

Full Report

Firefighter Fatalities in the United States -- 2006

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2006 Experience

In 2006, a total of 89 on-duty firefighter deaths occurred in the U.S. This is a slight increase over the 87 firefighter fatalities that occurred in 2005. It was the second consecutive year, and the fifth out of 10 years, that the total number of deaths has been below 100.¹ Figure 1 shows firefighter deaths for the years 1977 through 2006, excluding the 340 firefighter deaths at the World Trade Center in 2001.

Of the 89 firefighters who died while on duty in 2006, 46 were volunteer firefighters, 23 were career firefighters, nine were employees of federal land management agencies, four were employees of state land management agencies, three were contractors to federal land management agencies, two were contractors to state land management agencies, one was a member of a prison inmate fire crew and one was a member of an industrial fire brigade.

In 2006, there were six multiple-fatality incidents -- the two most severe incidents killing a total of nine wildland firefighters. Five of these nine were overrun at a wildland fire and fatally injured (see incident summary). Three federal wildland agency firefighters on firewatch duty and a contract pilot were killed when their helicopter crashed on the way back from the lookout tower to the helibase. There were two additional fatal aircraft crashes on wildland fires. In one, two federal contractors were killed when their helicopter crashed into a river while they were refilling its water tanks. In the other, a firefighter and a state contractor died when their spotter plane crashed into trees in mountainous terrain during a reconnaissance flight. Four firefighters were killed in structural collapses in two fires in commercial properties -- two when a wall collapsed during overhaul operations and the other two when the floor collapsed beneath them.

Analyses in this report examine the types of duty associated with firefighter deaths, the cause and nature of fatal injuries to firefighters, and the ages of the firefighters who died. They highlight deaths in intentionally-set fires and in motor vehicle-related incidents.² Since this is the 30th year that NFPA has published this report, we include a special look back over the progress that has been made in reducing on-duty firefighter deaths, and some of the issues that must be addressed to reduce the numbers further. Finally, the study presents summaries of individual incidents that illustrate important problems or concerns in firefighter safety.

Introduction

Each year, NFPA collects data on all firefighter fatalities in the U.S. that resulted from injuries or illnesses that occurred while the victims were on-duty. The term *on-duty* refers to being at the scene of an alarm, whether a fire or non-fire incident; while responding to or returning from an alarm; while participating in other fire department duties such as training, maintenance, public education, inspection, investigation, court testimony or fund raising; and being on call or stand-by for assignment at a location other than at the firefighter's home or place of business.

On-duty fatalities include any injury sustained in the line of duty that proves fatal, any illness that was incurred as a result of actions while on duty that proves fatal, and fatal mishaps involving non-emergency occupational hazards that occur while on duty. The types of injuries included in the first category are mainly those that occur at a fire or other emergency incident scene, in training, or in crashes while responding to or returning from alarms. Illnesses (including heart attacks) are included when the exposure or onset of symptoms occurred during a specific incident or on-duty activity.

The victims include members of local career and volunteer fire departments; seasonal, full-time and contract employees of state and federal agencies who have fire suppression responsibilities as part of their job description; prison inmates serving on firefighting crews; military personnel performing assigned fire suppression activities; civilian firefighters working at military installations; and members of industrial fire brigades.

Fatal injuries and illnesses are included even in cases where death is considerably delayed. When the injury and the death occur in different years, the incident is counted in the year of the injury. The NFPA recognizes that a comprehensive study of firefighter on-duty fatalities would include chronic illnesses (such as cancer or heart disease) that prove fatal and that arise from occupational factors. In practice, there is no mechanism for identifying fatalities that are due to illnesses that develop over long periods of time. This creates an incomplete picture when comparing occupational illnesses to other factors as causes of firefighter deaths. This is recognized as a gap the size of which cannot be identified at this time because of limitations in tracking the exposure of firefighters to toxic environments and substances and the potential long-term effects of such exposures.

The NFPA also recognizes that other organizations report numbers of duty-related firefighter fatalities using different, more expansive, definitions that include deaths that occurred when the victims were off-duty. Readers comparing reported losses should carefully consider the definitions and inclusion criteria used in any study.

Type of Duty

Figure 2 shows the distribution of the 89 deaths by type of duty. Fire ground operations accounted for 38 deaths. Although this category continues to account for fewer than half of the on-duty fatalities, it is the highest reported number of such deaths since 2002, when 46 firefighters were fatally injured at fires. Seventeen of the victims were local volunteer firefighters and nine were municipal career firefighters.³ Eleven of the victims worked for state or federal land management agencies and one was a member of a prison inmate crew.

There were 18 fatalities while responding to or returning from alarms -- half of them in collisions and rollovers and half due to sudden cardiac events. Seventeen of the victims were volunteer firefighters and one was a contractor to a state land management agency.

Eight deaths occurred during training activities. These included four during physical fitness activities, one at the station during preparation for a drill, one during an extrication drill, one during surf rescue training and one after live fire training.

Six firefighters were killed at non-fire emergencies, including four at scenes of motor vehicle crashes, one at an EMS call and one at a false alarm.

The remaining 19 firefighters died while involved in a variety of non-emergency-related on-duty activities. These activities included normal administrative or station duties (six deaths), community events (four deaths), errands (four deaths), and maintenance (one death). And finally, three firefighters and a contract pilot were killed when their helicopter crashed on its way back to the helibase.

Cause of Fatal Injury or Illness

Figure 3 shows the distribution of deaths by cause of fatal injury or illness. The term *cause* refers to the action, lack of action, or circumstances that resulted directly in the fatal injury.⁴

Deaths resulting from exertion, stress and other (often medical) issues made up the largest category of fatalities. Of the 38 deaths in this category, 34 were classified as sudden cardiac deaths (usually heart attacks), three were due to strokes and one was determined to be either a sudden unexplained ventricular arrhythmia or a seizure. There is more detail on sudden cardiac deaths in a separate section of this article.

The second leading cause of fatal injury was struck by an object or contact with an object. The 28 firefighters killed included 19 in motor vehicle crashes and three struck by motor vehicles. Those deaths are discussed in a separate section of this article. Two firefighters were struck by a collapsing

wall while operating outside at a structure fire, and another was struck and killed at a structure fire when an awning fell from a building. One firefighter cut his hand on a piece of equipment while working at the scene of a vehicle crash and his hand became infected. A firefighter was struck by a tree that was knocked over in the creation of a fireline. One firefighter was struck in the head by a rope that snapped while he was trying to tow a stuck apparatus at a wildland fire.

