Trends in On-Duty Firefighter Deaths and Injuries

Focusing on Career Firefighters

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Urban Fire Forum
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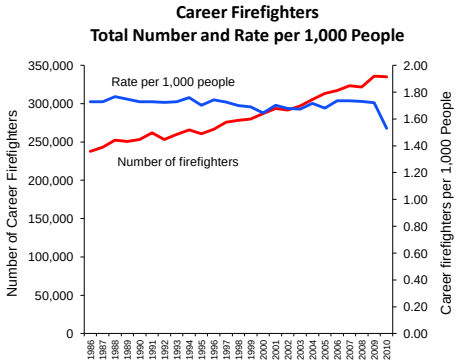
Presentation Overview

- **Review data sources for the two studies**
- **Overview of injury statistics**
- **Brief overview of the 2010 Firefighter Fatality Study**
- **Trends in career firefighter fatalities**



Data Sources

Firefighter injury data:

- Aggregate data collected as part of our annual fire experience survey
- Based on national estimates from a stratified random sample of fire departments
- Career vs. volunteer status of victims not reported

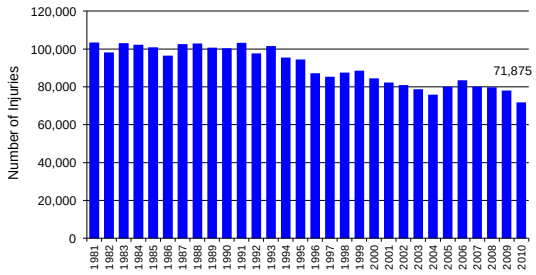
Firefighter fatality data:

- Firefighter fatality database is a 'census'

Firefighter Injury Study

- **Firefighter exposures**
  - to infectious diseases
  - to hazardous conditions
- **Matrix reporting**
  - Nature of Injury by Type of Duty
- **Fire Ground injuries by Cause of Injury**
- **Fire Department Vehicle Crashes**

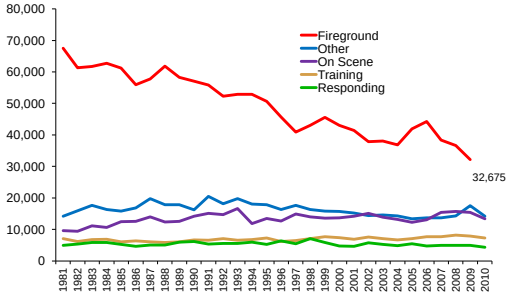
Firefighter Injuries - 1981 – 2010



Overall Results

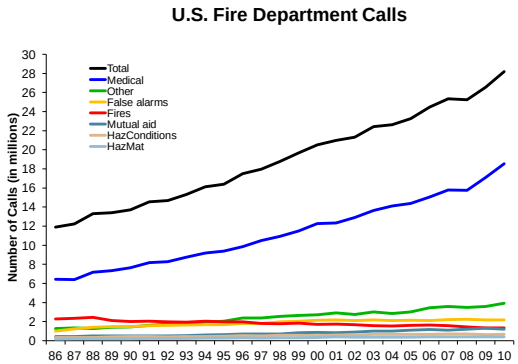
- 71,875 firefighter injuries occurred on duty in 2010 – a decrease of 8% from the year before.
- There were 11,200 exposures to infectious diseases (e.g., hepatitis, meningitis, HIV, others) in 2010 (0.6 exposures per 1,000 emergency medical runs by fire departments in 2010).
- There were 25,700 exposures to hazardous conditions (e.g., asbestos, radioactive materials, chemicals, fumes, other) in 2009 (24.2 exposures per 1,000 hazardous condition runs in 2010).
- An estimated 15,000 firefighter injuries resulted in lost time in 2010 (20.8% of all injuries).

