



# RESEARCH



## United States Firefighter Injuries in 2020

Richard Campbell and Ben Evarts  
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## Key Findings

An estimated 64,875 firefighter injuries occurred while on duty in 2020, an increase of seven percent from the 2019 injury total.

In addition to injuries, there were 20,900 documented exposures of firefighters to infectious diseases and 17,050 exposures to hazardous conditions.

Firefighters were more likely to be injured at fireground operations than at other types of duties. In 2020, 22,450 of all the reported firefighter injuries occurred at the fireground (35 percent).

The leading cause of fireground injuries was overexertion or strain (31 percent).

Strains, sprains, or muscular pain injuries accounted for approximately two out of five injuries on the fireground (40 percent).

Other major fireground injuries included wounds, cuts, bleeding, or bruising (13 percent); smoke or gas inhalation (10 percent); and thermal stress (frostbite or heat exhaustion) (8 percent).

Non-fireground injuries included 4,975 injuries while responding to or returning from an incident; 7,550 injuries incurred during training activities; 13,650 injuries at non-fire emergency incidents; and 16,250 injuries during other on-duty activities.

Strains, sprains, and muscular pain accounted for 49 percent of all the non-fireground injuries.

## Background and Objectives

Firefighters work in varied and complex environments that expose them to a number of potential hazards. Each year, NFPA gathers information about firefighter deaths and injuries to provide national statistics on their frequency, extent, and characteristics. Earlier this year, [NFPA reported](#) that there were 140 on-duty firefighter fatalities in 2020.

A better understanding of how firefighters become injured or ill on the job can help inform intervention efforts to ensure firefighter safety and health.

This report examines firefighter injuries in the United States in 2020. The results are based on data collected by the NFPA fire experience survey.

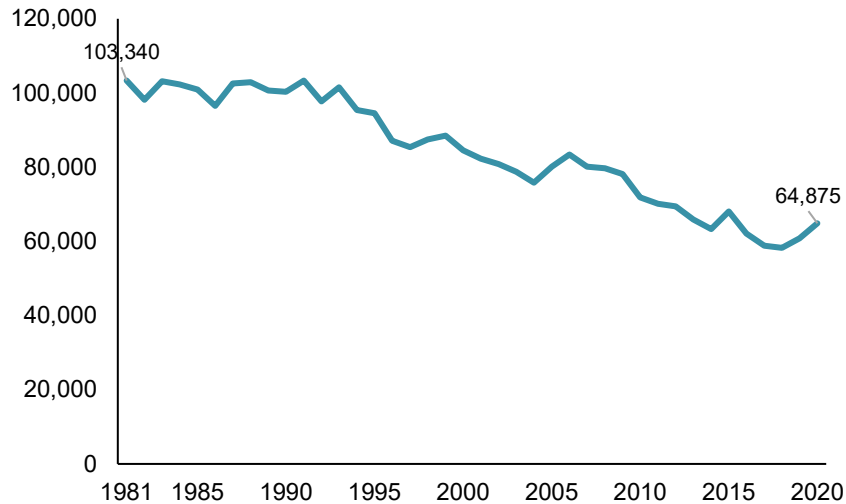
This year's report includes among its results:

- An estimate of the total number of firefighter injuries in 2020
- Estimates of the number of injuries by type of duty
- An estimate of the number of exposures to infectious diseases
- Trends in firefighter injuries and rates
- Fireground injuries by cause
- Fire department vehicle accidents and the resulting firefighter injuries

## US Firefighter Injuries in 2020

Based on data reported by fire departments responding to the 2020 NFPA national fire experience survey, we estimate that 64,875 firefighter injuries occurred in the line of duty in 2020. While this represents a seven percent increase over the 2019 total, this is nevertheless the sixth-lowest number of injuries since 1981 (See Figure 1). Over the past 20 years, the number of reported firefighter injuries has been much lower than prior years due in part to a redefinition of injuries that places exposures to hazardous conditions and infectious diseases in their own categories, some of which may have previously been included in injury totals.

**Figure 1. Total Firefighter Injuries by Year: 1981–2020**

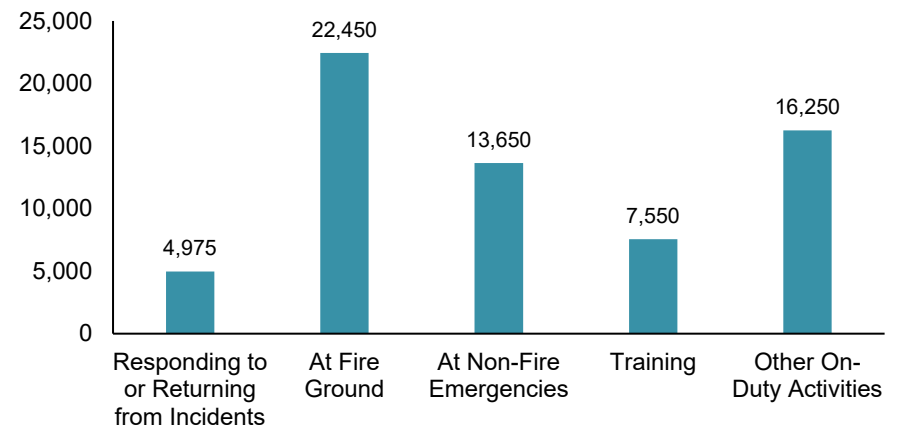


NFPA estimates that there were 20,900 exposures to infectious diseases such as hepatitis, meningitis, HIV, and COVID-19 in 2020, more than two and a half times the 7,675 exposures in 2019. This increase was almost certainly due to the COVID-19 pandemic that swept through the country in 2020. We also estimate there were 17,050 exposures to hazardous conditions such as asbestos, radioactive materials, chemicals, and fumes last year.

