during the staffing of shelters and for vaccinations immediately post-disaster, so preparing for such actions that take place on a daily basis is likely not a productive use of planning time. Less well developed are the plans that would allow public health staff to sustain for months in catastrophic disaster conditions or to communicate with special needs populations while dealing with devastation that has disabled most typical methods of communication; such planning is more in line with the preparations for community recovery. In addition, such planning needs to infer that it is this extreme event (the “black swan”) against which we should prepare, and that it is more likely the norm instead of the outlier that it has been thought to be.<sup>113</sup>

---

<sup>112</sup> Nassim Nicholas Taleb, *The Black Swan: The Impact of Highly Improbable Fragility* (2nd ed., Kindle ed.) (New York: Random House, 2010), Kindle location 484.

<sup>113</sup> *Ibid.*

## **B. KEY CONCEPTS**

### **1. An Absence of Recovery Plans**

As mentioned earlier, none of the states surveyed for this research had a separate recovery plan. It is not illogical to conclude that the states may be entirely unprepared to deal with community recovery, but given the incorporation of recovery-specific components within their other plans, this is clearly not the case. More interesting is why those states do not have a recovery plan. This research did not query states as to the reason for the lack of such a plan, but potential reasons include: lack of awareness, lack of need, or inclusion of such planning components into existing plans.

While the concept of the inclusion of community recovery into public health planning is only a few years old, it would be difficult to argue that public health planners were unaware of the need for public health recovery planning, given its presence in recent CDC grant literature. Similarly, lack of need as a possible reason for the absence of a recovery plan is somewhat difficult to justify because of the occurrence of major disasters (e.g., hurricane Katrina, Haitian earthquake, Japanese tsunami) over the past decade that have had significant health implications well beyond the initial disaster itself. A lack of need could be caused by a short-sighted belief that a jurisdiction is not susceptible to any particular hazard with health care implications. Unfortunately, this is not likely to be the case. Therefore, it is most likely, as seen throughout the review of plans for this research, that state public health agencies distributed recovery-specific information throughout existing plans. Much of what public health does involves actions that will take place in all phases of a disaster. Just because plans address recovery, however, does not indicate a high level of capacity for community recovery and that is most certainly the case for these reviewed plans.

Without a clear recognition of the public health slant on the definition of recovery and of the fact that recovery is, in part, a process through which a community heals after a disaster, public health will not be successful in fulfilling the needs within the

community. These plans were clearly different in the extent to which they recognized this distinction and these differences certainly played a role in accounting for the varying levels of concurrence with the CDC guidance.

## **2. Funding-oriented Planning**

The introduction of public health preparedness funding, beginning in earnest in the late 1990s and accelerating rapidly after 2001, was certainly a major driver in the intensity of planning and preparedness activities conducted by public health. For many of those years, planning was centered around the “focus areas” of the grant that were discipline-focus response areas (e.g., epidemiology, lab, general preparedness). Such a structure was less of a guidance for preparedness and more of a mechanism to organize a system of grant funding.

In 2011, the CDC, to which state public health agencies look to for both funding and guidance, established 15 capabilities in its planning standards document, one of which was “community recovery.”<sup>114</sup> The capabilities were designed to be addressed within the five-year grant cycle that began in the summer of 2012. While states must address all 15 within the five-year time frame, they can choose which capabilities to address each year. It is entirely possible that within the 18 months since the publication of the capabilities, states have either not addressed the community recovery capability or just begun to do so. It is reasonable to anticipate a significant grant-imposed improvement by the end of the grant cycle, but given that no state received more than 21 out of a possible 92 points on the abstraction tool (see appendix), all of the states would clearly need to make significant improvements to meet the expectations of the CDC.

## **3. Poor Overall Performance**

Examining all three of the CDC functions within the “community recovery” capability reveals that 163 (79 percent) of the assessments of individual components resulted in a score of zero (see Figure 5). With four out of every five scores resulting in a score of zero on a scale of 0 to 4, it is difficult to conclude anything other than, in

---

<sup>114</sup> CDC, *Public Health Preparedness Capabilities*.

general, that the states performed poorly on their compliance with the CDC standards. Reasonably better performance on function 1 (identification of need and monitoring) could be because the function roughly correlates to advanced planning which is a topic with which public health is quite familiar and something that has been a grant deliverable since the inception of the CDC's Public Health Emergency Preparedness (formerly, Bioterrorism) Grant in 2002.

