



TREND ANALYSIS

Hurricane Preparedness: Effects of Late Activations on Response Efforts

September 26, 2013

SUMMARY

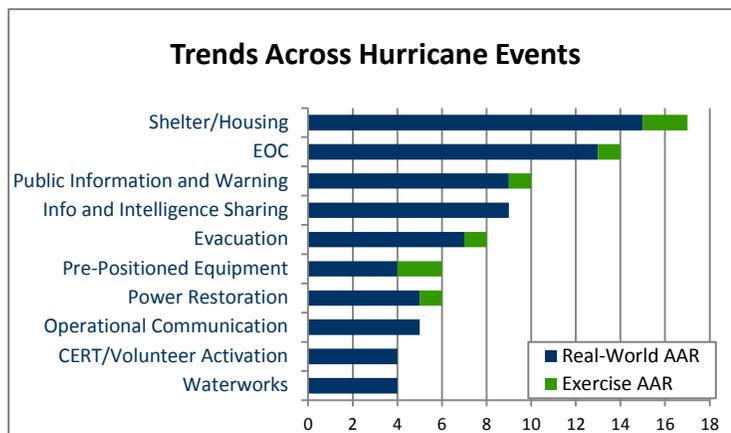
The Lessons Learned Information Sharing research team analyzed 22 hurricane After Action Reports (AARs) to identify trends in pre-disaster operations and found that state and local jurisdictions experienced numerous issues as a result of late activations of disaster plans and inadequate public information and warning. Timely activations play a critical role in conducting response efforts. In the analyzed AARs, late activations

delayed these efforts, impeding both situational awareness and the ability of jurisdictions to conduct effective sheltering, evacuation, and EOC operations. To help emergency managers and responders mitigate issues identified in this analysis, the LLIS team has compiled recommended plans to be incorporated into future planning.

DESCRIPTION

A hurricane¹ can “cause catastrophic damage to coastlines and several hundred miles inland.”² Hurricanes can produce tornadoes, flooding and storm surges, wind damage, power outages, and other hazards requiring mass evacuation and sheltering.

The LLIS team analyzed 22 AARs from real-world events and exercises that took place between 2008 and 2013. The analysis focused on pre-disaster preparedness operations in 12 states and local jurisdictions in response to six



The analysis of 22 hurricane After Action Reports (AARs) revealed the areas of improvement listed above.

2007-2012 Hurricane Fatalities and Damage Costs

YEAR	Hurricane Fatalities	Damage (million \$)
2007	1	38.80
2008	12	8,092.77
2009	2	0.93
2010	0	18.88
2011	9	653.68
2012	4	171.89

(Source: NWC Office of Climate, Water, and Weather Services³)

¹ From the *National Weather Service*, a hurricane is defined as “a tropical cyclone in which the maximum sustained surface wind (using the U.S. 1-minute average) is 64 kt (74 mph or 119 km/hr) or more. The term hurricane is used for Northern Hemisphere tropical cyclones east of the International Dateline to the Greenwich Meridian.”

hurricanes. This analysis identified recurring issues that responders encountered as effects of late activations related to the following areas:

- Shelter Activities
- Evacuation Plans and Procedures
- Emergency Operation Center (EOC) Activations

Trends and Recommendations

Shelter Activities

During a response to a major catastrophic event, emergency managers are responsible for providing mass care services (e.g. providing temporary housing, feeding, and related services) as needed for affected populations.⁴ The LLIS team found that 15 of the 22 AARs analyzed addressed shelter procedures prior to hurricane landfall. Nine of the AARs analyzed noted specifically that shelter activations typically occur between 72 and 24 hours prior to a hurricane making landfall. This span of time provides individuals with enough time to mobilize and evacuate to the shelters. Late shelter activations (less than 24 hours prior to the incident) hinder the ability of jurisdictions to mobilize personnel and assets to support sheltering operations. In addition, the affected population may not have sufficient time to evacuate to a shelter before conditions are deemed unsafe to travel. Further, late activations of shelters may impact accurate information sharing about shelter statuses, capacity, level of service provided, and operation times.

