August 2018 | Volume 19, Issue 5

Fire Department Overall Run Profile as Reported to the National Fire Incident Reporting System (2016)

These topical reports are designed to explore facets of the U.S. fire problem as depicted through data collected in the U.S. Fire Administration's National Fire Incident Reporting System. Each topical report briefly addresses the nature of the specific fire or fire-related topic, highlights important findings from the data, and may suggest other resources to consider for further information.

Findings

- In 2016, fire departments responded to 25,693,300 incident calls that were reported to the National Fire Incident Reporting System (NFIRS).
- Almost two-thirds (64 percent) of the reported calls to fire departments required Emergency Medical Services (EMS) and rescue services.
- Only 5 percent of all reported fire department runs were fire related.
- In 2016, fire departments responded to more severe weather calls reported on Saturdays than any other day of the week.
- About half (52 percent) of the reported calls were to residential properties. Only 3 percent of these were fire related.
- Approximately 9 percent of reported runs involved mutual or automatic aid.

Fire departments provide invaluable services to communities nationwide. They respond to all types of emergency situations involving fires, explosions, rescues, medical emergencies, hazardous conditions, natural disasters, and false alarms. They also respond to nonemergency service calls and good intent calls. Often, what is described to dispatchers does not reflect the actual incident type; nevertheless, fire departments are trained and prepared to respond to a wide variety of situations.[1]

To understand the full role fire departments play in a community, this topical report profiles fire department run activity as reflected in the 2016 NFIRS data.[2,3] In 2016, fire departments responded to 25,693,300 calls as reported to the NFIRS.[4]

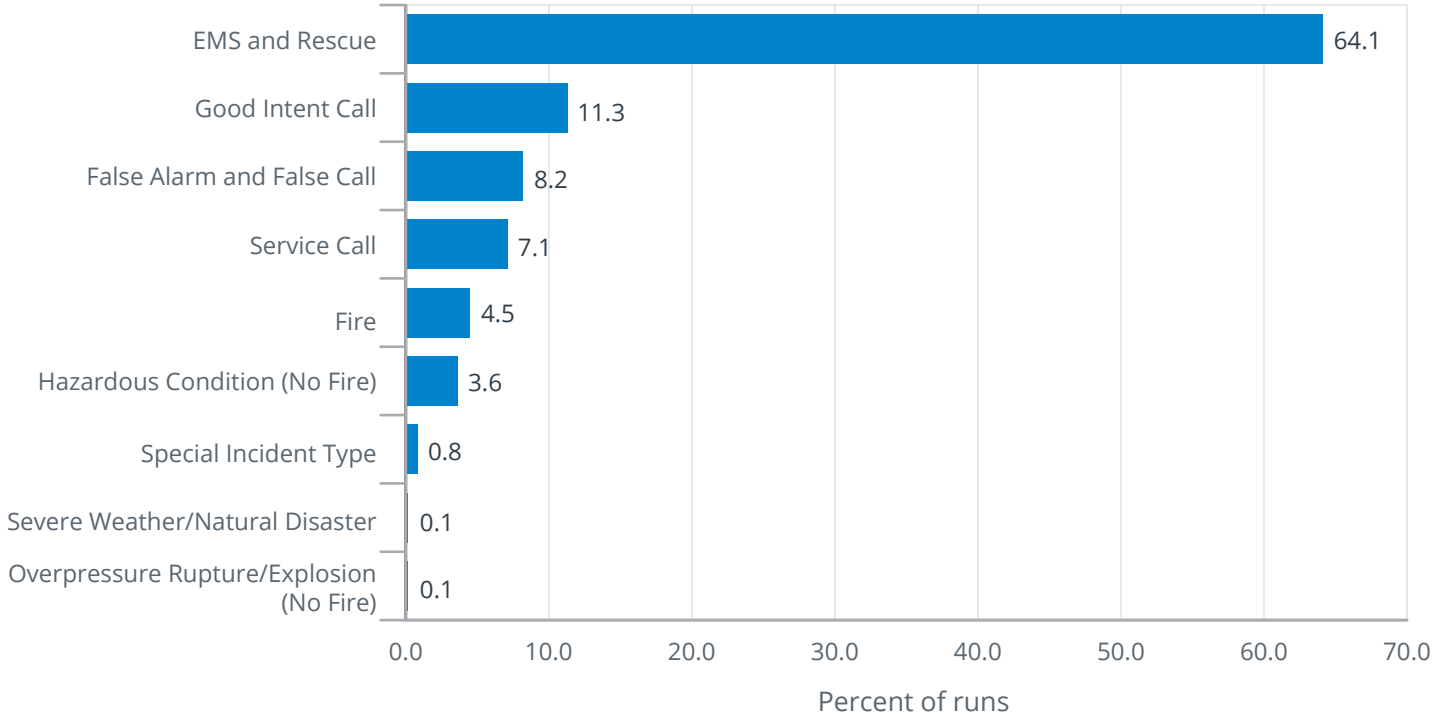
While "fire" is part of the department name, only 5 percent of runs made by fire departments actually involved fire, as shown in Figure 1. Runs in the EMS and Rescue, Good Intent, False Alarm, and Service Call Incident Type categories accounted for 91 percent of all reported runs.[5] Specifically, 64 percent of all fire department runs were categorized as EMS and Rescue. Good Intent Calls (11 percent), False Alarms and False Calls (8 percent), and Service Calls (7 percent) were the next most prevalent incident type categories, followed by Fire.[6]

Within the major incident type categories, EMS, medical assist, and dispatched and cancelled enroute calls were the leading specific types of fire department runs.[7] EMS calls accounted for 42 percent of all fire department runs. Medical assist calls accounted for 10 percent of runs, and fire departments were dispatched and cancelled enroute in 7 percent of calls.

