1ST PROGRESS REPORT
TASK 0 REPORT - DIAGNOSTIC

EUFireStat - Closing data gaps and paving the way for pan-European Fire Safety Efforts

Contractor European Commission
Directorate General For Internal Market, Industry, Entrepreneurship and SMEs

Reference of the contract SI2.830108

Date: 10-03-2021
Revision index: C
Number of pages: 258

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TRACK OF MODIFICATION

Indices of revision	Date	Modifications
A	24/12/2020	Initial version
B	18/01/2021	Revised version with comments from the European Commission
C	10/03/2021	Revised version with comments from the Steering Committee

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EXECUTIVE SUMMARY

This report provides an analysis and evaluation of the current state of fire statistics and data collection in European countries and selected non-European countries of interest. For each country, the project team created a detailed diagnostic sheet describing important components of fire statistics practice, with a focus on terminology, collection methods, interpretation issues and the state of existing data. The information was gathered by the consortium members by researching in public datasets, literature review, and networks of contacts. For some countries, there are missing data, those will be added in the following tasks of the project.

The review of the literature shows that fire data collection systems have been instrumental in informing firefighting strategies, building codes, educational programs, and technical innovations, to cite just a few applications. However, there is substantial agreement in the literature that differences between fire data collection systems in different countries complicate the ability to make comparisons that could be useful in evidence-based planning and prevention efforts. They are currently most useful in describing the global fire safety situation and certain fire-related trends.

The amount and quality of information in different data collection systems appear to be influenced in part by whether they include information from sources outside the fire service, such as insurers or medical authorities, through data linkage or other means. Data collection systems that collect too little or imprecise information may not produce useful data. At the same time, it was also observed that overly detailed data collection systems may overwhelm data collectors and thereby compromise data quality.

In general, it appears that the fire data collection systems in most countries are presumed to provide an accurate representation of their respective experiences with fire incidents. However, information gathered through this initial project task suggests that those involved in data collection efforts may be unaware of important limitations of their data due to missing information, differences in the way terms are defined or interpreted, and other identified issues. No European country appears to employ a methodology for dealing with missing data, although some countries do acknowledge that missing data is a potential problem that compromises data quality. Additionally, none of the consulted reports included uncertainty estimations.

To provide relevant information regarding the national fire safety situation (number of fires, fire fatalities, fire injuries, fire losses, etc.), fire statistics will have to be improved through common terminology, common methodology, and common training and qualification of persons in charge of filling in the fire report, including uncertainty estimation methods. The findings of this task will be used as preliminary groundwork for all the discussions that will occur during this project and as an output for all the following tasks.

1. INTRODUCTION

This first task of the project is established to assemble all the knowledge of the consortium members regarding fire statistics. A special focus was set upon sharing feedback on practices of each country in Europe and at least in Canada, New Zealand and USA, about where fire data comes from, who is responsible for what, how the data sets are defined, how they are collected, analysed and what is the output of these fire statistics. From there, common issues and limitations can be identified, as well as the best practices in the investigated countries. As most of the organisations within the consortium are based in western and northern Europe, though covering a substantial part of European countries, naturally more information is available in these countries, whereas less information was accessible or available from the rest of Europe. This has set an important challenge of gathering information through professional networks and through publicly available publication, despite the language barrier.

In this report, a literature review of work on fire statistics is presented; those are separated into studies focusing on national fire statistics and studies focusing on international comparison between practices. Publications of international organisations such as CTIF, ISO and WHO are also reviewed and considered as baseline of available international fire statistics. Finally, our findings about the investigated countries are presented in the different chapters of this report. Some countries present deeper descriptions than others, this is either due to the fact that in some of them more substantial studies or feedback relevant to the project are available.

The findings of this task will be used as preliminary groundwork for all the discussions that will occur during this project and as an input for all the following tasks.

2. LIST OF ABBREVIATIONS

APIRE	Association Public Insurance Companies for Real Estate
BAM	Bundesanstalt für Materialforschung und –prüfung (Federal Institute for Materials Research and Testing)
CDC	Centers for Disease Control and Prevention
CFS-CTIF	Centre for Fire Statistics of CTIF
CTIF	International Association of Fire and Rescue Service
DBI	Danish Institute of Fire and Security Technology
EC	European Commission
EMS	Emergency Medical Services
EU	European Union
EuroFSA	European Fire Safety Alliance
GDP	Gross Domestic Product
ICD	International Classification of Diseases
IRS	Incident Recording System
ISO	International Organization for Standardisation
LU	Lund University
MS	Member State
MSB	Swedish Civil Contingencies agency
NF	Number of Fires
NFD	Number of Fire Deaths
NFI	Number of Fire Injuries
NFIRS	National Fire Incident Reporting System
NFPA	National Fire Protection Association
PIRE	Public Insurance Companies for Real Estate
PT	Project Team
TR	Technical Report
UoE	The University of Edinburgh
USFA	US Fire Administration
VFDB	Vereinigung zur Förderung des Deutschen Brandschutzes (German Fire Protection Association)
WFSC	World Fire Statistics Centre
WG	Working Group
WHO	World Health Organization
WISQARS	Web-based Injury Statistics Query and Reporting System

3. LITERATURE REVIEW

As part of the project's initial work, the team undertook a comprehensive review of research into fire incidents and literature on fire data collection, as well as documents relating to fire data collection systems in member countries of the European Union, Australia, Canada, New Zealand, and the United States. In accordance with the project scope, our review of the existing literature focused as much as possible upon research and documents related to building fires.

3.1. RECENT TRENDS IN INTERNATIONAL FIRE EXPERIENCE

Several reports from the World Fire Statistics Centre (WFSC) in Geneva provided background for the project team on basic recent indices of the fire experience at the international level [1]. These reports also offered important insight into how currently available data on fire incidents are used, as well as its potential limitations.

The WFSC's information bulletin from 2011 reported findings from the United Nations that based on percentage of gross domestic product (GDP) calculations, direct losses from fire for the 2006-2008 period were generally stable, with most countries experiencing a slight decrease or holding steady [1]. Minor increases were observed in the United States, Finland, France, the Netherlands, and Poland. Western and Central European countries were reported to compare well against the average situation in Eastern Europe and central Asia/Eurasian countries in the number of fire deaths per 100,000 population. Variance observed in the cost of fire service organizations between similar countries was attributed to different ratios of public, private, and volunteer organizations. Notable differences were observed in the costs of fire protection for buildings between countries, reflecting varying requirements for different types and sizes of buildings. The report also noted that high fire death rates in Russia, Ukraine, Belarus, Moldova and the Baltic states were in decline, though still very high. The high variance in fire deaths was attributed to inadequate fire protection services, to poor building construction and maintenance and to high level of cigarette and alcohol consumption. Some of the Eastern and Eurasian countries were not members of the European Union and had not benefited from the possible advisory regulatory harmonization. The report emphasized that substantial differences in how fire data are collected and interpreted posed a critical challenge in using world fire statistics.

Findings from the United Nations for the 2007-2009 period were reported in the WFSC bulletin on world fire statistics in 2012, with fire deaths in Eastern Europe and Eurasia reported for 2001-2009 [2]. Direct losses due to fire showed that most countries had very minor decreases or increases in their losses as a percentage of GDP. Italy was an exception and experienced the largest increase. Proportional costs for funding fire service organizations remained largely stable, with only minor variances over the previous year's report, and absolute cost also saw relatively minor changes which generally took the form of small increases. Many countries continued to experience improved long-term trend in fire deaths, while Singapore showed the lowest proportion of fire deaths. Germany and Sweden continued to see slight increases in death figures for the three-year period of the report. The fire mortality rates in Eastern Europe and Eurasia showed improvement since 2000, but remained significantly higher compared to the Western and Central European states. In Estonia, Latvia, Lithuania and the Russian Federation, the reductions in mortality rates throughout the entire reporting period were dramatic, ranging from a low of twenty percent in the Russian Federation to a high of forty-two percent in Estonia.

The WFSC's 2014 report of fire analysis findings from the United Nations covered the period from 2008 through 2010 [3]. GDP calculations for direct losses were again reported to be stable or show a slight decrease, while showing decreasing costs in absolute figures. Scandinavian countries suffered above average fire losses, seen as possibly a result of the harsh climate and higher percentage of buildings containing wood. Most countries experienced small to noticeable decreases in per capita mortality due to fire for the reporting period, coinciding with decreases in deaths due to fire in 2010. The proportional costs of funding fire service organizations were again reported to be generally stable, with minor variances from the prior year's report, with the greatest variance being a noticeable decrease in costs in Japan. Absolute costs also saw relatively minor changes and frequently involved comparatively small increases, with the exception of the United States, which showed a noticeable cost increase in 2010. Cost of fire protection showed significantly higher cost estimates for various types of buildings than earlier reports and raised important questions about appropriate methods of calculations. The wide variation in building fire protection costs to some extent reflects differences in estimation assumptions and methods, but also differences in rates of construction activity within the larger economy.

3.2. RESEARCH USING FIRE INCIDENT DATA

Advocates of data collection emphasize that it is not an activity that is pursued for its own sake but should be guided by the practical goal of collecting useful information that can be applied to action. In the case of fire data collection, a number of studies were identified in the literature review that highlight the vital importance of information on fire incidents for efforts seeking to improve fire safety and guide interventions that reduce the human and economic cost of fire. National fire incident databases were used in the majority of the research, but some of the studies relied upon other sources of fire-related research.

3.2.1. Country specific studies

A 2003 study of fire deaths in Ireland from 2001 to 2002 evaluated at-risk individuals and behaviours linked to death and injury [4]. The research, drawing from multiple data sources, found that most fatalities (67%) occurred in house fires and that almost half (46%) occurred in two- or three-story dwellings. Most victims were male (65%) and alcohol was a factor in thirty-nine percent of fire deaths. Victims most often lived in urban locations. Fires occurring between 12 p.m. and 6 a.m., usually on early Sunday morning, accounted for most fire deaths. There was no working smoke alarm in eighty-two percent of fatal fires.

Research from the United States in 2006 used data from the National Fire Incident Reporting System (NFIRS) to examine fatalities and injuries in building fires during 1993 [5]. The research found that the number of injuries and deaths and proportion of deaths depend mainly on the extent of fire damage, area of fire origin, material ignited, and ignition factor, while the absolute number of fatalities depended upon the material ignited and form of the heat of ignition. High fatalities were found to be significantly influenced by the victim's condition, location and activity at the time of ignition.

A report by Swedish researchers from the SP Technical Research Institute of Sweden in 2009 used the country's fire data collection system to study arson fires between 1991 and 2007 [6]. In addition, detailed information from the municipal insurance company for the city of Gothenburg was used in studies of larger arson fires, including the role of technical equipment. Information from insurers was also used in identifying the costs of arson fires. The research found that arson fires most often targeted cars and waste containers, while arson in buildings most often occurred in apartment buildings. School buildings experienced fewer arson incidents, but arson nevertheless accounted for approximately half of all school fires. Insurance data indicated a higher number of school arson fires in Gothenburg than the national fire database, which the researchers attributed to the likelihood that the insurance company was likely to include minor fire incidents that did not require involvement of the fire service and that the fire service was likely to designate the cause of a fire as unknown rather than arson if there was uncertainty about the cause. Insurance company investigations found that wood façades on school buildings were critical to fire development. Single-story buildings with roof extensions beyond the façade also were found to constitute a risk, and inferior compartmentation of a building was associated with greater damage. Major arson fires could be reduced through restrictions on building access.

A subsequent study from Sweden in 2012 elaborated an approach to understanding deficiencies in fire protection by drawing upon both statistical data and more qualitative data from case studies of school fire incidents in Sweden [7]. The study used Swedish fire statistics on fire cause, extent of the fire, and room of fire origin in order to identify the types of fires that produced the greatest damage in Swedish school buildings. Data indicated that the most destructive school fires were those that were deliberately set during evening and night-time hours. Fire investigation reports of these fires showed that an absence of fire detection and insufficient fire separation contributed to the ability of fire to spread along the façades and into the attic space of school buildings. All case reports showed that a fire was very difficult to extinguish without causing substantial damage to the building once it spread into the attic space.

A study from Poland in 2014 examined residential fires in order to assess safety levels for the country as a whole and for the city of Warsaw for the years from 2000 to 2012 [8]. The researchers geocoded and mapped residential building fire incidents on a 25-kilometer cartography grid for national incidents and a one-kilometre grid for the city of Warsaw. Administrative Districts were ranked to show the highest and lowest number of residential fires. Fire causes were divided into three categories: human factor (caused directly or indirectly by humans), technical (caused by faulty devices, domestic appliances or other building structure defects) and unknown (unspecified). The research estimated that human factors accounted for sixty percent of residential building fires at the national level and seventy-three percent in Warsaw were caused by the human factor.

Technical factors were attributed to nineteen percent of national incidents and eleven percent of incidents in Warsaw, while twenty-one percent of national incidents and sixteen percent of Warsaw incidents were due to other factors.

A short communication analysed in 2017 the data collected by the Laboratoire central de la Police Prefecture in Paris (LCPP) concerning fires which caused casualties deceased on the spot for the years 2012, 2013 & 2014 [9]. The geographic sector includes Paris and its surrounding counties, constituting more than 10% of the French population. As this database is filled by trained staff that is called systematically when a fire causes one or several casualties, this data constitute one of the most reliable analyses in France, despite being limited to Paris and its suburbs. It was found that the origin of the fire was intentional for 19 deaths out of 124 (i.e. 15% of cases). Out of the 108 fires that were analysed, the origin of the fire could be determined in 90 cases out of 108 (i.e. 83%). In residential buildings, for 88 fires having caused 100 deaths, 26 fires caused 37 deaths, i.e. 35% of the recorded deaths. In four of the fires having caused 7 deaths, the flashover also reached the building staircase. In 43 fires having caused 44 deaths, i.e. 41% of the total number of deaths registered, the fire was limited to the room where the fire started: most often in a bedroom (20 fires having caused 20 deaths), then the living room and the lounge (10 fires having caused 10 deaths), last in the kitchen (9 fires having caused 9 deaths). The origin of the alarm was registered for 92% of the fires analysed: the alert was given by someone who neither was a victim nor lived on the premises in 90% of the cases registered; it was given by a victim or a resident in 7% of cases; smoke detectors gave the alarm in only 3% of the cases.
A significant number of death occurs during the day, when people are not usually asleep, with 44% of death from 9am to 9pm. Knowing that 94% of the victims were found in their homes and that the home occupation rate is much lower in the daytime, this goes against general opinion that fires kill in majority when people are asleep. The gender of the deceased is unknown for 8 victims. Males represent 58% of the deceased of known gender, females 42%.

Research from Australia in 2015 by Xiong and co-authors examined risk factors related to surviving or dying in residential fires [10]. The study used *The Victoria University Fire Fatality Coronial Database*, which includes fatalities from the states of Victoria, New South Wales, and Queensland, to identify fire deaths. Survivors of residential fires were drawn from the *Victoria University Residential Fire Survivor Database*, which includes data on fire survivors from the state of Victoria. Researchers removed deaths due to suicide, murder, deliberate fires, undetermined cause, fires in non-residential premises, or incidents with more than one victim, creating a database of 177 single-fatality fire deaths. The database of survivors included 183 survivors following the removal of missing data. The researchers found that the leading risk factors associated with fatal fires were psychotropic and sedative drug intake, discarded cigarettes, living alone, being over seventy years of age, being asleep, location in the room of fire origin at time of ignition, and alcohol intake. Risk factors most significantly associated with surviving fires included cooking fires, electrical fires, involvement of stove in ignition, and fire occurrence in a one- or two-family dwelling. Fire survivors were more likely to wake up to non-smoke alarm cues, such as smoke or breaking glass, than a cue from a smoke alarm.

3.2.2. Comparative and multiple country studies

Several studies were identified which examine fire incidence or fire-related outcomes in multiple countries and identify potential factors that influence disparities or trends.

One of the earlier studies in this area was a comparative analysis of fire risk in the United States, Japan and the United Kingdom by Sekizawa that was published in 1994 [11]. The research utilized data on the causes of residential fires and deaths, fire death trends, fire death rates by age group, and victim location to compare risk indices. The United States was found to have much higher fire death rates than the United Kingdom and Japan in almost every age group. Japan experienced the highest death rates among those 80 years or older, and it was also found that older or handicapped victims tended to be closer to the area of fire origin, suggesting that early detection was insufficient for such victims as evacuation probably had a key role. Common patterns for fire risk were shown in the United Kingdom and Japan. Further study involving international collaboration was identified as an important means for gaining a better understanding of fire risk.

A more recent study by the United States Fire Administration from 2011 examined fire death rate trends in the United States and twenty-three other industrialized countries [12]. The research found that although the USA had made substantial progress in reducing fire deaths since the 1970s, its fire death rate was the tenth highest among the 24 industrialized nations in 2007. Fire death rates per million population consistently fell throughout the industrialized world from 1979 to 2007 but fell faster in North America and Eastern European regions than

in other regions. From 1979 to 2007, the fire death rate in the United States declined by 66 percent. Fire death rates in Japan, a leader in fire safety, showed a slight worsening over the study period. The study identified a variety of factors that might contribute to differences in fire death rates, including differences in fire prevention practices and education, building practices and regulations, differences in lifestyles and cultural attitudes, and the proportion of senior citizens in the population. The authors note that one of the difficulties in determining the cause of different fire death rates in different countries is a lack of available data. Increased cooperation is identified as an important step for learning more about the causes of fire deaths and developing prevention measures.

Still more recently, a 2016 study used fire statistics from the United States, the United Kingdom, Japan and Finland for the 2002–2012 period to compare the number of deaths and injuries from structure fires started by a small open flame ignition source to those from fires started by smoking materials [13]. The research found that Japan had substantially more fires ignited by smoking materials than the other countries, but not more fatalities from these fires, while the problem of deaths from fires started by smoking materials was greatest in the United Kingdom. A more detailed quantitative analysis compared the relative contributions of low-energy ignition sources (match, lighter, space heater, etc.) to ignitions by smoking materials ignition to the USA fire problem. The analysis found that fires ignited by smoking materials more commonly resulted in fatalities than low-energy ignition fires, while the overall volume of low-energy ignition fires and corresponding losses and injuries are greater. Finally, a logistic regression model indicated that older persons were at greater risk of death from fires ignited by smoking materials than by low-energy ignition sources.

A 2016 study from Lund University in Sweden sought to understand why more people were killed in residential fires per population in Finland than in Sweden [14]. Using reports and fire databases in the two countries, the research found that fire victims in Finland were more likely to be male and that they were often single. A higher share of victims in Finland were under the influence of alcohol or drugs than in Sweden. A research of possible risk factors for fire death found that alcohol consumption, tobacco use, and the proportion of the population living alone were all higher in Finland than in Sweden and were seen as potentially contributing to disparities in the death rates in building fires between the two countries.

Another 2016 study from Sweden reviewed fire fatality data from 42 countries, using data from World Fire Statistics reports and from the International Association of Fire and Rescue Services [15]. The research found that reported rates of fire fatality experienced a decrease in most countries, but were particularly significant in Estonia, Germany, Great Britain, Latvia, Russia, and the United States. Fire safety interventions that contributed to the decreases in deaths included increased use of smoke alarms and sprinklers systems and fire regulations for children's sleepwear and for furniture and furnishings. The research noted that differences in how data is collected or how deaths due to fire are defined could explain differences in death rates between countries, but the focus of the study was on trends within countries rather than a direct comparison between them.

Comparative data from thirteen countries was used in a 2020 Swedish study of arson in schools and pre-schools in order to better understand the apparently high rates of school fires in Sweden and to assess school arson trends in the country over the preceding 20-year period [16]. The data indicated that Sweden experiences a higher frequency of school fires than most other comparable countries, with only New Zealand showing more fires per million inhabitants. However, the study concluded that inter-country comparisons on fires are complicated by substantial differences in the way they are collected and stored, as well as how fires or data elements are defined. The report notes, for instance, that Sweden reports all incidents which receive a fire service response, even if the fire is already extinguished, while qualifying events in other countries may be more restrictive. The report also points out that differences may also distinguish the classifications of different levels or types of schools from one country to another.

3.3. STUDIES OF NATIONAL FIRE INCIDENT DATA COLLECTION SYSTEMS

Due to the low level of consistency in how different countries record and obtain fire statistics, the Department for Communities and Local Government in the United Kingdom commissioned a study in 2011 with the European Union Fire Safety Network to examine and better understand fire data in member states of the European Union [17]. The research team relied upon an extensive literature review, telephone interviews with key stakeholders, and an on-line survey of national organizations collecting fire statistics in European Union states, as well as Norway and Iceland. The research found fire data to be collected at national and state levels in order to track and inform policy measures, raise awareness about fire risk, evaluate the number of fires and

deaths, and develop interventions. However, the research also confirmed substantial differences between countries in numerous aspects of fire data collection. The research noted that countries used different ways of recording in-scope fires and fire-related deaths and injuries. While most countries recorded such key points as the number of fires or deaths, the recording of other critical factors, such as type of injury, information about fire safety systems, and size of the fire, was much more mixed and infrequent. Such differences were recognized as complicating the ability to make comparisons in a number of key variables of interest. The research determined that reconciling data between countries in its current form would be a significant task, but noted that respondents expressed support for developing comparable datasets. The researchers emphasized that common datasets would facilitate comparisons that could be used to inform the development and effectiveness of fire safety interventions.

Data collection of fire incidents in Canada at the national level has been inactive in recent years and two reports from the Canadian Centre for Justice Statistics published in 2017 review the state of the country's fire data collection [18]-[19]. One report summarized preliminary observations from the National Fire Information Database, a pilot project designed to: collect ten years of microdata information on fire incidents and fire losses from Fire Marshals and Fire Commissioners Offices across Canada, create a standardized national system for the collection of fire statistics, and link the database with other relevant socio-economic data to assist in the development of new, relevant, evidence-based research related to fire incidents, public safety and security. Seven of Canada's provinces and territories participated in the project. The report found that this participation covered seventy-two percent of the Canadian population. Total reported fires declined by twenty-five percent between 2005 and 2014. The share of structural fires in the database rose from half of all fire incidents to more than sixty percent of fire incidents over that period, but the number of structural fires declined by twenty-six percent. Three-quarters of structure fires were in residential structures. Cooking equipment and smoking materials were the leading cause of structural fires. Fire-related deaths rose between 2004 and 2008 before declining by thirty-two percent between 2008 and 2014. Most fire-related deaths occurred in structural fires (87%), followed by vehicle fires (11%) and outdoor fires (4%). Smoke inhalation was the most common cause of death.

The second report from Canada evaluated the pilot National Fire Information Database project, examining the data collection system in relation to: the development of content (taxonomy), data collection, standardization of data, geo-coding activities and the addition of social domain data, and aggregation of jurisdictional files [8]. The report pointed out that although seven of thirteen provinces participating in the project represented seventy-two percent of the Canadian population, the database should ideally represent full coverage of every jurisdiction. In addition, the content of reporting data elements was found to vary between fire service participants. Some jurisdictions had limited reporting capacity due to financial or other constraints. Certain data elements were argued to require updating in order to reflect developments in technology (i.e., cell phones, laptops) or language conventions. A variety of data quality issues and data limitations due to underreporting were identified as issues that required resolution. The report argued that harmonization of the contents of reports and greater standardization of data was needed, and longer and more flexible data collection periods were proposed as one option for improving participation in reporting. In order to improve the capacity to provide linkage to other data sets, standardization of data elements for victims and geographic identifiers is recommended. The report concluded that the sustainability of any forthcoming national fire data collection system would require interest and support of stakeholders and funding support.

Several studies were identified which examined data quality issues with the US National Fire Incident Reporting System (NFIRS) [20][23]. A 2012 study by Butry and Thomas from the National Institute for Standards and Technology evaluated the ability of NFIRS data to depict fire activity in non-reporting US cities, to test differences between those cities which reported fire incident data and those which did not, and to discuss how findings could be used to weight NFIRS-based statistics in order to produce more accurate national estimates [20]. The report analyses data from NFIRS from 2002 to 2009. In addition, the report used socioeconomic data from the Census of Population and Housing (income, sex, race and housing items, such as the status of a housing unit, median age of units, and median value). Data from the National Fire Department Census were used to include information about fire departments listed with the US Fire Administration. The research found that there were differences in socioeconomic and fire department characteristics between those cities that submit reports to NFIRS and those that do not. The authors argued that if those factors also affected the risk of fire, then generalizations made about fire safety and risk based only on NFIRS data will not apply to non-reporting areas of the United States.

A second study of NFIRS data by the National Association of State Fire Marshals examined the problem of unknown data to better understand why NFIRS data elements for area of origin and causal information were frequently reported as undetermined, unreported, or inappropriately coded as “none” [21]. The researchers conducted qualitative interviews, collected and analysed fire department data collection policies, and conducted an on-line survey of fire departments in seeking to understand the problem of unknown data. They found that information containing causal information from fire investigations was often not included in NFIRS incident reports because the reports were not updated after the information became available. Liability concerns also influenced decisions about how much information to report in fire incidents. The researchers suggested that another factor could be insufficient training of firefighters about the importance of data collection, while the reporting system itself was seen to be overly complex and not to be user-friendly. They concluded program managers at the state level could be valuable resources for data quality by interacting with fire departments, supporting fire department participation, and providing quality control and feedback. “Data champions” within fire departments who recognize the value of data were also seen to be important resources for data quality efforts. The authors also argue that future iterations of the NFIRS system should strive to improve user-friendliness and reduce confusion about appropriate codes.

A 2016 study of NFIRS data by Kinsey and Ahrens examined the NFIRS three-digit coding system for types of fire incidents [22]. In this coding structure, the first digit of an incident type code is a broad category, the second is somewhat narrower, and the third provides the most detail. The researchers compared NFIRS narrative information from three large municipal fire departments with corresponding codes for type of incident, property use, and actions taken by the fire department. The authors independently reviewed the information provided and assigned their own incident type codes to the records. The authors found that they were most likely to agree at the broadest code level, but results were poor at the three-digit level. Agreement between at least one author and the incident report was about the same as the agreement between authors. More than seventy-five percent of incidents used just ten percent of the codes, suggesting that many codes get forgotten. The authors pointed out that long lists reduce accuracy and that too many choices can lead to no decision or a default choice. A standard research procedure is to measure broad categories first, then use follow-up questions for details. The research concluded that the NFIRS coding structure was based upon the researcher preferences rather than taking account of the way firefighters think and process information.

A more recent study of NFIRS data quality by the United States Fire Administration from 2017 assessed data quality and data usability for required data elements in NFIRS reports [23]. Data quality for each data element was indexed on the total proportion of valid entries for that element. Data usability for each data element was indexed on the proportion of valid known entries for that element. Both metrics were assigned a maximum value of 100. The report found that required data elements (Incident Type, Property Use, Incident Date, Alarm Time, Deaths, Injuries, Property Loss, Contents Loss, Area of Fire Origin, Heat Source, Item First Ignited, Cause of Ignition, Factors Contributing to Ignition, Equipment Involved in Ignition, Fire Spread, Presence of Detectors, Detector Operation, Detector Effectiveness, Presence of Automatic Extinguishing Equipment) had either or close to a perfect value of 100 for the overall data quality index. Lower scores were recorded for outside fires, fires with injuries, and the presence of detectors and automatic extinguishing systems in fires other than buildings and mobile property structures. The data quality index for fires with injuries was in the low 90s due to the number of injuries that occurred in outside and other fires where alternate reporting methods were allowed, and reporting requirements were less stringent. Fire injuries occurred frequently and across all types of fires. The lower data quality index for the presence of detectors and automatic extinguishing systems in fires other than buildings and mobile property structures was largely a result of deaths and injuries in vehicle incidents and outside fires.

3.4. PREVENTION-RELATED RESEARCH

Research on fire prevention measures can be useful in informing policy decisions and educational outreach. Three studies reviewed by the research team used fire incident data in order to examine and evaluate prevention-related interventions.

A study by the University of Surrey in 2005 argued that detailed fire statistics in the United Kingdom facilitated the ability to evaluate the potential benefits of fire safety design features of consumer products or residential fire safety equipment [24]. The study used fire data to show that prior to the 1990s, the use and effectiveness of residential smoke alarms in the United Kingdom was low and referenced findings from the United States indicating that a decline in the country’s fire deaths was strongly correlated with the increased use of residential

smoke alarms. The study went on to conclude that it was important for Europe to improve its fire data collection practices in order to establish high levels of health, safety, and consumer protection.

A 2009 study conducted by researchers from the Netherlands Institute for Safety (IFV) examined fire statistics in European countries and research on fire causes and development and found that domestic fires were more often caused by human behaviour than by technical failure [25]. The most common causes of fires involved smoking materials or cooking, while the presence of upholstered furniture or textiles were also contributing factors to fire development. The research also emphasized the need to exercise caution in drawing comparisons between countries on the basis of fire statistics due to the absence of European standards for gathering, analysing, and publicizing data on fire statistics. The report also cautioned that national fire data only include information reported to the responsible data bodies for data collection and are likely to substantially undercount the actual number of domestic fires.

Smoke alarms have received substantial attention as a fire safety intervention that can save lives by alerting occupants to fires and providing opportunities to extinguish a fire before it grows or additional time to escape. Research in the United States by Ahrens used data from the National Fire Reporting System and the NFPA annual fire experience survey to examine the presence and performance of smoke alarms in home fires [26]. Information about unreported fires was obtained from the US Consumer Product Safety Commission's 2009 report, 2004-2005 National Sample Survey of Unreported Residential Fires. The research found that the death rate in reported home fires with working smoke alarms was half that of fires without smoke alarms or with non-working smoke alarms. Two of every five home fire deaths resulted from fires with no smoke alarms at all. Nine percent were caused by fires in which smoke alarms failed to operate, typically due to missing or dead batteries or disconnected power. Hardwired smoke alarms were more likely to have operated than those powered by batteries. The thirty-seven percent of fatal fire victims with working smoke alarms were more likely to have been at least 65 years old, been in the area of origin when the fire began and unable to act, to have been engaged in fighting the fire than were victims without working smoke alarms. Victims with working smoke alarms were less likely to have been sleeping at the time of the fire. The death rate per one thousand reported home fires was lowest in fires in which hardwired smoke detection and sprinklers were both present.

A 2019 study by Shokouhi and co-authors conducted a systematic review of 30 studies of residential building fires, risk factors, and prevention measures in multiple countries, including the USA, Canada, the U.K., Denmark, Scotland, the Netherlands, Taiwan, Australia, New Zealand, and India [27]. The authors found that older adults, people with physical or mental disabilities, tobacco users, and people impaired by alcohol and drugs were at particular risk for fire-related injury or death. Single-parent households, low-income families, and areas with large numbers of young children were also identified as being at higher risk for fire-related injuries or death. Key prevention measures were identified as environmental modifications, behaviour change, improvements in emergency medical services, and education.

3.5. THE CASE FOR DATA COLLECTION

More recently, a multi-national group of researchers reviewed a number of emerging trends that present challenges for fire safety and highlighted the critical role of data in driving fire safety interventions in response to these challenges [28]. The report identifies climate change, resiliency, sustainability, population growth, urbanization, and globalization as key developments likely to influence - and potentially exacerbate – the threat of fire. Hazards related to these developments include the need for quickly-constructed buildings to address rapid population growth, adequate fire protection, and the threat of wildland fires and fires in the wildland-urban interface as a result of climate change. The report calls for greater collaboration across disciplines and between countries on fire data collection in order to facilitate applied research and formulate interventions to improve fire safety. The paper calls for a common database of information in order to promote the ability to learn from experience and promote effective collaboration. The fragmentation of fire statistics, lack of common terminology and uneven access to data in different countries are seen to be major challenges to meeting the emerging challenges.

3.6. FIRE INCIDENT DATA COLLECTION: CURRENT ISSUES AND FUTURE CONSIDERATIONS

A review of the literature provides strong evidence that fire data collection systems have been instrumental in reducing building fires and their associated deaths, injuries, and economic damage. The utility of information about these fires is apparent in the design of many fire safety interventions and policy initiatives. Data on fire incidents can inform firefighting strategies, building codes, educational and training programs, and technical innovations, to cite just a few applications. It is logical to assume that safety efforts can benefit from strategies that have worked in other places. However, there is substantial agreement in the literature that differences between fire data collection systems in different countries complicate the ability to make comparisons that could be useful in evidence-based planning and prevention efforts.

While national fire data collection systems are likely to share certain core features and to gather some fire incident data in common, there appears to be considerable variation in the type and scope of information collected, the way that data elements are defined and levels of detail they seek, as well as the types of training and resources dedicated to collection efforts. In addition, literature suggests that fire data are influenced by differences between data collection procedures and practices. Some data collection systems appear to provide opportunities to update information that may not be available at the time an incident record is first created, such as the cause of a fire or deaths that occur some time after the incident. The amount and quality of information in different data collection systems also appear to be influenced by whether they include information from sources outside the fire service, such as insurers or medical authorities, through data linkage or other means.

Literature suggests that the issue of how much information to collect is an important area for consideration in the design of fire data collection systems. Data collection systems that collect too little or the wrong kind of information may not produce data that are useful, while overly detailed data collection systems may overwhelm data collectors, and thereby compromise data quality, as suggested by studies from the United States.

In many respects, the issue of how much information to collect appears to be driven by available resources, as well as the capacities of data collectors, who mainly are fire service personnel, to collect and record information. Concise data collection records will require less support and fewer resources than those that are more complex. To that end, recent literature on fire data collection in Canada emphasizes that such factors as funding, resources, personnel, and stakeholder acceptance are critical considerations in the design and sustainability of national fire data collection systems.

Whatever model of fire data collection system is employed in host countries, available literature suggests that closing the gap between the data needed for drawing comparisons and information that is practically accessible will remain a challenge, but one with substantial public benefits.

4. DESCRIPTION OF WHO DATA

The World Health Organisation (WHO) maintains a wide range of data collections related to global health and well-being, as mandated by its member countries.

These databases contain not only information on diseases, such as malaria, influenza, tuberculosis, cholera, but also data on nutrition, health expenditure, road safety, etc. [29][30], and they have some utility for examining fire-related injury outcomes. Data for "burn deaths" offer one potential source of information. The most recent fact sheet with respect to burn deaths was published in 2018 [31], while the most recent official publication and evaluation is a 2008 report outlining a plan for burn prevention and care [32]. It is important to note and observe that the databases for burn deaths includes all type of burn injuries and is defined as an injury to the skin or other organic tissue primarily caused by heat or due to radiation, radioactivity, electricity, friction or contact with chemicals [31].

"Thermal (heat) burns occur when some or all of the cells in the skin or other tissues are destroyed by:

- hot liquids (scalds)
- hot solids (contact burns), or
- flames (flame burns)" [31]

The 2018 fact sheet includes some specific data on countries and risk groups. The databases kept by the European members of WHO provide an indication of trends in the European Mortality Databases [32]. In this case, data are reported as total number of deaths, as well as standardized death rates (SDRs) and crude death rates (CDRs).

SDRs are an age-standardized death rate calculated using the direct method and standard European population structure, while CDRs are calculated as a simple ratio: the number of registered deaths/ mid-year population (per 100000). The mortality rates have been calculated by the WHO Regional Office for Europe using the data on deaths by cause/age/sex and mid-year population by age/sex, annually reported to WHO by European Member States. It should be noted that mortality rates for some countries may be biased due to the under-registration of death [32] [34]. The parameters include deaths from exposure to smoke, fire and flames and are consequently a broader classification than exposure to fire.

Following groups are available on the WHO website:

- Deaths(#), Exposure to smoke, fire and flames
- SDR(0-14), Exposure to smoke, fire and flames, per 100 000
- SDR(0-64), Exposure to smoke, fire and flames, per 100 000
- CDR(1-4), Exposure to smoke, fire and flames, per 100 000
- SDR(15-24), Exposure to smoke, fire and flames, per 100 000
- SDR(25-64), Exposure to smoke, fire and flames, per 100 000
- SDR(30-44), Exposure to smoke, fire and flames, per 100 000
- SDR(5-14), Exposure to smoke, fire and flames, per 100 000
- SDR(60-74), Exposure to smoke, fire and flames, per 100 000
- SDR(75+), Exposure to smoke, fire and flames, per 100 000
- SDR, Exposure to smoke, fire and flames, per 100 000
- CDR(0 year), Exposure to smoke, fire and flames, per 100 000
- SDR(1-19), Exposure to smoke, fire and flames, per 100 000
- SDR(15-29), Exposure to smoke, fire and flames, per 100 000
- SDR(45-59), Exposure to smoke, fire and flames, per 100 000
- SDR(65+), Exposure to smoke, fire and flames, per 100 000

Figure 1 gives an example of the SDR trends for a selection of European countries for all age groups. Figure 2 shows the averages available for a variety of country classifications. The MDB has several visualisation tools available on its website [32].