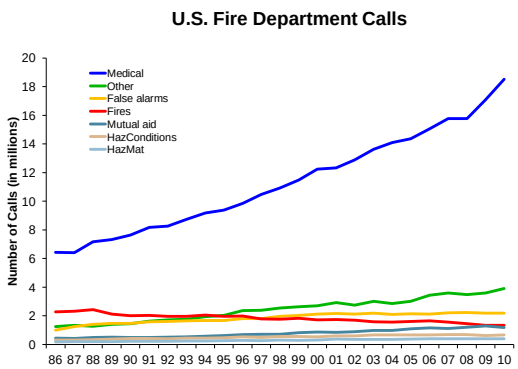
Firefighter Injuries by Type of Duty



Fire Department Calls

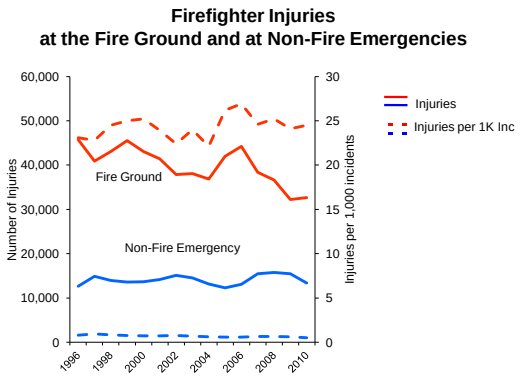
Year	Total	Fires	Medical	False alr	Mut aid	HazMat	HazCn	Other
1986	11,890,000	2,271,500	6,437,500	992,500	441,000	171,500	318,000	1,258,000
1991	14,556,500	2,041,500	8,176,000	1,578,500	494,000	221,000	428,500	1,617,000
1996	17,503,000	1,975,000	9,841,500	1,816,500	688,000	285,000	536,500	2,360,500
2001	20,965,000	1,734,500	12,331,000	2,157,500	838,500	381,500	605,000	2,917,500
2006	24,470,000	1,642,500	15,062,500	2,119,500	1,159,500	388,500	659,000	3,438,500
2008	25,252,500	1,451,500	15,767,500	2,241,500	1,214,500	394,500	697,500	3,485,500
2010	28,205,000	1,331,500	18,522,000	2,187,000	1,189,500	402,000	660,000	3,913,000
Change from 1986	More than doubled	Down 2/5	Almost tripled	More than doubled	Almost tripled	More than doubled	Doubled	More than tripled

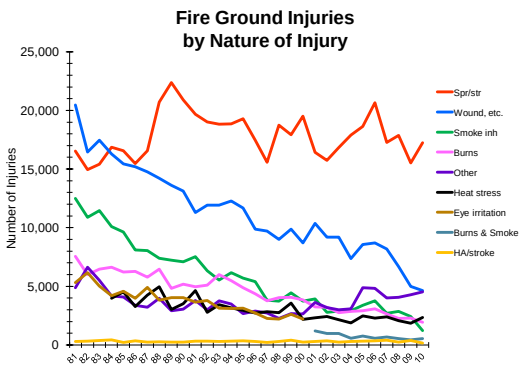




Firefighter Injuries and Injury Rates

	At the Fireground		At Non-Fire Emergencies	
Year	**Injuries**	**Per 1K fires**	**Injuries**	**Per 1K Incidents**
1996	45,725	23.1	12,630	0.81
1997	40,920	22.8	14,880	0.92
1998	43,080	24.5	13,960	0.82
1999	45,500	25.0	13,565	0.76
2000	43,065	25.2	13,660	0.73
2001	41,395	23.9	14,140	0.73
2002	37,860	22.4	15,095	0.77
2003	38,045	24.0	14,550	0.70
2004	36,880	22.1	13,150	0.62
2005	41,950	26.2	12,250	0.56
2006	44,210	26.9	13,090	0.57
2007	38,340	24.6	15,435	0.65
2008	36,595	25.2	15,745	0.66
2009	32,205	24.1	15,455	0.62
2010	32,675	24.5	13,355	0.50





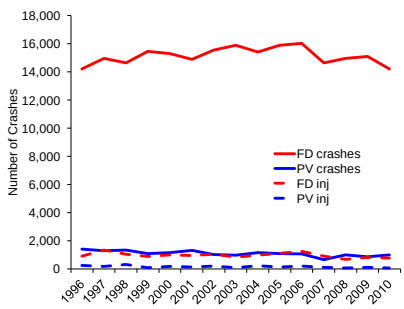
Average Number of Fires, Fire Ground Injuries and Injury Rates by Population Protected

Population Protected	Average Number of Fires	Average Number of Fire Ground Injuries	Fire Ground Injuries per 100 Fires	Fire Ground Injuries per 100 FFs
500,000 - 999,999	**2,638.7**	**81.0**	**3.1**	**7.2**
250,000 - 499,999	**1,020.4**	**28.5**	**2.8**	**6.4**
100,000 - 249,999	**511.7**	**12.0**	**2.3**	**5.3**
50,000 - 99,999	218.2	4.4	2.0	4.2
25,000 - 49,999	117.8	2.2	1.9	3.4
10,000 - 24,999	62.5	1.0	1.6	2.4
5,000 - 9,999	36.1	0.6	1.7	1.7
2,500 - 4,999	22.0	0.3	1.4	1.3
Under 2,500	10.6	0.2	1.9	0.9

Vehicle Crashes and Resulting Injuries While Responding to or Returning from Alarms

	Involving FD Vehicles		Involving FF personal vehicles	
Year	Collisions	FF Injuries	Collisions	FF Injuries
1996	14,200	910	1,400	240
1997	14,950	1,350	1,300	180
1998	14,650	1,050	1,350	315
1999	15,450	875	1,080	90
2000	15,300	990	1,160	170
2001	14,900	960	1,325	140
2002	15,550	1,040	1,030	210
2003	15,900	850	980	85
2004	15,420	980	1,150	220
2005	15,885	1,120	1,080	125
2006	16,020	1,250	1,070	210
2007	14,650	915	665	120
2008	14,950	670	1,000	70
2009	15,100	820	870	100
2010	14,200	775	1,000	75

Crashes and Firefighter Injuries While Responding to or Returning from Alarms



Firefighter Fatalities

Who is a firefighter?

