



**RESEARCH**

# **Firefighter Fatalities in the United States-2017**

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**Abstract**

In 2017, a total of 60 firefighters died while on-duty in the U.S. The largest share of deaths occurred while firefighters were operating at fires (17 deaths). Sudden cardiac death accounted for the largest share of deaths with 29 deaths. There was one multiple-fatality incident where two firefighters were struck and killed and another was injured by a drunk driver at the scene of downed power lines. Deaths among career and volunteer firefighters continued low in 2017, with both at the second lowest level since 1977.

Keywords: Firefighter fatality, statistics, heart attack, sudden cardiac death

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## 2017 Experience

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In 2017, 60 firefighters died while on-duty in the U.S. – the lowest number recorded since NFPA began this study in 1977. The annual average number of deaths over the past decade is 75. [Figure 1](#) shows on-duty firefighter deaths for the years 1977 through 2017, excluding the 340 firefighter deaths at the World Trade Center in 2001, and the cancer-related deaths of responding firefighters that have occurred since 2001.<sup>1</sup>

Of the 60 firefighters who died while on duty in 2017, 32 were volunteer firefighters, 21 were career firefighters, three were employees of federal land management agencies, two were contractors with state and federal land management agencies, and two were prison inmates.<sup>2</sup>

There was one multiple-fatality incidents in 2017: two firefighters were struck and killed and another was injured by a drunk driver at the scene of downed power lines.

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.<sup>3</sup> Finally, the study presents summaries of individual incidents that illustrate important concerns in firefighter safety.

## Introduction

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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 (including EMS calls);
- responding to or returning from an alarm;
- 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 type of firefighters included in this study can be:

- 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 facility or 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 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. (See, for example, the [USFA](#) and [National Fallen Firefighters Memorial](#) websites. \*) Readers comparing reported losses should carefully consider the definitions and inclusion criteria used in any study.

## Long-Term Effects on Firefighters' Physical and Emotional Health

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This study focuses on the deaths of firefighters that are due to specific events while on-duty, but NFPA recognizes that a comprehensive study of on-duty firefighter fatalities would include chronic illnesses, such as cancer or heart disease, that arise from occupational factors and prove fatal. The number of deaths due to long-term exposures, however, cannot be estimated 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. Besides the challenges that firefighter illnesses pose for gaining a complete picture of the firefighter fatality problem, we would be remiss if we did not also monitor the increasingly well-publicized problem of firefighter suicide.

**Suicide** According to the [Firefighter Behavioral Health Alliance](#) (FBHA), 91 firefighters and 17 EMTs and paramedics died by suicide in 2017. †

Due to the efforts of FBHA and others, recognition of the importance of behavioral health programs and peer support for firefighters is becoming more widespread. As with heart disease and cancer, this is a problem that follows firefighters after their careers end, whether in retirement or some

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\* USFA link is <https://www.usfa.fema.gov/>, National Fallen Firefighters' Memorial link is [www.firehero.org](http://www.firehero.org)  
† <http://www.fbha.org/>

other form of separation from the fire service. In 2012, FBHA produced a report, published by the National Volunteer Fire Council (NVFC) with support from USFA, on [behavioral health and suicide prevention](#).<sup>‡</sup> In collaboration with National Fallen Firefighters Foundation (NFFF), the Medical University of South Carolina has developed [a training course](#)<sup>§</sup> for counselors who work with firefighters. The NVFC has a program for firefighters, EMTs and their families called *Share the Load* that points them to resources and support for mental well-being.<sup>\*\*</sup> The International Association of Fire Fighters (IAFF) offers a peer-support training course for their members.

*NFPA 1500, Standard on Fire Department Occupational Safety and Health Program*, requires access to a behavioral health program that provides assessment, counseling and treatment for such issues as stress, anxiety, and depression. The goal of such programs is to change the culture of the fire service, help people to identify the warning signs, eliminate any stigma associated with mental health issues and asking for help, and provide training and assistance with retirement planning. According to FBHA statistics, almost one-fifth of the firefighters and EMTs who died by suicide were retired firefighters and EMTs. Early recognition and treatment of behavioral health issues are key to addressing this problem.

**Cancer** Regarding the long-term health effects of firefighting, there has been a vast change in the attention now paid to cancer risk and cancer prevention in the fire service. These efforts include research, education, behavioral changes and a variety of controls to minimize exposure to contaminants.

The National Institute for Occupational Safety and Health (NIOSH) undertook two large studies focused on firefighter cancer and concluded that firefighters face a 9 percent increase in cancer diagnoses, and a 14 percent increase in cancer-related deaths, compared to the general population in the U.S. The first study was a multi-year project to examine the cancer risk of firefighters, using health records of approximately 30,000 current and retired career firefighters from three large city fire departments to look at mortality and cancer incidents. The second study looked at exposure-response among 20,000 firefighters from the same fire departments. [Results of the first phase](#), which reported evidence of a relationship between firefighting and cancer, were published in October, 2013.<sup>††</sup> [Results of the second study](#), published in 2015, showed a relationship between firefighting and lung cancer and leukemia.<sup>‡‡</sup>

In efforts to raise awareness in the fire service of the heightened risk of cancer and ways to reduce exposures, valuable video presentations have been produced by organizations including, among

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<sup>‡</sup> [http://www.nvfc.org/wp-content/uploads/2015/09/ff\\_suicide\\_report.pdf](http://www.nvfc.org/wp-content/uploads/2015/09/ff_suicide_report.pdf)

<sup>§</sup> <http://training.helping-heroes.org/user/login>

<sup>\*\*</sup> <http://www.nvfc.org/programs/share-the-load-program/>

<sup>††</sup> [http://www.cdc.gov/niosh/firefighters/pdfs/OEM\\_FF\\_Ca\\_Study\\_10-2013.pdf](http://www.cdc.gov/niosh/firefighters/pdfs/OEM_FF_Ca_Study_10-2013.pdf)

<sup>‡‡</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4558385/>

others, the [Boston Fire Department](#)<sup>§§</sup>, the [University of Cincinnati and Cincinnati Fire Department](#)<sup>\*\*\*</sup> and the [National Fallen Firefighters Foundation](#).<sup>†††</sup> These videos help to inform firefighters of the steps they can take to address the hazards they face. Other efforts to inform the fire service of safe practices stem from research undertaken by the Fire Protection Research Foundation, including an on-going [four-phase study](#)<sup>‡‡‡</sup> to enhance the cleaning procedures for PPE that are outlined in [NFPA 1851](#), *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, and an earlier [respiratory exposure study](#)<sup>§§§</sup> that was completed in 2012. The [Firefighter Cancer Support Network](#) is an excellent resource for access to information on health-related topics and support and mentorship following a cancer diagnosis.<sup>\*\*\*\*</sup>

Although we cannot identify the total number of fire service-related cancer deaths that occur each year, the International Association of Fire Fighters alone lists on its [website](#) more than 120 firefighter cancer deaths that were reported to them in 2017.<sup>††††</sup>

**Cardiac Issues** In contrast to the recent strong focus on firefighter cancer and suicide, heart disease has been recognized as a serious health issue for the fire service for quite some time now.<sup>4</sup> Sudden cardiac death has consistently accounted for the largest share of on-duty firefighter deaths since the NFPA began this study in 1977. The NFPA has several standards that focus on the health risks to firefighters. For example, [NFPA 1582](#), *Standard on Comprehensive Occupational Medical Program for Fire Departments*, outlines for fire departments the medical requirements that must be met by candidate firefighters and incumbent fire department members. [NFPA 1500](#) calls for fire departments to establish a firefighter health and fitness program that meets [NFPA 1583](#), *Standard on Health-Related Fitness Programs for Fire Department Members*, and requires that firefighters meet the medical requirements of [NFPA 1582](#).