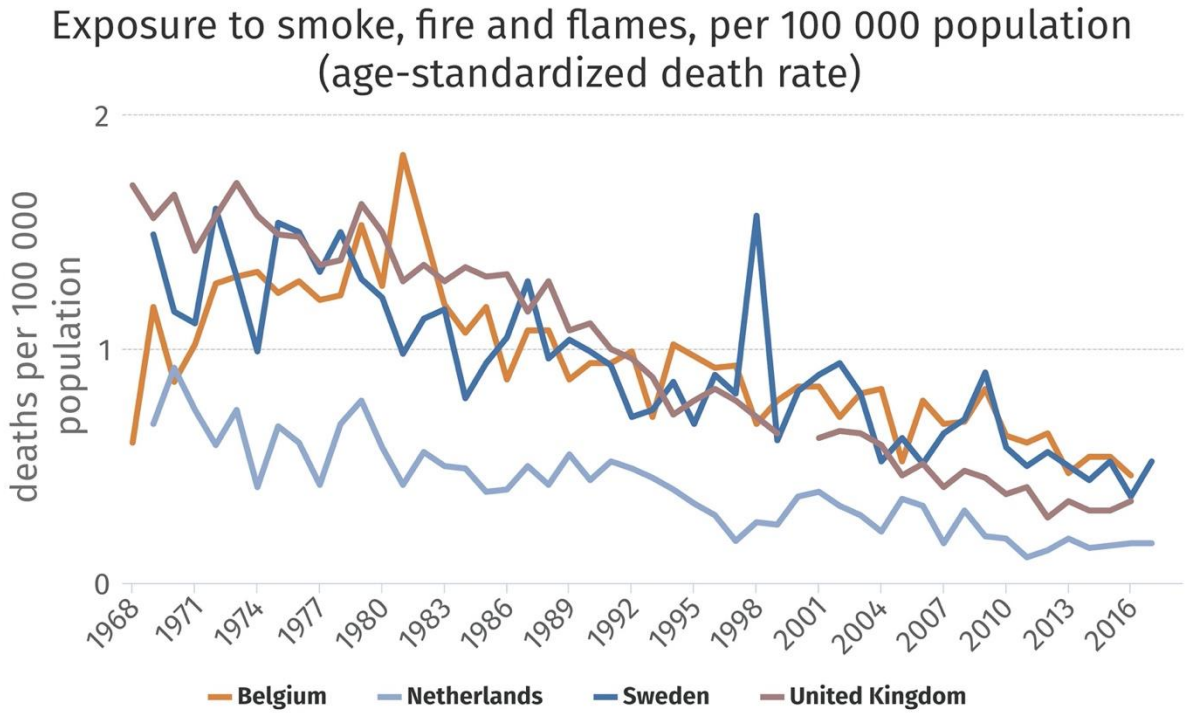

Figure 1: SDR data, Death per 100 000 population based on European WHO database for a selection of European countries (retrieved from [33]).

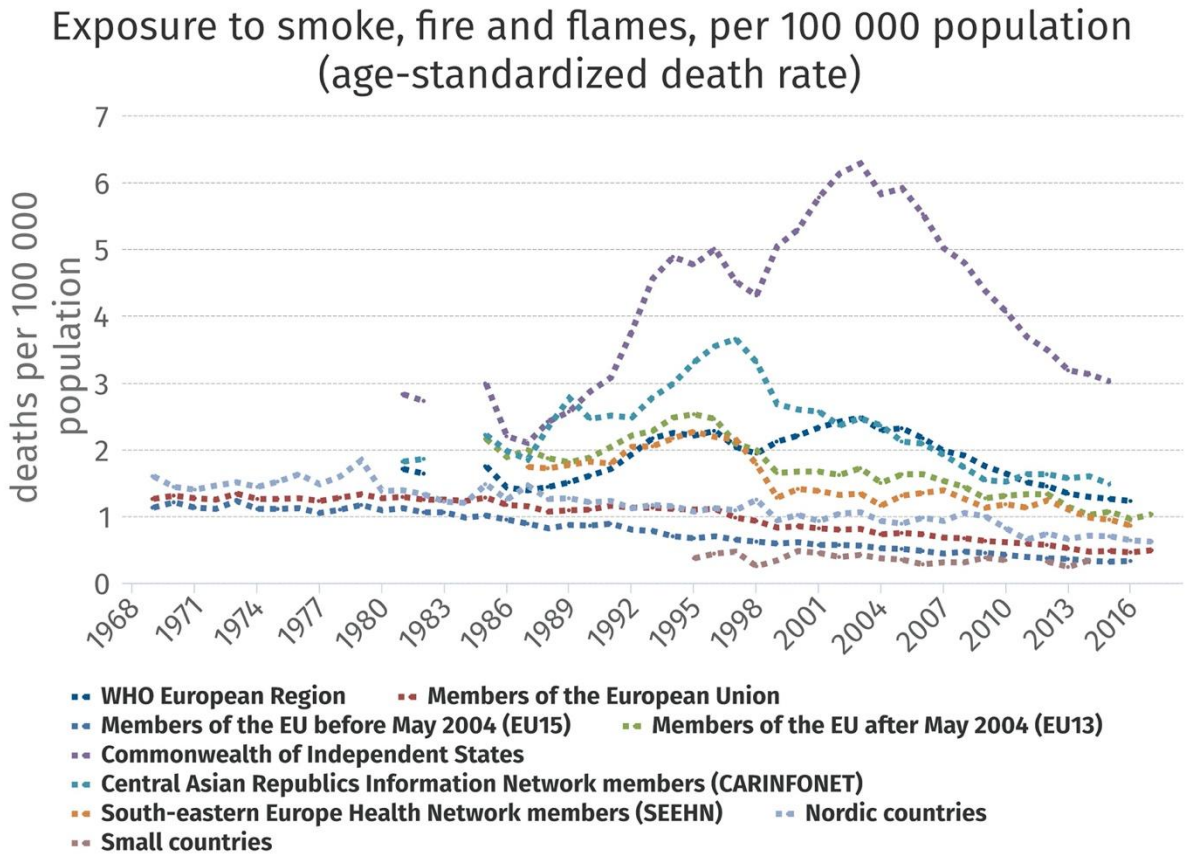

Figure 2: SDR Death per 100 000 population based on European WHO database with averages for group of countries (retrieved from [33])

Information on burn death trends for the same selection of European countries is available from Gapminder, an independent educational non-profit Swedish foundation which uses data from the World Health Organization and other sources [33], and is shown in Figure 3 below.

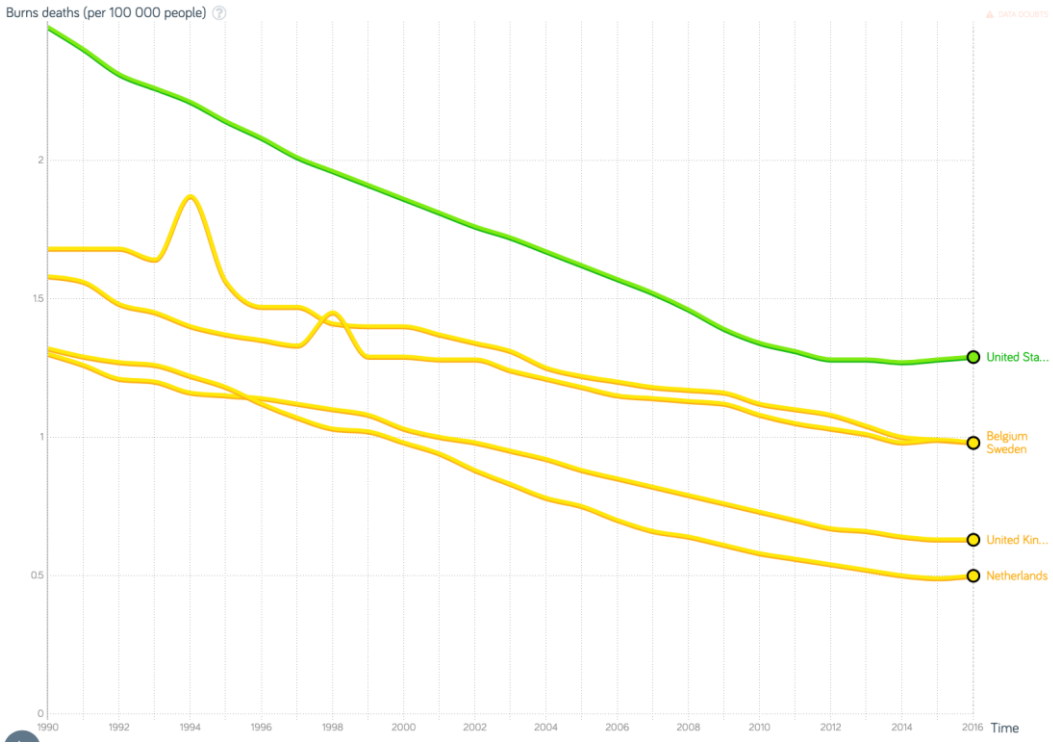

Figure 3: Trend of Burn Deaths per 100.000 for a selection of European countries and the USA retrieved from [35]

The figures from both WHO Europe and Gapminder show peaks influenced by specific large fires, including the 1998 Gothenburg discotheque fire in Sweden and the 1994 Switel fire in Belgium). The figures nevertheless show that burn deaths have followed a declining trend for the last two decades followed by a stabilisation.

It is important to acknowledge that the databases currently have limited utility in examining fire-related outcomes because they lack sufficient detailed fire data. However, the power for analysing data can be noted, contingent upon data quality. More information can be found in the paragraph 8.2.2. on ICD codes.

5. ANALYSIS OF CTIF REPORTS

5.1. GENERAL DESCRIPTION

As fire is a very complex phenomenon involving many different parameters, achieving a complete and precise understanding – including causes and circumstances of the fire, casualties, and damages, as well as firefighting issues – needs relevant, efficient, and complementary indicators. These indicators may be found in fire statistics. In many countries, provinces, municipalities, and cities, fire departments regularly collect important fire-related statistics. These statistics are frequently published and increasingly available on official websites. Although comparisons from one country to another are frequently complicated by a lack of common definitions and methodology, they can still be useful to describe the global fire safety situation and trends for groups of countries, as well as the specific fire safety situation in a given country. Data collection in some countries is performed by private bodies, such as insurance companies, and these data are generally not publicly available. Several studies have used available data to make inter-country comparisons, such as the evaluation of fire death rate trends [29].

In this chapter, data from the "World Fire Statistics" reports [37], published annually by the International Association of Fire and Rescue Service (CTIF), were compiled and analysed for the years between 2009 and 2018. CTIF collects (annual numbers) data from each country on a voluntary basis. Data are usually provided by fire and rescue services or firefighter associations. In some situations, data are provided by two institutions, such as firefighters and national institutes. In these cases, data may differ for the same country. In general, it was observed that the differences reported by the two main institutions range between 5% and 10%. There are also situations where countries do not provide data and we sought in such cases to fill the gaps where possible. We should also note that some countries only provide structure fires, while others provide structure fires, vehicle fires and wildfires. CTIF recommends analysing data by decades (i.e. sequential average over 10 year period) and not by year in order to capture proper trends and to adequately consider potential outliers that may be present in the data. If the data is analysed by year, then every big or exceptional fire event would cause some spikes in the trends, therefore the comparison year by year might be a bit more challenging.

5.1.1. Number of countries part of the study

This study draws upon CTIF data from European countries and select non-European countries included in the research pool, including Australia, Canada, USA and New Zealand. A total of 37 countries is included in the review.

5.1.2. Population consideration (2009-2018)

In this analysis, the number of fires, fire deaths and fire injuries were divided by the average population for each country. The averaged population was calculated from the population numbers reported by CTIF over the period from 2009 to 2018.

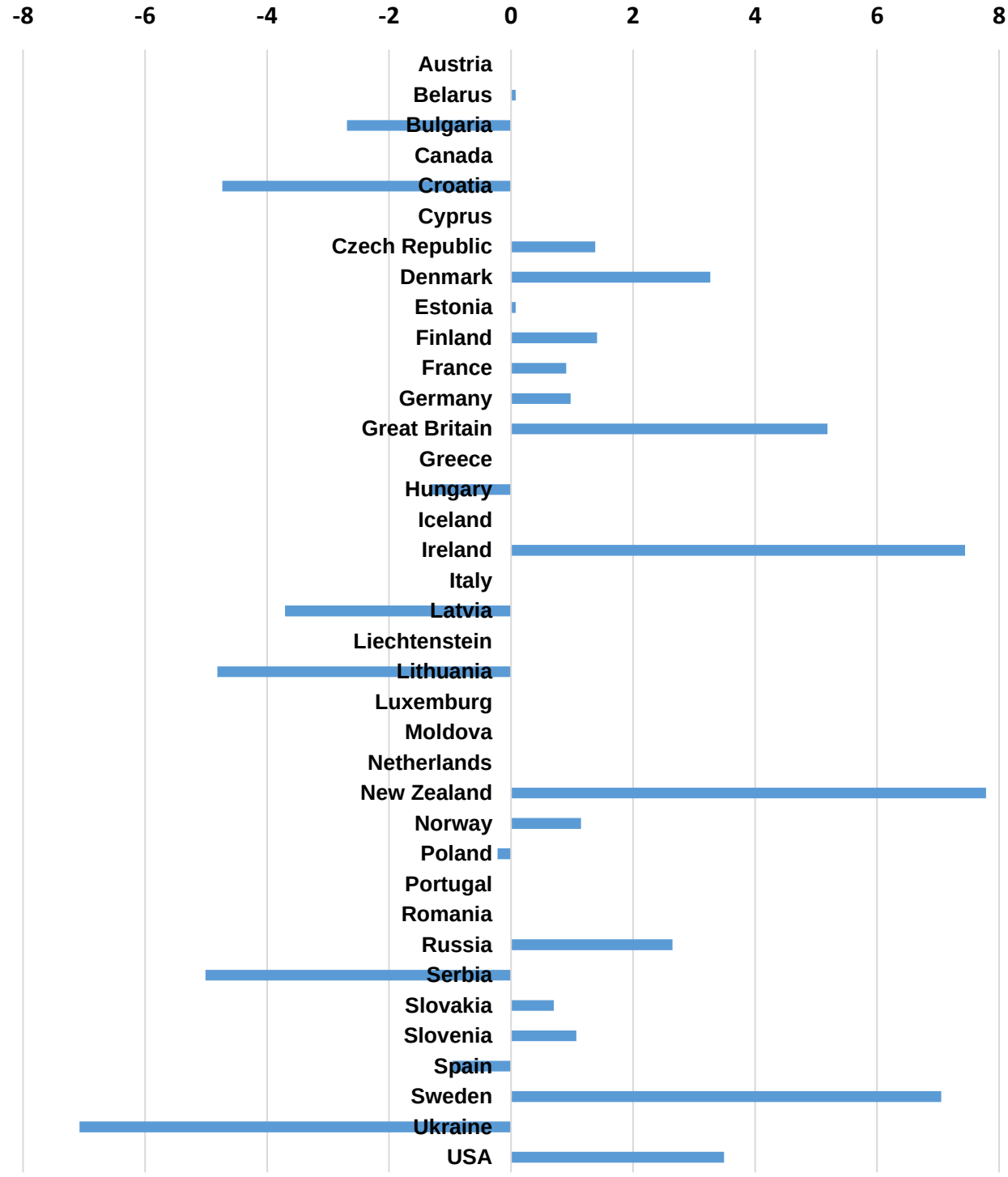

Figure 4 presents the increase percentage of population from years (2009-2013) to years (2014-2018) and shows that the difference is less than 5% for most of the countries. Only in Ukraine, Ireland, New Zealand and Sweden, the variation is between 6% and 8%.

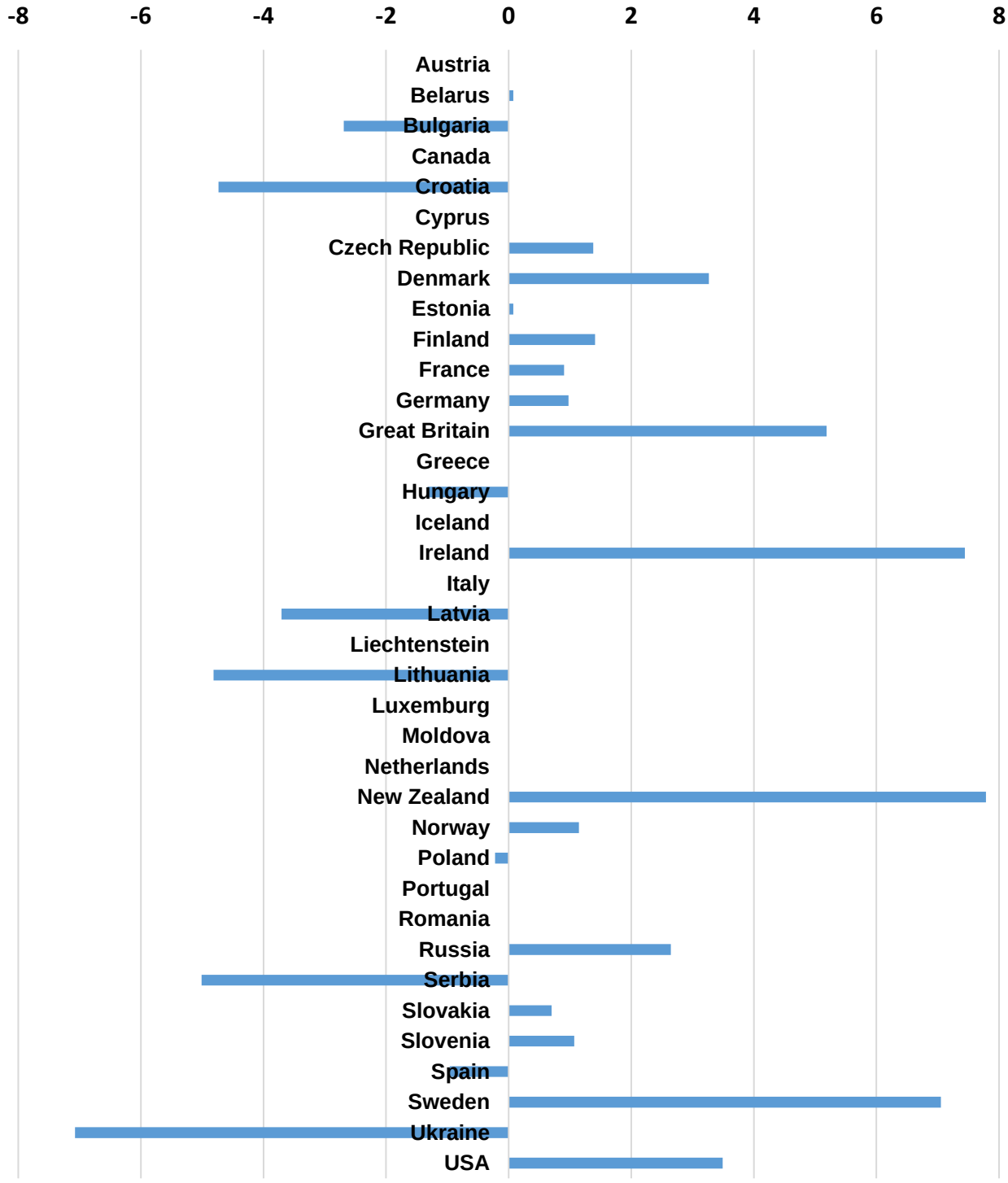

Figure 4. Variation percentage of population from (2009-2013) to (2014-2018).

5.2. NUMBERS OF FIRES (NF)

5.2.1. Average number of fires per 100 000 inhabitants.

Numbers of fires are shown in the countries whose data were available in CTIF reports [37].. Data for Luxembourg and Germany are derived from annual reports of these countries. In Luxembourg, the data found in the reports are significantly below the number which was given by CTIF [2]. This disparity could be due to a reliance upon different sources of information. However, CTIF had data for Luxembourg covering only one year (2018). Figure 5 gives an overview about the average number of fires between 2009 and 2018 per 100 000 inhabitants (inh.). Large disparities in the numbers of fires can be seen between countries. Those vary from around 50 fires per 100 000 inh. to more than 800 fires per 100 000 inh. in the case of Moldova and Cyprus, respectively.

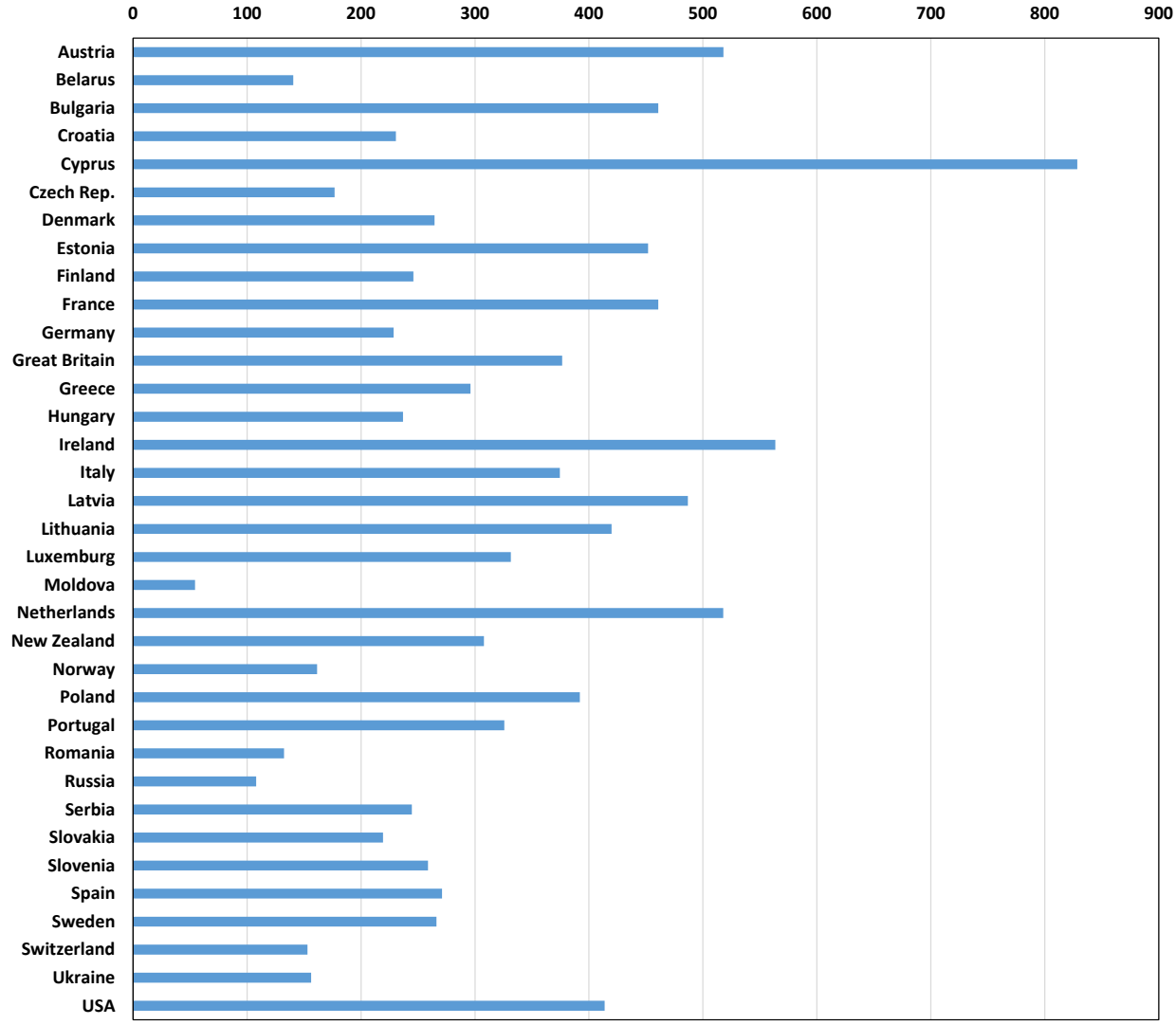

Figure 5. Average number of fires reported per 100 000 inh. (between 2009 and 2018).

5.2.2. Number of fires per 100 000 inh.

Based on the averaged numbers over ten years, presented in Figure 5, the countries are divided into three categories:

- Category 1: the average NF per 100 000 inh. is greater than 400;
- Category 2: the average NF per 100 000 inh. is between 200 and 400;
- Category 3: the average NF per 100 000 inh. is less than 200;

The grouping of countries into categories in this chapter is done only for the purpose of a better visualization and does not affect the conclusions.

Table 1: Categories of number of fires per 100 000 inh.

Category	*NF per 100 000 inh.*	*Countries*
1	> 400	Austria, Bulgaria, Cyprus, Estonia, France, Ireland, Latvia, Lithuania, New Zealand, USA
2	200-400	Croatia, Finland, Germany, Great Britain, Greece, Hungary, Italy, Luxembourg, New Zealand, Poland, Portugal, Serbia, Slovakia, Spain, Sweden
3	<200	Belarus, Czech Rep., Moldova, Norway, Romania, Russia, Switzerland, Ukraine

Figure 6, Figure 7 and Figure 8 present the average number of fires per 100 000 inh., for the period (2009-2018). In general, it can be observed that the NF is relatively constant or slightly decreasing. Most spikes in the graphs are related to an extraordinary event.

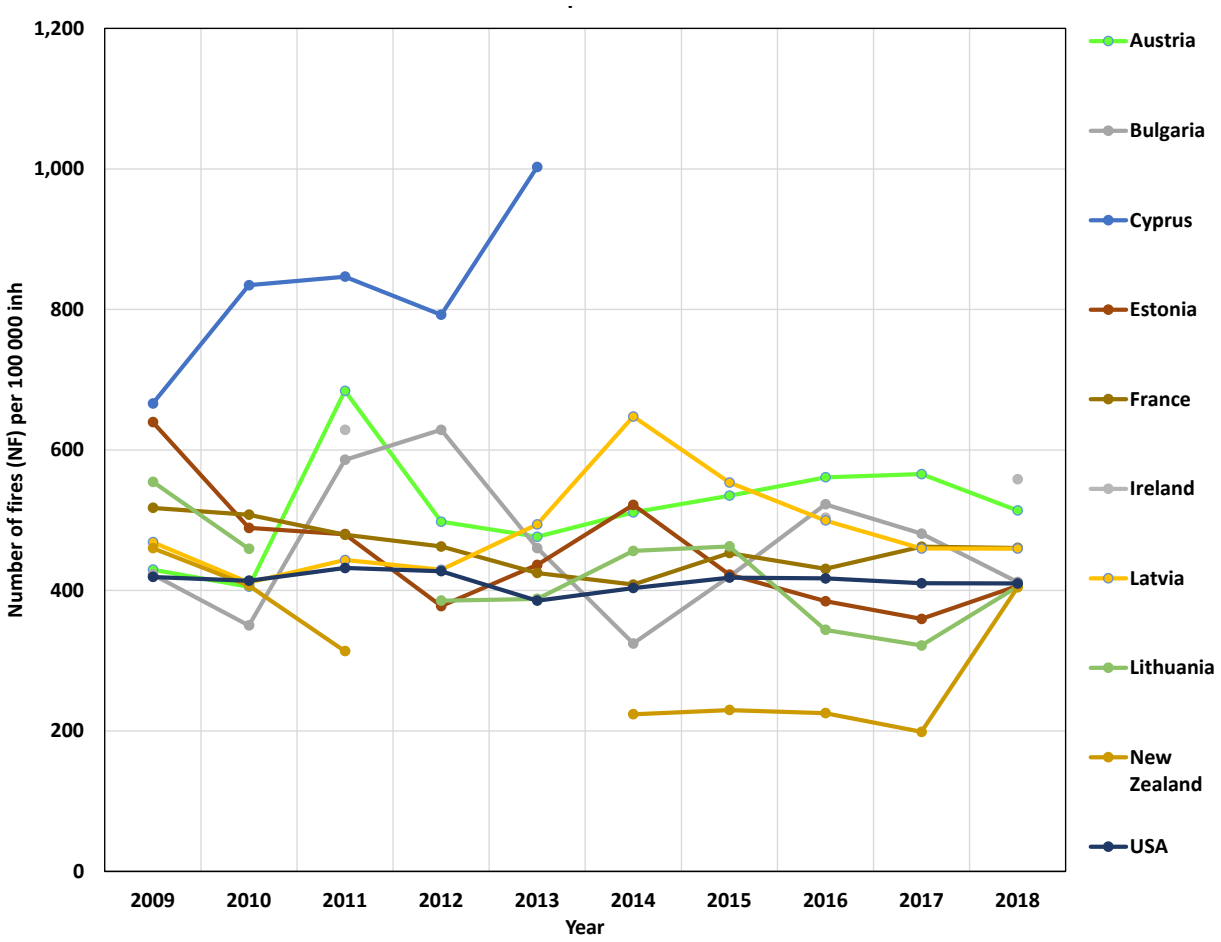

Figure 6. NF per 100 000 inh. for the period (between 2009 and 2018) – Category 1.

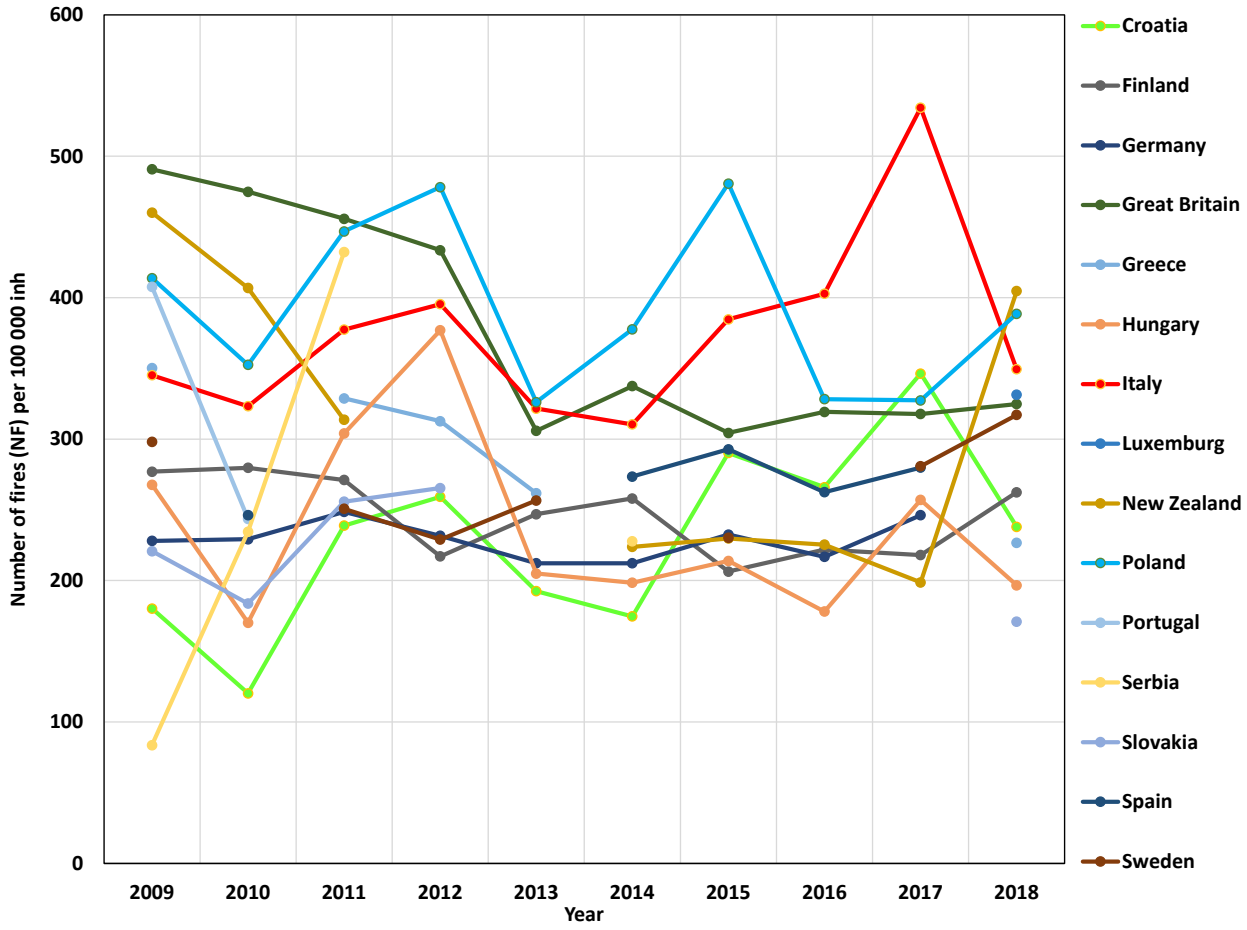

Figure 7. NF per 100 000 inh. for the period (between 2009 and 2018) - Category 2.

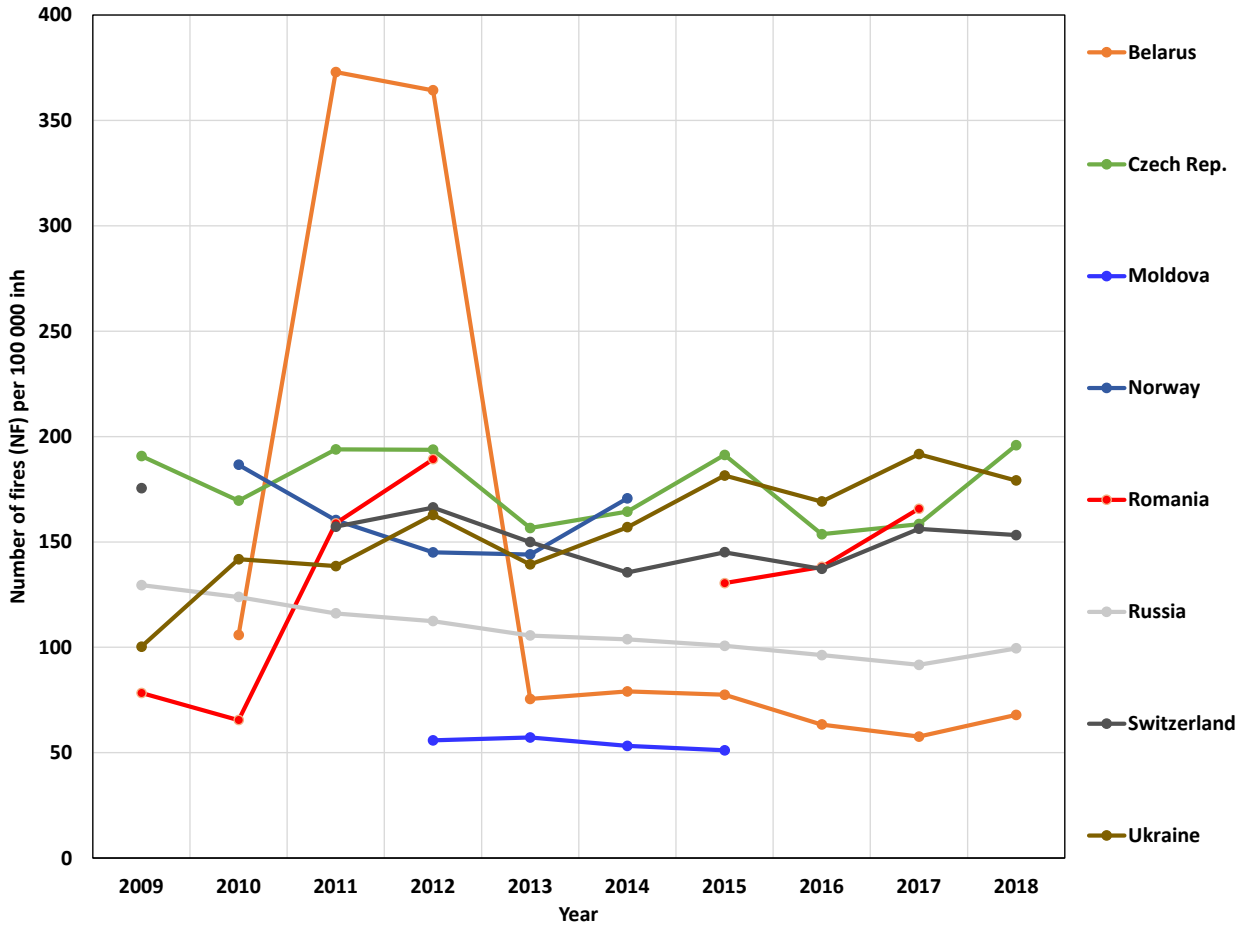

Figure 8. NF per 100 000 inh. for the period (between 2009 and 2018) – Category 3.

5.3. NUMBER OF FIRE DEATHS (NFD)

5.3.1. Average number of fire deaths per 100 000 inhabitants.

Figure 9 presents the average number of fire deaths (NFD) per 100 000 inh. for the period (2009-2018).

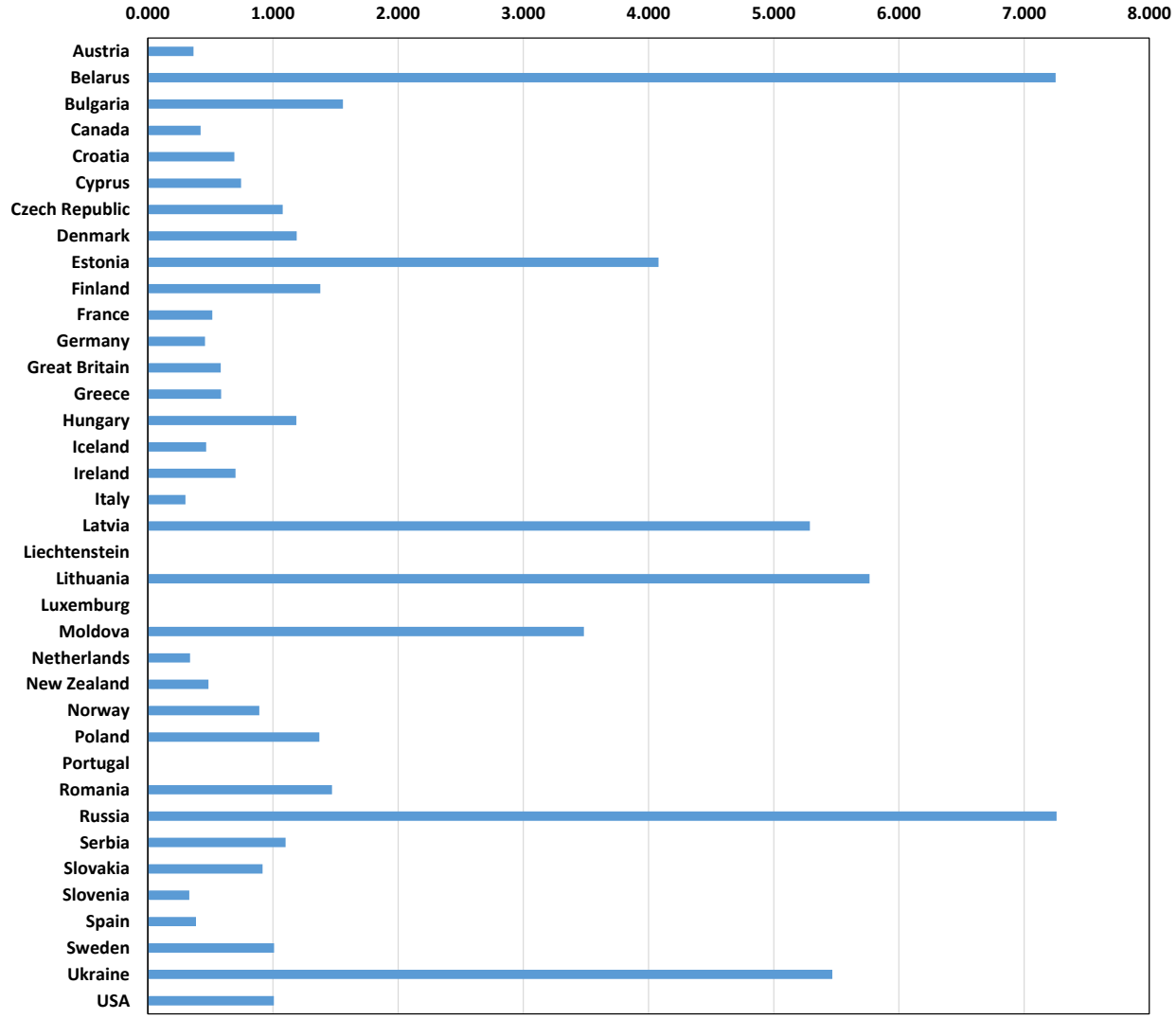

Figure 9. Average number of fire deaths per 100 000 inh. (2009-2018).

