Epidemiology in Texas 2006 Annual Report

Environmental, Injury, Mortality, and Toxicology Reports

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Asbestosis and Silicosis Surveillance in Texas

The Texas Occupational Disease Reporting Act mandates the reporting of asbestosis and silicosis, 2 lung diseases associated with occupational exposures. Both asbestosis and silicosis are reportable because they have well-understood etiologies, mainly result from occupational exposures, and are preventable. The law requires that designated professionals, primarily physicians and laboratorians, report specific information regarding asbestosis and silicosis to the Texas Department of State Health Services (DSHS). This type of reporting is known as passive surveillance. The reports are received by the Environmental Injury Epidemiology and Toxicology Branch (EIET), which acts upon the information received based on a standard protocol. The EIET has enhanced the passive reporting of asbestosis and silicosis by conducting quarterly reviews of death certificates to identify those with asbestosis or silicosis listed as a cause of death.

An individual who resides or died in Texas and has been diagnosed with asbestosis or silicosis by a physician is considered a case. Demographic information from the medical records is entered on a standardized form that includes name, sex, race and ethnicity, address, date of birth, occupational history (employer, dates of employment, occupation/job activities), diagnosing physician name, physician address or facility name, and physician's city. The completed forms are submitted to DSHS and the information is entered into the EIET database. Cases of asbestosis and silicosis can be reported directly to the Environmental and Injury Epidemiology and Toxicology Branch, DSHS by mail, by calling our toll-free number 1 (800) 588-1248, or by faxing them to (512) 458-7222. Case reports can also be made to the local or regional staff of the health department who will transmit the information directly to the DSHS central office.

Asbestosis

Asbestosis is a chronic, fibrotic lung disease that results from the long-term inhalation of respirable asbestos fibers. Asbestos can enter the environment from weathered natural mineral deposits and fiber releases from man-made asbestos products, such as floor tiles, roof shingles, cement, and automotive brakes. Electrical, plumbing, acoustical, and structural insulation products also commonly include asbestos. Occupations at risk for asbestosis include mining and milling of asbestos, construction (using asbestos), fireproofing and textile industries, paints and plastics production industries, and brake and clutch lining production industries. The main symptoms of asbestosis are shortness of breath (primary symptom), difficulty breathing, dry crackling rales at the lung bases, especially when inhaling, cough (may be dry or may produce mucus), chest pain or tightness, and recurrent respiratory infections.

In 2005, 202 newly identified individuals with asbestosis were reported to DSHS (**Table 1**). Physicians reported 85 asbestosis cases and 117 more cases were found through death certificate reviews. Of the 202 individuals reported to have asbestosis, 199 (98.5%) were male and 3 (1.5%) were female.

Table 1. Primary occupations of persons with asbestosis in Texas, 2005

No. of cases	Occupation
31	Management, professional, and related occupations
21	Service and retail Trade
2	Farming, fishing, and forestry
33	Production and transportation and material moving
33	Installation, repair, and maintenance
71	Construction and extraction
3	All others
8	Occupation not reported
202	**Total**

Information on race was available for 199 of the 202 individuals and on ethnicity for 195 of the 202 individuals. Of the 199 individuals for whom race information was available, 178 (89.4%) were White and 21 (10.6%) were African American. Of the 195 individuals for whom ethnicity was known, 38 (19.5%) were Hispanic and 157 (80.5%) were non- Hispanic. Smoking status was reported for 167 of these individuals; 106 (63.5%) had a history of smoking, and 61 (36.5%) were non-smokers.

Silicosis

Silicosis is an irreversible but preventable respiratory disease caused by inhalation of silica dust that leads to inflammation and scarring of the lung tissue. Methods for the prevention of silicosis have been recommended by the United States Department of Labor at least since the early 1930's. Currently, at least 1.7 million workers are exposed to respirable crystalline silica in a variety of industries and occupations, including construction, mining, welding, and sandblasting. Exposures to silica dust may be related to the development of autoimmune disorders, chronic renal disease, and other adverse health effects.

In 2005, EIET received 134 new reports of individuals with the diagnosis of silicosis (**Table 2**). One hundred twenty-eight newly identified cases were obtained from physicians' offices and 6 were obtained from death certificate reviews. Of the 134 cases, 128 (95.5%) were male and 6 (4.5%) were female.

Information on race was available for 133 of the 134 individuals and on ethnicity for 133 of the 138 individuals. Of the 133 individuals for whom race information was available, 113 (85.0%) were white and 20 (15.0%) were African American. Of the 130 individuals for whom ethnicity was known, 71 (54.6%) were Hispanic and 59 (45.4%) were non- Hispanic.

The data collected provide an account of the number of asbestosis and silicosis cases that have been diagnosed in Texas and reported to DSHS. However, since the majority of cases are reported through passive surveillance methods, these estimates may not represent the total number of diagnosed cases of asbestosis and silicosis that are actually in the state. These data should be used to promote awareness of asbestosis and silicosis and encourage physicians and laboratorians to continue to report

Table 2. Primary occupations of persons with silicosis in Texas, 2005

No.	Occupation
3	Management, professional, and related occupations
1	Service and retail tade
-	Farming, fishing and forestry
36	Production and transportation and material moving
15	Installation, repair, and maintenance
73	Construction and extraction
1	All others
5	Occupation not reported
134	**Total**

- indicates no cases reported.

cases as they are diagnosed. Since asbestosis and silicosis continue to persist, and the estimates provided are most likely underestimates of the true disease burden, there continues to be a need for the public health system to address the routes of exposure.

Resources

Texas Department of State Health Services (DSHS) - http://www.dshs.state.tx.us.

National Institute for Occupational Safety and Health (NIOSH) - www.cdc.gov/niosh.

Occupational Safety and Health Administration - http://www.osha.gov.

Prepared by the Environmental and Injury Epidemiology and Toxicology Branch, (512) 458-7269, www.dshs.state.tx.us/epitox

Evaluation of Contaminants Found in Muscle and Liver Tissues of White-Tailed Deer Inhabiting the Caddo Lake National Wildlife Refuge

Introduction/Background

The Caddo Lake National Wildlife Refuge (NWR) is located in Harrison County, Texas, along the southwestern portion of Caddo Lake on property that was formerly the Longhorn Army Ammunition Plant (**Figure 1**). The nearby communities of Karnack and Uncertain have populations of 775 and 150, respectively.

The former ammunition plant was an 8,943 acre United States Department of Defense (DOD) facility that operated intermittently from 1942 to 1997. The plant produced ammunition, explosives, trinitrotoluene (TNT), and rocket motors. In 1990, the United States Environmental Protection Agency (EPA) placed the plant and its property on the National Priorities List, thereby making it a “Superfund” site. Subsequently, chemical contamination was found in the site’s surface water, sediment, surface soil, and groundwater. In 1999, the Texas Department of State Health

Figure 1. Caddo Lake and surrounding area, including Caddo Lake National Wildlife Refuge

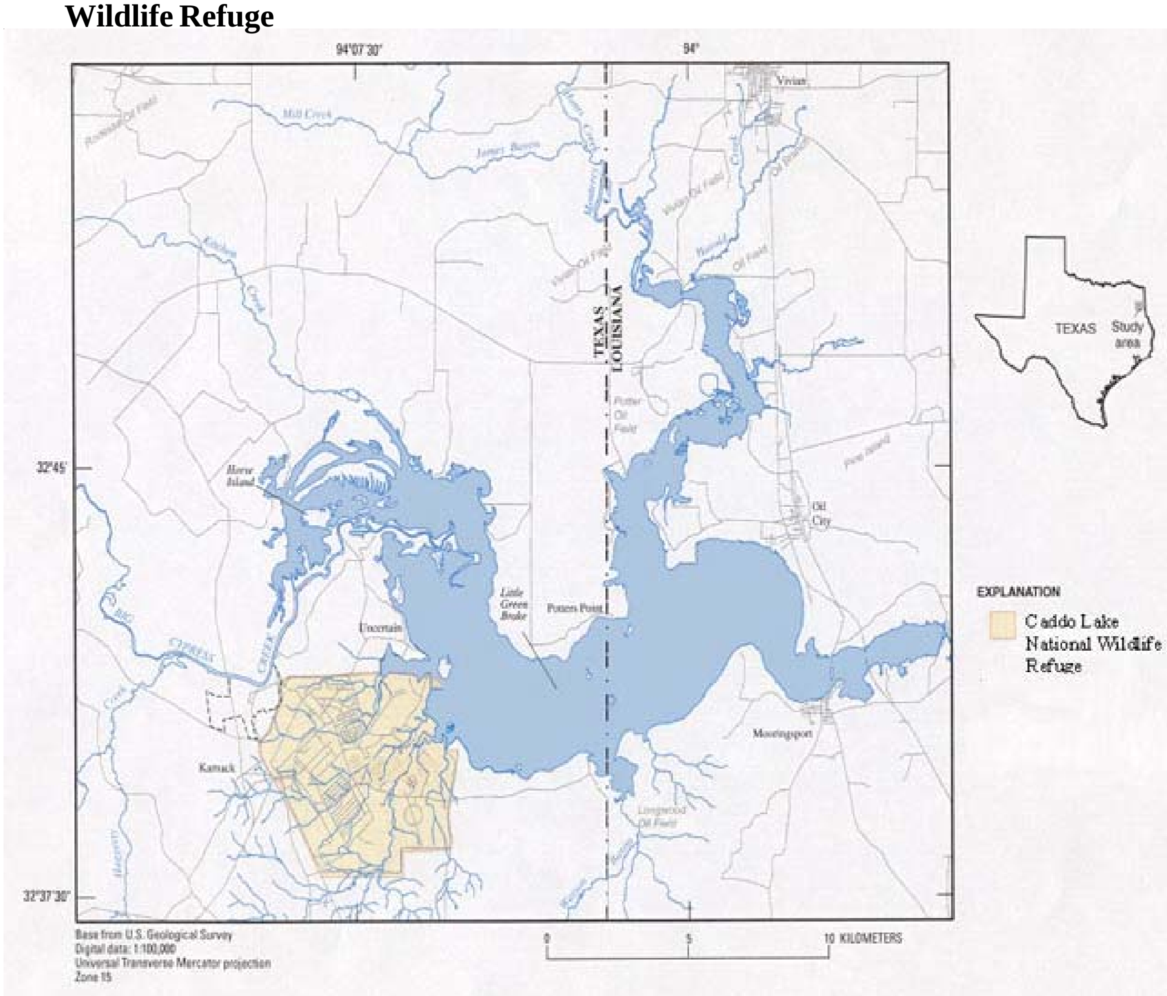


Table 1. Contaminants exceeding health-based screening values in white-tailed deer livers taken from Caddo Lake National Wildlife Refuge

Contaminant	Concentration range (mg/kg)	Screening value (mg/kg)		Number of samples exceeding screening values per total samples	
		Child	Adult	Child	Adult
Cadmium	0.34 - 7.7	0.2	0.4	18/18	17/18
Copper	22 - 949	9	22	18/18	18/18
Selenium	0.89 - 20.1	5	10	1/18	1/18

Services (DSHS) and the Agency for Toxic Substances and Disease Registry (ATSDR) concluded the site posed no apparent public health hazard because people were not likely to come into contact with site-related contaminants.

Administrative control of approximately 5,000 acres of the facility was granted in 2004 to the United States Fish & Wildlife Service (USFWS) as the Caddo Lake NWR. The DOD retains control of the remainder of the property until cleanup activities are completed at several areas on the site.

The USFWS considered offering public deer hunting on the Caddo Lake NWR, eventually allowing 300 individuals to hunt annually to harvest approximately 100 deer. Due to the environmental contamination and cleanup activities associated with the site, there was a concern about the potential human health risk from consumption of the deer meat. As a result, the USFWS asked the DSHS Health Assessment and Toxicology (HAT) Program to evaluate contaminants found in muscle and liver tissue of white-tailed deer (*Odocoileus virginianus*), which inhabit the Caddo Lake NWR.

Methods

In January and February 2005, tissue samples were collected by the USFWS from 20 white-tailed deer (18 female deer or does and 2 male deer or bucks), ranging from 1.5 to 6.5 years of age. The sampling ratio of does to bucks (9:1) was similar to harvest results from past hunting seasons when the United States Army allowed deer hunting by its personnel on the ammunition plant property.

The average live weight for the does ranged from 45 to 50 kg and the live weights for the bucks were 59 kg and 64 kg. Twenty muscle tissue samples of backstrap (loin) and hind quarters were pooled as one muscle tissue sample per deer, and 18 deer liver samples also were collected. The tissue samples were submitted to analytical laboratories for pesticide and metals analyses.

Health-based screening values for contaminants in deer tissues were not available; thus, we used ATSDR's minimal risk levels (MRLs) and EPA's reference doses (RfDs) to develop health-based screening values for noncarcinogenic effects. MRLs and RfDs are estimates of a daily exposure to contaminants that are unlikely to cause adverse non-cancerous health effects, even if the exposure occurs for a lifetime.

We used standard assumptions for body weight (15 kg for children and 70 kg for adults) and ingestion rates (0.113 kg per week for children and 0.227 kg per week for adults), with a frequency of exposure of one day per week for 6 months out of the year.