Information on developing a wellness-fitness program is available from other organizations, for example, the [IAFC/IAFF Fire Service Joint Labor-Management Wellness-Fitness Initiative](#)<sup>††††</sup> and [NVFC's Heart-Healthy Firefighter Program](#).<sup>§§§§</sup> The Heart-Healthy Firefighter Program was launched

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<sup>§§</sup> <https://www.youtube.com/watch?v=hOvBypsaHog>

<sup>\*\*\*</sup> <https://www.youtube.com/watch?v=Y-7I0U3323Y>

<sup>†††</sup> <http://www.everyonegoeshome.com/2016/02/17/the-silent-killer/>

<sup>‡‡‡</sup> <http://www.nfpa.org/PPECleaning>

<sup>§§§</sup> <https://www.nfpa.org/News-and-Research/Fire-statistics-and-reports/Research-reports/For-emergency-responders/Respiratory-Exposure-Study-for-Fire-Fighters>

<sup>\*\*\*\*</sup> <http://www.firefightercancersupport.org/>

<sup>††††</sup> <http://www.iaff.org/hs/lodd/advancedSearch.asp>

<sup>‡‡‡‡</sup> <http://www.iaff.org/library/pdfs/HS/WFI%203rd%20Edition%20Low%20Resolution.pdf>

<sup>§§§§</sup> <http://www.healthy-firefighter.org/>



in 2003 to address heart attack prevention for all firefighters and EMS personnel, through fitness, nutrition and health awareness.

We will continue to report on deaths that result from specific on-duty activities in this study, but NFPA is focused on all aspects of health and safety in the fire service, and EMS, as evidenced particularly by the Fire Protection Research Foundation's work on cancer prevention behaviors and the health and wellness provisions of [NFPA 1500](#) and [NFPA 450](#), *Guide for Emergency Medical Services and Systems*. The remainder of this report will focus on the on-duty fatalities in 2017.

## Type of Duty

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In this report, we look at four major categories for types of duty that firefighters were engaged in when they were fatally injured or suffered fatal medical events – fire ground, non-fire emergencies, responding to or returning from fires and emergency calls, and training. The remaining deaths occurred while firefighters were engaged in other on-duty activities.

[Figure 2](#) shows the distribution of the 60 deaths by type of duty. The largest share of deaths occurred while firefighters were operating at fires (17 deaths).

The 17 fireground deaths in 2017 is the second lowest number of fireground deaths that we have observed since we began doing this study in 1977, and the second consecutive year that the number has been below 20. In contrast, in the early 1970s, the number of fireground deaths annually averaged more than 80 deaths per year.

Nine of the 17 fireground deaths occurred at structure fires and eight occurred at wildland fires. Seven of the 17 fireground victims were volunteer firefighters, five were career firefighters, two were members of inmate firefighting crews, one was a state contractor, one was a federal contractor, and one was a federal wildland firefighter.

Eleven firefighters died at non-fire emergencies – five were operating at motor vehicle crashes, three were at incidents with wires down, one was at the scene of a downed tree, one was investigating an odor in a structure and one was checking on a possible flooding condition during a storm. Ten of the 11 were struck by passing vehicles and one suffered sudden cardiac death.

Ten deaths occurred during training activities. Sudden cardiac death claimed the lives of seven of the firefighters. Three of these seven firefighters were engaged in physical fitness training; two were involved in search and rescue training; one was training on vehicle extrication and one was involved in hose training. Two of the other three training deaths resulted from traumatic injuries. One of these firefighters fell from an aerial ladder during above ground fire training. Another was involved in a motor

vehicle crash while traveling to an off-site drill. One firefighter died shortly after developing complications from a recent medical procedure while he was attending a classroom refresher class at the fire station.

Nine firefighters were killed responding to or returning from alarms. This is by far the lowest number of deaths while responding to or returning from alarms in the 41 years of this study. Five of these nine firefighters were killed in motor vehicle crashes. Three suffered fatal cardiac events and another suffered a stroke. All crashes and sudden cardiac deaths are discussed in more detail later in this report. Seven of the victims were volunteer firefighters; one was a career firefighter and one was a wildland firefighter. The number of deaths that occurred while responding to or returning from calls has averaged 17 per year over the past 10 years and 13 per year over the past five years. The first 10 years that NFPA conducted this study (1977 through 1986), the average number of deaths per year while responding to or returning from alarms was 36. There has been a marked reduction in both crash deaths and cardiac-related deaths while responding to or returning from alarms over the past 40 years.

The remaining 13 firefighters died while involved in a variety of normal station or administrative activities. Eleven of these fatalities were due to sudden cardiac death and one to a stroke. One firefighter was killed in a crash while on fire department business.

## Cause of Fatal Injury or Illness

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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.<sup>5</sup>

Overexertion, stress and medical issues accounted for by far the largest share of deaths. Of the 32 deaths in this category, 29 were classified as sudden cardiac deaths (usually heart attacks), two were due to strokes and one was due to the medical procedure mentioned above. See the section below for more details on sudden cardiac deaths.

The second leading cause of fatal injury was struck by vehicles, which claimed 10 lives. Eight other firefighters were killed in crashes. These vehicle-related deaths are discussed in detail later in this report.

Five firefighters were struck and killed by objects – three by trees that fell at separate wildland fires, one by a hose he had just wrapped around a fire hydrant, and one by a chainsaw when he lost his balance while cutting a fire line on a wildland fire.

Three firefighters were killed by rapid fire progress – two while operating on separate wildland fires and one at a structure fire.

Two firefighters fell from ladders – one while climbing an aerial ladder during a high-rise fire training exercise and another from the basket of an aerial while fighting a structure fire.

## Nature of Fatal Injury or Illness

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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. As in almost every year since 1977, sudden cardiac death accounted for the largest share of the deaths annually, with 29 deaths. Sudden cardiac deaths will be discussed in more detail in the next section.

The next leading cause of death was internal trauma and crushing, with 24 deaths.

Three firefighters died of burns, and there were two deaths due to stroke and one each to laceration and complications from a medical procedure.

## Sudden Cardiac Deaths

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In 2017, 29 sudden cardiac deaths resulted with onset while the victim was on-duty. This is the fourth time in the last six years that the toll has been below 30, but still accounts for almost half of the deaths while on duty in 2017. Cardiac-related events accounted for 43 percent of the on-duty fatalities over the past 10 years.

From 1977 through 1986, an average of 60 firefighters a year suffered sudden cardiac deaths while on duty (44.7 percent of the on-duty deaths during that period). These are cases in which the onset of symptoms occurred while the victim was on-duty and death occurred immediately or shortly thereafter. The average number of deaths fell to 44 a year in the 1990s and to 33 in the past decade. In spite of this reduction, sudden cardiac death continues to be the number one cause of on-duty firefighter fatalities in the U.S. and in almost every year has accounted for the single largest share of deaths in the year. In addition, countless deaths occur annually of current and former firefighters whose health was compromised during their years in the fire service. For 2017, the U.S. Fire Administration is processing more than 20 fatalities that potentially qualify for federal death benefits under the Hometown Heroes Act (deaths within 24 hours of non-routine strenuous or stressful physical activity).

## Ages of Firefighters

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The firefighters who died in 2017 ranged in age from 19 to 83, with a median age of 51.5 years. [Figure 5](#) shows the distribution of firefighter deaths by age and whether the cause of death was sudden cardiac death or not.

Sudden cardiac death accounts for a higher proportion of the deaths among older firefighters, as might be expected. More than half of the firefighters over age 40 who died in 2017 died of heart attacks or other cardiac events. Interestingly, four of the seven firefighters aged 65 and over died of traumatic injuries – two were struck at emergency scenes by vehicles, one was killed in a crash and one was fatally burned on a wildland fire.

[Figure 6](#) shows death rates by age, using combined career and volunteer firefighter fatality data for the five-year period from 2013 through 2017 and estimates of the number of career and volunteer firefighters in each age group from NFPA's 2015 profile of fire departments (the mid-year in the range).<sup>6</sup>

The lowest death rates were for firefighters between 20 and 39. Their death rate was less than half the all-age average. The rate for firefighters aged 60 and over was two and one-half times the average. Firefighters aged 50 and over accounted just over half of all on-duty firefighter deaths over the five-year period, although they represent only one-quarter of all career and volunteer firefighters in the U.S.

## Fireground Deaths

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Of the 17 fireground fatalities, seven were due to sudden cardiac death, six to internal trauma, three to burns and one to laceration. Nine of the 17 deaths occurred at structure fires and eight on wildland fires.

