

DEATHS AND INJURIES DUE TO NON-FIRE BURNS

**John R. Hall, Jr.
Fire Analysis and Research Division
National Fire Protection Association**

March 2008



**National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471
www.nfpa.org**

Abstract

From 1965-1967 to 1991-1993, the number of burn injuries per year declined by nearly half, from 1,932,000 to 1,073,000. An estimated 221,200 burn injuries were reported to hospital emergency rooms in 2006. Over half were thermal burns. In 2004, 93 people died of unintentional injuries due to contact with hot objects and substances.

Keywords: Burn, injury, death, statistics, anoxia.

Acknowledgements

The National Fire Protection Association thanks the National Center for Health Statistics, which maintains the national death certificate database and the National Health Interview Survey; the National Safety Council, which publishes extensive analysis of injury-related deaths; and the U.S. Consumer Product Safety Commission, which maintains the National Electronic Injury Surveillance System (NEISS).

For more information about the National Fire Protection Association, visit www.nfpa.org or call 617-770-3000. To learn more about the One-Stop Data Shop go to www.nfpa.org/osds or call 617-984-7443.

Copies of this analysis are available from:

National Fire Protection Association
One-Stop Data Shop
1 Batterymarch Park
Quincy, MA 02169-7471
www.nfpa.org
e-mail: osds@nfpa.org
phone: 617-984-7443

NFPA No. USS55

Copyright © 2008, National Fire Protection Association, Quincy, MA

From 1965-1967 to 1991-1993, the estimated number of medically attended burn injuries per year declined by about half, from 1,932,000 to 1,073,000.

These statistics are estimated from the National Health Interview Survey (NHIS), a home in-person survey conducted and analyzed by the National Center for Health Statistics. “Medically attended” injuries are injuries that were brought to the attention of some medical professional, whether or not treatment was received. The NHIS is not subject to the problems of under-reporting that affect statistics limited to injuries reported to some authority, such as a fire department or hospital emergency room.

However, the NHIS is subject to under-reporting based on how far back respondents are asked to remember. In 2000-2003, the NHIS used a much longer recall period, which would be expected to result in more under-reporting and much lower estimates. Because of that change, it is not clear how much of the threefold decline in estimated burn injuries, from 1,073,000 in 1991-1993 to 318,000 in 2000-2003, is real and how much is under-reporting. (See Table 1.)

Table 1. Medically Attended Burn Injuries, by Year Group

Year Group	Injuries per Year
1965-1967	1,932,000
1980-1981	1,615,000
1985-1987	1,614,000
1991-1993	1,073,000
2000-2003	318,000*

* The recall period used in 2000-2003 was much longer than that used in previous years, and that could produce a significant reduction in estimated injuries, because memory decays at a significant rate.

Sources: *Types of Injuries, Incidence and Associated Disability, United States: July 1965-June 1967*, Series 10, No. 57, 1970; *Types of Injuries and Impairments Due to Injuries – United States*, Series 10, No. 159, 1986; *Types of Injuries by Selected Characteristics, 1985-1987*, Series 10, No. 175, 1990; advance data from John Gary Collins, U.S. Department of Health and Human Services, National Center for Health Statistics (NCHS), author of 1991-93 data analysis and previous two studies; and special analysis in private communication from Patricia Barnes, NCHS, May 1, 2006.

Males suffer more burn injuries than females, overall and relative to their shares of the population.

In 2000-2003, the male burn injury rate per million population was one-third higher than the female rate. There are no consistent differences by age of victim in total burn injury rate. Burn injury rates per 100 persons are higher for the poor but show no clear differences by race or region.

An estimated 221,200 burn injuries were reported to hospital emergency rooms in 2006.

Over half were thermal burns. Thermal burns can be caused by fire effects or by contact with hot objects such as space heaters, stove burners, or clothes irons. Emergency room burn injuries of all types generally declined from 1991 to 2006, after allowing for expansion of the data base from consumer-product-related injuries to all injuries in 2000-2001. Anoxia injuries, shown here for comparison, increased from 1991 to 1995 but have shown no clear trend since then. (See Table 2.)

Table 2. Burn Injuries Reported to Hospital Emergency Rooms

Type of Injury	1991	1992	1993	1994	1995	1996	1997	1998
Thermal burns	154,100	147,200	138,900	140,000	133,000	122,400	127,600	133,500
Scald burns	73,200	68,000	71,700	78,300	64,000	62,800	61,600	69,000
Chemical burns	33,100	31,800	28,900	29,500	27,800	25,800	27,100	30,100
Radiation burns	10,000	12,000	14,300	10,600	9,300	11,300	10,400	11,300
Electrical burns	5,800	6,100	5,700	6,000	7,100	5,300	6,300	5,500
Unknown type burns	2,800	2,500	2,700	2,700	2,000	2,400	3,500	2,600
Total burns	278,900	267,500	262,100	267,100	243,200	230,000	236,400	252,000
Anoxia	19,600	20,700	20,900	22,700	30,800	38,200	31,400	27,000
Type of Injury	1999	2000	2001	2002	2003	2004	2005	2006
Thermal burns	133,000	131,900	129,300	128,500	122,900	125,200	115,800	119,400
Scald burns	67,000	69,400	75,900	67,600	62,400	68,300	65,400	63,100
Chemical burns	30,400	28,400	29,100	25,900	23,000	21,600	20,400	21,000
Radiation burns	11,100	10,800	14,800	14,500	15,600	15,900	15,400	12,900
Electrical burns	4,600	4,800	4,600	3,900	2,900	3,600	3,600	3,500
Unknown type burns	2,100	3,300	2,900	2,700	2,200	600	1,600	1,300
Total burns	248,300	248,600	256,000	243,100	229,000	235,100	222,100	221,200
Anoxia	30,100	36,700	36,200	30,700	36,000	35,000	34,400	33,500