Screening values for carcinogenic health effects were developed by using EPA's chemical specific cancer slope factors (CSFs) and an estimated increased lifetime cancer risk of one person-in-one million developing a cancer as a result of the exposure.

Results and Interpretations

For any contaminant found in the deer tissue samples, we compared the maximum concentration to the respective calculated health-based screening values for non-cancer and cancer health effects. No contaminants exceeded non-cancer health-based screening values in muscle; however, health-based screening values for cadmium, copper, and selenium were exceeded in liver samples (**Table 1**). Concentrations of contaminants with CSFs were below the instrument detection limit in all tissue samples.

Discussion and Public Health Implications

Currently the public is not being exposed to the contaminants in the tissue of white-tailed deer, which inhabit the Caddo Lake NWR, as hunting is not allowed. We considered the potential for adverse health effects to occur if hunting is allowed in the future.

Because none of the contaminants exceeded their respective health-based screening values in muscle tissue samples, the consumption of deer muscle tissue collected from the Caddo Lake NWR would not be expected to result in adverse health effects.

Selenium exceeded the health-based screening value in only one liver sample and cadmium and copper exceeded their health screening values in almost all liver samples. Throughout the world, studies have been conducted to determine the risk to hunters of eating wild game contaminated with metals. One metal of particular concern has been cadmium and health advisories on the consumption of liver and kidney tissues have been issued in many areas, including Maine, New Hampshire, and Canada. Based on the levels of these metals in deer liver tissue collected from the Caddo Lake NWR, the livers from these animals should not be consumed.

Data on background concentrations of metals and pesticides in deer from other areas in the vicinity of Caddo Lake were not collected. Due to the absence of background sampling data, it was not possible to compare the health risk associated with eating the liver of deer from the former ammunition plant property to the risk associated with eating deer liver from other areas.

Conclusions

DSHS concluded that:

- Eating white-tailed deer muscle tissue taken from the Caddo Lake NWR poses no apparent public health hazard
- Eating the livers from deer taken from the Caddo Lake NWR may pose a public health hazard

Recommendation

If hunting is allowed on the property, DSHS recommended that the USFWS retain and dispose of the deer livers to prevent public exposure to elevated levels of copper and cadmium.

Reference

Agency for Toxic Substances and Disease Registry. Health Consultation - Consumption of Deer Tissue Collected at Caddo Lake National Wildlife Refuge. Karnack, Harrison County, Texas. U.S. Department of Health and Human Services. January 24, 2006.

Prepared by the Texas DSHS Health Assessment and Toxicology Program, (512)458-7111 ext 3004, http://www.dshs.state.tx.us/epitox/hat.shtm

Five Years of Contaminated Sharps Injury Reporting

In 2001, the Texas State Legislature passed and Governor signed into law House Bill 2085, which contained the Bloodborne Pathogens Control regulations that require governmental entity reporting of contaminated sharps injuries.[1] Texas governmental entities are required to report contaminated sharps injuries to the Texas Department of State Health Services while private Texas health care facilities continue to report their sharps injuries to U.S. Department of Labor, Occupational Safety Health Administration (OSHA).[1,2] Texas Bloodborne Pathogen law requires also the publishing of sharps injuries in aggregate form.

Comprehensive reports of contaminated sharps injuries reported 2001 through 2004 are published at: http://www.dshs.state.tx.us/idcu/health/bloodborne_pathogens/reporting/

From 2001 through 2005, eight thousand, seven hundred and thirty-four contaminated sharps injuries were reported by Texas governmental entity facilities. Reports of surveys by the Centers for Disease Control and Prevention (CDC) indicate that 50% or more of health workers do not report their occupational percutaneous injuries.[3]

Selected sharps injury data included in this five-year summary are:

- Injuries by public health service regions
- Type of governmental entity reporting the injury
- Job classification of injured workers
- Types of sharps in use at time of injury
- Use and nonuse of safety engineered sharps devices at the time of injury.

Sharps Injuries by Public Health Service Region (HSR)

Table 1 reflects the large urban populations and health care facilities in health service regions (HSR) 3, 6, and 8. Health care workers in HSR 1 are consistent in injury reporting with a range of 191 to 235 over 5 years.

Table 1. Sharps injuries by health service region (HSR)

HSR	2001	2002	2003	2004	2005	Total
1	235	206	200	198	191	1030
2	122	116	87	102	109	536
3	449	411	390	340	355	1945
4	36	69	52	58	40	255
5	8	4	2	17	10	41
6	375	343	576	609	579	2482
7	88	116	131	100	132	567
8	309	192	158	96	180	935
9	102	107	122	99	115	545
10	38	30	44	41	93	246
11	27	28	17	9	21	102
Missing				17	33	50
Total	1789	1622	1779	1686	1858	8734

Sharps Injuries by Type of Facility

Hospitals consistently reported the highest number of injuries (**Table 2**). Other facilities such as clinics have consistently reported the next highest number of injuries.

Table 2. Type of facility reporting sharps injuries

Year	2001		2002		2003		2004		2005		Total
Facility Type	No.	%	No.	%	No.	%	No.	%	No.	%	
Hospital	1399	78.2%	1295	79.8%	1437	80.8%	1410	83.6%	1514	81.5%	7055
Clinic	133	7.4%	124	7.6%	154	8.7%	109	6.5%	120	6.5%	640
EMS/Fire/Police	67	3.7%	32	2.0%	34	1.9%	32	1.9%	28	1.5%	193
School	38	2.1%	34	2.1%	28	1.6%	26	1.5%	31	1.7%	157
Correctional	42	2.3%	29	1.8%	21	1.2%	25	1.5%	58	3.1%	175
Morgue	5	0.3%	25	1.5%	12	0.7%	22	1.3%	10	0.5%	74
Home Health	9	0.5%	13	0.8%	12	0.7%	17	1.0%	12	0.6%	63
Dental Facility	10	0.6%	4	0.2%	9	0.5%	13	0.8%	13	0.7%	49
Out Patient Clinic	26	1.5%	18	1.1%	13	0.7%	12	0.7%	13	0.7%	82
Residential Facility	10	0.6%	18	1.1%	25	1.4%	10	0.6%	16	0.9%	79
Other	14	0.8%	11	0.7%	18	1.0%	5	0.3%	12	0.6%	60
Laboratory	32	1.8%	17	1.0%	15	0.8%	3	0.2%	29	1.6%	96
Blood Bank	4	0.2%	2	0.1%	1	0.1%	2	0.1%	2	0.1%	11
Total	1789	100.00%	1622	100.0%	1779	100.0%	1686	100.0%	1858	100.0%	8734

Sharps Injuries By Job Classification

Among job classifications that place health care workers at risk for sharps injuries, registered nurses and physicians have sustained the highest percentage of injuries (**Table 3**). The numbers of interns/residents reporting injuries has escalated over time. Laboratory staff, licensed vocational nurses, and surgery/operating room staff injuries have ranged from 6 to 10% over the 5 years. First responders (police, firefighters, EMT/Paramedics) injuries have had a decline over 5 years from 5% to 2%.

Type of Sharps Device in Use At Time of Injury

Syringes/Needles and Suture Needles have been involved in the highest and second highest number of injuries over the past 5 years, with Winged Steel Needles and IV Catheters/Needles as the third/fourth highest number/percent of devices involved in injuries (**Table 4**). Surgical Instruments (includes staples, tattoo pins, trocars, razors, wires, scissors, etc.) injuries have ranged from 7 to 9% of total injuries annually. Dental Instruments, Biopsy/Other Specimen Collection Needles, and Huber needles have been reported in sufficient numbers since 2004 to be listed as separate categories.

Engineered Sharps Injury Protection (ESIP)

Both Texas and federal Bloodborne Pathogen regulations require the use of safety engineered sharps devices.[1, 6] **Figure 1** displays the slight trend from traditional sharps devices to safety engineered devices with corresponding numbers of injuries occurring with the safety engineered devices. There are three distinct categories of safety syringes to choose from: retrofitted devices, which are conventional syringes with add-on pieces; automatically retractable syringes; and

Table 3. Sharps injuries by job classification

Year	2001		2002		2003		2004		2005		Total
Job Class	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
RN	464	25.9%	424	26.1%	384	21.6%	399	23.7%	437	23.5%	2108
MD/DO	393	22.0%	358	22.1%	481	27.0%	374	22.2%	227	12.2%	1833
Int./Res.	0	0.0%	4	0.2%	13	0.7%	146	8.7%	247	13.3%	410
Laboratory	179	10.0%	154	9.5%	160	9.0%	107	6.3%	148	8.0%	748
Surg. Asst	135	7.5%	117	7.2%	124	7.0%	117	6.9%	157	8.4%	650
LVN	143	8.0%	116	7.2%	129	7.3%	105	6.2%	144	7.8%	637
Students	78	4.4%	60	3.7%	81	4.6%	86	5.1%	91	4.9%	396
Housekeep	80	4.5%	60	3.7%	65	3.7%	53	3.1%	68	3.7%	326
First Resp.	82	4.6%	48	3.0%	42	2.4%	47	2.8%	41	2.2%	260
Aides	51	2.9%	62	3.8%	73	4.1%	40	2.4%	75	4.0%	301
Dental	32	1.8%	22	1.4%	27	1.5%	31	1.8%	32	1.7%	144
Other Tech	26	1.5%	35	2.2%	35	2.0%	20	1.2%	31	1.7%	147
Radiology	23	1.3%	18	1.1%	22	1.2%	18	1.1%	7	0.4%	88
Respiratory	24	1.3%	25	1.5%	17	1.0%	16	0.9%	24	1.3%	106
PA	9	0.5%	7	0.4%	15	0.8%	21	1.2%	21	1.1%	73
Maint.	0	0.0%	8	0.5%	4	0.2%	9	0.5%	4	0.2%	25
CRNA/NP	8	0.4%	17	1.0%	19	1.1%	17	1.0%	13	0.7%	74
Schools	13	0.7%	9	0.6%	9	0.5%	6	0.4%	25	1.3%	62
C.S.	0	0.0%	7	0.4%	10	0.6%	5	0.3%	15	0.8%	37
Other/Unk.	49	2.7%	71	4.4%	69	3.9%	69	4.1%	51	2.7%	309
Total	1789	100.0%	1622	100.0%	1779	100.0%	1686	100.0%	1858	100.0%	8734

manually retractable syringes.[4] It is vital for an institution to understand current technology so wise choices can be made in the selection of sharps devices.[4] A study conducted by the International Healthcare Workers Safety Center in 2001 found that the safety feature was not activated in 71% of injuries and 57% of injuries happened before the safety device was activated.[5] The best way for healthcare workers to protect themselves is to learn which devices are higher risk, which devices will reduce risk, and what to do in processes that will always have risks.[7]

Summary

Sharps injuries still occur with devices that are considered safety engineered. Thus, a work site quality improvement program with monitoring of work practice controls, process at time of injury, staff competency in procedure, and efficacy of specific devices are needed for injury prevention. Although many factors may be listed as essential to a safe work environment, three are associated with compliance to bloodborne pathogen exposure regulations:

1. senior management commitment and support for a safe work site
2. absence of barriers to safe work practices
3. cleanliness and orderliness at the worksite[8]

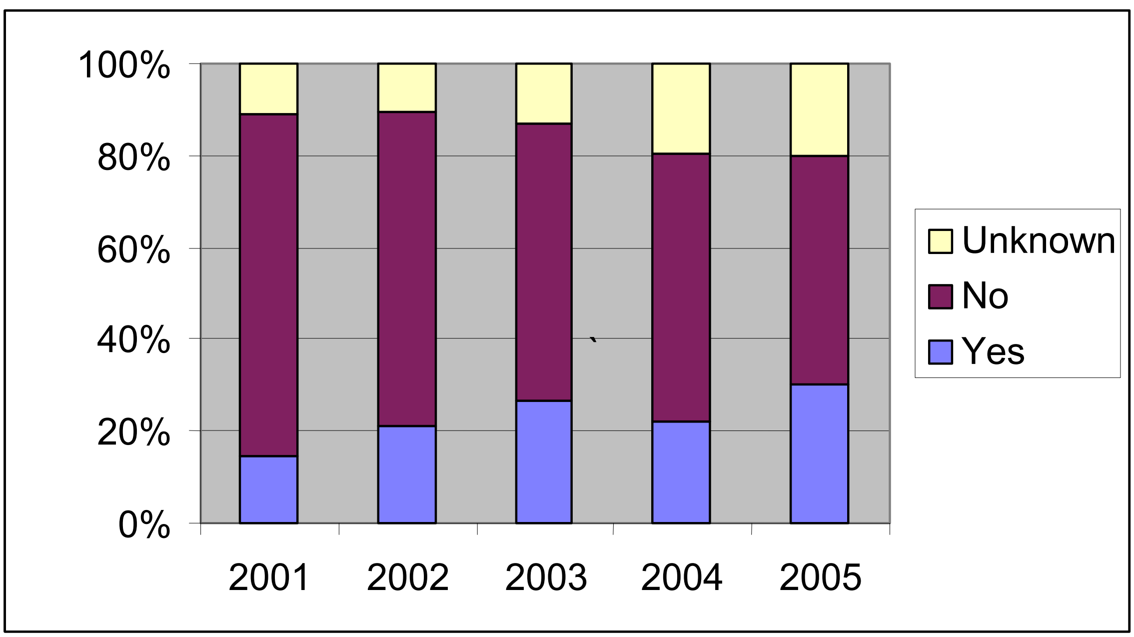
The Texas Department of State Health Services Infectious Disease Control Unit