The next leading cause of fatal injury was caught or trapped, resulting in 20 deaths. Ten of these 20 firefighters were trapped by fire progress; seven of those 10 were on wildland fires and three were at structure fires. Five were killed in floor collapses and another when a ceiling collapsed. Three firefighters became lost inside fire-involved structures and ran out of air. A firefighter standing on top of a rescue vehicle in the station became caught between the vehicle and a ceiling beam and crushed when the driver drove out of the station without realizing he was there.

One firefighter fell from a fire apparatus at a prescribed burn. One firefighter was electrocuted while recovering a tarp from a fire-damaged roof. One firefighter was killed in a tornado while responding to the fire station.

Nature of Fatal Injury or Illness

The term *nature* refers to the medical process by which death occurred and is often referred to as *cause of death* on death certificates and in autopsy reports.

Figure 4 shows the distribution of deaths by nature of fatal injury or illness. The largest number of fatalities, 34 deaths, were due to sudden cardiac death. The other major categories were internal trauma (26 deaths), asphyxiation (nine deaths), burns (nine deaths), stroke or aneurysm (three deaths) and crushing injuries (three deaths). The remaining deaths included two drownings, one electrocution, one due to septicemia and one due to a sudden arrhythmia or seizure.

Sudden Cardiac Deaths

The number of on-duty sudden cardiac deaths in 2006 was at the lowest level in the 30 years that NFPA has done this study. Sudden cardiac death, most often the result of heart attack, is typically the leading nature of injury and usually accounts for close to half of the total on-duty deaths. When NFPA began publishing this study in 1977, the number of sudden cardiac deaths was over 70. Deaths in this category had fallen 25 percent by 1990. Since then, however, the number of sudden cardiac deaths has generally been between 40 and 50 each year, down approximately one-third since the late 1970s.

Of the 34 victims of sudden cardiac events in 2006, 15 were reported to have had prior heart

problems -- usually prior heart attacks, bypass surgery or angioplasty/stent placement -- and post mortem medical documentation showed that 11 had severe arteriosclerotic heart disease, two had diabetes and three were hypertensive. (Some of the victims had more than one condition.) Over the past 25 years, post mortem information or other details on the victims' medical histories have been available for 713 of the 1,177 sudden cardiac death victims. Of those 713 victims, 603 (or 84.6 percent) had suffered prior heart attacks, had severe arteriosclerotic heart disease, had undergone bypass surgery or angioplasty/stent placement, or were diabetic.

Ages of Firefighters

The firefighters who died in 2006 ranged in age from 17 to 78, with a median age of 43 years. Figure 5 shows the distribution of firefighter deaths by age and cause of death (sudden cardiac death versus other causes).

Sudden cardiac death accounts for a higher proportion of the deaths among older firefighters, as might be expected. Almost 60 percent of the firefighters over age 40 who died in 2006 died of heart attacks or other cardiac events. The youngest victim of sudden cardiac death was aged 19; cardiomyopathy was found on autopsy. The condition had not been diagnosed previously.

Figure 6 shows death rates by age, using career and volunteer firefighter fatality data for the five-year period from 2002 through 2006 and estimates of the number of career and volunteer firefighters in each age group from the NFPA's 2004 profile of fire departments (the mid-year in the range).⁵

The lowest death rates were for firefighters in their 20s. Their death rate was less than half the all-age average. Firefighters in their 30s had a death rate approximately two-thirds the all-age average. The rate for firefighters in their fifties was almost twice the average and for firefighters age 60 and over, it was close to four times the average. Firefighters age 50 and over accounted for two-fifths of all firefighter deaths over the five-year period, although they account for fewer than one-fifth of all firefighters.

Fire Ground Deaths

Of the 38 fire ground deaths, 10 were due to internal trauma, nine to asphyxiation, nine to burns, eight were due to sudden cardiac death and one each were due to crushing injuries and drowning.

Figure 7 shows the distribution of the 38 fire ground deaths by fixed property use. The largest share of fire ground deaths in 2006 occurred on wildland fires (16 deaths). This is the highest number of

deaths on wildland fires since 1999 when 17 firefighters were killed.

Fifteen of the 22 structure fire deaths occurred in residential properties. Fires in single-family dwellings killed 14 firefighters and a fire in an apartment building killed one firefighter. There were five deaths in three fires in stores. There was also one death in a fire in a vacant dwelling, and one death at a fire in a building undergoing renovations. None of the structures involved in fatal fires in 2006 were reported to have had automatic suppression systems installed.

To put the hazards of firefighting in various types of structures into perspective, the authors examined the number of fire ground deaths per 100,000 structure fires by property use. Estimates of the structure fire experience in each type of property were obtained from the NFPA's annual fire loss studies from 2001 through 2005 (the 2006 results are not yet available) and from the updated firefighter fatality data for the corresponding years. The results are shown in Figure 8.

This figure illustrates that, although many more firefighter deaths occur at residential structure fires than at fires in any other type of structure, fires in vacant buildings and some nonresidential structures, such as mercantile and public assembly properties, are more hazardous to firefighters, on average. There were 6.5 fire ground deaths per 100,000 nonresidential structure fires from 2001 through 2005, compared to 3.7 deaths per 100,000 residential structure fires. The highest death rates over the five-year period occurred in stores and offices. The low rate in health care/correctional and educational buildings may reflect the fact that these occupancies are among the most regulated and most-frequently inspected and that their occupants are among the most likely to call the fire department to report fires while the fires are still in their early stages. The low rate in that five-year period for storage properties reflects the small number of fatalities that have occurred in such structures in recent years.

Vehicle-Related Incidents

In 2006, 19 firefighters died in vehicle crashes. In addition to those deaths, three others were fatally struck by vehicles and one firefighter fell from a tanker.

Eight of the 19 firefighters killed in crashes were responding to or returning from incidents when the crashes occurred. All were single-fatality crashes.

Four of these eight victims were driving or riding in pumpers or water tenders:

- One firefighter was driving a pumper back to the station after a structure fire when the brakes failed. He tried to avoid a steep grade and stop the vehicle by driving into an open gravel pit, but he lost control of the vehicle, it rolled over and he was ejected. The investigation revealed that the brake line had cracked and brake fluid had leaked out. The victim was not

wearing a seatbelt.