This is the second lowest number of fireground deaths since this study was first done in 1977, and is the second consecutive year that the total has been below 20. Except for 2001 at the World Trade Center and 2013, when an exceptionally high number of firefighters were killed at the scene of fires (19 firefighters on the Yarnell Hill wildland fire and nine in an explosion at a fertilizer plant), deaths on the fireground have been declining fairly steadily since 1999.

[Figure 7](#) shows the distribution of the 17 fireground deaths by fixed property use. The nine deaths at structure fires include six in fires involving one- and two-family dwellings, two in apartment buildings and one death at a fire in a shopping center. One of the single-family homes was vacant and abandoned.

None of the structures in which firefighters died was reported to have had an automatic fire suppression system.

Of the eight firefighters who died at wildland fire incidents – three were struck by falling trees, two were overrun by fire in separate incidents, one was fatally cut by his chainsaw, one crashed his vehicle while on his way to refilling his water tank, and one suffered a sudden cardiac event. In 2017, no firefighters died at the scene of motor vehicle fires.

To put the hazards of firefighting in various types of structures into perspective, the authors examined the number of fireground 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 2012 through 2016 (the 2017 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 some nonresidential structures, such as manufacturing, public assembly, storage and mercantile properties, are more hazardous to firefighters, on average. There were 8.6 fireground deaths per 100,000 nonresidential structure fires from 2012 through 2016, compared to 3.5 deaths per 100,000 residential structure fires. The highest death rates over the five-year period occurred in manufacturing properties. The very high rate over this time period is largely influenced by the fertilizer plant fire in 2013 that killed nine firefighters. The high rate for public assembly properties is influenced by two multiple-fatality deaths in the same year that claimed seven lives. The low rate in educational and healthcare/correctional properties over that five-year period may reflect the fact that these occupancies are among the most regulated, most-protected 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 rate in that five-year period for stores/offices and storage properties, which includes garages at dwellings, reflects the relatively small number of fatalities that have occurred in such structures in recent years.

From 2008 through 2017, there were 19 deaths in 17 fires in vacant buildings and buildings under demolition or renovation.

## Vehicle-Related Deaths

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In 2017, 18 firefighters died in vehicle-related incidents, including 10 firefighters who were struck by vehicles and eight who died in vehicle crashes. These results are very different from what we usually observe in a year. The 10 deaths of firefighters struck by vehicles is far higher than the average

of four deaths a year over the previous 30 years. Only twice before has the total been 10 or higher. In contrast, crash fatalities, which used to consistently account for the highest share of traumatic deaths annually, are below 10 for the fourth time in the past seven years.

Five of the firefighters were at the scene of motor vehicle crashes. A firefighter directing traffic on a dark road at the scene of a motor vehicle crash was struck by a driver who did not see him until it was too late to avoid him. A firefighter guiding an engine that was backing along the road at the scene of a crash was struck by the engine. It was not clear if he tripped or fell beneath the vehicle. And a firefighter who was returning to his vehicle after operating at a crash scene was killed by a vehicle that lost control while traveling at a high rate of speed on a dark, wet, slippery road. A firefighter reportedly walking down the middle of the road after finishing up at a scene was struck by a passing vehicle. The driver was not cited. And a firefighter retrieving his gear from his vehicle was struck by another responding firefighter who was intoxicated.

Three of the firefighters fatally struck by vehicles were at the scene of downed wires. Two firefighters were killed in one incident when they, and another firefighter, were standing off the road but were struck by a vehicle that veered off the main road. The driver was intoxicated. In the other incident involving downed wires, the victim was standing in front of a parked fire department vehicle that was struck in a chain reaction crash when a driver failed to stop for another vehicle that had slowed at the scene.

During a pre-dawn check of flooding conditions, a firefighter was struck and killed by a passing driver traveling at a high rate of speed. At the scene of a downed tree, a firefighter was killed when a driver struck his vehicle which then struck a brush truck that pinned the firefighter underneath. All emergency vehicles at the scene had lights operating and the victim was wearing appropriate reflective clothing. The driver was cited for impaired and reckless driving.

Four of the eight firefighters who died in road crashes were killed while responding to fires and one was killed while returning from a fire. One was driving to a training event, one was on official fire department business and one was operating at the scene of a wildland fire.

- A firefighter driving a tanker to a structure fire lost control of the vehicle and was ejected. The vehicle rolled over, pinning him. The vehicle was equipped with seatbelts, but he was not wearing his.
- A firefighter responding to a house fire in his personally-owned vehicle was struck at an intersection by a drunk driver in a stolen vehicle who failed to stop at a stop sign. Although the firefighter was reportedly wearing his seatbelt, he was partially ejected.

- A firefighter was driving a tanker to a house fire when the vehicle left the road and tipped over, sliding into an embankment. The tank came loose from the vehicle and struck the cab, killing the driver.
- A firefighter driving to a field fire in an engine went off the road on a curve, lost control and overturned. The firefighter was ejected from the vehicle.
- A firefighter returning home from working on a wildland fire was struck head on by an oncoming vehicle when it blew a tire. There was no information available on seatbelt use, but the driver was not ejected.
- A firefighter who was passenger in a personally-owned vehicle traveling to a training exercise was ejected when the vehicle went off the snow-covered road into a ditch and overturned. He was not wearing a seatbelt. Two other firefighters in the vehicle were wearing their seatbelts and survived.
- A firefighter driving a brush truck on fire department business was waiting at an intersection to make a left turn when the truck was rear-ended by a tractor trailer, and then struck again by an oncoming vehicle.
- A firefighter was driving an empty tanker to refill it while operating on a wildland fire. He lost control on a downhill curve, crashed through a guardrail and down a ravine. No other details were available.

Of the firefighters mentioned above who died in crashes, one was using a seatbelt, three were not using seatbelts, and no details on seatbelt use were reported for four victims. Three of the victims were ejected from the vehicles and another was partially ejected.

NFPA publishes several standards related to road and vehicle 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 and Emergency Services 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, Maintenance, Testing, 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.

- *NFPA 1901, Standard for Automotive Fire Apparatus*, addresses vehicle stability to prevent rollovers, and gives manufacturers options on how to provide it. New vehicles will have their maximum speed limited, based on their weight, and will have vehicle data recorders to monitor, among other things, acceleration and deceleration, and seatbelt use.
- *NFPA 1906, Standard for Wildland Fire Apparatus*, establishes minimum design, performance and testing requirements for new vehicles over 10,001 lb. gross vehicle weight (4,500 kg) rating that are specifically designed for wildland fire suppression. *NFPA 1091, Standard for Traffic Control Incident Management Professional Qualifications*, just published in 2015, identifies the minimum job performance requirements necessary to perform temporary traffic control duties at emergency incidents on or near an active roadway.
- *NFPA 414, Standard for Aircraft Rescue and Fire-Fighting Vehicles*, covers the criteria for design, performance, and acceptance of aircraft rescue and fire-fighting vehicles that carry personnel and equipment to the scene of an aircraft emergency.

The provisions of *NFPA 1500, Standard on Fire Department Occupational Safety and Health Program*, include requirements that operators successfully complete an approved driver training program, possess a valid driver's license for the class of vehicle, and operate the vehicle in compliance with applicable traffic laws. All vehicle occupants must be seated in approved riding positions and secured with seatbelts before drivers move the apparatus, and drivers must obey all traffic signals and signs and all laws and rules of the road. This includes coming to a complete stop when encountering red traffic lights, stop signs, stopped school buses with flashing warning lights, blind intersections and other intersection hazards, and unguarded railroad grade crossings. Passengers are required to remain seated and must not release or loosen their seatbelts for any reason while the vehicle is in motion. In related efforts, the USFA has an excellent [website](http://www.usfa.fema.gov/operations/ops_vehicle.html) with resources on emergency vehicle and roadway operations safety. \*\*\*\*

The focus of vehicle safety programs should not be exclusively on fire department apparatus, since, over the years, private vehicles have been the vehicles most frequently involved in road crashes. *NFPA 1500, Standard on Fire Department Occupational Safety and Health Program*, includes 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 1451, Standard for a Fire and Emergency*

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\*\*\*\* [http://www.usfa.fema.gov/operations/ops\\_vehicle.html](http://www.usfa.fema.gov/operations/ops_vehicle.html)



*Services Vehicle Operations Training Program*, also requires training for those using privately-owned vehicles.