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

National Fire Data Center
16825 S. Seton Ave.
Emmitsburg, MD 21727
https://www.usfa.fema.gov/data/statistics/

Figure 1. Fire department overall runs by major incident type category (Percent of runs, 2016)



Source: NFIRS 5.0.
Note: Total does not add up to 100 percent due to rounding.

Emergency calls

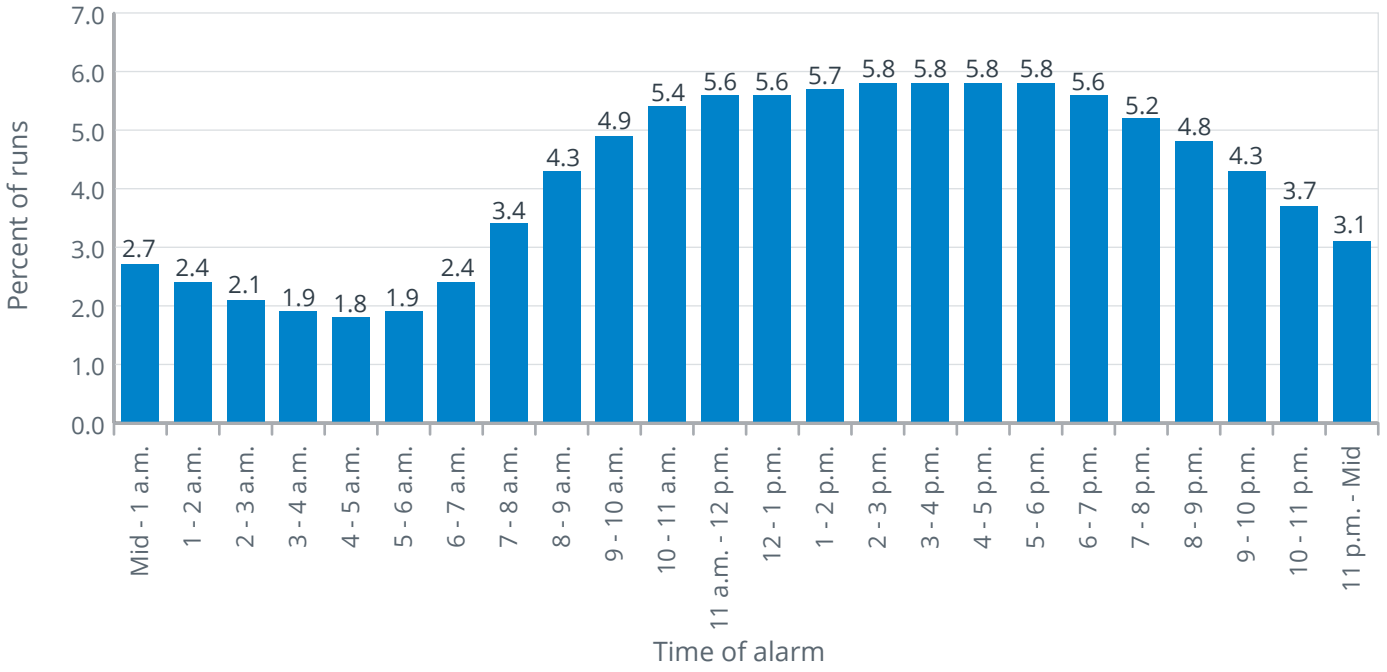
The official national emergency number is 911. Emergency calls are placed to Public Safety Answering Points (PSAPs), typically city or county controlled, where a trained dispatcher is ready to route the call to local emergency medical, fire and police services. Dispatchers at the PSAPs determine the location of calls by cross-referencing the telephone number against a location database.[8] Technology involving wireless telephones and Voice over Internet Protocol services, such as cellphones and internet connections (e.g., DSL, dial and cable modems), make determining where the call is coming from more complex because the call is not associated with a fixed location. This can delay emergency response times. However, to improve the ability of emergency personnel to respond efficiently to callers placing wireless 911 calls, the Federal Communications Commission has taken steps to ensure that wireless service providers make location information automatically available to PSAPs.

