

Hurricane Sandy: A Case Study

Introduction

From October 22-29, 2012, Hurricane Sandy wreaked havoc on the Caribbean and the U.S East Coast. There were devastating floods, mudslides, and destructive winds. It was an unusual and unanticipated meteorological combination of hurricane conditions and cold fronts that made Sandy so deadly.⁴

The National Oceanic and Atmospheric Administration estimates Sandy caused at least \$70 billion in damages, making it among the costliest storms in U.S. history, coming in second to Hurricane Katrina.⁴ It left 8.5 million people without power and destroyed 650,000 homes.⁵

This disaster made an example of the U.S. It showed how vulnerable some areas are to extreme weather events. Considering that we are habitually warned by scientist that climate change is threatening sea-level and hotter temperatures, regions should have rethought their disaster plans to try and increase their preparedness.⁴

Facts of The Case

Hurricane Sandy began as a tropical depression going 74mph off the northeast coast of Nicaragua, on October 22, 2012. Within two days, it became a category 1 hurricane and continued to move north. Before it reached the U.S, it touched down in Jamaica, Dominican Republic, and Haiti. Once it reached the Bahamas it had gone back to a tropical depression but quickly became stronger, becoming a category 1 once again and having a radius of 100 miles.⁴

Moving up the U.S coast, the Carolinas faced large waves and some coastal damage. However, this damage was insignificant compared to the damage to New York and New Jersey. Though Sandy was only a category 1, by the time it had gotten to Delaware and New Jersey, it become trapped by a cold front and was not able to move away from the coast giving it the power of a category 3. By October 30th, the storm started weakening and finally disappeared around Pennsylvania.⁴

It caused \$70.2 billion worth of damage, left 8.5 million people without power, and destroyed 650,000 homes⁵. Many of the homes up and down the coast were destroyed beyond restoration. Over 20,000 families were displaced, and thousands became homeless. In New York City alone there was 19 billion dollars in damage alone.⁴

The number of deaths from Hurricane Sandy, such as drowning, is counted at 147, according to the National Hurricane Center. Death counts in the U.S. totaled 72. Haiti was the second-most affected country with 54 deaths.⁵

Epidemiology¹

The observations for Sandy included satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB) and the Satellite Analysis Branch (SAB), as well as the Advanced Dvorak Technique from the University of Wisconsin-Madison/Cooperative Institute for Meteorological Satellite Studies (UW-CIMSS). Data and imagery were from NOAA(The National Oceanic and Atmospheric Administration) polar-orbiting satellites. These included the Advanced Microwave Sounding Unit (AMSU), the NASA Tropical Rainfall Measuring Mission (TRMM), Defense Meteorological Satellite Program (DMSP) satellites and the European Advanced Scatterometer (ASCAT) satellite. They were the primary tools used to construct the most probable track of Sandy. Twenty-four reconnaissance missions were flown in

and around Sandy as it progressed. These missions provided data that were pivotal in determining the intensity, severity, and structure of Hurricane Sandy.

Management

Midmorning on October 28, 2012, NYC Mayor Michael Bloomberg issued a mandatory evacuation order for Zone A, requiring 375,000 residents to leave before the storm. Under NYC's Coastal Storm Plan, New York City's Evacuation Zone A (the coastal zone at risk for flooding from any hurricane).³ must be evacuated in the event of a category 1 hurricane due to coastal flood risk resulting from storm surge.⁶

After Hurricane Sandy had subsided, it was concluded that drowning was the most common cause of death related, and 45% of drowning deaths in NYC occurred in flooded homes in Evacuation Zone A. Drowning is a leading cause of hurricane death regardless of location. However, but is preventable with advance warning systems and evacuation plans, which NYC had. Emergency plans should ensure that persons receive and understand evacuation messages and have the necessary resources to comply with them.³

During disasters, Red Cross helps to track deaths to provide services to surviving family members, i.e counseling, disaster-related expenses, locating housing, and addressing disaster-related health needs.³

Communication

Before the storm, city officials issued mandatory evacuation orders to thousands of residents, but few complied. Evacuation is important for reducing injury and mortality during disasters. However, people's decisions to evacuate are influenced by multiple factors. In most cases it is the timing, personalization, and clarity of the message, and risk perception affected evacuation.²

Since most fatal injuries occurred in Zone A, many of the Sandy-related injury deaths in NYC may have been prevented had individuals in Zone A evacuated. Public messaging regarding evacuation orders during Sandy in NYC was barely successful in reaching all Zone A residents and actually influencing evacuation behavior. A post-Sandy survey conducted by NYC found that only 71% of Zone A residents reported hearing an announcement to evacuate from a public official. Also, those who received an official instruction to evacuate were only slightly more likely to evacuate than those who did not receive such instruction. In one study, a few individuals citing the relatively weak arrival of Hurricane Irene in 2010 as a barrier to evacuation.⁶

Summary

New York City was clearly ill prepared for this kind of storm. The flood walls were out of date, the train systems had nowhere to divert extra water and most business did not have flood insurance.⁴ Several individuals died while trying to evacuate when storm conditions were already unsafe. It is noteworthy that there can be negative health impacts related to evacuation as well. There can be an increased risk of falls among older adults, spread of illness from living in proximity at temporary evacuation shelters, and psychological stress. These elements must be taken into consideration by the government and emergency management teams when executing hurricane evacuation orders. Evacuation order timing and the availability of vital assistance can help increase evacuation and prevent related injuries.⁶

References

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