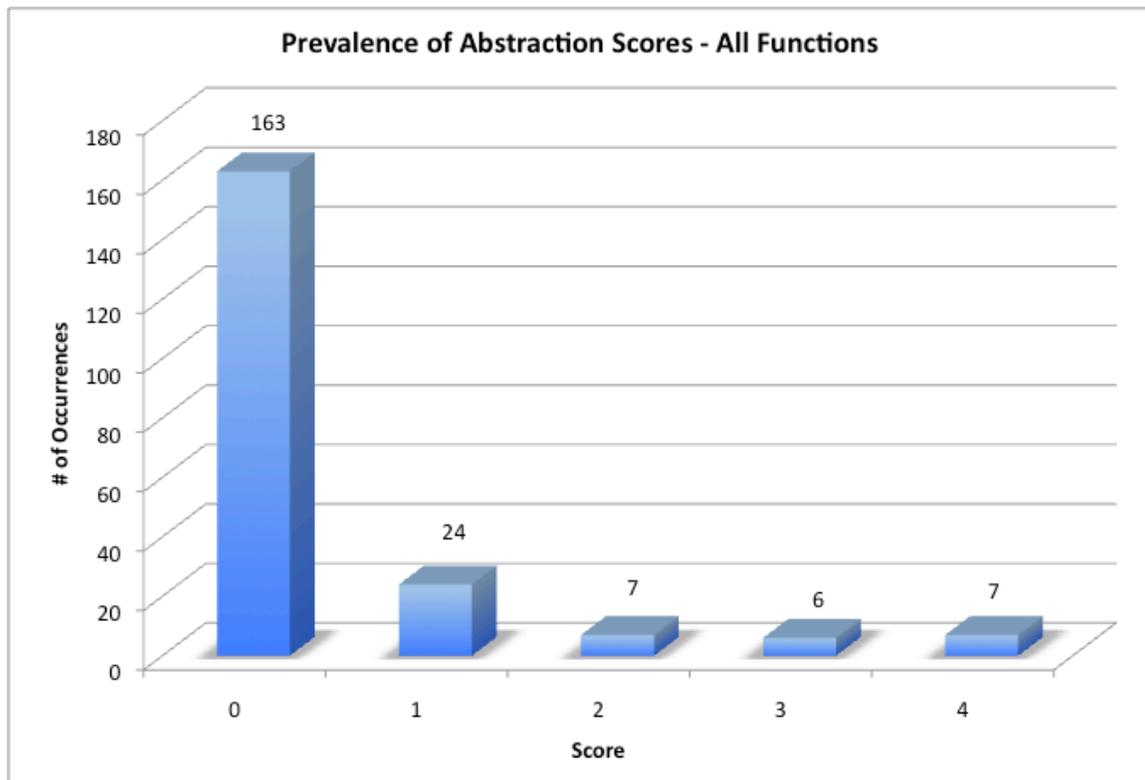


Figure 5. The Prevalence of All Abstraction Scores

Conversely, functions 2 (recovery operations) and 3 (corrective actions to mitigate future incidents) relate most closely to operational response and after-action planning. Such responses (and the after-action work that follows such response activity) are not daily occurrences within public health. Without having to address the issues as frequently, it follows that those issues would appear less frequently in public health plans.

A potential implication of poor performance on the CDC components is that public health has not undertaken the necessary planning to be ready to respond to a long-term public health recovery scenario. Whether or not this is true cannot be known, but a substantial amount of planning involves coordination and collaboration with external partners and, without such advanced planning, it becomes difficult to respond to a high-intensity event while functioning in an ad-hoc manner.

#### **4. Innovation in Public Health Preparedness**

The institution of preparedness tends to change drastically with large-scale disasters. Prior to 9/11, the process for managing emergencies had changed relatively little since the inception of Cold War-era civil defense organizations. The reaction to 9/11 and the resulting homeland security focus resulted in a momentous change in preparedness priorities and actions. As Christensen states, the method of management, or one could say good management, is “only situationally appropriate.”<sup>115</sup> Innovation was of a rapid and disruptive nature around the time of the 2001 terrorist attacks.

Less than five years later, hurricane Katrina came ashore and once again caused a monumental shift in our thinking of disasters. Suddenly, residents did not flee their town just to return once the winds had passed. The new paradigm was that disasters may render entire groups of communities unusable for years to come and may permanently impact the community. Since then, public health has been struggling to adapt to such a long-term community recovery scenario. The CDC guidance<sup>116</sup> attempts to present mechanisms for which public health can adapt to a post-Katrina model.

#### **C. LESSONS LEARNED**

To change to the extent suggested by this research will encompass disruptive innovation within public health and, to some extent, the emergency management structure. Bold steps will be necessary to change the direction of public health preparedness, such that they will remain relevant in an ever-changing threat environment.

---

<sup>115</sup> Clayton M. Christensen, *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail* (Kindle ed.) (Whiteriver Junction, VT: Perseus Books Group, 1997), ii.

<sup>116</sup> CDC, *Public Health Preparedness Capabilities*.

Public health must begin to adopt a definition of recovery that focuses first and foremost on the recovery of services for residents in the community. Without this, planning will continue to focus on internal operations and the protection of the public will suffer. Additional COOP preparations are also sorely needed. Four of the CDC components directly address COOP: identification of essential services, alternate worksites, scalable workforce and social distancing for staff. However, a recurring theme throughout the plans is a less-than-thorough handling of continuity of operations planning. Given the lack of attention on the need for such planning since 9/11, it is surprising that COOP was not more prevalent within the plans.

### **1. Limitations to Interpretation**

This research was limited, somewhat, by the willingness/ability of states to supply their plans. While all states shared plans, it is entirely possible that some states had components of their plan that they chose not to, or otherwise felt, that they could not share. The degree to which this is the case will probably never be known, but it is important to recognize this shortcoming. Several states did state that they chose not to share SOPs related to their plans because of the specificity or confidentiality within them. Such a response was entirely anticipated and, given the granularity that is typically contained within such SOPs, it is unlikely that significant sectors of the planning effort were missed by this analysis. The components within the CDC guidance are broad in nature, and it would be atypical to find such planning in SOPs, a fact that further indicates that the impact of not supplying SOPs probably had minimal impact on the validity of this research.

### **2. Areas of Future Study**

This research is relatively narrow in focus, and it could not possibly address all of the elements which would be indicators of a public health system that is prepared for disaster recovery. It is important to address areas of research that could complement that which is done here.

There are many partners in the response to a disaster scenario and certainly only the readiness of public health was analyzed here. The state emergency management

agency for one of the states examined in this research took on the task of addressing community recovery. It would be useful to the goal of determining overall recovery readiness to determine how state emergency management agencies are interpreting their role in community recovery; if, as stated in this research, states are (in some cases) implicitly deferring to emergency management or to other ESF agencies, then to what extent is state emergency management handling this issue. Certainly public health, for the most part, has not tackled the issue, but maybe that is partially because emergency managers are doing so.