Requirements are also in effect for emergency personnel operating on roadways. The 2009 version of the Federal Highway Administration's Manual of Uniform Traffic Control Devices (MUTCD) requires anyone working on a roadway to wear an ANSI 107-compliant high-visibility vest. An exemption was created for firefighters and others engaged on roadways that allows them to wear NFPA-compliant personal protective clothing (turn-out gear) when directly exposed to flames, heat and hazardous material. NFPA 1500 requires firefighters working on traffic assignments where they are endangered by motor vehicle traffic to wear clothing with fluorescent and retroreflective material and use fire apparatus in a blocking position to protect firefighters. The 2009 edition of NFPA 1901 requires that ANSI 207-compliant breakaway high-visibility vests be carried on all new fire apparatus, and MUTCD 2009 allows emergency responders to use them in lieu of ANSI 107-compliant apparel. Advice on compliance with the updated Federal rules can be found at: [MUTCD](#).<sup>††††</sup> [NFPA 1901](#) also requires reflective striping for improved visibility on new apparatus and a reflective chevron on the rear of fire apparatus. Advice on how to improve visibility of existing apparatus can be found at: [video](#).<sup>†††††</sup>

## Career/Volunteer Comparison

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[Figure 9](#) compares the number of deaths of career firefighters and volunteer firefighters from local fire departments since the study was first done in 1977. The 21 deaths of career firefighters while on-duty in 2017 is a slight increase over the 19 reported in 2016, which was the lowest total ever reported in this study. In the earliest years of this study, the annual average number of deaths of career firefighters while on duty was 57. The 31 deaths of volunteer firefighters is the second lowest total in all the years of thispage 13 study, and brings the average number of deaths in the most recent 10-year period to fewer than 40 deaths per year -- far lower than the average of 67 deaths per year in the earliest years of this study.

A breakdown of the fatality experience of the 52 career and volunteer firefighters killed in 2017 is shown in [Table 1](#).

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<sup>†††††</sup>[http://www.respondersafety.com/Articles/2009\\_Edition\\_of\\_the\\_Manual\\_on\\_Uniformed\\_Traffic\\_Control\\_Devices\\_MUTCD\\_Released\\_December\\_16\\_2009.aspx](http://www.respondersafety.com/Articles/2009_Edition_of_the_Manual_on_Uniformed_Traffic_Control_Devices_MUTCD_Released_December_16_2009.aspx)

<sup>†††††</sup> <http://www.respondersafety.com/MarkedAndSeen.aspx>

## Intentional Fires and False Calls

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One firefighter was killed and two others were injured as a result of one intentionally-set fire in 2017, in a gym at a shopping center. The victim and his partner were pulling ceiling tiles to gain access to fire in the attic when they were overcome by rapidly developing fire. Another firefighter was injured while searching for the downed firefighters. From 2008 through 2017, 41 firefighters (5.5 percent of all on-duty deaths) died in connection with intentionally-set fires, either at the fire or while responding to or returning from the fire.

In 2017, no deaths resulted during a false call. Over the past 10 years, six firefighter deaths have resulted from false calls, including malicious false alarms and alarm malfunctions.

## In Summary

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There were 60 on-duty firefighter deaths in 2017, the lowest number we've reported since 1977, when NFPA began producing this study. Sudden cardiac death accounted for more than half of the fatalities.

The number of firefighters who were fatally struck by vehicles was unusually high in 2017, while the number of crash deaths continued to occur at a rate far lower than what we've seen in past decades.

The number of deaths at the scene of fires continued far lower than usual – 17 deaths, only two more than reported in 2016, with nine at structure fires and eight at wildland fires.

Deaths among career and volunteer firefighters continued low in 2017, with both at the second lowest level since 1977.

The hazardous nature of firefighting cannot be fully captured in a study that focuses only on deaths that occur while firefighters are on the job, but it is not possible to accurately assess the total number of deaths and injuries that have resulted annually due to long-term exposures to carcinogens and physical and emotional stress and strain. This report focuses on the deaths of firefighters resulting from specific injuries or exposures while on duty in 2017. A complete picture of duty-related fatalities would also include the cancer, cardiac, stress and other fatalities that were caused by exposures to toxins or the emotional toll of responses. Other sources can provide some perspective on these aspects of the overall fatality problem. As mentioned above, the IAFF lists on its website more than 120 firefighter cancer deaths that were reported to them in 2017 and FBHA reports 91 firefighters and 17 EMTs and paramedics died by suicide in 2017. Over the past several years, in their annual report on U.S. firefighter

deaths, the U.S. Fire Administration has included an average of 15 firefighters a year who qualified for Hometown Hero benefits, which cover firefighters who suffer a heart attack or stroke within 24 hours after engaging in non-routine stressful or strenuous activity on duty. The USFA is following up on more than 20 such fatalities in 2017.

NFPA's Fire Protection Research Foundation is currently involved in three studies – a 30-year cohort study to track exposures and their effects, a study to validate procedures for the optimal removal of several types of contaminants from firefighting gear, and the third is a study to develop prototypes for real-time particulate and toxic gas sensors to alert firefighters to hazards in the air. The Foundation recently released a report on the development and implementation of a Fire Service Contaminant Control campaign. The findings from these studies will inform relevant NFPA standards for the fire service as well as educational and training programs aimed at reducing firefighter exposures.

## References

1. The NFPA's files for firefighter on-duty fatal injuries are updated continually for all years.
2. For this report, the term *volunteer* refers to any firefighter whose principal 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.
3. 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.
4. E. S. Soteriades, D. L. Smith, A. J. Tsismenakis, D. M. Baur, and S. N. Kales, "Cardiovascular Disease in US Firefighters: A Systematic Review," *Cardiology in Review*, Vol. 19, No. 4, July/August 2011, pp. 202-215.
5. The categories for cause of injury and nature of injury are based on the 1981 edition of NFPA 901, *Uniform Coding for Fire Protection*.
6. H. J. G. Haynes and G. P. Stein, "[U.S. Fire Department Profile 2015](#)," National Fire Protection Association, Quincy, Massachusetts, April 2017.

## **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-of-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. The Dale Long PSOB Improvements Act of 2012 expands the Hometown Heroes Act to include vascular ruptures.

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 changes as a result. The enactment of the USA PATRIOT bill in 2001 increased the benefit to \$250,000. As of October 1, 2017, the current benefit is \$350,079, a lump sum and tax free benefit.

A decedent's spouse and minor children are the first eligible beneficiaries for PSOB Program purposes. In cases in which the public safety officer had no surviving spouse or eligible children, the death benefit is to be awarded to either the individual most recently designated as beneficiary for PSOB benefits with the officer's public safety agency, organization, or unit, or, if there is no designation of beneficiary of PSOB benefits on file, then to the individual designated as beneficiary under the most recently executed life insurance policy on file with the agency at the time of death. (*See* 42 U.S.C. § 3796(a)(4) for specific details.) If no individuals qualify under 42 U.S.C. § 3796(a)(4), then the benefit is paid to the public safety officer's surviving parents; if the officer is not survived by a parent, the benefit may be paid to the officer's children who would be eligible to receive it but for their age (i.e., adult children).

**Line of duty disabilities:** 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 death benefit. Students may apply for PSOEA funds for up to 45 months of full-time classes. As of October 1, 2017, the maximum benefit a student may receive is \$ 1,041 per month of full-time attendance.

**Further benefits information:** 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 Office, Bureau of Justice Assistance, Office of Justice Programs, U.S. Department of Justice, 810 7<sup>th</sup> Street, N.W., Washington DC 20531. The telephone number is (888) 744-6513 and the email address is AskPSOB@usdoj.gov. Please note that the PSOB Customer Resource Center is available to take calls Monday through Friday from 8:00 AM until 4:30 PM ET. PSOB death claims can be filed online as well at: <https://www.psob.bja.ojp.gov/benefits/>.

