



Disaster Mortality Surveillance during Tropical Storm Hermine, Texas, 2010

On September 6, 2010 Tropical Storm Hermine, with maximum sustained winds of 65 mph, made landfall in extreme northeastern Mexico, just 40 miles south of Brownsville, Texas. The next day Hermine moved into Texas and brought heavy rains and flash flooding, tornadoes, and damaging winds to many parts of the state, forcing evacuations, water rescues, and opening of shelters. The Governor of Texas issued a Disaster Proclamation certifying that Hermine caused a disaster in 40 counties in Texas.

The Texas Department of State Health Services (DSHS) initiated surveillance activities on September 10, 2010 to identify those deaths that were potentially related to Tropical Storm Hermine. The objectives of the surveillance were to:

1. Identify the number of deaths-related to the storm and provide basic mortality information about the deceased for public health and emergency officials in affected jurisdictions.
2. Evaluate and assess the direct and indirect impact of the storm and human toll in affected communities.
3. Provide information on tropical storm-related mortality for public health and emergency officials to assist in coordinating response actions and for use in future planning and mitigation efforts.

A case was defined as any death, directly, indirectly, or possibly, associated with the storm among evacuees, residents or rescue personnel related to the Tropical Storm Hermine in targeted areas including declared disaster counties, counties along the Texas Gulf coast or counties known to have evacuation shelters occurring on or after September 6, 2010.

Deaths classified as “directly-related” include any death caused by the physical forces of the storm, such as wind, rain, floods, or by direct consequences of these forces, such as structural collapse or flying debris.

Deaths classified as “indirectly-related” include any death caused by unsafe or unhealthy conditions that occur because of the anticipation, or actual occurrence, of the storm. These conditions include the loss or disruption of usual services (i.e. utilities, transportation, environmental protection, medical care, police/fire), personal loss, and lifestyle disruption such as temporary displacement or property damage. Deaths that occur from natural causes are considered indirectly related if physical or mental stress before, during, or after the storm resulted in exacerbation of pre-existing medical conditions and contributed to death.

Deaths classified as "possibly-related" are deaths in the targeted areas for which the cause or manner of death is undetermined, pending, and information indicates that the storm may have caused or exacerbated a situation leading to death.

A one page surveillance form was used to collect data on demographic, date and place of death, cause and circumstance of deaths. DSHS Austin based - surveillance staff used a combination of surveillance techniques to identify storm-related deaths. Epidemiological response teams in the Health Service Regions (DSHS) worked with their local health departments, which collected data from medical examiner offices and justices of the peace. One Health Service Region (Region 8; San Antonio) reviewed information on decedents on a social networking site (Facebook). Outreach was also made to the American Red Cross (Texas Chapter), National Weather Service, and Texas Flood Plain Management Association. Since there was a potential for limited power outages, contact was made with the Texas Poison Control Network to determine if there were any reported carbon monoxide poisonings related to improper use of generators. In addition, internet newspaper alerts were set up to identify reports on potential storm deaths. To enhance tracking efforts, in collaboration with DSHS Vital Statistics Unit, a surveillance alert was also disseminated on the Texas electronic reporting system asking medical examiners and justices of the peace across the state to indicate if the cause of any death was related to the storm. Finally, information on all (8544) reported deaths occurring in the state between September 6 and September 27, 2010 were obtained from the DSHS Center for Health Statistics Unit and reviewed for relatedness to the storm. All data collected and forwarded to Austin were entered into Microsoft Excel 2003 file. Epidemiological information was reviewed by Austin – based staff and relatedness to the storm was applied consistently across all reported deaths.

Results:

There were 9 deaths related to this storm. There were three females and six males. The average age of the decedents was 39 years (19-57 years). Of the nine decedents, five were White, two Black, one Asian, and one unknown race. The cause of death for all decedents (except one, which is pending) was drowning.

Five deaths were directly related, three indirectly related and one possibly related to the storm. The directly related deaths were caused by vehicles being washed off the road when individuals drove over swollen water ways. Anecdotal information suggests that two vehicles may have driven around barricades and two other low locations may not have had any barricades erected. The three indirectly related deaths involved two swimmers and one kayaker in the presence of strong currents. The one possibly related death was attributed to swimming. in strong rip currents.

Though there was some delay in locating deceased individuals as bodies were washed away in the flooding, the date of death in Figure 1 represents the date that the body was found, which in some cases was six days after the day of drowning. The deaths occurred in six counties across Texas (Figure 2). These counties were Comal (2), Williamson (2), Bell (1), Bexar (1), Galveston (1), Johnson (1), and Travis (1).