This research was conducted very near the beginning of the five-year grant cycle, which is guided by the CDC guidance.<sup>117</sup> It will be enlightening to study the extent of recovery preparedness after the end of the five-year grant cycle to determine the progress that it made since this research and to determine if public health further defined and embraced its role in disaster recovery.

We live in a multi-threat society where the response needs are constantly changing. While this research argues for the applicability of these findings to other states, there are also local resources that could be used to enhance preparedness for recovery; this research did not do so, but it could be useful to examine counties and municipalities to find innovative and useful methods of planning for disaster recovery. Just as we look outside of the state for experts, planners interested in a strategic approach to community planning could benefit from looking deeper within local communities for experts in the form of those who will need the services during a disaster recovery. Such a process is critical to “identifying desirable strategies with strong chances of producing workable and societally desirable outcomes.”<sup>118</sup>

### **3. Applicability Elsewhere**

This research analyzed plans from nine of the 50 states, specifically those that have been most prone to hurricanes. Certainly, it would be foolish to assume that the data collected here captures all of the variability that exists across the state and territories

---

<sup>117</sup> CDC, *Public Health Preparedness Capabilities*.

<sup>118</sup> Christensen, *The Innovator's Dilemma*.

of the United States. However, the CDC guidance is multi-hazard, as were the plans analyzed here, indicating that these findings could reasonably be expected to hold true in geographies entirely unrelated to hurricanes. The identified gaps and the areas for improvement likely apply to any state public health agency in a disaster recovery planning environment.

It is worth noting that, given the frequency with which these nine states are accustomed to dealing with hurricanes and the planning necessary to prepare for such storms, that they may be within the upper echelon of preparedness. It is distinctly possible that other states may be less prepared than those examined here, although such a fact would tend to reinforce the contention that it is ever more important for all states to examine their level of readiness and adopt smart practices that are outlined within this research.

This research presents potential mechanisms that state public health agencies can use and concepts that they can adopt, to increase their level of preparedness. The CDC guidance is comprehensive in addressing recovery components that public health should address, but its information is not necessary easy to apply to plans and procedures. State public health agencies could use the abstraction form from this research to evaluate their own plans to determine areas in which their current planning efforts are insufficient.

Similarly, appendix C outlines plan elements that could greatly increase the level of preparedness and in a rather efficient manner too. Doing so would use approaches that, while novel or unique, could significantly boost the level of preparedness without expending all the time and effort to develop new concepts and techniques.

## **D. RECOMMENDATIONS**

### **1. U.S. Implementation of an Australian Solution**

The Australian government has proactively taken steps, consistent with the goals of shared responsibility, to empower local governments by putting forth concrete guidance that can be used by the response community. The Australian *Strategy* quite clearly states, “It is expected that state, territory and local governments will use the

Strategy to inform local action.”<sup>119</sup> It contrasts plans from the past that included roles, responsibilities, and procedures with a more modern planning algorithm that entails, “action-based resilience planning to strengthen local capacity and capability, with greater emphasis on community engagement.”<sup>120</sup>

On the contrary, the U.S. has neglected to take steps that make the strategic, visionary, and policy-oriented guidance such as that which can be implemented by local government in daily response operations. While the comparable U.S. document, the *National Disaster Recovery Framework* (NDRF), expresses the intention to link all levels of government, it “describes the concepts and principles that promote effective Federal recovery assistance.”<sup>121</sup> It defines the operation of federal entities in a disaster and quite clearly establishes a new set of hierarchical positions during recovery operations.<sup>122</sup>

It is both expected and reasonable that homeland security planning over the last decade has been largely influenced by our reactions to the 9/11 attacks. Inevitably, planning will tend to default to national-level scenarios of catastrophic proportion. By proceeding in such a manner, the U.S. has tended to focus on the response phase, but this country faces a myriad of disasters for which the recovery phase can last for months and years. In such a scenario, local communities will be left to bear a significant burden of the recovery. Local disaster workers, specifically public health workers, are very capable of performing their jobs, but they are not sufficiently informed and trained as to what their role is or how to achieve a successful recovery outcome in a disaster recovery scenario.

The U.S. could transition from a strategy of planning for disasters that focus on the heavy hand of federal resources to one that focuses on assisting local (city, county, state) communities. Such a policy shift would be represented by the recognition, in high-level recovery plans and frameworks, that the entire nation has a shared responsibility to help our communities recover after a disaster. Most realistically, it could be most successful to do so through the development of an implementation plan for the NDRF.

---

<sup>119</sup> Council of Australian Governments, *National Strategy for Disaster Resilience*, iii, iii.

<sup>120</sup> *Ibid.*, 2.

<sup>121</sup> DHS and FEMA, *National Disaster Recovery Framework*, 3.

<sup>122</sup> *Ibid.*, 1.

Such an implementation plan would make the high-level NDRF of the United States similar to Australia's *National Strategy for Disaster Resilience* (NSDR) in that it would be more easily implemented. Such an implementation plan would allow for the discussion of actions that local communities should take, and it would likely direct the planning toward the development of manuals and handbooks similar to those published by the Australians.

Regardless of whether the NDRF was expanded to include an implementation plan, a set of disaster-specific manuals could be easily integrated into, and would nicely complement, the host of high-level U.S. planning documents. A reasonable way to begin the process would be the implementation of something like the Australian *Disaster Health* handbook and the *Community Recovery* handbook. Not only would this be a logical next step to the NDRF in that it would significantly fill gaps in the readiness of public health disaster workers, but the Australian versions could serve as strong templates.