## Injuries by Type of Duty

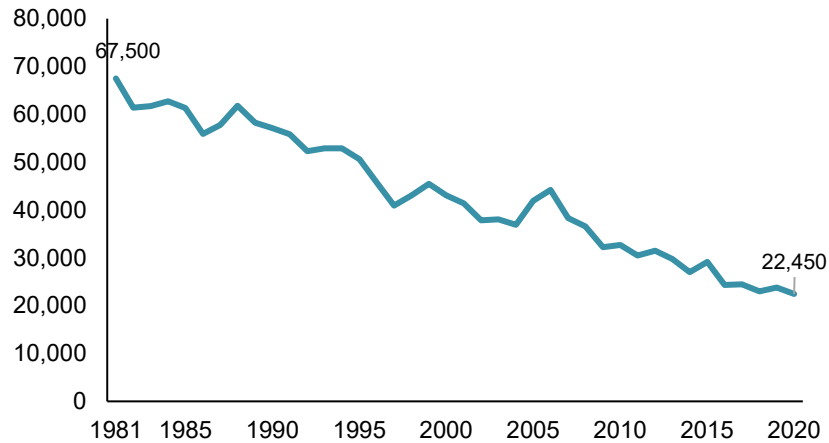
As in past reports, the types of duties being performed at the time of injury are divided into five categories: responding to or returning from an incident (includes fire and non-fire emergencies); at a non-fire emergency (includes rescue calls, hazardous calls, and natural disaster calls); during training; during other on-duty activities (e.g., inspection or maintenance duties); and at the fireground (includes structure fires, vehicle fires, brush fires, etc.). Estimates of firefighter injuries by type of duty are displayed in Figure 2.

**Figure 2. Firefighter Injuries by Type of Duty: 2020**



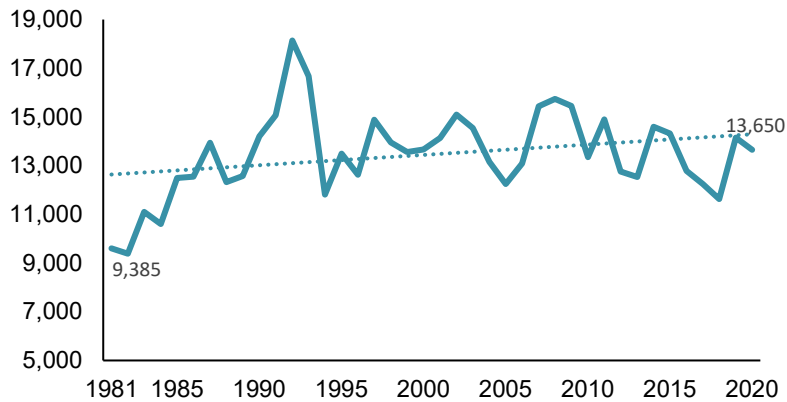
The fireground was the location with the largest share of firefighter injuries in 2020, accounting for 22,450 injuries (35 percent of the injury total), a six percent decrease in fireground injuries over the total in 2019 (see Table 1 at end of report). In addition, the rate of 16.2 fireground injuries per 1,000 fires in 2020 represented the lowest rate in 38 years (Table 1).

**Figure 3. Fireground Injuries by Year: 1981–2020**



The number of injuries at non-fire emergencies increased by 42 percent between 1981 and 2020, from 9,600 to 13,650 (Figure 4). However, the injury rate per 1,000 non-fire emergencies declined during that same period (from 1.2 to 0.4 percent), largely because the number of non-fire emergencies increased at a higher rate than the number of injuries at non-fire responses. In general, the total number of injuries at non-fire emergencies has shown substantial fluctuation, as shown in Figure 4.

