



U.S. Fire Administration
Working for a fire-safe America

Firefighter Fatalities in the United States in 2016

December 2017



FEMA

Firefighter Fatalities in the United States in 2016

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U.S. Department of Homeland Security
Federal Emergency Management Agency
U.S. Fire Administration
National Fire Data Center
and
The National Fallen Firefighters Foundation
<https://www.firehero.org>



**In memory of all firefighters
who answered their last call in 2016
To their families and friends
To their service and sacrifice**

Mission Statement

We provide national leadership to foster a solid foundation for our fire and emergency services stakeholders in prevention, preparedness and response.



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Photo/Mark A. Whitney

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This study of firefighter fatalities would not have been possible without the cooperation and assistance of many members of the fire service across the United States. Members of individual fire departments; chief fire officers; wildland fire service organizations, such as the U.S. Forest Service, the National Park Service, the Bureau of Land Management, the Bureau of Indian Affairs, the U.S. Fish and Wildlife Service; as well as the U.S. Department of Justice, the National Fire Protection Association, and many others, contributed important information to this report.

The National Fallen Firefighters Foundation was responsible for compilation of a large portion of the information used in this report. Their cooperation and work toward reducing firefighter deaths is gratefully acknowledged.

The ultimate objective of this effort is to reduce the number of firefighter deaths through an increased awareness and understanding of their causes and how they can be prevented. Firefighting, rescue and other types of emergency operations are essential activities in an inherently dangerous profession, and unfortunate tragedies do occur. These are the risks that all firefighters accept every time they respond to an emergency incident. However, the risks can be greatly reduced through efforts to improve training, emergency scene operations, and firefighter health and safety.

Background

For 40 years, the U.S. Fire Administration (USFA) has tracked the number of firefighter fatalities and conducted an annual analysis. Through the collection of information on the causes of firefighter deaths, the USFA is able to focus on specific problems and direct efforts toward finding solutions to reduce the number of firefighter fatalities in the future. This information is also used to measure the effectiveness of current programs directed toward firefighter health and safety.

Several programs have been funded by the USFA in response to this annual report. For example, the USFA has sponsored significant work in the areas of general emergency vehicle operations safety, fire department tanker/tender operations safety, firefighter incident scene rehabilitation, and roadside incident safety. The data developed for this report are also widely used in other firefighter fatality prevention efforts.

In addition to the analysis, the USFA, working in partnership with the National Fallen Firefighters Foundation (NFFF), develops a list of all on-duty firefighter fatalities and associated documentation each year. If certain criteria are met, the fallen firefighter's

next of kin, as well as members of the individual's fire department, are invited to the annual National Fallen Firefighters Memorial Service. The service is held at the National Emergency Training Center (NETC) in Emmitsburg, Maryland, during Fire Prevention Week in October of each year. The 36th Annual National Fallen Firefighters Memorial Weekend will be held Oct. 7 and 8, 2017. Additional information regarding the memorial service can be found at <https://www.firehero.org>, or by calling the NFFF at 301-447-1365.

Other resources and information regarding firefighter fatalities, including current fatality notices, the National Fallen Firefighters Memorial database, and links to the Public Safety Officer Benefits (PSOB) program, can be found at <https://apps.usfa.fema.gov/firefighter-fatalities/>.

Introduction

This report continues a series of annual studies by the USFA of on-duty firefighter fatalities in the U.S.

The specific objective of this study is to identify all on-duty firefighter fatalities that occurred in the U.S. and its protectorates in 2016 and to analyze the circumstances surrounding each occurrence. The study is intended to help identify approaches that could reduce the number of firefighter deaths in future years.

Who is a firefighter?

For the purpose of this study, the term “firefighter” covers all members of organized fire departments with assigned fire suppression duties in all 50 states; the District of Columbia; and the territories of Puerto Rico, the Virgin Islands, American Samoa, the commonwealth of the Northern Mariana Islands, and Guam. It includes career and volunteer firefighters; full-time public safety officers acting as firefighters; fire police; state, territory and federal government fire service personnel, including wildland firefighters; and privately employed firefighters, including employees of contract fire departments and trained members of industrial fire brigades, whether full-time or part-time. It also includes contract personnel working as firefighters, or assigned to work in direct support of fire service organizations (e.g., air-tanker crews).

Under this definition, the study includes not only local and municipal firefighters, but also seasonal and full-time employees of the U.S. Forest Service, the National Park Service, the Bureau of Land Management, the Bureau of Indian Affairs, the U.S. Fish and Wildlife Service, and state wildland agencies. The definition also includes prison inmates serving on firefighting crews; firefighters employed by other governmental agencies, such as the U.S. Department of Energy; military personnel performing assigned fire suppression activities; and civilian firefighters working at military installations.

What constitutes an on-duty fatality?

An on-duty fatality includes any injury or illness that was sustained while on duty and proves fatal. The term “on duty” refers to being involved in operations at the scene of an emergency, whether it is a fire or nonfire incident; responding to, or returning from, an incident; performing other officially assigned duties, such as training, maintenance, public education, inspection, investigations, court testimony or fundraising; and being on call, under orders or on standby duty (except at the individual’s home or place of business). An individual who experiences a heart attack or other fatal injury at home, while he or she prepares to respond to an emergency, is considered on duty when the response begins. A firefighter who becomes ill while performing fire department duties and suffers a heart attack shortly after arriving home (or at another location) may be considered on duty since the inception of the heart attack occurred while the firefighter was on duty.

On Dec. 15, 2003, the president of the U.S. signed the Hometown Heroes Survivors Benefit Act of 2003 into law. After being signed by the president, the act became Public Law 108-182. The law presumes that a heart attack or stroke is in the line of duty if the firefighter was engaged in nonroutine, stressful or strenuous physical activity while on duty, and the firefighter becomes ill while on duty, or within 24 hours after engaging

in such activity. The full text of the law is available at https://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_public_laws&docid=f:publ182.108.pdf.

The inclusion criteria for this study have been affected by this change in the law. Before Dec. 15, 2003, firefighters who became ill as the result of a heart attack or stroke after going off duty needed to register a complaint of not feeling well while still on duty in order to be included in this study. For firefighter fatalities after Dec. 15, 2003, firefighters will be included in this report if they became ill as the result of a heart attack or stroke within 24 hours of a training activity or emergency response. Firefighters who became ill after going off duty, where the activities while on duty were limited to tasks that did not involve physical or mental stress, will not be included.

A fatality may be caused directly by an accidental or intentional injury in either emergency or nonemergency circumstances, or it may be attributed to an occupationally related fatal illness. A common example of a fatal illness incurred on duty is a heart attack. Fatalities attributed to occupational illnesses also include a communicable disease contracted while on duty that proved fatal when the disease could be attributed to a documented occupational exposure.

Firefighter fatalities are included in this report even when death is considerably delayed after the original incident. When the incident and the death occur in different years, the analysis counts the fatality as having occurred in the year in which the incident took place.

There is no established mechanism for identifying fatalities that result from illnesses, such as cancer, that develop over long periods of time and may be related to occupational exposure to hazardous materials or toxic products of combustion. It has proved to be very difficult to provide a complete evaluation of an occupational illness as a causal factor in firefighter deaths due to the following limitations: the exposure of firefighters to toxic hazards is not sufficiently tracked; the often delayed long-term effects of such toxic hazard exposures; and the exposures firefighters may receive while off duty.

Sources of initial notification

As an integral part of its ongoing program to collect and analyze fire data, the USFA solicits information on firefighter fatalities directly from the fire service and from a wide range of other sources. These sources include the PSOB program administered by the U.S. Department of Justice (DOJ), the National Institute for Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration (OSHA), the U.S. Department of Defense, the National Interagency Fire Center, and other federal agencies.

The USFA receives notification of some deaths directly from fire departments, as well as from such fire service organizations as the International Association of Fire Chiefs, the International Association of Fire Fighters, the National Fire Protection Association (NFPA), the National Volunteer Fire Council, state fire marshals, state fire training organizations, other state and local organizations, fire service internet sites, news services, and fire service publications.

Procedure for including a fatality in the study

In most cases, after notification of a fatal incident, initial telephone contact is made with local authorities by the USFA to verify the incident, its location, the jurisdiction, and the fire department or agency involved. Further information about the deceased firefighter and the incident may be obtained from the chief of the fire department, designee over the phone, or by other forms of data collection. After basic information is collected, a notice of the firefighter fatality is posted at the National Fallen Firefighters Memorial site in Emmitsburg, Maryland, as well as on the USFA website. A notice of the fatality is also transmitted by email to a large list of fire service organizations and fire service members.

Information that is routinely requested from fire departments that have experienced a fatality includes National Fire Incident Reporting System (NFIRS)-1 (incident) and NFIRS-3 (fire service casualty) reports; the fire department's own incident and internal investigation reports; copies of death certificates and autopsy results; special investigative reports; law enforcement reports; photographs and diagrams; and newspaper or media accounts of the incident. Information on the incident may also be gathered from NFPA or NIOSH reports.

After obtaining this information, a determination is made as to whether the death qualifies as an on-duty firefighter fatality according to the previously described criteria. With the exception of firefighter deaths after Dec. 15, 2003, the same criteria were used for this study as in previous annual studies. Additional information may be requested by the USFA, either through follow-up with the fire department directly, from state vital records offices, or other agencies. The final determination as to whether a fatality qualifies as an on-duty death for inclusion in this statistical analysis is made by the USFA. The NFFF criteria as a line-of-duty death (LODD) for inclusion in the annual National Fallen Firefighters Memorial Service is made by the NFFF.

2016 Findings

Eighty-nine firefighters died while on duty in 2016, one less than the 2015 total of 90, and five fewer than the 94 firefighter fatalities in 2014. The 2016 total includes 22 firefighters who died under circumstances that were part of inclusion criteria changes resulting from the Hometown Heroes Survivors Benefit Act. When not including these fatalities for the purposes of a trend analysis, there were 67 non-Hometown Hero firefighter fatalities in 2016, the second lowest annual total since the USFA began this study.

An analysis of multiyear firefighter fatality trends needs to acknowledge the changes from the December 2003 Hometown Heroes Survivors Benefit Act. Some graphs and charts in this report may not indicate the Hometown Heroes portion of the total. However, this does not diminish the sacrifices made by any firefighter who dies while on duty, or the sacrifices made by his or her family and peers.

In the same light, when conducting multiyear comparisons of firefighter fatalities in this report, the losses resulting from the attacks on the World Trade Center in New York City on Sept. 11, 2001, are sometimes also set apart for illustrative purposes. This action is by no means a minimization of the supreme sacrifice made by these firefighters.

From 1997 to 2006, there were only three years with fewer than 100 firefighter fatalities; whereas, from 2007 to 2016, there were only three years with 100 or more firefighter fatalities.