(Continued ☞)

Table 4. Type of sharp in use at time injury

Year	2001		2002		2003		2004		2005		Total
Type of Sharp	No.	%	No.	%	No.	%	No.	%	No.	%	
Syringes/Needles	473	26.4%	525	32.4%	581	32.7%	522	31.0%	567	30.6%	2668
Suture Needle	320	17.9%	293	18.1%	379	21.3%	386	22.9%	392	21.2%	1770
Winged Steel Needles	156	8.7%	145	8.9%	175	9.8%	105	6.2%	144	7.8%	725
IV Catheter/Needles	122	6.8%	93	5.7%	96	5.4%	107	6.3%	144	7.8%	562
Surgical Inst.	162	9.1%	154	9.5%	148	8.3%	146	8.7%	138	7.4%	748
Scalpels	97	5.4%	101	6.2%	114	6.4%	130	7.7%	136	7.3%	578
Insulin Syringes	83	4.6%	93	5.7%	71	4.0%	68	4.0%	92	5.0%	407
Blood Tube Holders	83	4.6%	74	4.6%	58	3.3%	56	3.3%	58	3.1%	329
Other/Unknown	147	8.2%	18	1.1%	30	1.7%	36	2.1%	46	2.5%	277
Tuberculin Syringes	34	1.9%	32	2.0%	37	2.1%	23	1.4%	30	1.6%	156
Blood Gas Syringes	26	1.5%	24	1.5%	19	1.1%	20	1.2%	29	1.6%	118
Lancets	62	3.5%	45	2.8%	38	2.1%	46	2.7%	26	1.4%	217
Dental Inst.	0	0.0%	0	0.0%	0	0.0%	7	0.4%	22	1.2%	29
Biopsy/Other Needles	0	0.0%	0	0.0%	0	0.0%	7	0.4%	16	0.9%	23
Tubes/Glass	24	1.3%	25	1.5%	33	1.0%	20	1.2%	10	0.5%	112
Huber needles	0	0.0%	0	0.0%	0	0.0%	7	0.4%	8	0.4%	15
Total	1789	100.0%	1622	100.0%	1779	100.0%	1686	100.0%	1858	100.3%	8734

Figure 1. Safety engineered sharps devices in use at time of injury



website listed below[1] has information on how to manage a contaminated sharps injury and includes the website for the *U.S. Public Health Service Center for Disease Control Guidelines for Recommendations for Postexposure Prophylaxis.*

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Prepared by the Infectious Disease Control Unit, (512) 458-7676

The Pesticide Exposure Surveillance in Texas Program

Introduction and Background

The Texas Department of State Health Services (DSHS) Pesticide Exposure Surveillance in Texas Program (PEST) conducts surveillance of occupational pesticide exposures to reduce and prevent occupational pesticide exposure-related illness, to serve as an early warning system for harmful effects not previously noted, and to identify potential deficiencies in warning labels and instructions. PEST activities also have helped identify emerging pesticide problems such as pesticide poisoning in retail establishments, unintentional lindane (a pesticide used in shampoos to treat head lice) ingestions, and pesticide poisonings among working youth. DSHS receives funding and technical support from the National Institute for Occupational Safety and Health (NIOSH) to conduct these activities. Historically, occupational-related pesticide exposures have been under-ascertained.

Methods

The 1985 Texas Occupational Conditions Reporting Act, Health, and Safety Code, Chapter 84, House Bill 2091, and the accompanying Texas Administrative Code Chapter 99, require physicians, laboratory directors, and other health professionals to report acute occupational pesticide poisoning to the state public health agency. The law authorizes DSHS to collect and analyze information, including medical records and environmental and biological specimens. Medical records provide health and other information critical to successful follow up and case classification.

The PEST Program has used the same case definition and classification for acute pesticide-related poisoning since 1998. A confirmed exposure must fit into 1 of 4 classifications: “definite,” “probable,” “possible,” or “suspicious.” The toxicology and health effects of the pesticide are required to make this determination. A classification of “suspicious” is applied to exposure reports that lack a toxicological association to the pesticide.

PEST receives most of its reports from the Texas Poison Center Network (TPCN), which consists of 6 poison control centers located in Amarillo, Dallas, El Paso, Galveston, San Antonio, and Temple. An enhanced relationship between PEST and TPCN has improved case ascertainment and reduced the time interval from when the event occurred to when it was received by PEST from 202 days to 3 days. This has enabled staff to triage cases for timely follow-up interviews, medical record ascertainment, and field investigations.

Upon receiving a report, PEST initiates contact either with the exposed individual or proxy to obtain event details. Medical records are requested if appropriate. Interviews are conducted, in Spanish if necessary, using a standardized questionnaire developed for the SENSOR-Pesticides Incident Data Entry and Reporting (SPIDER) surveillance database, a tool developed by NIOSH which organizes approximately 148 standardized variables. Health effects data from medical records are transcribed into the questionnaire and the information is evaluated according to exposure, health effects, and cause. Exposure also is evaluated to determine illness severity: low severity for minimal exposures that resolve quickly, moderate severity for exposures with systemic health effects that are not life threatening, and high severity for exposures that involve fatalities, are life threatening, or result in significant residual disability (full definition: CDC, 2001). Field investigations are initiated if the exposure event involves 4 or more workers, injuries despite adherence to pesticide labeling, hospitalizations, death, or a repeating problem at the same workplace.

Results and Interpretations

From September 2002 to September 2006, PEST received 1,501 reports of suspected pesticide exposure, 70% of which were work related. During calendar years 2002 – 2005, there were 524 confirmed acute occupational pesticide exposures. The remainder of the information in this report addresses these exposures.

The majority of confirmed cases (79%) were received through the TPCN. The Texas Workers' Compensation Commission (TWCC), and the Texas Department of Agriculture (TDA) contributed 8% and 6% of the cases, respectively. All other reporting sources each contributed less than 2% of confirmed work-related reports.

Industry information was available for 83% of the cases. The agricultural industry was associated with 18% of the cases. The wholesale and retail industry and the Professional and Related Services industry each were associated with 17% of the cases for which industry was known. Farm worker was the occupation with the most pesticide-related illnesses (n=38), followed by janitors and cleaners (n=36), and pest control occupations (n=36).

Exposures to pyrethroids and pyrethrins (separately) were involved in 23% of all exposures and, of the work-related pesticide exposures involving more than 1 chemical class, pyrethroids and pyrethrins were the most commonly reported pesticides (28%). This was identified as a particular concern because these chemicals are derived from chrysanthemums and are often advertised as a "safe" alternative to other "more toxic" pesticides. While they may be less toxic, they still can cause harm when used improperly. Although surveillance on disinfectant exposures only began on January 1, 2004, they were responsible for 29% of the cases.

Fifty-eight percent of the cases sought medical attention, 37% went to the emergency room, and 5% required hospitalization. Eight percent (n=40) of the cases did not seek health care and did not consult poison control. Agriculture was the industry with the most workers not seeking health care (33%). The most frequently reported health effect was neurological (57%), followed by gastrointestinal effects (42%), respiratory effects (40%), ocular effects (32%), and dermal effects (28%).

The mean age for all workers was 34 years and 32% of all workers were female. The professional and related services industry was the only industry where females (71%) were exposed more often than males (29%). Exposure was distributed evenly for all age groups up to 44 years of age (range=22-25% of all cases); however, there were differences between industries. Thirty-five percent of workers youinger than 20 years of age were employed in the wholesale and retail industries and the youngest worker (14 years of age) was employed in agriculture. Agriculture also had the largest percentage of workers 55-64 years of age (28%). Employees 65 years of age and older comprised 2% of all cases. The majority of workers were White (79%) and 30% reported Hispanic ethnicity, 4% were African-American, and 1% (n=6) were Asian or Pacific Islanders. Race and ethnicity were unknown for 15% of the cases.

Outreach activities that were initiated include the creation of a bilingual brochure and 4 postcards for health care providers and workers in high-risk occupations. Staff also presented and participated in health fairs, seminars, and other conferences around the state, and met with migrant clinicians and farm worker unions. Outreach activities targeting children of agricultural workers who often work in the fields also were initiated.

Conclusions

Pyrethroids and pyrethrins involved the greatest number of exposures. Increased education on the potential for misuse of these products is warranted. The inclusion of disinfectants contributed to the increased number of cases and identified a worker population, cleaning and food service occupations, not previously captured by occupational pesticide exposure surveillance systems. Capturing these exposures identified a cohort of females found to be occupationally exposed to pesticides and demonstrates the extent to which exposure to pesticides is a public health problem. The disinfectant product exposures clearly illustrate that pesticides are not just an agricultural problem.

It is important for health practitioners to become more familiar with the symptoms associated with pesticide exposures since many of the symptoms can be non-specific and mimic other illnesses. In addition, many workers who seek care do not always provide the physician with a history of pesticide use. Employers also should make sure that their employees are properly trained on the use of pesticides since workers often ignore warning labels and do not properly protect themselves with appropriate personal protective equipment.

References

Centers for Disease Control (CDC): [2001] Severity index for use in state-based surveillance of acute pesticide-related illness and injury. Cincinnati, Ohio: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute of Occupational Safety and Health. Available: http://www.cdc.gov/niosh/pestsurv/ [accessed 16 November 2006]

Texas SENSOR, Final Progress Report, 2002-2006.

Prepared by the Environmental and Injury Epidemiology and Toxicology Branch, (800) 588-1248, http://www.dshs.state.tx.us/epitox/pest.shtm#numbers.

Texas Childhood Poisoning Prevention Program

Introduction and Background

Although regulations banning leaded gasoline, lead paint, and lead-soldered food cans have dramatically reduced potential sources of lead in the environment, the Centers for Disease Control and Prevention (CDC) estimates that 890,000 children 1 to 5 years of age in the United States may still have elevated blood lead levels. Current prevailing sources of lead exposure include chipping and peeling lead-based paint, imported pottery with leaded glazes, parental occupations and hobbies that involve work with lead, and traditional medicines that contain lead. Children are at greater risk from exposure to lead than adults since they employ more hand-to-mouth behavior and their digestive systems absorb a greater amount of the lead that is ingested. Performing a blood lead test is the primary way for determining whether a child is being exposed to lead and is a first step towards identifying and eliminating the source of the exposure.

In Texas, childhood blood lead levels are reportable to the Texas Department of State Health Services (DSHS). The Reports of Childhood Lead Poisoning Act, Texas Health and Safety Code Chapter 88, which mandate the reporting of childhood blood lead levels also stipulate that DSHS may implement policies and procedures to eliminate childhood lead poisoning within the state.

The DSHS Childhood Lead Poisoning Prevention Program (TX CLPPP) receives funding from the CDC for lead poisoning prevention activities and for surveillance. Some of these funds are provided to local lead poisoning programs in Austin-Travis County, City of Dallas, El Paso City-County, Houston, and San Antonio-Bexar County to promote lead poisoning prevention activities. Other local health departments such as the Harris County Health Department and the San Angelo-Tom Green County Health Department, which have not received funding from DSHS, also have worked with TX CLPPP and demonstrated a commitment to provide child lead poisoning prevention services to children in their respective jurisdictions.

Methods

TX CLPPP, a program within the Environmental and Injury Epidemiology and Toxicology Branch of the Epidemiology and Disease Surveillance Unit, conducts surveillance of blood lead levels in children younger than 15 years of age, maintains those blood lead reports in the Child Lead Registry, and works with various partners to eliminate childhood lead poisoning as a public health problem in Texas.

Currently, the CDC has identified 10 micrograms of lead per deciliter of blood (µg/dL) as the blood lead level of concern in children. The primary goal of blood lead screening and assessment is to identify children with blood lead levels above this level of concern and to promote appropriate intervention strategies in a timely manner. With the assistance of a Screening Advisory Group, TX CLPPP has developed screening guidelines for Texas children recommending that all children are tested at 12 and 24 months of age. Children in these age groups are at highest risk for lead poisoning because of the frequency of hand-to-mouth behavior and ease for absorption of ingested lead. Children 3 through 5 years of age are also considered to be at high-risk , but to a lesser extent than children 1 and 2 years of age. For children older than 2 years of age with an unknown history of lead testing, health providers often use a *Risk Assessment for Lead Exposure Questionnaire* to determine the need for a blood lead test.

Results and Interpretations

Children Tested

In 2006, 293,409 or 5.6% of all Texas children, at 0 through 14 years of age, received a blood lead test. Only 17.7% of children in the recommended age group (1-2 years olds) received a blood lead test (**Figure 1**).

