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Abstract
The purpose of this work was to present collective data on firefighter fatalities in Sweden between 1937 and 2016. Data presented is directly related to operations only. Fatalities due to long-term exposure of gases, particles, and physical/psychological stress or similar were not included in the study. Also, accidents involving ambulances as well as fatalities in direct relation to physical training were excluded. The data was collected from a large collection of newspaper articles, periodicals, magazines and reports. Over the period a total of 56 fatalities occurred, of which 19 fatalities were due to traumas, 15 fatalities were related to burns, 6 were related to road accidents or involved vehicles, 4 fatalities occurred during training, 4 due to cardiovascular problems, 7 due to asphyxiation and 1 fatality was due to drowning. 26 fatalities occurred inside structures and 30 outside. Conclusions from the data included that fatalities related to road accidents or accidents involving fire apparatus seems to be the highest cause in more recent cases and that fatalities related to structural firefighting seems to be the highest cause before introducing requirements on bringing a hose into structures (requirements introduced in 1986). Overall, traumas seems to be the cause to most fatalities in the Swedish fire service. Due to the small size of the dataset in conjunction with a long period in time, conclusions have been drawn with great caution.

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Sammanfattning (Swedish summary)

När vi råkar ut för en olycka, förväntar vi oss många gånger att räddningstjänsten snabbt kommer till vår undsättning. Syftet med räddningstjänstens beredskap är att kunna ge en så snabb hjälp som möjligt till personer i nöd. Som en följd av detta utsätts räddningstjänstens personal för situationer som kan tyckas vara bortom de flesta andra arbetsrelaterade aktiviteter. Tyvärr, och trots allt som görs för att minska riskerna, blir räddningstjänstens personal ibland skadade eller till och med dödade i samband med räddningsinsatser. Syftet med detta arbete var att presentera insamlade uppgifter om dödsfall inom svensk räddningstjänst under perioden 1937 till 2016. Arbetet innehåller även ett antal observationer, slutsatser och förslag till ytterligare arbete.

Under perioden var det totalt 56 dödsfall vid 48 olika tillfällen, varvid det vid 7 tillfällen inträffade flera dödsfall (2 - 3 dödsfall) vid samma händelse. Av de totala 56 dödsfallen var 19 orsakade av trauma, 15 dödsfall var relaterade till brännskador, 6 var relaterade till trafikolyckor eller involverade fordon på annat sätt, 4 dödsfall inträffade under övning, 4 på grund av kardiovaskulära problem, 7 på grund av kvävning och 1 dog på grund av drunkning. Av de 56 dödsfallen inträffade 26 inne I byggnaden och 30 utanför.

Observationer gjorda utifrån de presenterade uppgifterna innefattar att dödsfall i samband med trafikolyckor eller olyckor med räddningstjänstens fordon tycks vara den största bidragande orsaken i senare fall (dvs. efter cirka 2005) och att dödsfall relaterade till brandsläckning inne i byggnader tycks vara den största orsaken innan krav infördes på att medföra slang vid invändig brandsläckning (dvs. före 1986). Trauman, inklusive att träffas av föremål och att falla från hög höjd, tycks vara orsaken till de flesta dödsfallen nom svensk räddningstjänst under perioden 1937 – 2016.

Förslag till ytterligare arbete inkluderar en djupgående analys av samtliga identifierade fall, undersökningar och jämförelser mellan förändringar inom svensk räddningstjänst, inklusive organisatoriska aspekter, utbildningskrav, bemanning, teknik och taktik, antal och typ av räddningsinsatser, befolkningsmängd och trafikarbete/trafikflöden. Dessutom bör undersökning och utveckling av definitionen av dödsfall inom räddningstjänsten och vilka data som ska samlas ha hög prioritet, även i ett internationellt sammanhang.

Summary

When we encounter an accident or an incident, we call for help and we expect the fire service to arrive at the scene swiftly. The purpose of this is to provide an as fast as possible response to people in distress. As a consequence, fire service personnel are exposed to situations and hazards that may seem as beyond most other work related activities. Unfortunately, and despite every effort to mitigate the dangers, firefighters gets injured or even killed at the scene of accidents. The purpose of this work was to present collected data on firefighter fatalities in Sweden, over the period of 1937 to 2016. The presentation includes a number of observations, conclusions and suggestions for further work.

During the period there were a total of 56 firefighter fatalities at 48 different occasions and of which 7 were multiple fatalities (2 – 3 fatalities at the same event). Of these, 19 fatalities were due to traumas, 15 fatalities were related to burns, 6 were related to road accidents or involved vehicles, 4 fatalities occurred during training, 4 due to cardiovascular problems, 7 due to asphyxiation and 1 died due to drowning. Of these 56 fatalities 26 occurred inside structures and 30 outside.