Figure 1. On-duty firefighter fatalities (1977-2016)

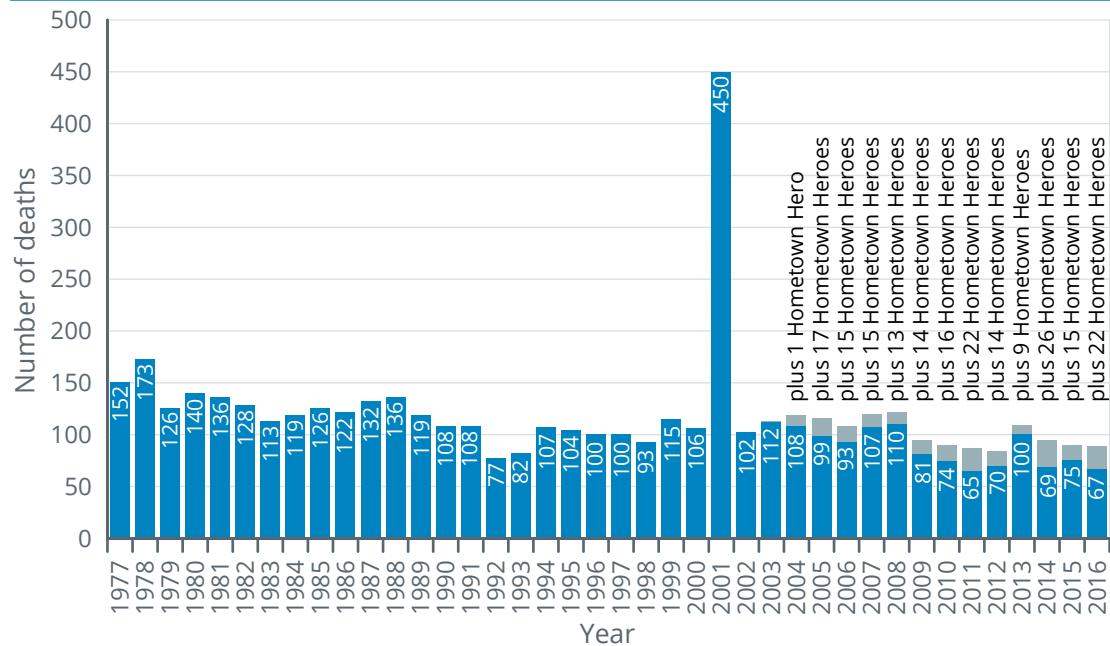
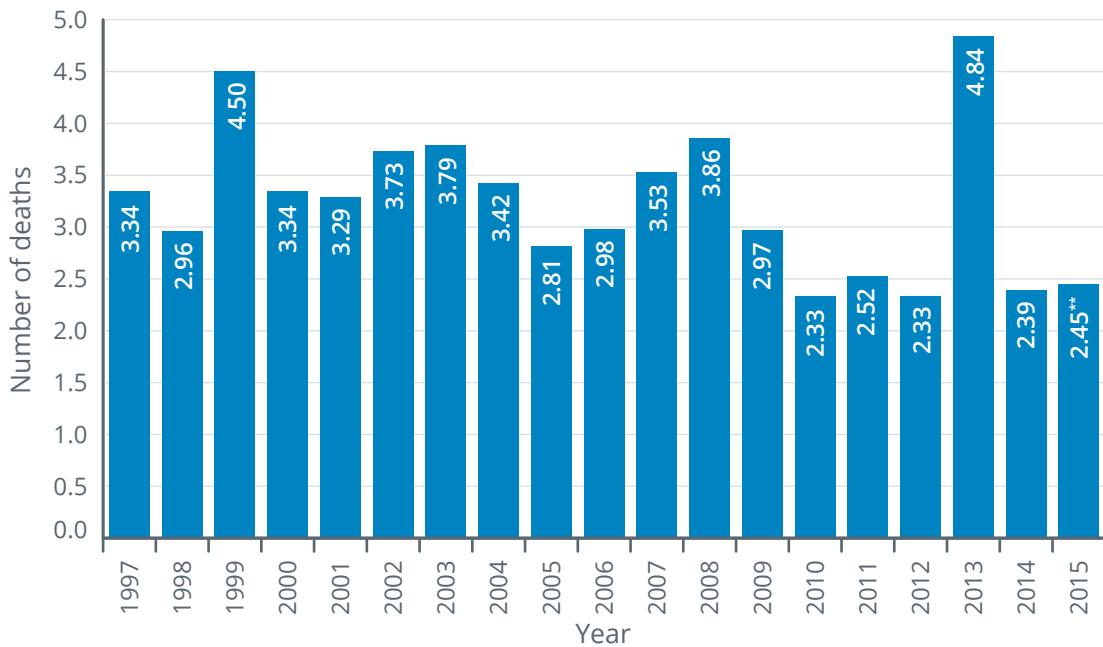


Figure 2. Firefighter fatalities per 100,000 fires*



*NFPA.

**The 2016 ratio will be included in the 2017 report.

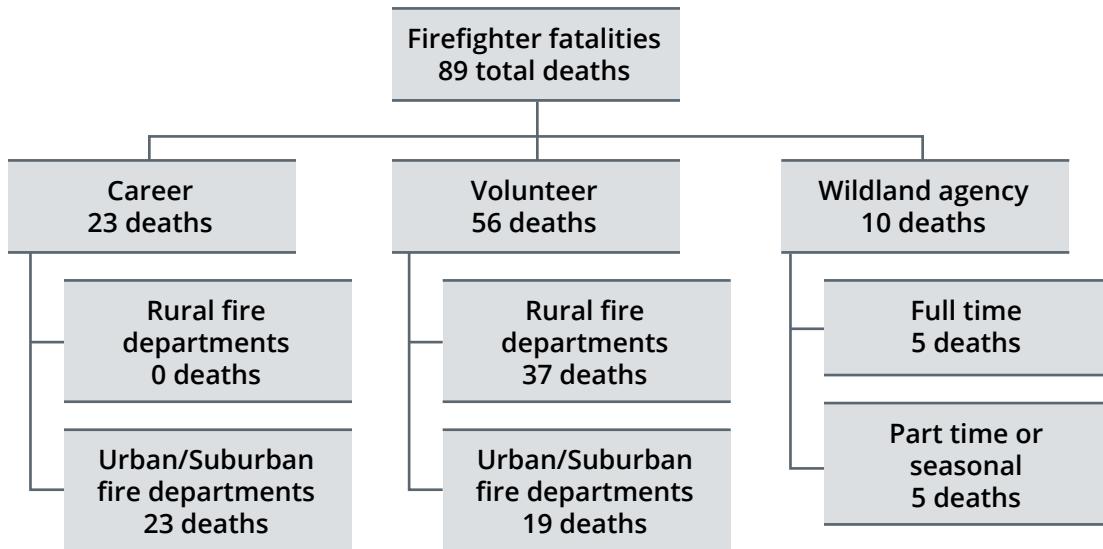
Averages

From 1990 to 2003, there was an average of 129 firefighter fatalities each year in the U.S. (There were 117 each year when not including firefighter deaths on Sept. 11, 2001.) The first full year of inclusion criteria changes resulting from the Hometown Heroes Survivors Benefit Act was 2004. This act resulted in an additional average of 16 firefighter deaths each year recognized in this report. Even with this change, the many individual, group and organizational efforts to reduce firefighter deaths have resulted in fewer firefighter deaths per year. From 2004 to 2016, there was an annual average of 102 firefighter fatalities (86 each year when not including Hometown Hero firefighter fatalities).

Career, volunteer and wildland agency deaths

In 2016, firefighter fatalities included 23 career firefighters, 56 volunteer firefighters, and 10 part-time or full-time members of wildland or wildland contract fire agencies (Figure 3).

Figure 3. Career, volunteer and wildland agency deaths (2016)



Gender

All 89 firefighters who died while on duty in 2016 were male — the second such year in a row, and the fifth since 1990, where all firefighters who died while on duty were male.

Multiple firefighter fatality incidents

The 89 deaths in 2016 resulted from a total of 85 fatal incidents, including three multiple firefighter fatality incidents taking the lives of seven firefighters. One structural collapse took the lives of three career firefighters, and two motor vehicle crashes killed, respectively, two wildland firefighters each.

Table 1. Multiple firefighter fatality incidents

Year	Number of incidents	Total number of deaths
2016	3	7
2015	3	7
2014	2	4
2013	4	34
2012	4	10
2011	3	6
2010	4	8
2009	6	13
2008	5	18
2007	7	21

Wildland firefighting deaths

In 2016, 15 firefighters were killed during activities involving brush, grass or wildland firefighting. This total includes part-time and seasonal wildland firefighters, full-time wildland firefighters, and municipal or volunteer firefighters whose deaths are related to a wildland fire (Figure 4).

Figure 4. Firefighter fatalities related to wildland firefighting (2006 to 2016)

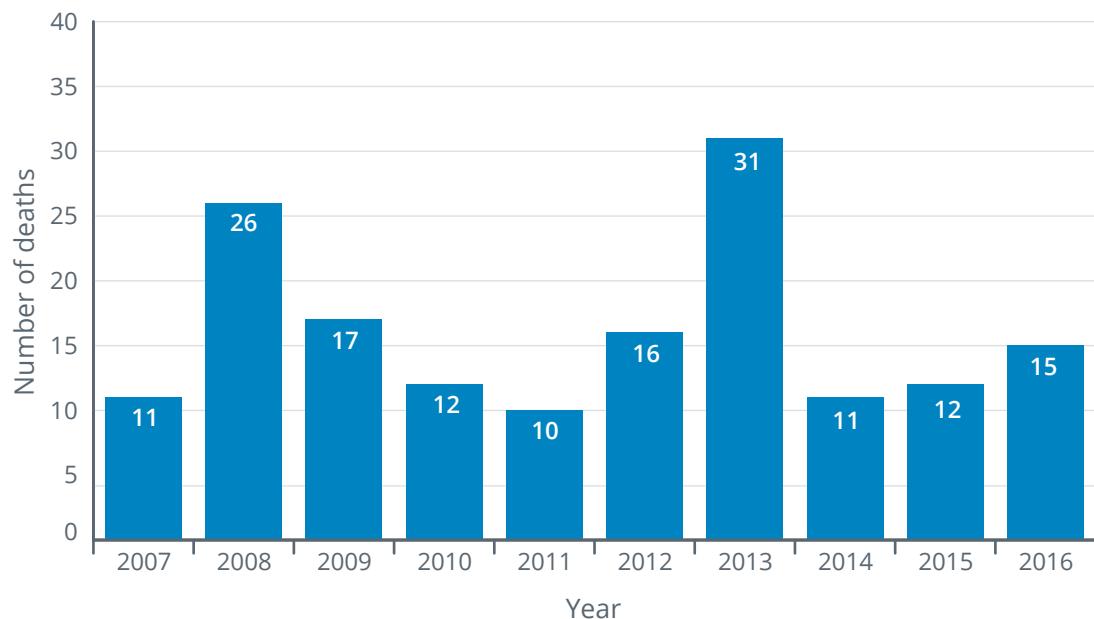


Table 2. Firefighter deaths associated with wildland firefighting

Year	Total number of deaths	Number of fatal incidents	Number of firefighters killed in multiple-death incidents
2016	15	13	4
2015	12	9	5
2014	11	11	0
2013	31	13	19
2012	16	12	6
2011	10	9	2
2010	12	12	0
2009	17	14	5
2008	26	15	14
2007	11	11	0

Table 3. Wildland firefighting aircraft deaths

Year	Total number of deaths	Number of fatal incidents
2016	0	0
2015	2	1
2014	2	2
2013	0	0
2012	6	2
2011	0	0
2010	0	0
2009	5	3
2008	16	4
2007	1	1

In 2016, there were no firefighter fatality incidents from an aircraft crash related to wildland firefighting.

An excellent online mapping tool to geographically search and contextualize U.S. firefighter fatalities, including links to independent in-depth investigations conducted by the NIOSH Fire Fighter Fatality Investigation and Prevention Program, can be found at <https://wwwn.cdc.gov/wisards/fffmap/>.

Type of Duty

Activities related to emergency incidents resulted in the deaths of 36 firefighters in 2016 (Figure 5). This includes all firefighters who died responding to an emergency or at an emergency scene, returning from an emergency incident, and during other emergency-related activities. Nonemergency activities accounted for 53 fatalities. Nonemergency duties include training, administrative activities, performing other functions that are not related to an emergency incident, and post-incident fatalities where the firefighter does not experience the illness or injury during the emergency.