- A firefighter driving a brush truck back to crew quarters while assigned to a wildland fire drifted onto the shoulder of the road, overcorrected, and overturned. He was not wearing a seatbelt and was ejected. Alcohol was reported to be a factor in this crash.
- A cadet firefighter, riding as passenger in a tanker enroute to a house fire, was killed when the vehicle's brakes overheated and failed on a steep grade leading down to a single-lane bridge. The vehicle did not slow on the curve approaching the bridge, struck the guardrail and flipped off the bridge, landing upside down in the creek bed. The vehicle, which was formerly a propane delivery truck, had two seats and was not equipped with seatbelts. Four firefighters were traveling in the vehicle -- two sitting in the passenger seat and the victim sitting on the floor between the two seats. The victim was trapped in the crushed cab.
- A firefighter driving a tanker on mutual aid to a structure fire lost control of the vehicle when the water in the tank shifted on a curve. He overcorrected, and the vehicle rolled, ejecting him. The victim was driving 63 mph in a 55 mph zone and was not wearing a seatbelt.

Three of the crashes while responding to alarms involved personal vehicles:

- A firefighter driving to the fire station to respond to a fire alarm struck a tractor-trailer that was turning across the road from an intersecting street. The victim was speeding. No information was reported about seatbelt use, but he was not ejected.
- Another firefighter, driving over the speed limit to the fire station to respond to a motor vehicle crash, crashed into a utility pole. Wet pavement and speed were reported as factors in the crash. No information on seatbelt use was reported, but the victim was not ejected.
- A firefighter, responding on his motorcycle to the fire station for a call for a motor vehicle crash, failed to stop at a stop sign and hit a car in the intersection. Excessive speed was cited as a factor in this crash.

The eighth crash responding to or returning from emergency calls involved a rescue vehicle:

- The firefighter driving the rescue to a medical call for a woman in labor lost control of the vehicle on a curve and the vehicle slid, striking a utility pole on the driver's side. Excessive speed was cited as a factor in the crash. The victim was not wearing a seatbelt and was not ejected.

Five firefighters were killed in three crashes while operating over or on wildland fires.

- Two contractors for a federal wildland management agency were killed when the tail rotor gearbox fell off their helicopter, causing it to crash into a river while they were refilling the

helicopter's water tanks. The final NTSB report on this crash has not been released yet.

- A firefighter and a contractor for a state wildland management agency died when their spotter plane crashed into trees and mountainous terrain during a reconnaissance flight. No cause for the crash has been reported yet, and the final NTSB report has not yet been released.
- A firefighter died four weeks after being injured when his brush truck with a 1,000-gallon water tank overturned and rolled down a ravine when he attempted to retreat from a brush fire during pump-and-roll operations alongside a roadway. He was driving in soft sand, between the paved shoulder and a drop-off into a ravine. When he tried to back up, the driver's side wheels lost traction and the overloaded truck overturned. The tank was not baffled. The driver was not wearing a seatbelt and was ejected.

The remaining fatal crashes occurred while firefighters were engaged in a variety of on-duty activities:

- In the helicopter crash mentioned earlier, a contractor and three employees of a federal wildland management agency were killed. No details on the cause of the crash are available. The final NTSB report on this crash has not been released yet.
- After three hours of practicing loading and unloading a personal water craft (PWC) during surf rescue training in deep rough water, a fatigued firefighter drowned after his PWC capsized. He was wearing a dry suit and using a personal flotation device.
- A firefighter driving his personal vehicle to pick up surplus federal equipment crossed the centerline on the highway and struck a tractor trailer truck head on. He was wearing his seatbelt and was not ejected. It was daytime, but the road was wet. The victim's inattention and improper lane change were cited as factors in the crash.

Of the 10 deaths in road vehicles mentioned above, six of the victims were not wearing seatbelts (four were ejected), one was wearing his seatbelt, and one crash involved a motorcycle. Seatbelt use was not reported in the other two crashes. Excessive speed was a factor in at least five of the 10 crashes, and brake failures were cited in two others. Alcohol may have been a factor in one crash.

Three firefighters were struck by vehicles and killed. In the first incident, the victim had responded to a pre-dawn multi-car crash that occurred when moisture on the highway froze suddenly. Vehicles traveling 65-70 mph on the highway could not see the pileup until they came around a curve in the road. The driver of the truck that struck the firefighter was trying to avoid another vehicle in front of

him, and slid sideways across all traffic lanes. The victim, who was wearing personal protective equipment, lost her helmet when she was struck and suffered fatal head injuries. At the time of the fatal crash, a police officer was trying to place flares along the roadway to warn oncoming traffic. In the second incident, the victim was spray painting markings on a highway to indicate the location of hydrants. He stopped his brush truck in the passing lane of the roadway, leaving the hazard lights operating, and worked in front of the truck. A vehicle approaching at close to the speed limit in the same lane rear-ended the truck, which crushed the firefighter. In the third incident, a firefighter was struck by a vehicle backing out of a space in the parking lot of a bank while he was headed to deposit the fire department's bingo money. Careless driving and deficiencies in the vehicle's braking system were cited as factors in the incident.

And, finally, a firefighter fell out of the driver's seat of a water tender at a prescribed burn and was run over. Alcohol was reportedly a factor in the incident.

Other Findings

From 1997 through 2006, 69 firefighters (6.9 percent of all on-duty deaths) died in connection with intentionally-set fires. The share of these deaths annually has been dropping since 1985, in part because of the decline in intentionally-set fires over the same period; however, the number of such deaths in 2006 is the highest since 2002. Five firefighters died at one intentionally-set wildland fire, and three others were killed in connection with intentionally-set structure fires -- two while responding to fires and one while at the scene.

In 2006, a total of 24 firefighters were killed either on wildland fires, while responding to or returning from duty on wildland fires, or during activities associated with wildland fires. This is the third highest total in the last 10 years.

One firefighter suffered a fatal stroke at the scene of a false alarm in 2006. Over the past 10 years, 32 firefighter deaths have resulted from false calls, whether malicious or alarm malfunctions.

Of the eight training deaths, five firefighters suffered sudden cardiac death and another firefighter suffered a stroke; one firefighter drowned; and one was crushed.

Of the six deaths at non-fire emergencies, three were the result of sudden cardiac events; and one each from stroke, being struck by a vehicle, and a cut finger that became infected.