**Table 1**  
**Comparison of On-Duty Deaths Between**  
**Career and Volunteer Firefighters, 2017\***

	<b>Career Firefighters</b>		<b>Volunteer Firefighters</b>	
	<b>Number of Deaths</b>	<b>Percent of Deaths</b>	<b>Number of Deaths</b>	<b>Percent of Deaths</b>
<b>Type of Duty</b>				
Operating at fireground	5	24 %	7	22 %
Responding to or returning from alarms	1	5 %	7	22 %
Operating at non-fire emergencies	1	5 %	10	31 %
Training	5	24 %	4	13 %
Other on-duty	9	43 %	4	13 %
<b>TOTALS</b>	<b>21</b>	<b>100 %</b>	<b>32</b>	<b>100 %</b>
<b>Cause of Fatal Injury</b>				
Overexertion/stress/other related	15	71 %	16	50 %
Motor vehicle crash	1	5 %	5	16 %
Fell	2	10 %	0	0 %
Struck by vehicle	1	5 %	9	28 %
Struck by object	0	0 %	1	3 %
Rapid fire progress	2	10 %	1	3 %
<b>TOTALS</b>	<b>21</b>	<b>100 %</b>	<b>32</b>	<b>100 %</b>
<b>Nature of Fatal Injury</b>				
Sudden cardiac death	13	62 %	15	47 %
Internal trauma/crushing	4	19 %	15	47 %
Stroke	1	5 %	1	3 %
Burns	2	10 %	1	3 %
Medical complications	1	5 %	0	0 %
<b>TOTALS</b>	<b>21</b>	<b>100 %</b>	<b>32</b>	<b>100 %</b>
<b>Rank</b>				
Firefighter	13	62 %	21	66 %
Company officer	4	19 %	3	9 %
Chief officer	4	19 %	8	25 %
<b>TOTALS</b>	<b>21</b>	<b>100 %</b>	<b>32</b>	<b>100 %</b>

**Table 1**  
**Comparison of On-Duty Deaths Between**  
**Career and Volunteer Firefighters, 2017\*, (Continued)**

	<b>Career Firefighters</b>		<b>Volunteer Firefighters</b>	
	<b>Number of Deaths</b>	<b>Percent of Deaths</b>	<b>Number of Deaths</b>	<b>Percent of Deaths</b>
<b>Ages of Firefighters</b>				
<b>All deaths</b>				
26 to 30	1	5 %	3	9 %
31 to 35	2	10 %	2	6 %
36 to 40	1	5 %	1	3 %
41 to 45	4	19 %	2	6 %
46 to 50	3	14 %	2	6 %
51 to 55	7	33 %	6	19 %
56 to 60	3	14 %	6	19 %
61 to 65	0	0 %	3	9 %
Over 65	0	0 %	7	22 %
<b>TOTALS</b>	<b>21</b>	<b>100 %</b>	<b>32</b>	<b>100 %</b>
<b>Ages of Firefighters</b>				
<b>Sudden cardiac deaths only</b>				
26 to 30	0	0 %	1	7 %
31 to 35	0	0 %	1	7 %
36 to 40	1	8 %	0	0 %
41 to 45	2	15 %	1	7 %
46 to 50	3	23 %	2	13 %
51 to 55	5	38 %	1	7 %
56 to 60	2	15 %	6	40 %
61 to 65	0	0 %	1	7 %
Over 65	0	0 %	2	13 %
<b>TOTALS</b>	<b>13</b>	<b>100 %</b>	<b>15</b>	<b>100 %</b>
<b>Fireground Deaths by Fixed Property Use</b>				
Dwellings	3	60 %	5	71 %
Wildland fire	1	20 %	2	29 %
Stores/offices	1	20 %	0	0 %
<b>TOTALS</b>	<b>5</b>	<b>100 %</b>	<b>7</b>	<b>100 %</b>

**Table 1**  
**Comparison of On-Duty Deaths Between**  
**Career and Volunteer Firefighters, 2017\*, (Continued)**

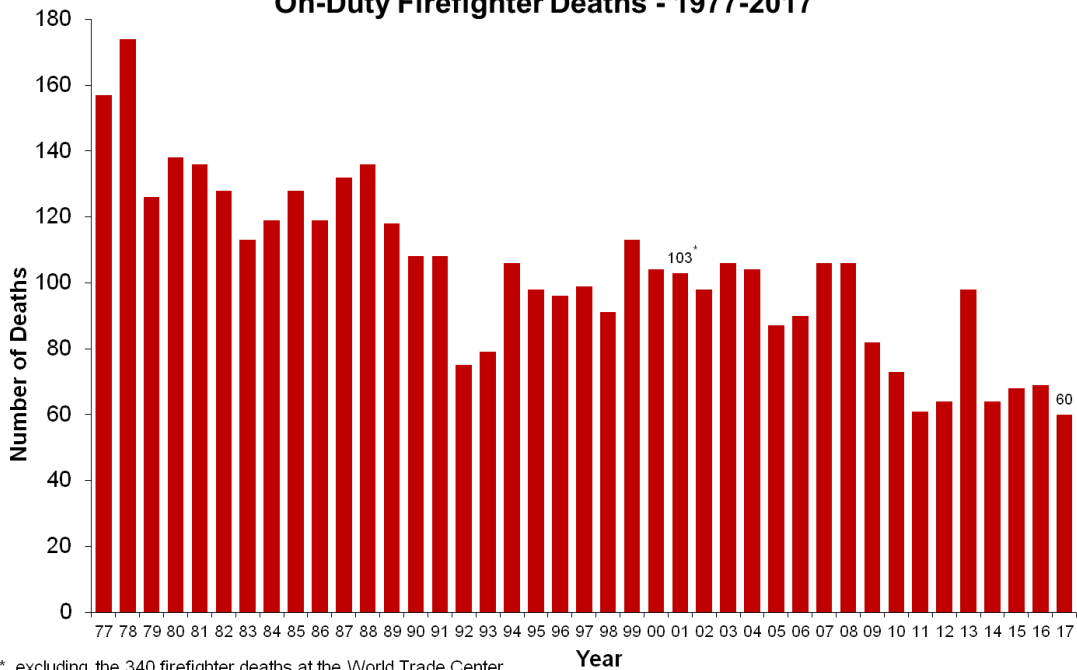
	Career Firefighters		Volunteer Firefighters	
	Number of Deaths	Percent of Deaths	Number of Deaths	Percent of Deaths
<b>Years of Service</b>				
5 or less	2	10 %	6	19 %
6 to 10	3	14 %	3	9 %
11 to 15	1	5 %	2	6 %
16 to 20	4	19 %	3	9 %
21 to 25	7	33 %	3	9 %
26 to 30	4	19 %	3	9 %
Over 30	0	0 %	9	28 %
Not reported	0	0 %	3	9 %
<b>TOTALS</b>	<b>21</b>	<b>100 %</b>	<b>32</b>	<b>100 %</b>
<b>Attributes of Fireground Deaths**</b>				
Intentionally-set fires	1		0	
Search and rescue operations	1		0	
<b>Motor Vehicle Crashes</b>	<b>1</b>		<b>5</b>	
<b>False Alarms</b>	<b>0</b>		<b>0</b>	

Source: NFPA's Fire Incident Data Organization.