A multiyear historical perspective relating to the percentage of firefighter deaths that occurred during emergency duty is presented in Table 4.

Figure 5. Firefighter deaths by type of duty (2016)

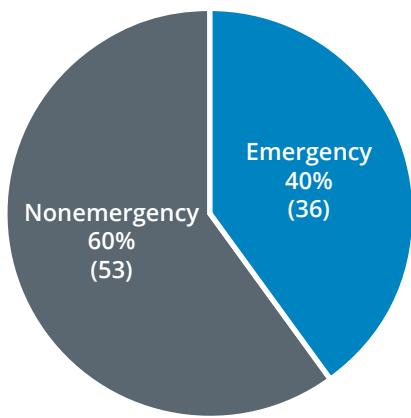


Table 4. Emergency duty firefighter deaths

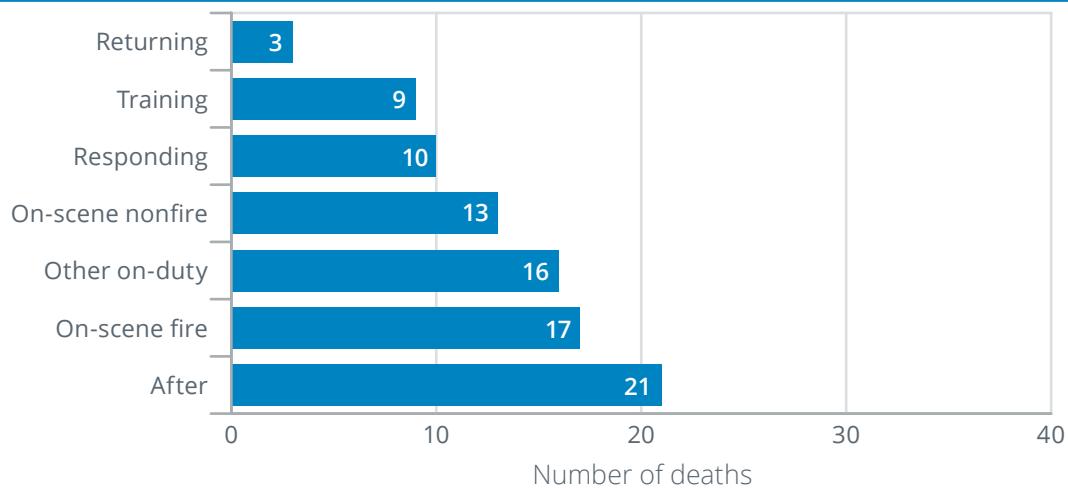
Year	Percentage of all deaths	Percentage of all deaths excluding Hometown Heroes
2016	40	54
2015	49	59
2014	46	63
2013	73	77
2012	56	65
2011	54	70
2010	55	67
2009	63	82
2008	64	70
2007	64	72

The number of deaths by type of duty being performed is shown in Table 5 and presented graphically in Figure 6 for 2016. Fireground duties were again the most common type of duty for firefighters killed while on duty.

Table 5. Firefighter deaths by type of duty (2016)

Type of duty	Number of deaths
Returning	3
Training	9
Responding	10
On-scene nonfire	13
Other on-duty	16
On-scene fire	17
After	21
Total	89

Figure 6. Firefighter deaths by type of duty (2016)



Fireground operations

Seventeen firefighters experienced fatal injuries during fireground operations in 2016. Of these fatalities, eight were at the scene of a structure fire, three were at the scene of a vehicle fire, and six others were at the scene of a wildland or outside fire. The average age of the firefighters killed during fireground operations was 48, with the youngest being 20 years old and the oldest being 78 years old. Eight of those killed were volunteer, six were career and three were wildland firefighters. The nature of fatal injury while engaged in fireground operations for seven of the firefighter deaths was heart attack (41 percent). The nature of fatal injury for the other 10 deaths include: asphyxiation (three), trauma (five), burns (one), and pulmonary embolism (one).

Type of fireground activity

Table 6 shows the types of fireground activities in which firefighters were engaged when they sustained their fatal injuries or illnesses. This total includes all firefighting duties on the fireground, such as wildland firefighting and structural firefighting.

Table 6. Type of activity (2016)

Water supply	1
Support	1
Search and rescue	1
Scene safety	1
Pump operations	2
Other	2
Incident command	2
Unknown	3
Advance hoselines	4

Fixed property use for structural firefighting deaths

There were eight fatalities in 2016 where firefighters became ill or injured while on the scene of a structure fire. Table 7 shows the distribution of these deaths by fixed property use.

Table 7. Structural firefighting deaths by fixed property use (2016)

Residential	6
Commercial	1
Street	1

Responding/Returning

In 2016, 13 firefighters died or experienced an onset of symptoms while responding to or returning from 12 emergency incidents; 10 while responding to, and three while returning from an incident.

Table 8. Firefighter deaths while responding to or returning from an incident

Year	Number of firefighter deaths
2016	13
2015	8
2014	13
2013	14
2012	17
2011	11
2010	17
2009	15
2008	25
2007	26

Training

In 2016, nine firefighters died while engaged in training activities. Two of the nine firefighters died from heart attacks. There were three deaths from traumatic injuries: one resulting from a vehicle collision — watercraft; one from a vehicle collision — fire apparatus; and one from a fall — trauma. One firefighter died from heat exhaustion. The nature of fatal injury for the three remaining “other” training related deaths were hypertrophic cardiomyopathy, aortic rupture, and cardiac ischemia related to rhabdomyolysis. All 16 of the training fatalities from 2014 and 2015 were from heart attacks.

For the nine firefighters who died while engaged in training activities, three firefighters died while performing fire department mandated physical fitness training; one died while involved in driver training; one died during an apparatus drill; one during search and rescue training at a local fire academy; one died after falling from a helicopter while participating in a monthly “hoist training” exercise; one died during water rescue training; and one firefighter died at the station shortly after completing unspecified training of a non-routine physical nature.

The average age of the nine firefighters was 46 years old. The youngest was 31, and the oldest was 63.

Table 9. Firefighter fatalities while engaged in training

Year	Number of firefighter deaths
2016	9
2015	7
2014	9
2013	7
2012	8
2011	8
2010	12
2009	10
2008	12
2007	11

Nonfire emergencies

In 2016, 13 firefighters were killed during emergency duties not related to fire. These response calls included five Emergency Medical Services (EMS) calls, four motor vehicle accidents, two technical rescues, one hazmat incident (illicit drug lab explosion), and one rescue/extrication response call (collapse of a dock into a lake).

Two of the 13 firefighters died from traumatic injuries, including one killed by a charter bus that crashed into a motor vehicle accident scene, and the second was struck by debris from an illicit drug lab explosion. Two firefighters died from gun violence on two separate calls: one EMS and one welfare check. Two firefighters died from asphyxiation, one while diving to recover the body of a reported drowning victim and one was swept away by a flash flood while responding to a community hit hard by a violent storm. Five firefighters died of heart attacks, and one from a stroke, who were an average of 52 years old. The youngest of these five firefighters was 38 years old, and the oldest was 67 years old.

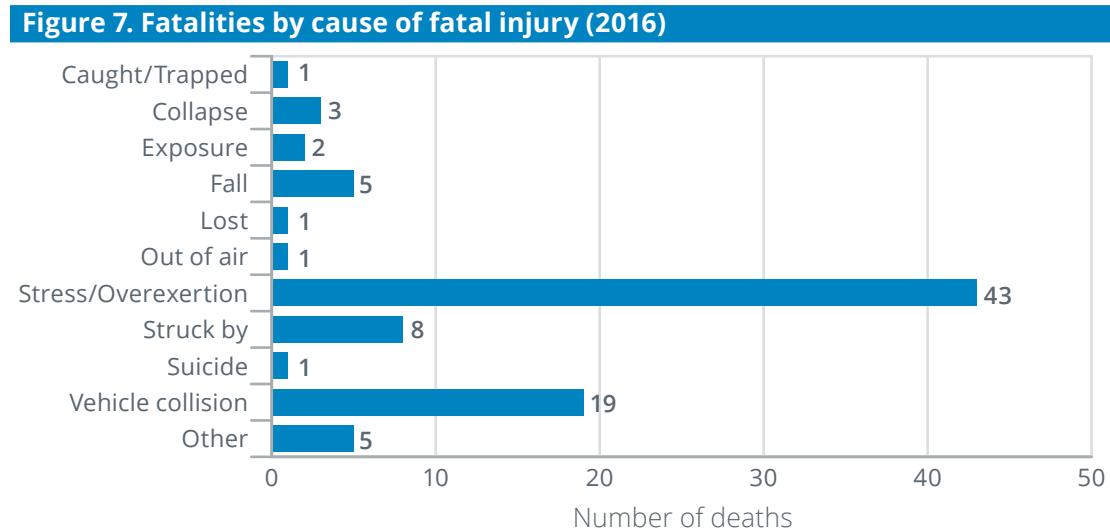
After the incident

In 2016, 21 firefighters died after the conclusion of their on-duty activities: 19 from heart attacks and two from strokes. The average age was 55 years old. The youngest was 31, and the oldest was 73. All of the 21 deaths were classified as Hometown Heroes where no symptom or complaint of illness became evident or was reported during duty.

Cause of Fatal Injury

The term “cause of injury” refers to the action, lack of action, or circumstances that directly resulted in the fatal injury. The term “nature of injury” refers to the medical cause of the fatal injury or illness, which is often referred to as the physiological cause of death. A fatal injury is usually the result of a chain of events, the first of which is recorded as the cause.

Figure 7 shows the distribution of deaths by cause of fatal injury or illness in 2016.



Caught or trapped

Being caught or trapped covers firefighters in wildland and structural fires who were unable to escape due to rapid fire progression and the byproducts of smoke, heat, toxic gas and flames. This classification may also include firefighters who drowned and those who were trapped and/or crushed. In 2016, one firefighter was killed while responding under a mutual-aid agreement with a nearby community; he was trying to aid citizens in distress. The private vehicle that the firefighter was driving washed into a harbor from flash-flood waters, and the firefighter perished from drowning.

Collapse

In 2016, three firefighters perished in a single residential fire incident as the result of a structural collapse.

At 0256 hours, fire department units were dispatched to a report of a structure fire. When firefighters arrived on the scene, they found a working fire in a two-story rowhouse with a basement. Firefighters advanced hoselines into the building to control the fire. As firefighters worked in the interior, a floor collapse occurred. Two firefighters (1 and 2) fell into the basement of the building and were trapped by fire and debris. Another firefighter (3) entered the basement, located firefighter (1), and was attempting to remove the firefighter when a subsequent collapse occurred and trapped both firefighters.

Firefighters (1) and (3) were pronounced dead as a result of their injuries on the date of the incident. Firefighter (2) was rescued and treated for extensive burns, but died as a result of injuries a little over two months later. The cause of death for firefighters (1) and (3) was asphyxiation and thermal injuries. The cause of death for firefighter (2) was complications from burns.

The fire was intentionally set.

Exposure

Two firefighters were killed in 2016 when they came into contact with or were exposed to harm.