5.3.2. Number of fire deaths per 100 000 inh.

Based on the results presented in Figure 9, the countries are divided in four categories:

- Category 1: the average NFD per 100 000 inh. is greater than two;
- Category 2: the average NFD per 100 000 inh. is between one and two;
- Category 3: the average NFD per 100 000 inh. is between 0.5 and one;
- Category 4: the average NFD per 100 000 inh. is less than 0.5;

Table 2: Categories of number of fire deaths per 100 000 inh.

Category	*NFD per 100 000 inh.*	*Countries*
1	> 2	Belarus, Estonia, Latvia, Lithuania, Moldova, Russia, Ukraine
2	1 - 2	Bulgaria, Czech Republic, Denmark, Finland, Hungary, Poland, Romania, Serbia, Sweden, USA
3	0.5 - 1	Croatia, Cyprus, France, Great Britain, Greece, Ireland, Norway, Slovakia
4	< 0.5	Austria, Canada, Germany, Iceland, Italy, Netherlands, New Zealand, Slovenia, Spain, Liechtenstein, Luxemburg, Portugal

A surprising observation from the data is, that for some countries with fewer fires (see Table 1) including Belarus, Czech Rep., Moldova, Norway, Romania, Russia and Ukraine, also have more fatalities. This raises a question about how fires and fire deaths are defined and counted.

Figure 10, Figure 11, Figure 12 and Figure 13 present the NFD per 100 000 inh. for each year between (2009-2018), for the four defined categories, i.e., Category 1, 2, 3 and 4, respectively.

In general, it can be observed that the NFD is decreasing for the Category 1 countries and remaining relatively constant for the Category 2 and 3 countries. All the spikes in the graphs suggest that an extraordinary event (larger scale) has occurred, such as the 2015 Colectiv nightclub fire in Romania (Figure 11). These spikes are mostly noticeable for countries with smaller population.

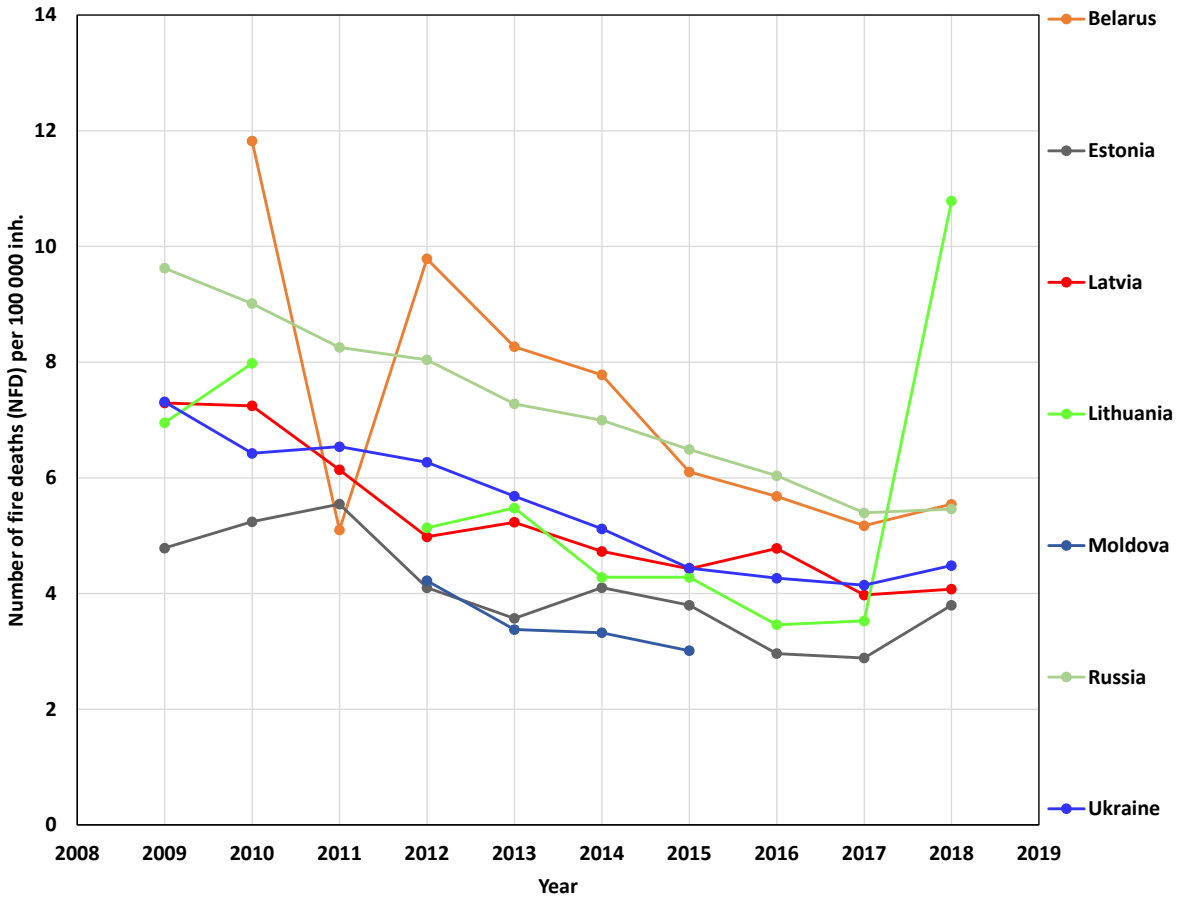

Figure 10. NFD per 100 000 inh. for the period (between 2009 and 2018) – Category 1.

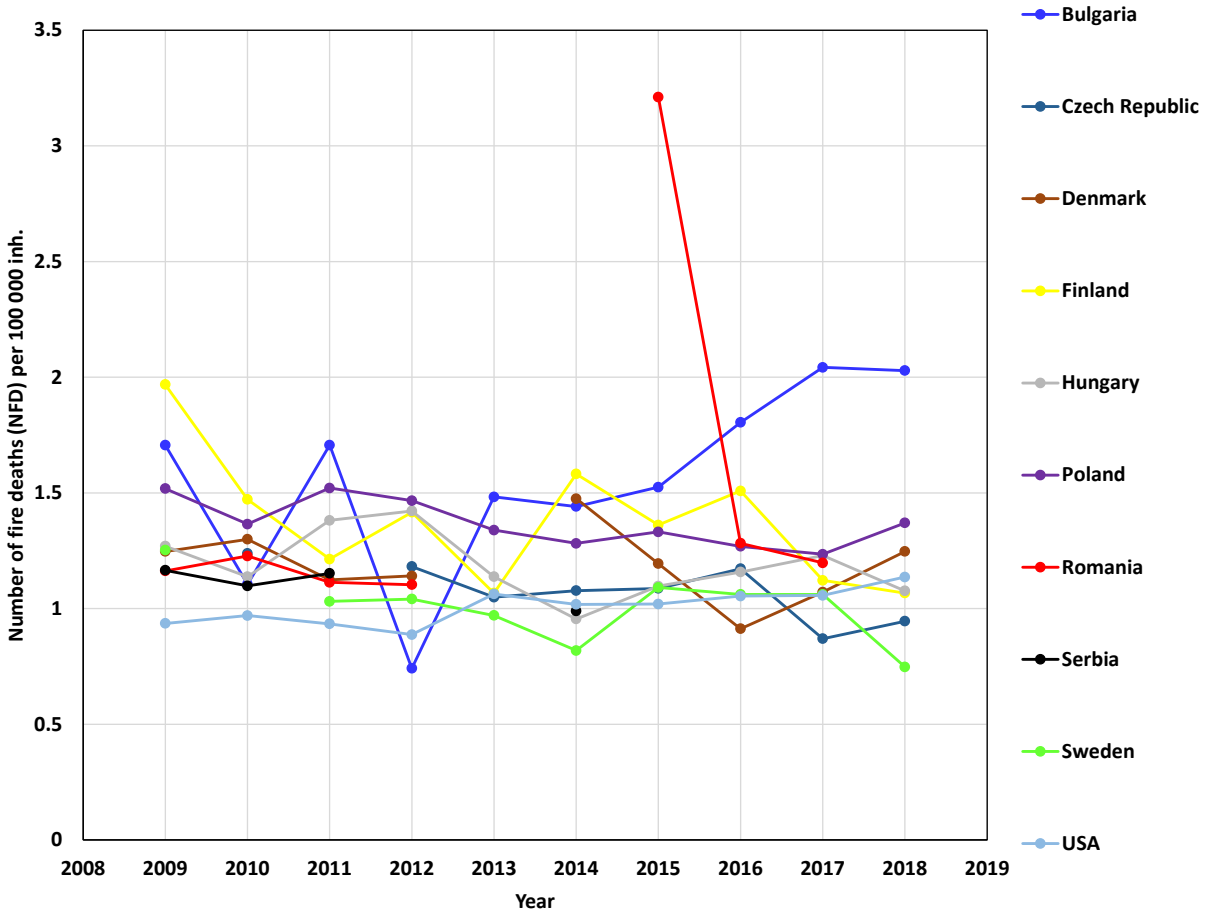

Figure 11. NFD per 100 000 inh. for the period (between 2009 and 2018) – Category 2.

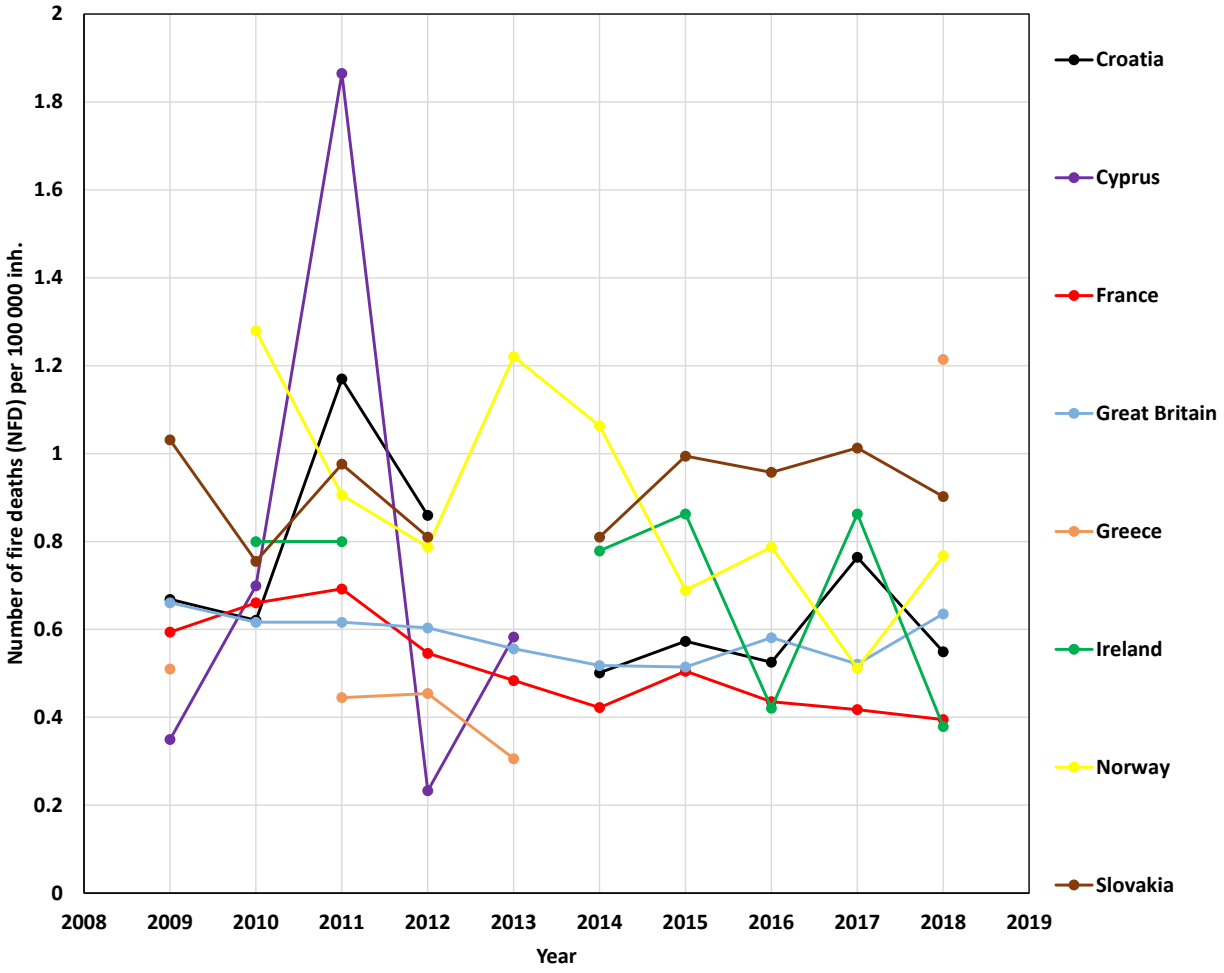

Figure 12. NFD per 100 000 inh. for the period (between 2009 and 2018) – Category 3.

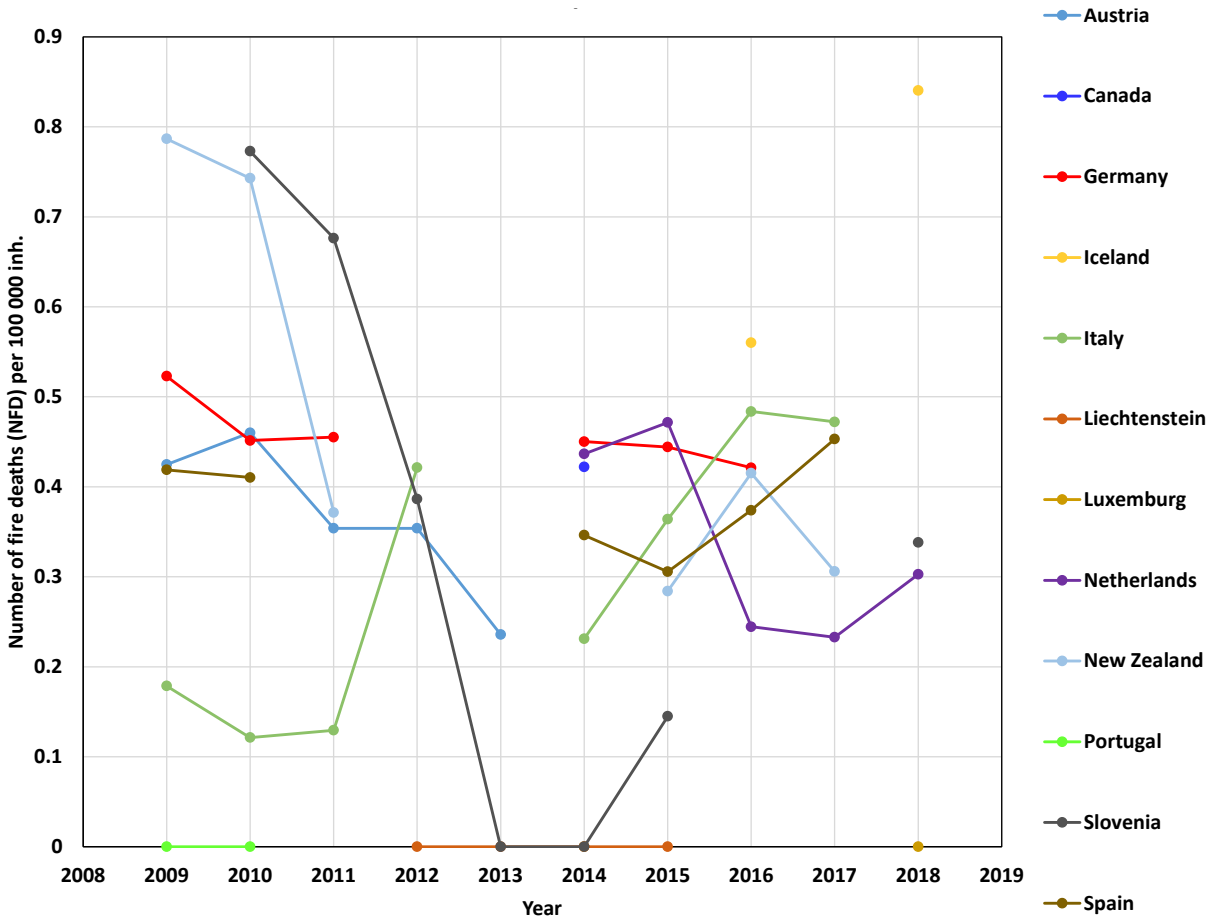

Figure 13. NFD per 100 000 inh. for the period (between 2009 and 2018) – Category 4.

All figures dealing with fire fatalities must be considered carefully since the exact definition of a fire death is rarely specified in documents on fire statistics. Countries have different approaches in how to consider the time elapsed after a fire to record a fire fatality. Many of them, such as Australia, France, Russia, the UK, and the USA, do not fix any time limit for recording a fire death. Canada counts a fire fatality as a result of injuries leading to death within one year and one day after the fire incident. In other countries, “death within 48 hours after fire” is regarded as a fire death. Additionally, some countries do not include fire deaths resulting from arson. France and Switzerland only report fire fatalities at the location of the fire – either those discovered by rescuers, or those declared dead after unsuccessful resuscitation attempts. Therefore, the French and Swiss official database does not consider fire fatalities that occurred at the hospital or during transport of casualties to the hospital. For instance, in France, the number of fire deaths was 6 deaths per million inhabitants in 2008, while figures derived from the French Institut National de la Santé et de la Recherche Médicale (INSERM) data are higher (9 deaths per million inhabitants in 2008) as they take into account not only the victims deceased on the spot, but also those who died in hospital. This is not the case in other countries like Germany, UK and Spain. Therefore, it is possible that a significant number of people with fire injuries died in hospital or during transport, and so may not have been accounted for in the final statement, skewing the final result.

It is surprising that the number of fires and the categories do not correlate with the number of fire deaths. For instance, Russia, Belarus and Ukraine belong to the category 3 for number of fires per 100 000 inh. with less than 200 fires per 100 000 inh. but are in category 1 for fire deaths with more than 2 fire deaths per 100 000 inh. That suggests that fires in these countries are less frequent but deadlier – or it could be a result of different definitions of fires as explained previously. This will be further examined in Task 1 of this project.

5.4. NUMBER OF FIRE INJURIES (NFI)

5.4.1. Average number of fire injuries per 100 000 inh.

Figure 14 presents the average number of fire injuries (NFI) per 100 000 inh., for the period (2009-2018). One must notice that fewer countries reported the number of fire injuries than the number of fires and number of fire deaths.

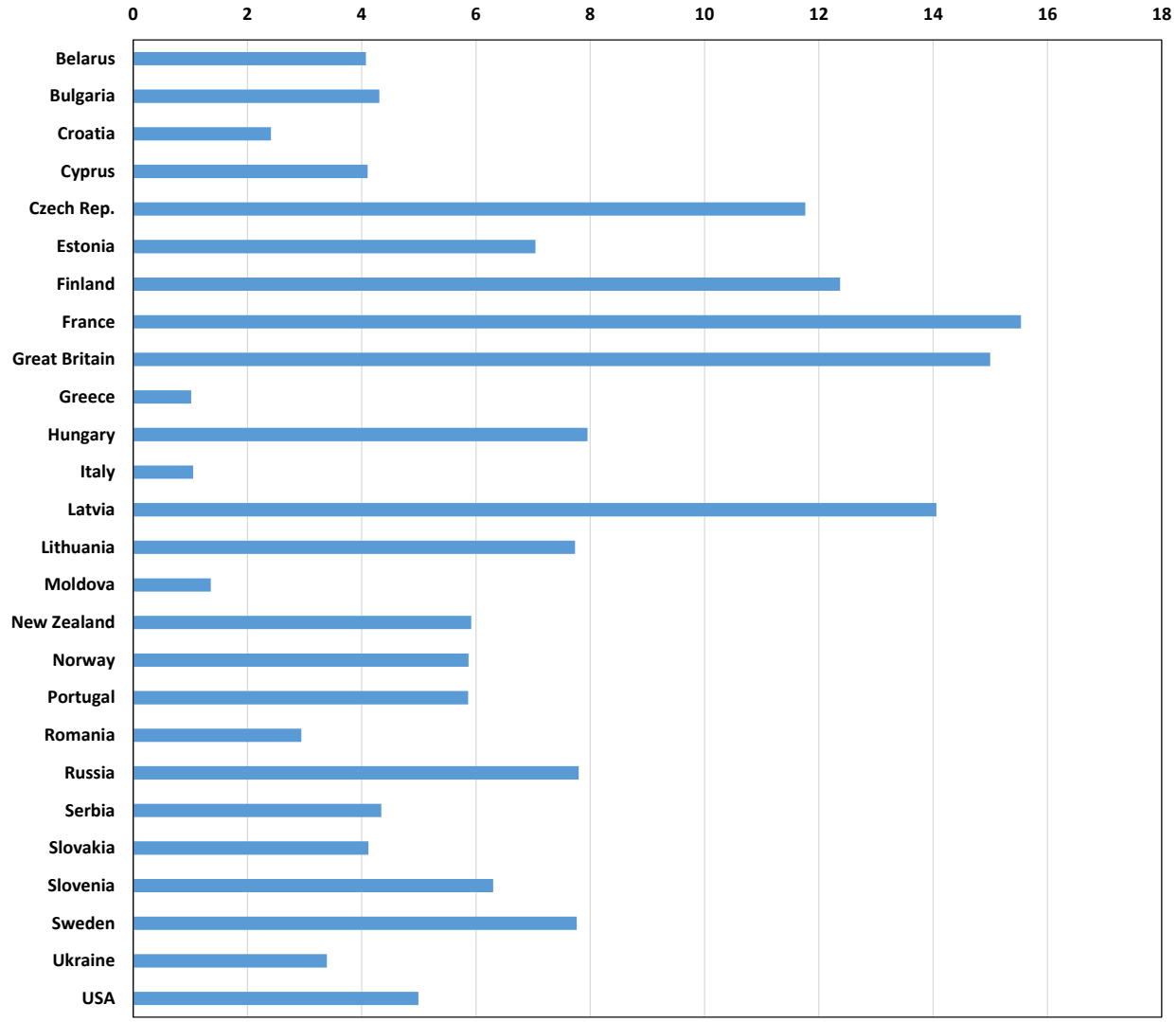

Figure 14. Average number of fire injuries per 100 000 inh. (between 2009 and 2018).

5.4.2. Number of fire injuries per 100 000 inh.

Based on the average NFI presented in Figure 11, the countries are divided into three categories:

- Category 1: the average NFI per 100 000 inh. is greater than ten;
- Category 2: the average NFI per 100 000 inh. is between six and ten;
- Category 3: the average NFI per 100 000 inh. is less than six;

Table 3: Categories of number of fire injuries per 100 000 inh.

Category	*NFI per 100 000 inh.*	*Countries*
1	> 10	Czech Rep, Finland, France, Great Britain, Latvia, Lithuania, Portugal, Slovenia, Sweden
2	6 – 10	Estonia, Hungary, New Zealand, Norway, Russia
3	< 6	Belarus, Bulgaria, Croatia, Greece, Italy, Moldova, Romania, Serbia, Slovakia, Ukraine, USA

The term of "fire injury" is very difficult to define, and the differences between "minor injury", "moderate injury" and "severe injury" are numerous between countries – indeed, much more so than for "fire death". Having highlighted these caveats, the current fire statistics show important differences in trends between countries.

Figure 15, Figure 16 and Figure 17 present the NFI per 100 000 inh. for each year between (2009-2018), for the three defined categories. In general, it can be observed that the NFI are irregular for most countries. In our opinion, this can be due to a lack of definition of an "injury" or due to a change in the methodology, but can also be due to others parameters that we did not identify.

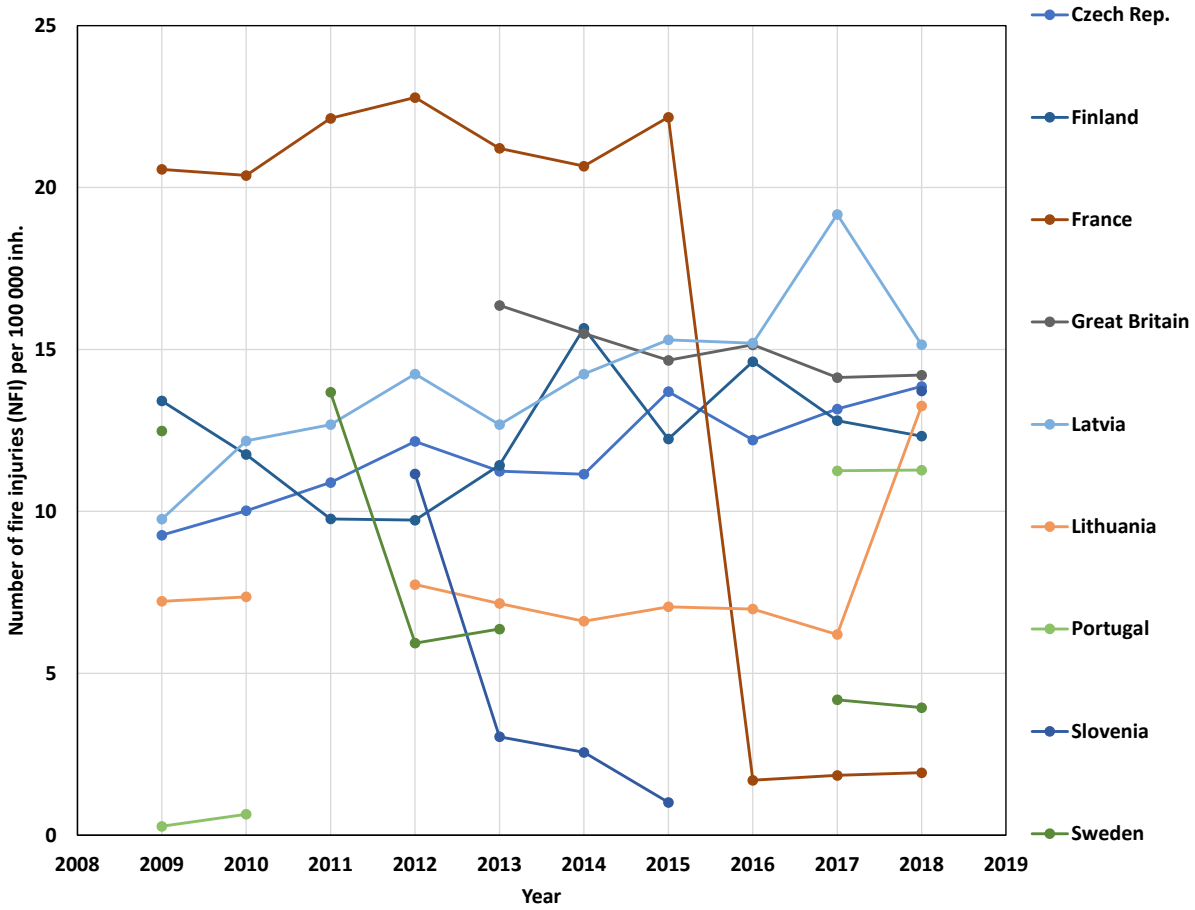

Figure 15 NFI per 100 000 inh. for the period (between 2009 and 2018) – Category 1.

For example, in the case of France, we can notice a steep decline in the number of fire injuries between 2015 and 2016. When investigating the French annual reports [38], we notice that the data for fire injuries prior to 2016 correspond to the number of injuries of "absolute emergency" and "relative emergency", the former meaning that the injured persons needed medical care whereas the latter means that the injured person did not need medical care. After 2017, the number of injuries reported in the CTIF reports by French officials correspond to the number of absolute emergency only, corresponding to the injuries that needed medical care

only. This explains why the number of injuries dropped promptly. Similarly, when comparing France and Italy, we find that for a relatively similar population and fatality per 100.000 inh. the number of injuries are completely different, leading to a doubt about the difference in the definitions.

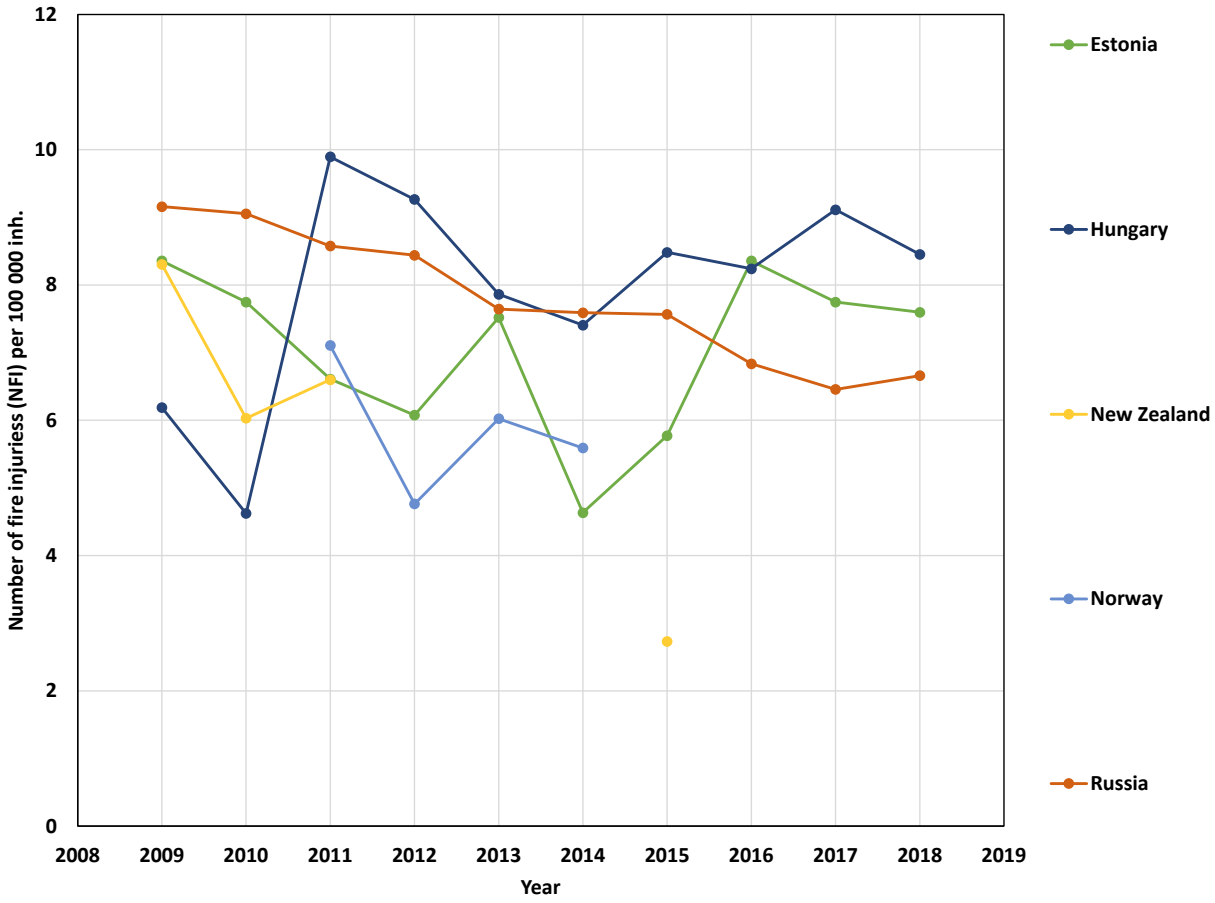

Figure 16. NFI per 100000 inh. for the period (between 2009 and 2018) – Category 2.

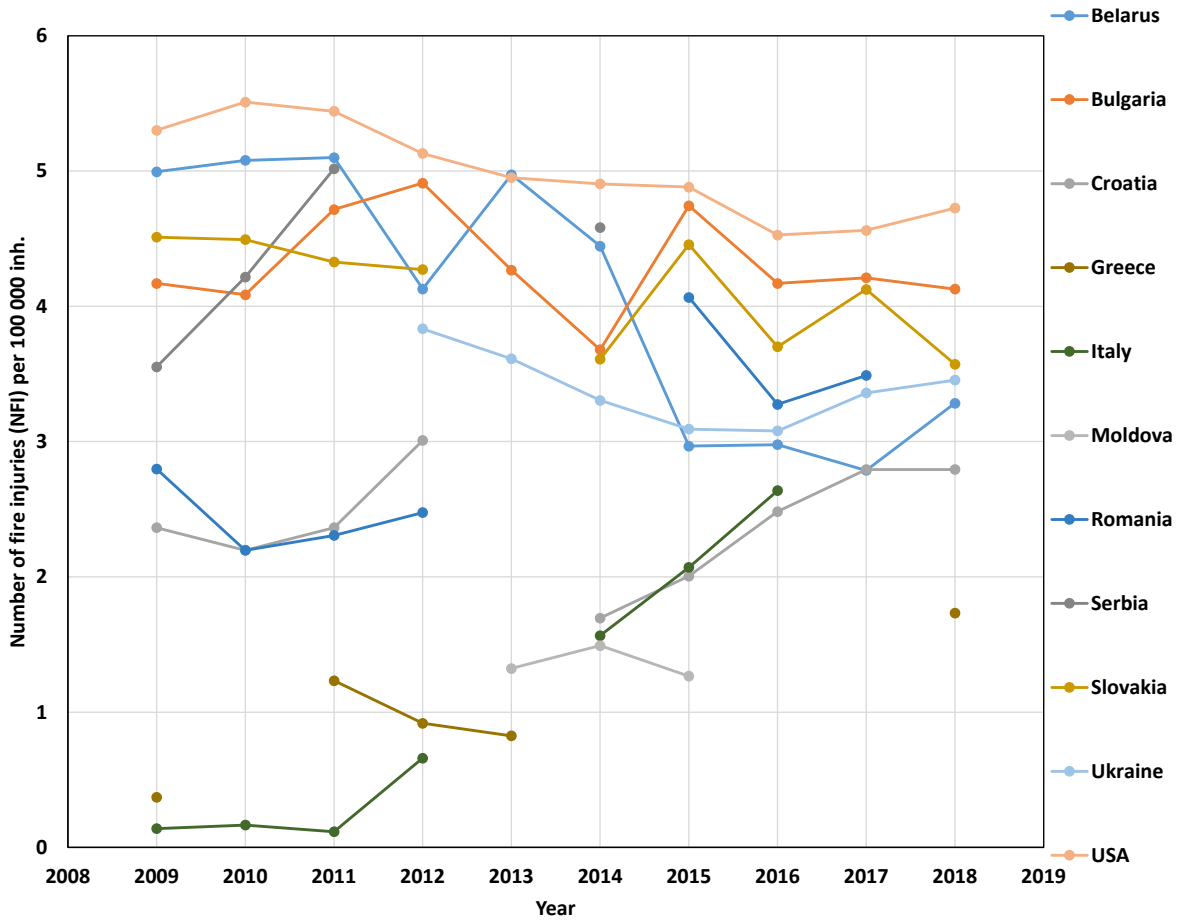

Figure 17. NFI per 100000 inh. for the period (between 2009 and 2018) – Category 3.

5.5. COMMENTS ON THE QUALITY OF DATA

The data collection in each country is dependent on the national definitions and collection methodology. Therefore, general trends can give indications, however the direct comparison between countries is not recommended. Here are a few of the most evident aspects, which should be taken into consideration:

- The types of fire included in the statistics should be well defined (e.g. structure fires, vehicle fires, and wildfires).
- The definition of fire deaths or injuries should be stated.
- The evaluation of uncertainties of the data should be included in annual reports of each country.

Most of the times, all of these aspects are not explained in the reports worldwide. However, one should acknowledge the possibility to identify changes and trends within a country (as long as the data collection method is stable), and later on use these trends to make comparisons between countries. Thus, positive or negative trends can be identified for individual countries.

This analysis raises questions on the sampling size of countries with small population and a reduced numbers of fires for which comparison with countries with larger datasets can create issues considering the difference in the statistical data populations examined. Indeed, a reflexion should take place on how to analyse data in these situations and how to properly use their outcome for decision making.

Finally, with the existing fire statistics, it remains difficult to derive useful conclusions from them, especially when wishing to compare the situation in different countries. To provide relevant information regarding the national fire safety situation (number of fires, fire fatalities and fire injuries), fire statistics will have to be internationally improved through common terminology, common methodology, and common training and qualification of the persons reporting data from fire scenes.

6. LESSONS LEARNED FROM ISO WORKING GROUPS

The work of ISO/TC92 - WG13: *Fire safety - Statistical data collection* started in 2015 and resulted with two publications, one presenting an overview of national fire statistics practices [39] and a second document proposing 85 harmonized definitions of certain terms commonly used in fire statistical data [40] which will be further developed in Task 1.

The roadmap of WG13 identifies steps to be completed in the upcoming years with ISO 17755 series: A methodology for collecting fire statistics will be the focus of the third part of the series and a document on data interpretation will be introduced in the fourth part. A work item is also ongoing on intentional fires.