- State and local fire service personnel, career and volunteer
- State or local public service officer, acting as firefighter
- Federal government fire service personnel
- Temporary fire suppression personnel operating under official auspices of one of the above
- Privately employed firefighters

How do we define "on-duty?"

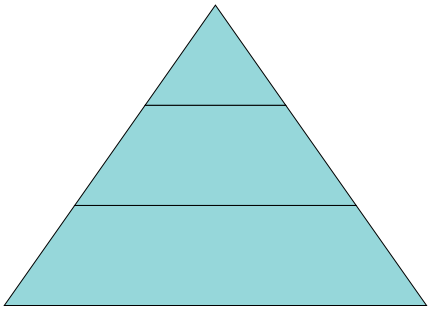
- At scene of alarms, whether fire or non-fire
- En route responding to or returning from alarms
- Performing other duties, including training, maintenance, public education, inspection, investigation, etc.
- Performing non-fire duties on official assignment
- Station duty

What do we count as an on-duty fatality?

- Any injury that was incurred while on duty and proves fatal
- Any illness that was incurred as a result of actions while on duty and proves fatal

On-duty fatalities are associated with ***specific*** on-duty activities and are reported as of the date of injury or onset.

Defining the U.S. Firefighter Death Problem



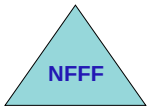
Defining the U.S. Firefighter Death Problem

The long-term health effects of firefighting cannot be reliably measured, in terms of resulting job-related deaths. A complete picture of the hazards of firefighting would include these fatalities.

Defining the U.S. Firefighter Death Problem

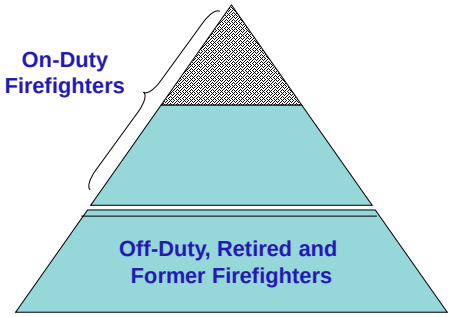
The NFPA inclusion criteria counts deaths where onset occurred while the firefighter was on-duty. USFA adds Hometown Hero/PSOB qualifiers who were off-duty.

Defining the U.S. Firefighter Death Problem



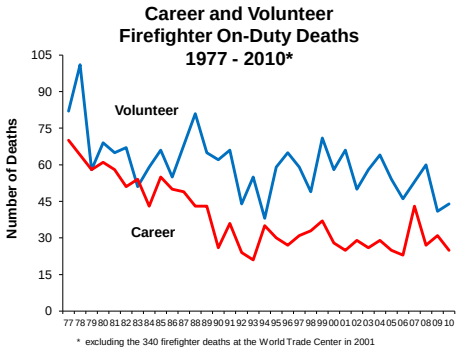
The National Fallen Firefighters Foundation uses the most narrow inclusion criteria, counting on-duty deaths and Hometown Hero qualifiers, but excluding on-duty deaths where drug abuse or negligence was a factor.

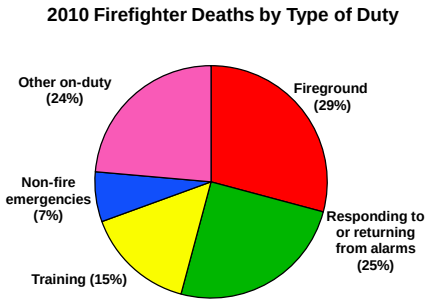
Defining the U.S. Firefighter Death Problem

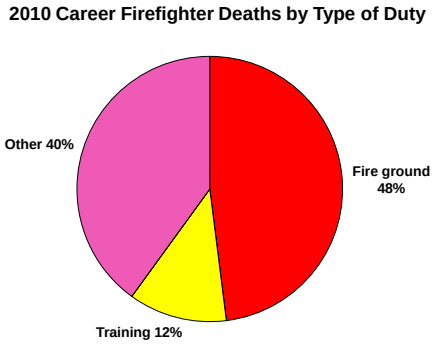


72 On-Duty Fatalities in 2010

- 44 volunteer firefighters
- 25 career firefighters
- 2 employees of state land management agencies
- 1 member of an inmate fire brigade