The U.S. is a large country composed of tens of thousands of diverse communities. Each one of those communities must be prepared to live, for months and years, through the recovery from a disaster. We must exploit this economy of scale and empower our local response communities with specific knowledge that will ensure that they are just as capable of ensuring a “secure and resilient nation” for which we strive in the *National Preparedness Goal*.<sup>123</sup>

## **2. Opposition to Public Health Recovery Planning**

It is a distinct possibility that, within public health preparedness circles or within the larger public health infrastructure, there will be opposition, or even resistance, to the involvement of public health in the planning for, and response to, disaster recovery. Clearly, this research indicates that community recovery would be an entirely new area of planning on which public health, for the most part, has not previously focused. There are several reasons as to why such opposition may exist.

---

<sup>123</sup> DHS, *National Preparedness Goal*, 1.

Although not a scenario unique to public health, one does not have to search hard to find a public health employee that says they, and the larger institution that is public health, have been forced to do more with less. Between fiscal year (FY) 2010 and FY 2012, public health emergency preparedness (PHEP) funding from the CDC has decreased over 11 percent.<sup>124</sup> During such times, it is a difficult argument, unless it comes directly from the funding organization, to say that public health must take on an entirely new realm of preparedness. Despite the fact that the CDC guidance document<sup>125</sup> delineates the capabilities (of which one is community recovery) for which public health must prepare, it could be that state public health agencies will, in reaction to the CDC guidance document and in response to this research, attempt to fit the new CDC capabilities and functions into existing plans and preparations versus trying to treat the requirements as unique elements for which they should plan.

In most states, state public health agencies work closely with state emergency management organizations on a number of preparedness fronts to include health and medical issues (ESF-8) and a variety of other support agency functions (mass care, transportation, etc.). In recognition of the uniqueness of the recovery phase of a disaster, emergency management has, over the last decade, begun to incorporate recovery support functions (RSFs) into their disaster planning. Additionally, emergency management has, as discussed earlier, always handled the component of recovery that is the distribution of funds (now nearly synonymous with recovery) to governments and individuals. It could be that because of the predominant role of emergency management in recovery, some public health professionals may be resistant to taking on additional responsibilities related to recovery. It should be noted that the niche for public health is remarkably distinct and significantly more specific than that which is overseen and coordinated by emergency management. The increasing cost of and impact to residents from disasters mandates that public health take a front-line role in helping communities recover.

---

<sup>124</sup> Centers for Disease Control and Prevention, "Funding and Guidance for State and Local Health Departments," Centers for Disease Control and Prevention, last modified August 2012, accessed November 12, 2012, <http://www.cdc.gov/phpr/coopagreement.htm>.

<sup>125</sup> Ibid.

Criticisms of this research may also come from those who believe that planning for community recovery from long-term disaster recovery is outside the scope of public health and, arguably, outside the realm of something for which state agencies should dedicate significant time and resources because of the uncertainty and unknown nature of the necessary response. While it may be true that it is more difficult to predict all of the actions that will be expected from public health during the recovery phase of a disaster, the counter-argument is that this is the very reason why community recovery cannot be ignored by public health.

The world is an uncertain place. It is the Katrina and 9/11 events that are remembered, and they are remembered because those are the events that change lives. Public health is intended to protect and preserve life, and such a goal cannot be achieved without planning for and being ready to respond to the extraordinary events. The failure by public health to address community recovery planning is what could turn the ordinary into extraordinary. The development of a clear role for public health in the recovery phase may indeed ensure a more robust capability during the more typical disaster public health responses.<sup>126</sup>

### **3. A Threatening Move?**

While public health may be hesitant to assume a role that many have associated with emergency management, the inverse could also be true. Emergency management has a significant infrastructure and tremendous responsibilities related to recovery operations, and it could be the case that emergency management will perceive a threat from public health's novel responsibilities within recovery. To combat such misunderstandings, education will be crucial. Public health may need to dedicate time and resources to meeting with local, county, and state emergency management agencies to ensure that they understand that the portion of recovery for which public health is responsible is a much smaller piece of the whole in that it is related to public health community recovery. Such an understanding would be integral to ensuring that emergency management and public health continue to successfully collaborate on the mission of disaster recovery.

---

<sup>126</sup> Taleb, *The Black Swan*, 421.

One of the most significant problems in the area of public policy is that each government agency tends to think that it has the ability to make autonomous decisions. This tends to result from minimal levels of conversation and coordination among agencies for fear, in part, that collaboration tends to weaken the power and influence of the agency head, if not the entire agency.<sup>127</sup> For public health to truly be successful in the area of planning for community recovery, it must work closely with emergency management to educate about its skills and abilities and negotiate priorities to ensure that both agencies are working to deliver the most efficient and effective response to a disaster.

This research indicates that not all state public health agencies are moving in the same direction when it comes to planning for disaster recovery. More specifically, the public health plans indicates that these states currently have levels of disaster preparedness that vary greatly. These states did not recently decide on individual goals and then develop these plans; instead, these are plans that have been formulated over a period of many years. The complex adaptive system that is recovery planning requires that states learn from the lessons and responses of neighboring states and assess the applicability of applying policies or procedures to their own preparedness. Because public health has had little concentrated focus on recovery planning in the past, such a loosely integrated (within states, across states, or as a nation) system of preparedness has resulted in the broad array of plans and public health recovery preparedness that exists today. Public health is structured quite differently from one community to the next; some states delegate much of the provision of public health to counties. Others have relatively autonomous regions within the state, and still others have a centralized public health infrastructure for the state. While there is no requirement for each public health agency to have identical plans, the wide variety of public health agencies around the nation should be heading toward the same goal (the CDC guidance, for example) while adopting

---

<sup>127</sup> Judith E. Innes and David E. Booher, *Planning with Complexity: An Introduction to Collaborative Rationality for Public Policy* (New York: Routledge, 2010), 9.

methods to reach that end point which complement the specific needs of their individual communities.