The distribution of deaths of career and volunteer firefighters from local fire departments is shown in Figure 9. The highest number of career and volunteer firefighter deaths occurred in 1977 and 1978, respectively. The annual death toll has fallen since then, with a steadier decline for the career fire

service. The most recent sustained drop for both groups started in 1999. The 23 deaths of career firefighters in 2006 is the lowest number since 1993; the 46 deaths of volunteer firefighters is the lowest since 1994. Over the past 10 years, there have been an average of 58 volunteer firefighter deaths and 29 career firefighter deaths annually. A comparison of the fatality experience of the 69 career and volunteer firefighters killed in 2006 is shown in Table 1.

Conclusions

Although the total on-duty death toll in 2006 is only slightly higher than for 2005, there are some important differences worth calling out:

- Deaths at fires were at their highest level over the past four years. This was due largely to the increase in the number of deaths on wildland fires; deaths at structure fires over the same period have plateaued at approximately 20 per year.
- The lowest number of on-duty heart attacks deaths reported over the years of this study occurred in 2006.
- Deaths during training activities, highlighted in the 2005 fatality article, were at their lowest level since 1999.
- The number of career and volunteer firefighter fatalities were both close to their all-time lowest levels in 2006; the number of other types of firefighters killed on-duty was third highest since 1977.

Other patterns continue to appear in much the same form, year after year. Again in 2006, sudden cardiac death, usually heart attacks, accounted for the largest share of on-duty firefighter fatalities. A very large proportion of the victims had serious health problems, which had not necessarily been diagnosed or treated.

The risk factors for heart disease are well-known and *NFPA 1582, Standard on Comprehensive Occupational Medical Program for Fire Departments*, outlines procedures for fire departments to follow in screening candidate firefighters and handling health problems that might arise during an individual's fire service career. *NFPA 1500, Standard on Fire Department Occupational Safety and Health Program*, requires the establishment of a firefighter health and fitness program based on *NFPA 1583, Standard on Health-Related Fitness Programs for Fire Fighters*, and requires that firefighters meet the medical requirements of *NFPA 1582*. Other information on developing a wellness-fitness

program is available from the IAFC/IAFF Fire Service Joint Labor Management Wellness-Fitness Initiative.

Some very worrisome data on the health status of firefighters has been collected by the National Volunteer Fire Council (NVFC) over the past few years, as part of their Heart-Healthy Firefighter Program. At trade shows around the country, the program has screened over 5,000 firefighters, both career and volunteer, for blood pressure, cholesterol, body fat and glucose. (Almost 11,000 show participants, in all, have been screened.) The purpose of the program is to lower the incidence of cardiac-related problems in the fire service by educating firefighters and their families about nutrition, fitness and heart disease prevention. Of the almost 2,000 firefighters tested for body fat distribution in 2005, 44.7 percent were found to be obese (defined as 25 percent or more of body fat for men and 32 percent or more for women). The blood pressure screenings in 2005 and 2006 found that 6.8 percent of the tested firefighters had Stage 2 hypertension; 31.5 percent had Stage 1 hypertension; and 46.4 were prehypertensive. Only 15.2 percent had normal blood pressure readings. Almost all of the 2,572 firefighters tested for glucose (non-fasting) in 2006 were found to be in the desirable range, with only 2.8 percent found to be diabetic and 6.3 percent pre-diabetic. Cholesterol screening done over the three years of the project found high or borderline high levels in 38.4 percent of the 5,411 firefighters tested. Through this program, many firefighters have come to understand their personal level of risk, and have adopted a more heart-healthy lifestyle. More information can be found at: www.healthy-firefighter.org.

Deaths in crashes continue to account for a significant proportion of the annual fatalities. Crashes are, in fact, the second leading cause of on-duty fatalities. In the 10 road crash deaths in 2006, six victims were not wearing seatbelts, and excessive speed was a factor in at least five crashes. NFPA publishes several standards related to road safety issues. *NFPA 1002, Standard on Fire Apparatus Driver/Operator Professional Qualifications*, identifies the minimum job performance requirements for firefighters who drive and operate fire apparatus, in both emergency and nonemergency situations. *NFPA 1451, Standard for a Fire Service Vehicle Operations Training Program*, provides for the development of a written vehicle operations training program, including the organizational procedures for training, vehicle maintenance, and identifying equipment deficiencies. *NFPA 1911, Standard for the Inspection, Testing, Maintenance and Retirement of In-Service Automotive Fire Apparatus*, details a program to ensure that fire apparatus are serviced and maintained to keep them in safe operating condition. In related efforts, the USFA has formed partnerships with the IAFF, NVFC and IAFC to focus attention on safety while responding in emergency apparatus. Details can be found at www.usfa.dhs.gov/fireservice/research/safety/vehicle.shtm.

But, the focus of vehicle safety programs should not be exclusively on fire department apparatus, since personal vehicles were the vehicles most frequently involved in road crashes, accounting for almost a third of the road crash deaths from 1997 through 2006. The last edition of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, added a requirement that when members are authorized to respond to incidents or to fire stations in private vehicles, the fire department must establish specific rules, regulations, and procedures relating to the operation of private vehicles in an emergency mode.

NFPA is partnering with many other fire service organizations to co-sponsor the third annual International Fire and EMS Safety Stand Down. The theme of the 2007 Stand Down is "Ready to Respond." This event is an important step in raising awareness across the fire service as to the steps fire departments and individual firefighters can take to reduce the risk of death and injury.

As demonstrated in the accompanying article, real progress in reducing firefighter on-duty fatalities has been made in some areas over the past 30 years. The fact that fewer than 90 firefighters were killed in each of the last two years is further evidence of this. However, sudden cardiac deaths and crashes continue to be major problems. Efforts must continue to reduce the incidence of heart disease among firefighters, especially by addressing the known risk factors. Driver and passenger safety, particularly the use of seatbelts, can have a direct and immediate impact on reducing some of the particularly preventable firefighter fatalities.

References

- 1.The NFPA's files for firefighter on-duty fatal injuries are updated continually for all years.
- 2.For this report, the term *motor vehicle-related incident* refers to motor vehicle collisions (including aircraft and boats) and rollovers, as well as to incidents such as falls from or struck by vehicles where the involvement of the vehicle played an integral role in the death.
- 3.For this report, the term *volunteer* refers to any firefighter whose principle occupation is not that of a full-time, paid member of a fire department. The term *career* refers to any firefighter whose occupation is that of a full-time, paid fire department member.
- 4.The categories for cause of injury and nature of injury are based on the 1981 edition of *NFPA 901, Uniform Coding for Fire Protection*.
- 5.Michael J. Karter, Jr., "U.S. Fire Department Profile Through 2004," NFPA Fire Analysis and Research Division, Quincy, Massachusetts, January 2006. The analysis shown here assumes that the number of firefighters adequately estimates exposure and that the age distribution of career and

volunteer firefighters is similar.