Observations made based on the presented data includes that fatalities related to road accidents or accidents involving fire apparatus seems to be the highest cause in more recent cases (i.e. after approximately 2005) and that fatalities related to structural firefighting seems to be the highest cause before introducing requirements on bringing a hose into structures (i.e. before 1986). Also, traumas, including hit by objects or falling from objects, seems to be the cause to the most fatalities in the Swedish fire service during the period 1937 – 2016.

Suggestions for further work includes in-depth analysis of all the cases, investigations into and comparison between changes in the Swedish fire service, including organizational aspects, training requirements, staffing, technique and tactics, number and type of responses, population and traffic. In addition, the definition of a firefighter fatality as well as what data to be collected should be of high priority, including in an international context.

Content

Introduction

When we encounter an accident or an incident, we call for help and we expect the fire service to arrive at the scene swiftly. The purpose of this is to provide an as fast as possible response to people in distress. Tradition says that the fire service puts fires out although they are expected to respond to basically any type of accident or incident, ranging from fires to cars accidents, medical calls, flooding and even the classical cat in a tree (although this last example may not necessarily be an operation from a strict legal point of view). Consequently, fire service personnel are exposed to situations and hazards that may seem as beyond most other work related activities.

That which is highly characteristic to the fire service is the ability to work in environments that few others can do, especially with regard to the need for speed and the risks that can often be associated with the situations they are in or conditions they are working under. Fire and rescue service staff are largely accustomed to working in dynamic situations where they must, on numerous occasions, exhibit a very high degree of flexibility. However, there are still safety regulations that must be met, many of them issued by the Swedish Work Environment Authority (www.av.se). Safety has for many years been of high priority in the Swedish fire and rescue service.

Of course, firefighters are expected to have training as well as protective gear and sufficient skills to encounter any such situation although there should be an upper limit to what is reasonable for them to achieve and conditions to work under. Unfortunately, and despite every effort to mitigate the dangers, firefighters gets injured or even killed at the scene of accidents.

The purpose of this work was to present collected data on firefighter fatalities in Sweden, over the period from 1937 to 2016. Due to the fairly low number of fatalities in combination with a long period in time, no actual analysis was made. However, the work still contains a number of observations, conclusions and of course suggestions for further work.

Background

Firefighters are, by nature of their work, exposed to extreme conditions impacting physical, psychological, and emotional stress [1]. They are expected to respond to any type of accident or incident, including fires (in residential as well as commercial buildings, bush fires, vehicle fires, etc.), medical emergencies, hazardous material spills, accidents involving road vehicle, trains and airplanes, and large-scale community disasters. The reason for this is, apart from a legal responsibility, most likely traditional along with the availability of tools, techniques and knowledge. Also, it is also likely to be connected to the strong local presence: in smaller villages everyone knows a firefighter and the firefighters know their locals and the local population expect firefighters to turn up at accidents and emergencies [2].

When responding to accidents and incidents firefighters are exposed to a number of hazards, including objects in motion, heights, explosions (pressure), heat (hot gases as well as radiation), swift water, chemicals (solids, liquids and gases), and non-breathable atmospheres. Despite their training and protective gear, preparatory measures are general and cannot, for practical or economic reasons, include every specific type of possible situation or exposure (training as well as equipment can be very costly). In addition, assessing and mitigating risks during operations are in many cases very hard or even impossible due to the nature of the situations [3]. Assessments and mitigations during firefighting operations are, generally, made by individuals responsible for the managements of operations. More systematic approaches to the reduction of risks to firefighting personnel are much harder due to the nature of the organization and, especially, much more general and often supposed to be applicable to a large number of situations. Consequently, the risk of injury or fatality is seemingly higher than in many other professions.

Although the type of risks associated with firefighters responding to incidents and accidents should be similar, the number of fatalities differs between countries. However, comparison is hard due to differences in e.g. staffing, training, organization and responsibilities.

Also, data on firefighter fatalities are not always officially collected (such as in the Swedish case), the definition of a firefighter fatality may differ between countries and there's not always an actual definition. A comparison of fire statistics in Europe [4] showed that 9 countries out of 27 did not collect the number of firefighter fatalities. Data collected in Europe differs in terms of

- Whilst at an incident or not
- Whilst on route to an incident or not
- Whilst on duty, responding or not responding
- On duty or off duty
- Whilst in training or actual operations only.