Figure 1. Deaths by Date of Body Discovery, Tropical Storm Hermine, Texas, 2010

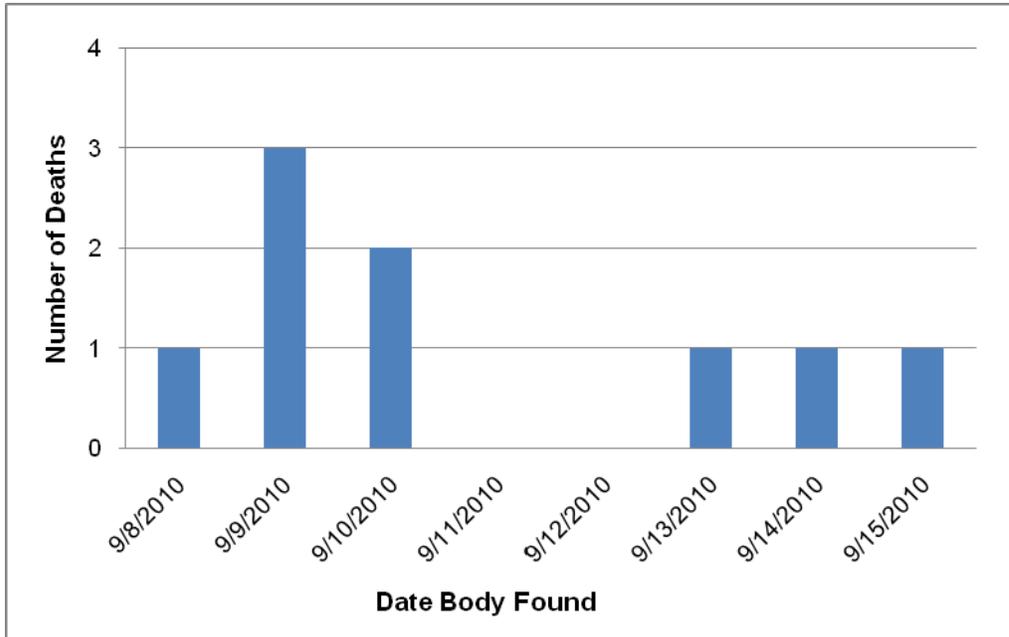
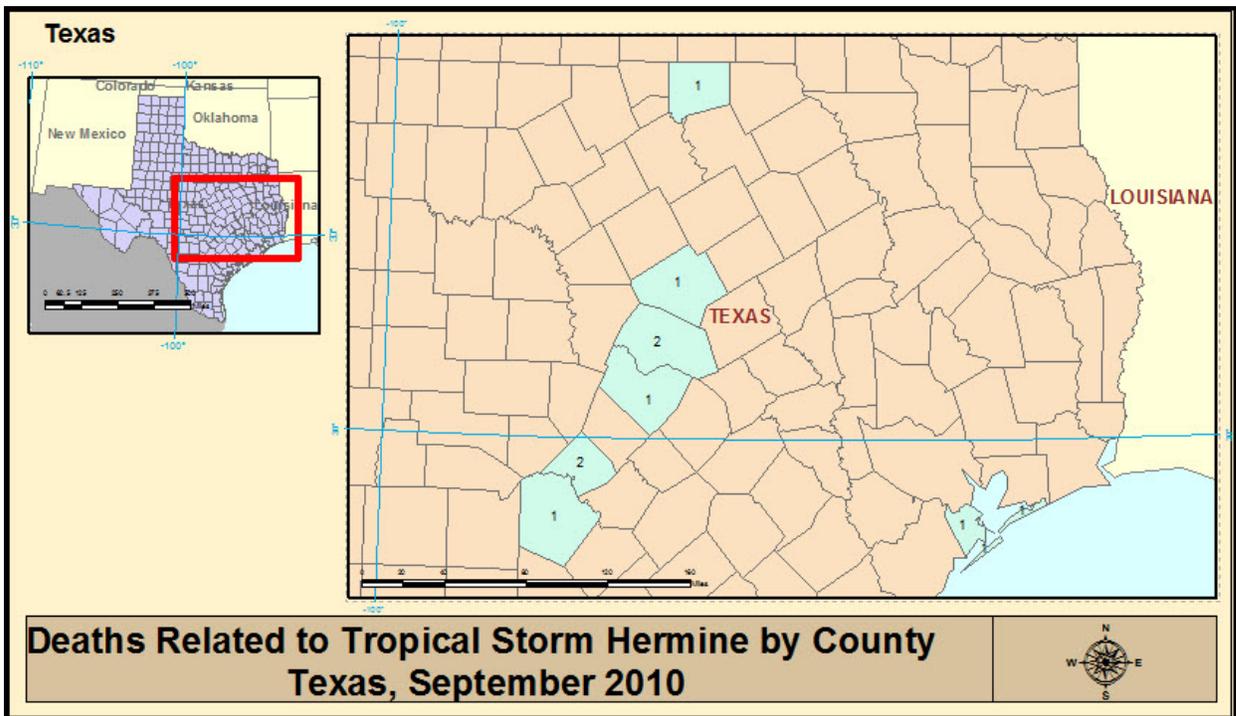


Figure 2. Map of the number of deaths related to tropical storm Hermine by county, Texas, September 2010



Public Health Recommendations

1. Continue to disseminate public health messages of the dangers of driving vehicles into hazardous flood waters. These messages could be strengthened by including the number of recent deaths in Texas associated with this behavior. This may help the public visualize the extent of the danger that arises from these activities under such unsafe conditions. The National Weather Service's campaign of "Turn Around Don't Drown (TADD)" provides a standardized message to the public.
2. Develop and disseminate news releases and messages about the dangers of swimming and kayaking in flooded waters.
3. Continue to work with our external partners (e.g., local and regional health departments, National Weather Service, Texas Flash Flood Council, Texas Floodplain Management Association, American Red Cross) to explore avenues to develop effective educational and engineering interventions to reduce the number of deaths associated with flash floods.

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Acknowledgements

We would like to acknowledge the following contributors:

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Huai Lin, (Health Service Region 6/5, Houston)
Russ Jones, Bonnie Feldt, Sandi Henley, Lacey Sanders (Health Service Region 7, Temple)
Trudi Shim, Beth Hannemann, Nancy Walea, Connie Alaniz (Health Service Region 8, San Antonio)
Albert Rivera (Vital Statistics Unit, Austin)
Sandra Lackey (Vital Statistics Unit, Austin)
Lyudmila Baskin (Center for Health Statistics Unit, Austin)
Mathias Forrester (Environmental Epidemiology and Disease Registries Section, Austin)

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Jerry Werling (San Antonio Metropolitan Health District)
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National Weather Service (Hector Guerrero, Dan Reilly, Paul Yura)

Texas Flood Plain Management Association (Roy Sedwick)

American Red Cross, Texas Chapter (Tami Dittburner)