**Figure 4. Injuries at Non-Fire Emergencies: 1981–2020**

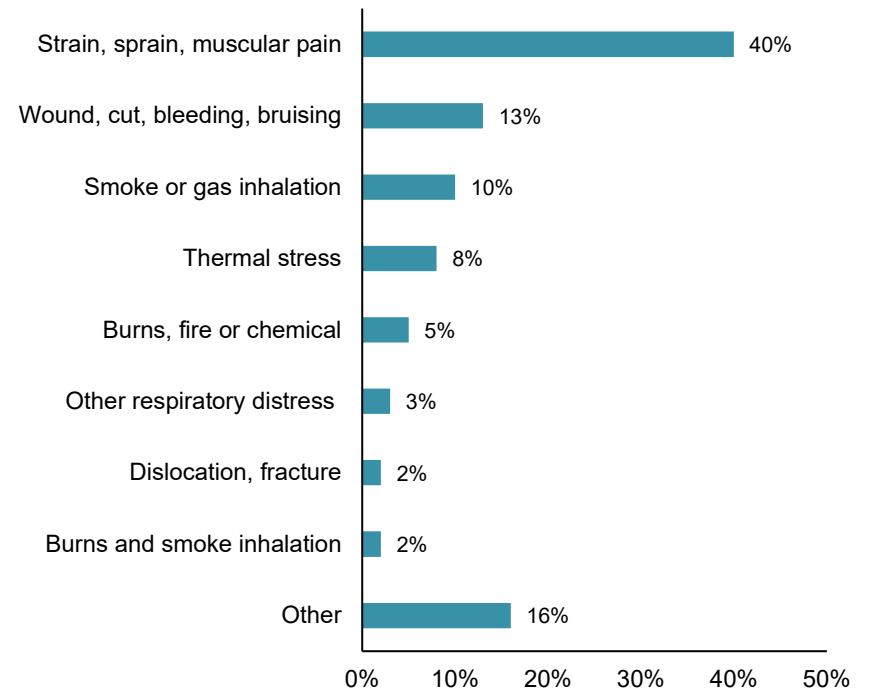


Another 7,550 firefighter injuries occurred during training activities, while 16,250 injuries occurred during other on-duty activities. In addition, 4,975 firefighter injuries occurred while responding to or returning from an incident in 2020.

### Nature and Causes of Fireground Injuries

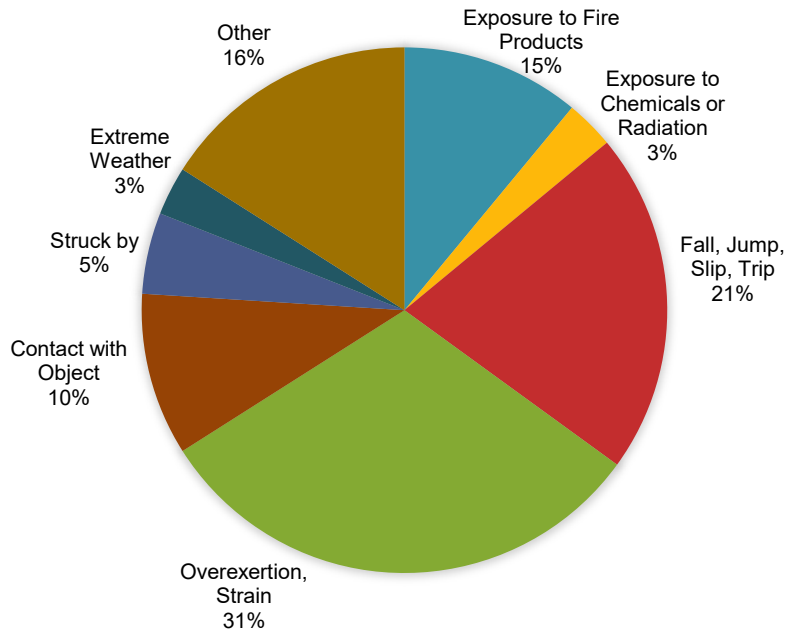
As the major location of firefighter injuries, injuries on the fireground are a particular concern. The major types of injuries that occurred during fireground operations were strains, sprains, or muscular pain, which accounted for 40 percent of the injuries; wounds, cuts, bleeding, and bruising, which accounted for 13 percent; smoke or gas inhalation, which accounted for 10 percent; and thermal stress (frostbite or heat exhaustion), which accounted for 8 percent. See Figure 5.

**Figure 5. Fireground Injuries by Nature of Injury: 2020**



The major causes of fireground injuries are shown in Figure 6. Cause, as defined here, refers to the initial circumstance leading to the injury. Overexertion or strain was the leading cause of fireground injuries, which accounted for three in ten injuries (31 percent). Other major causes of injury at the fireground were falls, jumps, or slips (21 percent), exposure to fire products (15 percent), and contact with objects (10 percent). Less prominent causes of injury included being struck by an object (5 percent), extreme weather (3 percent), and exposure to chemicals or radiation (3 percent).

**Figure 6. Fireground Injuries by Cause: 2020**



### Non-Fireground Injuries

Approximately two-thirds of firefighter injuries in 2020 (65 percent) occurred during training activities, during non-fire emergencies, while responding to or returning from incidents, or during other unspecified on-duty activities. The shares of these injuries are presented in Figure 2.

Table A shows the leading types of injury in each of these categories.

**Table A. Non-Fireground Injuries by Nature of Injury: 2020**

Nature of Injury	Responding to, Returning from	Non-Fire Emergency	Training	Other On-Duty
Strain, sprain, muscular pain	43%	3%	62%	41%
Wound, cut, bleeding, bruising	10%	11%	15%	11%
Thermal stress	6%	1%	1%	0%
Other respiratory distress	6%	1%	1%	1%
Smoke, gas inhalation	6%	0%	0%	0%
Dislocation, fracture	5%	1%	4%	2%
Other	23%	31%	12%	40%

As Table A indicates, strain, sprain, and muscular pain injuries were the leading types of injuries at all non-fireground incidents and were highest during training activities, where they accounted for over three in five injuries (62 percent). Strain, sprain, and muscular pain injuries also accounted for more than half of the injuries during non-fire emergencies (53 percent). Approximately two in five injuries occurred while responding to or returning from incidents (43 percent) and during other on-duty activities (41 percent).