In the US, a firefighter fatality is defined as a fatality resulting from injuries or illnesses that occurred while the victims were on-duty [5]. The term on-duty refers to being at the scene of an alarm, whether a fire or non-fire incident (including EMS calls); responding to or returning from an alarm; participating in other fire department duties such as training, maintenance, public education, inspection, investigation, court testimony or fund raising; and being on call or stand-by for assignment at a location other than at the firefighter's home or place of business. Fatal injuries and illnesses (including heart attacks) are included even in cases where death is considerably delayed.

Nevertheless, a very simple comparison between a few countries including all firefighter fatalities (line of duty deaths, LODD) regardless of their definition of such a fatality, respectively, is shown in table 1. However, conclusions from such comparisons should be made with caution, for several reasons (if the data is officially reported, how and what data is collected, etc.).

Table 1: Line of duty deaths, examples from a few countries.

Country	LODD/1000000 population	LODD/100000 calls	LODD/10000 ff	Reference
Sweden	0,068	0,684	0,429	6, 7 and table 3
England	0,028	0,289	0,347	8, 9
Hong Kong	0,082	1,359	N/A	10
Ireland	0,047	0,183	0,662	11, 12
California, US	0,136	N/A	1,550	13, 14, 15, 16
Wyoming, US	1,218	N/A	15,528	13, 14, 15, 16
US, all	0,281	0,268	0,777	13, 14, 15, 16
Queensland, Australia	0,083	0,579	0,099	17
New South Wales, Australia	0,044	2,714	0,486	18, 19

It is at this point not known why there are such differences, although factors such as training, staffing and even culture might have an impact. Also, infrastructure (including building components as well as protective measures) differs between countries. It is likely that this have an impact as well.

Nevertheless, it is of course important to reduce the number of firefighter fatalities and in doing so, facts on such fatalities must be known. Although collective data on firefighter fatalities in Sweden between 1937 and 2016 is presented in this work, more work is needed in order to understand the background and the cause to these fatalities. Otherwise, there is a possibility that wrong protective actions and precautions are taken, wrong type of hazardous tasks and situations are in focus or possibly even that more hazardous procedures, tasks and tools are developed and implemented in the fire service.

Data sources and limitations

Data presented in this paper was collected over a period of more than twenty years. For more recent fatalities, later than approximately 1980, a higher degree of details were found in investigative reports or similar. Data on earlier fatalities were mainly found through newspaper clips, news magazines and periodicals.

One such periodical has been published by The Swedish Fire Safety Association (Svenska Brandskyddsföreningen/Svenska Brandförsvarsföreningen) since 1920. Over the years the name of the magazine has varied, according to

- "Brandskydd", during the period 1920 to 1963
- "Brandförsvar", during the period 1964 to 1985
- "Brand & Räddning", during the period 1986 to 2004
- "Brandsäkert", during the period 2005 up until today

This magazine includes a large number of articles with subjects related to the fire service, including operational aspects, issues on fire inspection and development within the area of fire safety. However, most of the data found in these periodicals are rather imprecise.

The Swedish fire service is a fairly small community, including a total of approximately 15000 firefighters (career and part-time firefighters). Therefore, any firefighter fatality should be well known within this community.

Data presented is directly related to operations only. Fatalities due to long-term exposure of gases, particles, and physical/psychological stress or similar are not included. Also, it used to be common to have firefighters driving ambulances up to approximately the mid-80s, but such accidents have been excluded (2 fatalities on 5 May 1966 [20] and 1 fatality on 4 October 1978 [21]). In addition, fatalities in direct relation to physical training has been removed (1 fatality on 23 September 1983 and 1 fatality on 13 March 2004, both confirmed through hearsay only).

Errors in the collected data can be assumed to be very low. However, potentially missing data should not have a substantial effect neither on observations nor on conclusions. Detailed information is provided in appendix, so that the reader may make their own conclusions regarding case type, location, cause of fatality, etc.

Firefighter fatalities

The collected data was classified according to case type, table 2, and location. In a few cases, due to the lack of details in the data, the most likely case type was chosen. Locations for a fatality were divided in two groups, inside of structures ("inside") and in the open (outside of structures, "outside"). In a few cases, due to the lack of data, the most likely location was chosen. Consequently, case type as well as location may be subject to discussion.

Table 2: Definition of case types

Case type	Description
Trauma	Hit by object (including vehicles other than fire apparatus), falling from a height, pressure waves from explosions and similar.
Burns	Falling into fire, exposed to the ignition of gases (including fire gases and flammable gases such as propane or similar), heat stress and similar.
Vehicle	Road accidents, involving fire service vehicles
Cardiovascular	Myocardial infarction and similar, not explicitly related to other case types.
Asphyxiation	Inhalation of carbon monoxide, failure in breathing apparatus, running out of air or similar.
Drowning	As a consequence of immersion / submersion in liquid (water).