Credits

A study made possible by the cooperation and assistance of the United States fire service, the Public Safety Officers' Benefits Program of the Department of Justice, the United States Fire Administration, the National Institute for Occupational Safety and Health, the Forest Service of the U.S. Department of Agriculture, and the Bureau of Indian Affairs and the Bureau of Land Management of the U.S. Department of the Interior. The authors would also like to thank Thomas Hales, MD, MPH, of NIOSH, and Carl E. Peterson of NFPA's Public Fire Protection Division for their assistance on the study.

U.S. Department of Justice Death, Disability and Educational Benefits for Public Safety Officers and Survivors

Line of duty deaths: The Public Safety Officers' Benefits (PSOB) Act, signed into law in 1976, provides a federal death benefit to the survivors of the nation's federal, state, local and tribal law enforcement officers, firefighters, and rescue and ambulance squad members, both career and volunteer, whose deaths are the direct and proximate result of a traumatic injury sustained in the line of duty. The Act was amended in 2000 to include FEMA employees performing official, hazardous duties related to a declared major disaster or emergency. Effective December 15, 2003, public safety officers are covered for line-on-duty deaths that are a direct and proximate result of a heart attack or stroke, as defined in the Hometown Heroes Survivors Benefits Act of 2003.

A 1988 amendment increased the amount of the benefit from \$50,000 to \$100,000 and included an annual cost-of-living escalator. On October 1 of each year, the benefit increases as a result. The enactment of the USA PATRIOT bill in 2001 increased the benefit to \$250,000. The current benefit is \$295,194, tax free.

A decedent's spouse and minor children usually are the eligible beneficiaries. As a result of the reauthorization of the 2002 Mychal Judge Act, when there is no spouse or children, the PSOB Act now provides the benefits to the individual(s) designated by the officer at the time of death on the most recently executed designation of beneficiary on file with the officer's organization, or on the officer's most recently executed life insurance policy on file with the officer's organization. See the website below for full details.

Line of duty disability: In 1990, Congress amended the PSOB benefits program to include permanent and total disabilities that occur on or after November 29, 1990. The amendment covers public safety officers who are permanently unable to perform any gainful employment in the future. PSOB is intended for those few, tragic cases where an officer survives a catastrophic, line of duty injury. Only then, in the presence of the program's statutory and regulatory qualifying criteria, will PSOB's disability benefit be awarded. The bill's supporters anticipated that few PSOB disability claims would be eligible annually.

Public Safety Officers' Educational Assistance Program (PSOEA): An additional benefit, signed into law in October 1996 and amended in 1998, provides an educational assistance allowance to the spouse and children of public safety officers whose deaths or permanent and total disabilities qualify under the PSOB Act. This benefit is provided directly to dependents who attend a program of education at an eligible education institution and are the children or spouses of covered public safety officers. It is retroactive to January 1, 1978, for beneficiaries who have received or are eligible to receive the PSOB benefit. Students may apply for PSOEA funds for up to 45 months of full-time classes. As of October 1, 2006, the maximum benefit a student may receive is \$860 per month of full-time attendance.

Further benefits information: To initiate a claim for death benefits, to receive additional information on filing a disability claim or to receive additional information about coverage, call, email, or write the Public Safety Officers' Benefits Program, Bureau of Justice Assistance, Office of Justice Programs, U.S. Department of Justice, 810 7th Street, N.W., Washington DC 20531. The telephone number is (888) 744-6513 and the email address is ASKPSOB@usdoj.gov.

Table 1
Comparison of On-Duty Deaths Between
Career and Volunteer Municipal Firefighters, 2006*

	Career Firefighters		Volunteer Firefighters	
	Number of Deaths	Percent of Deaths	Number of Deaths	Percent of Deaths
Type of duty				
Operating at fire ground	9	39 %	17	37%
Responding to or returning from alarm	0	0	17	37
Operating at non-fire emergencies	4	17	2	4
Training	4	17	2	4
Other on-duty	6	26	8	17
TOTALS	23	100 %	46	100 %
Cause of fatal injury				
Exertion/stress/other related	12	52 %	23	50%
Struck by or contact with object	4	17	14	30
Caught or trapped	7	30	6	13
Fell	0	0	1	2
Other	0	0	2	4
TOTALS	23	100 %	46	100 %
Nature of fatal injury				
Sudden cardiac death	9	39 %	23	50%
Internal trauma	2	9	15	33
Asphyxiation	4	17	4	9
Burns	2	9	1	2
Crushing	1	4	2	4
Stroke/aneurysm	2	9	0	0
Drowning	1	4	0	0
Septicemia	1	4	0	0
Electrocution	0	0	1	2
Undetermined	1	4	0	0
TOTALS	23	100 %	46	100 %
Rank				
Firefighter	15	65 %	35	76%
Company officer	7	30	5	11
Chief officer	1	4	6	13
TOTALS	23	100 %	46	100 %

Ages of Firefighters

All deaths

20 and under	0	0 %	3	7%
21 to 25	1	4	4	9
26 to 30	0	0	0	0
31 to 35	4	17	5	11
36 to 40	3	13	4	9
41 to 45	4	17	6	13
46 to 50	3	13	2	4
51 to 55	6	26	2	4
56 to 60	0	0	10	22
Over 60	2	9	10	22
TOTALS	23	100 %	46	100 %

Ages of Firefighters

Sudden cardiac deaths only

20 and under	0	0%	1	4%
36 to 40	1	11	1	4
41 to 45	1	11	3	13
46 to 50	3	33	2	9
51 to 55	4	44	2	9
56 to 60	0	0	7	30
over 60	0	0	7	30
TOTALS	9	100 %	23	100 %

Fire ground deaths by fixed property use

Dwellings and apartments	4	44%	10	59%
Wildland	0	0	5	29
Stores	3	33	2	12
Vacant house	1	11	0	0
Building under renovation	1	11	0	0
TOTALS	9	100 %	17	100 %

Years of service

5 or less	2	9 %	13	28%
6 to 10	4	17	7	15
11 to 15	1	4	4	9
16 to 20	8	35	3	7
21 to 25	3	13	3	7
26 to 30	5	22	1	2
over 30	0	0	12	26
Not reported	0	0	3	7
TOTALS	23	100 %	46	100 %

Attributes of fire ground deaths**

Intentional fires	0	1
Search and rescue operations	2	1

Motor vehicle crashes 1 9

False alarms 1 0

* This table does not include the 20 victims who were employees of or contractors for state or federal land management agencies, or members of prison crews or industrial fire brigades.