Recommendations from the AARs analyzed related to sheltering operations include:

- "Secondary effects of late decisions to mandate evacuations and open shelters needs to be incorporated in plans."
- "Decisions need to be made far enough in advance of the arrival of severe weather so that the right personnel and assets can be in place to support these decisions."
- "Identify shelter location prior to storm season and complete all documentation and activation in prompt manner."
- "Planning process should include realistic timelines, staffing plans, logistics plans, and a realistic Go/No Go decision-making point that allows resources to be in place before the arrival of tropical storm force winds."



National Guard sets up a shelter in Louisiana for disaster survivors displaced by Hurricane Isaac. (Source: FEMA)

One AAR also recommended that emergency managers evaluate all hazards associated with the storm to activate shelters at the most beneficial time for residents. This would ensure that storm surge and the potential for flooding is incorporated into the decision to activate shelter plans, not just wind speeds. The recommendation stated that:

- "Response plans must be revised to focus more on the predicted effects of a storm rather than purely on the category of the storm."

Evacuation Plans and Procedures

The LLIS team found that 11 out of the 22 AARs analyzed addressed evacuation protocols and activations. Prior to a hurricane making landfall, jurisdictions issue mandatory evacuations of high-risk communities when anticipated damage to housing and critical infrastructures from hurricane force winds or storm surges is deemed likely. Orders to evacuate are often delivered to communities one or two days in advance to ensure that citizens have time to evacuate. Additionally, in many instances, evacuation procedures require a jurisdiction to coordinate with adjacent jurisdictions to carry out plans and provide temporary housing for affected populations.⁵

Five AARs noted that miscommunication and late decisions to mandate evacuations resulted in multiple issues. These included, among others, poor traffic conditions on evacuation routes, a lack of reliable information on evacuee numbers for shelters, and inadequate tracking of evacuated populations. To avoid these issues, two AARs recommended the following:

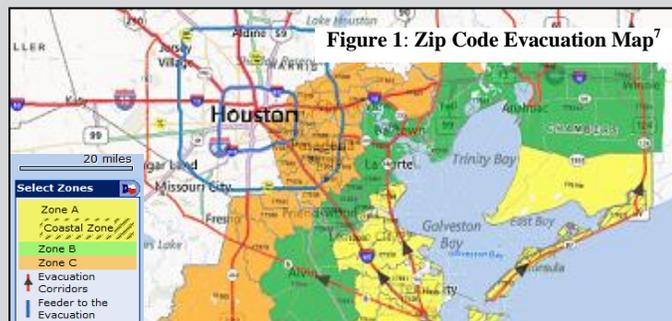
- “Leadership at the local jurisdictional level needs to be educated on the second and third order effects of late decisions to mandate evacuations and open shelters.”
- “To be implemented effectively, these decisions should be made far enough in advance of the arrival of severe weather so that the right personnel and assets can be in place to support these decisions.”
- “Evaluate methods for rapid registering of evacuees, either on the buses, or once they arrive at a destination. Relay information to SEOC or other designated need.”

The AAR review also found that many jurisdictions are unable to provide the public with clear evacuation guidance. For example, during Hurricane Ike and Gustav, public evacuation guides from several affected jurisdictions lacked information about evacuation services in neighboring states for residents.

The following are recommendations about public information related to evacuation procedures:

Zip Code Based Evacuation Plan:

The Harris County, Texas, Office of Homeland Security and Emergency Management (HCOHSEM) developed a zip code-based evacuation plan based on lessons learned from the 2005 Hurricane Rita evacuation. The plan was revised to include staggered evacuation procedures based on four zip code zones to control the flow of traffic and evacuate residents in the most efficient manner (see Figure 1 below).



The benefits of this plan were demonstrated when Harris County activated evacuation procedures two days prior to Hurricane Ike making landfall on September 13, 2008. The evacuation took place with limited traffic congestions. HCOHSEM successfully evacuated over 100,000 residents from all three zones within a 12-hour period.⁶

(Source: Harris County, Texas, Office of Homeland Security and Emergency Management’s Zip Code-Based Evacuation Plan)

- “Citizens should be aware prior to a disaster how they will receive orders to evacuate and shelter-in-place and from who those instructions will come.”
- “Orders to evacuate and shelter-in-place should be centrally coordinated and distributed to prevent message inconsistency.”
- “Facilitate coordination with [neighboring State] officials for potential services and relevant information that may be provided to evacuees through the evacuation guides.”