In some rural and remote areas, emergency calls connect directly to local fire stations. Presently, more and more rural area residences are in the process of establishing precise addresses for future PSAP capabilities.[9]

Hourly, weekly, monthly and seasonal profile of runs

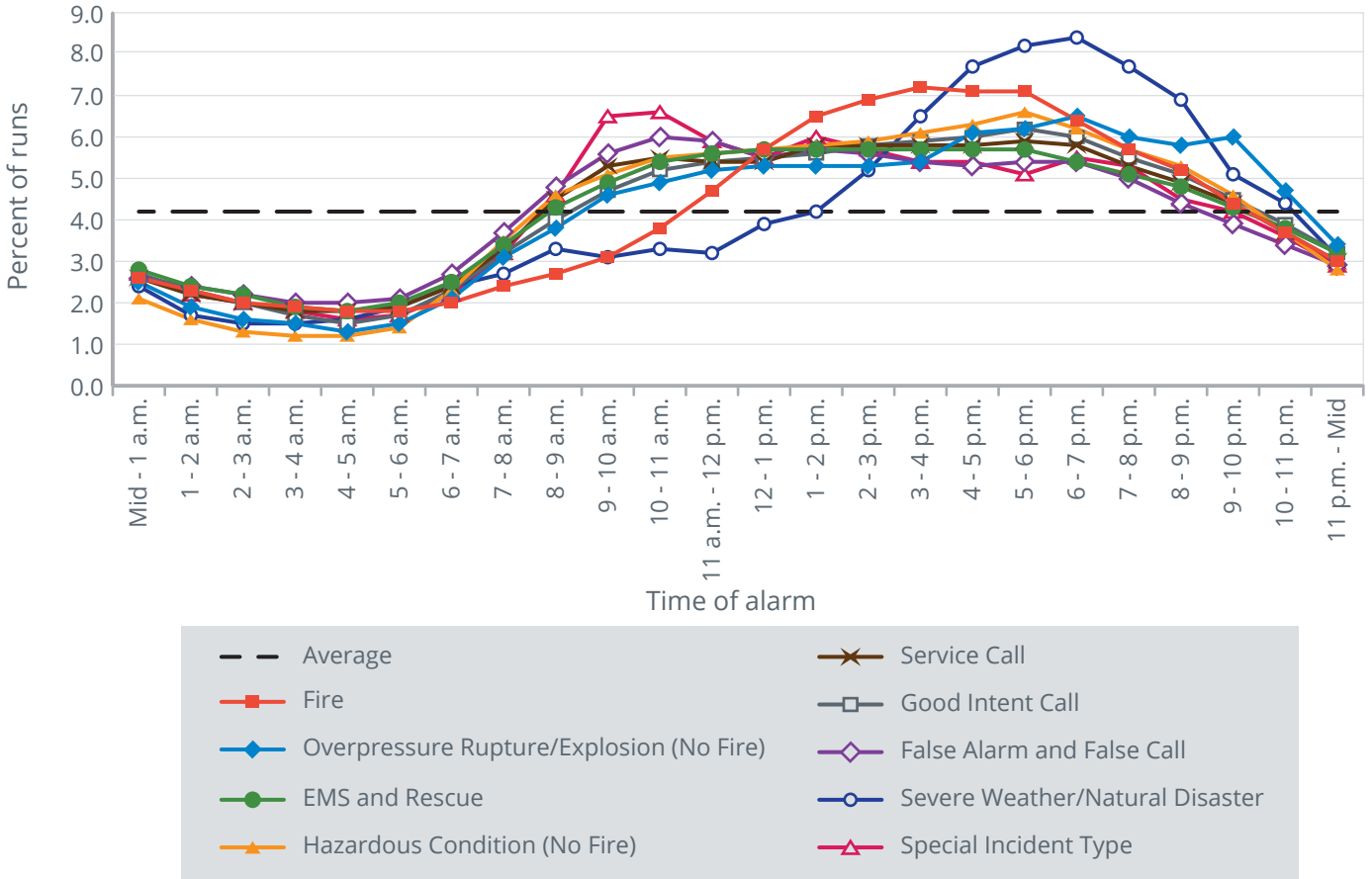
Fire departments respond to incidents everyday, at all times of the day. In 2016, the demand for fire department services was relatively constant during the late morning through the early evening. Peak demand was between the hours of 2 and 6 p.m., as shown in Figure 2. Each type of run has its own characteristic daily profile, as shown in Figure 3. All runs were lowest in the very early morning hours and increased during the morning as daily activities began. Most run types reached near peak demand in midmorning and remained relatively constant with peak hours occurring in the mid to late afternoon, until early evening. Fire, severe weather, and special incident (e.g., citizen complaint) runs were notable exceptions. Fire runs increased slowly but steadily during the day, peaked between late afternoon and early evening, and then steadily decreased. Severe weather runs had below average demand until midafternoon, increased sharply through late afternoon and early evening, then decreased sharply during the late evening hours. Special incident runs had below average demand until 8 a.m., peaked late morning, and continued to decline with two small peaks in the early afternoon and evening hours.

Figure 2. Fire department overall runs by time of day (Percent of runs, 2016)



Source: NFIRS 5.0.