Injuries involving a wound, cut, bleeding, or bruising were the second leading types of injuries experienced by firefighters during all non-fireground work activities, ranging from 10 percent of the injuries sustained when responding to or returning from incidents to 15 percent of the training injuries. Higher shares of injuries involving thermal stress, respiratory distress, smoke or gas inhalation, and dislocation or fracture were sustained while responding to or returning from incidents than the other non-fireground activities. See Table 2 for a full compilation of the injury types by work activity.

## Fire Department Vehicle Collisions

A previous NFPA report ([Firefighter Fatalities in the US in 2020](#)) noted that fifteen firefighters died in vehicle-related incidents in 2020. Seven crash victims were killed while involved in wildland fire suppression, including six victims in five aircraft crashes and another victim who was killed while repositioning an engine. Seven firefighters were involved in crashes involving road vehicles, five of whom were responding to or returning from alarms, while another was returning from an out-of-town training and the other was performing maintenance. At least three of the road vehicle victims were not wearing seatbelts.

In 2020, fire department vehicles were involved in an estimated 15,675 collisions while responding to or returning from incidents. These collisions resulted in 550 injuries (1 percent of all firefighter injuries). Another 725 collisions involved personal vehicles that were used when responding to or returning from incidents. These collisions resulted in an estimated 200 injuries (Table 3).

### Vehicle Safety

Investigations into vehicle-related firefighter fatalities by the National Institute for Occupational Safety and Health (NIOSH) have identified several key contributing factors to injury incidents during transport, including failure to use seatbelts, excess speed for conditions, and vehicle maintenance. Firefighters may also be exposed to vehicle hazards when not in transit, particularly when on or near roadways, where hazards may be influenced by lighting, road conditions, time of day, and the speed and volume of traffic.

Safety protocols and training programs based on best practices can help to reduce firefighter injuries from a variety of vehicle-related hazards. At a basic level, this entails mandatory seatbelt use for all firefighters in all areas of the vehicle or apparatus—including personal vehicles used during response. Protocols and training are also important in such areas as operating vehicles at safe speeds, navigating intersections, and backing up apparatus. To prevent injuries to firefighters working near roadways, NIOSH has developed recommendations for safety procedures in such areas as parking and staging vehicles, to ensure the safety of firefighters working near traffic.

## Average Number of Fires and Fireground Injuries per Department by Population Protected

The number of fires a department responds to is related to the population protected. The number of fireground injuries in a department is also related to the number of fires to which it responds. This point is demonstrated substantiated by the average number of fireground injuries per year per fire department, which ranges from a high of 62.9 percent for departments that protect communities of 500,000 or more to a low of 0.2 percent for departments that protect communities with fewer than 5,000 people (Table B).

One way to understand the risk of firefighter injury is to examine the number of fireground injuries per 100 fires. This considers relative fire experience and allows for a more direct comparison between departments protecting communities of different sizes. In 2020, the overall range of rates varied from 3.1 injuries per 100 fires for departments that protected communities with populations of 100,000 to 249,999 to a low of 1.1 injuries per 100 fires for departments that protected communities with populations between 5,000 and 9,999.

**Table B. Average Number of Fires, Fireground Injuries, and Injury Rates by Population of Community Protected: 2020**

Population of Community	Average Number of Fireground Injuries	Fireground Injuries per 100 Fires	Fireground Injuries per 100 Firefighters
500,000 or more*	62.9	1.7	4.5
250,000 to 499,999	17.7	1.3	3.9
100,000 to 249,999	19	3.1	7.5
50,000 to 99,999	6.7	2.9	6.4
25,000 to 49,999	1.5	1.4	2.4
10,000 to 24,999	1.0	1.5	2.4
5,000 to 9,999	0.4	1.1	1.3
2,500 to 4,999	0.3	1.2	1.3
Under 2,500	0.2	2.1	1.2

\*Excludes New York City.

Larger fire departments generally had the highest rates of fireground injuries per 100 firefighters; the highest rates in 2020 were in departments protecting between 50,000 and 249,999 residents, followed by those protecting populations of 250,000 and higher. As the size of the community decreases, the rate of fireground injuries generally declines, the lowest rate being 1.2 injuries per 100 firefighters for departments protecting fewer than 2,500 residents.

Firefighters in larger cities may have a higher risk of injury due to the presence of infrastructure and large buildings that can expose them to more complicated hazards than those in areas with less developed infrastructure and smaller buildings. In addition, fire departments in smaller communities are more likely to be staffed by volunteer firefighters who respond to fewer calls and experience lower levels of injury exposure. Different policies for documenting minor injuries and different levels of fire engagement could also explain some of these differences.

### **Exposure to Infectious Diseases**

As indicated previously, NFPA estimates that 20,900 firefighters were exposed to infectious diseases in 2020, a total that is over two and a half times greater than the estimated 7,675 exposures in 2019. Due to length considerations, the survey did not ask fire departments to identify exposures by the specific type of infectious disease, so it is not possible to specify how many of these exposures involved COVID-19. However, the NFPA report on firefighter fatalities in 2020 reported that 78 firefighter deaths were caused by COVID-19 in 2020. It is almost certain that the rise in infectious disease exposures in 2020 was dominated by exposures to COVID-19.