Emergency Operation Center (EOC) Activations

Out of the 22 AARs analyzed by the LLIS team, 11 addressed EOC activations prior to a hurricane landfall. Before a hurricane landfall, jurisdictions will activate an Emergency Operations Center (EOC) based on weather reports and if threshold circumstances are met.

The analysis of eight AARs found that the majority of jurisdictions activated their EOCs 36 to 24 hours prior to hurricane landfall. Two AARs also noted that early activations and coordination meetings that took place once EOCs were activated allowed responders to address last-minute concerns across agencies.

The LLIS team analysis also found that three AARs addressed the need for a regional EOC prior to a hurricane. A regional EOC would facilitate the sharing of relevant information concerning evacuees and resources available. Recommendations related to EOC activation planning include:

- “A regional EOC plan / facility should be established in coordination with regional players to bolster effective use of resources and improve information sharing between regions.”
- “Incident management needs to be addressed, including the need for a regional emergency operations center (EOC) to coordinate response between towns and state and federal officials.”

Plans and Resources

Based on the findings and recommendations from the AARs analyzed, the LLIS team identified additional resources that jurisdictions might consider reviewing to enhance their plans. The following are selected plans and Standard Operating Procedures that jurisdictions may wish to study to implement effective and efficient procedures:

[State of Florida SERT Multi-Agency Shelter Support Plan](#)

This document provides guidance and plans for mass care services. The plan identifies situational considerations for determining shelter requirements, resource allocation procedures, and the different operational priorities for sheltering prior to an incident.

[Georgia Hurricane Plan](#)

The Georgia Hurricane Plan provides an overview of threats and hazards associated with hurricanes (i.e. storm surge, wind, inland flooding, and tornadoes). The plan also provides an in depth explanation and timeline of operational considerations for the state prior to a hurricane.

[North Carolina Coastal Region Evacuation and Sheltering Standard Operating Guide](#)

This operating guide provides a master timeline and a checklist for evacuation and sheltering operations for State EOC and the State Emergency Response Teams. The guide also specifies the timeline for coordination of assets involved in evacuations and sheltering operations. Additionally, this guide covers public information dissemination during evacuations and provides coordination guidelines to partner with neighboring states.

[Considerations for Fusion Center and Emergency Operations Center Coordination](#)

This document provides individuals with information about EOC roles and functions. The guide also covers operational guidelines when coordinating with fusion centers.

REFERENCES

- ² Hurricanes, [Ready.gov](#), June 2013, accessed September 13, 2013.
- ³ [Natural Hazard Statistics](#), NWC Office of Climate, Water, and Weather Services, May 2013, accessed September 2013.
- ⁴ Emergency Support Function #6 – [Mass Care, Emergency Assistance, Housing, and Human Services Annex](#), FEMA, January, 2008.
- ⁵ [Evacuating Yourself and Your Family](#), [Ready.gov](#), February 2013, accessed September 13, 2013.
- ⁶ [Mass Evacuation: Harris County, Texas, Office of Homeland Security and Emergency Management’s Zip Code-Based Evacuation Plan](#), Lessons Learned Information Sharing, October 2009.
- ⁷ [Evacuation Map](#), Harris County Homeland Security & Emergency Management, 2010, September 2013.
- ⁸ [Harris County Hurricane Ike After-Action Report](#), Harris County Office of Homeland Security & Emergency Management, 2009, September 2013.
- ⁹ [City of Nashua New Hampshire Tropical Storm Irene After Action Report](#), City of Nashua Office of Emergency Management, 2011, September 2013.
- ¹⁰ [Hurricane Isaac After action Report and Improvement Plan, Federal Emergency Management Agency \(FEMA\)](#), 2013, July 2013.
- ¹¹ [NYC Hurricane Sandy After-Action Report](#), The City of New York, 2013, September 2013.
- ¹² [Hurricane Sandy FEMA After-Action Report](#), The Federal Emergency Management Agency, 2013, September 2013.
- ¹³ [Hurricane Suiter Emergency Support Function 6, Mass Care & Emergency Assistance AAR](#), 2009, September 2013.

ABOUT THE LESSONS LEARNED INFORMATION SHARING PROGRAM

The LLIS program develops and disseminates lessons learned, trend analyses, case studies, and innovative ideas to improve preparedness for the emergency management and homeland security communities. These documents, produced through research and analysis by the LLIS team, support whole community learning and continuous improvement.

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