Figure 3. Fire department overall runs by time of day and major incident type category (Percent of runs, 2016)



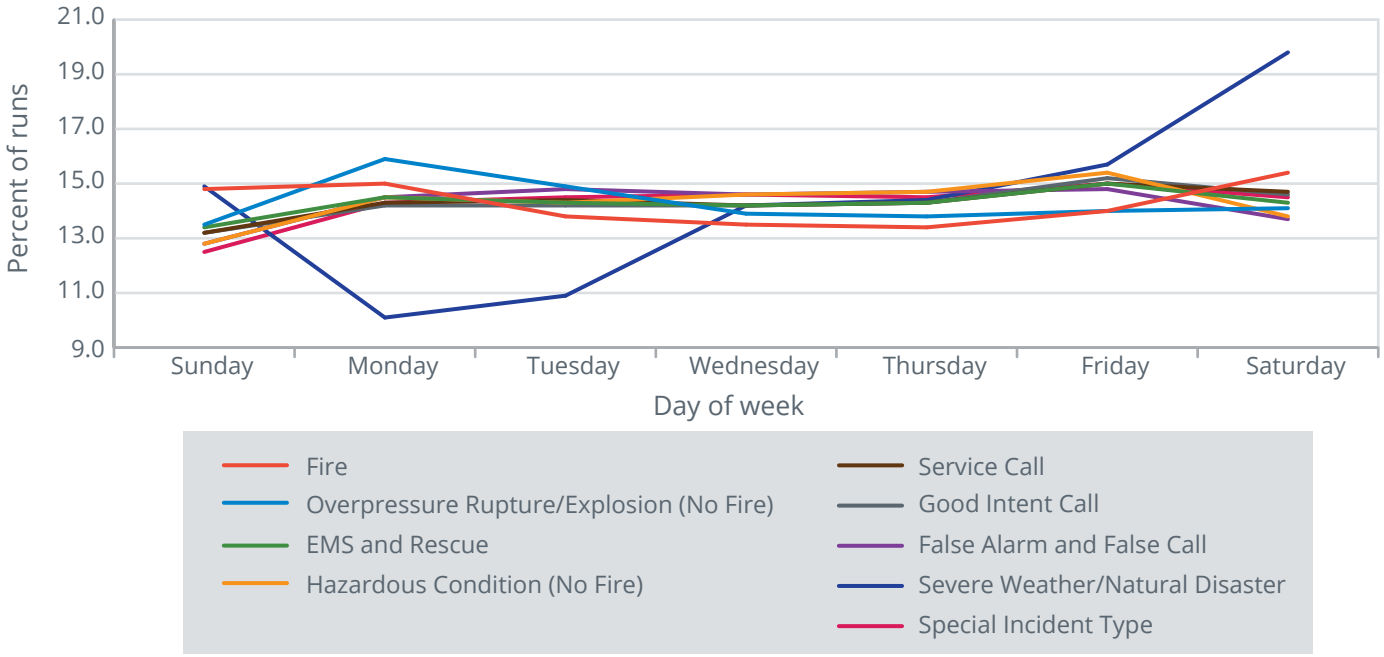
Source: NFIRS 5.0.

Overall, fire department runs followed a fairly consistent pattern by day of the week, except for calls to fires, explosions or overpressure ruptures, and severe weather events (Figure 4). In 2016, fire departments responded to more severe weather calls reported on Saturdays than any other day of the week; 65 percent of these weather events occurred in October (36 percent), July (17 percent) and August (12 percent).[10] Fire calls were more prevalent on the weekends, whereas explosion or overpressure rupture calls were more frequent on Mondays.

The occurrence of runs on a monthly basis was relatively constant. However, there was a slight increase in runs during July (Figure 5).

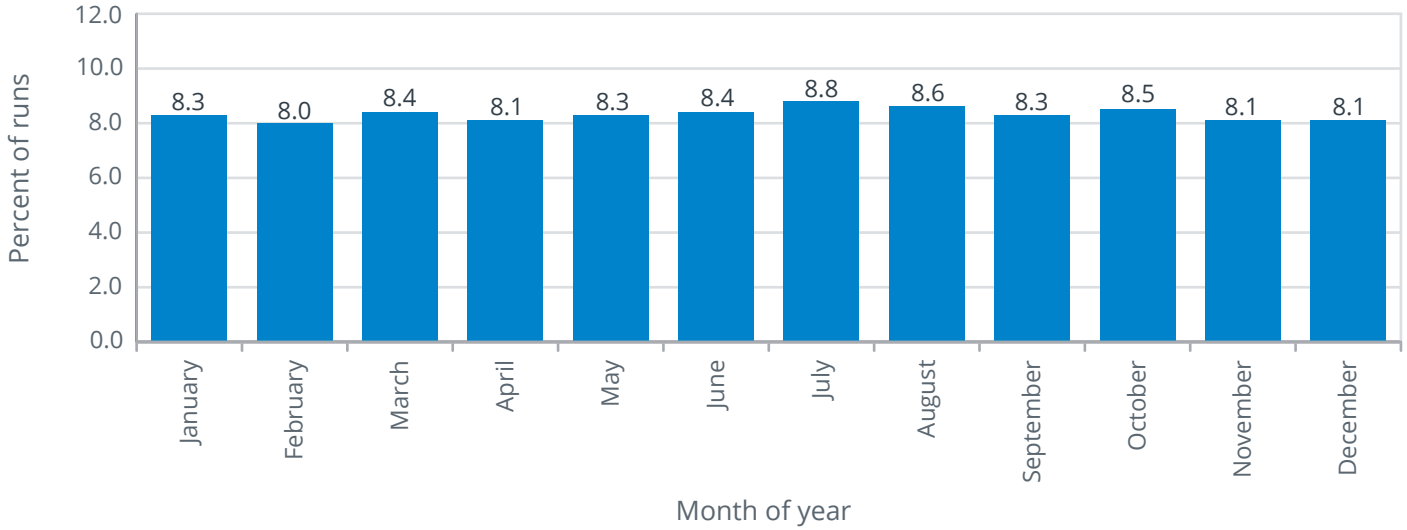
Seasonally, EMS and rescue responses were the most prevalent fire department responses, as shown in Figure 6.[11] Overall, the percentage distribution of the type of runs remained relatively consistent for each season.