Children with Elevated Blood Lead Levels

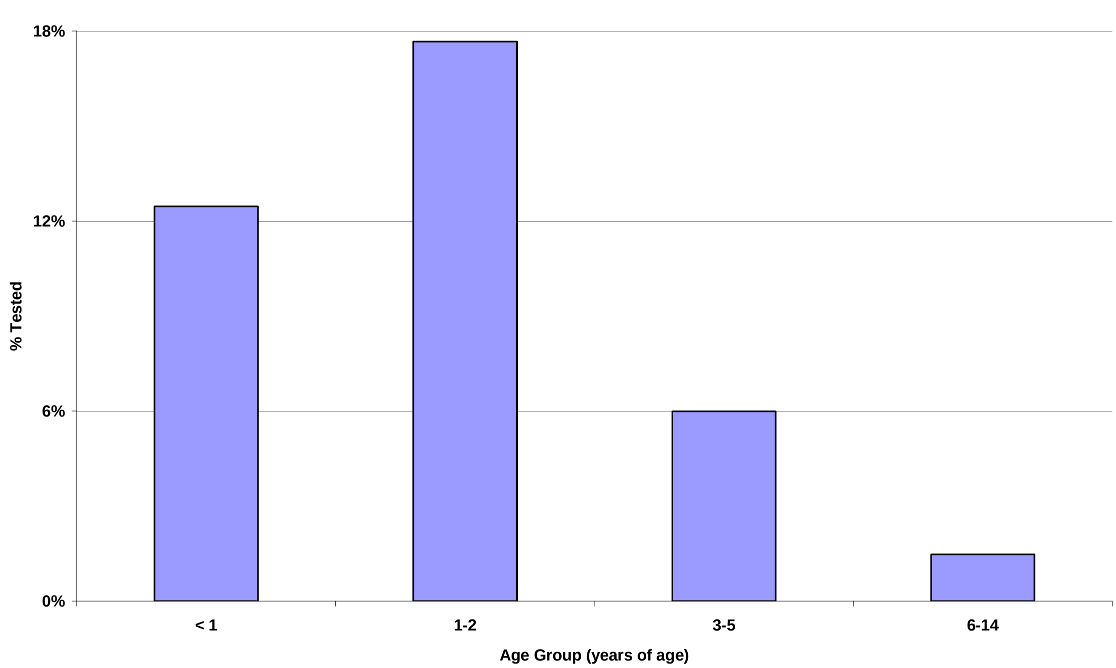
There were 3,429 children with elevated blood lead level test results (10 µg/dL or greater), which represents 1.2% of all children tested. As shown in **Figure 2**, the 1 and 2 years of age group had the highest percentage (1.4%) of children with elevated blood lead test results. The 3 to 5 years of age group had the second highest percentage (1.3%) of children with elevated blood lead test results (**Figure 2**).

Summary and Conclusions

TX CLPPP promotes lead poisoning education, surveillance, and case management for those children who have a current blood lead burden. To reduce the number of newly poisoned

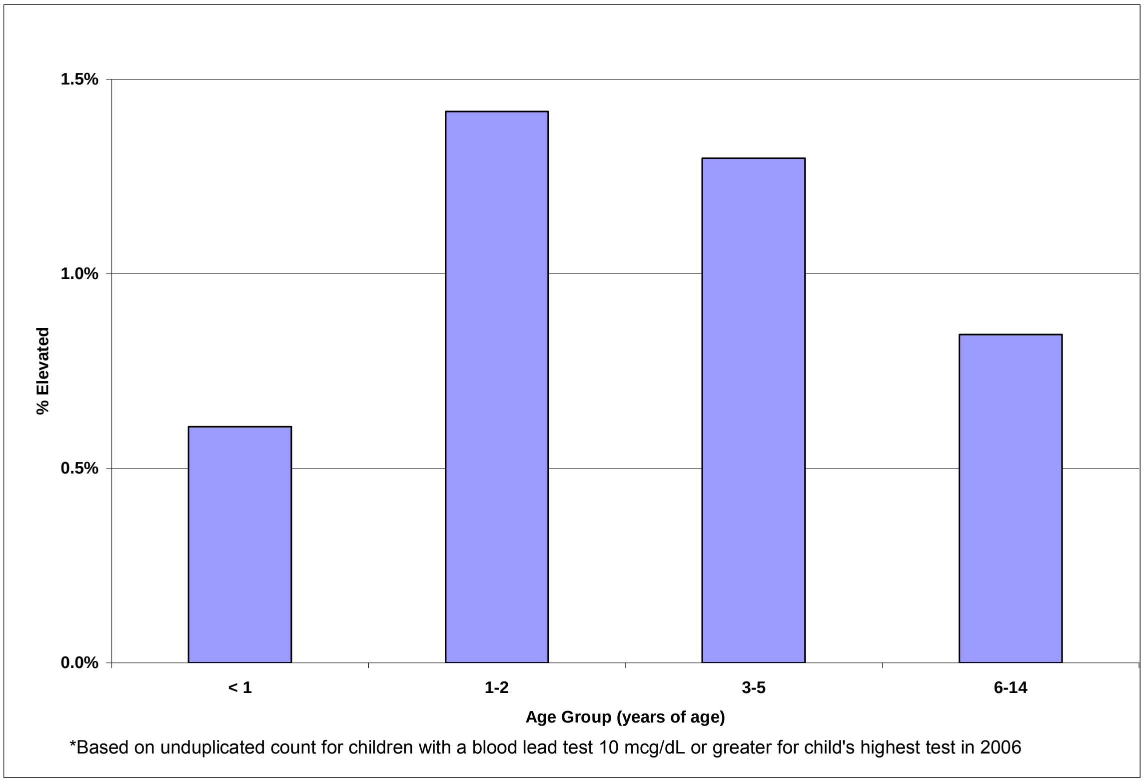
Figure 1. Age specific percentage of Texas children elevated among those tested for lead, 2006

N = 293,409 children tested



*Age-specific percentages calculated using 2006 Texas projected population estimates

Figure 2. Age-Specific percentage of Texas children elevated* blood lead levels among those tested for lead, 2006



children, TX CLPPP identifies at-risk populations and sources of lead exposure and provides guidelines for the elimination and control of lead hazards.

Only 5.6% of Texas children 0 through 14 years of age had a blood lead test and only 17.7% of Texas children 1 and 2 years of age were tested for lead. To reach the goal of eliminating childhood lead poisoning in Texas, more Texas children should be tested for lead poisoning, especially those in the high-risk age groups. Additionally, we need to insure that all children identified as having an elevated blood lead level receive prompt and appropriate follow-up and treatment.

Reference

DSHS Center for Health Statistics: 2006 Projected Population Estimates

Prepared by the Texas Childhood Lead Poisoning Prevention Program, 1-800-588-1248 or 1-512-459-7269; http://www.dshs.state.tx.us/lead/

Texas Drowning Events 2000-2004

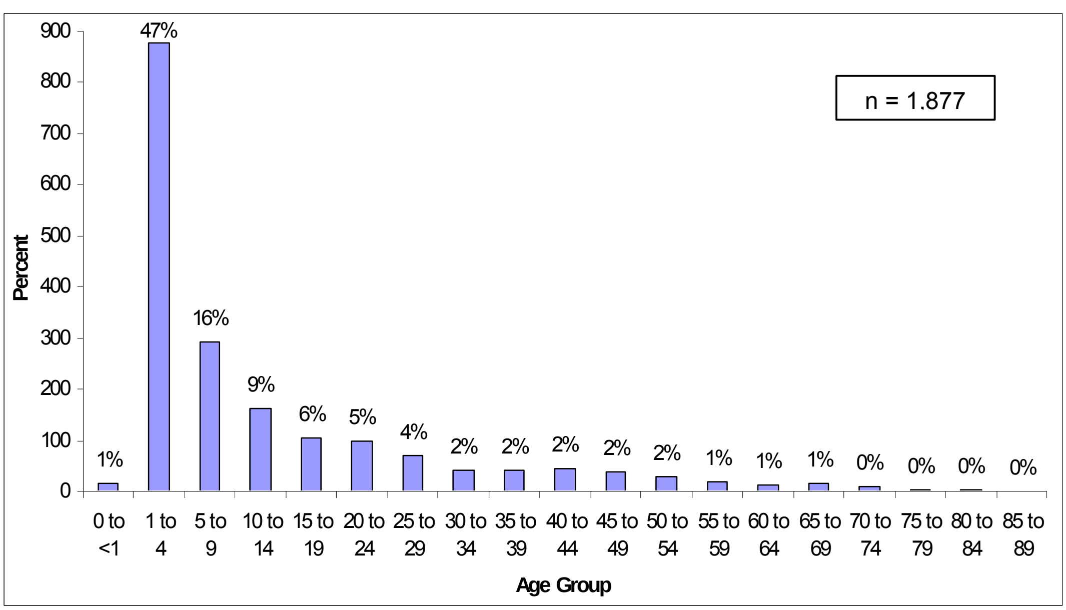
Drownings are a significant cause of mortality and morbidity in Texas. Each year, more than 300 people die from drowning in Texas; it is estimated there are at least another 300 non-fatal drownings annually, many recovering normally, but others suffering lifelong debilitating impairments. (Note: In 2005 the World Health Organization redefined 'drowning;' details are available at: www.scielosp.org/scielo.php?pid=S0042-96862005001100015&script=sci_arttext). Drowning is a reportable condition in Texas, meaning physicians, medical examiners, and hospitals are required by law to report fatal and non-fatal drowning events to health authorities. The information collected from each of these events is stored in the Texas Submersion Registry (TSR) located within Department of State Health Services Environmental and Injury Epidemiology and Toxicology Branch.

The TSR is a passive reporting system and thus is presumed to underestimate the actual number of drownings that occur. Preliminary analyses indicate that adult drownings in particular, are underreported. However, the patterns identified in the distribution of drownings among specific populations, geographic areas, and circumstances seem to accurately reflect the nature of the drownings. The information included in this report is taken from analyses of TSR data.

Age

There were 1,877 fatal and non-fatal drownings reported to the TSR during 2000-2004 (**Figure 1**). Nearly 3 of every 4 drownings reported (1,348/1,877 drownings; 72% of drownings reported) were amongst children younger than 15 years of age; most noticeable is that young children 1-4 years of age were

Figure 1. Texas drowning events by age, 2000 - 2004



involved in almost 1 out of every 2 drownings (878/1,877).

Location

Figure 2 shows distinct patterns for children and adults in the location of the drowning. The majority of child submersions (60%) occur in apartment, hotel, home, and public swimming pools. In contrast, most adult submersions (77%) occur in open water bodies of water, i.e., lakes, streams, and beaches.

Temporal Patterns

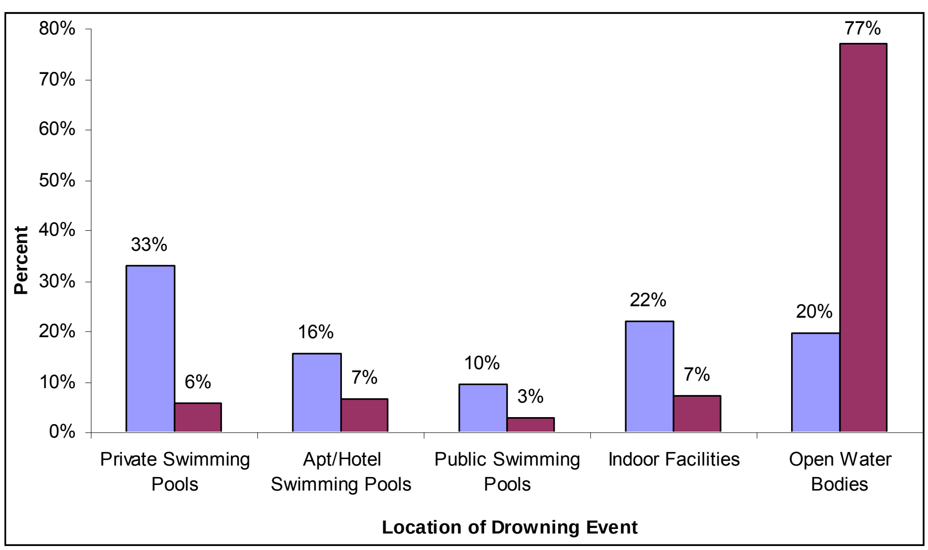
During the 5 years studied, Texas drownings have demonstrated distinct monthly, daily, and hourly patterns. Not surprisingly, the vast majority of drownings (82%, n=1535) occurred in the warmer months from April to September. The average number of drownings in June (75) was 10 times that in December (7). The highest number of drownings occurred over the weekend (Saturdays and Sundays) with lows during the midweek (Tuesday through Thursday). As evidenced in **Figure 3**, the number of drownings begins to increase early in the morning (7 a.m.), rising to peak from 5 to 6 p.m., and then declines rapidly through the night. Nearly identical 24-hour patterns were found for drownings that occur in private and public pools, indoors, and in open bodies of waters.

Summary

Those at greatest risk of drowning, children younger than 4 years of age, drown at home, in the bathtub or in the home swimming pool. Data from child fatality review teams indicate these are often with a parent present, but not within physical or visual presence of the child. Drowning events among adults, which account for about 70% of the fatalities, occur most often on open bodies of water (rivers, lakes, and in the Gulf) while swimming and boating. There are, of course, other circumstances of drowning, e.g., flood related or those swept away trying to drive through low water crossings.