Career and Volunteer
Firefighter On-Duty Deaths
1977 - 2010*
Number of Deaths
105
90
75
60
45
30
15
0
Volunteer
Career
77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10
* excluding the 340 firefighter deaths at the World Trade Center in 2001

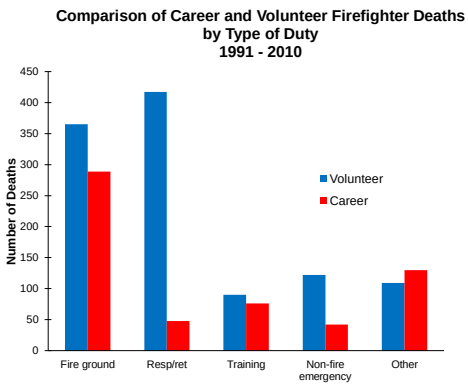

2010 Firefighter Deaths by Type of Duty
Other on-duty (24%)
Fireground (29%)
Non-fire emergencies (7%)
Responding to or returning from alarms (25%)
Training (15%)

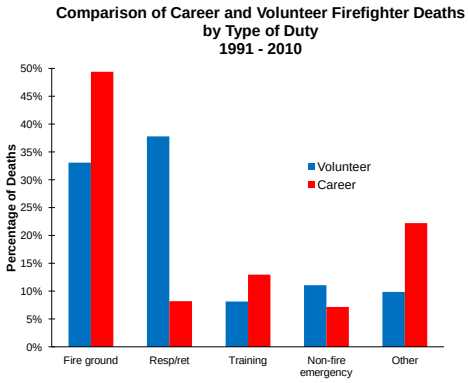

2010 Career Firefighter Deaths by Type of Duty
Other 40%
Fire ground 48%
Training 12%

Training deaths:

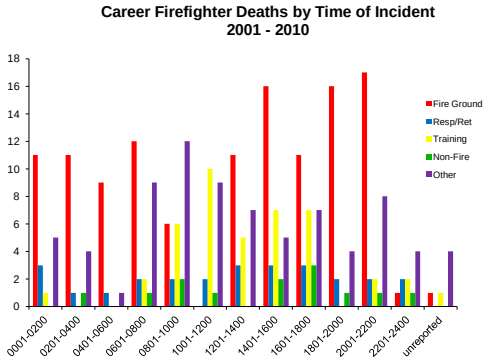
- Unsupervised physical training
- Search & rescue training (lifting and moving heavy objects
- annual self-contained breathing apparatus (SCBA) endurance evaluation

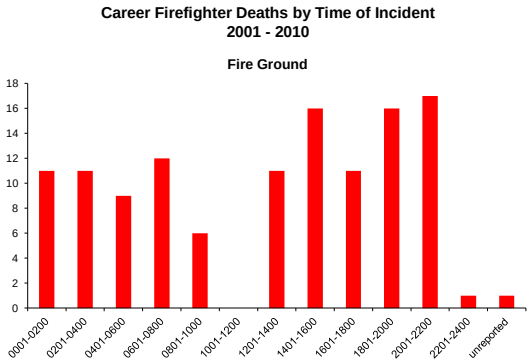
All three were sudden cardiac deaths.

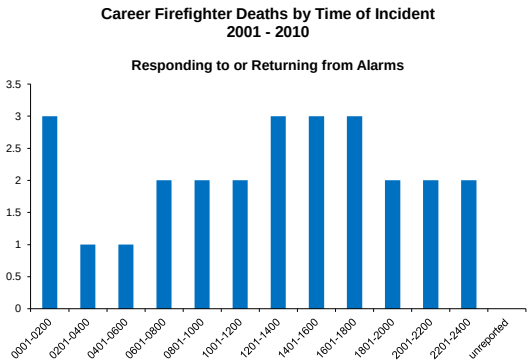




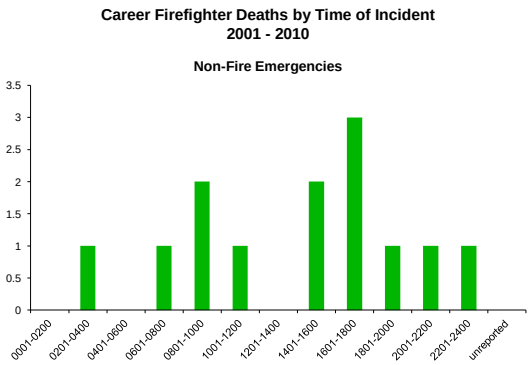
Career Firefighter Deaths by Time of Incident
2001 - 2010
35
30
25
20
15
10
5
0
0001-0200
0201-0400
0401-0600
0601-0800
0801-1000
1001-1200
1201-1400
1401-1600
1601-1800
1801-2000
2001-2200
2201-2400
unreported