Figure 4. Fire department overall runs by major incident type category and day of week (Percent of runs, 2016)



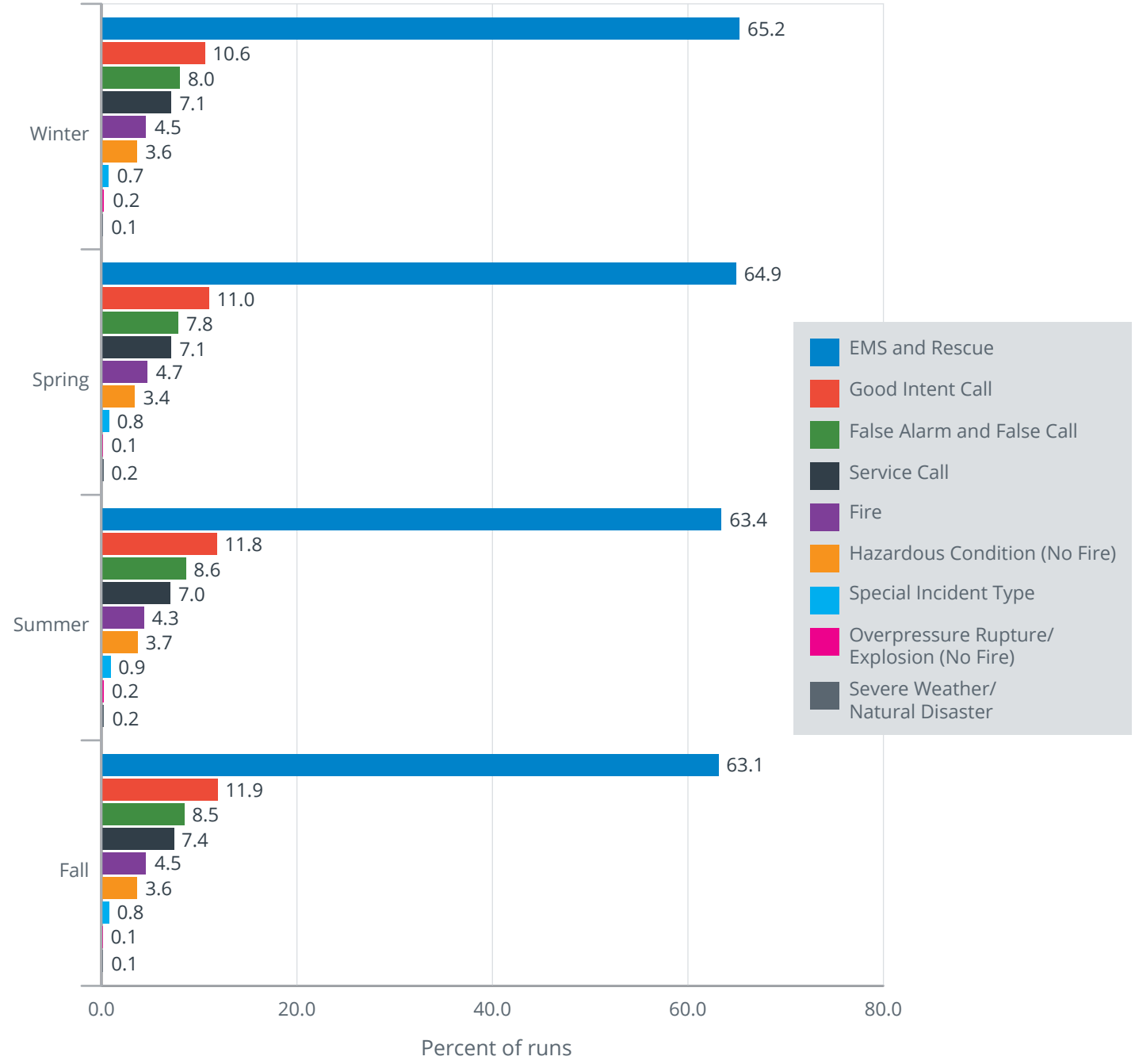
Source: NFIRS 5.0.

Figure 5. Fire department overall runs by month (Percent of runs, 2016)



Source: NFIRS 5.0.
Note: Total does not add up to 100 percent due to rounding.

Figure 6. Fire department overall runs by season and major incident type category (Percent of runs, 2016)



Source: NFIRS 5.0.
Note: For the summer distribution of runs, the total does not add up to 100 percent due to rounding.