ISO TR 17755:2014 *Fire safety — Overview of national fire statistics practices* [39] assembles data on national fire statistics practices. In the Introduction of the TR it is stated: “In the absence of any proposals for international standards on such practices, it is useful to ISO/TC 92 to have an overview of existing practices and their implications for existing fire statistical data.”, describing the actual worldwide situation on standardization of fire statistics.

The document concentrates on giving an overview over existing fire statistics and fire data collections. To achieve this, a general call to all nations participating in ISO TC 92 was issued and the following 10 countries (in alphabetical order) were asked to complete a survey prepared and distributed by the participating countries of ISO TC 92 WG 8: Australia, Canada, China, France, Japan, Kenya, (Republic of) Korea, Russia, United Kingdom and USA.

The survey which was given to the participating countries can be seen in Annex A of ISO TR 17755.
The TR 17755 itself is organized into four sections:

- Basic Aspects of Data Collection and Analysis (Clauses 1 to 7)
- General Characteristics of Fires (Clauses 8 to 10)
- Characteristics Related to Cause of Ignition (Clauses 11 to 20)
- Characteristics Related to Mitigation of Fire Severity (Clauses 21 to 25).

As a *summary of methods of estimation* section 1.1 gives an overview: Only two countries – Japan and the USA – reported use of statistical projection in addition to counting. The survey did not ask how statistical projection is used. Fire statistics based on the national fire database is used for Annual Report of Fire Statistics and White Book on Fire Service annually in Japan. All other countries treat their database as a census, but it is not known whether any of these countries calculate or publish the percentage completeness of their database (for example, by calculating the percentage of total national population represented by reporting jurisdictions).

With the *fires which are subject to reporting* section 2 gives insight. As a summary of this topic the following is given: All countries limit reporting to fires that received a fire department response. Some countries incorporate a minimum-loss threshold for reporting, but far more countries recognize that reporting of very small fires often does not occur, even though there should be reporting under the rules. Some countries permit separate, more limited reporting of certain types of very small fires in order to encourage complete reporting of the existence of these fires. Countries differ on the inclusion of vehicle fires, vegetation fires, and other outdoor fires in their reporting.

Fire deaths subject to reporting are addressed in section 3. The following summary is given: Countries differ regarding their use of reports from fire departments and medical records, as well as on their efforts to coordinate both sources into a comprehensive database using consistent definitions. Countries differ regarding the length of time after injury when a death is formally recognized as a fire death. Regardless of the formal length of time defined by a country, actual reporting may depend on the country’s ability to capture developments occurring after the victim leaves the fire scene. A delayed death may not become known to the fire authorities and may not be recognized as originating with a fire injury by medical authorities. Countries differ in their treatment of fatal injuries received in an incident involving fire and non-fire harm to the victim, such as an automobile collision followed by fire or a building collapse following fire.

In section 4 *fire injuries subject to reporting* are addressed. As a summary of the situation the following is given: Countries differ regarding their use of reports from fire departments and medical records, as well as on their efforts to coordinate both sources into a comprehensive database using consistent definitions. Countries differ

in their treatment of injuries received in an incident involving fire and non-fire harm to the victim, such as an automobile collision followed by a fire or a building collapse following a fire.

Section 5 deals with *victim characteristics*. Most countries collect information on victim age and gender, and many collect information on other characteristics.

Property damage subject to reporting is addressed in section 6. In summary: All countries limit reporting to fires that received a fire department response. Some countries incorporate a minimum-loss threshold for reporting, but far more countries recognize that reporting of very small fires often does not occur, even though there should be reporting under the rules. Some countries permit separate, more limited reporting of certain types of very small fires in order to encourage complete reporting of the existence of these fires. Some countries provide no national reporting of monetary damages but defer to reporting by insurance companies. Some countries (e.g. the USA) have annual published reports with estimated fire losses calculated separately and independently by fire departments and by insurance companies. Some fire departments may take steps to coordinate their own fire damage monetary reports for individual incidents with those of the responsible insurance company. Most countries also collect data on property damage using measures other than monetary damages. These may be counts of damaged objects (such as buildings, rooms, floors, or vehicles), area damaged, percentage of area damaged, or a qualitative confinement scale (such as confined to object or room of origin).

Other losses subject to reporting is addressed in section 7. As a summary it can be said: Nearly all countries collect data on firefighter deaths and injuries due to acute fire effects, and most collect data on other firefighter deaths and injuries sustained while on-duty. Only Kenya reports data collection on chronic illness and related death for firefighters. Kenya is also the only country to report data collection on indirect property damage (also called consequential damage, including business interruption and temporary housing), environmental damage, or damage to cultural heritage.

In section 8 the location of fire is addressed. As summary: Nearly all countries collect data so as to distinguish the broad categories of locations used in the survey:

- Buildings
- Structures other than buildings (for example, bridge, tunnel)
- Vehicles
- Crops, commercial forests, or other outdoor vegetation areas for which the vegetation has commercial value
- Other outdoor locations with commercial value (for example, outdoor storage, recreational areas
- and tourism sites outside structures)
- Outdoor vegetation areas with no commercial value (for example, brush-lands in a developed area)
- Other outdoor locations with no value (for example, trash bins, loose rubbish).

Several countries also provided coding categories for identifying specific types of buildings and structures and for identifying specific rooms or areas within buildings.

The *type of construction* is addressed in section 9. Most countries collect information on type of construction.

In section 10 *Other fire characteristics* are addressed. Many countries collect information on one or more of the other fire characteristics.

Section 11 addresses *Deliberately set fires and playing with fire*. As summary it can be said: Most countries collect information on deliberately set fires. Countries use different approaches to develop what they consider the best estimate of the size of the arson fire (or deliberate fire) problem in their country, which may include any or all of the following:

- Use of “suspicious” as a recognized choice for cause,
- Proportional allocation of fires with unknown cause or fires still under investigation,
- Relative use or non-use of trained arson investigators to declare a fire to be deliberate, and
- Inclusion or exclusion of fires determined to have been set without malicious intent (usually called “playing with fire”).

Several countries identify intentional fires set during or as part of a riot or social disturbance. Some countries can separate juvenile firesetting, both fires coded as playing with fire and intentionally set fires where the fire was set by someone young enough to qualify as juvenile under local laws or conventions. Only the USA. reported a more elaborate and detailed reporting of arson motives, and this reporting is only incorporated in the separate Arson Module of NFIRS, a module which is voluntary and often not completed. The United Kingdom was the only country to incorporate designations of homicide and suicide into its reporting categories for deliberate fires. However, all countries participate in the international standard for coding of vital records, which includes separate codes for homicide by fire and suicide by fire. This source of data can be used by any country and will capture fire deaths that were not part of a fire attended by a fire brigade and so not reportable to the country's national fire incident databases. Suicide by fire is a major cause of death in some countries. The death certificate database lacks any other details regarding the circumstances of the intentional fire, although it will include a number of details about the victim.

Section 12 addresses the *Natural cause*. Most countries collect information on natural cause fires. Only Australia and the USA reported subdividing natural cause fires into more specific types.

Exposure is addressed in section 13. Most countries collect information on exposure fires. Only Australia, Canada and the USA reported subdividing exposure fires into more specific types, but there is some question whether Canada's more detailed reporting is in current use.

Heat sources – Cigarettes and other smoking materials, including lighting implements are addressed in section 14. Most countries collect information on smoking material or open flame fires, but there are usually partially specified categories (which could be either smoking material or open flame) that make it difficult to estimate the two separately. Also, while all countries coding open flame fires include matches, lighters, and candles, there are other open flame categories that are included by some countries but not others or that some countries treat as equipment rather than open flame heat source:

- various types of torches,
- open fires,
- torches used for lighting,
- lamp or lantern excluding electric,
- ash or ember or ashtray contents,
- novelty lighter,
- charcoal or utility lighter,
- oil or incense burner,
- naked flame,
- warning or road flare, and
- backfire from an internal combustion engine.

Section 15 addresses *Equipment involved in ignition – Heating and cooling equipment*. Many countries collect information on heating equipment fires or on HVAC (heating, ventilation and air conditioning) equipment fires generally.

Section 16 addresses *Equipment involved in ignition – Cooking and other kitchen equipment*. Many countries collect information on cooking equipment fires or on kitchen equipment fires generally.

Section 17 addresses *Equipment involved in ignition – Clothes dryer*. Many countries collect information on clothes dryer fires generally.

Section 18 addresses *Equipment involved in ignition – Entertainment equipment*. Many countries collect information on entertainment equipment fires. The rapid changes in popular technologies mean that even the countries that provided extensive detail in coding choices are lagging behind popular usage. For example, there is no distinction of wall-mounted, high-definition or 3D televisions, or even of color versus black-and-white televisions.

In section 19 *Equipment involved in ignition – Office equipment* is addressed. Many countries collect information on office equipment fires. The rapid changes in popular technologies mean that even the countries that provided extensive detail in coding choices are lagging behind popular usage. For example, the different sizes of personal computers are not distinguished and smart phones (combination telephones and portable computers) are not mentioned.

In section 20 *Other characteristics of fires related to cause of ignition* are addressed.
The other characteristics of fires are grouped into seven categories:

- Electrical fires and electrical distribution or lighting equipment (not asked about in survey)
- All appliances and equipment not previously discussed
- Item first ignited defined by form or function
- Item first ignited defined by material composition
- Factors in ignition
- First major fuel package
- Factors in fire growth

First major fuel package was only reported by Kenya, which provided no unsolicited details on how this is reported. This data element is not covered in the detailed tables by country, for that reason.

Of the other countries:

- China and Japan report on equipment involved in ignition, item first ignited, material used in item first ignited, and factors in ignition, but do not report on first major fuel package or factors in fire growth.
- Korea reports on equipment involved in ignition, item first ignited, material used in item first ignited, factors in ignition, and first major fuel package, but not on factors in fire growth, and provided few details on any categories while indicating that they have numerous detailed coding choices for several of the categories.
- Kenya reports on all seven categories of other characteristics but volunteered no coding details on any of them.
- France was undetermined for all seven categories
- Russia did not include any details on its reporting on these characteristics.

In section 21 *Sprinklers and other extinguishing equipment* are addressed. Most countries collect information on presence of automatic extinguishing equipment and separately on type and performance of the equipment.

In section 22 *Detection and alarm equipment* is addressed. Most countries collect information on presence of detection and alarm equipment and separately on type and performance of the equipment.

In section 23 *Fire extinguishers and other manual extinguishing equipment* are addressed. Most countries do not collect information on presence of fire extinguishers and other manual extinguishing equipment. Australia, Canada and the United Kingdom are the countries that report and with some detail.

In section 24 *Smoke management and control equipment* are addressed. Most countries do not collect information on presence of smoke management and control equipment. Australia, Canada and the United Kingdom are the countries that report and with some detail.

In section 25 *Fire doors, fire walls and other elements of compartmentation* are addressed. Most countries collect information on type of construction.

7. OVERVIEW OF COLLECTED DATA

The information gathered in Task 0 is the result of the cooperation and collaboration of the consortium members who were able to provide the description of the fire statistics in several countries based on their previous research, experiences, studies investigated in the literature review, public datasets and through a network of contacts. For each country, a detailed diagnostic sheet was filled (see Annexe I for each country), based on the gathered information. We extracted information from all the diagnostic sheets and summarised them in this section and the next ones. Sources and references for the information about each country are often found in the corresponding diagnostic sheet.

The countries covered by Task 0 are subdivided into EU Member States, a number of other European countries (Non-EU) and other countries (International). For the EU Member States, the only countries missing are Belgium, Cyprus, Estonia, Finland, Lithuania, Malta, Portugal, Romania and Slovenia, which will be covered in Task 1 of the project. Information from the specific countries are missing due to the difficult access to their fire statistics. The other European countries investigated are Norway, Russia, Switzerland, Turkey and the UK and the international countries are Australia, Canada, New Zealand and the USA.

The following analysis has been divided into the evaluation of collection methodology and the fields covered. Sheets for all the countries examined in Task 0 and those for which information was not available, have been evaluated and increased in number in Task 1 where summary tables are developed for each nation based on the definitions available, fire statistics methodology and fields covered. Task 1 will be also focused on the recording system used by the relevant authorities and the semantic analysis of the definitions adopted by various countries for what concerns pre- and post-fire variables of real fire incidents affecting buildings.

In Task 0, an overview table has been created providing a summary of the fire statistics for the countries examined covering the relevant bodies responsible for collection and analysis of the data, the frequency of publication of the fire statistics and the language with which it is issued, the years covered in the datasets and the applications of the fire statistics.

In general, the fire statistics are usually published in the language of the country. In a few countries, some data are presented in English, such as for Croatia, Netherlands and Russia where information is available in both the local language and English, while in Italy, the annual report of the fire brigade interventions was translated into English in 2017. All the information obtained during Task 0 is summarized from Table 4 to Table 10 at the end of this section and based on them, the data elaboration has been developed. As seen in Figure 18, the issuing bodies are usually the Fire and Rescue Service or Civil Protection and the Ministry of Interior or Government in the EU Member States considering the 38% of cases for both classes. In Non-EU countries, fire statistics are usually published by Fire and Rescue Service (50%), Ministry of Interior (38%) and Statistics centres (less than 14%). In the International countries, in 75% of cases, fire statistics are issued by Fire and Rescue Service and 35% by Statistics centres.

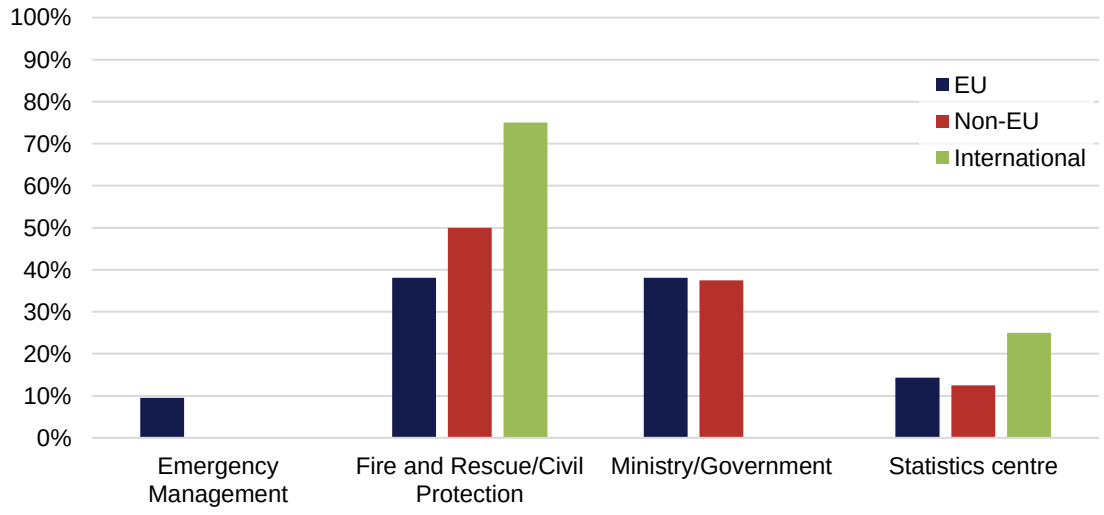

Figure 18: Issuing bodies of fire statistics in EU, Non-EU and International countries

The available datasets for fire incidents affecting buildings are usually dated from 2000 to the current or previous year if the latest publications are referred to the previous calendar year. Despite the large availability of datasets from 2000 to 2019, some countries such as Germany, Hungary and Switzerland have data going back to 1990, while Sweden has data from 1996 onwards and Slovenia from 1985 onwards. However, despite the years covered, usually, the fire statistics are predominantly released yearly in EU (94%), Non-EU (60%) and International countries (75%), as shown in Figure 19. In New Zealand, the Fire and Emergency service publishes on their website all the incidents attended in the previous 7 days and Norway at least every 14 days. The only EU Member State monthly releasing its fire statistics is Croatia. Finally, Switzerland publishes its data yearly and special reports every 10 years and Turkey every 5 years. However, the latter did not publish any national data since 2004.

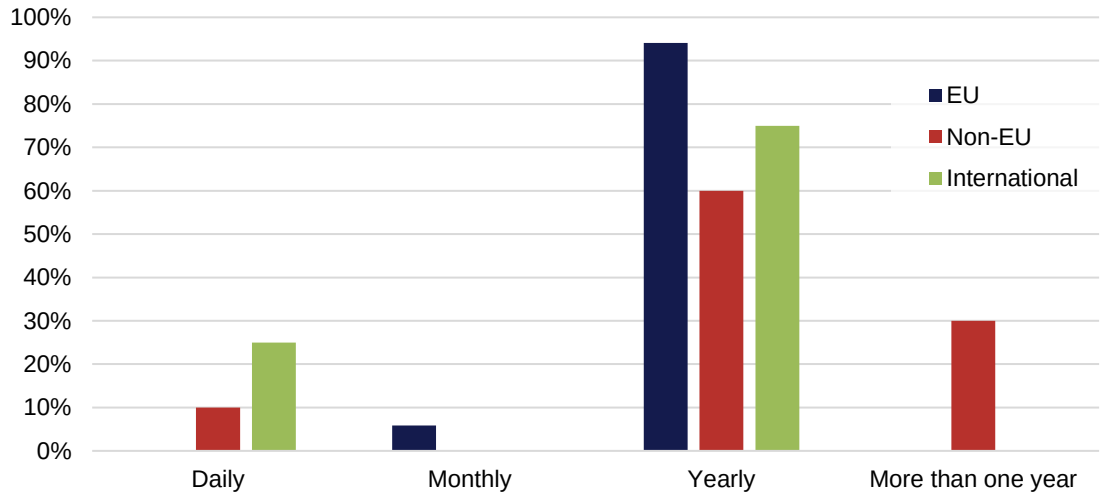

Figure 19: Publication frequency for fire statistics in EU, Non-EU and International countries

The fire statistics are almost exclusively collected by the fire brigade attending the fire scene in the aftermath of a fire incident in a building, as presented in Figure 20. The information is usually inserted in a recording system by the fire brigade attending the scene. The quality assurance phase significantly varies in the various countries examined. Potential errors or inconsistencies in the datasets can be reviewed and removed by senior fire brigade officers or authorities publishing the data or developing the analysis. This aspect will be further investigated in Task 1 of this project. There are some countries, for example Switzerland, in which data are provided by insurance companies. It is also worth mentioning that the fire investigation could be developed immediately after the fire incident or within a fixed period of investigation and developed by fire brigades, insurance companies or an investigation team of experts.

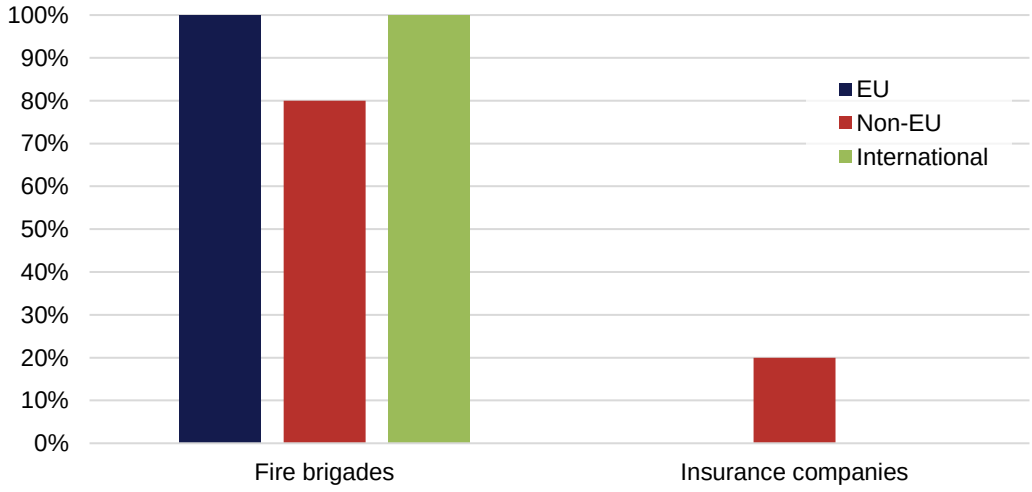

Figure 20: Data origin for fire statistics in EU, Non-EU and International countries

The definitions of the various fields collected in the fire statistics are available for more than 70% of the countries investigated herein. However, the data presented in Figure 21 need to be treated with a degree of uncertainty due to the fact that in several countries the definitions are not publicly available or only providing input for specific variables present during the fire incident. Therefore, this aspect will be further discussed and examined by Task 1 where the relevant authorities responsible for the fire statistics will be directly contacted and asked to provide specific definitions for 10 major areas of investigations including fire incident, fire response, fire consequence, fire safety measures, fatalities, casualties and direct and indirect financial costs deriving from fire.

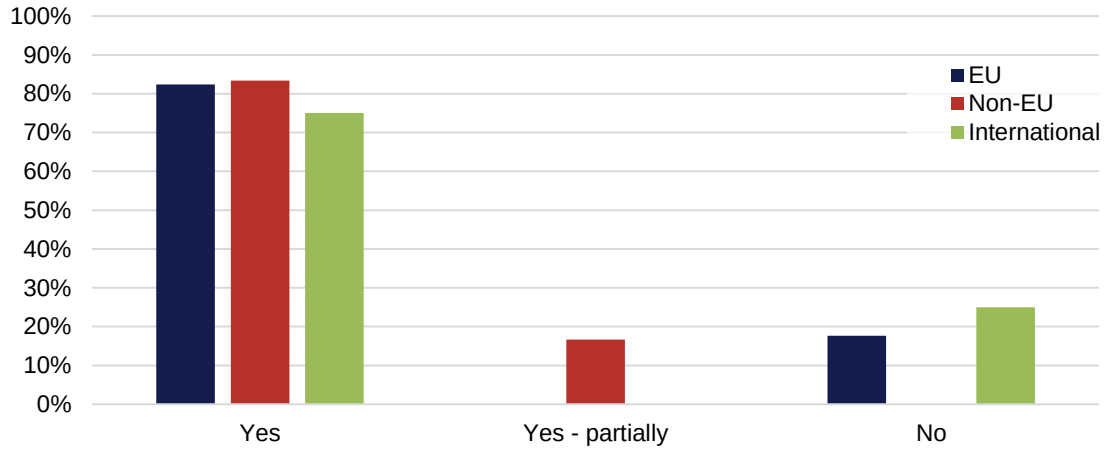

Figure 21: Availability of definitions for fire statistics in EU, Non-EU and International countries

The datasets can have various applications. For example, they can inform only the fire services and governments or can be widely used by private or public users. In Figure 22 the class named 'General' represents data used by fire departments to evaluate their performance and optimize their fire safety strategies, governments for decision making regarding fire safety in various building types, industries for the development of specific products or to improve their impact or continuity plans, and public and private users including the international fire safety community. As shown in Figure 22, the data applied in the abovementioned class are given by 44%, 60% and 100% in EU, Non-EU and International countries, respectively. It is also important to highlight that the complete datasets of fire statistics are not always available and often only partially released to the public while fire brigades and governments can have access to extended information.

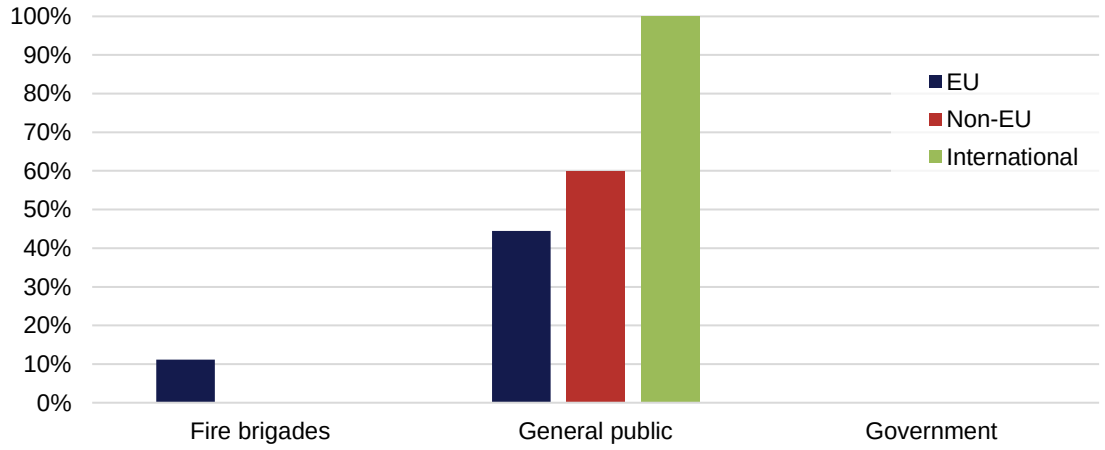

Figure 22: Usage of the fire statistics in EU, Non-EU and International countries

Figure 23 presents an overview of the fire safety fields included in the fire statistics. It appears that the fields related to the description of the fire incident, such as location, time, date and property type, are those collected by the majority of the countries examined, followed by the fire causes, room of origin, the situation at arrival and response time of the fire brigade. The number of fatalities, casualties are often present in the fire statistics

with the description of the people affected by the fire incident. For the fire safety measures, detectors and smoke alarms are recorded more often than automatic extinguishing systems, while the financial cost of the fire is usually evaluated by the cost of the damage caused by the fire event and seldom by the cost of injuries and protected values. The fields recorded in the fire statistics will also be examined in-depth in the summary tables created in Task 1, which will also consider fire consequences in terms of property and type of damage, direct and indirect financial loss, fire response of occupants and an extended number of different fire safety measures.

Finally, “near misses” is an important aspect to consider when attempting to identify common fire safety problems and these may not necessarily be included in official figures. “Near misses” are fire incidents that did not turn into big fires and were extinguished before firefighter arrival or there is no subsequent call to the fire service, therefore will not be included in the national figures but could point the way to go for much more effective fire safety solutions. These could be cooking incidents or fires started by electrics or cigarettes. There are few local initiatives that collect and analyse the “near misses”, such as in Higher Education Departments in Wales.

Collecting data on “near misses” would represent a useful field of investigation for the evaluation of the physical and societal hazards and causes of fire. It would also support the creation of preventive measures and campaigns. Despite the valuable contribution that such analysis could determine, the current project has the goal to provide a clear understanding of the fire statistics related to buildings subjected to fire incidents. Related to fire incidents, the collection of “near misses” implies a detailed and challenging evaluation, as these are never reported to the fire department and hence are never entered into an official data system. To get this type of information, every household in Europe would be required to record the information and submit it to a relevant agency or online through a dedicated platform. Alternatively, it could be accomplished as a sample survey every few years to see how many “near misses” occur. This is outside the scope of this project, but that we highly encourage pursuing it at European and National levels.

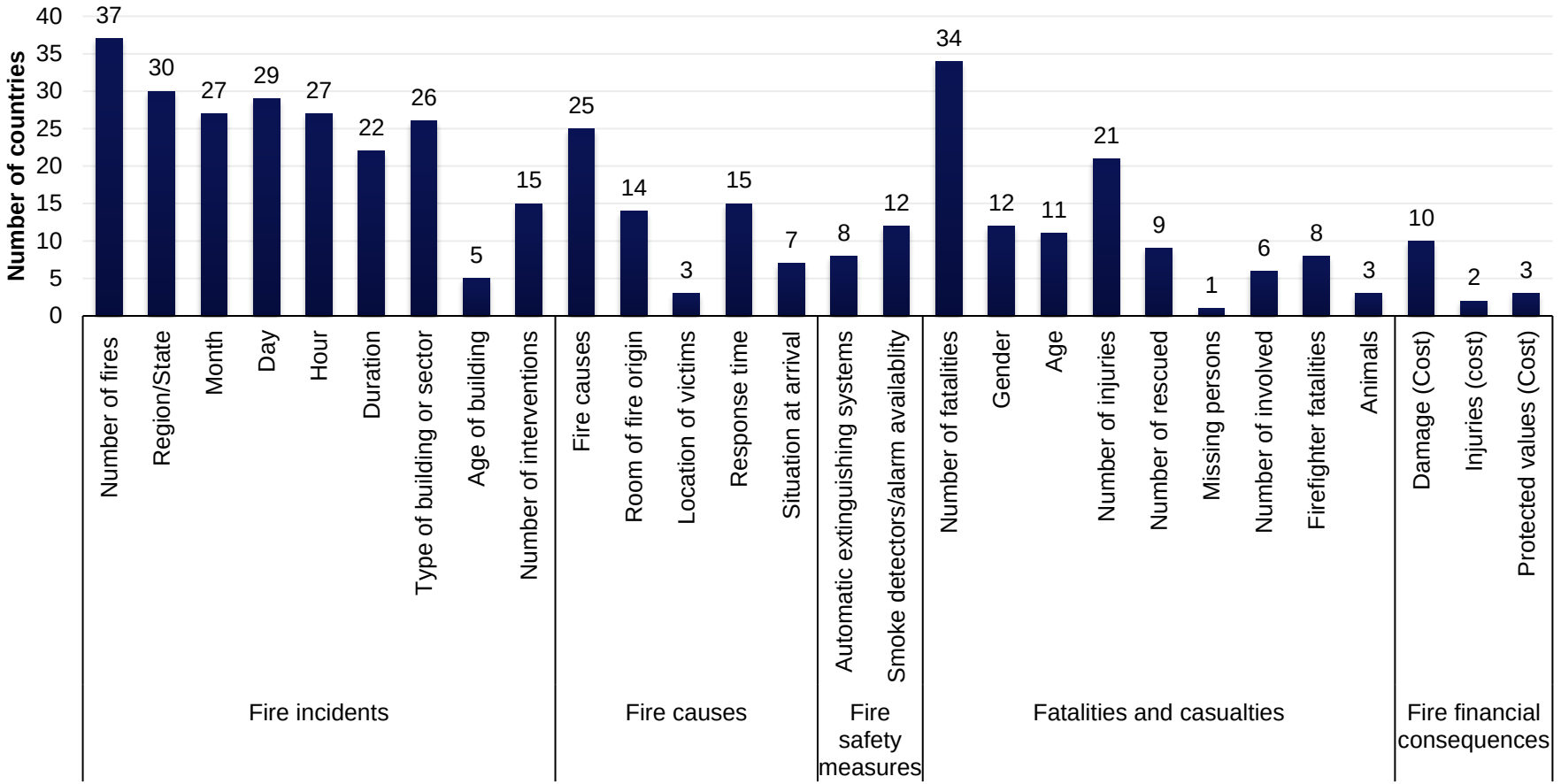

Figure 23: Fields covered by the fire statistics of EU, Non-EU and International countries

Table 4: Task 0 Overview table EU Countries 1/4

EU Countries	Language	Issuing body	Type of data collected	Years covered	Publication frequency	Definitions	Data origin	Collection methodology	Data usage
Austria	German	Sicherheitsinformationszentrum SIZ / Brandverhütungsstelle für Oberösterreich BVS / fire brigades	No systematic fire data	2008-2019	yearly	Yes, partly	Fire brigades, insurers, fire prevention associations		Ministry, fire brigades, others
Belgium	Dutch	Home Affairs (Federal Government Service)	Fatalities and injured, date, response time, intervention characteristics, object of fire, building and human characteristics	2014-2015	Unknown	Yes			
Bulgaria	Bulgarian	Ministry of the Interior - Directorate-General "fire safety and protection of the population" statistical and graphic information about the activities of gdpbzn - mbp	Number of accidents and fire and rescue equipment from 2015 to 2019. Fires with material losses, distributed by reasons of occurrence. Fires with material losses, distributed by industries. Statistics on fires, deaths and injuries.	2015-2019	Yearly				
Croatia	Croatian and English	Ministry of the Interior	Fire and explosions, killed, seriously injured, slightly injured, material damage (in local currency - Kn)	2000-present	Monthly				
Czech Republic	Czech	Ministry of the Interior – General Directorate of the Fire and Rescue Service of the CR	Total fires, Number of fires per 1,000 people, Cause, type of activity, Direct damage in thousands of CZK, Protected values in thousands of CZK, Killed persons, Injured persons	2010-present	Yearly (N-1)	Yes	National Fire Service of Czech Republic		
Denmark	Danish	DEMA (Danish Emergency Management Agency)	Fatalities and injured, type of municipality, dates, response time, intervention characteristics, cause/room of fire, building and human characteristics, smoke detectors	2011-present	Yearly	Yes	Fire brigades, DEMA	Fire brigade giving input to a database	Used to assess the fire brigade
Estonia	Estonian	Siseministeerium	Fatalities and injured, type of municipality, dates, response time, intervention characteristics, cause/room of fire, building and human characteristics, smoke detectors	2013-2017		Yes			
Finland	Finnish	Finnish Rescue Services	Fatalities and injured, date of reporting, response time, intervention characteristics, cause/object/room of fire, building and human characteristics, smoke detectors	2010-2016 in different forms		Yes	Data on emergency calls		
France	French	Ministry of Interior	Number of fire interventions, fire deaths, fire injuries, number of people involved for different types of buildings, firefighter fatalities	2002-2018	Yearly (N-2)	No	Fire departments	Data extrapolated for counties that did not collect data or partial data.	
Germany	German	Countries Ministries of Interior, DFV	fire interventions, fire deaths, technical and medical help, equipment used, size of fire, fire injuries firefighter fatalities	1990-2017	Yearly (N-3)	No	Fire departments	operation reports,	Fire departments

Table 5: Task 0 Overview table EU Countries 2/4

EU Countries	Language	Issuing body	Type of data collected	Years covered	Publication frequency	Definitions	Data origin	Collection methodology	Data usage
Greece	Greek	Hellenic Fire Corps	Type of incident (fire, assistance, etc), start time – ending time, duration of the incident, kind – type of staff participating in (staff of Hellenic Fire Service, military, volunteers, staff of foreign Fire Services e.g. earthquakes - Athens since 1999, etc.), vehicles, air means, kind of forest area - land (e.g. forest, marsh, agricultural area, etc.), injured persons (personnel, citizens)	2000-present	Yearly		Fire departments, - General Secretariat for Civil Protection - Forest Offices per region - National Observatory of Athens	The Hellenic Fire Corps collects all information. Besides, General Secretariat for Civil Protection and Forest Offices per region collect specific information, which is required by their sections.	
Hungary	Hungarian	National Directorate General for Disaster Management (NDGDM) - not publicly available	Number of fires, Number of victims (deaths, injured, rescued persons, missing persons), Fire causes, Fires by fire objects (buildings types, sectors of industry, etc.)	1990-2019	Yearly	There's a guide how to provide data from incidents	Local fire brigades		
Ireland	English and Gaelic	Department of Housing, Planning and Local Government	Fire service, fire prevention, fire brigade activities, location of fire, causes of fires, fatalities from fires	Fire service from 2013 to 2015 (data also from 1996); fire prevention-causes of fires-fatalities from fires from 2000 to 2018; fire brigade activities from 2000 to 2017; location of fires from 2000 to 2016	Yearly	No	Fire authorities	Every year the Department produces statistics about fire and other emergency calls dealt with by local authority fire brigades during that year. We also produce the fire death statistics for the year. The statistics are based on information supplied by fire authorities	Fire departments, governments, industries, public and private use
Italy	Italian	Corpo Nazionale Vigili del Fuoco (C.N.VV.F)	Fire incidents, location, causes, material ignited, response time, property type	Data from 200 to 2018	Yearly	Yes	Fire departments	STAT-RI - STATistica e Rapporto di Intervento.	Fire departments, governments, industries, public and private use
Latvia	Latvian	State Fire and Rescue Service - Valsts ugunsdzēsības un glābšanas dienests	Cause of fire, Number of fire, fires Victims, Destroyed buildings	2013-2019			Fire departments		

Table 6: Task 0 Overview table EU Countries 3/4

EU Countries	Language	Issuing body	Type of data collected	Years covered	Publication frequency	Definitions	Data origin	Collection methodology	Data usage
Lithuania	Lithuanian	Fire and Rescue Department under the Ministry of the Interior analysis of fire and rescue statistics	Deaths in fires Number of fires and deaths by location Statistics of children killed and injured in fires Causes and places of deaths of people Distribution of deaths in fires by age and sex Number of fires and their dynamics Main causes of fires Number of people rescued in fires Use of respiratory protection equipment Performance of fires Rescue operations	2014-2019	Yearly		Fire departments		
Netherlands	Dutch	Fire Service Academy (IFV)	Fatal residential fire, cause, smoke alarms, materials, response time, location, rooms, characteristics of building/property/victim/fire and fire service actions. Report from 2016 regarding fatal fires is in English.	Data from 2008 till now	Yearly report, dashboard every quarter	Yes	Fire brigades of the 25 safety regions	Survey data from questionnaire sent to fire brigades, data quality check by researcher, nearly 100% response	Fire departments, government researchers, public reports from IFV, media, policy and educational
	English	Central Bureau of Statistics (CBS)	Fire and non-fire incidents	2016 till now	Access to public database	Yes	Fire brigades of the 25 safety regions	Extraction from emergency registration, not checked	Public
	English/Dutch	Central Bureau of Statistics (CBS)	Fire and non-fire incidents, number of alarms, response time, damage by fire, fires by cause and object, indoor (and chimney) fires, outdoor fires, victims, fire equipment, costs	From 1985-2013	Yearly + access to public database	Yes	Fire brigades of the 25 safety regions	Survey data. Data extrapolated for counties that did not collect data or partial data.	Fire departments, government and public
Poland	Polish	This information is found in literature	Fatalities, cause of fire and death, room of fire and victim, age, gender, building type, accidental fires	2003-2011		Yes			
Slovenia	Slovenian	Firefighter's Association of Slovenia	Fatalities, number of injured people, date of intervention, response time of firefighters, building type, cause of the fire, rough estimation of material damage, size of the fire, technical and medical assistance, used equipment for intervention, number of fire brigades required for intervention.	1985-present	Yearly	Yes	Fire brigades are entering the data within the information system that is defined by the government.	Fire brigades are entering the data within the information system that is defined by the government.	Partially available to the public, however, some information is only accessible to the professional audience.