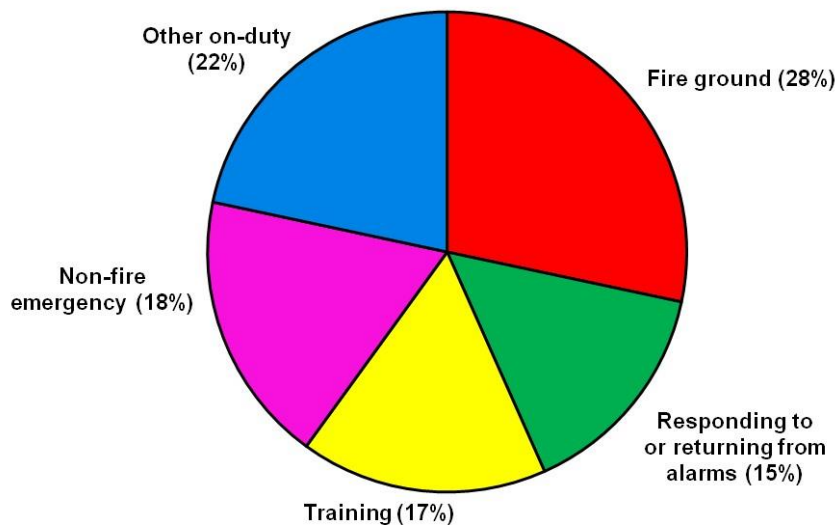
\* This table does not include the 7 victims who were employees or contractors with federal or state land management agencies, or members of an inmate fire crew.

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

**Figure 1**  
**On-Duty Firefighter Deaths - 1977-2017**

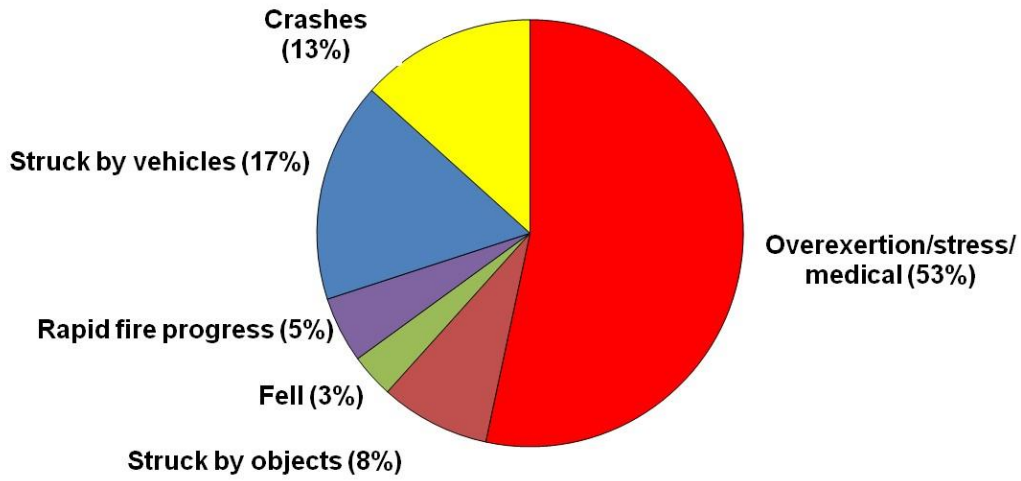


**Figure 2**  
**Firefighter Deaths by Type of Duty - 2017**

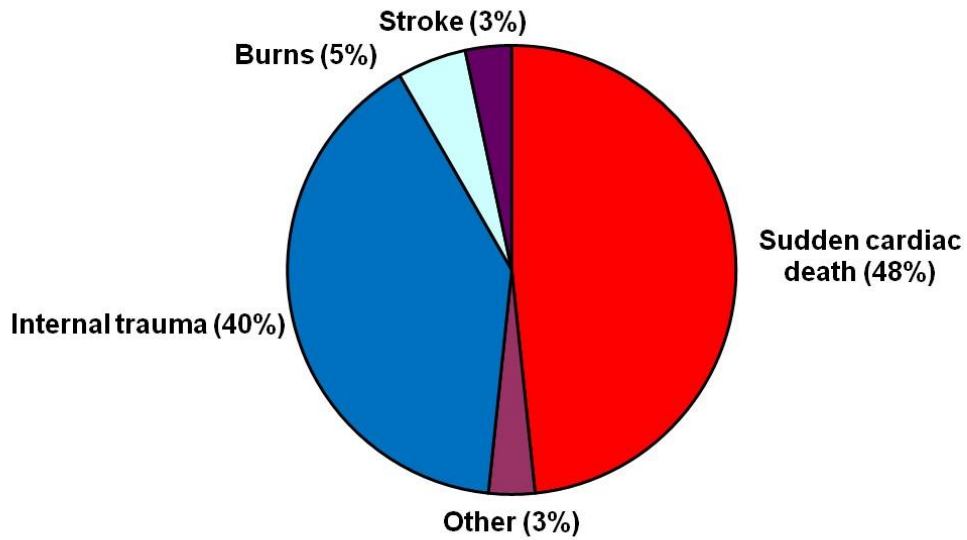




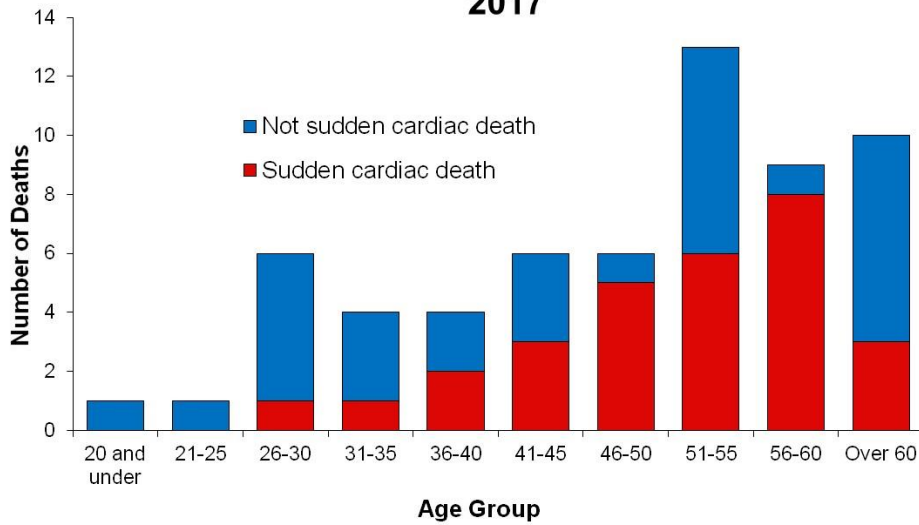
**Figure 3**  
**Firefighter Deaths by Cause of Injury -- 2017**



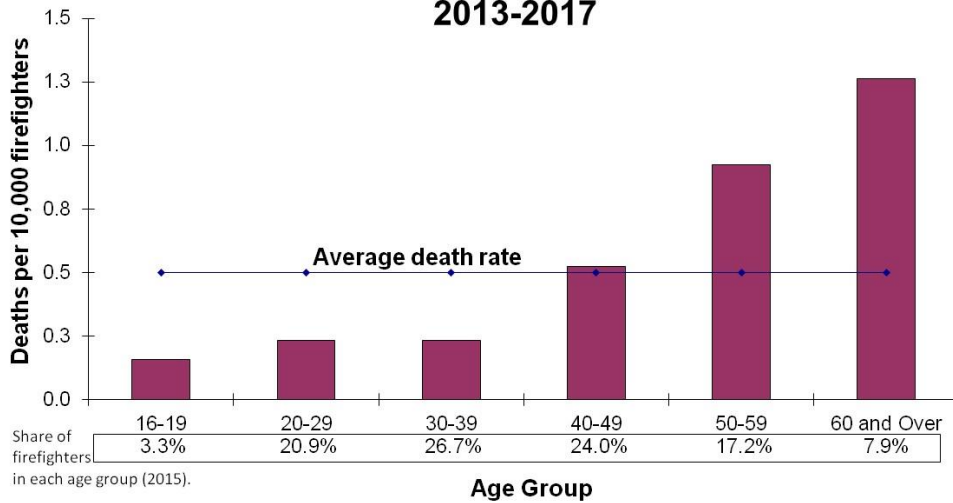
**Figure 4**  
**Firefighter Deaths by Nature of Injury -- 2017**