Regional profile of runs

Fire departments in the South reported the most runs in 2016; 42 percent of all runs occurred in this region (Table 1).[12] This is to be expected as 39 percent of the U.S. population resides in the South.[13]

For all regions, most calls to fire departments required EMS and rescue services (Figure 7). The Western region reported the highest percentage of EMS and rescue runs at 67 percent; the Northeast region had the lowest percentage at 54 percent. A number of fire departments in the Northeast still limit their role to traditional fire suppression services and have only recently taken on EMS roles. This situation may explain the disparity between the

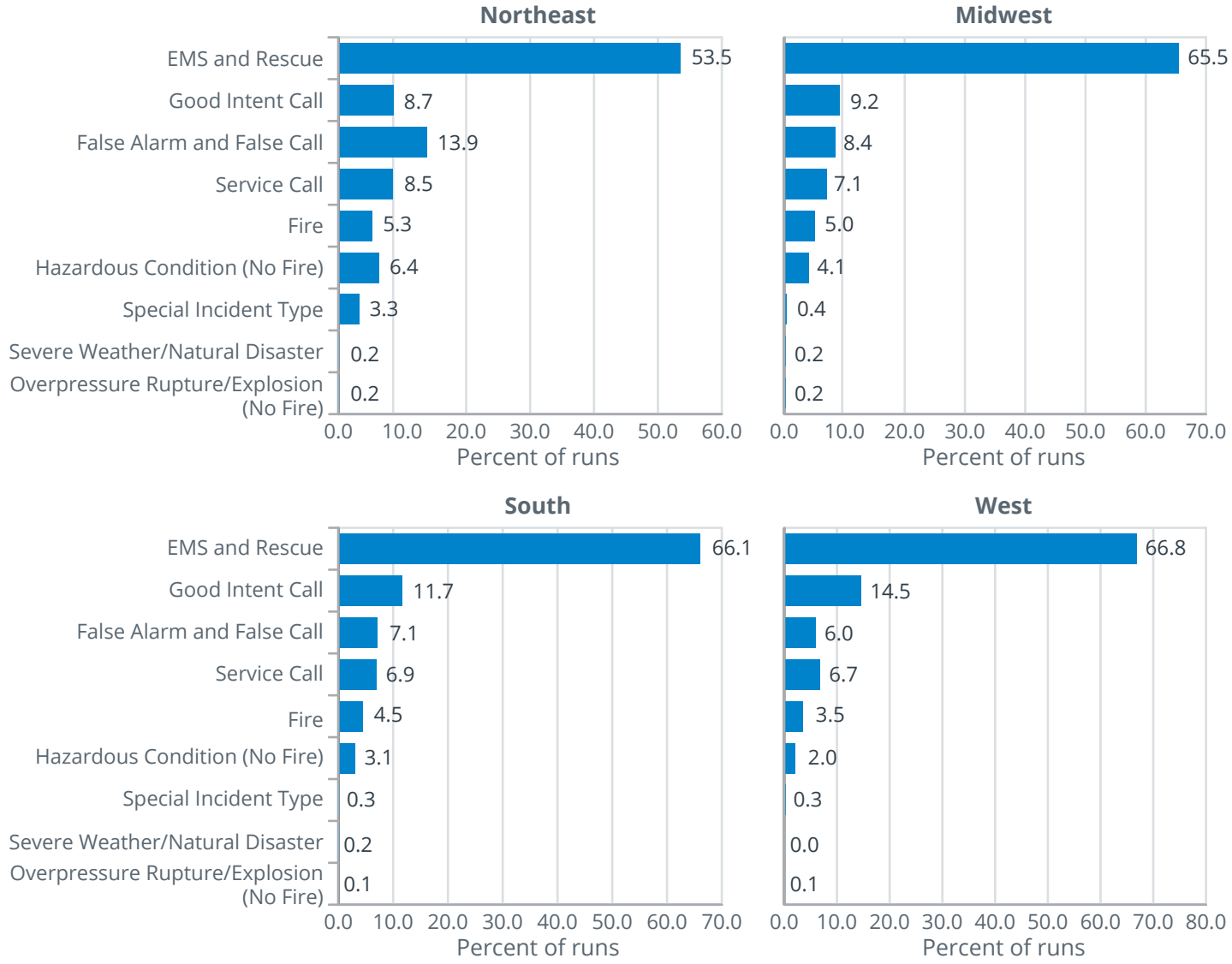
percentages of EMS runs in the Northeast and the rest of the nation.[14] Special incidents, such as citizen complaints, represented 3 percent of all runs in the Northeastern region, which was the highest out of all the regions. False alarm calls were also highest in the Northeast (14 percent), followed by the Midwestern (8 percent) region.

Table 1. Fire department overall runs by region (Percent of runs, 2016)

Region	Percent
Northeast	16.0
Midwest	19.3
South	42.4
West	22.3
Total	**100.0**

Source: NFIRS 5.0.

Figure 7. Fire department overall runs by region and major incident type category (Percent of runs, 2016)