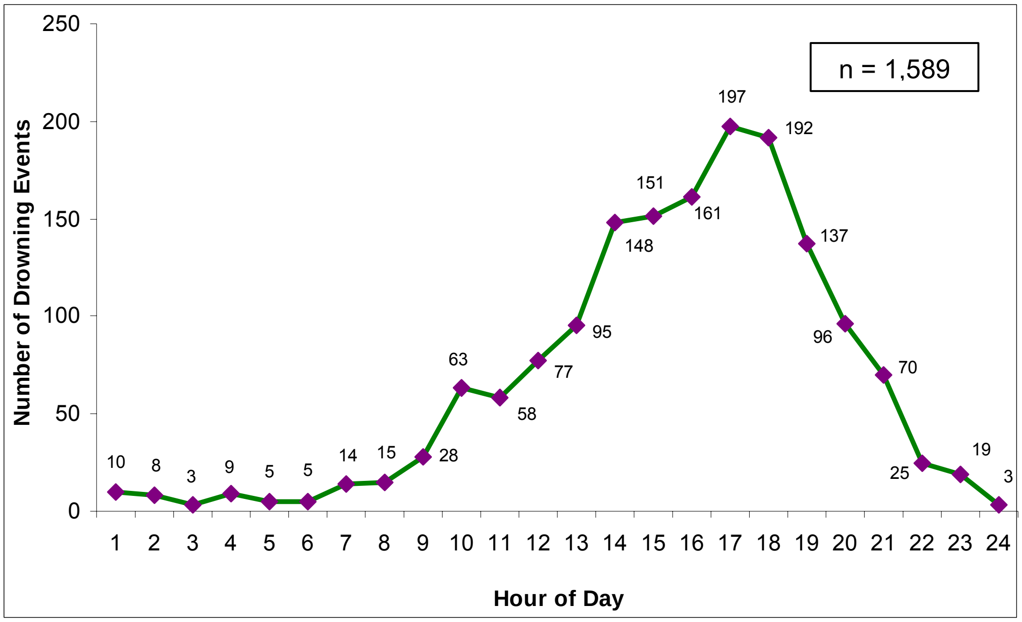
There are peak times for drowning that occur across age and location –the early summer months (May, June, July), daily from 2-7 p.m., and most often on weekends. It is important to note that

Figure 2. Texas drowning events by age and location, 2000-2004



n = 1149 children (<15 years), 460 adults (15+years)

Figure 3. Texas drowning events by clock hour, 2000-2004



drownings occur during each hour, each day, and each month.

The most obvious common factor in drownings is that the vast majority are preventable. Barrier protections around home swimming pools (4-sided fences with self closing gates and door and pool alarms), active supervision of young children in homes with pools or whenever around water, and following the accepted boating and water safety rules would reduce the number of Texas drownings.

Prepared by the Environmental and Injury Epidemiology and Toxicology Branch, (800) 588-1248

The Texas Hazardous Substances Emergency Events Surveillance System

Introduction

Under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the Texas Department of State Health Services (DSHS) conducts surveillance of emergency spills and air releases involving hazardous chemicals. These chemical events are considered emergencies because they are uncontrolled, illegal, or require immediate cleanup. Since 1993, the Texas Hazardous Substances Emergency Events Surveillance System (TxHSEES) has contributed information on the public health impacts of hazardous substances released in Texas.

Methods

TxHSEES receives information about these events from state and federal agencies, local fire department hazardous materials units, hospitals, industry, and primary responsible parties. A HSEES event is an uncontrolled or illegal acute release of any hazardous substance (except petroleum when petroleum is the only substance released), in any amount for substances listed on the HSEES Mandatory Chemical Reporting List or, if not on the list, in an amount greater than or equal to 10 lbs or 1 gallon. Threatened releases of qualifying amounts (any amount if on the HSEES Mandatory Chemical Reporting List or, if not on the list, in an amount greater than or equal to 10 lbs or 1 gallon) will be included if the threat led to an action (e.g., evacuation) to protect the public health. Information about these releases is collected in a standardized database and includes date, time, and location of event; type of industry; contributing factors; substance released; type of injuries; persons injured (employees, first responders, the general public); evacuations; and emergency decontaminations. Since 1993, the TxHSEES Program has investigated more than 32,000 events meeting the case definition.

Results

In 2006, TxHSEES investigated 2,069 hazardous substances emergency events meeting the case definition. Of these events, 1,596 (77.1%) occurred in fixed facilities and 473 (22.9%) were transportation-related events. The majority of releases occurred along the Texas Gulf Coast. **Table 1** shows the 10 most frequently spilled or released chemical substances in2006. **Table 2** shows the number of substances involved, by substance category and type of events.

A total of 378 persons were injured during 80 events. Eighty-six percent of the victims were injured in fixed-facility events and 14% were injured in transportation-related events. In 2006, 69% of those injured were employees, 29% were members of the general public, and 2% were emergency responders. Over four fifths (84%) of those injured were male and the median age of those injured was 36 (range <14 – 71) years. Among the 378 people who were injured, 20 (5.3%) were admitted to a hospital and 5 (1.3%) died either at the scene or after arrival at the hospital. Two deaths involved employees who died from hydrogen sulfide exposure while adding sulfuric acid to neutralize

Table 1. Most frequently released substances

Rank	Chemical	Number	Percent*
1	Vinyl Chloride	104	4.9
2	Paint or Coating or Paint NOS**	97	4.6
3	Ammonia	63	3.0
4	Benzene	59	2.8
5	Sulfuric Acid	44	2.1
6	Ethylene	37	1.7
7	Sodium Hydroxide	36	1.7
8	Hydrochloric Acid	35	1.7
9	Propylene	32	1.5
10	Mix: Hydrogen Sulfide/Sulfur Dioxide	26	1.2

*The number of substances (n=2,115) is greater than the number of events (n=2,069), since an event may have more than one substance released.
**NOS = Not Otherwise Specified.

waste inside processing equipment. The method the plant was permitted to use released the toxic gas and the employees were not using appropriate respiratory protection.

Three people died in 3 separate vehicle accidents involving 2 rollovers and 1 collision. In one event, the driver died from injuries and thermal burns when his trailer rolled over an embankment and caught fire. The trailer was carrying compound resin, flammable liquid not otherwise specified (NOS), organic peroxide, and paint solvents NOS. A tanker driver died from traumatic injuries when his propane tanker rolled over. Although the propane was not released, the road was closed and 40 people (including 30 from a day care facility) were evacuated. A third driver died from injuries in a head-on collision between a liquid nitrogen tanker, a pickup truck, and a third vehicle. Three additional people suffered traumatic injuries in this event, were transported to the hospital, treated, and released.

Table 3 shows the types of injuries sustained in both fixed-facility and transportation events. Overall, respiratory irritation was the most commonly reported injury. Of the 303 reports of respiratory irritation, 275 (90.8%) occurred in fixed-facility events and 28 (9.2%) occurred in transportation events. Employees and employee-responders (205) reported the greatest numbers of respiratory irritation, followed by members of the public (93). Eye irritation was the second most frequently reported injury; members of the public and students were the largest groups reporting eye irritation. For responders, respiratory irritation, followed by chemical burns and skin

Table 2. Number of substances involved, by substance category and type of event, 2006

	Type of event					
	Fixed facility		Transportation		All events	
Substance category	No. substances	%	No. substances	%	No. substances	%
Acids	61	3.8	88	17.7	149	7.1
Ammonia	51	3.2	12	2.4	63	3.0
Bases	18	1.1	41	8.2	59	2.8
Chlorine	20	1.2	6	1.2	26	1.2
Formulations	2	0.1	0	0.0	2	0.1
Hetero-organics	6	0.4	12	2.4	18	0.9
Hydrocarbons	16	1.0	6	1.2	22	1.0
Mixture*	727	45.1	24	4.8	751	35.6
Other†	21	1.3	31	6.2	52	2.5
Other inorganic substances‡	123	7.6	17	3.4	140	6.6
Oxy-organics	35	2.2	27	5.4	62	2.9
Paints and dyes	25	1.5	89	17.9	114	5.4
Pesticides	26	1.6	16	3.2	42	2.0
Polychlorinated biphenyls	6	0.4	1	0.2	7	0.3
Polymers	109	6.8	27	5.4	136	6.4
Volatile organic compounds	367	22.8	101	20.3	468	22.2
Total¶	**1613**	**100.1**	**498**	**99.99**	**2111**	**100.0**

* Substances from different categories that were mixed or formed from a reaction before the event.
† Not belonging to one of the existing categories.
‡ All inorganic substances except for acids, bases, ammonia, and chlorine.
¶ Of a total of 2,115 substances, 4 were excluded because they were not assigned a substance category. Of these, 1 substance was released in a fixed facility and 3 were released in transportation events. Percentages do not total 100% because of rounding.

irritation, were the most frequently reported injuries.

The largest number of injuries was associated with a sulfuric acid release in a refinery. The pump used for the transfer job was inadequate and failed causing a storage tank to over pressure releasing a cloud of sulfuric acid. This event resulted in 109 reports of respiratory irritation, a 4-hour evacuation of 1,307 people, and a shelter-in-place order for the surrounding neighborhoods and schools.

Evacuations were ordered in 51 (2%) events involving more than 5,289 people. The estimated number of people who left their homes, schools, or places of business ranged from 1 to 2,000 per event. More evacuations were ordered for fixed-facility events (42) than for

Table 3. Distribution of injuries by type of event

	Fixed-facility Events Number of Injuries (%)			Transportation Events Number of Injuries (%)			All Events Number of Injuries (%)
Type of Injury	Employees & Employee Responders	General Public	Responders	Employees & Employee Responders	General Public	Responders	Total*
Burns - Chemical	14 (4.8)	3 (1.6)	2 (33.3)	7 (14.6)	0	0	26 (4.7)
Dizziness or other CNS**	9 (3.1)	3 (1.6)	0	0	1 (12.5)	0	13 (2.4)
Eye Irritation	22 (7.5)	86 (44.8)	1 (16.7)	3 (6.3)	1 (12.5)	0	113 (20.5)
Headache	12 (4.1)	0	0	0	0	1 (16.7)	13 (2.4)
Heart Problems	1 (0.3)	0	0	0	0	0	1 (0.2)
Nausea/ Vomiting	2 (0.7)	6 (3.1)	0	0	0	0	8 (1.4)
Respiratory Irritation	182 (62.3)	91 (47.4)	2 (33.3)	23 (47.9)	2 (25.0)	3 (50.0)	303 (54.9)
Shortness of Breath	18 (6.0)	0	0	0	0	0	18 (3.3)
Skin Irritation	15 (5.1)	3 (1.6)	0	4 (8.3)	0	2 (33.3)	24 (4.3)
Trauma	14 (4.8)	0	1 (16.7)	11 (22.9)	4 (50.0)	0	30 (5.4)
Other	3 (1.0)	0	0	0	0	0	3 (0.5)
Total†	292 (99.7)	192 (100.1)	6 (100.0)	48 (100.0)	8 (100.0)	6 (100.0)	552 (100.0)

transportation events (9). Ammonia releases accounted for 19% of the events with ordered evacuations, the highest for any chemical. Approximately 514 people were evacuated as a result of ammonia releases.

Conclusion

The hazardous substances emergency events surveillance system is used to identify risk factors related to events associated with morbidity and mortality. When risk factors are identified, materials are developed to educate manufacturers and transporters of hazardous substances, local emergency planning committees, first responders, firefighters, hazardous materials units, medical personnel, and the public. The goal of these educational efforts is to provide information to reduce future injuries and deaths.

Prepared by the Environmental and Injury Epidemiology and Toxicology Branch, (512) 458-7269, http://www.dshs.state.tx.us/epitox/hsees.shtm

Traumatic Brain Injuries in Texas, 2004 —EMS/Trauma Registry Hospital Data Report

Background

A Traumatic Brain Injury (TBI) is an acquired injury to the brain, including concussions and other anoxic brain injuries. The term does not include brain dysfunction caused by congenital or degenerative disorders or birth trauma.

Chapter 92 of the Health and Safety Codes specifies TBIs as reportable conditions, however the ICD-9 diagnostic codes for TBIs due to anoxia during a near-drowning event (348.1 and 994.1) fall outside of the range currently collected by the Registry.

Reporting by acute care hospitals in Texas for 2004 is roughly estimated to be 57% statewide. Patients who expire prior to arriving at a hospital after sustaining a TBI might not be included in these data. The reporting period closes before many hospitals have time to enter their billing information.

Methods

Data analysis of EMS/Trauma Registry data was conducted for injury reports containing ICD-9 codes 800.0-801.9 (fracture of the skull), 803.0-804.9 (other and multiple skull fractures) and 850.0-854.1 (concussion, contusion, intracranial hemorrhage following injury, intracranial injury of other or unspecified nature), which identify traumatic brain injury (not including anoxia from drowning, 348.1 or 994.1). Numbers in this report represent the numbers of hospitalizations and not the number of individuals.