Table 7: Overview table EU Countries 4/4

EU Countries	Language	Issuing body	Type of data collected	Years covered	Publication frequency	Definitions	Data origin	Collection methodology	Data usage
Spain	Spanish	Fundación MAPFRE and Asociacion Profesional de Tecnicos de Bomberos	Number of interventions due to fires and explosions; number of fire and explosion victims. Distribution of fatalities by: Age, Gender, Month, Day, Hour, Region, Type of building	2007-present	Yearly (N-1)	Yes	Fire departments	Working groups within fire departments, then ratification of all input then verification with Institutes of Legal Medicine	
Sweden	Swedish	Swedish Civil Contingencies Agency (MSB)	Fire incidents, location, causes, material ignited, response time, property type and much more	Database from 1996, statistics published in web portal https://ida.msb.se from 1998.	Yearly and continuously	Yes	Fire Departments	National data checked and quality controlled by MSB experts	Fire departments, governments, industries, public, private use and researchers

Table 8: Overview table Non-EU Countries 1/2

Non-EU Countries	Language	Issuing body	Type of data collected	Years covered	Publication frequency	Definitions	Data origin	Collection methodology	Data usage
Norway	Norwegian	DSB (The Norwegian Directorate for Civil Protection)	Fire and non-fire incidents, number of alarms, response time, damage by fire, fires by cause and object, indoor (and chimney) fires, outdoor fires, victims, etc.	Data from 2016 - present	70% registered automatically - 30% manual work, but published at least every 14 days	Unknown	Fire departments	BRIS	Fire departments, governments, industries, public and private use
Russia	Russian and English	State (federal) fire service EMERCOM of Russia	100 parameters	<2008 - present	yearly	Yes	Fire departments	Harmonised across the country	
Switzerland	French/German	the Association of Cantonal Insurance Institutions - Kantonale Gebäudeversicherung / Interkantonaler Rückversicherungsverband IRV	Number of fire incidents by day, months, and type of cases, and damage. Gender of fire deaths. Evolution of fire damage rates and the share of damaged buildings in CHF or in ‰.	1990-present	Yearly and every 10 years	Yes, building type only	Insurances	Data is recorded on site by the damage estimators and communicated to the PIRE claims service. They are entered and managed electronically by the PIREs and transmitted once a year to the APIRE in a standardized format for the preparation of the "Statistics of APIRE damage". Data is from 19 of the 26 cantons covering around 80% of Swiss buildings.	For insurances, Government, public and private use
	French/German		Unknown	Unknown	Yearly	Unknown	Fire departments		Fire departments
Turkey	Turkish	İstanbul Metropolitan Municipality	Fire incident types, structural/non-structural fire types, building/property types and usage areas, response times, causes of fire.	Data from 2008 to 2018	Every 5 years	Yes	Istanbul fire departments		Fire departments, governments, industries, public, private use and researchers
		Turkish Civil Defence - Not available anymore	Types of fire, Number of fires, Loss of life (public, personnel, animal), real injury (in TL), cause of fire	1990-2004	Every 5 years	Unknown	Fire departments		

Table 9: Overview table Non-EU Countries 2/2

Non-EU Countries	Language	Issuing body	Type of data collected	Years covered	Publication frequency	Definitions	Data origin	Collection methodology	Data usage
UK - England	English	Home Office	fire incidents, causes, consequences, fatalities/casualties, response time, alarms and automatic extinguishing systems	Most updated datasets from 2010/11 to 2019/20	Yearly	Yes	Fire departments	Incident recording system (IRS). The Home Office filters the data removing potential errors and inconsistencies before publishing the datasets.	Fire departments, governments, industries, public and private use
UK - Northern Ireland		Northern Ireland Fire and Rescue Service	No publicly available datasets		Yearly		Fire departments		
UK - Scotland		Scottish Fire and Rescue Service	Incident type, property type, fatalities and casualties, fire stations and workforce	Data from 2009 to 2019	Yearly	Yes	Fire departments	Incident recording system (IRS). The Home Office manages the IRS, though SFRS has access to the Scottish data.	Fire departments, governments, industries, public and private use
UK - Wales		Welsh Government	Fire incident, location, cause, motive, casualties, response time, smoke alarms	Data from 2015 to 2019	Yearly (April-March)	Yes	Welsh Fire and Rescue Services collect data. Welsh Government publishes the datasets	The Welsh Government compiles the statistics in this bulletin from reports submitted by FRAs to the Home Office.	Fire departments, governments, industries, public and private use

Table 10: Overview table for international countries

International Countries	Language	Issuing body	Type of data collected	Years covered	Publication frequency	Definitions	Data origin	Collection methodology	Data usage
Australia - Queensland	English	Queensland Fire and Emergency Service	Fire incident, fire causes, attendance time of fire brigades, type of building	from 2016 to 2019	Yearly	Yes	Queensland Fire and Emergency Service	Information gathered by fire service	Fire departments, governments, industries, public and private use
Canada	English	Statistics Canada	Fire incidents, property type and casualty are available. The other fields are not publicly available.	Data from 2005 to 2014	Yearly	Yes	The data were collected by the Canadian Centre for Justice Statistics (CCJS) in collaboration with provincial/territorial Fire Marshals and Fire Commissioners Offices across Canada.	National Fire Information Database	Fire departments, governments, industries, public and private use
New Zealand	English	Fire and Emergency New Zealand	Fire incident, location, duration	Last 7 days. A full incident report can be provided on request under the Official Information Act	Every day	No	Fire departments	Fire Awareness & Intervention Programme (FAIP) Survey Data	Fire departments, governments, industries, public and private use
USA	English	US Fire Administration, NFPA	Fire incidents, causes, associated losses and injuries by type of property; firefighter deaths and injuries	1977-present	yearly for previous calendar year	Yes	Fire departments	incident reporting from fire departments; stratified random sampling of fire departments for fires, losses, injuries; census of firefighter deaths	Fire departments, governments, general public, industries

8. TERMINOLOGY ISSUES

8.1. DIFFERENCES WITHIN THE SAME COUNTRY

Most fire services in the investigated countries centralise their data into one unique database. That is the case for at least Bulgaria, Croatia, Czech Republic, Denmark, France, Greece, Hungary, Italy, Luxembourg, Norway, Poland, Romania, Russia, Slovakia and Spain. However, in France, Spain and other countries, due to the lack of official definitions and national fire statistical collection, it is possible that differences exist in the terminology adopted by the various fire departments when the data are gathered after attending fire incidents. More details are provided in the diagnostic sheets (see annexe I for each country).

Other investigated countries display differences with respect to how data is collected and maintained, which data elements are collected, and how variables are coded in different regions, states or even within a state. Those are Australia, Austria, Canada, Germany and the Netherlands.

Regarding the Netherlands, the regional registration methods have also changed for a number of regions between 2013 and 2014. This has had a particular impact on the 2013 figures for some regions.

In Sweden, since different fire services report to Swedish Civil Contingencies agency (MSB) there will be some differences. However, MSB has developed documentation and an online education to support individual fire and rescue services and reporters in the reporting [41]. Prior to 2018 there were three systems (Alarmos, Core or Daedalos) used by the fire and rescue services when reporting incidents. Nowadays all fire and rescue services in Sweden report their incidents into the same system.

In the UK, fire safety data are separate for England, Northern Ireland, Scotland and Wales. English statistics appears to provide the highest number of fields publicly available after a fire incident while Scottish fire statistics do not have data on the quantification of damage and presence of alarms or automatic extinguishing systems. Welsh fire statistics have additional fire safety data also on fire causes and motive and only on smoke alarms. Finally, Northern Ireland Fire and Rescue Service statistics do not use the Incident Recording System (IRS) and do not publish comparable statistics.

In the USA, Incident reports and data elements are standardized and can be found online [42] and will be presented in Task 1. However completeness of data entered into incident reports may vary by locality, creating differences in interpretation. For example, “Burnt food” may be considered a fire, excessive heat, a smoke scare, or a false alarm.

Similarly, many non-fatal civilian injuries are not captured by the fire service [43]. It is estimated that in the USA 21,174 of 48.202 civilian non-arson fire injuries resulted from residential or consumer-product fires attended by fire departments from July 1, 2002 to June 30, 2003. NFPA estimated totals of 18,425 civilian injuries in 2002, and 18,125 in 2003, including injuries caused by arson. This means that some of the injured may have left the scene before the fire department arrived or been transported by a non-fire department organization.

Last but not least, in Switzerland, in addition to the Fire service database, the Public Insurance Companies for Real Estate (PIRE) collect fire data using a specific codification. Data are then gathered by the insurance association (APIRE) who analyses said data. The latter collects data from 19 out of 26 Cantons; this covers 80% of the country’s buildings. Private insurances that cover buildings in the other seven cantons do not use this code.

8.2. DIFFERENCES AND CONTRADICTIONS WITH OTHER DOMAINS

8.2.1. General observations

In general, there are four main sources of fire databases in most countries, those are originated from fire services, medical field, insurance and police departments.

Regarding the fire service data, in some countries like France, Germany and Norway, due to the current lack of official definitions of terms and expressions for fire statistics, it is most likely that differences and contradictions with the aforementioned domains exist. While in other countries such as Germany and Sweden, it is clear that the fire service, police and insurers organise their data very differently, hence an overall picture cannot be built. Particularly, classifications in fire statistics from insurance companies do not correspond to those used by the fire and rescue services. For example, one fire incident according to the fire services could result in multiple fire claims from the insurance.

Finally, there are discrepancies between fire service data and the medical data, which is usually based on ICD-10 coding of death certificates, detailed in the next section (8.2.2).

8.2.2. Medical field

The World Health Organization's (WHO) 10th Edition of the International Classification of Disease (ICD) is used by health care systems and coroners for medical records, billing, and death certificates. ICD is a global classification system and tool for different diagnoses. The primary purpose of ICD is to enable classification and statistical description of diseases and other health problems that result in human death or contact with the health care system in a country. In addition to traditional diagnoses, the classification includes a wide range of symptoms, abnormal findings, ailments and social conditions.

The ICD system was first launched in the late 1800s and the World Health Organization (WHO) has been responsible for the maintenance of the system since 1948. The current version of ICD is ICD-10; however, according to the WHO [44], the 11th edition (ICD-11) was adopted by the World Health Assembly in May 2019 and is scheduled to come into effect on January 1, 2022.

The coding for lethality due to exposure to smoke, fire and flames is included in Chapter 20 in the 2016 edition of ICD-10 [45] and is expressed with the codes X00-X09 (see Table 11). External causes of injury codes on death certificates can be used to obtain fire death data. Separate categorizations are used for unintentional, intentional self-harm, assault, and undetermined intent. It is important to separate this coding from the section X10-X19 which is related to contact with heat and hot substances that are not related to smoke, fire and flames. It is also important to note that Chapter 20 in ICD-10 is intended to be used as secondary to a code from another chapter, indicating the nature of the condition. Most often, the condition will be classifiable to according to Chapter 19, "Injury, poisoning and certain other consequences of external causes" [46].

Table 11: Sub-sections for lethality due to exposure to smoke, fire and flames in ICD-10.

Code	Description
X00	Exposure to uncontrolled fire in building or structure
X01	Exposure to uncontrolled fire, not in building or structure
X02	Exposure to controlled fire in building or structure
X03	Exposure to controlled fire, not in building or structure
X04	Exposure to ignition of highly flammable material
X05	Exposure to ignition or melting of nightwear
X06	Exposure to ignition or melting of other clothing and apparel
X08	Exposure to other specified smoke, fire and flames
X09	Exposure to unspecified smoke, fire and flames
	Subsection for other intents
X76	Intentional self-harm by smoke, fire, and flames
X97	Assault by smoke, fire, and flames
Y26	Exposure to smoke, fire, and flames, undetermined intent

Except for X01 and X03, it is not easy to separate building fires from non-building fires, since X04-X09 do not distinguish if the exposure occurs indoors or outdoors. An additional code addresses wartime fires. Y36.3, “War operations involving fires, conflagrations and hot substances.”

Codes for different methods of terrorism were added to ICD-10 after the attacks in the US on September 11, 2001. The fire-related code is U01.3 "Terrorism involving fires, conflagration, and hot substances.”

Codes T20-32 “Burns and corrosions” identify burns on different parts or percentages of the body.
Code T58 “Toxic effect of carbon monoxide“ and T59- “Toxic effect of other gases, fumes, and vapors” may be combined with external cause of injury codes indicating fire to obtain the share of fires with deaths from burns only, smoke inhalation only, or both.

In the USA, the Centers for Disease Control and Prevention (CDC) [47] have two query tools that access fatal injury data. WISQARS™ — Web-based Injury Statistics Query and Reporting System [48] is the simpler of the two. Users may select intent, and fire and burn injuries, fire injuries only, or residential fatal injuries. Although not shown on the query page, residential includes unintentional only. CDC’s Wonder [49] is harder to use but allows more flexibility. Users may select multiple causes of death such as fire, with burns and or smoke inhalation.

The CDC provides additional information about what should be included in this category [50]:

- Asphyxia – originating from fire caused directly by a fire-producing device or indirectly by any conventional weapon
- Burns – originating from fire caused directly by a fire-producing device or indirectly by any conventional weapon
- Other injury – originating from fire caused directly by a fire-producing device or indirectly by any conventional weapon
- Petrol bomb
- Collapse of – burning building or structure
- Fall from – burning building or structure
- Hit by object – burning building or structure
- Falling from – burning building or structure
- Jump from – burning building or structure
- Conflagration
- Fire – of fittings or furniture
- Melting – of fittings or furniture
- Smouldering – of fittings or furniture

In a Swedish study [51], three different sources of information on fire fatalities were compared, and one of these sources, the cause of death register, uses the ICD-10 coding system. The study showed that the cause of death registry underestimates the number of fire fatalities by about 25%, and the authors argue that none of the single sources are sufficient to assess how many people actually die in fires.

Since the introduction of the ICD system, classifications have been changed several times and this needs to be accounted for when comparing data over longer periods. Jonson et al. [52] have used the ICD data for Sweden to conduct this type of study of temporal trends. The codes for unintentional fire fatalities from ICD-6 to ICD-10 are presented in Table 12.

Table 12: Codes for unintentional fire fatalities in ICD-6 to ICD-10

Years	ICD-version	Codes for unintentional fire fatalities
1952-1957	ICD-6	E916
1958-1968	ICD-7	E916
1969-1986	ICD-8	E890-E899
1986-1997	ICD-9	E890-E899
1997-present	ICD-10	X00-X09

Finally, there are discrepancies between fire service data and the ICD-10 coding of death certificates. For instance, NFPA counted the fatalities in the World Trade Center and Pentagon attacks as fire deaths, while the death certificates called them terrorism. It can also be unclear to determine when vehicle fire deaths should be counted as transportation events rather than fires in the ICD-10 codes. There are other cases where ICD-10 codes do not show if they are due to fire or not, such as defenestration, suicide and collapses or collisions by a falling object.

While ICD codes have their issues and limitations, they are widely used and usually managed by national statistic institutes. A way to determine the reliability of fire service data is to conform said data with those of ICD.

9. COLLECTION ISSUES

9.1. WHO IS RESPONSIBLE FOR COLLECTION OF FIRE STATISTICS?

Fire departments are responsible for entering data with key details from the incidents for which they are dispatched, which in some countries include not only fires, but also emergency medical services, severe weather and natural disasters, and other incidents. Reports are filed for incidents and, if applicable, casualties (fatal and non-fatal). Firefighter casualties and civilian casualties generally utilize separate reports. Fire departments are in most cases composed of civilian professional firefighters and civilian volunteer firefighters. In some cases, military professional firefighter units can be responsible for cities or areas (e.g. Paris and Marseille).

Volunteer, professional, military and mix usually participate in filling the fire response reports. In particular, they are filled and signed by the firefighter in charge of the operation. The information is then collected by the fire department then is sent to the regional or national body (e.g. Ministry of interior), where all data are compiled. Since data is collected at local levels - which vary by resources, staffing, and leadership – there are substantial opportunities for disparities between jurisdictions related to the completeness and accuracy of data. Moreover, different fire departments provide different levels of quality control. For instance, in the Netherlands, fire investigators report for deadly fires and the report is then reviewed, whereas, other fires are reported by firefighters. It is certain that the difference in the level of training for reporting will result in different data quality. That does not mean that firefighters need more training, but that as the main goal of firefighters is to rescue, tackle fires and other activities, they will have less time to spend on filling sheets during their shifts.

Another striking example is for Austria where, the Austrian Fire Prevention Associations collect data from the police stations and insurers for each federal state and publish them yearly.

9.2. MISSING DATA, ISSUES AND LIMITATIONS

Missing data is a serious issue which compromises the quality and completeness of fire incident data. In the United States, the National Fire Protection Association (NFPA) employs a “national estimates approach” to correct for data that goes unreported in data collected by the National Fire Incident Reporting System (NFIRS), the national database of fire incidents sponsored by the United States Fire Administration (USFA). No other countries appear to employ a methodology for dealing with missing data, although some countries do acknowledge that missing data is a potential problem that compromises data quality.

Several issues were identified in the current data reporting systems and publications; those are presented for each country listed below. Not all countries have been included in this list due to a lack of information for certain countries.

EU Member States

Austria

- It is difficult to get an overall picture as data is collected differently in separate regions.

Bulgaria

- There is a lack of definitions for collected terms, statistics fields, as well as a lack of training for the firefighters in charge of the fire response report.
- The database from the fire brigade does not take into account the fire casualties occurring at the hospital or during their transportation to the hospital by emergency medical services (EMS).

Denmark

- Lack of training for the firefighters on how to fill information in the fire response report.
- The police are responsible for the fire investigation and there is no feedback-loop into the database from their investigation.
- The database from the fire departments is not taking into account the fire casualties, which are not reported or are reported in a separate database.

France

- The lack of definitions for fields collected and expressions.

- The lack of methodology to fill the gaps where information is missing.
- The lack of training for the firefighters in charge of the fire response report.
- The database from the fire departments does not take into account the fire casualties occurring at the hospital or during their transportation to the hospital by EMS

Germany

- No uniform fire statistic has been enforced in Germany. Hence, disparity between the practices in different regions makes it difficult to obtain an overview of the country's statistics.
- All fire service interventions and statistics are obtained with different criteria in Germany. Due to this situation, there is a lack of statistical information on extensive fire service interventions and reasonable statistical findings on fire service intervention, on the fire phenomenon and on the effectiveness of fire protection measures.
- Much detailed information (building / first burning item / smoke detector us etc.) is missing.
- The link between fire causes and fire consequences is missing.
- The link between the different sources of data is missing. For instance, it is not possible to link data from insurer, police or fire service to gain information.

Hungary

- Data is not publicly accessible, hence difficult to assess its quality and limitations.

Italy

- Limitations are given by the limited fields recorded in terms of pre- and post-fire conditions of buildings subjected by fire incidents.

Luxemburg

- The fire services use two main databases: One database with all the operational information from the coordination center and one database with the reports of the incident commanders. Both databases are not linked yet, so the full data cannot be compared and analyzed automatically. To get all the information, the data has to be combined manually.

Netherlands

- Only a limited number of incidents are extensively registered.

Norway

- The lack of definitions for fields
- Most data is missing in the official reports. For instance, police only report about 25-30% of the fires and insurance, who investigate most fires, do not report to the DSB (The Norwegian Directorate for Civil Protection).

Romania

- Data is not publicly accessible, hence difficult to assess its quality and limitations.

Spain

- There are no official statistics since 1994 due to lack of funding. Currently in Spain, the only available data covers only fires with fatalities and is funded by a private initiative (insurance). Fire investigation results are excluded from the database, which means that in many fire reports, there is not enough information to include the cause of fire or the reason for the fire deaths, which are determined later.

Sweden

Regarding data published by the Swedish Civil Contingencies agency (MSB):

- There have been issues with missing data when different systems (Alarmos, Core or Daedalos) were used at different fire and rescue services. There have previously been some double counting of incidents when several fire and rescue services from different municipalities/regions are involved. This has been corrected in the yearly quality control done by MSB. The routines at joint incidents have been improved in 2020 and MSB expect this to more or less eliminate problems with double counting.
- Due to incident report content revisions and changes in local routines for recording data, there is a potential to over-interpret discontinuities in some time series.

Other European countries
England

- Despite the review process, there are likely to be some inaccuracies in the data due to reporting or keying errors, such as misclassification or missing cases.

Switzerland

Regarding data collected by public insurance companies:

- Fire deaths at the hospital or in the ambulance are not accounted.
- Some codifications are very vague, for example in the causes of fire; there is no category for fires from PV panels or from Li-ion batteries.
- Anyone can fill the inspection sheet; can be made by investigators, architects, police or firefighter.

Scotland

- There may be some miscategorisation which has yet to be addressed, or is not possible to address, without access to another data source.

International
Australia

- It appears that a significant amount of fires is not recorded and not all Australian fire services contribute to the database.
- Not all the fields are required or need to be completed and the compulsory fields are based on the nature of the call.

Canada

- A number of tables contain a relatively high proportion of unknown values. Although these counts are removed from the calculation of proportions for other categories in the table, the proportion of known values is artificially inflated.
- National database is incomplete, this is due to the fact that not all jurisdictions provide data for national consolidation and not all local fire departments provide data to the office of the fire commissioner or fire marshal.

USA

- Some jurisdictions refuse to report dollar loss. Some have policies that require causal information to be reported as undetermined when fires are referred for investigation.
- To make it easier for firefighters, information about causal factors and details on fire protection are not required for six types of bulding fires, collectively called confined fires. These include confined cooking fires, confined chimney or flue fires, confined fuel burner or boiler fires (mostly oil burner blowbacks), confined compactor fires, confined incinerator fires, and rubbish trash fires in or on a building that did not extend to the building or other contents. Some data elements were left optional. “None” is a choice in some data elements such as factor contributing to ignition and equipment involved in ignition that can seem like an easy out. The United States Fire Administration (USFA) places a heavy reliance upon states as cooperative partners in administering the NFIRS program but much of the cost burden for NFIRS is carried by the states. No federal funding is provided to states for personnel, and USFA provides no guidelines for the staffing of state NFIRS programs. Consequently, the levels and form of staffing and the resources available to NFIRS programs varies from state to state. Funding and resource limitations can undermine support for data collection, including participation in training and access to computer and software support.
- The reliance on firefighters as primary data collectors is a recognized barrier in as much as firefighters are not trained researchers and have substantial responsibilities that can diminish attention to data collection and reporting. Liability concerns can also discourage complete reporting of information.
- Little attention has been paid to the reliability of the data. It is clear that many firefighters who are doing their best to complete the reports disagree about how the reports should be coded [53].
- With respect to the completeness and accuracy of reporting is that NFIRS codes are seen to be overly complex, resulting in frustration that can deter reporting. Because the list of code choices is so long for many data elements, many fire departments use cheat sheets (short set of notes) with the most commonly used code choices. Rarely used codes may be completely forgotten.

10. INTERPRETATION ISSUES

10.1. WHO IS INTERPRETING THE STATISTICS?

Many differences exist among who is interpreting the fire statistics, depending on the purpose. First of all, how many organizations within a country are interpreting it? To which purpose?

It is notable that in smaller countries (in terms of number of buildings and population) the interpretation of the collected statistics is done by a single institute or organization. Examples of countries in which one or two organizations interpret the statistics are: the Netherlands, Switzerland, Denmark and Hungary. In Austria, The purpose is to provide data for research and scientifically reasons as well as for performance-based fire prevention measures.

For the USA, both forms of interpretation are present, due to the differences between states. States with fewer resources may rely upon a single person. Some state programs include full-time research analysts, while others rely upon administrators, information technology staff, or investigators to run their programs, often on a part-time basis. The UK (Wales, Scotland, England and Northern Ireland) has different organizations that interpret as well. Other countries that have several organisations interpreting the statistics are Sweden and Russia.

Secondly, almost all countries differ in which organization/who is interpreting the data. Organizations that have been mentioned as responsible for interpreting the statistics are: insurance associations, governmental organizations, universities, research institutes, individual municipalities (represented through the local fire and rescue service), departments of State fire service, scientific and educational organizations, ministries, General Inspectorate for Emergency Situations, Directorate for Civil Protection, the fire corps, first responders and technical experts.

A remarkable practice regarding who is interpreting the data was seen in Sweden and in Russia. Everyone can interpret it because fire statistics are presented in an open access database.

Having so many different organizations interpreting the data makes it difficult to exchange fire statistics. Not only because different organizations have different interests and objectives but also because different sorts of organizations interpret based on different languages, definitions and terminologies.

10.2. PURPOSE FOR WHICH DATA IS COLLECTED

The purpose of collecting fire statistics is the same despite all the differences between countries. When comparing all the diagnostic sheets for all countries, we find that there are eleven main purposes that are important for most countries (listed in no particular order):

1. Evaluate effectiveness of emergency responses
2. Define volume of personnel and equipment
3. Help with decision making for organizations of fire rescue services
4. Justify budgets for policymakers
5. Support legislation related to fire issues
6. Fire prevention in general
7. Education to increase fire safety for civilians.
8. Identify trends relative to the severity of fire incidents
9. Assess fire risks
10. Identify the main causes of fire
11. Reduce the number of fires, victims and its damage and costs.

10.3. ISSUES WITH ANALYSING THE EXISTING DATA

When discussing issues with analysing data, the most important issue mentioned is dealing with missing data. This could be due to the lack of reported cases of fire or different databases exist that do not correspond or complement each other. Different databases from insurances, police, fire service, hospitals that are not possible to link with each other makes it very difficult to gain complete information about a fire and its corresponding damage or victims. An illustrating example of this issue is when fire deaths at the hospital or in the ambulance are not accounted for. If an organization that interprets the data has only small parts of databases available and therefore lacking the whole picture of a fire incident, it is an issue to learn from fire statistics.

Unfortunately, many other issues arise when analysing data. The following are mostly mentioned.

1. Some codifications are very vague
2. Anyone can fill the incident sheet, e.g. fire investigators, police or firefighter. The answers could therefore be inconsistent while discussing the same incident.
3. Not enough data to establish the cause of the fire or the reason for the fire deaths
4. Heavy reliance upon states as cooperative partners, especially when the partners are not obligated to corporate (for example insurance companies with additional information).
5. Double counting, breaks in time series, missing data
6. Misclassification by the data provider or analyst
7. Lack of definitions
8. Constant updates
9. Integration of data with other data of ministries

10.4. FOLLOW UP TO DATA COLLECTED

Some countries use, at least to some extent, a method to follow up on the collected data. This method mostly consist on reviewing and correcting the data, ensuring the data is complete and if possible crosschecking one database with another. Giving fire services the chance to comment or reconsider data is also current practice. All countries have in common that updates are carried out regularly (often once a year), depending on the needs of the Fire Rescue Service.

11. CONCLUSION

This first task of the project is established to assemble all the knowledge of the consortium members regarding fire statistics in European countries and other non-European countries of interest. The review of the literature shows that fire data collection systems have been instrumental in reducing building fires and their associated deaths, injuries, and economic damage. The utility of information about these fires is apparent in the design of many fire safety interventions and policy initiatives. Data on fire incidents can inform firefighting strategies, building codes, educational and training programs, and technical innovations, to cite just a few applications. For example, with populations aging more than ever before, we might expect higher death rates among senior citizen, despite early fire detection. It is logical to assume that safety efforts can benefit from strategies that have worked in other places. However, there is substantial agreement in the literature that differences between fire data collection systems in different countries complicate the ability to make comparisons that could be useful in evidence-based planning and prevention efforts.

While national fire data collection systems are likely to share certain core features and to gather some fire incident data in common, there appears to be considerable variation in the type and scope of information collected, the way that data elements are defined and levels of detail they seek, as well as the types of training and resources dedicated to collection efforts. In addition, literature suggests that fire data are influenced by differences between data collection procedures and practices. Some data collection systems appear to provide opportunities to update information that may not be available at the time an incident record is first created, such as the cause of a fire or deaths that occur sometime after the incident. The amount and quality of information in different data collection systems also appear to be influenced by whether they include information from sources outside the fire service, such as insurers or medical authorities, through data linkage or other means. Literature suggests that the issue of how much information to collect is an important area for consideration in the design of fire data collection systems. Data collection systems that collect too little or wrong kind of information may not produce data that are useful, while overly detailed data collection systems may overwhelm data collectors, and thereby compromise data quality, as suggested by studies from the United States.

In many respects, the issue of how much information to collect appears to be driven by available resources, as well as the capacities of data collectors, who mainly are fire service personnel, to collect and record information. Concise data collection records will require less support and fewer resources than those that are more complex. To that end, recent literature on fire data collection in Canada emphasizes that such factors as funding, resources, personnel, and stakeholder acceptance are critical considerations in the design and sustainability of national fire data collection systems.

In general, it appears that the fire data collection systems in most countries are presumed to provide an accurate representation of their respective experiences with fire incidents. However, information gathered through the initial phase of research suggest that they may be unaware of important limitations of their data due to missing information, differences in the way terms are defined or interpreted, and other identified issues.

We identified significant issues with fire data from Australia, Bulgaria, Canada, Denmark, France, and Germany which complicate confidence in the data, particularly for their use in inter-country comparisons. Most of the issues stem from the lack of definitions for collected terms, lack of training, dispersed data, missing information and low coverage.

USA, Italy, and the Netherlands have very different systems while having each separate advantages and drawbacks. The fire data collection system in the USA has an existing terminology, includes a large number of data fields, and has vast experience in this field, but also appears to have a significant problem with missing fire incident, However, because the EU is in a comparable situation to the USA, there are many lessons from the experience of the USA that can be directly applied to the EU. Italy has adopted a quality control system to ensure the integrity of all data treated but is missing important fire data. The approach of the Netherlands has been to reduce the problems posed by uncertainties by focussing data collection efforts on fatal residential fires.

We estimate that Austria, Russia, Sweden and the UK (in particular England, Wales and Scotland) provide data with high confidence level due to the existing definitions, important covered areas and collected terms and existing quality safeguards.

For the other countries that were not mentioned, we do not have enough details to evaluate the level of confidence in their data.

It is important to note that none of the consulted reports included uncertainty estimations. However, it will be important to introduce uncertainty estimates to be able to analyse the relevance of the collected data and their trends.

Due to the lack of terminologies and precise collection methodologies and other issues identified, it is clear that current fire statistics cannot be compared from one country to another (with a few exceptions). They can only be useful to describe the global fire safety situation and trends to some extent for a group of countries, or the specific fire safety situation. To provide relevant information regarding the national fire safety situation (number of fires, fire fatalities, fire injuries, fire losses), fire statistics will have to be internationally improved through common terminology, common methodology, and common training and qualification of persons in charge of filling in the fire report, including uncertainty estimation methods. The findings of this task will be used as preliminary groundwork for all the discussions that will occur during this project and as an output for all the following tasks.

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ANNEX I – DIAGNOSTIC SHEET PER COUNTRY

The information gathered in Task 0 is the result of the collaboration of the consortium members who were able to provide the description of the fire statistics in several countries based on their previous research, experiences, and studies investigated in the literature review, public datasets and through a network of contacts. For some countries there are missing data, which will be complemented in the following tasks of the project, when it is necessary. For each country, a detailed diagnostic sheet was filled, based on the gathered information. The standard structure of the diagnostic sheet is presented hereafter:

1. TERMINOLOGY ISSUES

Information from ISO 17755-1 & -2

References of existing database/studies

Existing definitions

Are there differences within the same country?

Are there differences and contradictions with other domains?

Identification of missing information

2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

Fire response organization

Who collects data?

Who issues the data?

Are there different levels of collection?

Identify disparities in data feedback

Where is the data stored?

3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

Purpose for which data is collected

Is there follow up to data collected?

Analyse potential cause and consequences in trends

4. ANALYSE EXISTING DATA

Determining the level of confidence

Pinpointing issues and limitations

Examples

A. DIAGNOSTIC SHEET FOR AUSTRALIA

A1. TERMINOLOGY ISSUES

Information from ISO 17755-1 & -2

Methods of estimation, by country (ISO 17755:2014, page 1)
The Australian Incident Reporting System (AIRS) is based on separate reports on each incident requiring a response by a fire brigade. There is a national standard for coding of incidents, overseen by the National Data Management Group.
All fire brigades are participants, and all are required to report on all incidents regardless of size of loss or other characteristics; therefore, the design is a census and there is no adjustment for missing data. Not all fire services in Australia contribute to the national database. Of the fire services that do contribute, some do not include responses from the rural component of their service. Also, not all fires that occur in the community are included in the AIRS National Database. Analysis is by counting only.
Most reports are completed by firefighters who lack extensive training in fire investigation and who obtain most of their information from non-professionals such as the owners and occupants of places where fire occurred.

Fires subject to reporting, by country (ISO 17755:2014, page 4)
Fires not responded to by fire crew are not required to be reported to the national database.
The data on fires and emergencies do not represent 100 percent coverage. An AIRS report is required whenever a fire brigade resource responds to an incident regardless of the size of the incident or the method of notification. Most fires are not reported to fire services. These are usually small fires in the home or in workplaces which go out by themselves or are extinguished by an occupant. We do not have sufficient information to be able to estimate the number of unreported fires.

Fire deaths subject to reporting, by country (ISO 17755:2014, page 6)
The Australian Incident Reporting System (AIRS) Standard defines fire fatalities as “those people who died from injuries that are attributable to the incident or the action of handling the incident”.
The number recorded is based on data which is the best available at the time of the incident.
However, in recent years, fire fatality information has been sourced from the Australian Bureau of Statistics for reporting to Government and fire brigade databases.
Annual fire death rate represents all deaths where the underlying cause of death is fire related to smoke, fire and flames including all (structure and landscape) fires — as recorded in Causes of Death, Australia (ABS cat. no. 3303.0). Fire deaths are identified from cause of death information supplied by the medical practitioner certifying the death or by a Coroner.
Fire deaths are reported by year of registration of death at State and Territory Registrars of Births, Deaths and Marriages.

Fire injuries subject to reporting, by country (ISO 17755:2014, page 9)
The Australian Incident Reporting System (AIRS) Standard defines injuries as those people who received injuries that are attributable to the incident or the action of handling the incident.
For the purposes of incident reporting, an injury is defined as requiring:
— treatment by a medical practitioner or;
— at least one day of restricted activity immediately following the incident.
However, for reporting purposes in recent years fire injury information has been sourced from the Australian Institute of Health and Welfare. Fire injuries are represented by hospital admissions (excluding emergency department non-admitted casualties) and are reported by the State or Territory where the admission occurs. A person injured by fire may be treated more than once, and in more than one State or Territory. Deaths from fire injuries after hospitalization are removed from the fire injury data for the time series because these are counted in the fire death rate.
In fire department systems, fire injuries where the victim has been transported to hospital prior to brigade arrival may be missed in fire injury reporting.

Reporting on victim characteristics by country (ISO 17755:2014, page 10)
Not included in reporting.

Property damage subject to reporting, by country (ISO 17755:2014, page 26)

Australian fire departments define damage to property as the estimated monetary value of the damage to property and contents caused by fire and fire fighting operations. They don't include land value. Measures used are:
— Monetary value of loss
— Percentage of total area that was damaged, estimated separately at arrival of fire brigade and at extinguishment
— Other: confinement rate
Some other comments related to dollar loss, source limitations and quality.
Recently, one Australian fire department conducted a review of the dollar loss data. They found:
a) 17% of building fires had a recorded value of zero fire dollar loss, and an additional 18% had no dollar loss value reported. It is unclear as to what a zero value for dollar loss means: it could mean no or minimal fire dollar loss or it could mean that the dollar loss cannot be determined. Of the building fires categorized as medium to large where the confinement rate extended beyond the room of origin 3% fires had a recorded value of zero fire dollar loss, and an additional 14% had no dollar loss value reported.
b) A comparison of dollar loss data with dollar loss data from insurance companies and other external sources revealed significant variability in the estimated dollar loss values reported by fire-fighters.
Feedback from focus group workshops with fire-fighters revealed widely varying practices and inconsistencies in estimating and reporting the dollar loss some firefighters included direct and indirect losses; some included relocation and business disruption costs others did not.
Firefighters felt it easier to estimate damage for white goods and small household items than for items such as art, jewelry and other high value items.

Other losses subject to reporting, by country (ISO 17755:2014, page 29)
Not included in reporting.

Locations of fires based on survey responses, by country (ISO 17755:2014, page 32)
Separate reporting of single family dwellings, buildings with multiple private housing units, and commercial residential properties, such as hotels, dormitories.