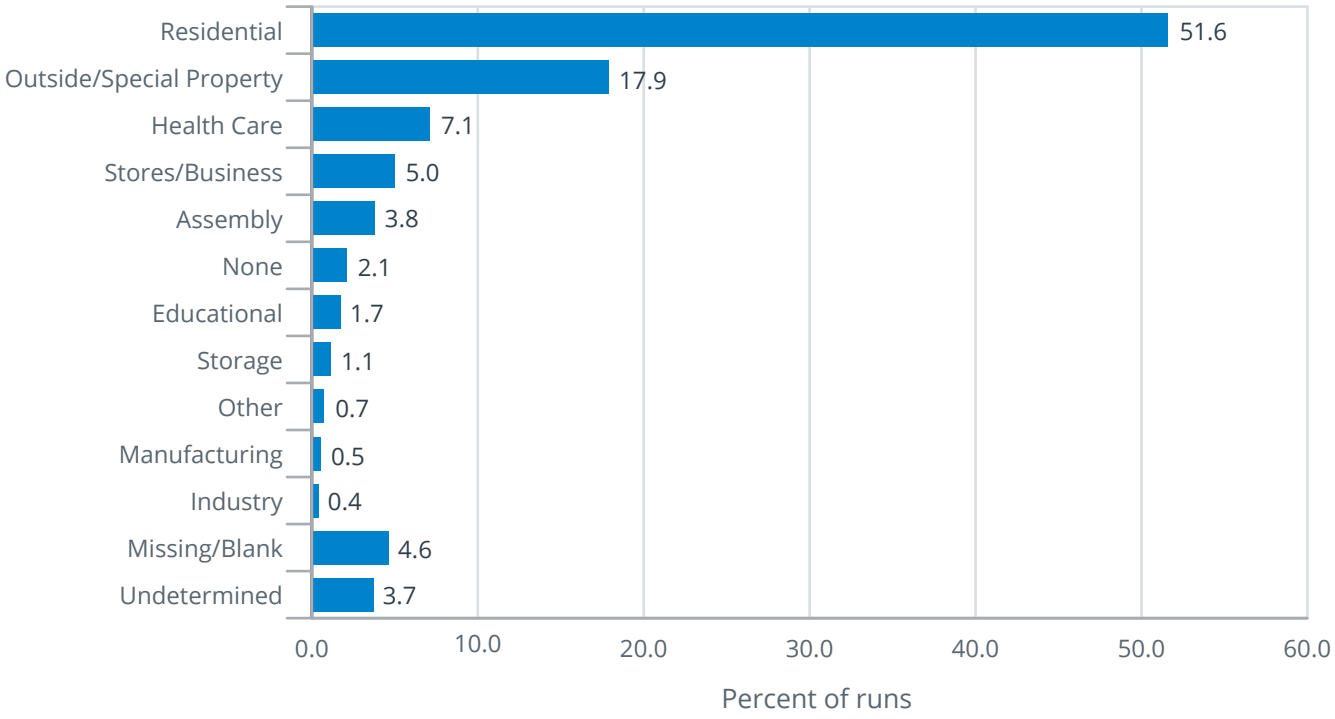


Source: NFIRS 5.0.
Note: For the Midwest and West distributions of runs, the totals do not add up to 100 percent due to rounding.

Property use

In 2016, about half of all calls involved residential properties (52 percent) followed by outside or special properties (18 percent), as shown in Figure 8. Generally, 70 percent of all reported calls to residences required EMS and rescue services. Service calls (8 percent) and false alarm calls (8 percent) accounted for an additional 16 percent of all residential calls. Only 3 percent of the reported calls to residences were fire-related.

Figure 8. Fire department overall runs by property use category (Percent of runs, 2016)



Source: NFIRS 5.0.
Note: Total does not add up to 100 percent due to rounding.

Aid

Aid offers additional resources to fire departments for large-scale or specialized incidents, or when response time to an incident is faster by another jurisdiction. Aid is either given or received, either automatically or mutually, for a specific incident. Automatic aid involves prearranged agreements according to hazard conditions, jurisdictions or incidents requiring special equipment. Mutual aid is generally requested on a reactive basis as resources are depleted at the incident.

Informal and formal aid relationships vary depending on the location or the type of the incident. Innovative aid relationships, which focus on improving the allocation of resources and response times, continue to augment the advancement of fire department services. Overall, 9 percent of fire department runs involve giving or receiving aid, either mutual or automatic (Table 2).

Small rural areas generally follow informal agreements where it is understood that large-scale incidents will require all available resources from several community fire departments, and that each department sustains its own resources when providing aid. However, informal relationships in rural areas are giving way to more formal relationships between jurisdictions as rural areas experience huge growth and do not have the resources to contain the fire demands that increasingly point toward "metropolitan risk" levels.[15]

Formal aid relationships provide better access to resources. Many local jurisdictions and states maintain exemplary aid systems. The key issues facing aid agreements deal with liability and reimbursement. Resolving these issues results in better fire services. The Emergency Management Assistance Compact and Urban Search and Rescue teams have greatly improved the ability to overcome these issues and move resources from state to state. The National Mutual Aid System was developed to manage greater threats facing the United States, including terrorism and natural disasters.[16]

Types of aid

While 92 percent of all fire department runs were not aid-related, the level of aid runs varies with the type of incident. Aid given and aid received runs were more prevalent for fire incidents than for any other incident type category. Good intent calls and explosion or overpressure rupture incidents also involved aid runs more often than other types of incidents (Table 2). A more detailed analysis of aid relationships and resulting runs is necessary to draw definitive conclusions on the use and frequency of aid.