The most successful way convince multiple players to unite around, or at least not resist, a policy, is to provide a unified goal.<sup>128</sup> For state public health agencies to embrace a policy of comprehensive recovery planning, defining clear roles for public health is a necessary and useful first step. With the release of the CDC guidance in 2011, public health suddenly had a unifying document that set standards for recovery planning efforts. The document established recovery functions for public health with a common set of elements that public health should have and tasks that public health should be able to accomplish. Given the substantial number of significant disasters over the last decade, it should not be surprising that this document has recently been crafted, for it is most common for a collaborative unification of goals to occur in the aftermath of a natural disaster.<sup>129</sup>

## **E. SUMMARY**

As identified earlier, the thousands of autonomous health departments around the nation will likely continue to independently plan for and address disaster recovery unless areas of focus and improvement are identified. This research has attempted to define those areas.

As stated in *Thinking of Systems*, “If everyone can work harmoniously toward the same outcome...the results can be amazing.”<sup>130</sup> This research detailed areas, identified through a review of plans from a sampling of disaster-prone states, where state public health agencies are not aligned with the standards set forth in the CDC guidance.<sup>131</sup> These areas include more comprehensive continuity of operations planning, increased communication with partners and the public regarding plans for public health recovery operations, and a greater emphasis on the assessment of the response post-incident and

---

<sup>128</sup> Donella H. Meadows, *Thinking in Systems: A Primer* (Kindle ed.) (White River Junction, VT: Chelsea Green Publishing, 2008), location 2172.

<sup>129</sup> *Ibid.*

<sup>130</sup> Meadows, *Thinking in Systems*.

<sup>131</sup> CDC, *Public Health Preparedness Capabilities*.

the incorporation of lessons learned during the response. The solidification of a clear role for public health in disaster recovery has been initiated by the CDC guidance and could be furthered by addressing the areas for improvement that have been identified in this research.

THIS PAGE INTENTIONALLY LEFT BLANK

## **APPENDIX A. ATTACHMENT 1: ABSTRACTION FORM INSTRUCTIONS PUBLIC HEALTH PLAN REVIEW: THE ROLE OF PUBLIC HEALTH IN RECOVERY OPERATIONS**

Intention of this form: There is no document that details the elements that should be included in a public health recovery plan. In March 2011, the Centers for Disease Control published *Public Health Preparedness Capabilities: National Standards for State and Local Planning*. The CDC document addresses the intent of the National Health Security Strategy in that it provides guidance for public health planning, including recovery planning. It is the first document to provide detailed recovery plan components from a nationally standardized perspective. The CDC document is not a catalogue of plan elements from which a planner can pick and choose, but it does provide some details as to public health capabilities that should be addressed in a plan.

Most public health jurisdictions don't yet have plans that are specific to the recovery phase of a disaster; it is common to find components of a recovery plan in existing emergency operations plans. This form is intended to document the extent to which plans have incorporated the recently identified CDC capabilities and identify new and different functions and tasks in the plan that are outside those items which have been identified at a national public health level.

The CDC defines, within the disaster recovery capability, the following terms; this abstraction form uses the same terms.

- **Function:** describes the critical items that need to occur to achieve a capability (Disaster Recovery, in this case).
- **Tasks:** the steps that need to occur to accomplish the function
- **Elements:** resources a jurisdiction needs to have, or have access to, in order to successfully perform a function and the associated tasks

This research will consider tasks and elements as essentially identical; tasks are actions that must occur and elements are resources that must be in place, but both are used to ensure that a function is accomplished.

Instructions:

Using the following scale, rate the extent to which the plan being reviewed includes the tasks or elements, as published by the Centers for Disease Control.\*

SCALE:

- 0. Made no mention of the task or element in the plan
- 1. Made mention that the jurisdiction would employ the task or element in the plan, but gave no additional details.
- 2. Made mention of the task or element and included few, if any, details. Any details were limited to general description and did not mention specific methods, agencies, departments, locations or staff.
- 3. Made mention of the task or element and then included substantial and specific details to include specific resources, agencies, locations, or staff.
- 4. Dedicated an entire section of the plan to addressing how (via methods, procedures, etc.) the jurisdiction would implement the task or element.

**APPENDIX B. ABSTRACTION FORM PUBLIC HEALTH PLAN  
REVIEW: THE ROLE OF PUBLIC HEALTH IN RECOVERY  
OPERATIONS**

**Public Health Plan Review: The Role of Public Health in Recovery  
Operations**

Date Abstraction Performed:			
State:			
Agency/Department Name:			
Date of Plan (last revision):			
Type of Plan:			
Name of Plan:			
<b>Scale:</b>			
0. Made no mention of the task or element in the plan			
1. Made mention that the jurisdiction would employ the task or element in the plan, but gave no additional details.			
2. Made mention of the task or element and included few, if any, details. Any details were limited to general description and did not mention specific methods, resources, agencies, locations or staff.			
3. Made mention of the task or element and then included substantial and specific details to include resources, agencies, locations, or staff.			
4. Dedicated an entire section of the plan to addressing <u>how</u> (via methods, procedures, etc.) the jurisdiction would implement the task or element.			