Specific types of buildings and other structures, by country providing detailed attachment (ISO 17755:2014, page 33)
CLASS 1
Class 1a - a detached house
Class 1a - (i) one or more attached dwellings, each being a building, separated by a fire resisting wall, including a row house, terrace house, town house or villa unit; or (ii) two attached dwellings, neither of which is located above the other or above or below another
Class of building other than its appurtenant private garage
Class 1b - (i) a boarding house, guest house, hostel or the like with a total floor area not exceeding 300 m^2 and in which not more than 12 persons would ordinarily be resident which is not located above or below another dwelling or another Class of building other than a private garage; or (ii) a boarding house, guest house, hostel or the like with a total floor area not exceeding 300 m2 in which not more than 12 persons would ordinarily be resident, which is not located above or below another Class or building other than a private garage
CLASS 2
A building containing 2 or more sole-occupancy units each being a separate dwelling Class 2
CLASS 3
A residential building, other than a building of Class 1 or 2, which is a common place of long term or transient living for a number of unrelated persons
A boarding house, guest house, hostel, lodging house or backpackers accommodation
A residential part of an hotel or motel
A residential part of a school
Accommodation for the aged, disabled or children
A residential part of a health care building which accommodates members of staff
A residential part of a Detention Centre for the accommodation of the inmates of the center
CLASS 4
A dwelling in a building that is Class 5,6,7,8 or 9 if it is the only dwelling in the building
CLASS 5
An office building used for professional or commercial purposes excluding buildings of Class 6,7,8 or 9
CLASS 6
A shop or other building for the sale of goods by retail or the supply of services direct to the public

An eating room, cafe, restaurant, milk or soft drink bar
A dining room, bar, shop or kiosk part of a hotel or motel
A hairdressers or barbers shop, public laundry, or undertakers establishment
A market or sale room, showroom, or service station
CLASS 7
A public car-park
Storage, or display of goods or produce for sale by wholesale
CLASS 8
Factories, or a building in which a handicraft or process for the production, assembling, altering, repairing, packing, finishing, or cleaning of goods or produce is carried on for trade, sale or gain
Laboratory other than in health care buildings
CLASS 9
A health care building, including those parts of the building set aside as a laboratory
An assembly building, including a trade workshop laboratory or the like in primary or secondary school, but excluding any other parts of the building that are of another Class
A non-habitable building or structure:
Class 10a - a non habitable building being a private garage, carport or shed
Class 10b - a structure being a fence, mast, antenna, retaining or free-standing wall, or swimming pool

Specific types of rooms and other areas, by country providing detailed attachment (ISO 17755:2014, page 43)
Means of Egress
— Hallway, corridor, mall
— Exterior stairway, including fire escapes and exterior ramps
— Interior stairway, including interior ramps
— Escalator
— Lobby, entrance way
— Fire-isolated escape route
— Means of egress not classified above
Assembly or Sales Areas
— Large assembly areas with fixed seats (100 or more persons).
— Large open room without fixed seats (100 or more persons).
— Small assembly area with or without fixed seats (less than 100 persons).
— Lounge area, including living rooms, common rooms, dens, recreation rooms, family rooms.
— Sales, show-room area.
— Library.
— Swimming pools
— Assembly, sales areas not classified above
— Assembly, sales area with insufficient information available to classify further
Functional Areas
— Sleeping room for under five persons, including patient rooms, bedrooms, cells
— Sleeping area for five or more persons.
— Dining area, lunchroom, cafeteria.
— Kitchen, cooking area.
— Lavatory, locker room, cloakroom.
— Laundry room, area.
— Office
— Personal service area
— Laboratory
— Printing or photographic room, area
— First aid, treatment room.
— Operating room.
— Electronic equipment room/area.
— Performance, stage area.
— Projection room, area.
— Process, manufacturing area
— Functional areas not classified above
— Functional areas insufficient information available to classify further
Storage Areas

— Product storage room or area, storage tanks, storage bin.
— Closet and small storage area
— Supply storage room or area.
— Records storage room, vault
— Shipping, receiving, loading area, loading dock.
— Waste or rubbish area, container.
— Garage, carport, vehicle storage area
— Storage areas not classified above
— Storage areas; insufficient information available to classify further
Service Facilities
— Lift, dumbwaiter.
— Utility shaft.
— Light shaft
— Chute.
— Duct.
— Display window
— Chimney/flue.
— Conveyor
— Service facilities not classified above
— Service facilities with insufficient information to classify further
Service, Equipment Areas
— Machinery room/area.
— Heating equipment room or area, water heater area
— Switchgear area, transformer vault, switchboard
— Incinerator room/area.
— Maintenance shop/area.
— Test cell (a testing area or unit that simulates a condition)
— Enclosure with pressurized air
— Enclosure with enriched oxygen atmosphere
— Service, equipment areas not classified above
— Service, equipment areas; insufficient information available to classify further
Structural Areas
— Crawl space, substructure space
— Exterior balcony, open porch or veranda
— Ceiling and floor assembly, concealed floor/ceiling space
— Ceiling and roof assembly, concealed roof/ceiling space
— Wall assembly, concealed wall space
— Exterior wall surface
— Exterior roof surface
— Awning
— Structural areas not classified above
— Structural areas; insufficient information available to classify further
Other areas are specified for vehicles and for outdoor locations

Reporting of type of construction by country (ISO 17755:2014, page 51)
Need clarification. Survey says this is included in reporting and refers reader to attachment, but attachment has no details on type of construction.

Reporting on building height and other building characteristics, by country (ISO 17755:2014, page 53)
— Level or floor where fire began
— Structure status, such as vacant, under construction, or under demolition
— Age of building

Reporting and estimation of deliberately set fires by country (ISO 17755:2014, page 55)
Yes, recorded as “incendiary” and “suspicious” as choices under Ignition Factor.
All four loss measures reported.
Classification as deliberate – no information on who provides classifications; presumably Australia practices cited in 1.2 apply here as well.
No mention of use of unknown cause fires in estimates

Reporting of fireplay, and no fires are categorized as both deliberate and fireplay; fireplay incidents are subdivided by age of person starting fire – 5 and under, 6 to 12, 13 to 16; no provision for fireplay but persons older than 16.
Intentional fires are categorized as to motive or circumstances.
— During social disturbance
— Not during social disturbance

Reporting and estimation of natural cause fires by country (ISO 17755:2014, page 60)
Yes, recorded as any of six choices under Ignition Factor:
— High wind
— Earthquake
— High water, including floods
— Lightning
— Unclassified natural condition or event
— Unknown-type natural condition or event

Reporting and estimation of exposure fires by country (ISO 17755:2014, page 60)
Yes, recorded as any of five choices under Ignition Factor:
— Separate, removed exposure, at least 18m distance
— Separate, detached exposure, more than 200mm but less than 18m distance
— Separate, adjoining exposure, less than 300mm distance or separated by an unpierced wall
— Attached, protected exposure
— Attached, unprotected exposure

Reporting and estimation of smoking material and open flame fires by country (ISO 17755:2014, page 64)
Unclear. The parts of the coding manual provided with the survey response do not provide details under Heat Source, but an early 1990s report on Australian fire statistics, prepared by CSIRO, indicated that Form of Heat of Ignition had 10 relevant choices with 4 partially undefined categories and one irrelevant choice linked to some of the partially undefined categories (backfire):
— Cigarette
— Cigar
— Pipe
— Smoking material, unclassified
— Smoking material, unknown type
— Cutting torch
— Welding torch
— Torch other than cutting or welding
— Candle or taper
— Match
— Lighter
— Open fire
— Backfire from internal combustion engine
— Open flame or spark, unclassified
— Open flame or spark, unknown type
This coding arrangement was modeled on the USA's NFIRS codes of the time, and NFIRS has since changed (see USA). It is not clear what the current coding choices are for this in Australia.

Reporting and estimation of heating and cooling equipment fires by country (ISO 17755:2014, page 66)
Unclear. The parts of the coding manual provided with the survey response do not provide details under Equipment Involved in Ignition, but an early 1990s report on Australian fire statistics, prepared by CSIRO, indicated that Equipment Involved in Ignition had 12 relevant choices and 2 partially relevant choices with 4 partially undefined categories and 2 possibly irrelevant choices linked to some of the partially undefined categories (water cooling device; fixed, stationary local refrigeration unit):
— Central heating system
— Water heater
— Fixed, stationary local heating unit
— Indoor fireplace
— Portable local heating unit

— Chimney or gas vent flue
— Chimney or vent connector
— Heat transfer system
— Unclassified heating system
— Unknown-type heating system
— Fixed, stationary local air conditioning unit
— Central air conditioning or refrigeration equipment
— Portable air conditioning or refrigeration unit
— Unclassified air conditioning or refrigeration equipment
— Unknown type air conditioning or refrigeration equipment
This coding arrangement was modeled on the USA's NFIRS codes of the time, and NFIRS has since changed (see USA). It is not clear what the current coding choices are for this in Australia.

Reporting and estimation of cooking and kitchen equipment fires by country (ISO 17755:2014, page 70)
Unclear. The parts of the coding manual provided with the survey response do not provide details under Equipment Involved in Ignition, but an early 1990s report on Australian fire statistics, prepared by CSIRO, indicated that Equipment Involved in Ignition had 10 relevant choices and 2 partially relevant choices with 4 partially undefined categories and 2 possibly irrelevant choices linked to some of the partially undefined categories (water cooling device; fixed, stationary local air conditioning unit):
— Fixed, stationary surface cooking unit (such as stovetop)
— Fixed, stationary oven
— Fixed, stationary food warming appliance
— Deep fat fryer
— Portable cooking or warming unit
— Open fired grill
— Grease hood or duct
— Unclassified cooking equipment
— Unknown-type cooking equipment
— Fixed, stationary local refrigeration unit
— Central air conditioning or refrigeration equipment
— Portable air conditioning or refrigeration unit
— Unclassified air conditioning or refrigeration equipment
— Unknown type air conditioning or refrigeration equipment
This coding arrangement was modeled on the USA's NFIRS codes of the time, and NFIRS has since changed (see USA). It is not clear what the current coding choices are for this in Australia.

Reporting and estimation of clothes dryer fires by country (ISO 17755:2014, page 74)
Unclear. The parts of the coding manual provided with the survey response do not provide details under Equipment Involved in Ignition, but an early 1990s report on Australian fire statistics, prepared by CSIRO, indicated that Equipment Involved in Ignition had 2 relevant choices and 2 partially undefined categories and 7 irrelevant choices linked to the partially undefined categories (television or radio; floor care equipment; separate motor or generator; hand tool; portable appliance designed to produce controlled heat; portable appliance not designed to produced controlled heat):
— Dryer
— Washing machine
— Unclassified appliance or equipment
— Unknown type appliance or equipment
This coding arrangement was modeled on the USA's NFIRS codes of the time, and NFIRS has since changed (see USA). It is not clear what the current coding choices are for this in Australia.

Reporting and estimation of entertainment equipment fires by country (ISO 17755:2014, page 75)
Unclear. The parts of the coding manual provided with the survey response do not provide details under Equipment Involved in Ignition, but an early 1990s report on Australian fire statistics, prepared by CSIRO, indicated that Equipment Involved in Ignition had 1 relevant choice and 2 partially undefined categories and 8 irrelevant choices linked to the partially undefined categories (dryer; washing machine; floor care equipment; separate motor or generator; hand tool; portable appliance designed to produce controlled heat; portable appliance not designed to produced controlled heat):
— Television, radio, or phonograph
— Unclassified appliance or equipment

— Unknown type appliance or equipment
This coding arrangement was modeled on the USA's NFIRS codes of the time, and NFIRS has since changed (see USA). It is not clear what the current coding choices are for this in Australia.

Reporting and estimation of office equipment fires by country (ISO 17755:2014, page 78)
Unclear. The parts of the coding manual provided with the survey response do not provide details under Equipment Involved in Ignition, but an early 1990s report on Australian fire statistics, prepared by CSIRO, indicated that Equipment Involved in Ignition had 4 probably relevant choices and 2 partially undefined categories and 4 irrelevant choices linked to the partially undefined categories (biomedical device or equipment; separate pump or compressor; internal combustion engine; conveyor):
— Electronic equipment
— Vending machine or drinking fountain
— Office machine
— Unclassified special equipment
— Unknown type special equipment
This coding arrangement was modeled on the USA's NFIRS codes of the time, and NFIRS has since changed (see USA). It is not clear what the current coding choices are for this in Australia.

Reporting of electrical and electrical distribution or lighting equipment fires by country (ISO 17755:2014, page 81)
Australia is not present in this table.

Reporting of other appliance and equipment fires by country (ISO 17755:2014, page 85)
Australia is not present in this table.

Reporting of item first ignited in terms of form and function by country (ISO 17755:2014, page 92)
Australia is not present in this table.

Reporting of item first ignited in terms of material composition by country (ISO 17755:2014, page 101)
Australia is not present in this table.

Reporting of factors in ignition by country (ISO 17755:2014, page 104)
Australia is not present in this table.

Presence and type of sprinkler or other extinguishing equipment by country (ISO 17755:2014, page 112)
Yes, included in reporting. No coding for different types of sprinklers or for different types of automatic extinguishing equipment. Coding refers to "sprinklers", which suggests that non-water based systems are not captured here.

Performance of sprinkler or other extinguishing equipment by country (ISO 17755:2014, page 115)
Sprinkler performance
— Extinguished fire
— Prevented spread, but did not extinguish
— Did not prevent spread
— Equipment operated, performance not classified above
— Equipment should have operated but did not
— Equipment present but fire too small to require operation
— No equipment present in room or space of fire origin
— Performance of equipment not classified above
— Sprinkler performance; insufficient information available to classify further
— Performance of equipment undetermined
— Sprinkler performance not reported
Factors degrading effectiveness
— High severity of fire
— System disconnected
— Inadequate water supply (at the time of fire)
— Obstruction of system
— Faulty component in system

— Premature closure of valve
— Fire started in un-sprinkled area
— Not applicable
— Factor degrading sprinkler effectiveness not classified above
— Factor degrading sprinkler effectiveness undetermined
— Factor degrading sprinkler effectiveness not reported
Number of sprinkler heads that operated.

Presence and type of detection or alarm equipment by country (ISO 17755:2014, page 117)
Yes, included in reporting. No mention of fire detectors that are not smoke detectors (for example, heat detectors).
Smoke Alarms/Detector Presence
— Smoke alarm present
— Unable to determine presence of smoke alarm
— No smoke alarm present
Smoke Alarms/Detector Power Source
— Battery only
— Hard wire only
— Plug in
— Hard wire with battery
— Plug in with batter
— Mechanical
— Multiple alarms and power supplies
— Alarm power supply not applicable
— Other power supply not classified above

Performance of detection or alarm equipment by country (ISO 17755:2014, page 121)
Operation
— Failed to operate
— Operated properly
— Operation of smoke alarm not applicable
Effectiveness
— Alerted occupants
— Occupants failed to respond
— There were no occupants
— Failed to alert occupants
— Effectiveness of smoke alarm not applicable
— Other not classified above
Reasons for Failure
— Hard wire power failure, shutoff or disconnect
— Improper installation or placement
— Defective
— Lack of cleaning
— Battery missing or disconnected
— Battery discharge or dead
— Fire not within designed range of smoke alarm
— Reason for smoke alarm failure not applicable
— Other reason for alarm failure not classified above

Presence of extinguishers or other manual extinguishing equipment by country (ISO 17755:2014, page 125)
Yes, included in reporting.
Extinguishers Installed
— Yes
— No
— Undetermined
Separate data element reports number of extinguishers used by occupants (non-fire personnel).
Hose Reels Installed
— Yes

— No
— Undetermined
Separate data element reports number of hose reels used by occupants (non-fire personnel).
Hydrants Installed
— Yes
— No
— Undetermined
Separate data element reports number of hydrants used by occupants (non-fire personnel).

Presence of smoke management or control equipment by country (ISO 17755:2014, page 127)
Probably not, although there is information on “Air Handling System”.

Reporting on fire doors, fire walls and other compartmentation by country (ISO 17755:2014, page 127)
Need clarification. Survey says this is included in reporting and refers reader to attachment, but attachment has no details on compartmentation

References of existing database/studies

Fire statistics:

- Queensland: https://www.data.qld.gov.au/organization/queensland-fire-and-emergency-services
- South Australia: https://data.sa.gov.au/data/dataset/fire-service-incidents
- Western Australia: https://www.dfes.wa.gov.au/annualreport2020/year-in-review/

Summaries of existing database

The fire statistics in Australia is subdivided into the six states: Queensland, New South Wales, South Australia, Tasmania, Victoria and Western Australia. However, the Australian Incident Reporting System (AIRS) is a national standard for reporting. It has an electronic form and the data recorded can vary between states and within a state [1].

Existing definitions

The AIRS includes definitions and it is composed of 10 parts as follows:

A. Incident report header
B. False alarm
C. Hazardous materials
D. Casualties, rescue and evacuation
E. Ignition (all fires)
F. Firefighting
G. Bush, Forest, Grass fires
H. Dollar loss fires
I. Mobile property
J. Structure fires [1].

Are there differences within the same country?

Yes, despite the AIRS is a national standard of reporting there could be differences in the data collected by the various states and within a state [1].

Identification of missing information

A significant amount of fires is not recorded and not all the Australian fire service contribute to the national database.
Not all the required fields need to be completed and the compulsory fields are based on the nature of the call [1].

A2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

It is the responsibility of the officer of the first appliance to fill the report. The officer can contact the other station to require some information or access the rosters [1].

Fire response organisation

The fire organization is subdivided into the 6 states:

- Queensland Fire and Emergency Service
- New South Wales Fire and Rescue Service
- Metropolitan Fire Service South Australia
- Tasmania Fire Service
- Fire Rescue Victoria
- Department of Fire and Emergency Service Western Australia

Who collects data?

It is the responsibility of the officer of the first appliance to fill the report. The officer can contact the other station to require some information or access the rosters [1].

Who issues the data?

Each state yearly publishes some information of the dataset. The fire statistics dataset of Queensland are publicly available while for South Australia and Western Australia data are partially available:

- Queensland: https://www.data.qld.gov.au/organization/queensland-fire-and-emergency-services
- South Australia: https://data.sa.gov.au/data/dataset/fire-service-incidents
- Western Australia: https://www.dfes.wa.gov.au/annualreport2020/year-in-review/

Are there different levels of collection?

The AIRS is an incident standard of reporting. However, national statistics is not available and each state has its fire statistics dataset.

A3. STATISTICS INTERPRETATION ISSUES

Purpose for which data is collected

The collection of data is used to identify trends in fire and incidents and the AIRS is adopted to evaluate the effectiveness of emergency responses to community [1].

There is currently a research project funded by Australian Building Codes Board to review the national fire statistics and reporting in Australia. The ultimate goal would be to harmonise the fire data and to provide valuable information for regulators and fire safety engineers.

A4. ANALYSE EXISTING DATA

Determining the level of confidence

It is the responsibility of the officer of the first appliance to fill the report. The officer can contact the other station to require some information or access the rosters. However, the rosters may not be accurately reflect the fire fighters present at the fire scene. Moreover, higher alarm levels may increase the risk of inaccurate personnel reporting increases [1].

Pinpointing issues and limitations

- Several fires are not recorded
- Not all Australian fire service contribute to the database
- Firefighters exposure to toxins not recorded

- Only some fields are compulsory
- The data recording is based on the visible to the officer at the scene [1].

Examples

QUEENSLAND:
Fire statistics datasets are available in the following link:
https://www.data.qld.gov.au/organization/queensland-fire-and-emergency-services

NEW SOUTH WALES:
Fire and rescue annual review reports from 1999/2000 to 2018/2019 are available in the following link:
https://www.fire.nsw.gov.au/page.php?id=453
The report of 2018/2019 contains information about:
- Overview of Fire and Rescue NSW
- Capabilities
- Building Organisational Capability.

No data related to fire in buildings.

SOUTH AUSTRALIA:
Fire service incidents datasets are available from 2014 to 2020 in the following link:
https://data.sa.gov.au/data/dataset/fire-service-incidents
The Fire Service Incidents database from 1/7/2015 to 30/6/2020 contains data about:
- Date
- Brigade
- Situation found.

TASMANIA:
Tasmania Fire Service website:
http://www.fire.tas.gov.au/
No data available.

VICTORIA:
Fire Rescue Victoria:
https://www.frv.vic.gov.au/
No data available

WESTERN AUSTRALIA:
https://www.dfes.wa.gov.au/Pages/default.aspx
Structure fire (suggestions but no data available on previous incidents):
https://www.dfes.wa.gov.au/safetyinformation/fire/fireinthehome/Pages/default.aspx
Annual Report 2019/2020 – Department of Fire & Emergency Service:
https://www.dfes.wa.gov.au/publications/Annual%20Reports/DFES_Annual_Report_2019-2020.pdf
It contains:
- Executive summary
- Corporate structure
- Financial Statements and Performance Indicators
- Compliance and Other Disclosures

No data about previous fire incidents in buildings.

REFERENCES:
[1] United Firefighters Union of Australia, “Sub_19 UFUA supp,” 2011.

B. DIAGNOSTIC SHEET FOR AUSTRIA

B1. TERMINOLOGY ISSUES

References of existing database/studies

Databases

In general, the Austrian Fire Prevention Associations collect data from the police stations and insurers for each federal state (excepting Vienna) and publish them yearly. The several fire statistics are gattered by the Upper Austrian Fire Prevention Association for creating and publishing an Austrian Fire Statistic, which is also published once a year. These statistics provide data in a superficial way only (number and loss by ignition source and federal state, number and loss by risk group and federal state, trend of lethal fire injuries, long-term statistic over 10 years).
https://www.bvs-ooe.at/services-und-leistungen/brandschadenstatistiken/

Data Management-System in Fire Investigation:
In the years 2014 to 2017 a group of experts in fire investigation created a database-system to collect fire data in a structured way (Datenmanagement in der Brandursachenermittlung – DMBUE). Six of nine Austrian federal states participate in this data management-system up to now.
Since 2017 the participating Austrian Fire Prevention Associations collect information the fires including information of police stations and fire investigations conducted by the fire prevention associations.

Studies

Brandverhütungsstelle Voralrberg, several studies (uploaded):
https://www.brandverhuetung.at/brandstatistik/

Harsch, G. (2015): Data management in fire investigation operated by the Austrian Fire Protection Associations for exploitation in approval processes of commercial facilities. August 2015, Danube-University Krems.

Summaries of existing database

Sources are based on several different entities who publish fire data, which are predominantly based on the Austrian Fire Statistics, provided by the Austrian Fire Prevention Associations. Several are more focused on property losses and fire causes, others seem to collect data about fatalities and injuries as well.
In addition, the Austrian Fire Brigade Association (Österreichischer Bundesfeuerwehrverband) provides statistical data focussing fire service interventions.

Several local systems seem to be in place.

The DMBUE is a web-based tool to collect information about fire incidents. Primarily, the surveyors of the Austrian Fire Prevention Associations, that conduct fire investigations, feed data into the system. System-members connect to www.brandursache.or.at

The gathered data are available topically to create statistics or requests.

The data management-system uses terms and definitions provided by national and European standards and national regulations (see Task 1.4).

Information gathered by the Data management in fire investigation operated by the Austrian Fire Protection Associations:

1. Identification

1.1. ID-Number (reference number, file number,…)
1.2. Incident location
1.2.1. Federal state

1.2.1.1. District
1.2.1.1.1. Municipality
1.2.1.1.2. Postal Code
1.3. Incident date
1.3.1. Date (dd.mm.yyyy)
1.3.2. Time
1.4. Date of Investigation

2. Fire Loss

2.1. Insurer
2.2. Amount of Damage
2.2.1. Known amount OR
2.2.2. Estimated amount
2.3. Damage to Persons
2.3.1. Personal injury
2.3.1.1. Gender
2.3.1.2. Age
2.3.1.3. Type of injury
2.3.2. Dead Person
2.3.2.1. Gender
2.3.2.2. Age
2.3.2.3. Cause of Death
2.4. Killed Animals
2.4.1.1. Kind
2.4.1.2. Number

3. Alerting/ Fire detection

3.1. Alerting of Fire Brigade
3.2. Internal Alarm

4. Fire Data

4.1. Risk-Group (Civilian, Farming, Commerce, Industries, Other)
4.2. Ignition Source (according to ignition-source-code)
4.3. Primary ignited Material
4.4. Location of Ignition Source
4.4.1. Inside a Building
4.4.1.1. Building type
4.4.1.2. Building key data
4.4.1.2.1. Construction of the entire Building
4.4.1.2.2. Fire Resistance of major part of the bearing structure
4.4.1.2.2.1. Walls
4.4.1.2.2.2. Ceilings
4.4.1.2.2.3. Roof construction
4.4.1.2.3. Number of Floors (above and underground)
4.4.1.2.4. Approximate gross floor area
4.4.1.2.5. Approximate area of the affected fire compartment
4.4.1.2.6. Approximate area of the fire room
4.4.1.3. Technical fire-protection appliances

4.4.1.3.1. Type
4.4.1.3.1.1. Plant type
4.4.1.3.1.1.1. Scope of protection
4.4.1.3.1.1.1.1. Fire location within the scope of protection
4.4.1.3.1.1.1.1.1. Effectiveness and reason for ineffectiveness
4.4.1.4. Organisational fire protection measures
4.4.1.5. Course of the fire
4.4.1.5.1. Location of the area where the fire started
4.4.1.5.2. Room use of fire breakout
4.4.1.5.3. Main content of the room
4.4.1.6. Way of fire spread
4.4.2.Outdoors
4.4.2.1. Use of the open area
4.4.2.2. Course of the fire
4.4.2.3. Way of fire spread

Are there differences within the same country?

Yes, the regions seem to have different ways to collect fire data.

The federal countries of Austria developed different systems for data-collection over decades. For example:
- BUE-Statistik OÖ (Fire Investigation statistics of Upper Austria)
- Fire Investigation Statistics of Vorarlberg

In addition, the federal fire brigade associations are collecting specific data about fire fighting operations.

Since 2017 a process to harmonize data collection was started. Today most of the federal countries in Austria (six of nine) use DMBUE.

Identification of missing information

It is difficult to get an overall picture for Austria as data is collected in regions.
Some fire data seem to be detailed but this seems to be not the case for all collected data.

DMBUE does not collect data about fire fighting operations. It focusses on preventative fire protection measures.

B2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

Fires and technical incidents.
(Red and green cross is responsible for ambulance.)

Fire response organisation

In Austria nearly every village has a fire service, in total there are 4.500 voluntary fire services (not personnel but services) and 300 company fire services and 6 professional fire services.

The Austrian Fire Prevention Associations are organized in different ways. They are organized as nonprofit associations, companionships or as a part of the federal fire brigade association.
In general, the Fire Prevention Associations are civilian organisations.

Who collects data?

Fire Investigation Data are collected in Austria by the Fire Prevention Associations (DMBUE), by Police departments, which also provide data for DMBUE, and the fire-insurers.
The information from all these institutions is gattered and published in the Austrian Fire Statistic, provided by the Austrian Fire Prevention Associations.

Who issues data?

The yearly fire statistics are published by each federal Fire Prevention Association. The Upper Austrian Fire Prevention Association consolidates the federal statistics and publishes the combined Austrian Fire Statistic. Special reports are provided primarily for research and scientifically reasons.

Where is the data stored?

The DMBUE is hosted on a high-level security server.

B3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

The Austrian Fire Statistic is publicly available. Special reports from DMBUE are interpreted by surveyors and fire safety experts.

Purpose for which data is collected

The purpose is to provide data for research and scientifically reasons as well as for performance-based fire prevention measures.

Is there follow up to data collected?

Experts of the Austrian Fire Prevention Associations make a revision of DMBUE once a year. The system DMBUE includes a function to implement new data-types by general-administrators.

Analyse potential cause and consequences in trends

Yes, new keywords are displayed on a dashboard automatically to be controlled by one of the general-administrators.

B4. ANALYSE EXISTING DATA

Determining the level of confidence

Data-collection is conducted by surveyors for fire-investigation and -prevention. So the level of confidence seems to be very high.

Pinpointing issues and limitations

Six of nine Austrian federal states participate in this data management-system up to now.

Examples

Trends in fire statistic data

- Fatalities due to smoke inhalation, smoke is hazardous for inhabitants and fire fighters (smoke layer ignition, back draft etc.) (Brandschutzforum Austria- Heisse Zahlen)
- High property loss in a few numbers of industrial fires, these are not the fires with the most fatalities
- Property loss is increasing over recent years

C. DIAGNOSTIC SHEET FOR BULGARIA

C1. TERMINOLOGY ISSUES

References of existing database/studies

All information is available at https://www.mvr.bg/gdpbzn

Summaries of existing database

The annual reports contain the following chapters and describe all the activities of fire services in Bulgaria:

- Number of accidents and exits of fire and rescue equipment
- Fires with material losses, distributed by reasons of occurrence
- Fires with material losses, broken down by industry
- Statistics on fires, deaths and injuries
- Information on the performed activity
- Information on the performed activity in the field of preventive control
- Training and preparation
- Document flow and administrative services
- Current state of the voluntary formations
- Participation of the bodies of the General Directorate for Combating Organized Crime in the work related to the Council of Ministers, NATO, the EU and humanitarian operations

Existing definitions

The definitions of the terms used in fire statistics are set in internal regulations.

Are there differences within the same country?

The fire statistics in Bulgaria are organized uniformly across the country.

C2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

National emergency management authority: Fire Safety and Civil Protection Chief Directorate, Ministry of Interior
According to Art. 52 g of the Law on the Ministry of Interior (last amendments in Official Gazette No 88 of 9 November 2010) „The Fire Safety and Civil Protection Chief Directorate is a national specialized structure of the MoI for ensuring fire safety, rescue and protection in case of disasters under the terms and provisions of this Law and the Disaster Protection Law".
Main tasks:

- Firefighting and rescue activities;
- Emergency recovery activities, operational protection in case of floods and search and rescue operations;
- CBRN protection in case of incidents and accidents with HAZMAT and dealing with ecological incidents;
- State fire safety control;
- Prevention activities and control;
- Early-warning and alert of the state executive bodies and the population in case of disaster;
- Protection of the population in case of "wartime" or "emergency situation" in compliance with the Geneva Conventions;
- Assistance in the activities of the Interagency Commission for recovery and relief to the Council of Ministers;
- Methodical and expert support for disaster protection to the territorial executive authorities;

- Operational cooperation with the EU and NATO structures and other international organizations/initiatives in the field of fire safety and protection of the population, humanitarian aid and civil-military emergency planning.

Fire response organisation

As for the years 2001-2016, the following information is available. With a population of around 7.2 million, the country has 243 fire stations. There are around 690 fire engines or fire tenders and 66 ladder engines in service. The state's fire departments have around 6,000 professional firefighters and 2,600 volunteer firefighters.

Who collects data?

The fire statistics are compiled by the responsible Ministry of the Interior. There the directorate for fire protection is responsible.

Who issues the data?

Ministry of the Interior

Are there different levels of collection?

The fire statistics are collected at the local level according to standardized criteria. So there are no differences between urban and rural settlements.

Where is the data stored?

In the Ministry of the Interior

C3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

- Ministry of Interiors
- Fire Service
- Technical Experts

Purpose for which data is collected

- Reducing the number of fires
- Reduction in the number of fire victims
- Reducing fire damage
- Elimination of the main causes of fire
- Increasing fire safety in the most important fire objects
- Reducing the environmental damage caused by fires
- Creation of stable fire-resistant infrastructure
- Increasing fire safety for children and the elderly

What are the methods used to fill the gaps where information is missing?

There is no a particular method due to the fact that all the required information is collected by each region and stored in the platform mentioned above.

Is there follow up to data collected ?

The data will be reviewed and the corrections published in the following year.

Analyse potential cause and consequences in trends

The Interior Ministry is analyzing the statistics and taking measures to improve the situation with the fires.

C4. ANALYSE EXISTING DATA

Pinpointing issues and limitations

- The lack of definitions for fire statistics words and expressions.
- The lack of methodology to fill the gaps where information is missing.
- The lack of training for the firefighters in charge of the fire response report.
- The database from the fire brigade does not take into account the fire casualties occurring at the hospital or during their transportation to the hospital by EMS

Examples

- The fire statistics of the state of Bulgaria are organized centrally.
- Particular attention is paid to the issue of fire damage.
- The fire statistics of Bulgaria describe the causes of the fire in a good way. It is particularly noticeable that the causes of fire due to electricity are to be found in the first place. In second place, a lot of actions by people when dealing with open fire can be seen.
- The statistics of the state distribute the fires to the various economic sectors. The residential sector accounts for a particularly large proportion of the fires. The transport sector also has comparably high numbers of fires.
- A general distinction is made between fires with and without material losses.
- The number of fire victims is divided into age groups. One can clearly distinguish between children, adults and older people.
- The Bulgarian fire statistics also show the development of the number of fire victims by year and age group. Since 1995 the number of fire deaths has been increasing.

Table 1: Fires by Year and Losses

Year	Fires		
	FIRE WITH MATERIAL LOSSES	FIRE WITHOUT MATERIAL LOSSES	TOTAL FIRE
2019	8422	33719	42141
2018	7961	21487	29448
2017	9120	26362	35482
2016	9058	28304	37362
2015	8656	21353	30009

Table 2: Fires by Year and Causes

Fire Causes	TOTAL				
	2019	2018	2017	2016	2015
SHORT CIRCUIT	2074	2265	2326	2216	2306
INCORRECT USE OF HEATING APPLIANCES 1	285	334	386	335	335
INCORRECT USE OF HEATING APPLIANCES 2	364	330	353	351	347
NEGLIGENCE WHEN HANDLING WITH OPEN FIRE	2138	1510	2013	2090	1907
TECHNICAL FAULT	1066	1007	1088	989	973
DISTURBED TECHNOLOGY	19	28	29	28	32
NATURAL PHENOMENA	42	64	50	44	63
INTENTION	392	402	508	534	504
IN THE PROCESS OF ESTABLISHMENT	1294	1315	1541	1692	1401
OTHERS	231	225	247	212	223
CONSTRUCTION FAULT	151	171	192	193	201
FIRE WORKS	51	64	70	57	55
SELF-IGNITION	225	168	202	212	201
CHILDREN'S GAME	81	70	112	98	104
POOR QUALITY REPAIR	9	8	3	7	4
TOTAL FIRE WITH LOSSES	8422	7961	9120	9058	8656

Table 3: Fires by Year and Sectors of Economy

Fires by Sectors of Economy	TOTAL				
	2019	2018	2017	2016	2015
ENERGY	273	267	288	276	311
PROCESSING INDUSTRY	142	148	150	132	154
CONSTRUCTION	16	16	26	32	22
AGRICULTURE AND FISHERIES	702	563	848	860	650
FORESTRY	330	94	231	277	147
TRANSPORT, STORAGE AND MAIL	2166	2229	2427	2353	2278
TRADE AND REPAIR	213	198	228	235	240
HOTELS AND RESTAURANTS	192	175	210	228	228
HOUSING	3535	3391	3756	3503	3426
EDUCATION	35	47	44	41	26
CULTURE, SPORT AND ENTERTAINMENT	31	26	20	33	18
HUMAN HEALTH AND SOCIAL CARE	32	27	25	31	32
GOVERNMENT	15	18	27	14	17
WATER SUPPLY, SEWERAGE, GARBAGE COLLECTION	575	601	664	790	919
OTHER INDUSTRIES AND ACTIVITIES	165	161	176	253	188
TOTAL FIRE WITH LOSSES	8422	7961	9120	9058	8656

Table 4: Fires by Year and Number of Fire Deaths

Years	fires with material losses	fires without material losses	Total fires	Fire Deaths							
				Up to 7	8-14	15-18	19-60	61-70	Over 70	Unknown	Total
1995	7621	7437	**15058**	14	1	-	56	9	27	-	**107**
1996	7357	9486	**16843**	11	1	2	41	10	30	-	**95**
1997	6982	7793	**14775**	10	1	-	37	11	33	-	**92**
1998	8137	14256	**22393**	7	1	-	51	9	27	-	**95**
1999	8165	10921	**19086**	10	2	1	44	12	25	-	**94**
2000	11670	26802	**38472**	1	1	1	40	21	34	-	**98**
2001	9244	21778	**31022**	8	2	-	45	14	35	-	**104**
2002	7647	10803	**18450**	11	1	3	34	11	37	-	**97**
2003	8553	17382	**25935**	15	-	1	39	11	42	-	**108**
2004	7980	15846	**23826**	7	2	1	41	15	38	-	**104**
2005	7540	11430	**18970**	6	1	-	46	16	33	-	**102**
2006	8548	20542	**29090**	8	-	-	27	16	44	-	**95**
2007	10501	27686	**38187**	8	2	-	38	20	37	-	**105**
2008	9659	28439	**38098**	5	2	-	50	19	36	-	**112**
2009	8970	21249	**30219**	9	-	-	49	25	36	3	**122**
2010	8136	16894	**25030**		3	-	32	11	32	1	**79**
2011	9487	32403	**41890**	5	-	-	37	18	60	2	**122**
2012	9728	35203	**44931**	2	-	-	35	20	60	4	**121**
2013	8503	24401	**32904**	5	1	-	39	19	40	2	**106**
2014	7781	15417	**23198**	4	1	-	30	22	42	4	**103**
2015	8656	21353	**30009**	1	-	-	33	19	55	1	**109**
2016	9058	28304	**37362**	10	1	1	38	24	55	-	**129**
2017	9120	26362	**35482**	4	-	-	30	39	73	-	**146**
2018	7961	21487	**29448**	7	2	-	38	42	56	-	**145**
2019	8422	33719	**42141**	4	1	0	36	42	51	-	**134**

Table 5: Number of Fire Injuries by Years and Age

	Up to 7	8-14	15-18	19-60	61-70	Over 70	Unknown	Total
1995	14	7		86	9	11	-	127
1996	9	7	6	151	11	20	-	204
1997	23	8	8	142	18	15	-	214
1998	11	28	10	190	31	23	-	293
1999	12	3	6	192	30	26	-	269
2000	12	5	4	147	36	33	-	237
2001	22	8	12	166	28	27	-	263
2002	6	6	4	143	26	25	-	210
2003	9	4	8	170	30	43	-	264
2004	10	6	5	168	30	36	-	255
2005	9	11	4	134	15	50	-	223
2006	21	7	7	168	29	45	-	277
2007	18	8	7	168	31	43	-	275
2008	15	5	5	208	40	47	-	320
2009	15	4	10	176	40	52	3	300
2010	14	6	3	160	47	54	8	292
2011	14	10	7	185	45	73	3	337
2012	21	7	8	190	48	72	3	349
2013	3	7	6	168	35	76	10	305
2014	7	2	3	144	41	63	3	263
2015	10	9	9	185	44	78	4	339
2016	5	4	8	189	39	53	-	298
2017	9	7	2	170	45	68	-	301
2018	10	6	5	149	44	71	-	285
2019	5	4	4	149	48	83	-	293

D. DIAGNOSTIC SHEET FOR CANADA

D1. TERMINOLOGY ISSUES

Information from ISO 17755-1 & -2

Methods of estimation (ISO 17755-1, page 1)
Canada's databases begin as individual-incident databases at the local fire department level. Data may be aggregated before passing from provincial level to national level. The national level is a council of provincial fire commissioners. There is no mention of any adjustments for missing fire departments or other missing data. There is no mention of an incident-specific database at the national level. Analysis is by counting only. All or nearly all reports are completed by firefighters who lack extensive training in fire investigation.

Fires subject to reporting (ISO 17755-1, page 4)
All fires that result in Fire Department (FD) response should be reported.

Fire deaths subject to reporting (ISO 17755-1, page 6)
The Canadian definition of a fire fatality is "***a person who dies as a result of injuries sustained during a fire incident***". Examples of fire-related deaths that are likely to be recorded as non-fire deaths and not included in the database include people who die by fire resulting from vehicle accidents and deaths from a fire that is otherwise controlled (e.g. death by CO poisoning) and so does not receive a fire department response. As for fire deaths likely to be missed, as opposed to captured but not reported under fire, some jurisdictions in Canada (ON) count a death as a result of injuries sustained that must occur within one year and one day of the incident. There are differences between jurisdictions.