Research during the COVID-19 pandemic indicated that fire service emergency medical service (EMS) responders accounted for a substantial share of the firefighter exposures. For instance, [a study of fire department personnel in New York City](#) found confirmed cases of COVID-19 in 573 of 4,408 EMS responders over the study period compared to 1,198 cases of COVID-19 among 11,230 firefighters. Researchers point out that fire-

based EMS responders are at heightened risk of exposure to COVID-19 due to their [unique job demands and responsibilities](#), which include close contact with patients, constantly changing work settings, work in enclosed settings with limited ability to practice social distancing, long work shifts, and potential shortages of personal protective equipment.

### **Discussion**

Since 1981, when firefighter injury data was first collected for this report, the overall trend has been a decrease in the number of firefighter injuries. While this decline is encouraging, the number of firefighter injuries—nearly 65,000 in 2020—continues to represent a substantial problem not only for firefighters and their families, but also for the cities and towns that bear the financial burden of the expenses related to these injuries.

As the statistics in this report and previous reports attest, firefighting presents risks of personal injury to firefighters. Due to the kind of work performed and the hazards of the incident scene environment, it is unlikely that all firefighter injuries can be eliminated. However, the adoption of proactive safety programs by fire departments can help to reduce injury and illness among firefighters and other emergency response personnel.

For example, the prevalence of strain and sprain injuries identified in this report have been well documented in other research and the focus of numerous prevention initiatives. [A recent study of musculoskeletal disorders in California firefighters](#) found that firefighters experienced a significantly elevated rate of musculoskeletal disorders (MSDs) compared to other workers, including those in other high-risk jobs. The study found that MSDs accounted for 47 percent of firefighter injuries, compared to 38 percent for police and 42 percent for other public sector workers.

Although many of the activities that influence strain injuries are regular parts of firefighting—such as carrying hoses and heavy equipment, performing forcible entry, climbing ladders, and contending with uneven and slippery surfaces—[injury prevention specialists](#) have identified potential opportunities to reduce injury risk. For instance, training in

techniques to reduce the mechanical load on parts of the musculoskeletal system involved in ergonomically challenging tasks, such as bending and lifting, has been shown to reduce injuries to the back and upper extremities of firefighters.<sup>1</sup> Better aerobic fitness has also been found to be associated with lower risk for sprain and strain injuries, underscoring the need for structured fitness programs in firefighter injury prevention efforts.<sup>2</sup>

Research indicates that firefighters may fail to follow model injury prevention practices because they are unaware of new protocols, have limited training, or don't have access to new equipment, which could be mitigated through the adoption of proactive risk management programs. In addition, [attributes of fire department leadership and organizational culture](#) have been found to influence safety motivation and the use of personal protective equipment among firefighters. Inspirational leadership and commitment to safety among immediate supervisors are associated with firefighter motivation to adopt safety practices and comply with the effective use of personal protective equipment.

In addition, the underutilization of patient transfer equipment to reduce strain and sprain injuries has been cited as an indication of the need for greater attention to injury control through comprehensive risk management.<sup>3</sup> Safety protocols and training programs based on best practices can help to reduce firefighter injuries from a variety of hazards.

A recent study of the NIOSH firefighter fatality database found that personal protective equipment, seatbelt use, and fitness were contributing factors in nearly half of the fatalities between 2009 and 2014.<sup>4</sup> The researchers also found that a lack of training or experience and inappropriate medical clearance in fire departments that did not have standard operating protocols for respirator fitness testing, use of personal protective equipment, fitness testing, rapid intervention, medical clearance,

safety or distress alarms, vehicle maintenance, or incident command. An absence of key safety protocols was seen to put firefighters at risk, which the authors suggested might be increasing over time.

In addition to their efforts to prevent traumatic injuries, it is also critically important for firefighter health and safety programs to include policies and procedures that address the long-term health risks of firefighting activities, including prevention efforts around [cardiovascular health and protection from exposure to toxic materials](#).

Annual medical evaluations are an important component of programs for reducing the risk of cardiac events and should include clearance for duty by physicians who are familiar with the physical demands of firefighting. Fitness and wellness programs also play a role in enhancing the ability of firefighters to contend with the cardiovascular strain of fire-related duties. At the fireground, good practice requires on-scene rehabilitation to ensure adequate hydration and rest, as well as medical monitoring to evaluate indications of cardiovascular strain.

Besides reducing the risk of injury, firefighter health and safety programs need to be attentive to reducing exposure to contaminants or pathogens that might lead to illness or disease, whether through inhalation, ingestion, or absorption through the skin. Firefighters are exposed to a variety of contaminants at the fire scene—and potentially at the fire station itself in the case of diesel exhaust—that may be carcinogenic.

However, while carcinogens represent a particularly serious health threat for firefighters, firefighters are also at risk for chronic respiratory disease, coronary heart disease, and other illnesses from their work-related exposures. Use of SCBA with properly fitting masks is essential when exposure to contaminants is an issue, including during overhaul,

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<sup>1</sup> WF, Peate; et al. *Core strength: a new model for injury prediction and prevention*. Journal of Occupational Medicine and Toxicology 11: 2–3 (2007).

<sup>2</sup> GS, Popli; et al. *The association of aerobic fitness with injuries in the fire service*. American Journal of Epidemiology 179: 149–155 (2014).