<b>Function 1: Identification of Need and Monitoring</b>			
<b>Task or Element</b>	<b>Scale</b>	<b>Page numbers</b>	<b>Notes</b>
Collaboration processes with community organizations			
Plans for community assessment and monitoring			
Scalable work force plan			
Identification of essential services			
Social distancing procedures for staff			
Identification of vital documents for essential services			
Alternate worksites			
Strategies to repair or rebuild public health and sanitation infrastructure			
Procedures to guide the long term provision of medical and behavioral health services			
Identification of the sectors that can support the recovery effort			
Protocols to identify legal authorities for the credentialing of non-jurisdictional clinicians			
Plans to engage business, educational and social service sectors to support the restoration of health services			
Processes to facilitate partner sectors to develop continuity of operations plans			
Regularly scheduled meetings to promote collaboration between and with partner sectors			
<b>Function 2: Recovery Operations</b>			
<b>Task or Element</b>	<b>Scale</b>	<b>Page numbers</b>	<b>Notes</b>

Plans for the provisions of physical and behavioral health services with a particular focus on at-risk populations			
Plans to inform the community of the availability of physical and behavioral health services and case management services with a particular focus on at-risk populations			
Plans for the notification of the community via community partners of the health agency's plans for restoration of impacted services			
Partnerships with health professionals and social networks to educate constituents regarding health interventions being recommended by public health			
Behavioral health training for the Medical Reserve Corps or other volunteer training programs.			

**Function 3: Corrective Actions to Mitigate Future Incidents**

<b>Task or Element</b>	<b>Scale</b>	<b>Page numbers</b>	<b>Notes</b>
Post-incident assessment and planning as part of the after action report process			
Collection of community feedback to determine corrective actions			
Plans for the implementation of corrective actions			

Engagement of educational, medical, behavioral health and environmental health sectors to solicit feedback and recommendations for improved community access to health services			
<b>General Comments</b>			

**Plan Elements that Were Not Identified CDC Capabilities**

<b>Task or Element</b>	<b>Scale (1–4)</b>	<b>Page numbers</b>	<b>Explanation as to why this element is unique from CDC elements.</b>

## **APPENDIX C. ATTACHMENT 3: NOVEL PLAN COMPONENT AND POTENTIAL SMART PRACTICES**

The CDC has devised priority tasks and elements against which this analysis has critiqued public health plans, but this research would be lacking if it didn't consider that these plans also have components that clearly don't qualify in fulfilling the intent of the components in the CDC guidance, but which, through extensive experience with disasters over many years, the states have devised to serve the public well in that state. Quite possibly, such a component could also prove useful to other states. The following components are listed in no particular order.

### **Plan Component: CASPER (Community Assessment and Public Health Emergency Response)**

Explanation: CASPER is a process designed by the CDC to aid communities in assessing the public health needs of a community, particularly in a post-disaster scenario. It relies on trained teams, statistical sampling models and standardized methods for seeking input from residents.

Research findings: One state appeared to have far exceeded the others in the area of community post-disaster assessment in that it has developed particularly specific standard operating guidelines (SOGs) for CASPER. The SOGs detailed everything from activation procedures, to organizational composition of the teams, to resupply of the teams after completion. This guide included team members' roles and organization, activation and deployment steps and job action guides for individual team members. Such plans could have significant affect on the advanced readiness to respond to community needs.

Particularly important to the continuation of assessment throughout an extended disaster recovery, the plan featured job action sheets that were specific to the jurisdiction's staff positions, which could enable the all-too-necessary rotation of staff throughout the duration of an event.

### **Plan Component: At-Risk Populations**

Explanation: The CDC guidance discusses, numerous times in various subject areas, the need for the inclusion of “at-risk” or “vulnerable” populations. While public health has long been accustomed to working with “special medical need” individuals in shelter settings, the requirement to address at-risk populations, much less to address those populations during a community recovery event, is a relatively novel concept. Particular attention is paid to ensuring that medical and behavioral health services are available during a recovery and that plans are in place to reach out to this sometimes hard to reach population to inform them of how and where services will be offered during recovery operations. While the definition of at-risk populations is becoming well recognized in public health planning efforts, the scope of that population is very large.

Research Findings: Plan G addressed both of these items in a more targeted manner than other states, in that it included a guide that established a five-step process for addressing the unique needs of at-risk populations, including recovery-specific considerations. Of particular interest is a state emergency management recovery plan that dedicated substantial attention to at-risk populations. This recovery plan included members of a Recovery Task Force, upon which much emphasis is placed throughout the document. The Task Force included many members from non-traditional responders such as the housing authority, food bank, special needs organizations and many others. No other plan included the use of such a task force. The recovery plan also discussed the priorities of a Special Needs Committee and suggested the development of a County Unmet Needs Committees. The plan specifically addressed long-term recovery with detailed processes to establish ad-hoc working committees throughout the recovery period. Such committees could be very helpful to an entire community, but could also be equally as helpful to public health in providing mechanisms where public health could be tasked with recovery responsibilities or where it could have a voice regarding community priorities.

### **Plan Component: COOP (Continuity of Operations Planning) Preparations**

Explanation: COOP is a process intended to ensure that organizations have plans in place to cope with disasters such that they can continue operations, at least those that are critical to the mission of the organization, during and after a disaster. While COOP, per se, is not a task or element mentioned by the CDC guidance, several of the CDC tasks (identification of alternate worksites, identification of essential services, identification of vital documents, etc.) clearly relate to continuity planning.