Fire injuries subject to reporting (ISO 17755-1, page 9)
A fire injury is a person who is injured as a result of a fire incident.

Reporting on victim characteristics (ISO 17755-1, pages 11-13)
In the Canadian databases, on the basis of the document named "Canadian Code Structure (CCS) on Fire Loss Statistics", the following characteristics are reported:

Age (if exact age is not known, give an estimate to the nearest 10 years),
Gender
Status:
— Firefighter
— Civilian
Nature (severity) of casualty
— Death
— Minor injury (less than 1 day hospital or off work)
— Light injury (1-2 days hospital or 1-15 days off work)
— Serious injury (3 days and more hospital or 16 days and more days off work)
Probable/possible cause of casualty:
— Smoke inhalation
— Burn
— Physical injury
— Other
Condition of casualty:
— Asleep at time of fire
— Bedridden or other physical handicap
— Impairment by alcohol, drugs or medication
— Awake and no physical or mental impairment at the time of fire
— Under restraint or detention
— Too young to react to fire emergency
— Mental handicap – includes senility
— Child left unattended
— Condition of casualty – unclassified
Action of casualty:
— Injured while attempting to escape
— Over-exertion, heart attack

— Entered or remained for rescue purposes
— Entered or remained for fire-fighting
— Entered or remained to save personal property
— Loss of judgment or panic
— Received delayed warning
— Did not act
— Action of casualty – unclassified

Cause of failure of escape:
— Trapped by rapid spreading of fire/smoke – through vertical openings, stairways, elevators
— Trapped by rapid spreading of fire/smoke – through horizontal openings
— High flame spread of combustible interior finish
— Building collapse
— Falling debris
— Explosion
— Exit blocked, locked, or obstructed
— Outdoor fire – includes forest/brush fires
— Cause of failure to escape – unclassified

Ignition of clothing or other fabrics:
Type of clothing or other fabric
— Outer clothing
— Sleepwear
— Underclothing
— Costume
— Bedding or bed linen (includes pillow)
— Mattress
— Rugs
— Unclassified fabric
— Unknown type fabric

Type of material ignited:
— Cotton
— Wool
— Other natural fibre
— Other synthetic fibre
— Mixture of fibres
— Rubber
— Plastics or plastics foam
— Unclassified fabric
— Unknown type fabric

Property damage subject to reporting (ISO 17755-1, page 26)
Loss shall be recorded as the estimate of the damage caused by the fire. The loss includes damage to property and contents. Loss shall only include direct loss caused by the fire, including salvage, but not indirect loss due to “use and occupancy” or business interruption. Measures used are:
— Monetary value of loss
Damage likely to be missed includes damage present but not reported by fire departments and damage that is not visible during investigation and reporting.

Other losses subject to reporting (ISO 17755-1, page 29)
— Deaths and injuries of firefighters, fire officers, fire brigade personnel, and other emergency responders due to acute fire effects.

Locations of fires based on survey responses (ISO 17755-1, page 32)
— Separate reporting of single family dwellings, buildings with multiple private housing units, and commercial residential properties, such as hotels, dormitories
— All residential properties reported together but distinguished from other buildings
— All buildings with private housing units reported together but distinguished from other Buildings

Specific types of buildings and other structures (residential only) (ISO 17755-1, page 35)
Residential use:

— Residential – row, garden, town housing, condominium
— Residential – apartment, tenement
— Hotel, motel, lodge, hostel, boarding house, dormitory
— Residential – single detached
— Residential – duplex, 3-plex, 4-plex, semi-detached
— Educational Institution (residential)
— Camp site/RV park
— Residential – mobile home/ trailer park
— Residential- with business/mercantile, up to 3 stories

Reporting of type of construction (ISO 17755-1, page 52)

General Construction

— Combustible Construction - open wood joist
— Protected Combustible Construction - wood protected by plaster
— Heavy Timber Construction
— Non-Combustible Construction - exposed steel
— Protected Non-Combustible Construction - protected steel or concrete
— General Construction - not applicable
— General Construction - unclassified

Possibly relevant when used in combination with the general construction codes would be the reporting of **year of construction**, because specific requirements, materials, and methods of construction might be correlated with different periods in recent history.

Method of Construction

— Stick Built – Constructed On Site
— Manufactured – Assembled/Placed On Site

Reporting of building height and other characteristics (ISO 17755-1, page 54)
— Height of building
— Level or floor where fire began
— Structure status, such as vacant, under construction, or under demolition
— Age of building

Reporting and estimation of deliberately-set fires (ISO 17755-1, page 56)
Recorded under Act or Omission using any of following categories
— Incendiary
— Suspicious
— Incendiary/riot or civil disturbance
— Incendiary/unclassified
— Incendiary/additional details unknown
The last three categories presumably include incendiary and suspicious fires.
All four loss measures reported as well as fire brigade deaths and injuries
Classification as deliberate – some by trained arson investigators, some by insurance investigators or other insurance personnel
Statistical analysis of deliberate fires includes some fires with unknown cause or cause still under investigation
Reporting of fireplay, and no fires are categorized as both deliberate and fireplay, but practices appear to vary from province to province, based on last national statistics report published (2007). Ages are distinguished as
— 11 or younger
— 12 to 17
— 18 or older
— Playing but age unknown
The same age breakdowns can be reported for incendiary fires and for suspicious fires.
Intentional fires are categorized as to motive or circumstances.
— Arson for profit (reported in survey but not clear in 2002 coding manual where or how this point is covered)
— Arson during riot or social disturbance
— Arson by juveniles (children).

Reporting and estimation of natural cause fires (ISO 17755-1, page 60)
Details appear to be limited to a coding entry for lightning under Fuel or Energy Associated with Igniting Object

Reporting and estimation of exposure fires (ISO 17755-1, page 62)
Recorded as any of the following choices under Igniting Object
— Structure attached
— Structure detached
— Lumber yard
— Outside storage container or tank
— “Open” fire
— Forest or trees
— Grass, shrub, brush or scrub
— Vehicle
— Unclassified or unknown

Reporting and estimation of smoking material and open flame fires (ISO 17755-1, page 64)
Recorded as any of the following choices under Igniting Object
— Cigarette
— Pipe (contents)
— Cigar
— Ashtray (contents)
— Match used as lighting implement
— Lighter used as lighting implement
— Smoker’s material of unknown type
— Match not used as smoker’s implement
— Lighter not used as smoker’s implement
— Match or lighter (not clear which) not used as smoker’s implement
— Lamp or lantern (not electric)
— Candle or taper
— Cutting torch
— Welding torch
— Torch other than cutting or welding
— Hot ash or ember
— Unclassified or unknown type smoker’s material or open flame
These coding choices include a number of categories that cannot be confidently allocated to smoking materials versus open flames.

Reporting and estimation of heating and cooling equipment fires (ISO 17755-1, page 67)
recorded as any of the following choices under Igniting Object; some of these choices are linked to partially specified choices (unclassified or unknown appliance or equipment not further specified)
— Central heating unit
— Water heater
— Stationary space heater not further specified
— Stationary space heater – wood stove
— Portable space heater
— Fireplace not further specified
— Zero clearance fireplace
— Fireplace (with) insert
— Free-standing fireplace
— Masonry or brick fireplace
— Chimney not further specified
— Factory built chimney
— Masonry chimney
— Metal chimney
— Flue pipe or vent connector
— Radiant heating system not further specified
— Radiant heating system ceiling
— Radiant heating system floor

— Unclassified or unknown type heating equipment
— Central air conditioning *or refrigeration* equipment (partially relevant)
— Individual air conditioner or dehumidifier
— Vehicle related heater not further specified
— Vehicle related heater – interior
— Vehicle related heater – block heater
— Vehicle related heater – battery blanket
— Sauna heater (under unclassified or unknown appliance or equipment)
— Waterbed heater (under unclassified or unknown appliance or equipment)
These coding choices include a number of categories that cannot be confidently allocated to smoking materials versus open flames.

Reporting and estimation of cooking and kitchen equipment fires (ISO 17755-1, page 71)
Recorded as any of the following choices under Igniting Object; some of these choices are linked to partially specified choices (unclassified or unknown appliance or equipment not further specified)
— Stove or range – involving fire in pan
— Stove or range – involving fire in pot used as a deep fat fryer
— Stove or range – involving other circumstances
— Oven or stove or range
— Chafing dish or fondue
— Deep fat fryer, separate appliance
— Commercial cooking equipment – non-turbulent medium (older units)
— Commercial cooking equipment – turbulent medium (new high efficiency units)
— Domestic/household temperature controlled deep fat fryer
— Smoker for meat, fish, etc.
— Fry pan or grill not on stove
— Other portable cooking unit, including hot plate and camp stove
— Open fired broiler, fixed type
— Open fired broiler, portable type, including barbecue
— Portable food warming appliance, including steam table, warming drawer, warming table
— Toaster or waffle iron
— Electric kettle, coffee maker or urn
— Microwave oven
— Unclassified or unknown cooking equipment
— Central air conditioning *or refrigeration* equipment (partially relevant)
— Individual refrigeration unit, including refrigerator or freezer
— Electric barbeque starter

Reporting and estimation of clothes dryer fires (ISO 17755-1, page 74)
Recorded as any of the following choices under Igniting Object; some of these choices are linked to partially specified choices (unclassified or unknown appliance or equipment not further specified)
— Clothes dryer
— Washing machine

Reporting and estimation of entertainment equipment fires (ISO 17755-1, page 76)
Recorded as any of the following choices under Igniting Object; some of these choices are linked to partially specified choices (unclassified or unknown appliance, unclassified or unknown electrical equipment, or equipment not further specified)
— Television or computer monitor (partially relevant to entertainment equipment and partially relevant to office equipment)
— Radio, stereo, phonograph, tape recorder, video cassette recorder
— Video game equipment

Reporting and estimation of office equipment fires (ISO 17755-1, page 78)
Recorded as any of the following choices under Igniting Object; some of these choices are linked to partially specified choices (unclassified or unknown appliance, unclassified or unknown electrical equipment, or equipment not further specified)
— Television or computer monitor (partially relevant to entertainment equipment and partially relevant to office equipment)

— Electronic communications equipment
— Electronic data processing equipment, including computers
— Photocopier, facsimile machine, or computer printer

Reporting of electrical and electrical distribution or lighting equipment fires (ISO 17755-1, page 81)
Recorded as any of the following choices under Igniting Object; some of these choices are linked to partially specified choices (unclassified or unknown appliance, unclassified or unknown electrical equipment, or equipment not further specified)
— Generator
— Permanent electric wiring or cable, including junction box and power line, excluding copper or aluminum conductors
— Copper conductor
— Aluminum conductor
— Transformer
— Switchgear
— Panelboard or switchboard, including fuse or circuit breaker
— Switch, outlet, receptacle or socket
— Temporary electric wiring excluding next three more specific types
— Extension cord
— Construction site or field wiring
— Power bar
— Low voltage wiring
— Battery or rectifier
— Unclassified or unknown electrical distribution equipment
— Incandescent lamp or light bulb
— Halogen lamp
— Grow lamp or light
— Fluorescent lamp including ballast
— Unclassified or unknown electrical equipment (also linked to other electrical equipment, including office equipment)

Reporting of other appliance and equipment fires (ISO 17755-1, page 85)
Recorded as any of the following choices under Igniting Object; some of these choices are linked to partially specified choices
— Pressing iron
— Lawn mower
— Snow blower
— Electric blanket or heating pad
— Incinerator
— Vacuum cleaner
— Paint sprayer
— Motor (separate reporting for over or under 1 horsepower)
— Internal combustion engine
— Heat treatment equipment
— Industrial oven including kiln
— Tar pot
— Bearing, belting, conveyor or brake
— Commercial or industrial machinery or equipment
— Miscellaneous igniting object
— Unknown igniting object

Reporting of item first ignited in terms of form and function (ISO 17755-1, pages 92-95)
recorded as any of the following choices under Igniting Object; some of these choices are linked to partially specified choices
— Wood roof covering
— Non-wood roof covering
— Exterior wall covering, surface or finish
— Exterior trim or appurtenance including door, porch or balcony
— Wood floor covering

— Tile or plastic floor covering
— Carpet or rug floor covering
— Building component – floor, ceiling or roof
— Building component – wall
— Interior wall covering excluding plastic
— Interior wall covering – plastic
— Wood or high density fibreboard as ceiling covering
— Low density fibreboard as ceiling covering
— Plastic ceiling covering
— Wood or wood product insulation
— Plastic insulation
— Mineral insulation
— Unclassified building components
— Undetermined building components
— Upholstered furniture
— Non-upholstered wood furniture
— Non-upholstered plastic furniture
— Ironing board
— Mattress
— Bedding
— Drapery
— Broom, mop or brush
— Unclassified furniture or furnishing
— Undetermined furniture or furnishing
— Cotton clothing
— Wool clothing
— Synthetic fibre clothing
— Cotton fabric
— Wool fabric
— Synthetic fibre fabric
— Fur
— Tarpaulin
— Unclassified clothing or textile
— Undetermined clothing or textile
— Wood excluding wood products listed elsewhere and excluding felled timber
— Wood shavings
— Paper or packing material
— Paper decoration
— Wastepaper
— Cardboard
— Paper stock
— Unclassified wood or paper product
— Undetermined wood or paper product
— Gasoline
— Fuel oil not further specified
— Diesel
— Kerosene
— Fondue fuel
— Lighter fluid
— Combustible liquid not further specified
— Power steering fluid
— Transmission fluid
— Brake or hydraulic fluid
— Motor grease
— Crude oil
— Motor oil
— Contact cement
— Glue
— Flammable liquid not further specified excluding gasoline

— Paint or varnish
— Cooking oil or fat
— Vegetable oil
— Animal fat
— Deep fat synthetic frying oil
— Tar or asphalt
— Polish or wax
— Undetermined flammable or combustible liquid
— Natural gas
— Propane
— Anaesthetic gas
— Acetylene
— Hydrogen
— Unclassified flammable gas
— Undetermined flammable gas
— Cellulose nitrate
— Plastic
— Oxidizing material
— Magnesium and alloys
— Titanium, zirconium and alloys
— Natural or synthetic rubber including tires and belts
— Ammonium nitrate
— Unclassified chemical, plastic or metal
— Undetermined chemical, plastic or metal
— Natural or synthetic fibre
— Grain or flour
— Food – starch
— Food – protein
— Food – fruit
— Hay
— Tree or shrub
— Felled timber
— Grass, brush or leaves
— Manure
— Natural Christmas tree
— Unclassified agricultural or forestry product
— Undetermined agricultural or forestry product
— Coke or coal
— Barbecue starter stick
— Fire log
— Barbecue starter briquette
— Peat
— Creosote
— Sulphur or gunpowder
— Wood treatment oil
— Electrical insulation
— Garbage, trash or rubbish
— Oily rags
— Artificial tree
— Unclassified material first ignited
— Undetermined material first ignited

Reporting of item first ignited in terms of material composition (ISO 17755-1, page 101)
All coding is integrated into coding for item first ignited in terms of form and function

Reporting of factors in ignition (ISO 17755-1, pages 104-105)
Specific codes below omit codes previously listed for intentional fires and child-playing fires.
— Misuse of smoker’s material
— Thawing

— Inadequate control of open fire
— Welding or cutting too close
— Torch too close
— Unclassified misuse of source of ignition (also links to playing with fire choices)
— Undetermined misuse of source of ignition (also links to playing with fire choices)
— Fuel spilled accidentally
— Improper fuelling technique
— Flammable liquid used to kindle fire
— Cleaning or washing part
— Improper container
— Overheated cooking oil, grease or wax
— Combustible placed too close to heat
— Improper storage
— Unclassified misuse of material ignited
— Undetermined misuse of material ignited
— Part failure, leak or break
— Automatic control failure
— Manual control failure
— Electrical short circuit (can also be used to identify electrical fires)
— Part worn out
— Backfire of engine
— Unclassified mechanical or electrical failure or malfunction
— Undetermined mechanical or electrical failure or malfunction
— Design deficiency
— Construction deficiency
— Installed too close to combustible
— Other installation deficiency
— Over-fusing (can also be used to identify electrical fires)
— Suspected faulty connection involving aluminum wiring (can also be used to identify electrical fires)
— Suspected faulty connection involving copper wiring (can also be used to identify electrical fires)
— Unclassified construction, design or installation deficiency
— Undetermined construction, design or installation deficiency
— Over-fueling
— Wood-burning appliance
— Log rolled out
— Screen not closed
— Glass doors exploded or shattered
— Paper fell out
— Flying embers
— Unclassified misuse of equipment
— Undetermined misuse of equipment
— Asleep
— Temporary loss of judgment suspected
— Physical or mental disability
— Accident
— Suspected impairment by alcohol, medication or other drugs
— Asleep due to suspected use of alcohol, medication or other drugs
— Fatigued
— Ignorance of hazard
— Distracted or preoccupied
— Unclassified human failing
— Undetermined human failing
— Eight categories of vehicle accident
— Tampering with safety devices
— Unclassified miscellaneous act or omission
— Hot exhaust or catalytic converter
— Act or omission not applicable
— Undetermined act or omission

Reporting of factors in fire growth (ISO 17755-1, page 108)
Through several data elements defined primarily as descriptions of the path of flame spread or smoke spread
— Flame spread via interior finish
— Flame spread via vertical openings, including factors of unenclosed stairwell or elevator shaft, inadequate firestopping, or failure of rated assembly
— Flame spread via horizontal openings, including burn-through or doors left open in rated assembly
— Smoke spread, including through openings in construction

Presence and type of sprinkler or other extinguishing equipment (ISO 17755-1, pages 112-113)
Coding refers to presence in building and not relevance to fire.
Separate coding for sprinklers versus other types of automatic extinguishing equipment.

Sprinkler Codes – complete versus partial
— Complete Sprinkler Protection - supervised or watchman service
— Complete Sprinkler Protection - alarm to fire department
— Complete Sprinkler Protection - unsupervised, local alarms only
— Partial Sprinkler Protection - supervised or watchman service
— Partial Sprinkler Protection - alarm to fire department
— Partial Sprinkler Protection - unsupervised, local alarms only
— No Sprinkler Protection
— Not Applicable - vehicle, outside area, etc.
— Sprinkler Protection - unclassified
— Cannot Be Determined

Sprinkler Codes – type of sprinkler
— Wet Pipe System - includes central station supervised, standard watchman service, or alarm connection to fire department
— Wet Pipe System - local alarm only
— Dry Pipe System - includes central station supervised, standard watchman service, or alarm connection to fire department
— Dry Pipe System - local alarm only
— Pre-Action System - includes central station supervised, standard watchman service, or alarm connection to fire department
— Pre-Action System - local alarm only
— Deluge System - includes central station supervised, standard watchman service, or alarm connection to fire department
— Deluge System - local alarm only
— Sprinkler System – unclassified

Fixed System Other Than Sprinkler – Presence and Relationship to Alarm Provisions:
— Fixed System Other Than Sprinkler - supervised or watchman service
— Fixed System Other Than Sprinkler - alarm to fire departments
— Fixed System Other Than Sprinkler - unsupervised, local alarms only
— No Fixed System
— Not Applicable - vehicle, outside area, etc.
— Fixed System Other Than Sprinkler – unclassified

Fixed System Other Than Sprinkler – Type of Extinguishing Agent
— Carbon Dioxide System
— Dry Chemical System
— Halon System
— Conventional (Protein) Foam System
— High Expansion Foam System
— Foam-Water System
— Water Spray System
— Wet Chemical System
— Fixed System Other Than Sprinklers – unclassified

Performance of sprinkler or other extinguishing equipment (ISO 17755-1, page 115)

Performance of Automatic Extinguishing Equipment:
— Equipment Operated
— Equipment Should Have Operated But Did Not

— Equipment Present but Fire too Small to Require Operation
— No Equipment Present in Room or Area of Origin of Fire
— Performance of Automatic Extinguishing Equipment - unclassified
— Performance of Automatic Extinguishing Equipment – unknown

Presence and type of detection or alarm equipment (ISO 17755-1, page 118)
Coding refers to presence in building and not relevance to fire.

Presence of Detection/Alarm System:
— No central alarm
— Single stage central alarm
— Single stage central alarm, connection to remote monitoring agency (See Section H2)
— Two stage central alarm
— Two stage central alarm, connection to remote monitoring agency
— Central alarm with voice
— Central alarm with voice, connection to remote monitoring agency
— Not applicable (vehicle, outside area, etc.)
— Cannot be determined

Type of Detection Device(s) Present:
— No detection devices
— Smoke detectors
— Smoke detectors, heat detectors and smoke detectors in return air ducts
— Heat detectors and smoke detectors in return air ducts
— Heat detectors
— Smoke detectors and specialty detectors
— Heat detectors and specialty detectors
— Not applicable (vehicle, outside area, etc.)
— Heat detectors, smoke detectors and specialty detectors
— Cannot be determined
Note: Specialty detectors include flame detectors, beam detectors and line detectors.

Performance of detection or alarm equipment (ISO 17755-1, page 122)

How Fire Was Detected:
— Smoke Alarm Device
— Smoke Detector Device
— Heat Alarm Device
— Heat Detector Device
— Automatic Sprinkler System
— Automatic System Other Than Sprinkler
— Visual Sighting or Other Means of Personal Detection
— No initial detection (burned out before detection)
— Initial Detection - unclassified
— Initial Detection – unknown

Performance and Reasons for Failure
— No Smoke Alarm
— Alarm in Room of Origin - Activated
— Alarm Not in Room of Origin - Activated
— Alarm in Room of Origin – Not Activated – Non-suitable Location
— Alarm in Room of Origin – Not Activated – Battery Dead
— Alarm in Room of Origin – Not Activated – No Battery
— Alarm in Room of Origin – Not Activated – AC Not Connected/Disabled
— Alarm in Room of Origin – Not Activated – Mechanical Failure
— Alarm Not in Room of Origin – Not Activated – Battery Dead
— Alarm Not in Room of Origin – Not Activated – No Battery
— Alarm Not in Room of Origin – Not Activated – AC Not Connected/Disabled
— Alarm Not in Room of Origin – Not Activated – Mechanical Failure
— Not Enough Smoke to Activate Smoke Alarm
— Smoke Alarm Activation - Unknown

Impact
— Not Applicable/No Occupants

— Occupants Evacuated Safely
— Occupants Did Not Evacuate – Alarm Inaudible
— Occupants Did Not Evacuate – Physically/Mentally Challenged
— Occupants Did Not Evacuate – Age Related (Infants/Aged)
— Occupants Did Not Evacuate – Unnecessary to Evacuate
— Occupants Did Not Evacuate – Suspected Influence of Drugs/Alcohol
— Occupant Response/Evacuation – Unknown

Presence of extinguishers or other manual extinguishing equipment (ISO 17755-1, page 125)
Included in reporting under “Manual Fire Protection Facilities”.
— Extinguishers & Standpipe System
— Extinguishers
— Standpipe System
— No Manual Fire Protection
— Not Applicable - outside area, etc.
— Manual Fire Protection Facilities - unclassified
— Cannot Be Determined
Under “Outside Fire Protection”, there is an opportunity to report the presence of municipal or private hydrants, but the emphasis is on hydrants for use by fire brigades not by occupants.

Reporting on fire doors, fire walls and other compartmentation (ISO 17755-1, page 128)
Included in reporting indirectly as factors in flame spread:

Flame Spread – Vertical Openings
— Through Unenclosed Stairwell or Elevator Shaft
— Through Inadequate Firestopping, including inside of walls, around pipes, poke-throughs
— Through Air-Handling Ducts
— Through Utility Shaft
— Through Failure of a Rated Assembly
— By Way of the Exterior of the Building
— Not a Factor
— Flame Spread Vertical Openings- unclassified

Flame Spread – Horizontal Openings
— Through Air-Handling Ducts
— Through Attic Spaces, Ceilings or Concealed Spaces
— Doors Burned Through in Rated Assembly
— Though Doors Open in Rated Assembly
— Through Corridor
— Through Utility Openings
— Through Windows
— Not a Factor
— Flame Spread Horizontal Openings - unclassified

Smoke Spread Avenues
— Through Air-Handling Ducts
— Through the Corridor
— Through the Elevator Shaft
— Through the Stairwell
— Through Openings in Construction, including gaps between slabs and walls, over doors
— Through Utility Openings - horizontal walls
— Through Utility Openings - in floors
— Not a Factor
— Smoke Spread Avenues – unclassified

References of existing database/studies

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Summaries of existing database

Data is collected at the provincial and territorial levels. Currently there is no national database, although data was previously consolidated from across the country. Data describes structure fires, vehicle fires, and outdoor fires. Data includes core variables regarding date and location, type of property and characteristics, fire protection features, circumstances contributing to ignition, causal information, discovery of fire and actions taken, and casualties.

Existing definitions

Structure fire: includes a wide range of properties/assemblies of materials forming a construction for occupancy or use to serve a specific purpose.

Vehicle fire: includes a wide range of motorized vehicles including, but not limited to passenger vehicles (other than a motor home), trucks, sport utility vehicles, buses, freight or transport vehicles, rail vehicles, farm equipment, water vehicles (this does not include accidents)**.**

Outdoor fire: refers to fires involving vegetation, grass, brush, crops, leaves and other outdoor properties not involving a structure or vehicle.

Are there differences within the same country?

Yes, differences exist both within and between provinces and territories with respect to in how data is collected and maintained, which data elements are collected, and how variables are coded.

Identification of missing information

According to the Canadian Association of Fire Chiefs, “a number of tables contain a relatively high proportion of unknown values. Although these counts have been removed from the calculation of proportions for other categories in the table, the proportion of known values is artificially inflated.”

D2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

Local fire departments provide requested data on fire incidents, but it appears that this is generally a voluntary activity and that reporting and extent of compliance vary, based upon local and provincial directives.

Fire response organisation

The majority of firefighters are volunteers, but there are also professional career firefighters who serve in local fire departments.

Who issues the data?

Data is not currently issued at the national level. The Canadian Centre for Justice Statistics (CCJS) is responsible for collecting and standardizing dat. The National Fire Incidents Statistics Committee (NFISC) is a subcommittee of the Canadian Association of Fire Chiefs (CAFC) and the Council of Canadian Fire Marshals and Fire Commissioners (CCFMC) charged with providing guidance and direction of data content.

Are there different levels of collection?

Varies by province or territory. Currently no national data is reported.

Identify disparities in data feedback

Although data is not currently collected at the national level, there was substantial variation in data submission from provinces and territories in the National Fire Information Database from 2005 to 2014. Seven provinces and territories did not participate. In addition, the completeness of data also varied among seven jurisdictions which did participate (six provinces and the Canadian Armed Forces). Some provinces did not provide a unique key that would provide linkage between incident files and victim files.

Where is the data stored?

Provincial level and Canadian Centre for Justice Statistics (division of Statistics Canada.

D3. STATISTICS INTERPRETATION ISSUES

Purpose for which data is collected

According to the Council of Canadian Fire Marshals and Fire Commissioners, data on fires is intended to identify trends relative to the cause and severity of fires.

What are the methods used to fill the gaps where information is missing?

None currently.

Is there follow up to data collected?

Possibly, but likely to vary by province or locality.

Analyse potential cause and consequences in trends

According to Fire Statistics in Canada, Selected Observations from the National Fire Information Database 2005 to 2014, the total number of fires reported to the National Fire Incident Database (*NFID*) showed a downward trend, declining 25% between 2005 and 2014. The report indicates that heating equipment as the source of ignition in residential fires declined consistently over the ten-year period, dropping 43%. Cooking equipment, such as ovens and fryers, was the most frequently reported source of ignition, accounting for one-third (33%) of all residential fires in 2014. This was followed closely by smoker's equipment and open flames, which accounted for a quarter (24%) of these fire incidents. There was some variation among the provinces in regards to the leading source of ignition in residential fires

D4. ANALYSE EXISTING DATA

Determining the level of confidence

Participation in the 2014 National Fire Information Database included coverage of 72% of the Canadian population. Seven provinces or territories did not participate, six of which had comparatively small populations and may have had unique issues not represented by the data from the more populous participating provinces.

Pinpointing issues and limitations

Data is incomplete. Not all jurisdictions provide data for national consolidation. Not all local fire departments provide data to the office of the fire commissioner or fire marshal. Reporting by First Nations fire services may not be included. There are a high number of unknown values in some categories.

Examples

Canada: Key Findings

- In the 10-year period between 2005 and 2014, a total of 439,256 fire incidents were reported to the National Fire Incident Database.
- These fires resulted in 1,733 deaths and 12,503 persons injured.
- Civilians represented 98 percent to 100 percent of the annual deaths over the ten-year period.
- A total of nine firefighter deaths were reported as a result of firefighting activities and 3,102 firefighter line-of-duty injuries were reported over the period.
- Residential fires accounted for the majority of structural fires, ranging from 69 percent in 2005 and 2006 to 75 percent in 2013.
- Cooking equipment and smoking equipment or open flame were the leading sources of ignition.
- Heating equipment as a source of ignition in residential fires declined by 43 percent from 2005 to 2014.
- The number of fires declined by 25 percent between 2005 and 2014.
- A total of 38,844 fires were reported in 2014, of which 19,062 incidents were structural fires.
- Three-quarters of the structural fires in 2014 were residential fires.
- Almost nine in ten fire-related deaths in 2014 occurred in structure fires. Vehicle fires accounted for 11 percent of reported deaths and outdoor fires for four percent of deaths in 2014.

Source: Statistics Canada. Fire statistics in Canada, Selected Observations from the National Fire Information Database 2005 to 2014. September 2017. Available at: http://nfidcanada.ca/wp-content/uploads/2017/09/Fire-statistics-in-Canada-2005-to-2014.pdf . Accessed 3 October, 2020.

E. DIAGNOSTIC SHEET FOR CROATIA

E1. TERMINOLOGY ISSUES

List references of existing database/studies

The Croatian Firefighting Association has developed several web-based data-collection and management systems of activities and incidents of all Croatian fire-fighting organizations:

1. Vatronet: Fire-fighting net
2. GIS i sustav za praćenje vozila- GIS and tracking system
3. Sustav za uzbunjivanje-Alarm system
4. Interaktivna baza opasnih tvari: Dangerous materials
5. SPIS: Central portal of internet pages of fire-fighting organizations
6. UVI: Incident management system (integrated data with 1. to 4.)

Instructions for use are published only for Geo information and tracking system
http://www.hvz.hr/informatizacija/sustav-za-pra%C4%87enje-vozila

The other web-applications have no written manuals (is planned to be made in near future), but our office gives assistance if problems with use and organize in each county educations each year for each application.
http://www.hvz.hr/informatizacija/korisni%C4%8Dka-podr%C5%A1ka

Law: Firefighting organisations have the responsibility to enter data (article 24) Strategic documents (http://www.hvz.hr/informatizacija/pravilnici-i-strategije):

1. Strategy of informatisation of the Croatian Firefighting Association
2. Regulation of education of ICT operators of the Croatian Firefighting Association
3. Regulation about the informatics system of the Croatian Firefighting Association

Orders and Regulations:

1. Regulation about the maintenance and use of informatics systems of the Croatian Firefighting Association (https://www.hvz.hr/informatizacija, at the bottom)
2. Standardization of fire-fighting incidents
3. Matrix of fire-fighting incidents
4. Standardization of fire-fighting equipment
5. Matrix of standardization of fire-fighting equipment
6. Standardization of aircrafts in fire-fighting
7. Standardization of fire-fighting boats
8. Engagement and alert plan of fire-fighting forces (has to be made by county-fire-fighting associations)
9. System of management of fire-fighting incidents
10. Order about unique report of fire-fighting incident
11. Order about unique price list about fire-fighting incidents
12. Order about education program of fire-fighting operators
13. Order about the exit number of the alert system of the Croatian Firefighting Association
14. Decision about alerting of operative members of the firefighting brigades through the Alert System of the Croatian Firefighting Association
15. Decision about the daily order
16. Order about the organizational and technical measures of use of ICT applications of the Croatian Firefighting Association
17. Working processes during management of fire-fighting incidents in a county fire-fighting call center
18. Registration and deny sheet for fire-fighting operators
19. Order about operational data bases (villages, house numbers, sirens, fire-alas, fire monitoring), fire-protection plans, contacts with other organizations)
20. Order about radiophonic data (on county level)
21. Parish register of member of firefighting unit
22. Use agreement of Fire-management system between the Croatian Firefighting Association and County Fire-fighting Association

Summaries of existing database

1. Vatronet: Fire-fighting net: 11 modules (members, organizations-equipment, reports, search, education, competitions, decorations, ID cards, forum, other activities, administration)
2. GIS i sustav za praćenje vozila- GIS and tracking system: GIS fire-fighting layers and vehicle tracking
3. Sustav za uzbunjivanje-Alarm system alarming by phone and SMS
4. Interaktivna baza opasnih tvari: Dangerous materials-basic data about all dangerous goods by UN number, lessons learned, producers/suppliers, experts, equipment, general information
5. Središnji portal internet stranica SPIS: Central portal of internet pages of fire-fighting organizations-each fire-fighting organization can open a web-site
6. UVI: Incident management system (integrated data with 1. to 4.)- real time data collection for incidents (preparation for incident, incident management, statistical-and analytical management)

Existing definitions

The Croatian Firefighting Association has a list of all definitions.

Are there differences within the same country?

Unique database within the whole country.

E2. STATISTICS COLLECTION ISSUES

Fire response organisation

- Professional fire-brigades
- Volunteer fire brigades
- Intervention units of Croatian Firefighting Association
- Army (air forces and namjenski organizirane snage-purpose organized forces)

Who collects data?

- Number of fires is collected by the Croatian Firefighting Association
- Fires by fire objects (buildings types, sectors of industry, etc.) is collected by the Croatian Firefighting Association
- Number of victims (deaths, injured, rescued persons, missing persons) is collected by the Ministry of interior
- Fire causes is collected by the Ministry of interior
- Fire damage is collected by the Ministry of interior

Who issues the data?

Croatian Firefighting Association on behalf of all firefighting departments

Are there different levels of collection?

No difference.

Identify disparities in data feedback

The new Firefighting Law from 2019: all firefighting units are obliged to enter and renew data that are prescribed by law

Where is the data stored?

At national level (ministry, institution, private company), in the Shared Services Centre within the Ministry of Justice and Administration

E3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

Ministry and Fire Service

Purpose for which data is collected

Incident preparation, incident management, post analysing, financing of fire-fighting units ("Vatrogasna mreša"- Firefighting Net), public relations and visibility

What are the methods used to fill the gaps where information is missing?

All fire departments are required by law to report their data; meaning that funding can be withdrawn is data in not provided.

Is there follow up to data collected ?

Update versions are made regularly

E4. ANALYSE EXISTING DATA

Determining the level of confidence

Confidence is growing as it used to be collected from several sources but now it is all governed by the Croatian Firefighting Association

Pinpointing issues and limitations

Issues: constant updates, integration of data with other data of ministries, use for free for all fire-fighting units.
Limitations: Informatics personnel

Examples

- The examples shown above show that the main focus in Croatia is on fighting forest fires.
- The number of fires in buildings has been increasing for years.
- Since there are many key players in Croatia, the procedure for uniform national fire statistics is a bit confusing.

F. DIAGNOSTIC SHEET FOR CZECH REPUBLIC

F1. TERMINOLOGY ISSUES

References of existing database/studies

The name of the national Fire Statistics Database is “Statistical monitoring of emergencies” (Statistické sledování událostí). In this programme not only fire statistics are recorded but also all details of all emergencies in which the fire units intervened.

The database is accessible only by the Fire Rescue Service, but the basic data are published every 3 months on the website and in the Statistical Yearbooks.
https://www.hzscr.cz/clanek/statistical-yearbooks.aspx

The typical content of the Yearbook is as follows:
FIRE SERVICE ACTIVITY (FSA)

- Individual types of events with FSA interventions
- Evacuated and rescued persons
- Number of interventions in natural disasters
- Summary information on events in the regions
- Interventions (including multiple)
- for individual types of events according to the type of FSA
- Basic information about FSA
- Interventions of FSA HZS ČR at events abroad
- Death and injury of firefighters during interventions
- Events with the intervention of the chemical laboratory of the Fire and Rescue Service of the Czech Republic and aeronautics of other services
- Events involving military fire brigades
- Events in the territory under the administration of municipalities with extended powers
- Road traffic accidents with the participation of FSA
- FSA cooperation in intervention
- Negative effects of interventions
- Overview of FSA interventions in districts and regions
- The share of individual types of FSA in the total number of interventions
- Events with FSA interventions by time of day
- Fires with damage of CZK 10 million and more, events in the 3rd and special alarm level
- Number of persons killed in fires
- Number of persons injured in fires
- Number of rescued persons
- Number of persons killed in traffic accidents
- Number of persons injured in traffic accidents
- Number of evacuees
- Extraordinary events in the 3rd and special alarm level
- Selected tactical and verification exercises of IRS units
- Individual activities of the FSA

FIRE 27

- Basic indicators
- Fires - an overview
- Share of fires with damage of CZK 1 million and higher in total damages
- Persons killed and injured in fires
- Fires: by district and region
- Fires - an overview of industries
- Fires in restaurant facilities
- Fires in connection with heat preparation of food and chimney fires
- Direct damage and protected values in case of fires
- Fires and damage by place of origin
- Persons killed in a fire
- Fires in buildings, vehicles and open spaces

- Forest fires
- Fires by cause and activity

PREVENTION

- Overview of fire prevention services of the Fire and Rescue Service of the Czech Republic
- Inspections of restaurant facilities
- Inspections of monuments
- An overview of other selected data from the activities of the Fire and Rescue Service of the Czech Republic
- Preventive educational activity

INTERNATIONAL COOPERATION

- Humanitarian aid
- International exercises of IRS units
- Foreign activities

ECONOMIC AND PERSONNEL TELE SHOW
TYPES OF EXTRAORDINARY EVENTS WITH FSA INTERVENTIONS

Summaries of existing database

- Type of emergency,
- Address,
- times,
- number of fire units,
- casualties,
- Fires: saved values, damages, causes and activities by the origin, building, objects

Are there differences within the same country?