** Because these attributes are not mutually exclusive, totals and percentages are not shown.

Figure 1
On-Duty Firefighter Deaths - 1977-2006

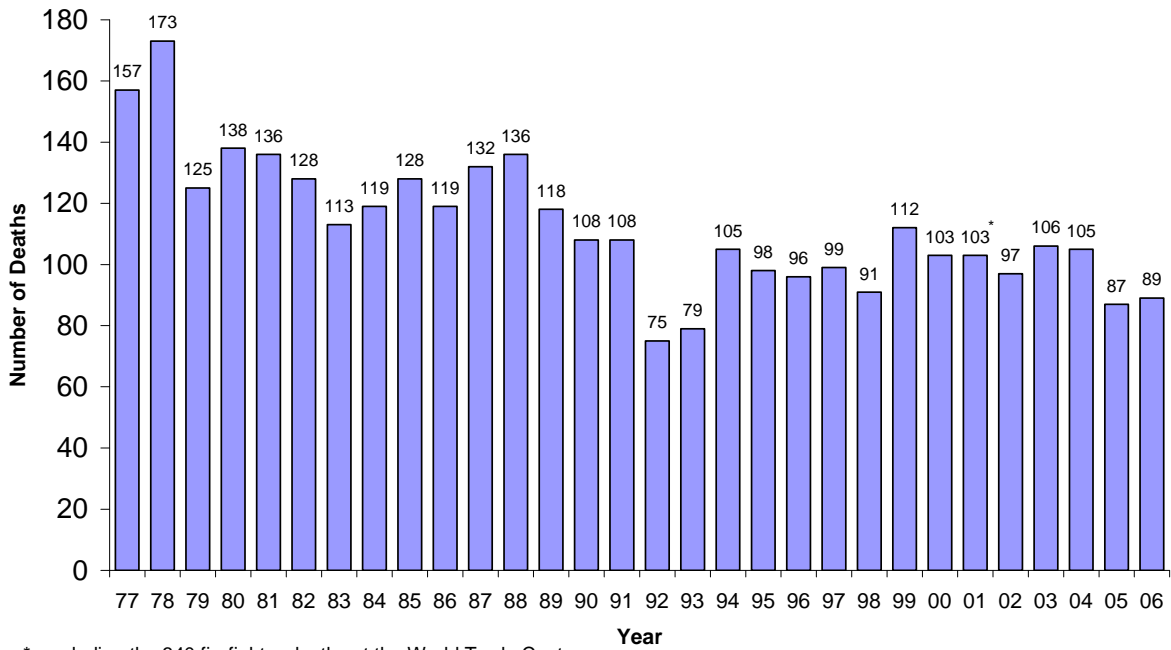


Figure 2
Firefighter Deaths by Type of Duty - 2006

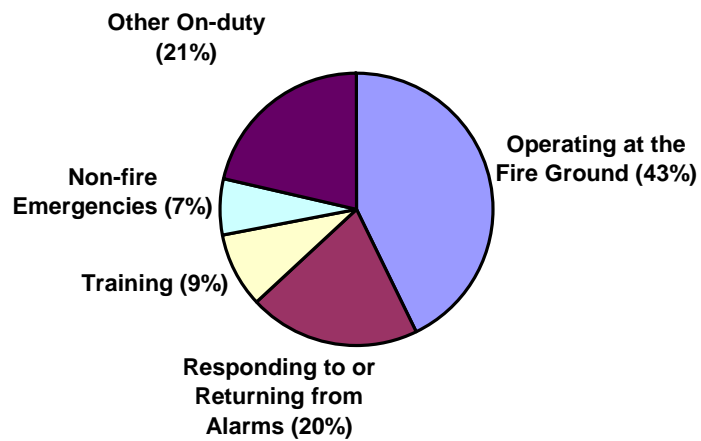


Figure 3
Firefighter Deaths by Cause of Injury -- 2006