Figure 2 (below) and table 3 (next page) shows the collected data on firefighter fatalities during the period 1937 – 2016. Over the period, a total of 56 firefighter fatalities occurred at 48 different occasions. A more detailed description of the cases are presented in appendix 1.

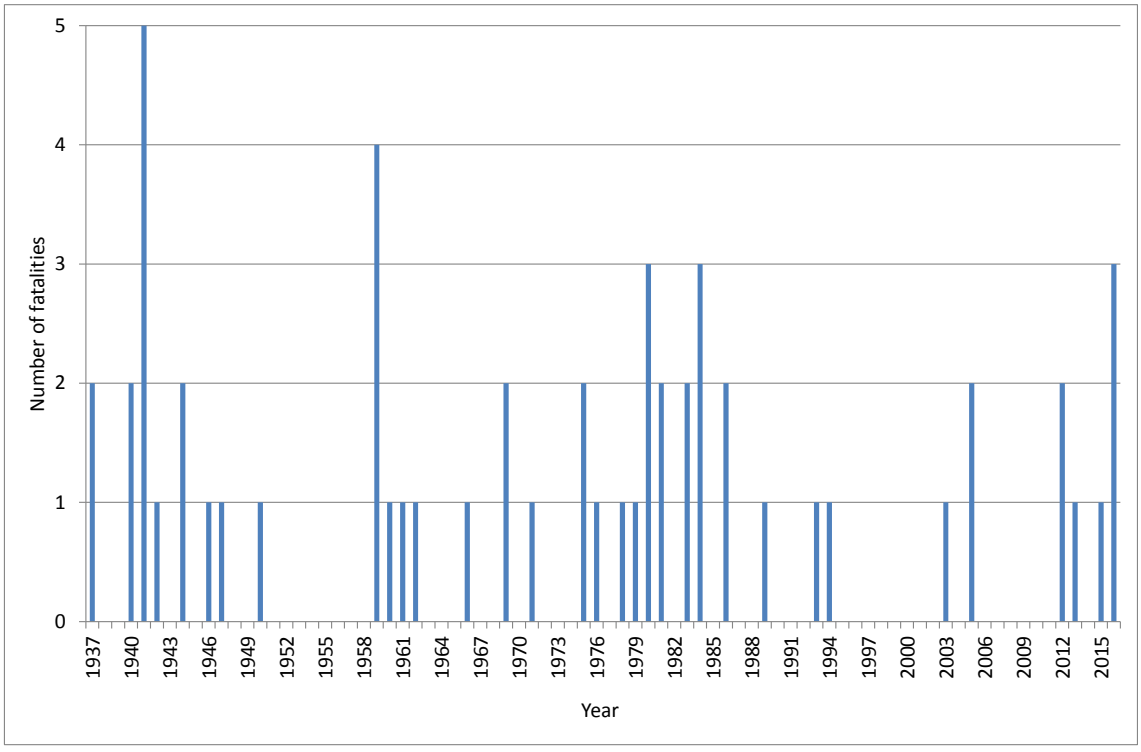

Figure 1: Number of fatalities per year

Table 3: Firefighter fatalities in the Swedish fire service, 1937 – 2016. See appendix 1 for details.

Date	#	Case type	Location	References
1937-02-08	1	Trauma	Outside	22, 23, 24, 25
1937-09-03	1	Burns	Outside	26, 27
1940-05-27	1	Trauma	Outside	28
1940-10-23	1	Asphyxiation	Inside	29
1941-02-17	3	Asphyxiation	Inside	30
1941-10-02	1	Trauma	Outside	31, 32
1941-11-16	1	Burns	Inside	33
1942-05-21	1	Trauma	Outside	34
1944-09-25	2	Trauma	Outside	35, 36
1946-09-18	1	Trauma	Outside	37
1947-08-04	1	Training	Outside	38, 39
1950-09-30	1	Burns	Inside	40
1959-03-29	2	Burns	Inside	41
1959-06-12	1	Training	Inside	42
1959-07-12	1	Cardiovascular	Outside	43
1960-03-11	1	Trauma	Outside	44
1961-08-26	1	Asphyxiation	Inside	45
1962-12-23	1	Trauma	Inside	46
1966-07-16	1	Cardiovascular	Outside	47
1969-09-16	1	Trauma	Inside	48, 49
1969-11-01	1	Trauma	Outside	50
1971-03-01	1	Burns	Inside	51
1975-02-10	2	Burns	Inside	52, 53
1976-07-30	1	Trauma	Outside	54, 55
1978-04-23	1	Trauma	Inside	56
1979-04-16	1	Burns	Inside	57
1980-01-20	1	Trauma	Inside	58
1980-08-26	2	Vehicle	Outside	59, 60
1981-04-14	1	Burns	Inside	61
1981-05-08	1	Burns	Outside	62, 63, 64
1983-06-05	1	Drowning	Outside	65
1983-06-17	1	Trauma	Inside	66
1984-01-14	1	Burns	Inside	67, 68
1984-03-21	1	Cardiovascular	Outside	69
1984-10-19	1	Training	Outside	70, 71
1986-10-09	2	Burns	Inside	72, 73
1989-09-02	1	Cardiovascular	Outside	74, 75
1993-10-03	1	Asphyxiation	Inside	76, 77
1994-12-05	1	Asphyxiation	Inside	78, 79
2003-05-27	1	Burns	Inside	80
2005-01-08	1	Trauma	Outside	81
2005-07-08	1	Vehicle	Outside	82
2012-07-12	2	Vehicle	Outside	83
2013-09-30	1	Vehicle	Outside	84
2015-12-01	1	Training	Outside	85
2016-02-08	1	Trauma	Outside	86
2016-04-12	1	Trauma	Outside	87
2016-04-26	1	Trauma	Outside	88
Total	**56**			