- ➊ One industrial firefighter was on duty at a steel plant, conducting fire equipment checks in an elevator control motor room. The air in the room had been displaced with nitrogen gas. The firefighter was overcome and was later found deceased. OSHA fined the steel company for several violations, including failure to adequately train workers using pneumatic tools powered by nitrogen and the safety related to the use of these tools. The firefighter died of asphyxiation.
- ➋ One fire cadet was a member of a metropolitan fire department cadet class. He and other cadets were participating in self-contained breathing apparatus (SCBA) training in the Survival House located at the fire department training facility. He was wearing full structural personal protective clothing and SCBA. The interior of the Survival House is air conditioned, and no live fire is used. A smoke generator is used in some parts of the house. Instructors are able to monitor the progress of students through the course by direct observation and video.

The cadet complained to another cadet that he was hot prior to entering the course. He entered the course at 1025 hours. At approximately 1107 hours, an instructor heard the cadet stop, followed shortly by the activation of his personal alert safety system device. A MAYDAY was called, and the cadet was removed from the course. CPR was initiated, and a medic unit at the training facility was summoned.

The cadet was provided with paramedic-level EMS care, including aggressive cooling. He was transported to the hospital, but did not recover. He was pronounced dead at 1248 hours. The cause of death is listed as hyperthermia and dehydration.

The Texas State Fire Marshal's Office prepared a detailed report of this incident. The report is available at <https://www.tdi.texas.gov/reports/fire/documents/fmfffwhitfield.pdf>.

Fall

Five firefighters died in 2016 as the result of falls.

- ➌ While assigned to an EMS incident in January 2016, one firefighter suffered a shoulder injury as the result of a fall. The firefighter was off duty pending surgery after his injury. The surgery occurred in late June. He was discharged from the hospital, but became ill and died in early July 2016. The cause of death was a pulmonary embolism.

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- One firefighter was a member of a fire department and state air rescue team. During training on helicopter hoist operations, the firefighter fell from the helicopter skid and was fatally injured. For additional information about this crash, consult the National Transportation Safety Board (NTSB) website at https://www.ntsb.gov/news/press-releases/_layouts/ntsb.aviation/Index.aspx — NTSB identification ERA16LA253.
 - One firefighter was preparing to leave home for a response call to assist law enforcement with gaining access to the roof of a building. The firefighter tripped and fell, suffering a severe injury. The firefighter was treated by fellow responders and transported to the hospital where, despite all efforts, he succumbed to his injuries several days later. The cause of death was blunt force trauma.
 - One firefighter reported to the fire station for a company drill. He remained alone at the station to perform maintenance duties while other company members attended the drill. At some point, the firefighter ascended a ladder inside the station for these maintenance duties. When fire department personnel returned from the drill, they found the firefighter entangled in the fallen ladder. Despite lifesaving efforts, the firefighter was pronounced dead shortly thereafter. It is unknown whether the firefighter suffered a medical emergency while atop the ladder and then fell, or if the ladder had fallen while he was on it, causing his trauma.
 - One firefighter had been deployed for several weeks to a southern state to help fight wildland fires in the area. He was walking to his hotel from dinner around midnight. In an unfamiliar area, he fell over a concrete railing into a parking garage. He suffered head and leg injuries. He remained in intensive care until he died nearly one month later. The firefighter was scheduled to return to his home base in the Northwest the day after he was injured.

Lost or disoriented

One firefighter died in 2016 by becoming lost or disoriented inside of a burning structure. The firefighter and members of his fire department were dispatched to a structure fire in a commercial occupancy. The firefighter entered the structure with other firefighters and became disoriented. A MAYDAY was called, and the firefighter was removed from the structure. He was transported to the hospital, but was pronounced deceased. The cause of death was reported as inhalation of combustion products.

Out of air

One firefighter died in 2016 from an arterial gas embolism when he ran out of air during a recovery operation for the body of a drowning victim. The evening before, firefighters were able to locate a possible target at the bottom of the lake, but called off the recovery process for the night based on weather and lack of light. When firefighters responded back to the lake to commence recovery operations, firefighter (1) and firefighter (2), aided by sonar, entered the water at approximately 1541 hours. After being under water for approximately 15 minutes, the divers were ordered back to the surface. The divers paused at approximately 20 feet during their ascent for a safety stop. At this point, firefighter (1) ran out of air and was in distress. The mask of the other diver was knocked off, he surfaced, and sounded the alarm that a diver was down. Initial attempts to rescue firefighter (1) were unsuccessful, but recovery efforts brought the deceased firefighter to the surface.

Stress or overexertion

Firefighting is extremely strenuous, physical work, and it can be one of the more physically demanding of human activities.

Stress or overexertion is a general category that includes all firefighter deaths that are cardiac or cerebrovascular in nature, such as heart attacks and strokes, as well as other events, such as extreme climatic thermal exposure. Classification of a firefighter fatality in this “cause of fatal injury category” does not necessarily indicate that a firefighter was in poor physical condition.

In 2016, 43 firefighters died as a result of stress or overexertion:

- ⌚ Thirty-nine firefighters died due to heart attacks.
- ⌚ Four firefighters died due to cerebrovascular accident (CVA) — stroke.
- ⌚ Twenty-two were Hometown Heroes.

Table 10. Deaths caused by stress or overexertion

Year	Number	Percent of fatalities	Hometown Heroes
2007	56	46.6	13
2008	55	45	12
2009	52	55.3	12
2010	56	62.2	16
2011	54	62	21
2012	48	57.1	14
2013	39	36.1	9
2014	63	67	24
2015	60	66.7	15
2016	43	48.3	22
10-year average	52.6	54.6	15.8

Struck by object

Being struck by an object was the third leading cause of fatal injuries for firefighters in 2016, resulting in eight firefighter fatalities.

- ⌚ One firefighter responded to an emergency medical incident at a residence. The firefighter was wearing a fire department jacket and carrying EMS equipment as he entered. As the firefighter walked down a hallway inside of the home, the patient shot him multiple times. The firefighter was pronounced dead at the scene. The shooter in the incident was under the influence of illegal drugs and was convicted of manslaughter.

-
- One firefighter was working as part of a hand crew in a steep ravine on a wildland fire incident when a large rock fell about 100 feet from the hillside above and struck the firefighter in the head. The firefighter was immediately treated on-scene by fellow firefighters. He was quickly hoisted into a helicopter and airlifted to a medical center, where he succumbed to his injuries the following day.
 - One firefighter was working at the scene of a residential structure fire. According to the law enforcement report on the incident, the firefighter attempted to jump onto the back step of an engine apparatus that was backing up at approximately 5 mph; he became entangled in the hose at the rear of the apparatus. He was crushed by the apparatus as it moved backward.
 - Firefighters were dispatched to a residence to check on the welfare of an occupant. The resident's brother called 911 to report that he had not been able to contact him for two days. Firefighters made their presence known by knocking and shouting to elicit a response from inside the home. Firefighters made the decision to force entry into the dwelling through the front door. As firefighters entered the home, the resident discharged multiple gunshots from a handgun. One firefighter was struck in the chest. He was transported immediately to a local hospital, but did not survive.
 - One firefighter was engaged in tree falling operations on a wildland fire. He was struck by a falling tree as he worked. Firefighters provided treatment, and he was extracted from the scene by helicopter. Upon his arrival at a helibase, he was assessed by paramedics and pronounced deceased. Additional information about this incident can be found at <https://www.wildfirelessons.net/orphans/viewincident?DocumentKey=b8c4e15c-4c37-40c5-bbd8-41f95b6e750c>.
 - One firefighter was killed while working at a vehicle crash. A charter bus entered the scene and crashed into responders. The driver of the charter bus was charged with two counts of negligent homicide, driving without a license, and reckless operation of a vehicle.
 - At 0632 hours, fire department units were dispatched to a reported natural gas leak. Upon their arrival, firefighters encountered a strong odor of natural gas. Firefighters were able to gain entry into the home and discovered a high-pressure gas pipe had broken and was leaking natural gas into the two-story private dwelling. Firefighters were able to shut off the gas at the curb valve. Upon further investigation inside the dwelling, units discovered a marijuana grow house on the second floor. The features of the grow house provided very little ventilation options on the second floor. This floor had many different forms of ventilation equipment, lights and fans that enhanced the growth of the marijuana. At 0732 hours, an explosion occurred, and one firefighter was struck with debris from the force of the blast. It was determined that a large section of roof, approximately 18 feet by 6 feet, weighing almost a ton, struck the firefighter while he was trying to take cover in the street from the explosion. The firefighter was transported to the hospital, but succumbed to his injuries shortly after he arrived.
 - One firefighter suffered head and arm injuries while working a wildland fire incident when a tree limb fell and struck him and the fire apparatus he was on. The firefighter was airlifted to a medical center for treatment, but succumbed to his injuries.

Suicide

One firefighter took his own life in 2016.

Four on-duty firefighter deaths from suicide have been reported to the USFA since 1990, including one each in 2010, 2013, 2015 and 2016. While many more such deaths have undoubtedly occurred before and since 1990, only in recent years has the issue been recognized as a critical one in the fire service needing more attention and prevention/mitigation measures. Thanks to the many years of leadership and efforts by organizations, such as the Firefighter Behavioral Health Alliance (<http://www.ffbha.org/>), a subject once kept quiet is now being faced more squarely by the fire service as a whole.

Vehicle crashes

In 2016, a total of 19 firefighters — three career, 11 volunteer, and five wildland — lost their lives due to vehicle crashes. Vehicle crashes were the second leading cause of fatal firefighter injuries for the year, almost four times the previous year's total. There were two double fatality crashes involving wildland firefighters. Thirteen of the firefighters died in crashes involving fire department vehicles (one was a backing incident), four involved privately-owned vehicles (POVs) (there were no POV-involved firefighter deaths the previous year), one death involved a watercraft, and one involved a dozer operated in difficult terrain that rolled over and crushed the operator on a wildland firefight. None of the vehicle crashes in 2016 involved an aircraft.

- ➊ One firefighter was responding in his personal vehicle to an emergency medical incident — a heart attack with CPR in progress. As he responded, the firefighter's vehicle crossed the center line of the roadway. The firefighter overcorrected to the right. The vehicle left the roadway and struck a ditch and two trees.
- ➋ One firefighter was the driver of a breathing air support apparatus responding to a residential structure fire. The apparatus failed to negotiate a 90-degree turn in the roadway and traveled nearly 700 feet into a field before coming to rest. Law enforcement reports on the incident indicated that the firefighter may have suffered some sort of medical emergency prior to the crash. His death was caused by trauma. There were conflicting reports on the status of his seat belt.
- ➌ One firefighter and his son, a junior firefighter, were returning from fighting a wildland fire. They were in their personal vehicle, a 2001 Dodge Dakota. As they drove along the highway at the posted speed of 55 mph, the vehicle suddenly veered to the side of the road and struck a parked logging trailer. Both occupants were trapped in the vehicle and had to be extricated. Both occupants were wearing their seat belts at the time of the crash. The firefighter died as the result of trauma.
- ➍ One firefighter was participating in water rescue training. The firefighter was a passenger on a rescue sled being towed by a jet ski. He became separated from the rescue sled and was found floating in the water. The operator of the jet ski and an off-duty firefighter removed the injured firefighter from the water onto the beach and initiated CPR. Responding firefighters and emergency medical workers provided medical treatment and transported the injured firefighter to where he passed away from a spinal column injury.

