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Medical Examiner/Coroner Reports of Deaths Associated With Hurricane Hugo—South Carolina

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AT 11:57 p m. eastern daylight time on Thursday, September 21, 1989, the eye of Hurricane Hugo struck the coast of South Carolina north of Charleston. Peak wind velocities in Charleston were measured at 135 mph, and there was an accompanying tidal surge of 12-17 feet. Heavy rains caused additional flooding and further damage. In addition to the damage or destruction to homes and buildings, approximately 900,000 persons in North and South Carolina were left without electrical power. After striking the coast, Hugo moved across central South Carolina and North Carolina. On September 22, the National Weather Service downgraded Hugo to a tropical storm.

As part of the Medical Examiner and Coroner (ME/C) Information Sharing Program at CDC, public health officials, using contact information in Medical Examiner and Coroner Jurisdictions in the United States,[1] asked ME/Cs in 25 South Carolina counties in the path of Hurricane Hugo to report 1) the number of deaths in their jurisdictions that they investigated between September 21 and October 6; 2) the number of these deaths that were related to the hurricane; and 3) for the 35 deaths reported as hurricane related, information about the demographic characteristics, cause, and circumstances of each death. ME/Cs reported that 29 injury deaths were directly related to the hurricane and categorized the manner of death for these persons as "accident."* In Dorchester and Berkeley counties, coroners reported six deaths caused by "heart attacks" attributed to stress associated with the hurricane. The manner of death in these cases was "natural," and all six occurred after the hurricane.

No deaths are known to have occurred before the storm (preimpact phase), 13 occurred during the storm (impact phase), and 22 occurred after the storm (post impact phase). Of the 13 traumatic deaths that occurred during the impact phase, six persons drowned (five when they attempted to bring boats inland from Charleston on the Cooper River and one when her mobile home was struck by the storm surge). Four persons were crushed by their mobile homes. One person was killed when his house collapsed during the storm, and two others were crushed by trees during the storm (one when a tree fell on his house and one when a tree fell on his car)

Of the 22 postimpact-phase deaths, 16 were traumatic. Nine resulted from smoke inhalation or burns from five house fires, these fires were attributed to the use of candles during power outages. In one instance, fire officials concluded the fire was the direct consequence of adults leaving candles burning after going to bed at night. Of the five fires, two separate house fires were each responsible for the deaths of a mother and two young children. Five of the nine fire-related deaths were among children aged 1-7 years.

Four persons were electrocuted in separate incidents during clean-up activities: two of these were occupationally related deaths (one person was working on power lines, and one was repairing a roof). Two deaths resulted when bystanders were injured by falling trees (one of these was an 8-year-old child who died from head injuries sustained when a tree fell on him; the other was a 27-year-old woman who was trapped under a tree's roots as it fell back into the hole from which it had been uprooted). One death was caused by a chainsaw injury sustained during the clean-up. All deaths occurred immediately or within 8 hours of the fatal incident.

TABLE. Characteristics of the 35 deaths attributed to Hurricane Hugo—South Carolina, September 21–October 6, 1989

Date	Age (yrs)	Sex	Cause and circumstances of death
Impact phase			
September 22	38	M	Drowned while bringing boats inland
	41	F	
	58	M	
	59	M	
	30	M	
	60	F	Drowned by storm surge in mobile home
	1	M	Crushed by mobile home/trailer
	41	F	
	32	M	
	69	M	
	55	M	Crushed by collapsing house
	67	M	Suffered multiple blunt trauma from tree falling into home
	30	M	Suffered head injury when car hit by falling tree
Postimpact phase			
September 22	56	M	Electrocuted while working on power lines
	7	F	Asphyxiated (from smoke inhalation) in house fire caused by candle
September 23	77	F	Collapsed in yard from "heart attack"
	27	F	Asphyxiated while trapped under uprooted tree
	76	M	Burned in house fire caused by candle
September 24	21	F	Asphyxiated (from smoke inhalation) in house fire caused by candle
	3	F	
	1	M	
	57	M	Exsanguinated from neck laceration caused by chain saw
	69	F	Suffered "heart attack" related to stress
	87	M	
	86	M	
September 25	58	M	Electrocuted while clearing debris in yard
September 27	65	F	Asphyxiated (from smoke inhalation) in house fire caused by candles
September 28	48	M	Suffered "heart attack" related to stress
September 29	36	F	Asphyxiated (from smoke inhalation) in house fire caused by candles
	6	M	
	2	M	
September 30	8	M	Suffered head injuries when hit by tree during clean-up
	41	M	Electrocuted while removing debris
October 2	64	M	Suffered "heart attack" related to stress
October 3	22	M	Electrocuted while repairing roof