Observations and discussion

The data presented suffers from several limitations that should be noted. First, data derives from a period of 80 years. Consequently, it can be assumed with reasonable certainty that several aspects related to the fire service changed of this period, including training, responsibilities, and organization. Second, the description, classification, and interpretation of the data required a certain amount of subjectivity due to the lack of details in some of the references. As an example, a case classified as caused by burns might very well have been a trauma or asphyxiation. And third, over time it appears to be a fairly low number of fatalities (although still unfortunate and unwanted). There are periods with several years in a row, up to 8 years, without any fatalities at all. Consequently, trends and conclusions are hard to make and a number of observations only have been made (below).

During the period there were a total of 56 firefighter fatalities at 48 different occasions of which 7 were multiple fatalities (2 – 3 fatalities at the same event). Of these, 19 fatalities were due to traumas, 15 fatalities were related to burns, 6 were related to road accidents or involved vehicles, 4 fatalities occurred during training, 4 due to cardiovascular problems, 7 due to asphyxiation and 1 died due to drowning. Of these 56 fatalities 26 occurred inside structures and 30 outside (table 4).

Table 4: Compilation of data

	Trauma	Burns	Vehicle	Training	Cardiovascular	Asphyxiation	Drowning	
Inside	5	13	0	1	0	7	0	26
Outside	14	2	6	3	4	0	1	30
Total	**19**	**15**	**6**	**4**	**4**	**7**	**1**	**56**

During the year 1959, a total of 4 fatalities occurred. All of these can be related to fighting fires inside structures (including 1 during training). Interesting enough, in December 1958 the first national regulation for structural firefighting was issued (being in effect in 1959), i.e. regulations for the use of breathing apparatus for firefighting [89]. The regulations included demands on

- Working in teams of two
- Person in contact on the outside
- Lifeline (rope or similar)
- >10 h of education/training
- 4 sessions/year
- <45 years or age
- Medical including chest radiography every three years

It should be noted that requirements to bring a hose when working inside structures on fire was added in 1986 [90]. As a probable consequence to the introduction of these regulations on structural firefighting, in 1959, such activities seem to be a fairly low risk activity in comparison to other type of activities.

Also, it should be noted that basic training of firefighters as well as fire officers became a responsibility by the government in 1986. Before that, it was a responsibility of each individual municipality [91]. Consequently, the quality in the training should have increased simply because it should have resulted in higher standards on instructors as well as on training material (including training facilities).

According to the data, a few more fatalities occurred outside of structures (30 out of 56). In these cases, traumas and accidents involving vehicles were the most common causes. For the fatalities that occurred inside, burns were the most common cause (13 out of 26). However, of these 13 fatalities all but 4 occurred before the regulations included demands for bringing a hose. Of these 4 fatalities occurring after 1958, 2 occurred when the firefighters lost their hose due to the ignition of fire gases in a large room adjacent to the fire room, and 1 was due to that the firefighter lost the hose on the way out of the structure. Consequently, bringing and staying in contact with a hose seems to be somewhat important during structural firefighting. In addition, rooms adjacent to a fire room may pose a greater risk, simply because the danger may not seem obvious.

During the period 2005 – 2016 a total of 9 fatalities occurred, of which 8 can be related to road accidents (including vehicles) or operations in relation to road accidents. Fatalities related to traumas, 3 recent fatalities can also be related to vehicle (all of which occurred during 2016), in that vehicles were involved (i.e. not fire apparatus but firefighters responding to road accidents). Out of a total of 30 fatalities outside, 11 fatalities involved vehicles of some kind. All but 2 of these occurred from 1980 and later. Seemingly, traveling to the scene of an accident or responding to a road accident and working in close vicinity of other vehicles passing the operation seems to be a high risk activity.