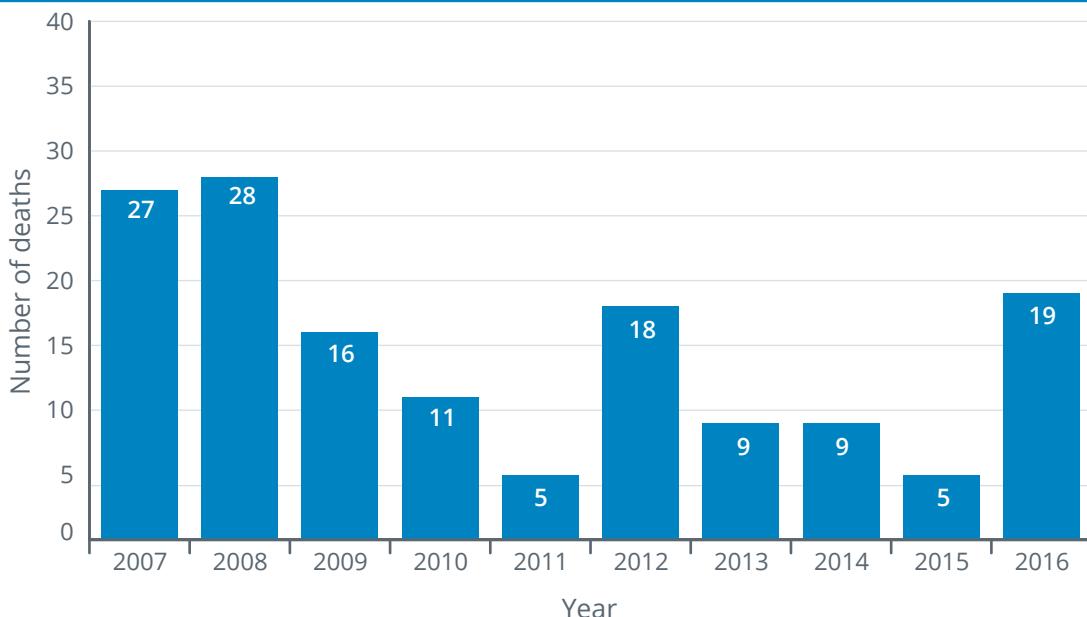
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- One firefighter was assigned the responsibility of vehicle maintenance for his fire department. As a part of these duties, the firefighter would inspect and road test the three apparatus assigned to his station before the semi-monthly meetings of the fire department. While performing one such road test and negotiating a curve, the apparatus left the right side of the roadway. The firefighter overcorrected, and the apparatus flipped three times before leaving the roadway and coming to rest. The firefighter was killed in the crash and pronounced dead at the scene. The law enforcement report on the incident stated that the firefighter was wearing his seat belt at the time of the crash and that a text had been sent from the firefighter's mobile phone at the time of the collision.
 - Firefighters were assigned to an engine as the lead vehicle in a four-vehicle group headed back from an assignment. The engine was a 2006 Unimog U500 with four large single tires, two front and two rear. The group was on a state highway and driving at approximately 60 mph. While operating at speed, the engine experienced a catastrophic failure of the right rear tire. The tire degraded, and the rim contacted the roadway. This pulled the vehicle to the right, and the driver attempted to compensate by turning the steering wheel to the left. The vehicle traveled approximately 320 feet before it began to roll. The engine rolled several times and came to rest on its wheels. During the roll, the structure of the cab was badly damaged. All three firefighter occupants of the engine were wearing their seat belts at the time of the crash, but the seat belts were compromised in the crash. Two firefighters, the driver and the right-front passenger, were declared dead at the scene — the driver having been ejected from the vehicle as it rolled. The third firefighter was transported by medical helicopter to a regional hospital. The interagency report on this incident is available at <https://www.wildfirelessons.net/orphans/viewincident?DocumentKey=83d3cae0-413d-44c6-a401-129627c6a15e>.
 - One firefighter was performing maintenance at a county radio tower site. The firefighter was struck and killed by a pickup truck that was backing up on the tower site. He was transported to the hospital by ambulance, but was pronounced dead due to traumatic injuries.
 - Firefighters had completed a public service detail and were returning an apparatus into the bays of the fire station. One firefighter was behind a 2008 Peterbilt tanker (tender) directing the driver as the unit was backed into the station from a parking lot across the street. The firefighter was at the right rear of the apparatus. As the apparatus approached the bay door, the firefighter was struck and backed over by the tanker. The firefighter was pronounced dead at the scene.
 - A contracted bulldozer was in operation on a wildland firefight. The dozer was attempting to access an area where fireline was to be constructed. In order to access this area, the dozer had to maneuver around an engine which was pumping a hoselay. The engine was blocking the lower roadway, which led to the area where line was to be constructed. The dozer traveled east on a parallel road above the lower road, backed up and turned to travel down an embankment towards the lower road. The dozer proceeded slowly over the embankment in an effort to reach the lower road. During this maneuver, the dozer rolled onto its left side and roof. During the rollover event, the dozer operator was ejected from the cab and became pinned underneath the left sweep of the dozer. Other firefighters working nearby immediately responded and determined that the dozer operator was deceased. The CAL FIRE report on this incident is available at <https://www.wildfirelessons.net/orphans/viewincident?DocumentKey=68b83258-f54d-494e-adc7-4e534adce577>.

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- ➊ One firefighter was the driver of a tanker (tender) apparatus enroute to a parade in a nearby community. As the apparatus was driven on a highway, the driver's side front tire failed. The apparatus left the roadway, crossed the median, crossed the opposing lanes, and rolled over into an embankment. The firefighter was ejected in the rollover. He was treated at the scene and transported to a hospital where he later died. The tanker came to rest on its wheels in a ditch. The law enforcement report on the crash concluded that neither driver nor the front seat passenger were wearing seat belts at the time of the crash. The vehicle's speed just prior to the crash was estimated at 68 mph.
 - ➋ One firefighter was the rear seat passenger in a Ford F-150 pickup truck returning from a state police academy graduation ceremony. The firefighter's attendance at the ceremony was approved by his fire chief to represent the fire department. The driver of the vehicle experienced a possible medical emergency, and the pickup crashed into woods in the median. The firefighter was killed in the crash. The cause of death was multiple traumatic injuries. The status of the firefighter's seat belt was not determined.
 - ➌ Two firefighters in a wildland crew carrier were killed while in transit to a wildland fire occurring in a different state. There were a total of nine firefighters riding in the crew carrier on an interstate highway. For unknown reasons, the vehicle left the roadway, struck the median cable barriers, and rolled. The driver of the vehicle later told law enforcement officials that he was sleep deprived and had consumed illegal drugs in the days and hours before the crash. He was charged with two counts of vehicular homicide. The status of the seat belts for the deceased and injured firefighters are unknown.
 - ➍ One firefighter was driving an engine responding to a report of an oil-tank storage battery fire. The roadway was wet from recent heavy rain. An empty tractor trailer tanker approached from the other direction. As it approached the responding engine, the empty trailer began to hydroplane, and the entire tractor trailer unit drifted into the opposing lane of traffic. The tractor trailer struck the engine apparatus, which went off of the roadway and rolled. The firefighter was severely injured and had to be extricated from the apparatus. He was transported to the hospital, but was pronounced dead shortly after his arrival. The driver of the tractor trailer was charged with driving too fast for conditions and failure to remain in the travel lane. The firefighter was wearing his seat belt at the time of the crash. The Texas State Fire Marshal's Office prepared a detailed report on this incident. The report is available at <https://www.tdi.texas.gov/reports/fire/documents/fmloddslaughter.pdf>.
 - ➎ One firefighter was driving an engine apparatus responding to a report of a trailer fire. As the apparatus entered a left-hand curve, the vehicle went off of the right side of the roadway. The firefighter attempted to steer the apparatus back onto the roadway, but the rear of the apparatus came around counter-clockwise, and the vehicle began to roll. The driver was killed in the crash. Two other firefighters on-board were injured. All three firefighters on the apparatus were wearing their seat belts at the time of the crash, but the passenger compartment had been so compromised during the rollover that all three firefighters were fully ejected from the vehicle.
 - ➏ One firefighter was staffing a tanker (tender) on a wildland incident. The crew was assigned to perform support operations at a helibase. The firefighter was a passenger in the tanker as it drove from a hotel to its assigned work site for the day. Driving conditions that morning were complicated by darkness and heavy fog. At approximately 0630 hours, as the apparatus entered a roundabout, the left-front tire of the vehicle struck a raised curb. The driver attempted to brake and gain control of the vehicle, but

it rolled, coming to rest on its right side. The firefighter was restrained by a seat belt, but he received fatal injuries in the crash. He was later extricated from the vehicle and pronounced dead at the scene.

- One firefighter was responding to the fire station in response to an emergency medical incident. He was in his personal vehicle, a 2008 Ford F-250. As he drove to the fire station, he crossed the center line to pass another vehicle, lost control, hit the guardrail, came back across the driving lanes, struck the other guardrail, and rolled. The firefighter was ejected during the roll and sustained fatal injuries.
- One firefighter was responding to an emergency incident in his personal vehicle. His vehicle became trapped on railroad tracks and was struck by a passing train. The firefighter, who was intoxicated by a combination of drugs and alcohol, was killed in the collision.

Figure 8. Firefighter fatalities in vehicle collisions (including aircraft)



Setting an example

In 2016, of the 16 vehicle collision deaths where the firefighters could have been using seat belts, 10 of them were wearing seat belts at the time of the crash, setting an example even in a tragic loss. While the status of seat belt use remains unknown in three cases, in only three other cases were the deceased firefighters not wearing seat belts (and all three were fully ejected from their vehicles). Seat belts are proven to increase the likelihood of surviving a crash. The number of firefighters whose lives were saved by wearing seat belts in 2016, like any year, remains unreported.

Other

In 2016, five firefighters died from causes of fatal injuries not previously categorized.

- ➊ One firefighter responded to an emergency medical incident at 0920 hours. Upon his return to the station, he went to a local school to exercise. As he exercised, he suffered a heart attack. Firefighters were dispatched to the scene and transported the firefighter to a hospital where he later died. His death was caused by undiagnosed hypertrophic cardiomyopathy, a disease where the heart muscle becomes abnormally thick and pumping blood becomes difficult.
- ➋ One firefighter and the members of his engine company responded to a working vehicle fire at 1053 hours. Shortly after assisting with placing the unit back in service, the firefighter complained of not feeling well to other firefighters. The firefighter was discovered deceased in his bunk at 0714 hours the following day. His death was caused by a pulmonary embolism.
- ➌ One firefighter was participating in a water supply drill for members of his fire department and other fire departments. He drove to the training site, attached hoselines to a fire hydrant, and joined other firefighters at the side of a portable water tank. Shortly after arriving at the water tank, the firefighter collapsed and bent forward toward the tank. Fellow firefighters immediately began CPR and other medical aid. The firefighter was transported to the hospital where he later died as the result of a ruptured aortic dissection.
- ➍ One firefighter was on duty and participating in physical fitness activities with other firefighters. The crew had selected non-contact pass-and-catch football drills as a cardiovascular warm-up for that day. During the activity, the firefighter suffered acute muscle pain. The pain was so severe that the firefighter was transported to the hospital. The firefighter was discharged from the hospital several days later. The following day, the firefighter was found unresponsive at home. He was unable to be revived. His death was caused by cardiac ischemia related to rhabdomyolysis (a breakdown of muscle tissue that releases a damaging protein into the blood).
- ➎ One firefighter responded with other members of his fire department to the collapse of a dock on a lake. A number of people had fallen into the water. He responded on a heavy rescue apparatus and donned a dry suit for the operation. Once on-scene, the firefighter assisted with the rescue of civilians over ground ladders. He was then directed to remove equipment from the apparatus in preparation for a dive. The dive was called off due to the current and due to the fact that everyone was accounted for. The firefighter suffered a medical emergency shortly thereafter. He was treated by firefighters and transported by ambulance to a local hospital. He was unable to be revived. His death was caused by an aortic dissection.