<sup>3</sup> KM, Pollack; et al. *Implementing risk management to reduce injuries in the U.S. fire service*. Journal of Safety Research 60: 21–27 (2017).

<sup>4</sup> SA, Kahn; et al. *Factors implicated in safety-related firefighter fatalities*. Journal of Burn Care & Research 38 (2016).



when contaminants are less obvious but still present. Suppression activities also require the use of gloves and hoods to protect against dermal absorption of hazardous substances.

Although the hazards of firefighting are very real, the use of best practice health and safety protocols, active training programs, and other measures can help to protect firefighters in all their areas of work.

#### **Contaminated Gear and Equipment**

In recent years, cancer concerns have prompted considerable interest in minimizing firefighter exposure to toxic contaminants. Among the areas of emerging interest around firefighters and cancer is attention to the health hazards [contaminated gear and equipment](#). Some of the best practices for avoiding exposure to dirty gear are likely to be beyond the reach of many fire departments, including such practices as purchasing two sets of gear for every firefighter or spatially separating clean and dirty zones of fire stations in ways that require substantial station redesign. However, there are a number of best practices that are not expensive and can be implemented right away, such as removing gear before returning to the station and storing it in leak-proof bags or using alternate footwear inside the station. Information on [best practices for reducing exposure to carcinogens](#) is available through the Washington State Council of Fire Fighters.

## **Methods**

Every year, NFPA surveys a sample of fire departments in the United States to make national projections of the fire problem. The sample is stratified by the size of the community protected by the fire department and includes all the United States fire departments that protect communities with populations larger than 5,000 residents. These 8,745 fire departments protect a population of 287 million, or 87 percent of the United States population as of July 2019. The rest of the sample includes 16,430 randomly selected departments that protect populations under 5,000, for a total sample size of 25,175 departments, or 85 percent of all the departments in the US known to NFPA.

A ratio estimation was used for the survey, with stratification by community size<sup>5</sup>. For each injury statistic, a sample injury rate was computed for each stratum. This rate consisted of the total of each particular statistic from all the departments that reported it divided by the total population protected by the departments that reported the statistic. Note that this means the departments used in calculating each statistic could be different, reflecting differences in unreported statistics. The national projections were made by weighting the sample results according to the proportion of the total US population accounted for by the communities of each size. Around any estimate based on a sample survey is a confidence interval that measures statistical certainty. We are confident that the actual number of total firefighter injuries falls within five percent of the estimate.

Data were collected by sending designated fire departments a form requesting a description of the circumstances that led to a particular injury. The overall response rate to the 2020 survey was 8.8 percent based on 2,204 fire department responses. Response rates were considerably higher from departments protecting larger communities. Departments protecting communities with populations of 50,000 or more had an overall response rate of 42 percent, while departments protecting communities of 10,000 to 49,999 residents had a 19 percent response rate, and departments protecting fewer than 10,000 residents had a 5 percent response rate. The 2,204 departments that responded to the survey protect 111 million people, or 33 percent of the US population.

The results reported here are based on injuries incurred by public fire departments. No state or federal firefighting entities are included, and no adjustments have been made for injuries that occurred during fires attended solely by private fire brigades.

<sup>5</sup> William G. Cochran, *Sampling Techniques*. (New York, NY: John Wiley, 1977), pp. 150–161.

## NFPA Codes and Standards References

NFPA offers a number of protocols and initiatives that can be used at the local level to promote the safety and health of personnel. **Note:** Some changes are being introduced to these codes through the Emergency Response and Responder Safety Consolidation Project. For more information on the project and its efforts, please visit <https://www.nfpa.org/errs>.

- Commitment on the part of top fire service management to reduce injuries. *NFPA 1500™, Standard on Fire Department Occupational Safety, Health, and Wellness Program*, Section 4.3.
- Establish a safety committee headed by a safety officer to recommend a safety policy and the means of implementing it. *NFPA 1500*, Section 4.5.
- Develop and implement an investigation procedure that includes all incidents, near misses, injuries, fatalities, occupational illnesses, and exposures involving members. *NFPA 1500*, 4.4.4. and 4.4.5.
- Provision appropriate protective equipment and mandate its use. *NFPA 1500*, Section 7.1 through Section 7.8.
- Develop and enforce a program for the use and maintenance of SCBA. *NFPA 1500*, Section 7.9 through Section 7.14.
- Develop and enforce policies on safe practices for drivers and passengers of fire apparatus. *NFPA 1500*, Section 6.2 and Section 6.3.
- Develop procedures to ensure sufficient personnel responds for both firefighting and overhaul duties. *NFPA 1500*, 4.1.2; *NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*; and *NFPA 1720, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Department*.
- Implement regular medical examinations and a physical fitness program. *NFPA 1500*, Section 10.1 through Section 10.3; *NFPA 1582, Standard on Comprehensive Occupational Medical Program for Fire*

*Departments*; and *NFPA 1583, Standard on Health-Related Fitness Programs for Fire Department Members*.