However, a number of actions to prevent such event have recently been introduced by (amongst others) the Swedish Civil Contingencies Agency (MSB), the Swedish Transport Administration and the Police Authority [92]. Amongst other things, the guidance emphasizes the importance of blocking the accident site and the use of large vehicles (fire apparatus) as barriers.

From a layman perspective, firefighting in structures would seem to be a high-risk activity. However, there's nothing in the data after 1986 indicating that structural firefighting would be the activity with the highest risk of fatalities. The reason should most likely be the high demands on education and training, in combination with the assumed high level of fire safety in buildings (including the relatively long-standing requirements on compartmentation, escape routes/access routes, structural stability, etc.) [93]. Seemingly, there is a correlation between introducing strict regulations for structural firefighting and a lower number of fatalities related to such activities after 1958. As of today, responding to accidents and working at road accidents seems to be of a much higher risk for fatalities in the Swedish fire service.

Data was collected from cases occurring over a long period in time. During this time, several aspects in the fire service have changed significantly. Such changes would include responsibilities, organizational affiliation (national/local), training, personal protective equipment, the use of breathing apparatus, regulations (especially from the work environment authority), traffic flow and staffing. A more in-depth analysis of and conclusions from the data would require investigations and comparisons between such factors.

Conclusions and suggestions for further work

Due to the low number of line of duty deaths over a very long period in time, conclusions can only be drawn with caution.

Fatalities related to road accidents or accidents involving fire apparatus seems to be the highest cause in more recent cases (i.e. after approximately 2005).

Fatalities related to structural firefighting seems to be the highest cause before introducing requirements on bringing a hose into structures (i.e. before 1986).

Traumas, including hit by objects or falling from objects, seems to be the cause to most fatalities in the Swedish fire service during the period 1937 – 2016.

Preventing firefighter injuries and fatalities should be of high priority and more work is needed in order to further reduce the risk of fatalities. Such work would e.g. include

- In-depth analysis of all the cases
- Investigations into and comparison between changes in the Swedish fire service, including organizational aspects, training requirements, staffing, technique and tactics, etc.
- Investigations into and comparisons between other factors affecting fire service operations, including number and type of responses, population, traffic, etc.

In addition, international agreements should be initiated and made regarding how to define a firefighter fatality and what data that should be collected. This would also include exchange of expertise and knowledge on how to prevent firefighter fatalities.

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Appendix 1, detailed description of firefighter fatalities in Sweden, 1937 – 2016

Case#	Date	Description	#LODD	Case type	Location	Place	References
1	1937-02-08	During a major fire in an attic, a 43-year old firefighter was cut off from the ladder. He climbed out a window in an attempt to escape the fire but fell to the ground.	1	Trauma	Outside	Stockholm	22, 23, 24, 25
2	1937-09-03	During a fire in a large farm, the fire truck drove close to the fire so that the clothes (PPE) of a firefighter caught fire. He later died due to his injuries.	1	Burns	Outside	Nymö, Kristianstad	26, 27
3	1940-05-27	During firefighting a 38-year old firefighter was injured and died.	1	Trauma	Outside	Blommenshov, Nyköping	28
4	1940-10-23	During a major fire, a firefighter was intoxicated and died during firefighting.	1	Asphyxiation	Inside	Boden	29
5	1941-02-17	During a fire in a factory/storage-facility, three firefighters (43, 34 and 31 years old) were intoxicated and died.	3	Asphyxiation	Inside	Uddevalla	30
6	1941-10-02	A firefighter was killed when he got jammed between two lorries.	1	Trauma	Outside	Uppsala	31, 32
7	1941-11-16	During firefighting in a castle, which housed a nursing home, a firefighter was burned and died due to his injuries. The fire started in the attic.	1	Burns	Inside	Rönneholm, Stehag	33
8	1942-05-21	A 43-year old firefighter died during firefighting at a farm.	1	Trauma	Outside	Brukets gård, Örkelljunga	34
9	1944-09-25	Fire gases due to an underventilated fire that had been burning for several hours in a basement, ignited violently just as the fire crew was investigating the scene. The explosion that followed caused parts of the ceiling (including the entrance where the firefighters were standing) to cave in, burying firefighters Holger Flyckt (age 30) and Voldemar Sedman (age 39).	2	Trauma	Outside	Kocksgatan, Stockholm	35, 36
10	1946-09-18	During a turn-out, on the way to a fire, a young firefighter hit his head on a girder to a bridge and died.	1	Trauma	Outside	Stockholm	37
11	1947-08-04	During a repelling exercise, a rope failed and a firefighter fell to the ground and died.	1	Training	Outside	Uppsala	38, 39
12	1950-09-30	Firefighter Albert Wetterlind (age 54) was killed when the ladder he was standing on fell. The ladder was leaning towards an end-wall that fell into the fire when the wall collapsed. The firefighter was buried under the collapsing wall.	1	Burns	Inside	Lidköping	40
13	1959-03-29	During a fire in a concrete culvert hosting a large rubber conveyor, the conveyor came loose. The fire gases lit up and caught two firefighters in the flames.	2	Burns	Inside	Mo/Domsjö, Alfredshem	41
14	1959-06-12	A 42-year old firefighter was killed during a fire drill at a military facility. The purpose of the drill was to put out a fire inside a building, wearing a gas mask.	1	Training	Inside	Solna	42