Nature of Fatal Injury

Figure 9 shows the distribution of the 89 firefighter deaths that occurred in 2016 by the medical nature of the fatal injury or illness. For heart attacks, Figure 10 shows the type of duty involved.

Figure 9. Fatalities by nature of fatal injury (2016)

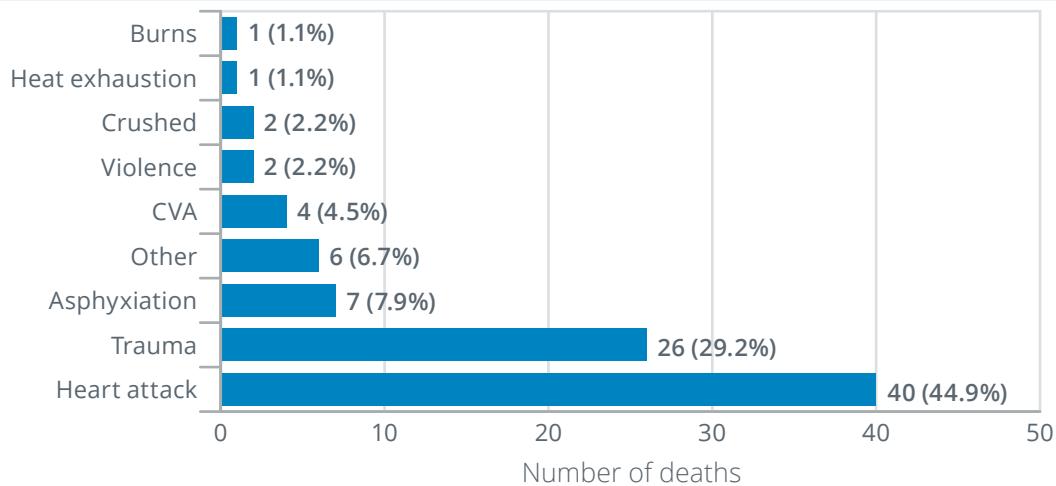
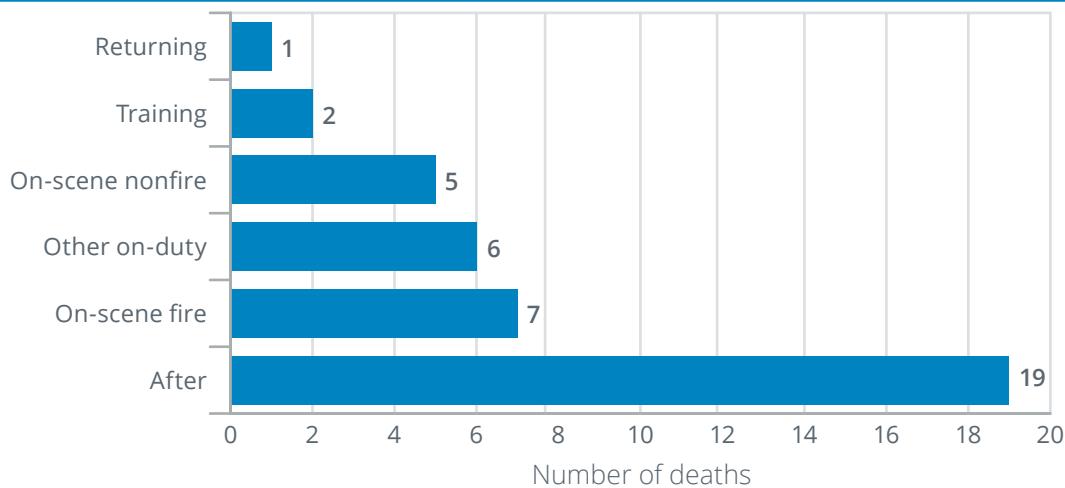


Figure 10. Heart attacks by type of duty (2016)



Firefighter Ages

Figure 11 shows the percentage distribution of firefighter deaths by age (at the time of injury) and nature of the fatal injury. Table 11 provides a count of firefighter fatalities by age and the nature of the fatal injury.

Younger firefighters were more likely to have died as a result of traumatic injuries, such as injuries from an apparatus accident or becoming caught or trapped during firefighting operations. Stress-related deaths are rare below the 31- to 35-years-of-age category and, when they occur, often include underlying medical conditions.

Figure 11. Fatalities by age and nature (2016)

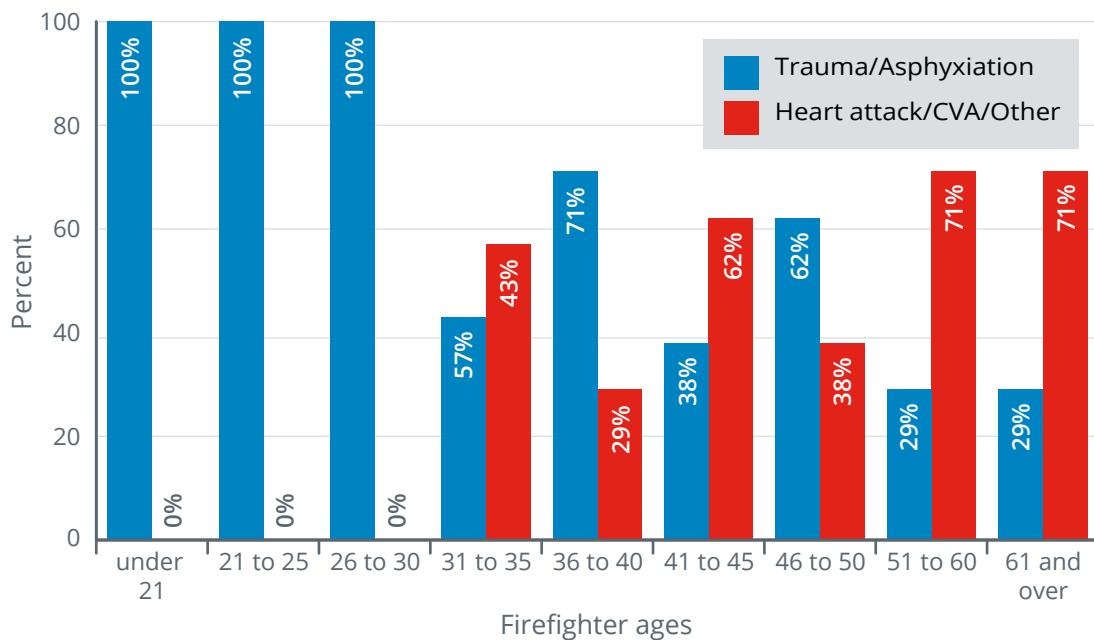


Table 11. Firefighter ages and nature of fatal injury (2016)

Age range	Heart attack/CVA/Other	Trauma/Asphyxiation
under 21	0	1
21 to 25	0	6
26 to 30	0	4
31 to 35	4	3
36 to 40	2	5
41 to 45	8	5
46 to 50	5	8
51 to 60	15	6
61 and over	12	5

In 2016, the U.S. fire service lost more than 1,700 years of active fire service experience as represented by those who gave the extreme sacrifice for their communities and the nation as a whole.

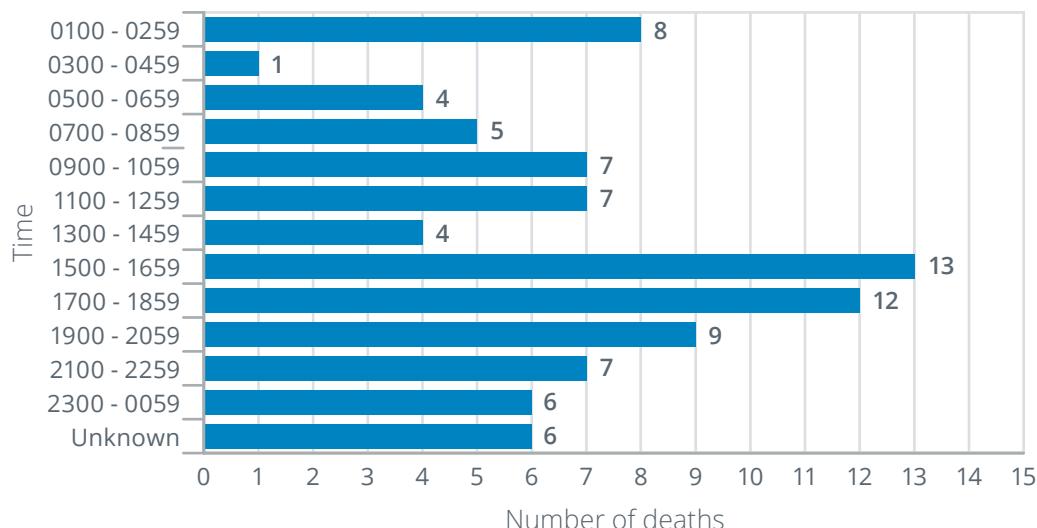
The youngest firefighter to die while on duty was 20 years old. He was shot and killed as he responded to an emergency medical incident in a residence. The firefighter was wearing a fire department jacket and carrying EMS equipment. As he entered the residence and walked down a hallway inside of the home, the patient shot him multiple times.

The oldest firefighter to die while on duty in 2016 was 79 years old. He was at the fire station for a company drill. He remained alone at the station to perform maintenance duties while other company members attended the drill. At some point, the firefighter ascended a ladder inside the station for these maintenance duties. When fire department personnel returned from the drill, they found the firefighter entangled in the fallen ladder. Despite lifesaving efforts, the firefighter was pronounced dead shortly thereafter. It is unknown whether the firefighter suffered a medical emergency while atop the ladder and then fell, or if the ladder had fallen while he was on it, causing his trauma. An autopsy is pending to determine the official cause of the firefighter's death.

Deaths by Time of Injury

For 2016, the distribution of firefighter deaths, according to the time of day when the fatal injury occurred, is illustrated in Figure 12. The time of fatal injury for six firefighters was either unknown or not reported.

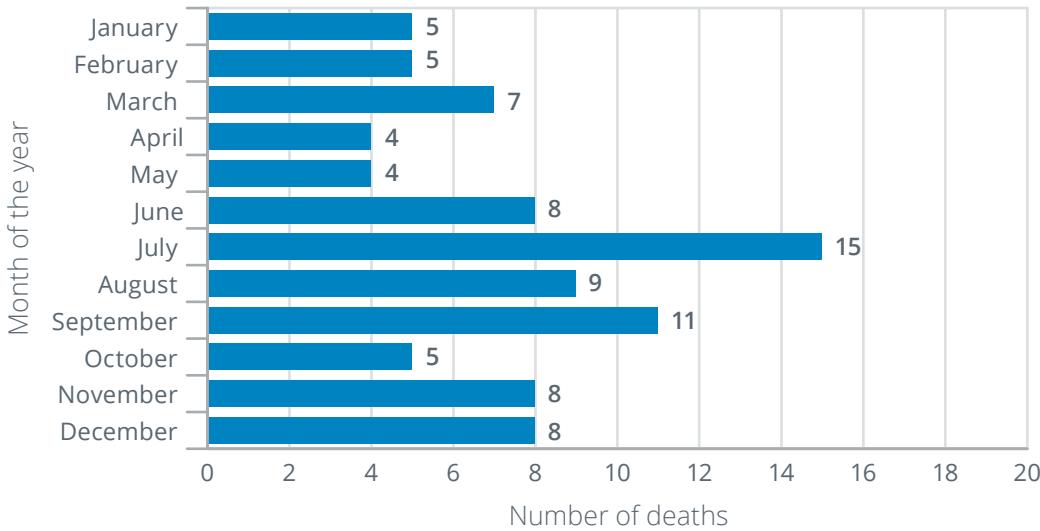
Figure 12. Fatalities by time of fatal injury (2016)



Firefighter Fatality Incidents by Month of Year

Figure 13 illustrates the 2016 firefighter fatalities by month of year.