Table 2. Fire department overall runs by major incident type category and general type of aid (Percent of runs, 2016)

Major incident type category	Aid			No aid	Total
	Aid received	Aid given	Total		
Fire	11.2	19.8	30.9	69.1	100.0
Overpressure Rupture/Explosion (No Fire)	7.9	5.6	13.5	86.5	100.0
EMS and Rescue	2.7	3.1	5.9	94.1	100.0
Hazardous Condition (No Fire)	4.4	4.8	9.2	90.8	100.0
Service Call	1.6	6.1	7.7	92.3	100.0
Good Intent Call	2.9	12.6	15.5	84.5	100.0
False Alarm and False Call	4.3	3.6	7.9	92.1	100.0
Severe Weather/Natural Disaster	4.7	6.3	11.0	89.0	100.0
Special Incident Type	1.6	2.9	4.5	95.5	100.0
OVERALL	**3.3**	**5.3**	**8.5**	**91.5**	**100.0**

Source: NFIRS 5.0.
Note: Totals may not add up due to rounding.

NFIRS Data specifications for overall fire department runs

Data for this report were extracted from the NFIRS Public Data Release (full, all-incident data) file for 2016 (released February 2018). Only Version 5.0 data were extracted.

- Overall fire department runs were defined using Incident Types 100 to 911 (excluding Incident Type 110):

NFIRS major incident type category	Description
100-173	Fire (excludes incident type 110)
200-251	Overpressure Rupture/Explosion (No Fire)
300-381	EMS and Rescue
400-482	Hazardous Condition (No Fire)
500-571	Service Call
600-672	Good Intent Call
700-751	False Alarm and False Call
800-815	Severe Weather/Natural Disaster
900-911	Special Incident Type

Note: More details regarding the specific NFIRS incident types are available in the "NFIRS Complete Reference Guide," January 2015: https://www.usfa.fema.gov/data/nfirs/support/documentation.html.

To request additional information, visit: https://www.usfa.fema.gov/contact.html. To comment on this specific report, visit: https://apps.usfa.fema.gov/contact/dataReportEval?reportTitle=Fire%20Department%20Overall%20Run%20Profile%20as%20Reported%20to%20the%20National%20Fire%20Incident%20Reporting%20System%20(2016).

Notes:

[1]The incident type is defined as the actual situation that emergency personnel found on the scene when they arrived.
[2]NFIRS 5.0 contains both converted NFIRS 4.1 data and native NFIRS 5.0 data. This topical report includes only incident types that reflect native 5.0 data. Incident Type 110 (structure fire, other) is not included in this analysis as it is a "conversion only" code. That is, Incident Type 110 is technically a version 4.1 incident and, as such, is not included in this analysis. Aid runs, usually excluded in incident-based analyses, are included in the data for this report.
[3]"Runs" or "calls" have different meanings for different fire departments. As NFIRS incident data reflects summary data from individual fire departments (not from individual fire stations in a fire department), a "run" or "call" as used in this topical report means the fire department's collective response to an incident. "Runs" and "calls" are used interchangeably.
[4]The count of NFIRS runs is rounded to the nearest 100. The actual count of NFIRS runs used for the analyses in this report was 25,693,285. Also excluded are runs with Incident Type 110 (conversion only code). By comparison, the National Fire Protection Association (NFPA) estimated that there were 35,320,000 fire department responses in 2016 (NFPA, "Fire Loss in the United States During 2016," September 2017).
[5]For a description of how the major incident type categories are defined in the NFIRS, refer to the section of this report regarding NFIRS data specifications for overall fire department runs.
[6]The total percentage for the EMS, good intent, false alarm, and service call incident type categories does not add up to 91 percent due to rounding.
[7]Within the major incident type categories in the NFIRS, there are many subcategories. For example, EMS calls and medical assist calls are two specific subcategories of the EMS and rescue incident type category.
[8]"Emergency Communications," Federal Communications Commission, Consumer & Governmental Affairs Bureau, https://www.fcc.gov/consumers/guides/emergency-communications (accessed June 4, 2018).
[9]Idaho County, "Rural Addressing," http://idahocounty.org/commissioners/rural-addressing/ (accessed June 4, 2018).
[10]There was not one specific severe weather event that caused the spike on Saturdays; however, Hurricane Matthew impacted Georgia, North Carolina and South Carolina on Saturday, Oct. 8, 2016. The 2016 NFIRS data showed that of the severe weather and natural disaster runs that occurred on Saturdays in October, 44 percent of the runs were located in North Carolina, 27 percent in South Carolina, and 17 percent in Georgia.
[11]In this report, winter is defined as January through March; spring is defined as April through June; summer is defined as July through September; fall is defined as October through December.

[12]The regions of the U.S. are defined by the U.S. Census Bureau as the **Northeast** (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont); **South** (Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia); **Midwest** (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin); and **West** (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming).
[13]U.S. Census Bureau, Population Division. July 1, 2016 population estimates from Table 1. Annual Estimates of the Resident Population for the United States, Regions, States and Puerto Rico: April 1, 2010 to July 1, 2017 (NST-EST2017-01), Release Date: December 2017, https://www.census.gov/data/tables/2017/demo/popest/state-total.html.
[14]U.S. Fire Administration (USFA), Topical Fire Report Series, "Fire Department Overall Run Profile," Volume 7, Issue 4 (December 2007).
[15]USFA, Topical Fire Report Series, "Fire Department Overall Run Profile," Volume 7, Issue 4 (December 2007).
[16]FEMA, Resource Management and Mutual Aid, "National Mutual Aid System," https://www.fema.gov/resource-management-mutual-aid (accessed June 4, 2018).