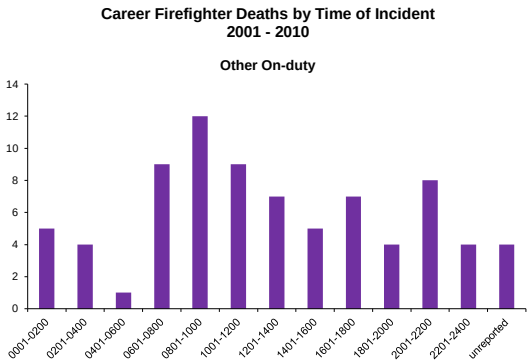

Career Firefighter Deaths by Time of Incident
2001 - 2010
18
16
14
12
10
8
6
4
2
0
Fire Ground
Resp/Ret
Training
Non-Fire
Other
0001-0200
0201-0400
0401-0600
0601-0800
0801-1000
1001-1200
1201-1400
1401-1600
1601-1800
1801-2000
2001-2200
2201-2400
unreported

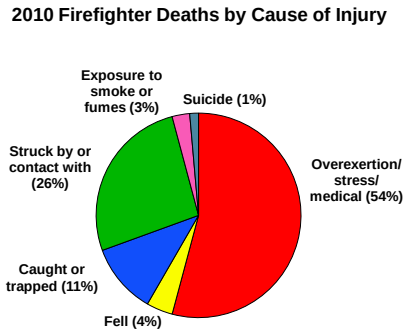

Career Firefighter Deaths by Time of Incident
2001 - 2010
Fire Ground
18
16
14
12
10
8
6
4
2
0
0001-0200
0201-0400
0401-0600
0601-0800
0801-1000
1001-1200
1201-1400
1401-1600
1601-1800
1801-2000
2001-2200
2201-2400
unreported

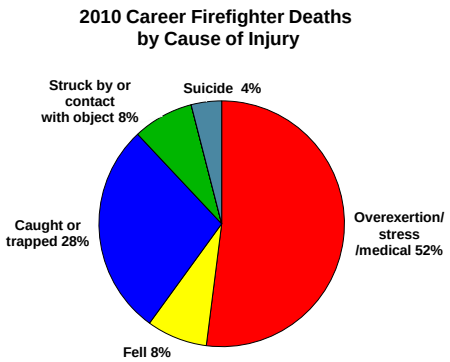

Career Firefighter Deaths by Time of Incident
2001 - 2010
Responding to or Returning from Alarms
3.5
3
2.5
2
1.5
1
0.5
0
0001-0200
0201-0400
0401-0600
0601-0800
0801-1000
1001-1200
1201-1400
1401-1600
1601-1800
1801-2000
2001-2200
2201-2400
unreported

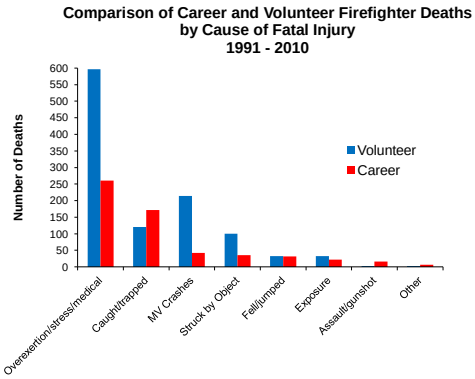
Career Firefighter Deaths by Time of Incident
2001 - 2010
Training
12
10
8
6
4
2
0
0001-0200
0201-0400
0401-0600
0601-0800
0801-1000
1001-1200
1201-1400
1401-1600
1601-1800
1801-2000
2001-2200
2201-2400
unreported

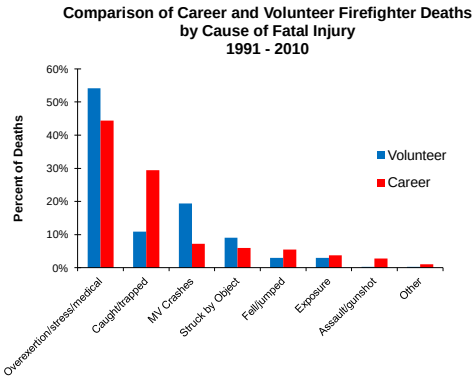

Career Firefighter Deaths by Time of Incident
2001 - 2010
Non-Fire Emergencies
3.5
3
2.5
2
1.5
1
0.5
0
0001-0200
0201-0400
0401-0600
0601-0800
0801-1000
1001-1200
1201-1400
1401-1600
1601-1800
1801-2000
2001-2200
2201-2400
unreported