Results

A total of 18,181 TBI cases were reported to the EMS/Trauma Registry for 2004. Of these, 67% or twice as many (12,255) occurred in males compared to 33% for females (5,921). The age group reported most frequently for TBI (12.3% or 1,842) included those 75 years of age and older (**Figure 1**). Adolescents 15 to 19 years of age experienced the next highest percentage of TBI at 1,708 (11.4%), and the 20 to 24 year of age group accounted for 1,616 (10.7%) of TBI cases. The next highest group was infants 4 years of age or younger, at 1,389 (9.2%) of TBI cases.

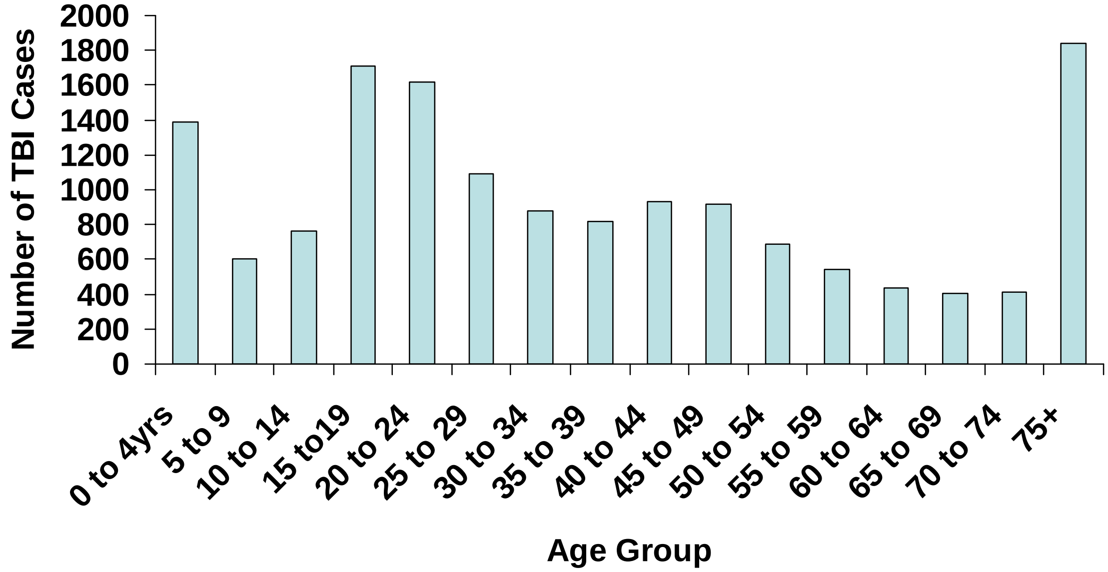
The race and ethnicity for TBI cases reported to the Texas EMS/Trauma Registry for 2004 included 10,025 (55%) White, 5,786 (32%) Hispanic, 1,793 (10%) African-American, and 533 (3%) other races (**Figure 2**).

Overall, the majority (56%) of the 2004 reported events resulted in patients being discharged to their home (10,140), while 2,533 (14%) were discharged to an acute care facility, 1,285 (7%) were discharged to a rehabilitation facility, 567 (3%) were discharged to a nursing home facility, and less than 101 (1%) were discharged to a residential facility. There were 1,568 (9%) persons discharged to an unknown or missing destination, less than 135 (1%) 135 leaving against medical advice (AMA), and 380 (2%) being discharged to some other type of facility. A total of 1,472 (8%) died.

Most 2004 TBI cases reported to the Texas EMS/Trauma Registry were expected to make a full recovery (**Figure 3**). The condition at discharge was listed for 8,391 (48%) persons as

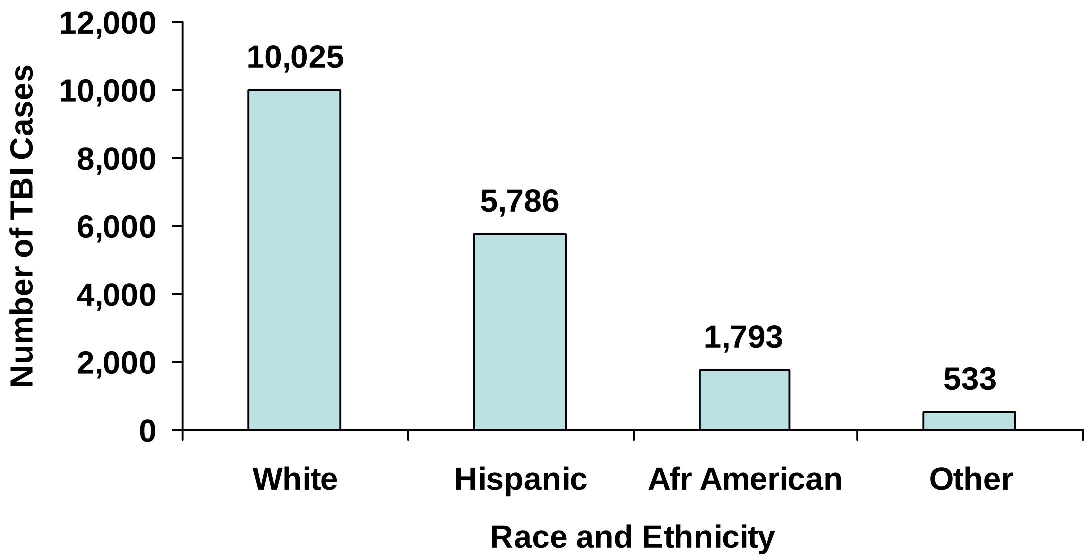
(Continued ☞)

Figure 1. Traumatic brain injuries by age, reported to Texas EMS/Trauma Registry, 2004 (n=15,034*)



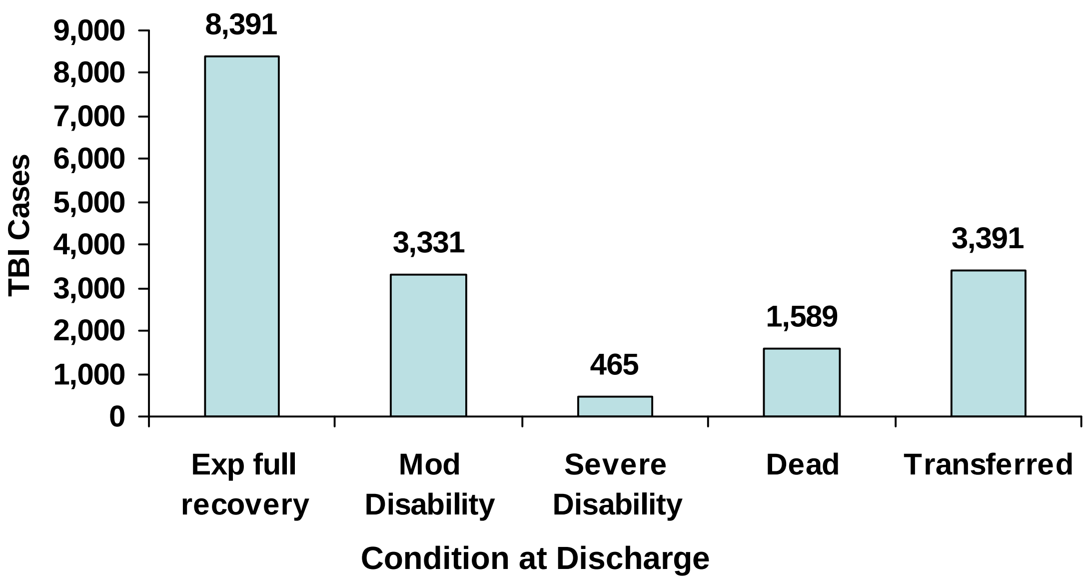
*3,147 missing age

Figure 2. Traumatic brain Injury (TBI) by race and ethnicity reported to the Texas EMS/Trauma Registry, 2004 (n=18,089*)



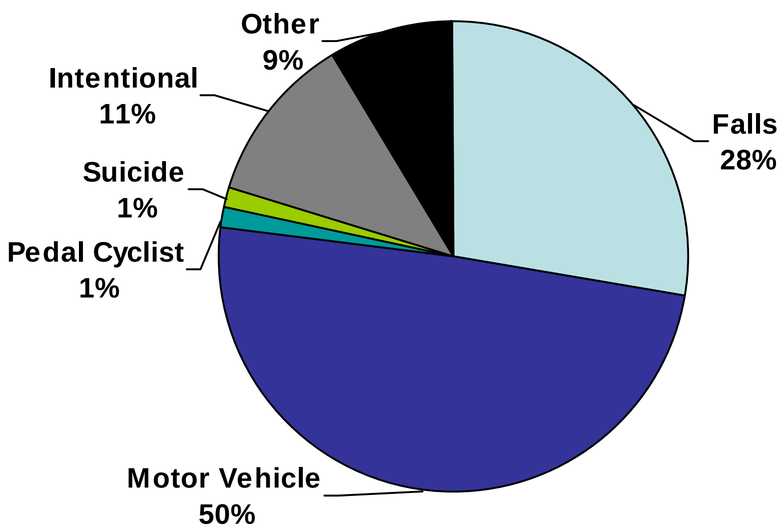
*92 missing race

Figure 3. Traumatic Brain Injury and Patient Condition at Discharge, Texas EMS/Trauma Registry, 2004 (n=17,167*)



*1,014 missing condition at discharge

Figure 4. Traumatic Brain Injury by Leading Cause of Injury, Texas EMS/Trauma Registry, 2004 (n=18181)



"alive, expect full recovery," for 3,331 (18%) the prognosis was "alive, expect moderate recovery," while 465 (3%) were listed as "alive, expected severe disability," and 1,589 (9%) were reported dead overall. An additional, 3,391 (19%) patients were transferred at discharge to another health care facility and 1,014 (5%) were missing, as no data was reported for this variable.

There were differences in patient discharge and destination for different racial and ethnic groups. Among White TBI patients (9, 595), the majority 5,118 (53%) were discharged home, while 1,455 (15%) were discharged to an acute care facility, 857 (9%) were discharged to a rehab facility, 393 (4%) to a nursing home facility, 61 (1%) were discharged to a residential facility, 979 (10%) were discharged AMA, unknown or other, and 780 (8%) were discharged to a morgue or funeral home. The discharge destination was not reported for 430 TBI events involving White patients. Among Hispanic TBI patients (5,648), the majority, 3,697 (65%) were discharged home, 782 (14%) were discharged to an acute care facility, 275 (5%) were sent to a rehabilitation facility, 130 (2%) to a nursing home, 27 (less than 1%) to a residential facility, 258 (5%) were discharged AMA, unknown or other, and 479 (8%) were discharged to a funeral home or morgue. The discharge destination was not reported for 138 TBI events involving Hispanic patients. Among African American TBI patients (1,688) the majority, 981 (58%) were discharged home, while 211 (13%) were sent to an acute care facility, 106 (6%) to a rehabilitation facility, 32 (2%) were sent to a nursing home facility, less than 5 (1%) to a residential facility, 184 (11%) were discharged AMA, unknown or other, and 165 (10%) were discharged to a morgue or funeral home. The discharge destination was not reported for 105 African American patients. Overall, 92 events were reported with no discharge destination designation.

The condition at discharge for each racial and ethnic group is described in **Table 1**. Death was reported to a larger extent, 180 (11%) among African Americans (1676), compared to White deaths, 868 (9%), Hispanic deaths, 492 (9%), or Other race/ethnicity TBI-related deaths, 44 (9%). A total of 9417 White, 5584 Hispanic, and 475 Other race/ ethnicity events were reported for these outcome conditions. Likewise, African Americans were more likely to be transferred to an acute care or rehabilitation facility, 364 (22%) than White, Hispanic or Other racial and ethnic groups, 1849 (20%), 1060 (19%), or 89 (19%), respectively. Moderate recovery (2033) or severe disability (304) was reported more frequently among White TBI events (22% and 3%, respectively) or Other groups, 14 (3%) for severe disability. A higher percentage of Hispanic TBI events reported an outcome of full recovery (53%). Overall, 92 events were reported with no condition specified.

TBI deaths by age groups also varied within different racial and ethnic groups. Deaths for those 75 years of age and older were

Table 1. TBI discharge condition and race and ethnicity

Discharge Condition	White	Hispanic	African American	Other
Full recovery	4,315 (46%)	2,982 (53%)	805 (48%)	248 (52%)
Mod recovery	2,033 (22%)	930 (17%)	277 (17%)	83 (17%)
Severe disability	304 (3%)	109 (2%)	38 (2%)	14 (3%)
Transferred	1,849 (20%)	1,060 (19%)	364 (22%)	89 (19%)
Deceased	868 (9%)	492 (9%)	180 (11%)	44 (9%)

reported most frequently for White TBI events, 200 (27%), compared to Hispanics, 50 (13%), and African Americans, 8 (6%) in this age group. Deaths due to TBI for 4 years of age and younger were reported most frequently among African Americans, 21 (14%), followed by Hispanic, 42 (11%), and White, 21 (3%). For the adolescents, of 15 to 19 years of age, Hispanics exhibited the highest percentage of deaths, 42 (11%), whereas this age group included 65 (9%) of White and 8 (6%) of African American TBI deaths. African Americans had high deaths for the 20 to 24 years of age group, 20 (14%) also, while this age group represented only 62 (8%) of White and 37 (9%) of Hispanic TBI deaths.