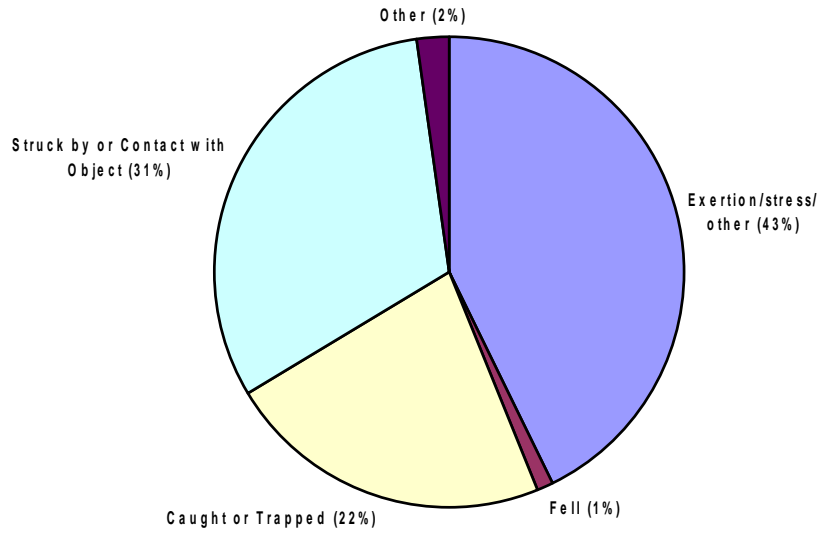


Figure 4
Firefighter Deaths by Nature of Injury - 2006

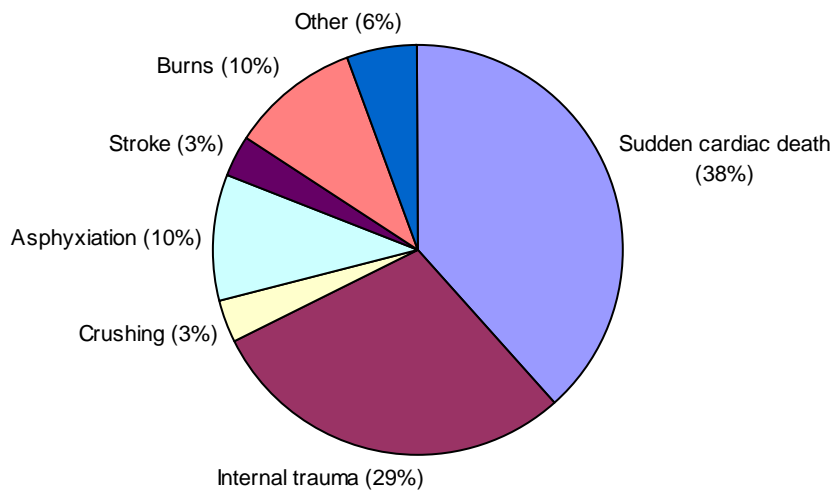


Figure 5
On-Duty Firefighter Deaths by Age and Cause of Death - 2006

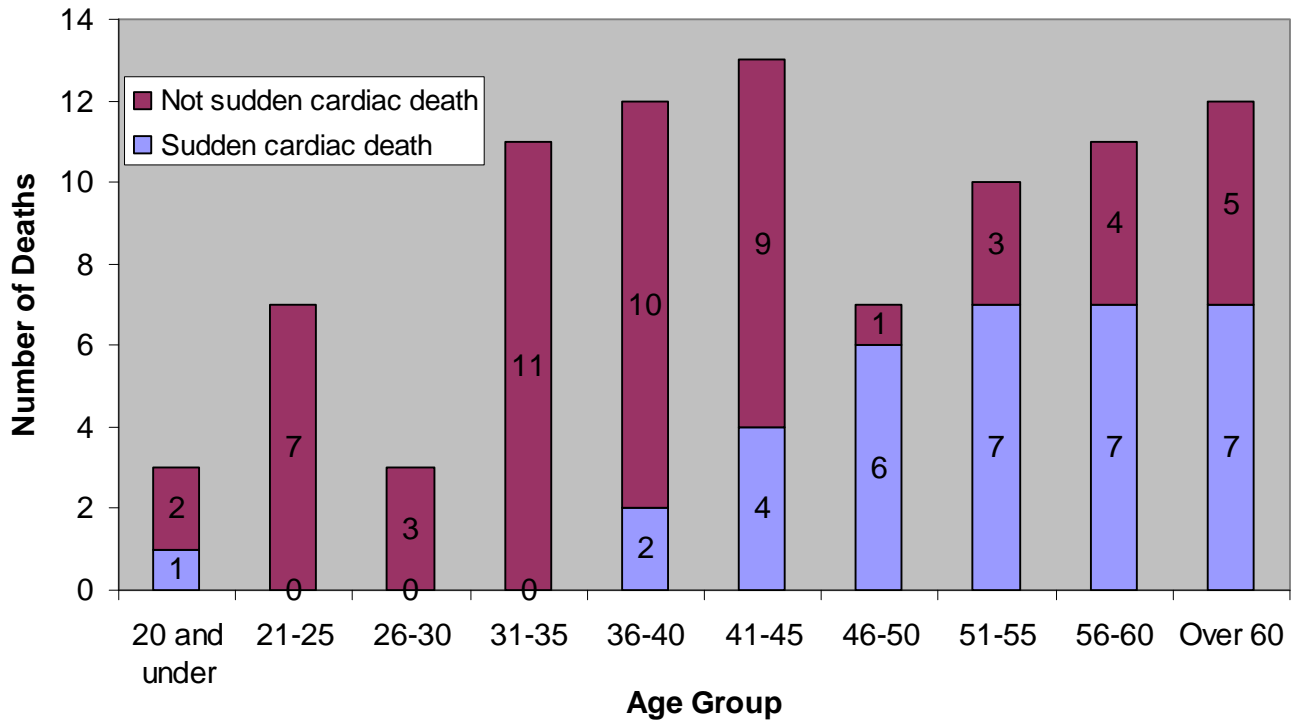
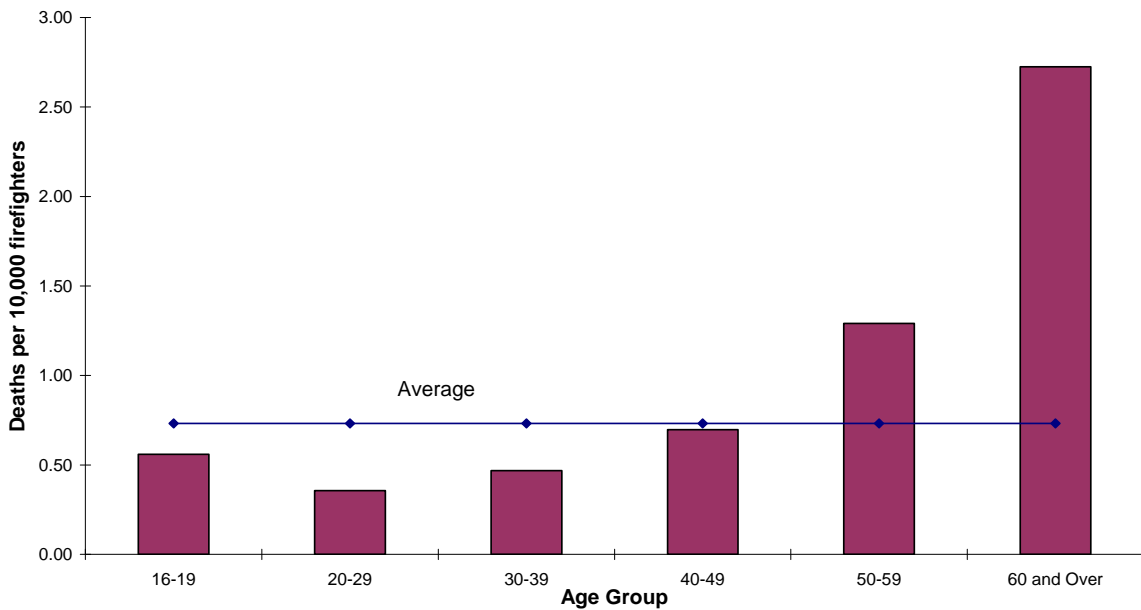
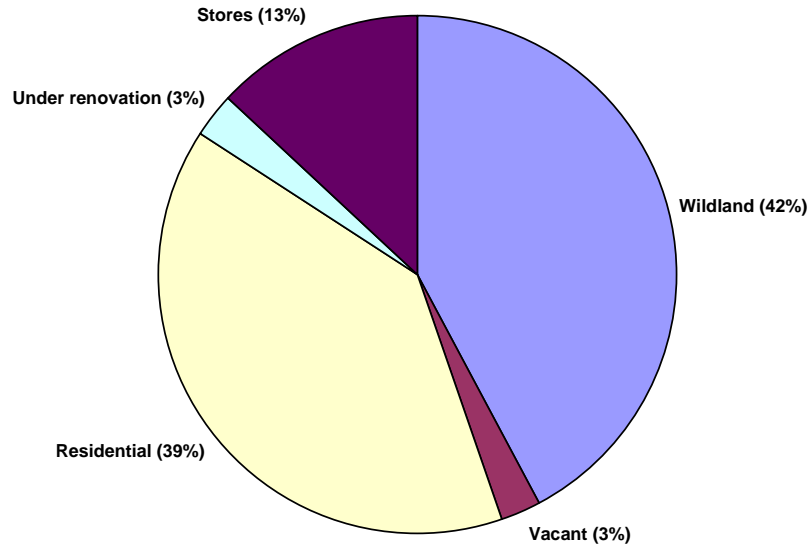