Figure 13. Deaths by month of year (2016)



State and Region

The distribution of firefighter deaths in 2016 by state is shown in Table 12. Firefighters based in 35 states died in 2016.

The highest number of firefighter deaths in 2016 (based on the location of the fire service organization) occurred in North Carolina with nine losses. Four states suffered six firefighter deaths: Michigan, New Jersey, New York, and Pennsylvania. There were no other states with five or more on-duty firefighter deaths in 2016.

Table 12. Firefighter fatalities by state based on location of fire service* (2016)

State	Fatalities	Percentage
NC	9	10.1
MI	6	6.7
NJ	6	6.7
NY	6	6.7
PA	6	6.7
CA	4	4.5
DE	4	4.5
OH	4	4.5
TX	4	4.5
MO	3	3.4
NH	3	3.4
AR	2	2.2
IL	2	2.2
IN	2	2.2
KS	2	2.2
KY	2	2.2
MT	2	2.2
NE	2	2.2
NV	2	2.2
SC	2	2.2
WI	2	2.2
AL	1	1.1
CO	1	1.1
CT	1	1.1
FL	1	1.1
GA	1	1.1
HI	1	1.1
LA	1	1.1

*This list attributes the deaths according to the state in which the fire department or unit is based, as opposed to the state in which the death occurred. They are listed by those states for statistical purposes and for the National Fallen Firefighters Memorial at the NETC.

Table 12. Firefighter fatalities by state based on location of fire service (2016) — continued

State	Fatalities	Percentage
MD	1	1.1
ME	1	1.1
MS	1	1.1
OR	1	1.1
TN	1	1.1
VT	1	1.1
WA	1	1.1

Figure 14. Firefighter fatalities by region (2016)

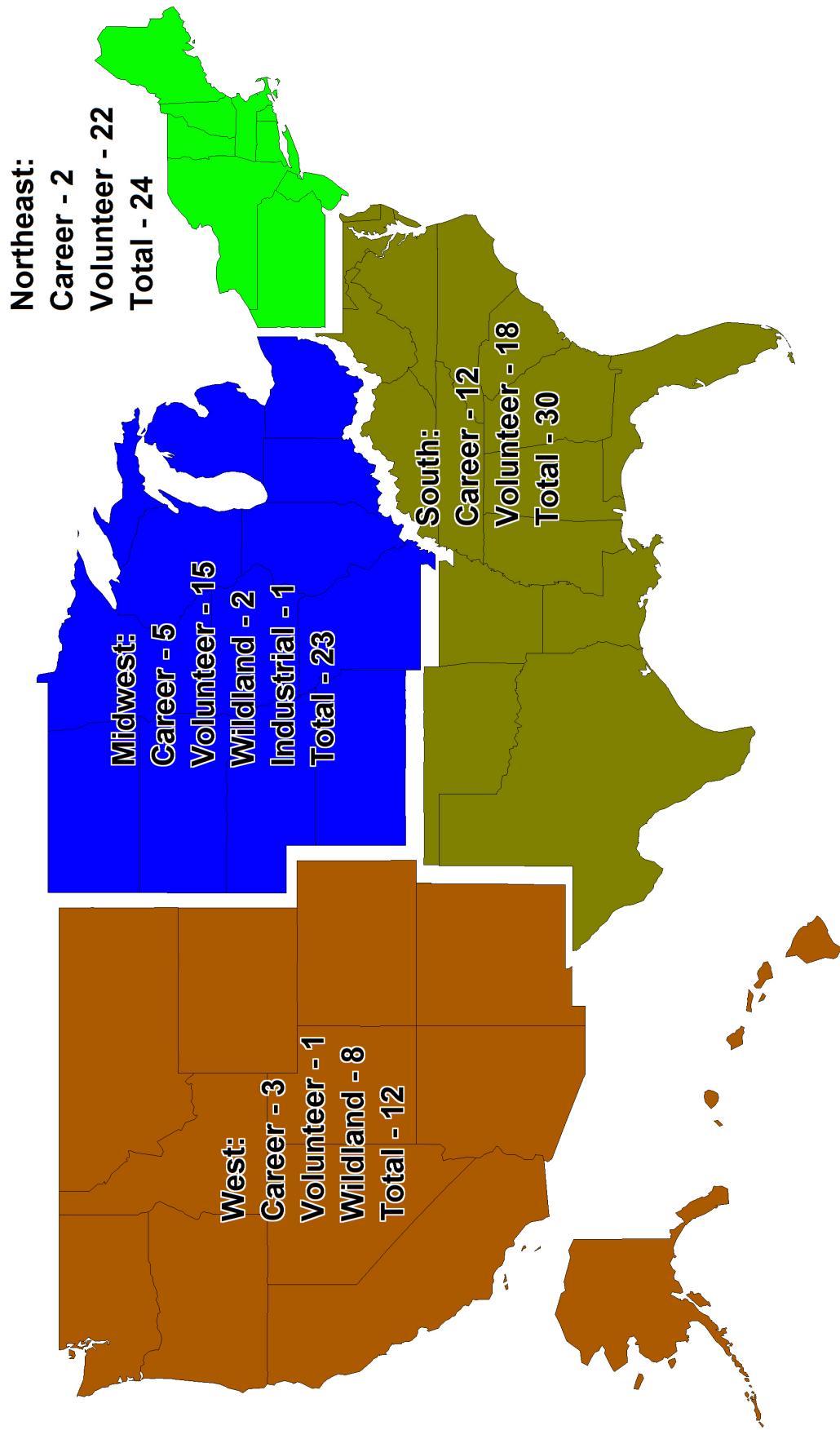


Figure 15. On-duty firefighter fatalities by fire department location (2016)

USA Firefighter Fatalities - 2016 By Fire Department Location

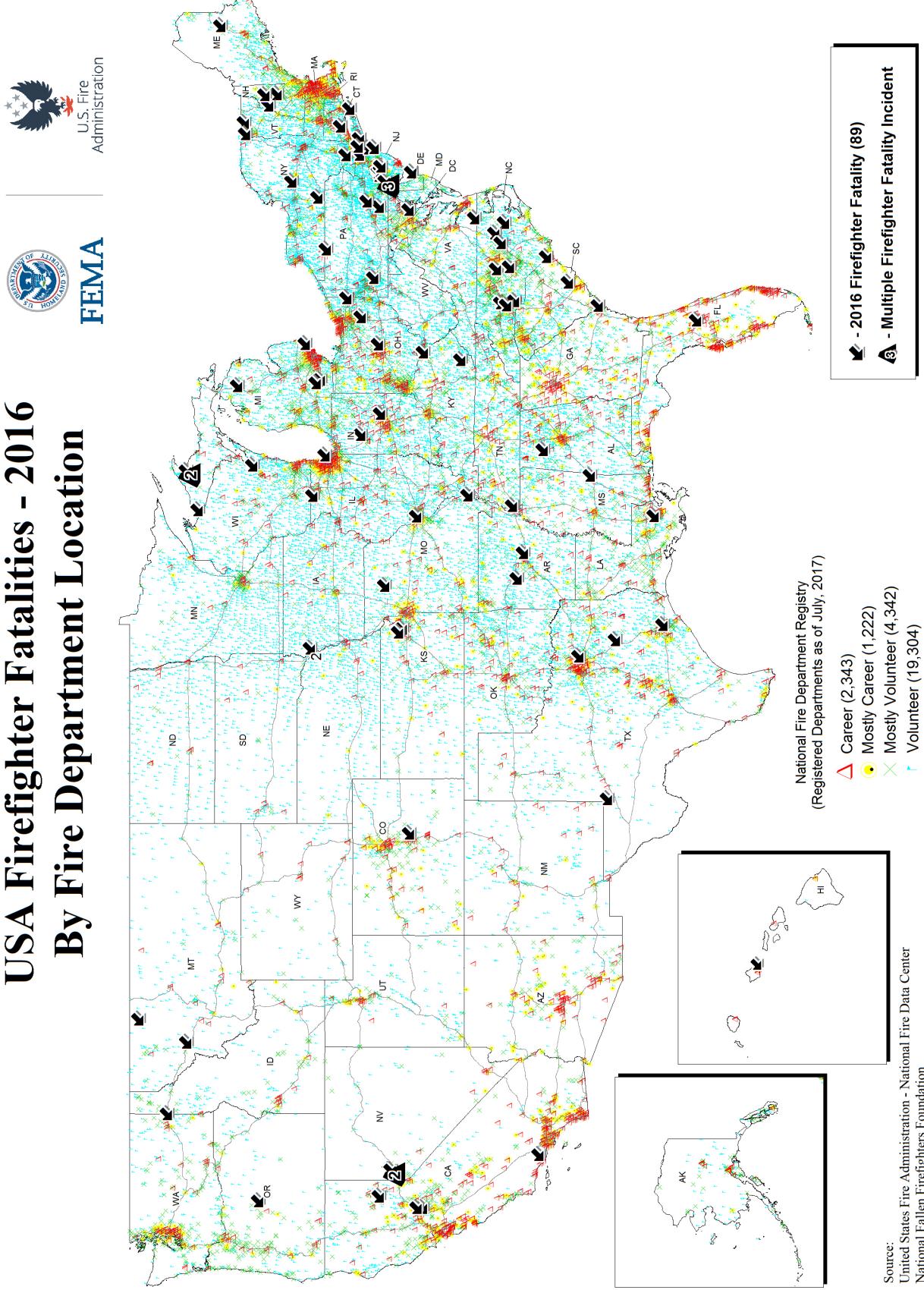


Figure 16. On-duty firefighter fatalities by incident location (2016)