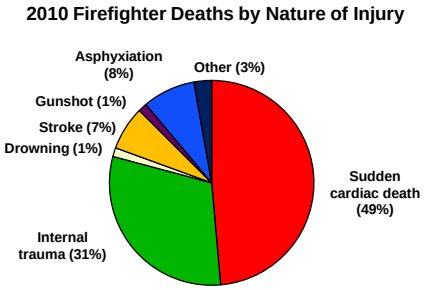

Career Firefighter Deaths by Time of Incident
2001 - 2010
Other On-duty
14
12
10
8
6
4
2
0
0001-0200
0201-0400
0401-0600
0601-0800
0801-1000
1001-1200
1201-1400
1401-1600
1601-1800
1801-2000
2001-2200
2201-2400
unreported


2010 Firefighter Deaths by Cause of Injury
Exposure to smoke or fumes (3%)
Suicide (1%)
Struck by or contact with (26%)
Overexertion/ stress/ medical (54%)
Caught or trapped (11%)
Fell (4%)

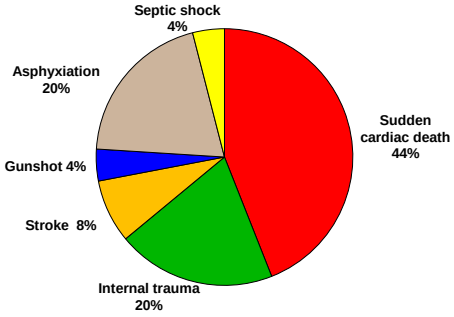

2010 Career Firefighter Deaths
by Cause of Injury
Struck by or contact with object 8%
Suicide 4%
Caught or trapped 28%
Overexertion/ stress /medical 52%
Fell 8%


Comparison of Career and Volunteer Firefighter Deaths
by Cause of Fatal Injury
1991 - 2010
Number of Deaths
600
550
500
450
400
350
300
250
200
150
100
50
0
Volunteer
Career
Overexertion/stress/medical
Caught/trapped
MV Crashes
Struck by Object
Fell/jumped
Exposure
Assault/gunshot
Other


Comparison of Career and Volunteer Firefighter Deaths
by Cause of Fatal Injury
1991 - 2010
Percent of Deaths
60%
50%
40%
30%
20%
10%
0%
Volunteer
Career
Overexertion/stress/medical
Caught/trapped
MV Crashes
Struck by Object
Fell/jumped
Exposure
Assault/gunshot
Other


2010 Firefighter Deaths by Nature of Injury
Asphyxiation (8%)
Other (3%)
Gunshot (1%)
Stroke (7%)
Drowning (1%)
Sudden cardiac death (49%)
Internal trauma (31%)

2010 Career Firefighter Deaths by Nature of Injury



Prior Health Problems

Of the 11 sudden cardiac death victims, 7 had existing health problems:

severe arteriosclerotic heart disease

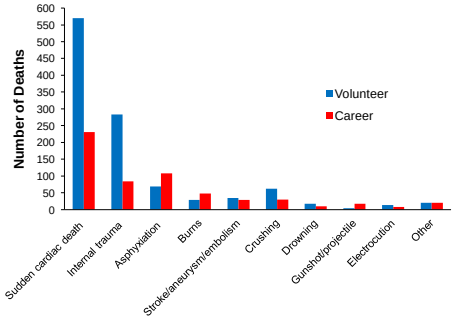
hypertension

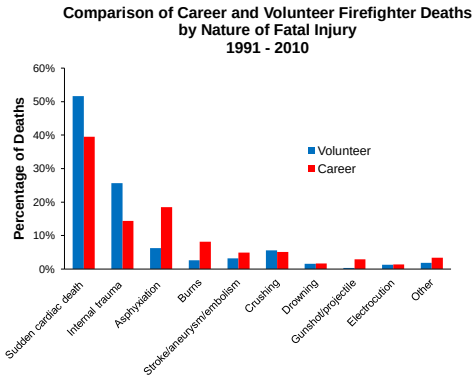
previous heart attacks and bypass surgery

other cardiac issues

Generally, 80% have been found to have prior, often detectable, health problems.