15	1959-07-12	Responding to a fire in a transformer plant, a firefighter collapsed upon arrival at a fire scene and died due to myocardial infarction.	1	Cardiovascular	Outside	Gullhögen, Skövde	43
16	1960-03-11	During a fire in a farm, a chimney collapsed and fell towards the ladder a firefighter was standing on.	1	Trauma	Outside	Vegeholm, Ängelholm	44
17	1961-08-26	A firefighter was asphyxiated during firefighting onboard the ship Maltesholm, laying in the harbor. Most likely, he fell into the hold.	1	Asphyxiation	Inside	Varberg	45
18	1962-12-23	A firefighter was killed due to an explosion during final extinction of a fire in a barn. The explosion occurred in a storage of explosives.	1	Trauma	Inside	Mörarp	46
19	1966-07-16	A firefighter died due to myocardial infarction during firefighting.	1	Cardiovascular	Outside	Linköping	47
20	1969-09-16	The shed on fire containing several gas bottles (containing acetylene) of which at least one exploded and killed firefighter Olof Hedin (age 56). He was most likely unaware of the presence of the gas bottles.	1	Trauma	Inside	Sköndal, Stockholm	48, 49
21	1969-11-01	During a storm, parts of a roof made out of steel sheet came loose. In an attempt to fixate the steel sheet, a firefighter was caught by the strong wind and was killed hitting the ground.	1	Trauma	Outside	Uppsala	50
22	1971-03-01	During a fire at a furniture factory, firefighter Sivert Andersson was killed in an attempt to fight the fire. The firefighter had his primary workplace at factory and stayed at the scene when he got the call. It was assumed he was at the fire station and was not accounted for. Other firefighters finding him several hours later during the operation was startled.	1	Burns	Inside	Skillingaryd	51
23	1975-02-10	During firefighting in a train workshop, fire gases from burning plastics ignited and two firefighters (Fritz and Andersson) lost their way in their attempt to escape the smoke and the heat.	2	Burns	Inside	Stockholm	52, 53
24	1976-07-30	Firefighter Björn Karlsson (age 37) was killed when a brick wall fell over during a fire in a plastic plant manufacturing boats. The wall was 9 m high.	1	Trauma	Outside	Arvika	54, 55
25	1978-04-23	Firefighter Leif Gigg (age 31) was killed at a fire at a farm. During the operation, a large explosion in a storage of dynamite occurred.	1	Trauma	Inside	Bollnäs	56
26	1979-04-16	Firefighter Magnus Johansson (age 28) was killed during an operation at a residential fire. The floor he was standing on collapsed due to heat from below and he fell into the fire.	1	Burns	Inside	Bräkne-Hoby	57
27	1980-01-20	A beam running all the way through a factory came loose due to heat stress, pulling down the roof which fell into a room not affected by fire. A firefighter was crushed under a large section of the roof.	1	Trauma	Inside	Malmköping	58
28	1980-08-26	Firefighters Gulve Malmqvist (age 44) and Kurs Nilsson (age 42) was killed when their fire truck ran off the road during a turn-out. The accidents happened when they were overtaking a tractor on a narrow road. The fire truck ran off the road and rolled several times before it stopped.	2	Vehicle	Outside	Öland	59, 60

