

Flood-Related Mortality -- Southeast Texas October 16-25, 1994

Heavy, prolonged rains beginning October 16, 1994, resulted in devastating flooding of much of southeastern Texas over a period of roughly two weeks. Fed by deep tropical moisture from the Gulf of Mexico, a large storm cell developed over Montgomery, Walker, Polk and San Jacinto counties. More than five inches of rain fell in less than three hours. Excessive rainfall continued throughout the next forty-eight hours.

Thirty-five counties were declared either total or partial federal disaster areas. Most of these counties received 10-15 inches of rain. Lake Conroe and the west fork of the San Jacinto River, the Trinity River above Lake Livingston, and the Trinity River above Liberty received 20-25 inches of rain. The result was massive flooding in the Brazos, San Jacinto and Trinity river basins, in Pine Island Bayou, and the Neches River watershed. Eighty-seven water systems in ten counties were contaminated or otherwise affected by flood waters. Fifty-year-old crest records of lakes, creeks and rivers were frequently broken.

The 1994 population in the affected counties is estimated to be 5,082,262, or approximately one-third of the entire population of Texas. Over 10,000 persons were evacuated from flooded areas. More than 20,000 homes, several schools, and numerous businesses sustained some degree of flood damage. Numerous roads were inundated and closed.

This report summarizes findings of the investigation of deaths associated with the floods.

To assess mortality associated with this episode of flooding, staff of the Injury Prevention and Control Program (IPCP), Bureau of Epidemiology, Texas Department of Health, obtained epidemiologic information from officials in a 36-county area (35 disaster-declared counties and one adjacent county [Lavaca]). Medical examiners, sheriffs, county judges, emergency management office personnel, hospital personnel, and Texas Department of Health regional office personnel were questioned by telephone using a standard survey tool developed by IPCP.

A case was defined as a death that occurred between October 16 and October 25, 1994, and was directly or indirectly related to flooding in the study area. A directly-related death was defined as one that resulted from physical contact with flood water, such as drowning. An indirectly-related death was defined as one that did not result from physical contact with flood water, and which would not have happened if flooding had not occurred. Examples of indirect deaths include those resulting from a flood-related activity, such as electrocution due to post-flood cleanup, cardiac arrest due to exertion or stress during the flood or during post-flood cleanup, or motor vehicle crashes related to flood-diverted traffic patterns. A motor vehicle-related death was defined as any death that would not have occurred in the absence of a motor vehicle.

Nineteen deaths occurred as a result of the floods between October 16 through October 25. Eighteen victims were Texas residents and one was a Mexican National. Seventeen of the nineteen deaths (89%) were directly-related to flooding (i.e., victims drowned), while the remaining two (11%) deaths were indirectly-related to flooding (e.g., one death due to motor vehicle-pedestrian collision and the other due to carbon monoxide poisoning).

Decedents ranged in age from 2 months to 72 years (mean: 41 years; median: 43 years). Seventy-four percent (14/19) of decedents were males.

Fifty-eight percent (11/19) of the confirmed deaths occurred because a motor-vehicle was first driven into high water. Nine of the eleven (82%) motor vehicle-related deaths were due to drowning.

Seven victims and their vehicles were swept from roadways by fast-moving, deep water. For example, a mother lost two of four children as the family attempted to reach safety after their car was driven into high water; and an infant slipped from the arms of his father as the family climbed onto the roof of their car after driving into high water. One victim was a pedestrian hit by an auto trying to avoid high water on the road; one victim died of carbon monoxide poisoning while idling his pickup truck in high water which surrounded him; one victim lost control of his vehicle which then skidded into a flooded gully; and one victim died when a culvert collapsed, sending him and his vehicle into the flooded creek. Nine of the eleven (82%) motor vehicle-related deaths occurred within approximately five miles of the victim's home.

Forty-two percent (8/19) of the deaths were non-motor vehicle-related. Two deaths occurred to ranchers on horseback as they attempted to drive their animals to higher ground; two individuals died when they attempted to swim in flood waters; three victims were walking when they slipped into flood waters; and one victim drowned while inside her home.

Sixty-eight percent (13/19) of deaths occurred in the first two days of the flood (October 16 and 17).

Nearly all (10/11, 91%) of the motor vehicle-related deaths occurred in the first two days of flooding. Eighteen of the nineteen deaths occurred during flash flooding of creeks or rivers. Two separate incidents (involving three flash flood deaths) occurred on October 16, within one hour and 100 yards of each other on Holland Creek in Grimes county. Three other flash flood deaths involved flood waters of the San Jacinto River in Montgomery and San Jacinto counties. Two of these deaths occurred within thirty minutes of each other on the same river in Montgomery and San Jacinto counties, while the other death in Montgomery county occurred two days later. Deaths from San Jacinto River and Holland Creek accounted for 33% (6/18) of flash flood deaths.

The only death not due to flash flooding occurred when a 63 year old woman refused to leave her home in Montgomery county and drowned in rising water from a flooding river.

Seventy-four percent (14/19) of the deaths occurred in four counties (Montgomery, Harris, Grimes, Polk). Montgomery and Harris counties had five and four deaths, respectively.