- Adopt and implement an incident management system. *NFPA 1500*, Section 8.1 and *NFPA 1561, Standard on Emergency Services Incident Management System and Command Safety*.
- Train and educate all members involved in emergency operations. *NFPA 1500*, Chapter 5.
- Implement programs for the installation of private fire protection systems so fires are discovered at an earlier stage, exposing firefighters to a less hostile environment. *NFPA 1, Fire Code* and *NFPA 101® , Life Safety Code®*.
- Increase efforts in the area of fire safety education programs so citizens are made aware of measures to prevent fires and the correct reactions to fire situations. *NFPA 1201, Standard for Providing Fire and Emergency Services to the Public*, Chapter 6.

Other NFPA standards that can help in reducing firefighter injuries and illnesses include:

- *NFPA 1582, Standard on Comprehensive Occupational Medical Program for Fire Departments*.
- *NFPA 1584, Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises*, 2008 edition, Chapter 4, Preparedness, and Chapter 6, Incident Scene and Training Rehabilitation.
- *NFPA 1002, Standard for Fire Apparatus Driver/Operator Professional Qualifications*, 2010 edition, Section 4.8.
- *NFPA 1620, Standard for Pre-Incident Planning*, 2010 edition; Chapter 4, Pre-Incident Planning Process; Chapter 5, Physical & Site Considerations; Chapter 7, Water Supplies & Fire Protection Systems; and Chapter 8, Special Hazards.

Firefighter injuries can be reduced in a number of ways. By addressing the priorities listed above, fire service organizations can make significant strides toward reducing the number and impact of such injuries.

## Definition of Terms

**Fire:** Any instance of uncontrolled burning. Excludes combustion, explosions, and fires out on arrival (whether authorized or not); overpressure ruptures without combustion; mutual aid responses; smoke scares; and hazardous materials responses, e.g., flammable gas, liquid, or chemical spills without fire.

**Incident:** The movement of a piece or pieces of fire service apparatus or equipment in response to an alarm.

**Injury:** Physical damage suffered by a person that requires (or should require) treatment by a practitioner of medicine (physician, nurse, paramedic, or EMT) within one year of the incident (regardless of whether treatment was received) or that results in at least one day of restricted activity immediately following the incident.

## Acknowledgments

NFPA is grateful to the many fire departments that responded to the 2020 national fire experience survey for their continuing efforts to provide the data necessary to make national projections. The authors would also like to thank the members of the NFPA staff who worked on this year's survey, including Stephen Belski, Frank Deely, and Jay Petrillo, for editing the survey forms and making follow-up calls to fire departments.

To learn more about the research, visit [nfpa.org/research](https://nfpa.org/research).

Email: [research@nfpa.org](mailto:research@nfpa.org)

NFPA No. FFI10

**Table 1. Total Firefighter Injuries, Firefighter Injuries at the Fireground, and Firefighter Injuries at Non-Fire Emergencies: 1981–2020**

Year	Total Firefighter Injuries	Firefighter Injuries at the Fireground		Firefighter Injuries at Non-Fire Emergencies	
		Injuries	Injuries per 1,000 Fires	Injuries	Injuries per 1,000 Incidents
1981	103,340	67,500	23.3	9,600	1.2
1982	98,150	61,400	24.2	9,385	1.2
1983	103,150	61,700	26.5	11,105	1.3
1984	102,300	62,700	26.8	10,600	1.2
1985	100,900	61,300	25.9	12,500	1.4
1986	96,540	55,900	24.7	12,545	1.3
1987	102,600	57,755	24.8	13,940	1.4
1988	102,900	61,790	25.4	12,325	1.1
1989	100,700	58,250	27.5	12,580	1.1
1990	100,300	57,100	28.3	14,200	1.3
1991	103,300	55,839	27.3	15,065	1.2
1992	97,700	52,290	26.6	18,140	1.4
1993	101,500	52,885	27.1	16,675	1.3
1994	95,400	52,875	25.7	11,810	0.8
1995	94,500	50,640	25.8	13,500	0.9
1996	87,150	45,725	23.1	12,630	0.8
1997	85,400	40,920	22.8	14,880	0.9
1998	87,500	43,080	24.5	13,960	0.8
1999	88,500	45,500	25.0	13,565	0.8
2000	84,550	43,065	25.2	13,660	0.7
2001	82,250	41,395	23.9	14,140	0.7
2002	80,800	37,860	22.4	15,095	0.8

**Table 1. Total Firefighter Injuries, Firefighter Injuries at the Fireground, and Firefighter Injuries at Non-Fire Emergencies: 1981–2019  
(Continued)**

Year	Total Firefighter Injuries	Firefighter Injuries at the Fireground		Firefighter Injuries at Non-Fire Emergencies	
		Injuries	Injuries per 1,000 Fires	Injuries	Injuries per 1,000 Incidents
2003	78,750	38,045	24	14,550	0.7
2004	75,840	36,880	22.1	13,150	0.6
2005	80,100	41,950	26.2	12,250	0.6
2006	83,400	44,210	26.9	13,090	0.6
2007	80,100	38,340	24.6	15,435	0.7
2008	79,700	36,595	25.2	15,745	0.7
2009	78,150	32,205	24.1	15,455	0.6
2010	71,875	32,675	24.5	13,355	0.5
2011	70,090	30,505	22	14,905	0.5
2012	69,400	31,490	22.9	12,760	0.4
2013	65,880	29,760	24	12,535	0.4
2014	63,350	27,015	20.8	14,595	0.5
2015	68,085	29,130	21.6	14,320	0.4
2016	62,085	24,325	18.1	12,780	0.4
2017	58,835	24,495	18.6	12,240	0.4
2018	58,250	22,975	17.4	11,625	0.3
2019	60,825	23,825	18.4	14,150	0.4
2020	64,875	22,450	16.2	13,650	0.4

Source: NFPA survey of fire Departments for US fire experience (1981–2019).