The contributing causes of injury for a TBI included 8,947 (50%) for motor vehicle collisions, 5,052 (28%) for falls, 2,088 (11%) from intentional injuries, 268 (1%) from pedal cyclist injuries, 252 (1%) from suicide/intentional self-harm, and 1574 (9%) from other or undetermined causes (**Figure 4**). The average length of hospital stay for TBI incidents was 17 days, with range up to 374 days. The average reported cost per TBI patient to the Texas EMS/ Trauma Registry was $43,052, not including secondary rehabilitation facilities or physician fees. However, the cost for 3,636 (20%) of the incidents was unknown. The reported range of cost billed by the hospital for a TBI injury in 2004 was from $0 to $133,432 per incident. The total of all Texas TBI hospital charges billed was $402,965,095.

Public Health Implications

The numbers presented in this report underestimate the true burden that traumatic brain injuries incur. The long-term costs, impact and outcome for TBI patients is unknown and so is the true impact of TBI injuries in Texas. Although the majority of patients were able to be discharged home within 2 weeks (52%), some TBI injuries required extreme medical resources. More preventive effort for all causes of TBI injury is needed to improve these statistics.

Prepared by the Texas EMS/Trauma Registry, (800) 242-3562, Environmental Epidemiology and Injury website: http://www.dshs.state.tx.us/injury/, TBI Council: http://www.dshs.state.tx.us/braininjury/default.shtm, (512) 458-7266

Traumatic Spinal Cord Injuries, 2004

Introduction

A traumatic spinal cord injury is defined as an acute, traumatic lesion of the neural elements in the spinal cord, resulting in temporary or permanent sensory deficit, motor deficit, and/or bladder or bowel dysfunction. The annual incidence of spinal cord injury (SCI), not including those who die at the scene of the accident, is approximately 40 cases per million population in the United States, or approximately 11,000 new cases each year (Spinal Cord Injury Information Network, 2006). These injuries are particularly devastating due to:

- The permanent nature of most injuries
- The relatively young age of most victims
- The high costs of both acute and long-term care

Traumatic SCIs have been a reportable condition in Texas since 1994. Physicians and hospitals are required to report such injuries to the Texas Department of State Health Services (DSHS). Physicians and hospitals meet their reporting requirements by submitting data to the Texas EMS/Trauma Registry. Reports may be entered into the on-line reporting system or electronically downloaded into this system. Information collected in the registry includes items such as demographic data, etiology, intentionality, level and extent of injury, use of restraints or helmets, and discharge status.

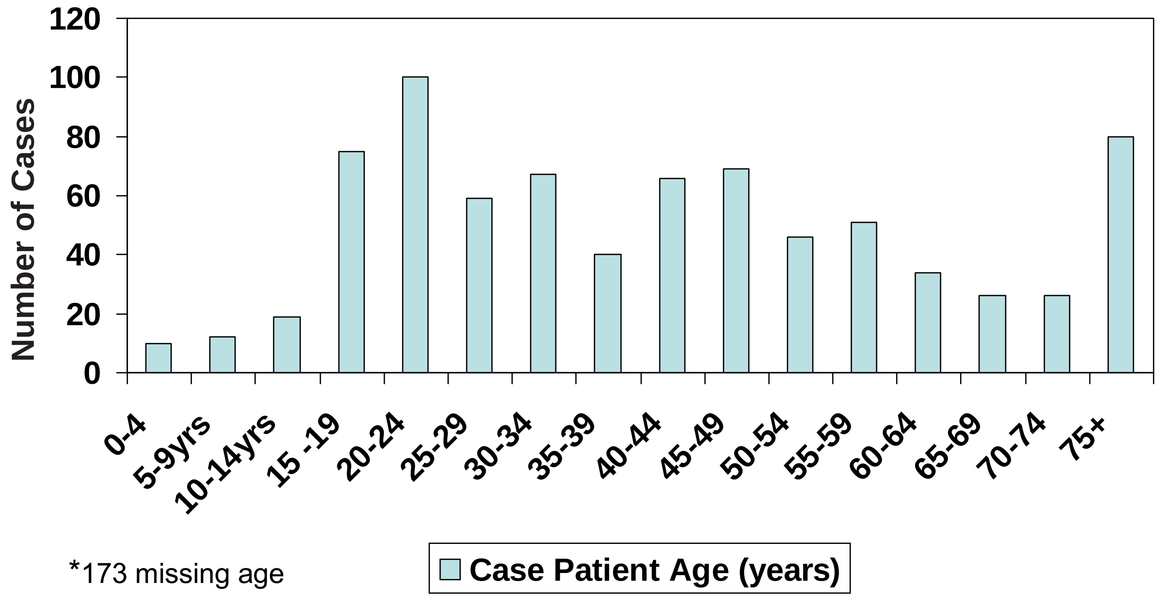
Methods

SCIs are identified for data analysis using International Classification of Disease – ICM-9 codes 806.0 to 806.9 (fracture of vertebral column with spinal cord injury) and 952.0 to 952.9 (spinal cord injury without evidence of spinal bone injury). This report uses 2004 data, which are the most recent available data.

Results

In 2004 there were 953 new cases of SCI among Texas residents reported to the EMS/Trauma Registry. Over twice as many males, 683 (72%), as females, 270 (28%), sustained a SCI. The ages of persons ranged from 6 months to 103 years. One hundred (13%) SCIs were reported for persons 20 to 24 years of age, 80 (10%) occurred in persons 75 years of age and older, and 75 (10%) were reported for persons 15 to 19 years of age (**Figure 1**). People 45 to 49 years of age accounted for 69 (9%) of SCIs, followed by those 30 to 34 years of age, 67 (9%), and 40 to 44 years of age, 66 (9%). The 25 to 29 years of age group accounted for 59 (8%) of the SCIs reported. The 55 to 59 years of age group accounted for 51 (7%) of the SCIs, while the 50 to 54 years of age group accounted for 46 (6%) of the SCI incidents. Forty (5%) SCIs were reported for persons 35 to 39 years of age and 34 (4%) for those 60 to 64 years of age. The 65 to 69 years of age group and the 70 to 74 years of age group each accounted for 26 (3%) of the SCIs, while the younger age groups represented the lowest percentages of

Figure 1. Number of Texas spinal cord injuries reported to the EMS/Trauma Registry, by age group, 2004 (n=780*)



*173 missing age

SCIs (2% or 19 for the 10 to 14 years of age group and slightly over 1% for each of the 5 to 9 years of age group (12) and the infant to 4 years of age group, 10). There were 173 cases (19%) for whom age was not provided; thus the total number of cases with age reported was 780.

The racial and ethnic distribution of SCI cases in Texas for 2004 was 555 (58%) White, 225 (24%) Hispanic, 149 (16%) African American, and 22 (2%) other (**Figure 2**). Two cases from 2004 are missing the race. These data are similar to national data, except that nationally the percentage of Hispanic cases is lower than for Texas.

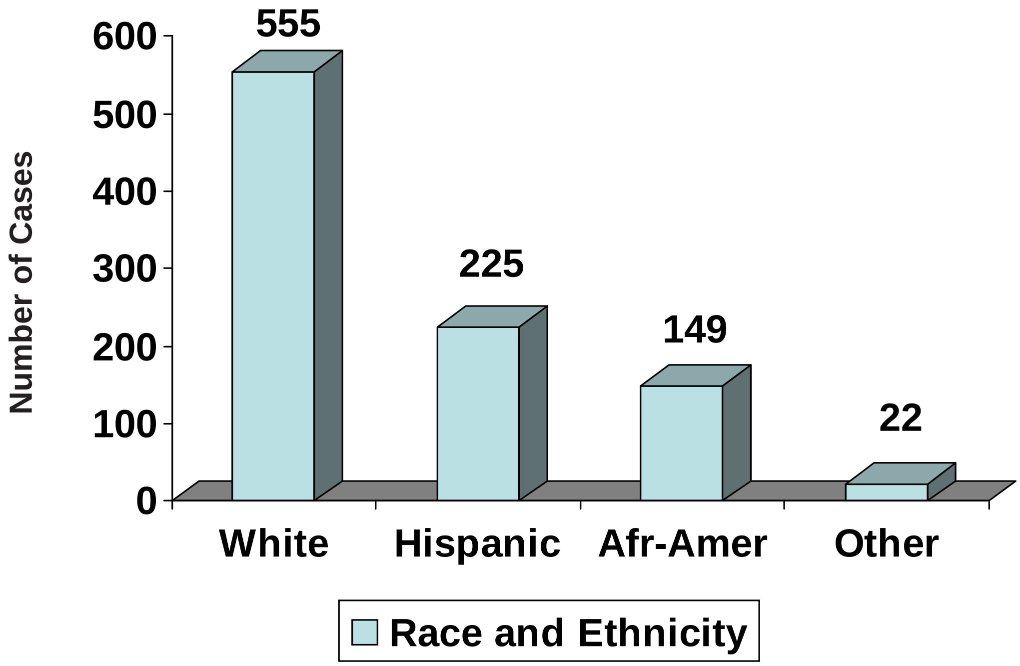
Eight hundred sixty-seven SCIs (91%) occurring in 2004 were unintentionally caused. As shown in **Figure 3**, the most frequent cause of SCIs was motor vehicle-related incident, 457 (48%), followed by falls, 286 (30%). There were 48 (5%) injuries resulting from being struck by an object or machinery. Other vehicles accounted for 38 (4%) of SCIs. Other non-intentional injuries accounted for 38 (4%) of the SCIs.

Sixty-three percent (195) of all motor vehicle related SCIs (307) occurred to persons 15 to 49 years of age. Forty persons 20 to 24 years of age exhibited the highest percentage (13%) of motor-vehicle related SCIs, followed by the 40 to 49 years of age group at 34 (11%). Persons 25 to 29 years of age represented 30 (10%) of motor vehicle related SCIs, and 28 (9%) of motor vehicle-related SCIs occurred to the 30 to 34 year old age group. Of the fall-related SCI injuries (202 with age also), the most frequently reported occurrence was for persons 65 years of age and older, 49 (24%). Persons 55 to 59 years of age accounted for 17 (8%) of fall-related SCIs.

Intentional injuries accounted for 86 (9%) of the reported SCIs. Firearms were used in 57 (6%) of the intentional SCIs. Suicide attempts accounted for 9 (1%) of intentional SCIs, while 27 (3%) were other intentional injuries. None of the SCIs had a non-identified cause.

(Continued ☞)

Figure 2. Texas spinal cord injuries by race and ethnicity, EMS/Trauma Registry data, 2004 (n=951*)



*2 race or ethnicities are missing

Figure 3. Texas spinal cord injuries by injury cause, EMS/Trauma Registry 2004 Hospital data (n=953)

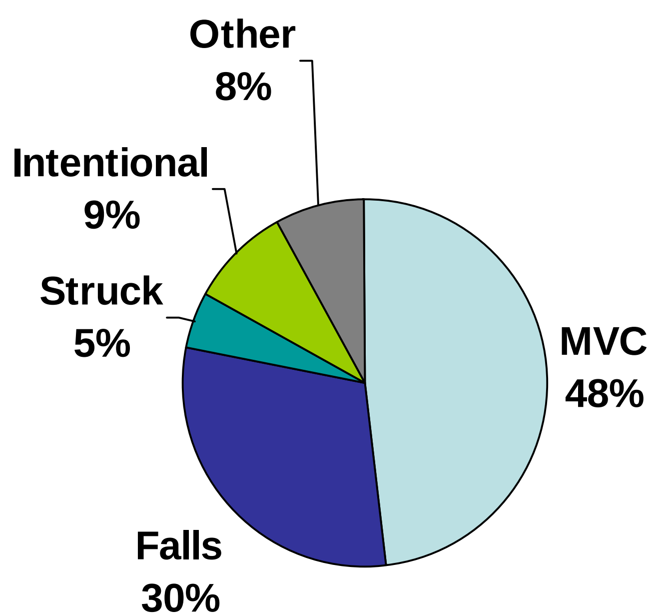
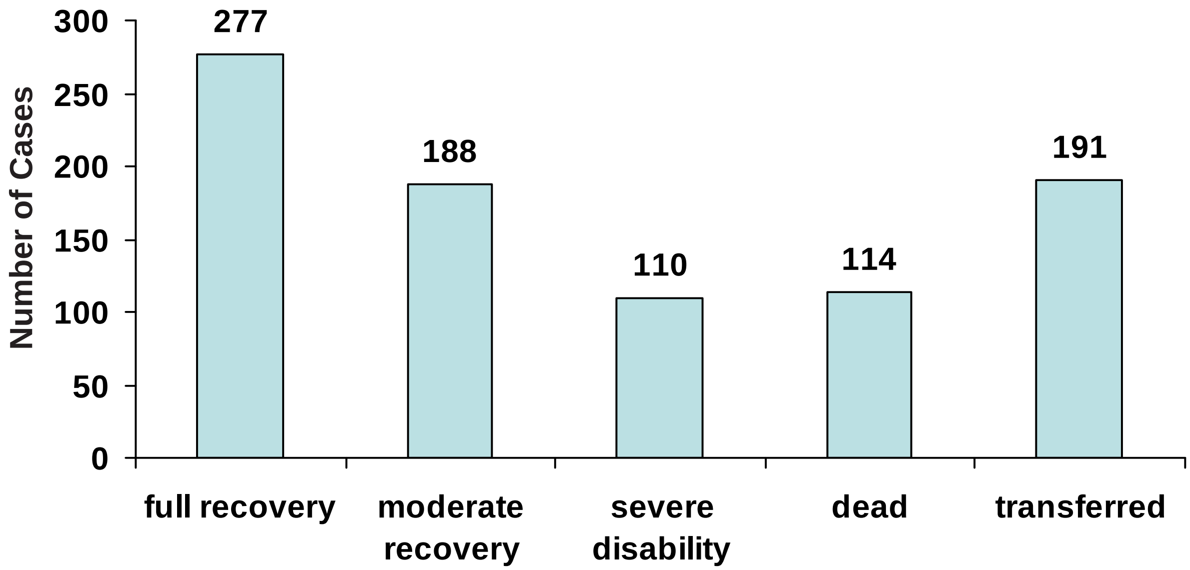


Figure 4. Condition at discharge, EMS/Trauma Registry Hospital data, spinal cord injuries, Texas: 2004 (n=953)



Among 138 SCIs patients who were tested for blood alcohol level, 111 (80%) were found to have a blood alcohol level above the statutory level of intoxication (blood alcohol content >= 0.08 mg/dL). Eighty seven percent of patients who were legally intoxicated were male. Nine persons who were legally intoxicated (8%) were under the legal drinking age of 21 years.