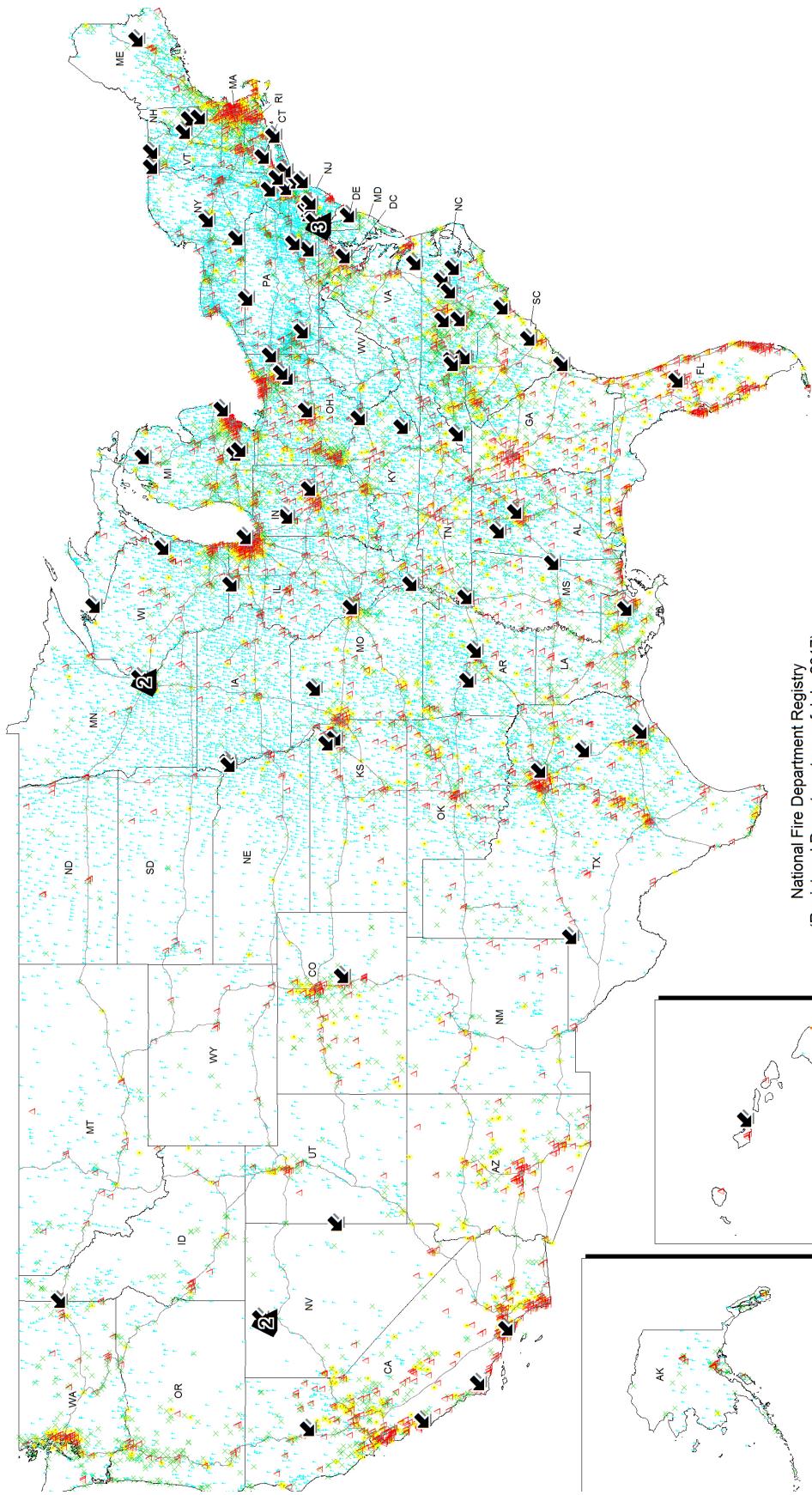
USA Firefighter Fatalities - 2016 By Incident Location



U.S. Fire
Administration



FEMA



Analysis of Urban/Suburban/Rural Patterns in Firefighter Fatalities

The U.S. Census Bureau defines “urban” as a place having a population of at least 2,500, or lying within a designated urban area. “Rural” is defined as any community that is not urban. “Suburban” is not a census term, but may be taken to refer to any place, urban or rural, that lies within a metropolitan area defined by the Census Bureau, but not within one of the central cities of that metropolitan area.

Fire department areas of responsibility do not always conform to the boundaries used by the Census Bureau. For example, fire departments organized by counties or special fire protection districts may have both urban and rural coverage areas. In such cases, where it may not be possible to characterize the entire coverage area of the fire department as rural or urban, firefighter deaths were listed as urban or rural based on the particular community or location in which the fatality occurred.

The following patterns were found for 2016 firefighter fatalities. These statistics are based on answers from the fire departments, and when no data from the departments were available, the data were based upon population and area served, as reported by the fire departments.

Table 13. Firefighter deaths by coverage area type (2016)

Urban/Suburban	Rural	Total
42	47	89

Appendix

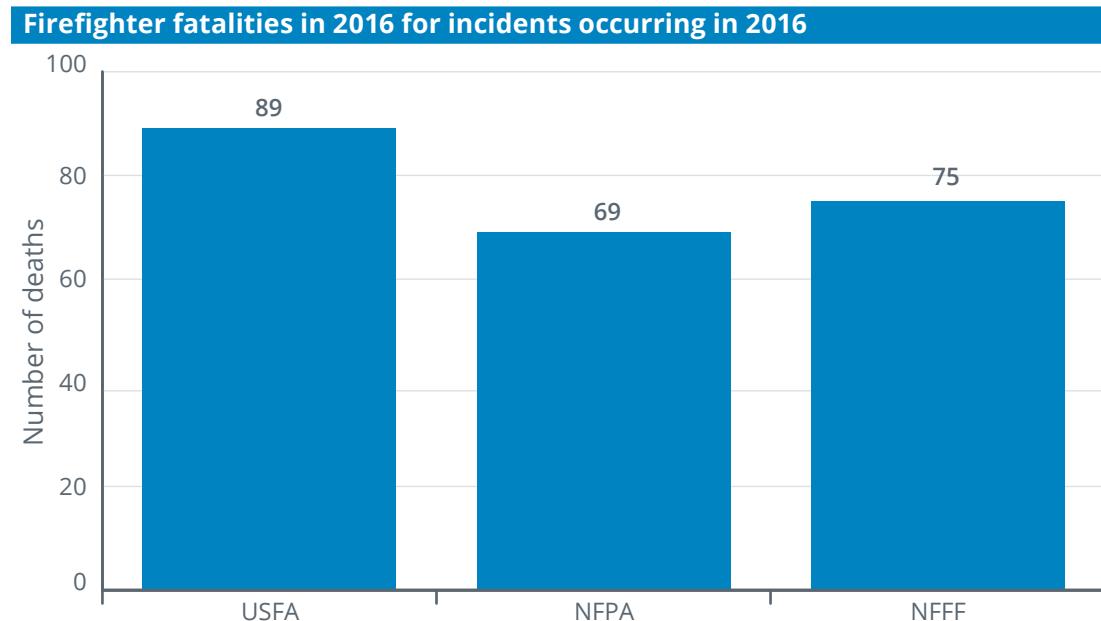
Firefighter Fatality Inclusion Criteria — National Fire Service Organizations

The NFPA, NFFF, USFA and other organizations individually collect information on firefighter fatalities in the U.S. Each organization uses a slightly different set of inclusion criteria that are based at least in part on the purposes of the information collection for each organization and data consistency.

As a result of these differing inclusion criteria, statistics about firefighter fatalities may be provided by each organization that do not coincide with one another. This section will explain the inclusion criteria for each organization and provide information about these differences.

The USFA includes firefighters in this report that died while on duty, became ill while on duty and later died, and firefighters that died within 24-hours of an emergency response or training regardless of whether the firefighter complained of illness while on duty. The USFA counts firefighter deaths that occur in the 50 states, the District of Columbia, and U.S. protectorates, such as Puerto Rico and Guam. Detailed inclusion criteria for this report appear starting on page four of this report.

For 2016, the USFA reported 89 on-duty firefighter fatalities.



Inclusion criteria for NFPA's annual firefighter fatality study

Introduction

Each year, the 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 purpose of the study is to analyze trends in the types of illnesses and injuries resulting in deaths that occur while firefighters are on the job. This annual census of firefighter fatalities in its

current format dates back to 1977. (Between 1974 and 1976, the NFPA published a study of on-duty firefighter fatalities that was not as comprehensive.)

What is a firefighter?

For the purpose of the NFPA study, the term **firefighter** covers all uniformed members of organized fire departments, whether career, volunteer, combination or contract; full-time public service officers acting as firefighters; state and federal government fire service personnel; temporary fire suppression personnel operating under official auspices of one of the above; and privately employed firefighters, including trained members of industrial or institutional fire brigades, whether full- or part-time.

Under this definition, the study includes, besides uniformed members of local career and volunteer fire departments, those seasonal and full-time 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. Impressed civilians would also be included if called on by the officer in charge of the incident to carry out specific duties. The NFPA study includes fatalities that occur in the 50 states and the District of Columbia.

What does “on duty” mean?

The term **on duty** refers to being at the scene of an alarm, whether a fire or nonfire incident; being en-route while responding to or returning from an alarm; performing other assigned duties, such as training, maintenance, public education, inspection, investigations, court testimony and fundraising; and being on call, under orders or on stand-by duty other than at home or at the individual’s place of business. Fatalities that occur at a firefighter’s home may be counted if the actions of the firefighter at the time of injury involved firefighting or rescue.

On-duty fatalities include any injury sustained in the line of duty that proves fatal, any illness incurred as a result of actions while on duty that proves fatal, and fatal mishaps involving nonemergency occupational hazards that occur while on duty. The types of injuries included in the first category are mainly those that occur at an incident scene, in training, or in accidents while responding to or returning from alarms. Illnesses (including heart attacks) are included when the exposure or onset of symptoms are tied to a specific incident of on-duty activity. Those symptoms must have been in evidence while the victim was on duty for the fatality to be included in the study.

Fatal injuries and illnesses are included even in cases where death is considerably delayed. When the onset of the condition and the death occur in different years, the incident is counted in the year of the condition’s onset. Medical documentation specifically tying the death to the specific injury is required for inclusion of these cases in the study.

Categories not included in the study

The NFPA study does not include members of fire department auxiliaries; non-uniformed employees of fire departments; emergency medical technicians who are not also firefighters; chaplains; or civilian dispatchers. The study also does not include suicides as on-duty fatalities even when the suicide occurs on fire department property.

The NFPA recognizes that a comprehensive study of firefighter on-duty fatalities would include chronic illnesses (such as cardiovascular disease and certain cancers) that prove fatal and that arose from occupational factors. In practice, there is no mechanism for identifying on-duty 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 the limitations in tracking the exposure of firefighters to toxic environments and substances, and the potential long-term effects of such exposures.

2016 experience

In 2016, a total of 69 on-duty firefighter deaths occurred in the United States, according to the NFPA inclusion criteria.

National Fallen Firefighters Foundation

In 1997, fire service leaders formulated new criteria to determine eligibility for inclusion on the National Fallen Firefighter Memorial. LODDs shall be determined by the following standards:

1. (a) Deaths of firefighters meeting the DOJ's PSOB program guidelines, and those cases that appear to meet these guidelines whether or not PSOB staff has adjudicated the specific case prior to the annual National Fallen Firefighters Memorial Service.
(b) Deaths of firefighters from injuries, heart attacks or illnesses documented to show a direct link to a specific emergency incident or department-mandated training activity.
2. While PSOB guidelines cover only public safety officers, the Foundation's criteria also include contract firefighters and firefighters employed by a private company, such as those in an industrial brigade, provided that the deaths meet the standards listed above.
3. Some specific cases will be excluded from consideration, such as deaths attributable to suicide, alcohol or substance abuse, or other gross abuses as specified in the PSOB guidelines.

The National Fallen Firefighters Memorial was built in 1981 in Emmitsburg, Maryland. The names listed there begin with those firefighters who died in the line-of-duty that year. The U.S. Congress created the NFFF to lead a nationwide effort to remember America's fallen firefighters. Since 1992, the tax-exempt, nonprofit foundation has developed and expanded programs to honor our fallen fire heroes and assist their families and co-workers by providing them with resources to rebuild their lives. Since 1997, the Foundation has managed the National Memorial Service held each October to honor the firefighters who died in the line-of-duty the previous year.

As of this writing, the Foundation will be honoring 95 firefighters who died in the line-of-duty at the October 2017 Memorial Weekend. Seventy-five firefighters being honored are associated with incidents and deaths that occurred in 2016 and 20 deaths as the result of an incident that occurred prior to 2016.

Acronyms

CPR	cardiopulmonary resuscitation
CVA	cerebrovascular accident
DOJ	U.S. Department of Justice
EMS	Emergency Medical Services
LODD	line-of-duty death
mph	miles per hour
NETC	National Emergency Training Center
NFFF	National Fallen Firefighters Foundation
NFIRS	National Fire Incident Reporting System
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NTSB	National Transportation Safety Board
OSHA	Occupational Safety and Health Administration
POVs	privately-owned vehicles
PSOB	Public Safety Officer Benefits
SCBA	self-contained breathing apparatus
USFA	U.S. Fire Administration



U.S. Fire Administration
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