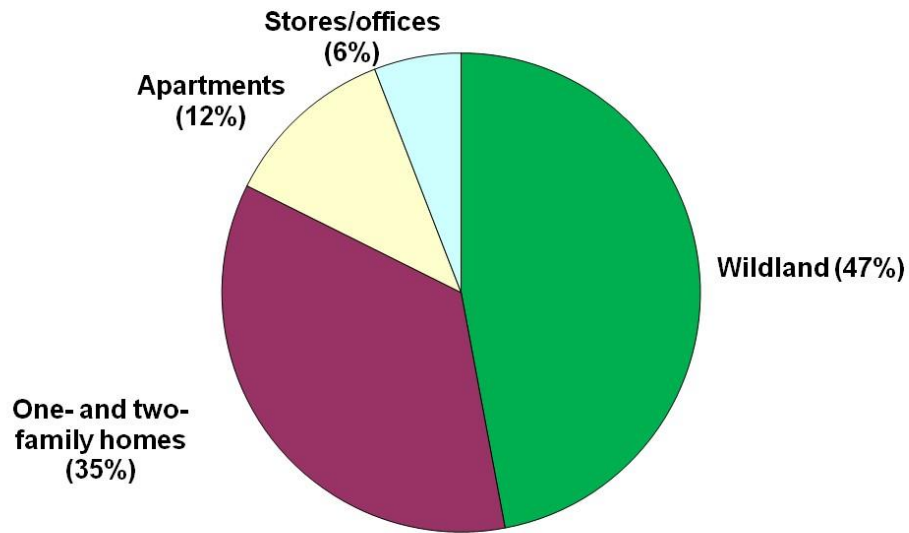
**Figure 5**  
**Firefighter Deaths by Age and Cause of Death**  
**2017**



**Figure 6**  
**On-Duty Death Rates per 10,000 Career and**  
**Volunteer Firefighters**  
**2013-2017**

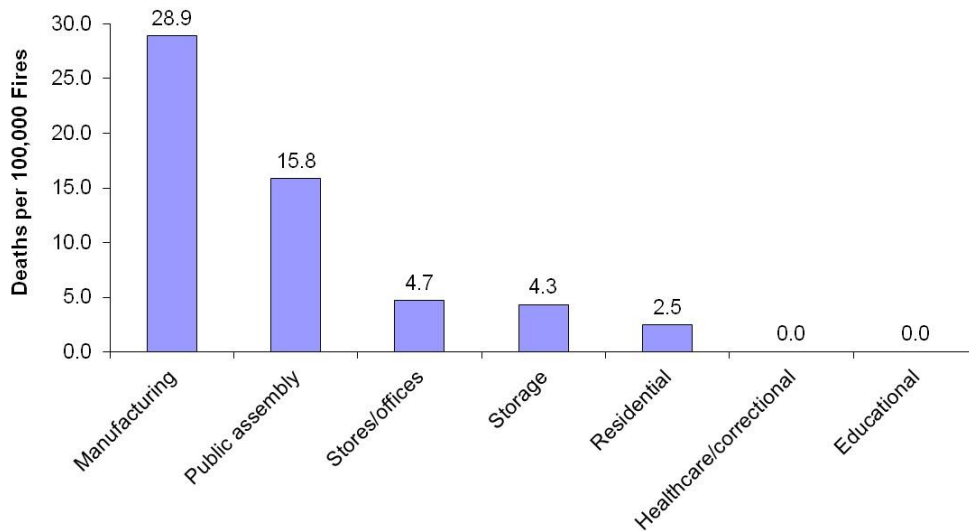


**Figure 7**  
**Fire Ground Deaths by Fixed Property Use\***

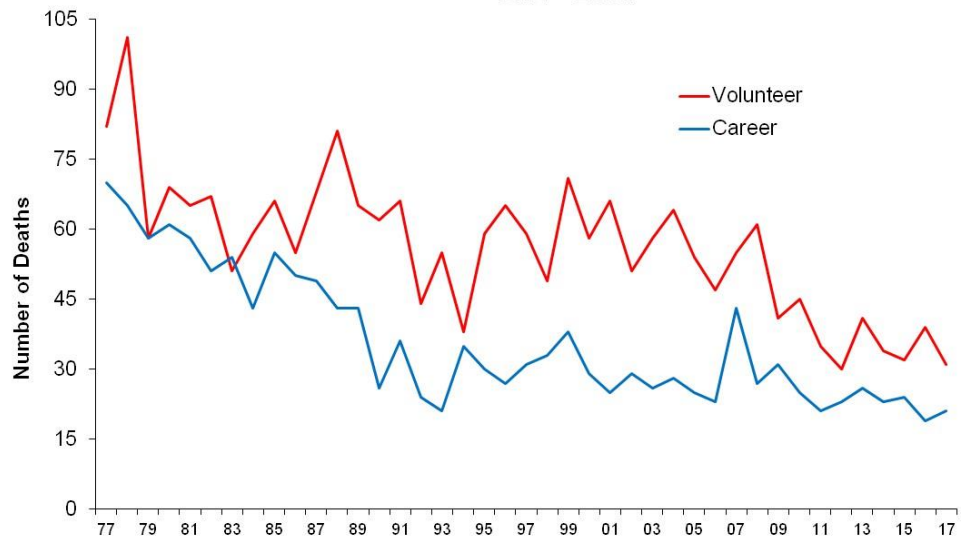


\* There were 17 deaths on the fire ground in 2017.

**Figure 8**  
**On-Duty Fire Ground Deaths per 100,000 Structure Fires 2012-2016**



**Figure 9**  
**Career and Volunteer Firefighter Deaths**  
**1977 - 2017\***



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

### **Wildland**

A crew of inmate firefighters was tasked with clearing brush and tree limbs along a road in a remote mountainous region with limited access. On the first day, a safety briefing was held and work begun on the project. On the third day at the work site, the crew was picking up piles of limbs and brush they had cleared and placed along the side of the roadway, and placing the piles of debris in the chipper.

While the crew was working near the fully-throttled chipper, their supervisor heard two loud pops. He saw a large tree falling towards the crew.

The supervisor immediately yelled and warned the crew that a tree was falling from the steep hillside. None of the crew members reacted and branches from the tree struck and injured one of the inmates. The top 18 feet (5.5 meters) of the 146-foot-tall (44.5-meter) tree struck a 26-year-old inmate firefighter in the head, neck, and chest while he was working near the chipper.

Nearby firefighters that witnessed the tree fall grabbed a trauma bag and began life saving measures, including cardiopulmonary resuscitation. The supervisor attempted to call for help but due to the remote location his messages were not transmitted. He ran approximately 400 yards (122 meters) downhill and down the road to use his radio to request a medical response.

Once the advanced life support unit arrived, paramedics pronounced the victim dead approximately an hour after he was struck.

Several issues and lessons learned were identified by the reporting organization including that the tree was identified as a hazard but it was estimated to be outside the work area. Another issue was that the crew could not hear the supervisor's warning due to the noise of the chipper.

### **Sudden Cardiac Death**

A local fire department responded to a reported fire in a single-family home with a ground floor area of approximately 660 sq. ft. (61 m<sup>2</sup>). Upon the department's arrival, they encountered a bedroom fire on the second-story in the wood-frame home.

First arriving companies began an aggressive interior attack, stretching a hose line up the interior stairs and knocking down the flames.

Fire investigators determined that an occupant discarded cigarette butts into a trash barrel and then took a shower. Flames grew out of the trash can and the fire quickly extended to the room and contents.

Smoke alarms were located on the first story only and they did not operate. The occupant got out of the shower, saw the smoke, exited the building and dialed 911.

A 21-year veteran firefighter wearing a full protective ensemble helped companies advance the hose line up the front stairs. Once the hoseline was in place, he proceeded to perform overhaul of the second-story bedroom.

Crews in the area assisting with overhaul found him on the floor unconscious in cardiac arrest. They quickly called a mayday and removed him from the building.

The 54-year-old victim did not have a known medical history. After an autopsy, the fire department reported that his cardiac arrest was caused by overexertion.

## **Struck by Vehicle**

A fire department responded to a report of a transformer issue and dump truck crash. Upon their arrival, they found a dump truck tangled in the power lines at a “Y” intersection. The intersection was not blocked but the power lines were crossed over both roadways.

Nearly an hour after arriving on scene, the power company arrived. Three firefighters wearing reflective vests were standing off the roadway in a gravel area in the middle of the “Y” intersection awaiting direction from the incident commander who was conferring with power company representatives.