Notes: These are projections from a sample of U.S. hospital emergency rooms. The sample was changed in 1997, and published estimates for previous years have been adjusted by CPSC for more valid comparison with post-1997 estimates. The data base was expanded in 2000-2001 to include all injuries, not just injuries involving consumer products, and much of the increase from 2000 to 2001 may reflect that change. Anoxia is injury due to oxygen deprivation. A sample of 2003 radiation burn cases were nearly all flash burns to the eyes due to welding without the use of eye protection. Sunburn was also recorded as radiation burn. "Radiation" refers primarily to radiated heat, not to atomic radiation. Unknown-type burns estimated by author using derived scaling factor and reported sample number, for 2004 and 2006.

Source: National Electronic Injury Surveillance System (NEISS), queried on <http://www.cpsc.gov>.

In 2004, 93 people received fatal unintentional injuries from contact with a hot object or substance.

This number is down by more than half from 1980 and hot tap water accounted for the largest share (roughly one-third) of these fatal injuries in 2004. For more discussion of scald injuries involving cooking or food preparation, see Marty Ahrens et al., *Behavioral Mitigation of Cooking Fires Through Strategies Based on Statistical Analysis*, EME-2005-CA-0343, project report to U.S. Fire Administration, National Fire Protection Association, Quincy, MA, 2007. (See Table 3).

Table 3. Unintentional Injury Deaths Involving Contact with Hot Objects or Substances

A. 1980-1998

Year	Total
1980	194
1981	192
1982	154
1983	139
1984	142
1985	176
1986	134
1987	137
1988	122
1989	142
1990	131
1991	125
1992	131
1993	130
1994	107
1995	97
1996	104
1997	111
1998	108

B. 1999-2004

Hot object or substance	1999	2000	2001	2002	2003	2004
Hot tap water	51	55	57	40	26	30
Hot drink, food, fat, or cooking oil	14	6	6	8	11	9
Other hot fluid	15	17	15	15	12	8
Steam or hot vapors	5	3	2	4	5	7
Hot air or gas	2	2	4	2	2	4
Hot heating equipment, including pipes	17	10	11	18	16	14
Other hot household equipment	11	5	5	6	10	16
Other hot metal	2	4	2	1	0	1
Other or unspecified heat or hot substance	6	8	12	8	6	4
Total	123	110	114	102	88	93

Note: Corrosive substances are included. Totals for 1999-2004 are comparable to totals for 1980-1998.

Source: National Safety Council, *Accident Facts and Injury Facts*, 1981-2007 editions, 1121 Spring Lake Drive, Itasca, IL 60143; and <http://www.cdc.gov/nchs>.

Electrical current led to 384 unintentional-injury deaths in 2004, the second lowest number in the 25 years studied.

With coding changes in 1999, none of the sub-categories of electric current deaths available through 1998 can still be separately tracked. Lightning deaths, which are counted separately, also have generally declined over the past two decades and in 2004 reached their second lowest level in the 25 years studied. (See Table 4.) For more information on home fire deaths involving electrical failure or malfunction in electrical equipment, see John R. Hall, Jr., *Home Fires Involving Electrical Distribution or Lighting Equipment*, NFPA Fire Analysis and Research Division, March 2008.

Statistics are taken from the national death certificate database. External cause of injury codes W85-W87 are for deaths due to exposure to electric current and X33 is for deaths due to lightning.

Table 4. Unintentional-Injury Deaths by Electrical Current

Year	Home Equipment	Industrial Equipment	Generating Plants or Distribution	Other or Unknown	Total*	Lightning
1980	177	106	122	690	1,095	94
1981	150	120	156	582	1,008	87
1982	151	89	150	589	979	100
1983	160	70	158	484	872	93
1984	148	68	215	457	888	91
1985	146	69	196	391	802	85
1986	150	89	182	433	854	78
1987	121	64	177	398	760	99
1988	122	75	165	352	714	82
1989	143	61	143	355	702	75
1990	100	54	160	356	670	89
1991	82	74	132	338	626	75
1992	66	37	139	283	525	53
1993	82	46	142	278	548	57
1994	84	42	144	291	561	84
1995	88	26	158	287	559	76
1996	66	15	135	266	482	63
1997	53	27	139	269	488	58
1998	59	27	144	318	548	63

Year	Electric Transmission Lines	Other or Unknown	Total*	Lightning
1999	127	310	437	64
2000	99	296	395	50
2001	83	326	409	44
2002	109	322	431	66
2003	96	280	376	47
2004	94	288	384	46

* Lightning not included in total.

Note: The sub-categories used in coding changed in 1999 in such a way that only the total can be tracked over the entire period.

Sources: National Safety Council, *Accident Facts and Injury Facts*, 1981-2007 editions, 1121 Spring Lake Drive, Itasca, IL 60143, and <http://www.cdc.gov/nchs>.

Data Sources And Methodology

The national death certificate database, maintained by the U.S. National Center for Health Statistics (NCHS), is coded according to the International Classification of Diseases (ICD), which was substantially revised in 1999. These modifications changed the categories that can be used to analyze trends in deaths involving gases.

The U.S. Consumer Product Safety Commission (CPSC) maintains the National Electronic Injury Surveillance system (NEISS), which provides sample-based estimates of injuries reported to hospital emergency rooms.

NCHS also conducts the National Health Interview Survey every year. Estimates of the incidents of health conditions are sensitive to changes in definitions and to the length of the recall period used. Even with multiple years of data, there has not been enough data on burn injuries to support a published analysis since the 1980s.