Comparison of Career and Volunteer Firefighter Deaths by Nature of Fatal Injury 1991 - 2010

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Percentage of Deaths
60%
50%
40%
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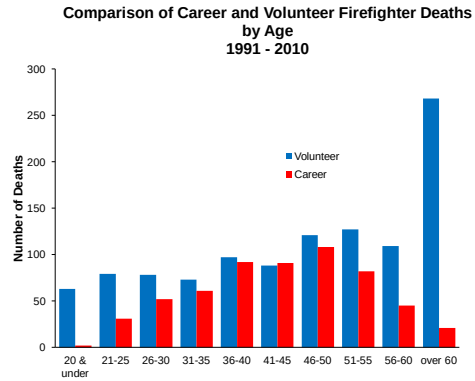
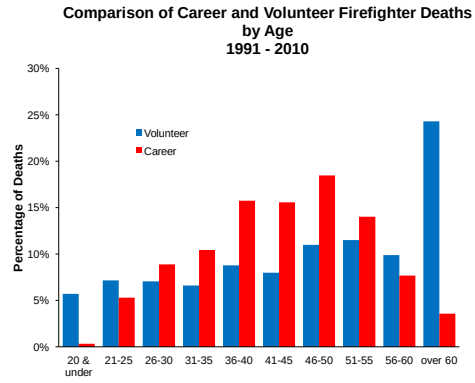
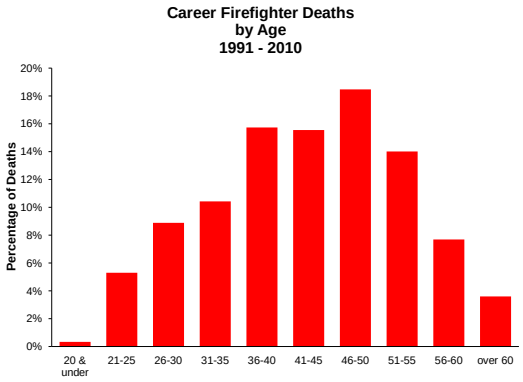
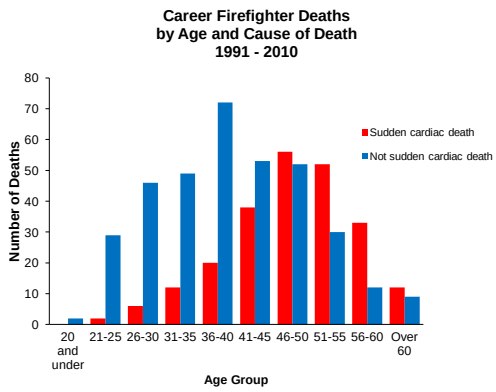
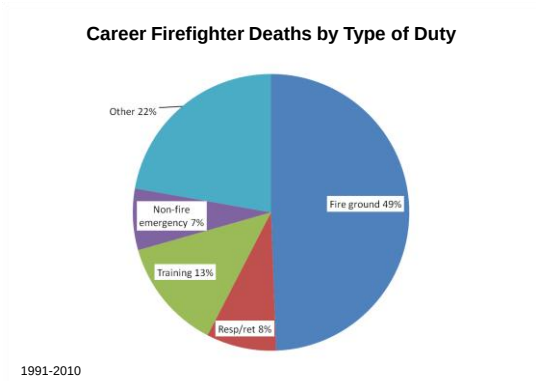
10%
0%
Volunteer
Career
Sudden cardiac death
Internal trauma
Asphyxiation
Burns
Stroke/aneurysm/embolism
Crushing
Drowning
Gunshot/projectile
Electrocution
Other


Comparison of Career and Volunteer Firefighter Deaths
by Age
1991 - 2010
Number of Deaths
300
250
200
150
100
50
0
Volunteer
Career
20 & under
21-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
over 60

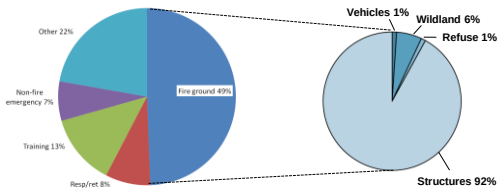

Comparison of Career and Volunteer Firefighter Deaths
by Age
1991 - 2010
Percentage of Deaths
30%
25%
20%
15%
10%
5%
0%
Volunteer
Career
20 & under
21-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
over 60


Career Firefighter Deaths
by Age
1991 - 2010
Percentage of Deaths
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
20 & under
21-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
over 60

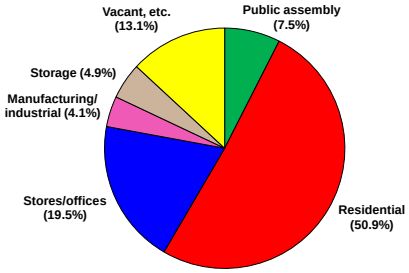

Career Firefighter Deaths
by Age and Cause of Death
1991 - 2010
Number of Deaths
80
70
60
50
40
30
20
10
0
Sudden cardiac death
Not sudden cardiac death
20 and under
21-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
Over 60
Age Group