A small car approached the scene and left the road, driving into the gravel area in the “Y” intersection and striking the three firefighters. The driver then fled the scene in the car.

Two firefighters suffered severe blunt force trauma and were pronounced dead at the scene. One was a 53-year-old firefighter and the other an 80-year-old deputy chief. The third firefighter, a 15-year veteran of the department, suffered two broken ribs and a bruised leg.

The 31-year old driver of the vehicle was apprehended approximately 6 miles (9.6 km) from the scene of the crash and was charged with driving under the influence.

## **Sudden Cardiac Death**

A 42-year-old firefighter collapsed into cardiac arrest while cleaning firefighting equipment after a structure fire.

The department had responded to fire in a wood-frame pole barn at 02:19 hours. The cause of the fire was listed as unintentional. A heat lamp had been placed too close to combustible materials in the barn to keep several pets warm during the night.

The victim, who had a year of experience on the department, had arrived on one of the first fire companies on scene. He performed suppression operations in a full structural firefighting protective ensemble including self-contained breathing apparatus (SCBA). The incident commander rotated the victim’s crew into rehabilitation where the victim, along with other members of his company, swapped out their self-contained breathing apparatus (SCBA) cylinders and rested for approximately 10-15 minutes. After rehabilitation, the victim donned his full structural firefighting protective ensemble with self-contained breathing apparatus (SCBA) and performed overhaul. After the incident was mitigated, he returned to the firehouse and began cleaning equipment and tools, and preparing the apparatus for the next emergency response.

After saying goodbye to the victim, the chief left the firehouse at approximately 05:30 hours and went home. Sometime around 09:15 hours, the victim’s fiancé called the chief and fellow firefighters stating the victim had not returned home from the fire. Firefighters found the victim dead on the apparatus floor.

## **Overrun by Fire**

During a multi-day deployment on a large wildland fire, a task force of several engine companies were tasked with establishing a fire break with two bulldozers and several helicopters.

As the dozers finished up the fire line, the group began to reestablish the anchor point. A lookout point was established and a safety zone was identified in the black (burned area). As a hose line crew advanced along the dozer line, they extinguished spot fires near the edges. Crews reported a little flare up in the unburned area. The firefighter operating the nozzle of a 700-foot (213-meter) hand line noticed a spot fire flare up approximately 20 feet (6 meters) from the fire line in the tall unburned fuel.

The 32-year-old firefighter reached the small fire when suddenly spot fires ignited and the small fires erupted, cutting off his escape route. The trapped firefighter requested air support using his portable radio and began traveling parallel to the recently-cut fire line, but his escape route was cut off. The safety spotter called out over the radio to “get out of there”. A mayday was called and acknowledged by the incident commander. Air support, additional ground units, and an advanced life support ambulance were dispatched to the area.

The trapped firefighter turned down the hill, but two other fires erupted in front of him. He was running through chest- to head-high vegetation, trying to escape. The safety spotter and helicopter crews could see the top of his helmet as he ran through the vegetation. They witnessed him disappear in thick vegetation.

Six helicopters began saturating the area with fire retardant and water, eventually cooling the area so firefighters could enter the last location where the victim had been seen. They located him approximately 30 minutes after the mayday.

He was found in a deep gulch and had not deployed his shelter. He was wearing all proper protective clothing. The 8-year veteran succumbed to thermal burns and smoke inhalation.

### **Struck by Hose**

A fire ignited in a bedroom of a wood-frame single-family home. A 29-year-old firefighter responded to the scene in his personally-owned vehicle.

He exited his vehicle and instead of grabbing supply hose, he grabbed a 3-inch pre-connected hose line off an engine at the scene and wrapped it around a fire hydrant. He then went over to his car parked several feet away and began donning his protective clothing. As he was getting dressed, the fire engine pulled away from the hydrant and pre-connected hose line untangled from the hydrant and the nozzle from the 3-inch pre-connected hose line struck him in the head.

The 12-year veteran was transported to the hospital with traumatic head injuries. He succumbed to his injuries several days later.

### **Burns**

Late in the evening on a warm, windy night, a local fire department responded to a reported fire in a shopping complex. Upon their arrival, firefighters observed a large amount smoke emanating from the roof of the large strip mall and incident command was established. The incident commander immediately requested a second alarm due to potential fire spread.

The first engine and ladder companies forced entry through the front doors of a gym. A hand line was stretched to the doors and they entered the gym. Crews reported low visibility and were advancing the hand line while on their knees. Two firefighters from the ladder company were assigned to search the gym. They began a right-hand search as they passed the firefighter on the nozzle of the hose-line.

Approximately 10 minutes into the fire, another engine company in the rear of the structure reported flames coming from the roof. A minute later, the firefighters from the ladder company searching the gym reported to the commander that they had located the fire in the attic area in the gym and they began pulling down ceiling tiles. The members on the hose line reported a rapid buildup of heat as their thermal imaging camera showed all white. They opened their line but it had little to no effect on the rising heat levels.

The incident commander ordered everyone to evacuate the building 15 minutes into the incident. The two members from the ladder company performing a search became disoriented and called a mayday. They transmitted several more times but the messages were unintelligible.

A rapid intervention team (RIT) was deployed under the command of a battalion chief leading the rescue operations. They located one of the overcome firefighters and removed him nine minutes after the RIT entered building. He was rushed to the hospital aboard an advanced life support ambulance. He suffered extensive burns and was admitted to the intensive care burn unit.

A second RIT was sent in to locate the other missing firefighter. Crews were worked tirelessly to locate him. One firefighter was injured during the rescue efforts. He suffered from smoke inhalation and exhaustion.

Nearly 45 minutes into the incident and 19 minutes after his partner was rescued, the victim was located and removed from the building. He was pronounced dead at the scene.

The fire department examined all protective clothing and did not find any major defects with their protective ensembles. The victim was a 31-year-old firefighter with six years' experience. His cause of death was listed as conflagration injuries. The manner of death was listed as homicide.

The cause of the fire was determined to be incendiary and arson charges were filed against an owner of one of the occupancies.

### **Fall from Aerial**

A 29-year-old firefighter suffered critical injuries during training on the upper floors of a local six-story hotel. Several fire companies were participating in the drill. The victim was a member of a ladder company.

The training plan was communicated to all members and an operational briefing was held prior to the start of the evolution. Personnel participating in the drill were wearing complete structural firefighting protective ensembles, including self-contained breathing apparatus. The operator of the ladder truck positioned the apparatus in front of the hotel and the aerial ladder was raised to the roof at a 73-degree angle and extended 86 feet (26 meters). As the aerial was being raised, two firefighters raised a 35-foot extension ladder to a second-story fire escape balcony. They returned to the apparatus, donned their SCBA, grabbed the "roof kit" and climbed onto the pedestal.

Three firefighters began to ascend the aerial ladder. Approximately, 55-65 feet up (17-20 meters), the lead firefighter fell from the aerial ladder, landing on the pedestal of the ladder.

He was treated on scene and transported to a local trauma center. He succumbed to his traumatic injuries several days later. The department issued a brief report after the incident and had its members review the inherent dangers of carrying equipment while climbing ladders.

### **Apparatus Crash**

A 54-year-old firefighter suffered traumatic injuries when the mobile water supply vehicle (tanker) she was driving crashed. The truck left the roadway and tipped over while responding to a structure fire in a residential occupancy. After tipping over onto its side, the truck struck an embankment. The fully-loaded tank detached from the truck and crashed into the cab, killing the firefighter.



## **Laceration**

A 22-year-old inmate firefighter was mortally wounded while cutting a fire line. The crew was working in steep terrain approximately two miles (three kilometers) from the fire. The cutting teams decided to leapfrog each other along the fire line. They completed about 70-80 feet (21-24 meters) of fire line when they came across a rock outcropping with a steep drop off. During the operation, the victim lost his balance and his momentum carried him off the outcropping and he inadvertently straddled his chainsaw.

The chainsaw lacerated his upper right thigh just behind his Kevlar chaps, severing his femoral artery. Nearby firefighters began treatment including a tactical tourniquet. The incident commander requested an advanced life support ambulance. The firefighter was transported by ground and pronounced dead at the emergency room.