Research Findings: Plan H, more so than any other plan that was reviewed, integrated significant and substantial COOP items into their EOP. Specifically, the plan included a lengthy attachment that detailed essential tasks (including sub-activities and personnel assignments), a detailed alternate facility checklist and a multi-year strategy to plan for and maintain continuity throughout a disaster. Such a robust COOP, despite the fact that it is not solely recovery-specific, could have appreciable effects on the recovery-readiness of a state due to the fact that it tends to force a state to ensure that it can operate in atypical, and often austere, conditions while continuing to provide alternative, yet high quality, methods of care.

### **Plan Component: Deployable Team**

Explanation: The concept of having established pre-disaster functional teams could help speed the implementation of public health programs in a community.

Research Findings: The Plan B EOP contained a section dedicated solely to deployable teams. It featured over a dozen, operational teams (included CDC focus areas such as behavioral health services) and it went so far as to discuss staff, qualifications and training necessary for each of the teams.

### **Plan Component: Group Collaboration**

Explanation: There is little that one agency, or one division within an agency can accomplish in a disaster, forcing public health to rely on partnering for success.

Research Findings: One plan developed a state Disaster Medical System (DMS). It proposed integration at all four phases of emergency management, and provided a

concept of operations for how the various ESF-8 entities can work seamlessly at all jurisdictional levels during response and recovery phases. It focused particular attention on devising ways in which public health and healthcare resources can integrate during a recovery.

The system is much like the collection of agencies that are assembled in state ESF-8 plans except this group grew out of a need to have a more coordinated planning effort of an expanded ESF-8-like group. The DMS was intended to resolve communication and chain of command issues by bring together public health, healthcare, emergency medical services for advanced planning, as opposed to one ESF-8 lead agency attempting to coordinate in a vacuum, to improve the organizational structure for requesting assistance during and after disasters. The DMS plan integrated health-related services in each of the four phases (preparedness, response, recovery and mitigation) of emergency management to improve response and recovery at all jurisdictional levels.

Similarly, another plan took the integration of public health and healthcare very seriously. It detailed plans for healthcare coordination systems. The role of these hospitals was to serve as a communication hub between other hospitals in the region and the state health department. Additionally, in the case of post-disaster resource needs, the regional hospital would coordinate the reallocation of resources among the region or coordinate requests for assistance from other regions within the state.

Each region of the state chose a Regional Healthcare Coordinating Center to serve as the coordinator of hospital actions within a region. Public health coordinates closely with the Coordinating Center, but does not manage it. The system is intended to reduce potential confusion, post-disaster, as to the role of public health and public/private healthcare institutions. Such a system could prove useful in long-term recovery in the allocation of scarce resources within a region and across regions within a state.

## LIST OF REFERENCES

- Abramson, David and Richard Garfield. *On the Edge: Children and Families Displaced by Hurricane Katrina and Rita Face a Looming Medical and Mental Health Crisis*. Columbia, NY: Columbia University Mailman School of Public Health, 2006.
- Abramson, David, Richard Garfield, and Irwin Redlener. *The Recovery Divide: Poverty and the Widening Gap among Mississippi Children and Families Affected by Hurricane Katrina*. Columbia, NY: Columbia University Mailman School of Public Health, 2007.
- Ahlers, Douglas, Arnold M. Howitt, and Herman B. Leonard. "Preparing in Advance for Disaster Recovery." *Global Is Asian*, no. 12 (2011, October–December).
- Association of State and Territorial Health Officials. *Public Health Preparedness: Six Years of Achievement*. Arlington, VA: Association of State and Territorial Health Officials, 2007.
- Association of Public Health Laboratories. "Louisiana PHL Finds Recovery Slow Going." *APHL Minute* 6 (November-December, 2006). Association of Public Health Laboratories. Accessed January 12, 2013.  
[http://www.aphl.org/AboutAPHL/aboutphls/Documents/Louisiana\\_PHL\\_2006.pdf](http://www.aphl.org/AboutAPHL/aboutphls/Documents/Louisiana_PHL_2006.pdf).
- Australian Emergency Management Institute, *Community Recovery Handbook 2*. Mt. Macedon, Victoria (Australia): Australian Emergency Management Institute, 2011.
- . *Disaster Health Handbook 1*. Mt. Macedon, Victoria (Australia): Australian Emergency Management Institute, 2011.
- Bardach, Eugene. *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving*, 3rd ed. Washington, D.C.: CQ Press, 2009.
- Bell, Melissa Taylor and Irakli Khodeli. "Public Health Worker Shortages." *Trends Alert: Critical Information for State Decision-Makers* (2004, November): 4. Council of State Governments. Accessed January 18, 2013.  
<http://www.csg.org/knowledgecenter/docs/TA0411HealthWork.pdf>.
- Blake, Eric S. and Ethan J. Gibney. *NOAA Technical Memorandum NWS NHC-6: The Deadliest, Costliest, and Most Intense United States Tropical Cyclones from 1851 to 2010 (and Other Frequently Requested Hurricane Facts)*. Miami, FL: National Weather Service, National Hurricane Center, 2011.