Four hundred eighty six (51%) of SCI patients had a hospitalization of 6 days or less. Seven hundred fifteen (75%) of SCI patients were hospitalized 2 weeks or less, while 810 (85%) were hospitalized 3 weeks or less. The range of days spent in the hospital for SCIs was from 0 to 156. The condition or transfer at discharge (**Figure 4**) for SCI incidents included 277 (31%) classified as “alive, expect full recovery,” 188 (21%) “alive, expect moderate recovery,” 110 (13%) “alive, expect severe disability,” 191 (22%) transferred to another facility, and 114 (13%) died. There were 73 reported cases missing condition status. Of the more serious injuries incurred, 62 events resulted in quadriplegia and 170 events represented paraplegia cases.

As for the destination that patients were discharged to, 288 (32%) were discharged to their home, 146 (16%) were discharged to an acute care facility, 260 (29%) to a rehabilitation facility, 36 (4%) to a nursing home or skilled care facility, 24 (3%) to some other facility, 106 (12%) to a morgue or funeral home (deceased), and 46 (5%) to an unknown destination (47 were missing a destination).

EMS/Trauma Registry data on cost incurred per incident were available for 732 (77%) of 2004 SCI cases. The average cost per traumatic SCI incident was over $94,141. in acute care costs; this does not include rehabilitation hospital costs nor physician fees. The cost range was $0 to $1,272,069 and the total cost for those 732 SCI cases with known costs was $68,628,970. If the average cost were applied to all SCI patients, the total cost would exceed $89 million dollars.

Public Health Implications and Conclusions

SCIs are often lifelong disabling conditions that often affect the younger populations and are very disabling. Currently, the main long-term causes for loss of life after an SCI involve septicemia, pneumonia, or pulmonary emboli (Spinal Cord Injury Information Network, 2006).

Although treatment and technology has improved, better preventive methods for reducing SCIs are needed. Education concerning prevention of motor vehicle-related injuries should be directed to the highest risk age groups, those 15 to 49 years of age, as described above. Concomitantly, education concerning fall-related injuries should directed to persons 75 years of age and above to reach the persons at highest risk of these debilitating SCI injuries.

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Prepared by the Texas EMS/Trauma Registry, (800) 242-3562, (512) 458-7266; Environmental Epidemiology and Injury Surveillance Group website address: http://www.dshs.state.tx.us/injury/.

Prepared by the Texas EMS/Trauma Registry, (800) 242-3562

A podcast of this epidemiologic investigation is available at: http://www2a.cdc.gov/podcasts/player.asp?f=6391

Wildfire-related Mortality —Panhandle, March 12-20, 2006

Introduction/Background

During March 12 - 20, 2006, wildfires burned approximately 1 million acres in the Texas Panhandle. The two largest fires, which spread to 9 counties, were caused by power lines downed by sustained winds of 46 mph, with gusts up to 53 mph. The wildfires destroyed more than 89 structures and five vehicles, with estimated losses in excess of $16 million. The fires caused the evacuation of 8 areas with a cumulative total population of 4,072 (1). This report summarizes the findings of an epidemiologic investigation of the 12 human deaths associated with the wildfires.

Methods

Case finding focused on interviews with local emergency management officials, justices of the peace and highway safety officials, in addition to a review of local newspapers which covered the wildfires. Detailed information on each decedent (e.g., cause of death and age) was provided by the Texas Department of State Health Services Bureau of Vital Statistics. A case was defined as any death, directly or indirectly, associated with the wildfire among civilians or firefighters (volunteer or paid) between March 12 - 20, 2006. A directly-related death was defined as one resulting from direct contact with the wildfire or wildfire products (e.g., smoke, superheated air). An indirectly-related death was defined as one for which the decedent had indirect contact with the wildfire products (e.g., automobile crash resulting from low visibility caused by smoke).

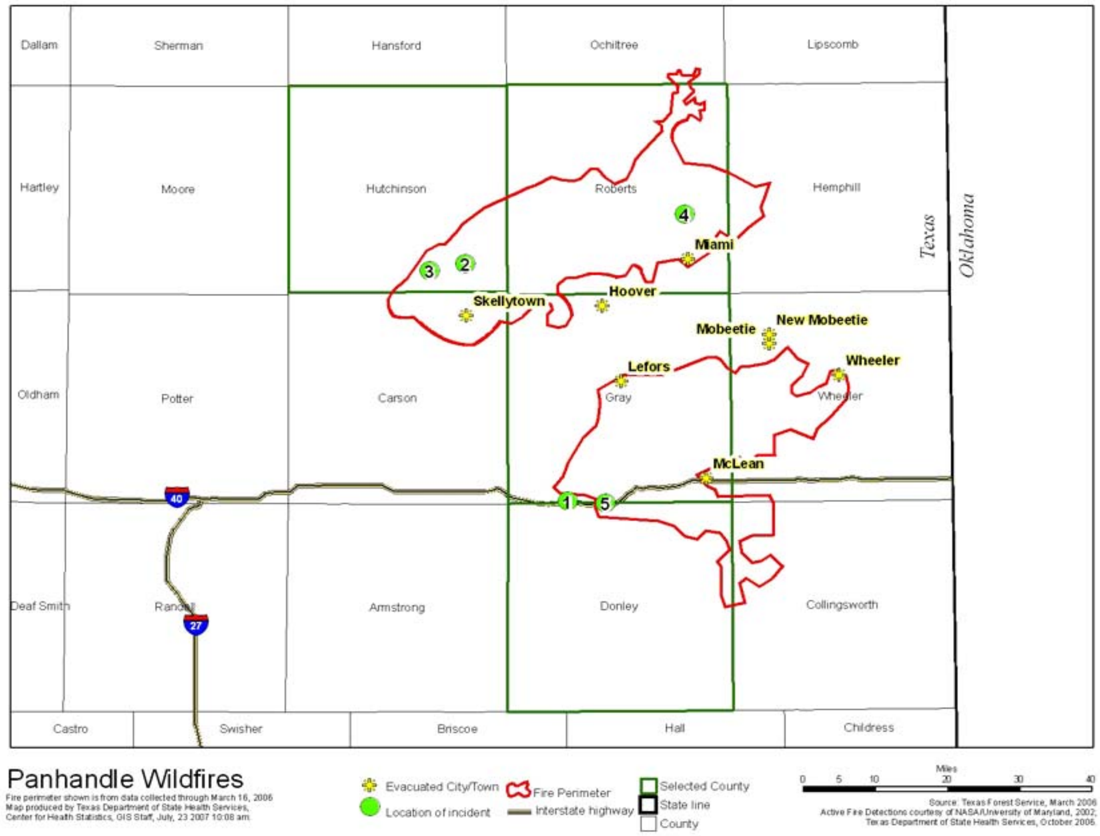
Results and Interpretation

Twelve deaths were considered directly or indirectly related to the wildfire (7 directly and 5 indirectly). Decedents ranged in from 14 to 94 years of age; the median age was 48 years. Eight of the decedents were males. Eleven of the victims were civilians who died on March 12. The twelfth victim was a volunteer firefighter involved in responding to the wildfires who sustained serious injuries on March 12 and died 27 days later.

Injury exposure for all 12 decedents occurred in 4 rural counties within an estimated 45-mile radius (**Figure 1**) and occurred on March 12, 2006 between 1:30 p.m. and 7:00 p.m.

The deaths occurred in 5 separate incidents. Three of the 5 incidents involved multiple deaths, including 2 incidents in which 4 people died and one in which 2 people died. The 5 incidents included: 1) four individuals died as a result of a 9-car collision on a major interstate highway caused by reduced visibility due to smoke from the wildfires *(see* **Figure 2** *- an example of reduce visibility on roadway due to blowing ash, smoke, and sand/dirt*); 2) 2 individuals died when they were overcome by the advancing wildfires as they were leaving a residence; 3) an elderly man died in his home when he refused attempts by local responders to evacuate him; 4) four oil rig individuals driving to work in a remote location were trapped and overcome by the wildfires; and 5) a volunteer firefighter sustained fatal injuries when the water truck he was driving turned over and rolled down a 60-

Figure 1. Location of death incidents by county



foot deep ravine while he was responding to the wildfires.

The manner of death for all decedents was classified as "accidental." The immediate cause of death for eight (67%) of the decedents was smoke inhalation. The listed underlying cause for 4 of these 8 decedents was superheated air from grass wildfires. The immediate cause of death for 4 (33%) of the decedents was blunt force trauma and complications due to injuries sustained in an automobile accident, with the underlying cause listed as vehicular accident or collision.

Discussion/Public Health Implications

In response to the wildfires in the Panhandle, regional and state public health preparedness staff at the Texas Department of State Health Services activated mortality surveillance and initiated an investigation to describe the epidemiology of deaths associated with the disaster, which was consistent with an all-hazards approach. The findings were used to quantify the extent of mortality related to the wildfires and to recommend prevention measures.

Conditions in the Panhandle were ideal for grassfires; the area had been in a drought for 11 months and under extremely critical drought conditions for 5 months. The National Weather Service Storm Protection Center issued an *Extremely Critical Fire Danger* warning for March 8, 10, 11, and 12, 2006.

Wildfires can spread rapidly and, even in rural, relatively sparsely populated areas, multiple fatalities can occur within a very short period of time. This is illustrated by the 5 incidents described

Figure 2. Photo captures reduced roadway visibility in Texas Panhandle wildfires

Clint Rollins, USDA Natural Resources ConservationService

above in which the injury exposures for all 12 decedents were clustered in time (within 7 hours of the start of the fire) and place (within an estimated 45-mile radius).

The findings in this report are subject to at least 2 limitations. First, although cases were identified through multi-source case finding efforts, it is possible that some deaths directly attributable to the wildfires were missed. Second, due to the limited and focused time frame of the investigation, some post-wildfire deaths may have occurred outside of the study period, particularly those indirectly attributable to the wildfires.

These wildfires were the largest and deadliest in Texas' history. The 11 civilian deaths were the most attributed to wildfires in the United States since 2003.

All wildfire-related deaths are potentially preventable. Preparedness and disaster planning are essential to reducing the health impact of wildfires. There are proven effective methods that homeowners and responders can take to protect home and property to create "defensible spaces," but these need to be instituted before a wildfire starts.

Steps to take to protect a home from wildfires include keeping all combustibles, such as firewood and dead vegetation away from structures, and clearing roof surfaces and gutters regularly to avoid build up of flammable materials such as leaves and other debris.[2]

Wildfire prevention messages have been developed and are available for use from the Texas Forest Service, United States Fire Administration, Federal Emergency Management Agency, and the United States Centers for Disease Control and Prevention (CDC).[2-5] Key messages include the importance of adhering to warning and evacuation orders, not driving through smoke on roadways, having an exit strategy and avoiding the path of the wildfire. Messages also exist for individuals caught at home, caught out in the open, and those in vehicles.[4] A comprehensive strategy addressing wildfires is provided in the United States National Fire Plan.[6]

Conclusions

Wildfires pose dangers to the public's health. Preparedness and disaster planning are essential to reducing the dangers and public health impact. Wildfires illustrate one real-life example of the type of disaster and all-hazard event to which public health must respond. To enhance public health response capacities, a recent resolution recommended, in part, that each state and territory establish and maintain expertise in disaster epidemiology.[7] Information collected from multiple fatality events can identify the circumstances contributing to loss of life. This information should be routinely collected and shared with all organizations that can help prevent deaths in future incidents.

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Prepared by Health Service Region 1 (Lubbock) and Community Preparedness Section (Austin), Texas Department of State Health Services, Texas Forest Service, and the National Center for Environmental Health, Centers for Disease Control and Prevention, (512) 458-7111, ext 6422