Career Firefighter Deaths by Type of Duty
Other 22%
Non-fire emergency 7%
Training 13%
Resp/ret 8%
Fire ground 49%
1991-2010

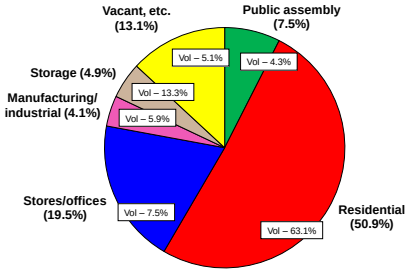
Career Firefighter Deaths by Type of Duty and Incident Type



Structure Fire Deaths by Fixed Property Use Career Only



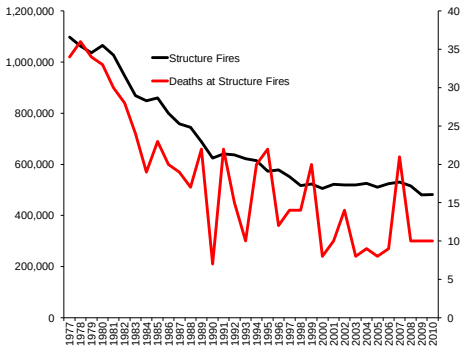
Structure Fire Deaths by Fixed Property Use Career Only



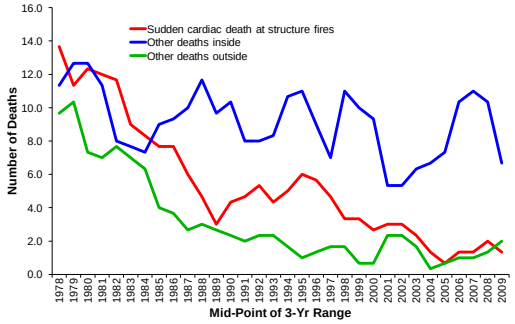
Causes of Fatal Injuries at Structure Fires

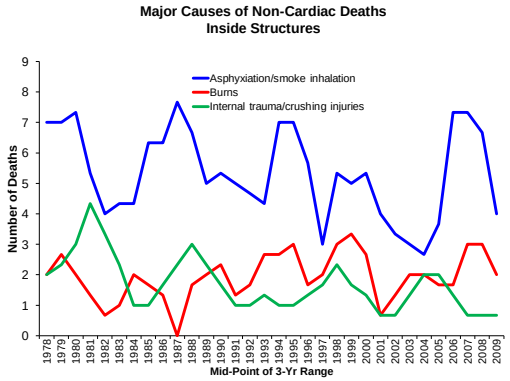
Cause	Inside	Outside	On Roof	On Ladder	Total
Structural collapse	52	10	1		63
Exertion/stress/other medical	25	38	3		66
Fire progress	45				45
Lost inside	34				34
Struck by object/vehicle	3	5			8
Explosion	2	4			6
Fell in hole burned in floor/roof	7		1		8
Fell/jumped from structure	4	1	1		6
Other falls	3				3
Electrocution		2		2	4
Smoke exposure (all no SCBA)	5				5
Gunshot		1			1
Other caught/trapped	16				16
Other/no details	1	1			2
Total	197	62	6	2	266

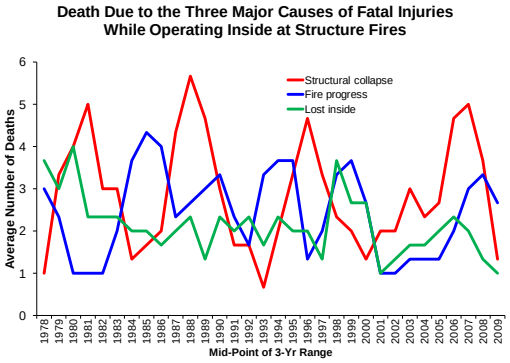
Career Firefighter Deaths at Structure Fires



Patterns for Career Firefighter Deaths at Structure Fires







Snapshot

- **The average number of career firefighter deaths annually has dropped by <u>more than half</u>**
- **Among career firefighters, on-duty sudden cardiac deaths have dropped by <u>almost two thirds</u>, but remain the #1 cause of on-duty firefighter deaths**
- **<u>Almost half</u> of all career firefighter deaths occur on the fire ground**

Concluding remarks

- Sudden cardiac death continues to be the major problem
- Real progress has been made in reducing firefighter deaths over the past 30 years, but more can be done
- In 2010, no career firefighter deaths occurred while responding to or returning from alarms, and none occurred while operating at non-fire emergencies.

The 2010 firefighter fatality study was published in the July/August issue

of *NFPA Journal*

and

the full report is available

free on NFPA's website: www.nfpa.org
(under Research & Reports)