- Brahmbhatt, Daksha, Jennifer L. Chan, Edbert B. Hsu, Hani Mowafi, Thomas D. Kirsch, Asma Quereshi P. Gregg Greenough. "Public Health Preparedness of Post-Katrina and Rita Shelter Health Staff." *Prehospital and Disaster Medicine* 24, no. 6 (2009).
- Business Civic Leadership Center. "What does a Successful Recovery Look Like?" Business Civic Leadership Center. Accessed November 12, 2011. <http://bclc.uschamber.com/document/what-does-successful-recovery-look>.
- Centers for Disease Control and Prevention. "Funding and Guidance for State and Local Health Departments," Centers for Disease Control and Prevention. Last modified August 2012. Accessed November 12, 2012, <http://www.cdc.gov/phpr/coopagreement.htm>.
- . *Public Health Preparedness Capabilities: National Standards for State and Local Planning*. Washington, D.C.: Centers for Disease Control and Prevention 2011.
- . *Public Health Preparedness: Strengthening CDC's Emergency Response*. Washington, D.C.: Centers for Disease Control and Prevention, 2009.
- Centers for Disease Control and Prevention. "Ten Essential Public Health Services." Centers for Disease Control and Prevention. December 2010. Accessed November 15, 2011. <http://www.cdc.gov/nphpsp/essentialservices.html>.
- Christensen, Clayton M. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Kindle ed. Whiteriver Junction, VT: Perseus Books Group, 1997.
- Council of Australian Governments. *National Strategy for Disaster Resilience*. Canberra, Australia: Council of Australian Governments, 2011.
- Goldman, Lynn and Christine Coussens. *Environmental Public Health Impacts of Disasters: Hurricane Katrina: Workshop Summary*. Washington, D.C: National Academies Press, 2007.
- "Hurricane Strikes by State." *Wall Street Journal*. August 24, 2011. Accessed October 16, 2012. [http://online.wsj.com/public/resources/documents/st\\_HURRICANES110820110824.html](http://online.wsj.com/public/resources/documents/st_HURRICANES110820110824.html).
- Innes, Judith E. and David E. Booher. *Planning with Complexity: An Introduction to Collaborative Rationality for Public Policy*. New York: Routledge, 2010.

- Lister, Sarah. *Hurricane Katrina: The Public Health and Medical Response*. September 21, 2005. Washington, D.C.: Congressional Research Service, 2005.
- Louisiana Recovery Authority. "Hurricane Katrina Anniversary Data for Louisiana." Louisiana Recovery Authority. Accessed November 11, 2011. <http://www.lra.louisiana.gov/index.cfm>.
- Meadows, Donella H. *Thinking in Systems: A Primer* (Kindle ed.). White River Junction, VT: Chelsea Green Publishing, 2008.
- Post Katrina Health Care: Continuing Concerns and Immediate Needs in the New Orleans Region: Hearing before the Subcommittee on Oversight and Investigations of the Committee on Energy and Commerce, House of Representatives*. 110th Cong., 1st sess., 2007. Serial no. 110–17.
- Post-Katrina Recovery: Restoring Health Care in the New Orleans Region: Hearing before the Committee on Oversight and Government Reform, House of Representatives*. 111th Cong., 1st sess., 2009.
- RAND Corporation. *The Public Health System a Decade after 9/11: Key Successes and Continuing Challenges*. Santa Monica, CA: RAND Corporation, 2011.
- Ringel, Jeanne S., Anita Chandra, Kristin J. Leuschner, Yee-Wei Lim, Nicole Lurie, Karen A. Ricci, Agnes Gereben Schaefer, Molly Shea, Lisa R. Shugarman, and Jeffrey Wasserman. "Lessons Learned from the State and Local Public Health Response to Hurricane Katrina." Working paper, RAND Corporation, Santa Monica, CA, 2007.
- Roger Pielke, Joel Gratz, Christopher W. Landsea, Douglas Collins, Mark A. Saunders, and Rade Musulin. "Normalized Hurricane Damage in the United States: 1900–2005." *Natural Hazards Review* 9, no. 1 (2008): 29.
- Robin Rudowitz, Diana Rowland, and Adele Shartzter. "Health Care in New Orleans before and After Hurricane Katrina," *Health Affairs* 25 (2006): 397.
- Taleb, Nassim Nicholas. *The Black Swan: The Impact of Highly Improbable Fragility*. 2nd ed., Kindle ed. New York: Random House, 2010.
- U.S. Dept. of Health and Human Services. *National Health Security Strategy of the United States of America*. Washington, D.C.: U.S. Dept. of Health and Human Services, 2009.
- U.S. Dept. of Homeland Security. *National Preparedness Goal*. Washington, D.C: U.S. Dept. of Homeland Security, 2011.

- U.S. Dept. of Homeland Security and Federal Emergency Management Agency. *National Disaster Recovery Framework Strengthening Disaster Recovery for the Nation*. Washington, D.C.: U.S. Dept. of Homeland Security, Federal Emergency Management Agency, 2011.
- U.S. Environmental Protection Agency and Office of the Inspector General. *EPA's and Mississippi's Efforts to Assess and Restore Public Drinking Water Supplies after Hurricane Katrina*. Washington, D.C.: U.S. Environmental Protection Agency, Office of Inspector General, 2006.
- U.S. Government Accountability Office. *September 11: HHS Needs to Develop a Plan that Incorporates Lessons from the Responder Health Programs*. GAO-08-610. Washington, D.C.: U.S. Government Accountability Office, 2008.
- Vest, Joshua R. and Adolfo M. Valadez. "Health Conditions and Risk Factors of Sheltered Persons Displaced by Hurricane Katrina." *Prehospital and Disaster Medicine* 21, no. 6 (2006).
- White House. *National Security Strategy*. Washington, D.C.: White House, 2010.
- World Bank. "G20 Urges Actions to Counter Rising Costs from Natural Disasters." News release. World Bank News. June 16, 2012. Accessed January 10, 2012. <http://www.worldbank.org/en/news/2012/06/16/g20-urges-action-counter-rising-costs-natural-disasters>.
- World Bank and the United Nations. *Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention*. Washington, D.C.: World Bank and United Nations, 2010.

## **INITIAL DISTRIBUTION LIST**

1. Defense Technical Information Center  
Ft. Belvoir, Virginia
2. Dudley Knox Library  
Naval Postgraduate School  
Monterey, California