Figure 6
On-Duty Death Rates per 10,000 Career and Volunteer Firefighters 2002-2006*



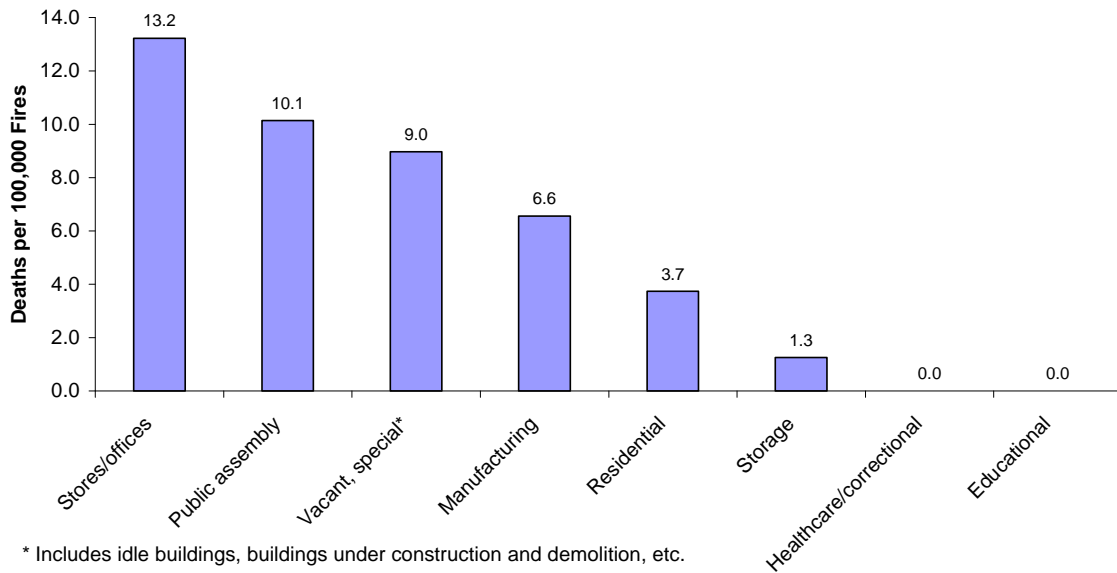
* excluding the 340 firefighter deaths at the World Trade Center in 2001

Figure 7
Fire Ground Deaths by Fixed Property Use -- 2006*



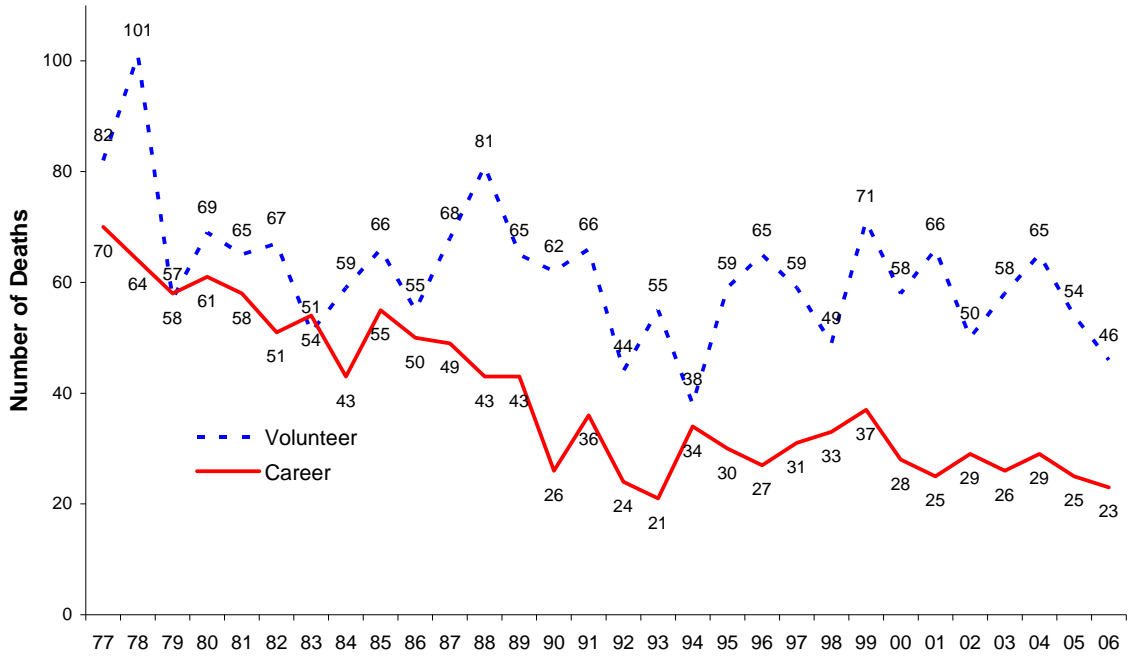
* There were 38 deaths on the fire ground in 2006.

Figure 8
On-Duty Fire Ground Deaths
per 100,000 Structure Fires
2001-2005
(excluding the World Trade Center deaths in 2001)



* Includes idle buildings, buildings under construction and demolition, etc.

Figure 9
Firefighter Deaths - Local Career vs. Local Volunteer
1977 - 2006*



* excluding the 340 firefighter deaths at the World Trade Center in 2001