**Table 2. Firefighter Injuries by Nature of Injury and Type of Duty: 2020**

Nature of Injury	Responding to or Returning from Incidents		At the Fireground		At a Non-Fire Emergency		During Training		During Other Duties		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Burns (fire or chemical)	25	(1%)	1,050	(5%)	75	(1%)	150	(2%)	175	(1%)	1,475	(2%)
Smoke or gas inhalation	300	(6%)	2,250	(10%)	50	(0%)	25	(0%)	75	(0%)	2,700	(4%)
Other respiratory distress	300	(6%)	750	(3%)	125	(1%)	50	(1%)	175	(1%)	1,400	(2%)
Burns and smoke inhalation	75	(2%)	450	(2%)	50	(0%)	125	(2%)	125	(1%)	825	(1%)
Wounds, cuts, bleeding, or bruising	475	(10%)	2,825	(13%)	1,475	(11%)	1,100	(15%)	1,800	(11%)	7,675	(12%)
Dislocation, fracture	225	(5%)	525	(2%)	200	(1%)	325	(4%)	400	(2%)	1,675	(3%)
Heart attack or stroke	25	(1%)	250	(1%)	100	(1%)	75	(1%)	300	(2%)	750	(1%)
Strain, sprain, or muscular pain	2,150	(43%)	8,975	(40%)	7,225	(53%)	4,675	(62%)	6,700	(41%)	29,725	(46%)
Thermal stress (frostbite, heat exhaustion)	275	(6%)	1,825	(8%)	100	(1%)	100	(1%)	75	(0%)	2,375	(4%)
Other	1,125	(23%)	3,550	(16%)	4,250	(31%)	925	(12%)	6,425	(40%)	16,275	(25%)
<b>Total</b>	<b>4,975</b>	<b>(100%)</b>	<b>22,450</b>	<b>(100%)</b>	<b>13,650</b>	<b>(100%)</b>	<b>7,550</b>	<b>(100%)</b>	<b>16,250</b>	<b>(100%)</b>	<b>64,875</b>	<b>(100%)</b>

Note: In cases where individual firefighters sustained multiple injuries, only the nature of the most serious injury was tabulated and reported.

Source: NFPA survey of fire departments for US fire experience during 2020.

**Table 3. Fire Department Vehicle Collisions and Resulting Firefighter Injuries  
While Responding to or Returning from Incidents: 1990–2020**

Year	Involving Fire Department Emergency Vehicles		Involving Firefighters' Personal Vehicles	
	Collisions	Firefighter Injuries	Collisions	Firefighter Injuries
1990	11,325	1,300	950	175
1991	12,125	1,075	1,375	125
1992	11,500	1,050	1,575	150
1993	12,250	900	1,675	200
1994	13,755	1,035	1,610	285
1995	14,670	950	1,690	190
1996	14,200	910	1,400	240
1997	14,950	1,350	1,300	180
1998	14,650	1,050	1,350	315
1999	15,450	875	1,080	90
2000	15,300	990	1,160	170
2001	14,900	960	1,325	140
2002	15,550	1,040	1,030	210
2003	15,900	850	980	85
2004	15,420	980	1,150	220
2005	15,885	1,120	1,080	125
2006	16,020	1,250	1,070	210
2007	14,650	915	665	120
2008	14,950	670	1,000	70
2009	15,100	820	870	100
2010	14,200	775	1,000	75
2011	14,850	970	790	190

**Table 3. Fire Department Vehicle Collisions and Resulting Firefighter Injuries While Responding to or Returning from Incidents: 1990–2020 (Continued)**

Year	Involving Fire Department Emergency Vehicles		Involving Firefighters’ Personal Vehicles	
	Collisions	Firefighter Injuries	Collisions	Firefighter Injuries
2012	14,300	725	750	70
2013	12,350	730	830	185
2014	14,910	550	620	90
2015	16,600	1,150	700	50
2016	15,430	700	850	175
2017	15,425	1,005	795	75
2018	14,425	575	700	50
2019	15,350	575	800	10
2020	15,675	550	725	200

Source: NFPA survey of fire departments for US fire experience (1980–2020).

**Table 4. Average Number of Fires, Fireground Injuries, and Injury Rates by Population of Community Protected: 2020**

Population of Community Protected	Average No. of Fireground Injuries	Fireground Injuries per 100 Fires	Fireground Injuries per 100 Firefighters
500,000 or more*	62.9	1.7	4.5
250,000 to 499,999	17.7	1.3	3.9
100,000 to 249,999	19.0	3.1	7.5
50,000 to 99,999	6.7	2.9	6.4
25,000 to 49,999	1.5	1.4	2.4
10,000 to 24,999	1.0	1.5	2.4
5,000 to 9,999	0.4	1.1	1.3
2,500 to 4,999	0.3	1.2	1.3
Under 2,500	0.2	2.1	1.2

Source: NFPA survey of fire departments for US fire experience (1980–2020).