29	1981-04-14	A firefighter was killed when (most likely) fire gases ignited. He was standing in the basement, waiting for his comrade to bring more hoseline. The visibility was reported to be fairly good in the basement.	1	Burns	Inside	Lövånger, Skellefteå	61
30	1981-05-08	A leaking pipeline caused a large cloud of propane. When the fire service responded to the fire, a fire truck drove into the cloud which might have caused an ignition of the gas cloud. Two firefighters got caught in the flames, of which one later died.	1	Burns	Outside	Gothenburg	62, 63, 64
31	1983-06-05	During an attempt to save a man who had fell into a river, in the city center, the rescue boat sank and a firefighter was caught in the white water and drowned. One of the victims, a 15-year old boy, died as well and it was all witnessed by hundreds of people.	1	Drowning	Outside	Örebro	65
32	1983-06-17	During a major fire at a scrap yard, a wall came down and fell into a part of a building not exposed the fire. Two firefighters were buried in the debris of which one died. It should be noted that this was the third fire in three days at the same facility.	1	Trauma	Inside	Älmhult	66
33	1984-01-14	During the later stages of firefighting in a large butchers shop, fire gases ignited violently. Two firefighters were caught in the flames of which one was killed.	1	Burns	Inside	Karlskrona	67, 68
34	1984-03-21	A 57-year old firefighter died due to a myocardial infarction during an operation. At the accident, a collision between a train and a car, the driver of the car was killed as well.	1	Cardiovascular	Outside	Åmotsfors	69
35	1984-10-19	A firefighter fell to the ground and was killed during a repelling exercise. The exercise was a preparation for a public show planned for the next day.	1	Training	Outside	Lund	70, 71
36	1986-10-09	During the investigation of a separating wall during a fire in a department store for construction materials, fire gases ignited. Two firefighters lost their way in an attempt to get out of the building. Their officers stayed in contact with one of the firefighters for about a minute after the ignition of the fire gases. It seemed as if he didn't apprehended the situation as serious as it was.	2	Burns	Inside	Täby	72, 73
37	1989-09-02	A firefighter died due to myocardial infarction when fighting a residential fire. Together with a colleague, he managed to save a woman but the effort was probably too much.	1	Cardiovascular	Outside	Munkfors	74, 75
38	1993-10-03	During firefighting onboard a ship, a firefighter was asphyxiated by the inhalation of carbon dioxide. Most likely, his face mask came off when falling. The gas was used to put the fire out and a few breaths only were sufficient asphyxiation. The accident happened three days into the operation (of a total of seven days).	1	Asphyxiation	Inside	Kappelshamn	76, 77

39	1994-12-05	During firefighting in a basement to a residential building, a firefighter got lost on the way out. It seemed as if the air bottles leaked and that the firefighter was asphyxiated due to inhalation of carbon monoxide.	1	Asphyxiation	Inside	Jämshög, Olofström	78, 79
40	2003-05-27	During the retreat from firefighting in a restaurant, a newly recruited firefighter drops the hose and gets lost. He was later found dead. He was in a team of two who made a second attempt to fight the fire. This team, as well as the first team, aborted the interior firefighting due to heat and low visibility.	1	Burns	Inside	Norrköping	80
41	2005-01-08	An assistant fire chief (age 56) was hit and killed by a falling tree when trying to help a number of civilians trapped during a major storm. He was on the way to work as the chief of staff, due to the storm. The storm caused major damages to property in the south of Sweden.	1	Trauma	Outside	Hörby	81
42	2005-07-08	A firefighter (age 51) was killed when the tanker truck he was driving to a forest fire crashes. For unknown reasons, one of the tires exploded and the truck went off the road and down a slope. The extrication took several hours, during which the firefighter was conscious. He died later the same day at the hospital.	1	Vehicle	Outside	Sysslebäck	82
43	2012-07-12	During a turn-out to a car accident, a firetruck with five firefighters went off the road. At a narrow-road meeting, the vehicle comes too far out on the roadside, it gets a throw, rolls into a 6-7m deep ravine and collides with two trees. Two firefighters were killed at the scene.	2	Vehicle	Outside	Smedjebacken	83
44	2013-09-30	During a turn-out to a fire in a barn, a firetruck with three firefighters went off the road. One of the firefighters are thrown out of the vehicle and gets jammed under the vehicle.	1	Vehicle	Outside	Mellerud	84
45	2015-12-01	During training/inspection of a ladder truck, a firefighter (age 54) fell from the bucket and died.	1	Training	Outside	Lycksele	85
46	2016-02-08	During an operation at a car accident, a civilian car drives into the scene hits a firefighter. It was early morning and road was very slippery.	1	Trauma	Outside	Märsta	86
47	2016-04-12	During an operation at a high-way, involving two lorries, the wire railing came loose hitting and killing a firefighter and injuring another three.	1	Trauma	Outside	Örkelljunga	87
48	2016-04-26	During an operation on a high-way, involving a lorry, a civilian car drove into the scene at high speed hitting and killing a firefighter.	1	Trauma	Outside	Munkedal	88