Reported by C Copeland, Coroner, Beaufort County; WB Smith, Coroner, C Langston, Deputy Coroner, Berkeley County, JH Schuler, Coroner, Calhoun County; S Conradi, MD, Chief Medical Examiner, M Ward, MD, Medical Examiner, Charleston County EW Wright, Coroner, Chester County, RI Stephens, Coroner, Clarendon County; AA Bryan, Coroner, Colleton County; E Norton, Coroner, Darlington County; D Grimsley, Coroner, Dillon County; J Rogers, Coroner, Dorchester County; J Silvia, Coroner, Fairfield County; JC Gregg, Coroner, Florence County; WM Williams, Coroner, Georgetown County; RL Edge, Coroner, M Crossett, Fire Chief, Horry County; LM Sauls, Coroner, Jasper County, T Horton, Coroner, Kershaw County, M Morris, Coroner, Lancaster County; M Hancock, Coroner, Lee County, HO Harmon, Coroner, Lexington County, JM Richardson, Coroner, Marion County, P Simmons, Coroner, Orangeburg County; F Baron, Coroner J Anasti, Deputy Coroner, Richland County; DC Gamble, Coroner, D Jones, Sumter County Civil Defense; H McKnight, Coroner, Williamsburg County; J Chapman, Coroner, York County; JL Jones, MD, M Hudson, MPH, D Breeden, MD, South Carolina Dept of Health and Environmental Control. Div of Environmental Hazards and Health Effects, Center for Environmental Health and Injury Control, CDC

CDC Editorial Note: ME/C systems have not been fully assessed in disaster settings for the purpose of surveillance; however, a study is in progress by CDC to evaluate ME/Cs and other sources of death information in Hurricane Hugo. As part of this study, the completeness and accuracy of ME/C data will be assessed.

In South Carolina, each county has a coroner who is usually an elected official and not a physician.[1,2] Charleston County, which includes the city of Charleston, has both a medical examiner and a coroner. There is no universally accepted definition of a "hurricane-related death," and for the purposes of this report, the determination was made by each ME/C. Because each county in South Carolina has a different official who used his or her own criteria for determining which deaths were hurricane related, the types of deaths reported as hurricane related vary among counties Furthermore, other organizations, such as the American Red Cross and the National Weather Service, collect information on disaster-related deaths and might apply different criteria in determining disaster-related deaths. These variations suggest the need for an improved and uniform definition of "disaster-related" deaths.

In the past, hurricane-related mortality has resulted primarily from impact-phase drownings associated with storm surges.[3] However, as in Puerto Rico, relatively few impact-phase drownings occurred in South Carolina.[4] The principal public health response to Hurricane Hugo in South Carolina was early warning and a coordinated evacuation plan. By the evening of September 21, South Carolina officials had ordered the evacuation of persons in low-lying and high-risk areas in six coastal counties (Beaufort, Charleston, Colleton, Georgetown, Horry, and Jasper) with a total population of 624 000. Approximately 250 000 persons were evacuated.

In contrast to Puerto Rico, where only two (22%) of nine hurricane-related deaths occurred during the impact phase, 13 (45%) of 29 trauma-related deaths in South Carolina reported here were impact-phase fatalities. Four of the postimpact-phase deaths in South Carolina were electrocutions (one power company employee, compared with five in Puerto Rico).[5]

The South Carolina data suggest opportunities for prevention of hurricane-related deaths. Accordingly, efforts to educate and prepare the public should focus on: 1) hazards of power outages, including electrocution and the danger of using candles or open flames for light and heat; 2) the need to evacuate from mobile homes potentially in the path of the hurricane to a safe location; 3) hazards of boating during high winds; and 4) risks of injuries during disaster cleanup.

References

1. Parrish RG, Ing R. Medical examiner and coroner jurisdictions in the United States Colorado Springs, Colorado: American Academy of Forensic Sciences, 1988.
2. CDC. Death investigation—United States, 1987 MMWR 1989;38:1-4.
3. French J Hurricanes. In: Gregg MB, ed Public health consequences of disasters Atlanta: US Department of Health and Human Services, Public Health Service (in press).
4. CDC. Deaths associated with Hurricane Hugo—Puerto Rico. MMWR 1989;38:680-2.
5. CDC. Update work-related electrocutions associated with Hurricane Hugo—Puerto Rico. MMWR 1989;38:718-20,725.

*"Manner of death" and "accident" are medicolegal terms used on death certificates that refer to the circumstances under which a death occurs, "cause of death" refers to the injury or illness responsible for the death. When a death occurs under "accidental" circumstances, the preferred term within the public health community for the cause of death is "unintentional injury."