There is a unique database. Each region is responsible for collecting the fire statistics and the republic data are concentrated in Ministry of the Interior-General Directorate of the Fire Rescue Service of the Czech Republic

Are there differences and contradictions with other domains?

No

Identification of missing information

There are no missing information in our database. All relevant data collected is necessary and sufficient for analysing the emergencies.

F2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

Primary mission of the Fire Rescue Service of CR is to protect life, health and property of citizens against fire, and to provide effective help in emergencies. Fire Rescue Service of CR is one of the basic bodies of the Integrated Rescue System, which has been operating with new structure since 1st January 2001. Under the Act No. 320/2015 Coll. on Fire Rescue Service of CR and on certain regulations, new organisational structure had been established and the basic tasks had been determined.

https://www.hzscr.cz/hasicien/article/fire-rescue-service-of-the-czech-republic-mission-and-tasks.aspx?q=Y2hudW09MQ%3d%3d

Fire response organisation

The fire system in the Czech Republic is based on professional fire units (Act No. 320/2015 Coll.) and voluntary fire units.

Who collects data?

The Fire Rescue Service is responsible for collecting fire data, some information is collected also by insurance companies and Police of the Czech Republic.

Who issues the data?

Fire Rescue Services (FRS) of the regions issue their statistics and the republic data are issued by the Ministry of the Interior- Directorate General of the Fire Rescue Service.

Are there different levels of collection?

The detailed information about fires (expert reports) are collected by the regional FRS. The national database includes only basic indicators about fires.

Identify disparities in data feedback

Not applicable.

Where is the data stored?

The data are stored in the FRS of the regions and in the Ministry of the Interior- Directorate General of the Fire Rescue Service.

F3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

The data are interpreted by the FRS of the regions and the Ministry of the Interior- Directorate General of the Fire Rescue Service.

Purpose for which data is collected

All relevant data which are necessary for analysing the emergencies.

Is there follow up to data collected ?

The Ministry of the Interior- Directorate General of the Fire Rescue Service analyse every 3 months the data from the regions – in case anything is missing – the regions repair the data in the database.

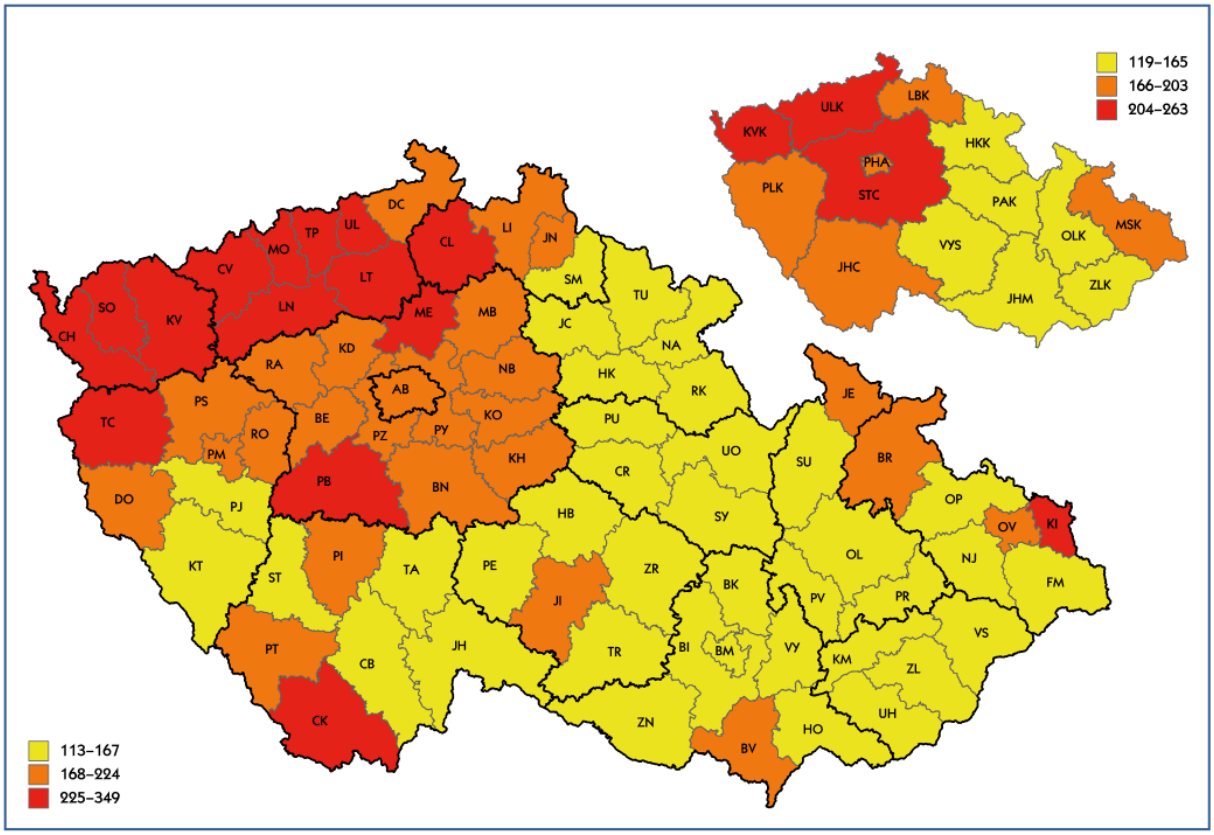
The database is updated every year depending on the special needs of the Fire Rescue Service.

F4. ANALYSE EXISTING DATA

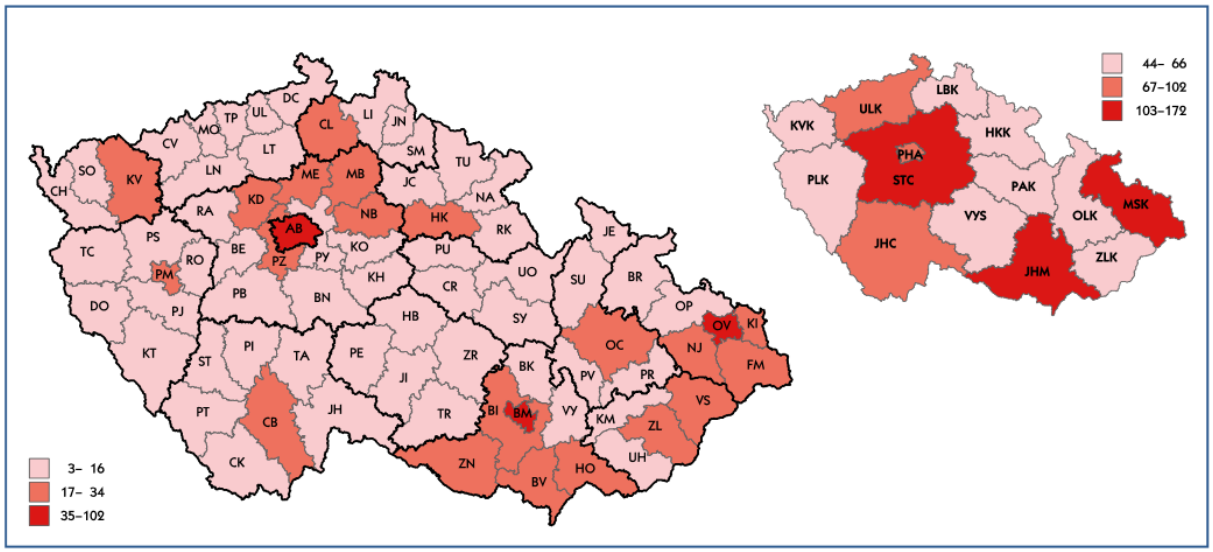
Examples

The following figures taken from Statistical Yearbook 2017.

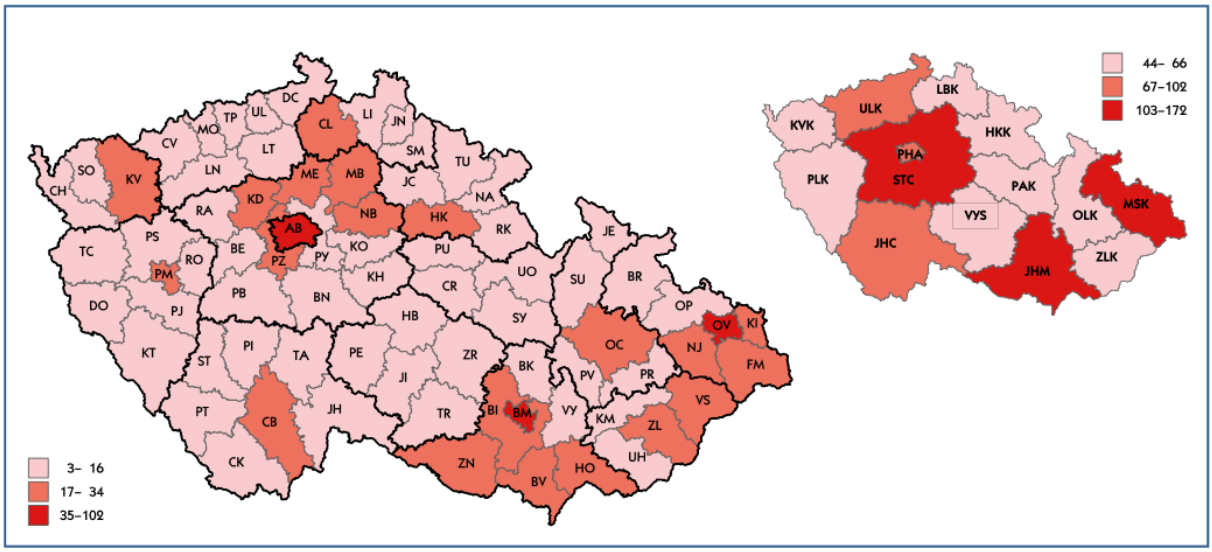
	Fires	Damage (Kč)	Protected values (Kč)	Fire Deaths	Fire injuries
1996	21 539	1 345 497 700	8 418 267 000	118	1 037
1997	21 540	1 229 951 200	6 393 776 000	135	1 026
1998	24 041	1 902 566 000	6 925 493 000	96	1 123
1999	20 857	2 088 610 700	8 907 455 000	105	934
2000	20 919	1 426 340 200	6 584 192 000	100	975
1996–2000	**108 896**	**7 992 965 800**	**37 229 183 000**	**554**	**5 095**
2001	17 285	2 054 670 000	6 230 121 000	99	881
2002	19 132	3 731 915 000	6 251 751 000	109	942
2003	28 937	1 836 614 900	7 646 975 000	141	1 112
2004	21 191	1 669 305 100	6 977 363 000	126	918
2005	20 183	1 634 371 000	7 110 116 000	139	914
2001–2005	**106 728**	**10 926 876 000**	**34 216 326 000**	**614**	**4 767**
2006	20 262	1 933 991 700	9 182 541 000	144	919
2007	22 394	2 158 494 200	8 974 428 000	130	1 023
2008	20 946	3 277 297 400	14 545 693 000	142	1 109
2009	20 177	2 169 150 200	9 074 906 000	117	980
2010	17 937	1 956 159 200	11 115 762 000	131	1 060
2006–2010	**101 716**	**11 495 092 700**	**52 893 330 000**	**664**	**5 091**
2011	21 125	2 241 800 100	8 078 932 000	129	1 152
2012	20 492	2 861 527 700	10 637 936 000	125	1 286
2013	17 105	2 402 562 900	13 342 294 000	111	1 189
2014	17 388	2 198 327 400	11 533 643 000	114	1 179
2015	20 232	2 495 902 900	11 093 236 000	115	1 449
2011–2015	**96 342**	**12 200 121 000**	**54 686 041 000**	**594**	**6 255**
2016	16 253	3 378 246 000	11 654 305 900	124	1 291
2017	16 757	3 653 115 100	9 674 378 000	92	1 392



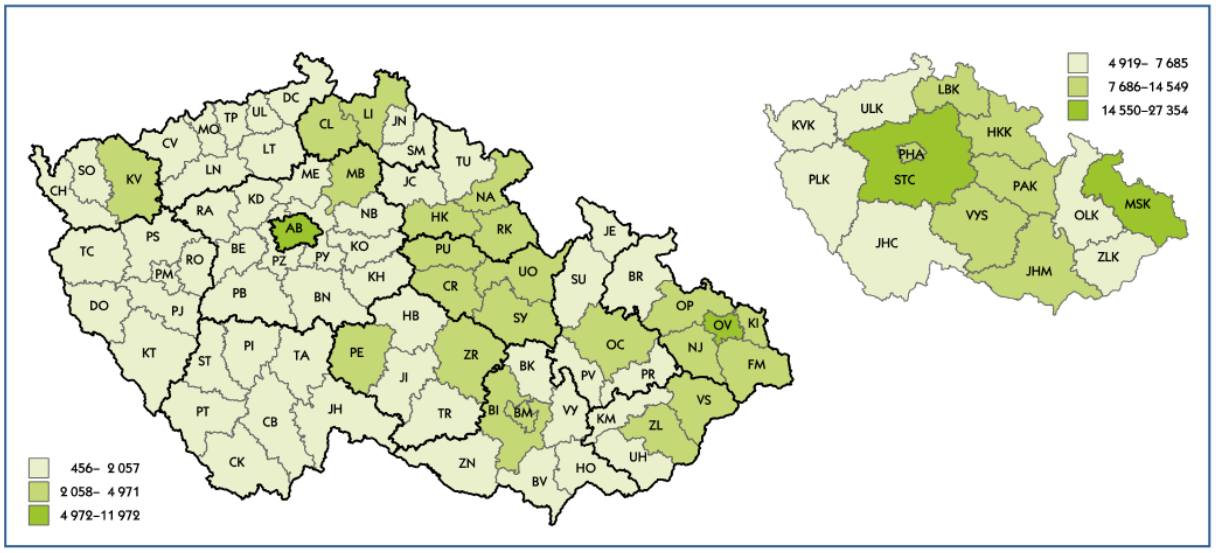
Fires in 2008–2017 (number per 10,000 inhabitants)



Number of people killed in fires in 2008-2017



Number of persons injured in fires in 2008–2017



Number of rescued persons in 2008–2017

G. DIAGNOSTIC SHEET FOR DENMARK

G1. TERMINOLOGY ISSUES

References of existing database/studies

https://www.beredskabsstyrelsen.dk/viden/odin/vejledninger/definitioner/Pages/default.aspx

Summaries of existing database

At national level:
Danish national fire statistics is published every year.
It published by Danish Emergency Management Agency – (DEMA) www.brs.dk

Existing definitions

In the database there exists the following definitions:

- Real alarm/false alarm
- CRBN Tasks
- Type for vehicles
- Type of emergency for vehicles
- Type of task for personnel
- Definition of personal
- Definition of competences
- First response type
- Category of report

Capacities (information regarding the municipal fire department)

Fire stations: (Name, address, category, type (full time/part time/volunteer)
Personal: (Name, full time/part time/volunteer, education)

Vehicles (ID, type, station)

Response activities
Alarm:

- Date and time
- Who alarmed (alarmcenter, firealarm system, other)
- Cause of alarm (building fire, rescue, train accident etc.)
- Adress
- Response time and response demand
- Assistance
- Meeting plan

Information about the incident address:

- Type of alarm (real or false alarm)
- Place of incident (type of building)
- Type of incident (fire, traffic incident, pollution, nature disaster)
- Is it building covered by the fire regulation.
- extinguished before arrival

Information about used vehicles:

- Type of emergency response
- Type of task
- Time of alarm
- Time of departure
- Time of arrival
- Time of release
- Ready
- Use of special material

Information of personal:

- Task
- Function
- Time of alarm
- Time of arrival
- Ready

Task:

- Job done at the incident scene (extinguishing fire, rescue persons ie)
- Object for the effort
- Any dead or injured

Fire incidents:

- Information about the extinguishing
- Classification
- Water consumption
- Source of water
- Information about ignition
- Information about factors resulting in fire
- Building fire
- Size of fire at arrival
- Starting place of fire
- Spread of fire
- Any functional fire safety equipment
- Information about rescue task
- Use of ladders
- Number of persons rescued
- Number of animals rescued
- Number of persons evacuated
- Information about CRBN task

Fire alarm system:

- System number
- Number of detectors
- Types of detectors
- Cause of alarm

Are there differences within the same country?

No both the local (municipal) fire department and the state fire department use the same program/database

Are there differences and contradictions with other domains?

No, not known. Health authorities make there own statistics about people insured or dead in fires / smoke intoxication etc.

Identification of missing information

Fire´s the fire brigade don´t know about (no official fire alarm) is not stored in the database-system. The insurance companies have more data / databases but they are not public available.

G2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

The local fire departments are responsible to deliver the data to the database.

Fire response organisation

The local fire department is owned by the municipal, and is always involved in a incident. If it is a large scale incident then the state can assist with materiel and men.

Who collects data?

The database is driven by the State (DEMA) but it is the local fire department, that delivers the data.
The police department and Health authorities (ambulance) do not deliver any data. The insurance company don't deliver any data

Who issues the data?

DEMA

Are there different levels of collection?

The local fire department delivers the data from their alarms. The national firebrigade delivers the data from their alarms

Identify disparities in data feedback

The education in filling out the report (database) is rather weak, which increase the risk of different interpretations of a incident.

Where is the data stored?

DEMA (in the database ODIN)

G3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

DEMA

Purpose for which data is collected

The main purposes are:

1. To elaborate and develop the fire departments
2. To optimize fire response time
3. To define the volume of personnel and equipment
4. To detect any trends in incidents

What are the methods used to fill the gaps where information is missing?

Unknown

Is there follow up to data collected ?

DEMA is controlling that all reports are made and contact the municipal if any is missing

G4. ANALYSE EXISTING DATA

Determining the level of confidence

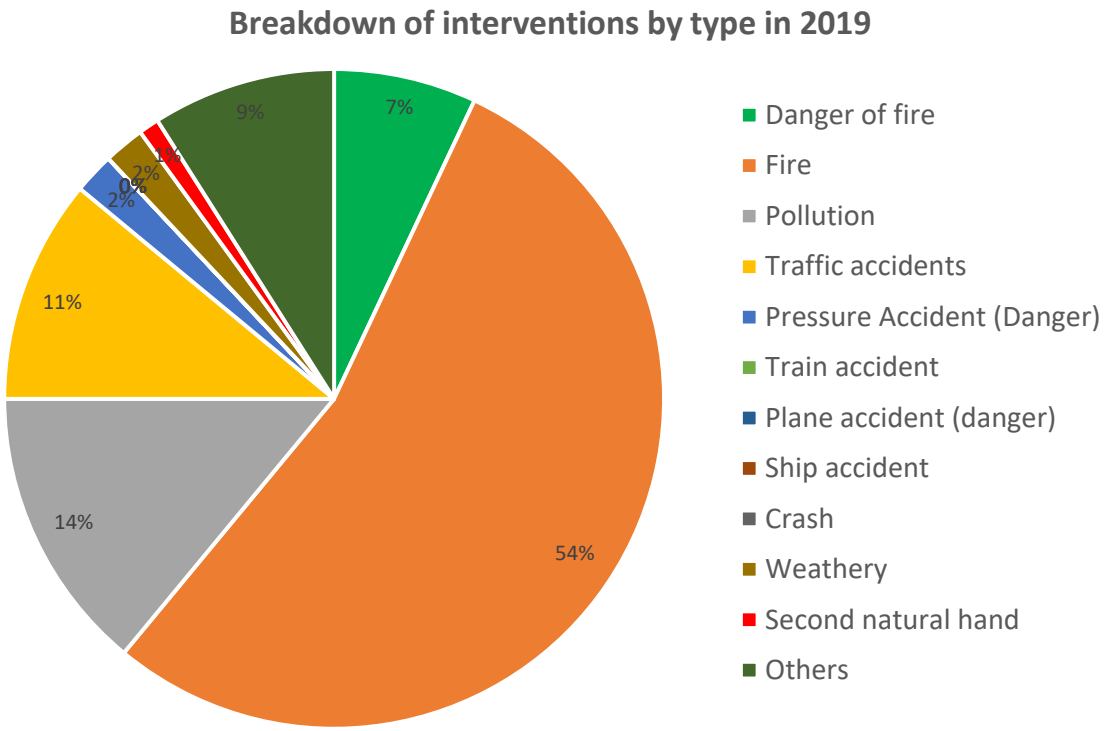
Medium, mostly due to the lack of education.

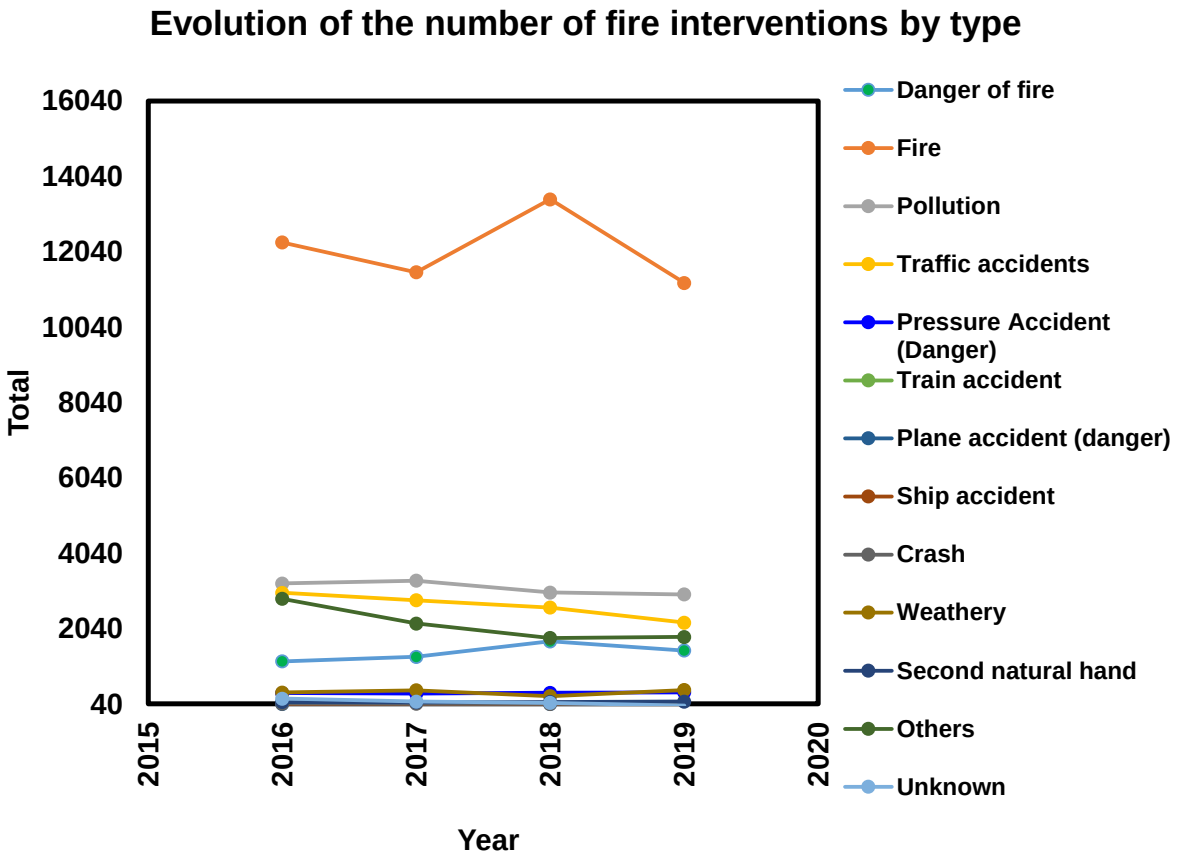
Pinpointing issues and limitations

- The lack of training for the firefighters in charge of the fire response report.
- The police is responsible for the fire investigation. There is no feedback-loop into the database from their investigation.
- The database from the fire departments is not taking into account the fire casualties, which are not reported or reported in a separate database.

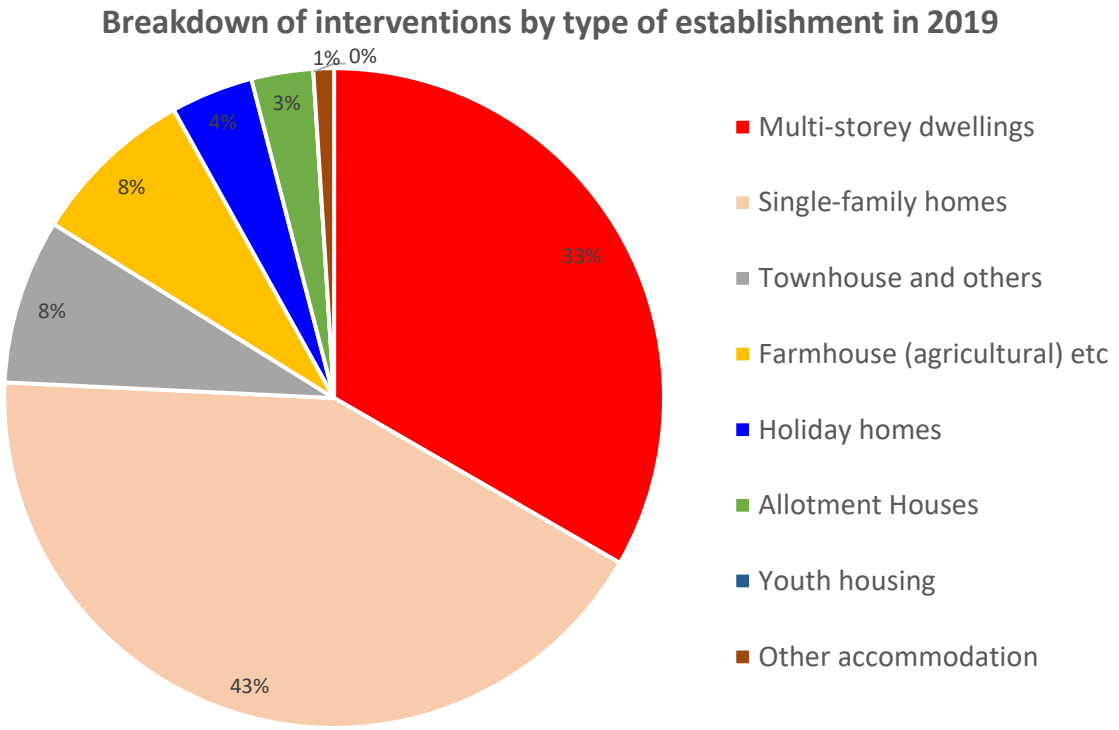
Examples

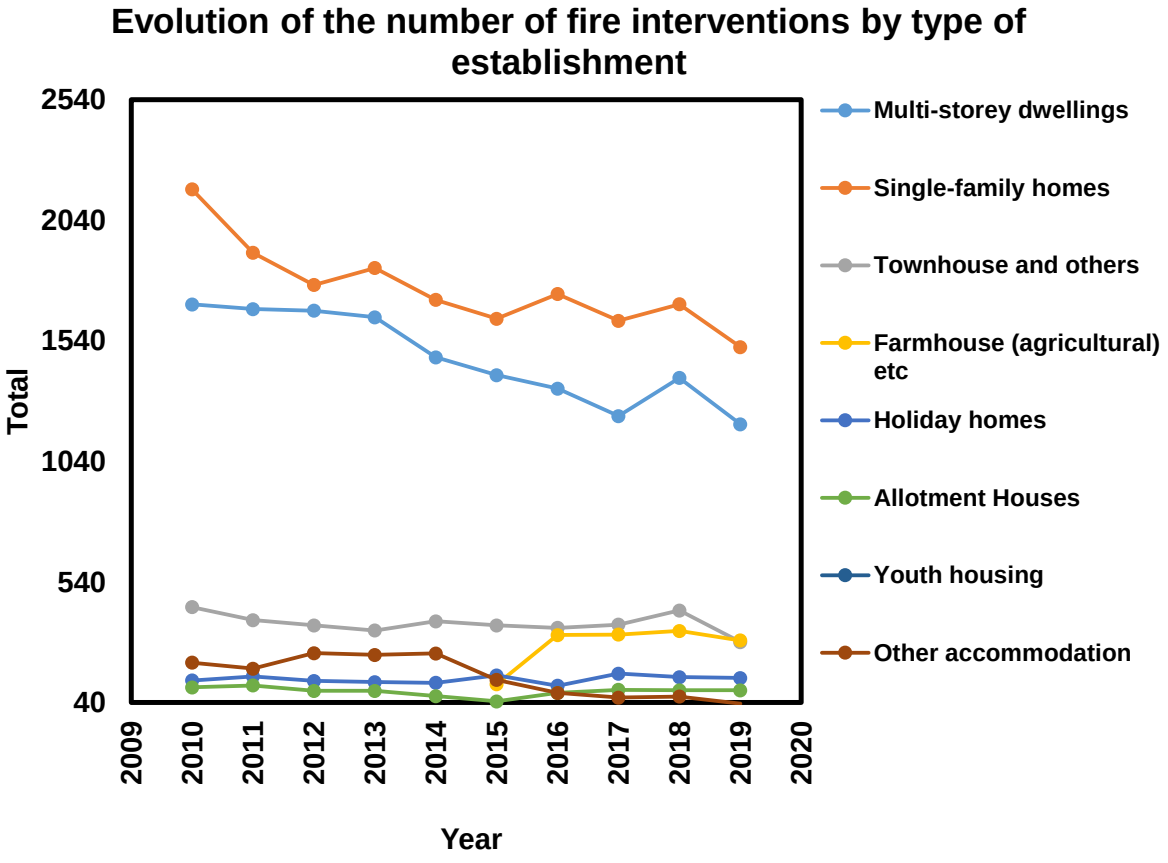
In 2019, the fire activity has accounted for 54% of the total activity and it represented the main activity.

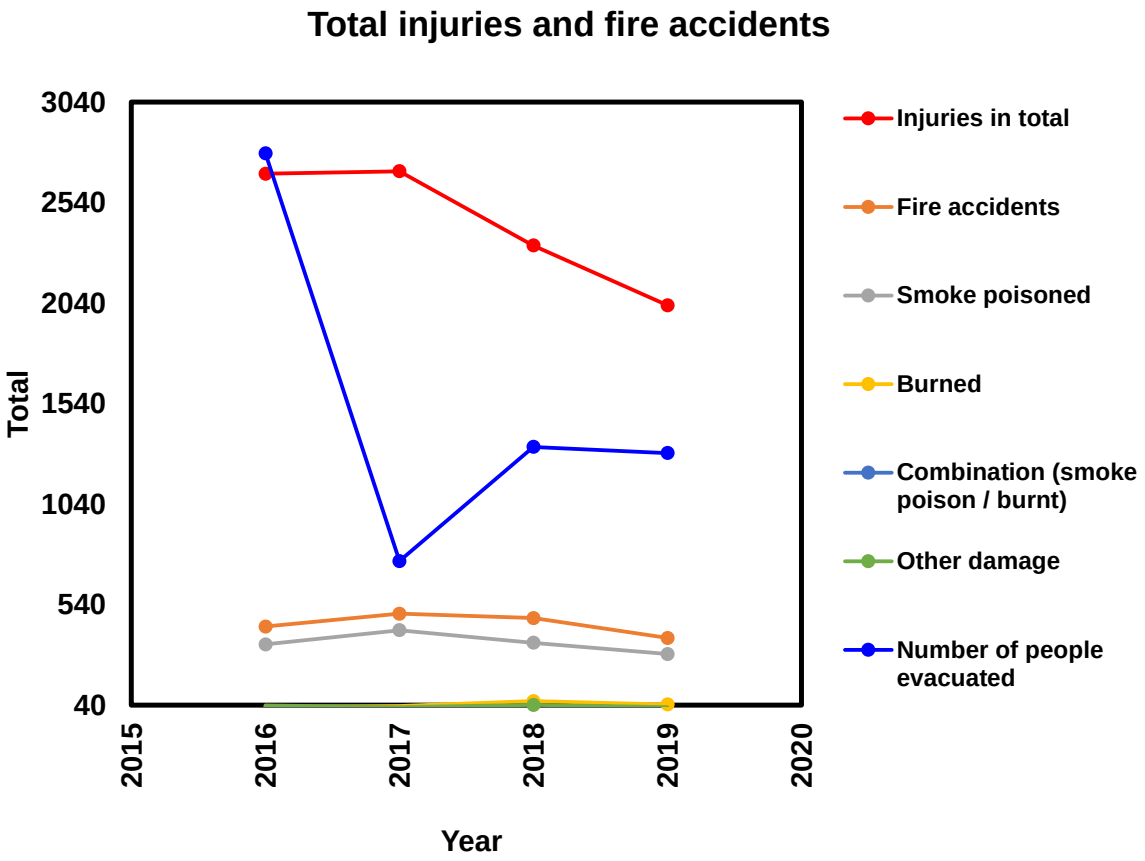


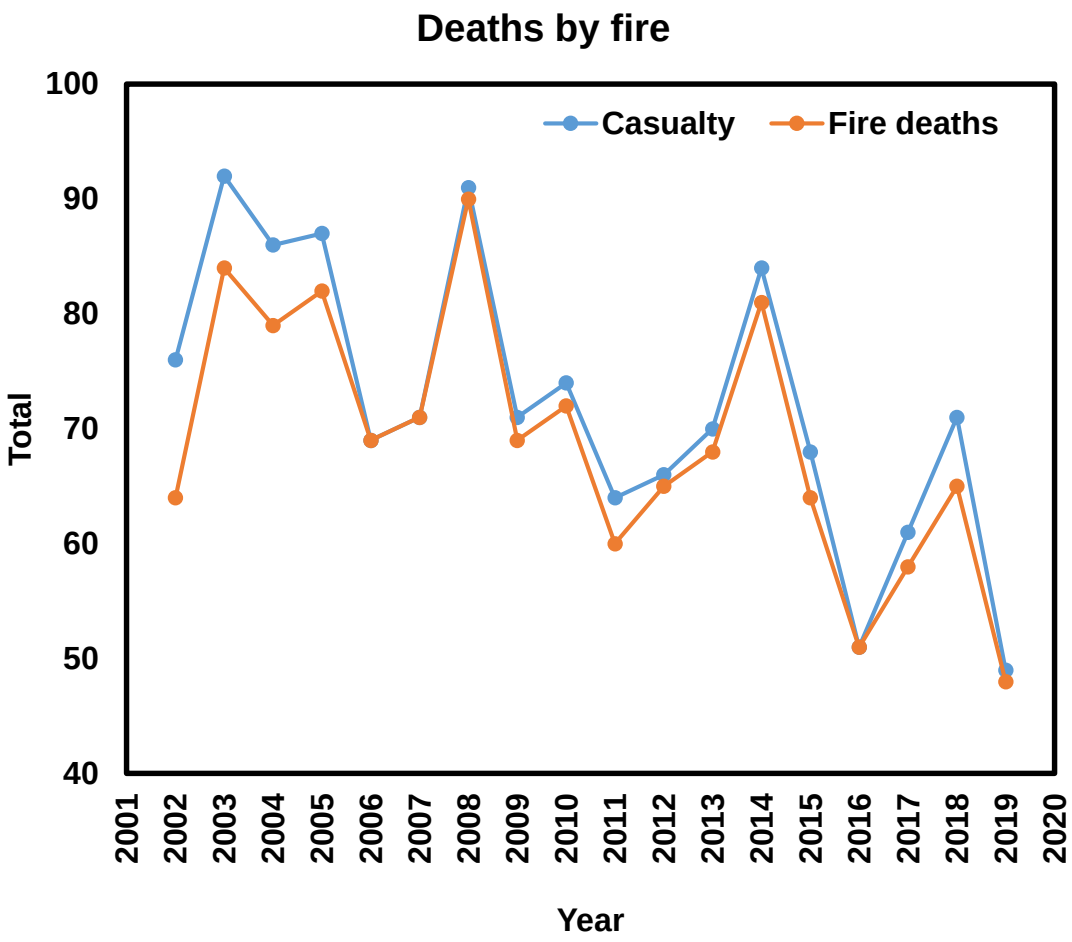

Evolution of the number of fire interventions by type
Total
16040
14040
12040
10040
8040
6040
4040
2040
40
2015
2016
2017
2018
2019
2020
Year
Danger of fire
Fire
Pollution
Traffic accidents
Pressure Accident (Danger)
Train accident
Plane accident (danger)
Ship accident
Crash
Weathery
Second natural hand
Others
Unknown

In 2019, the majority of fire interventions was for single-family homes (43%), followed by fire interventions in multi-storey dwellings (33%), townhouse and others (8%), farmhouse (agricultural) (8%) and others (8%).






Total injuries and fire accidents
3040
2540
2040
1540
1040
540
40
Total
2015
2016
2017
2018
2019
2020
Year
Injuries in total
Fire accidents
Smoke poisoned
Burned
Combination (smoke poison / burnt)
Other damage
Number of people evacuated



The source of the data is https://brs.dk/globalassets/brs---beredskabsstyrelsen/dokumenter/forskning-statistik-og-analyse/2020/-redningsberedskabet-i-tal-2019-2.pdf.

H. DIAGNOSTIC SHEET FOR FRANCE

H1. TERMINOLOGY ISSUES

Information from ISO 17755-1 & -2

ISO TR 17755-1

Fires subject to reporting (ISO TR 17755-1 page 4)

"Undetermined."

Fire deaths subject to reporting (ISO TR 17755-1 page 7)

"Officially undetermined (No survey returned).
But actually there are two different fire fatality databases in France: one is realized by the Home Ministry-DGSCGC and the other by the INSERM- CepiDc.
The database realized by the Home Ministry - DGSCGC is implemented by the fire services. All the deaths which occurred on the scene of a fire are taken into account. Deaths (due to acute fire effects) of firefighters, fire officers, fire brigade personnel and other emergency responders are also reported. This database does not take into account the fire casualties which will die at the hospital or during their transportation to the hospital by EMS.
Some elements of this database are published every year by DGSCGC through a special document. The 2012 edition (for 2011) detailed the number of French fire services which have contributed to the national database and the number of fire fatalities which occurred on the scene of fires. This publication does not detail the age, gender, ethnicity (strictly forbidden by the law), activity when injured, type and severity of injury, behaviors that contributed to injury, part of body injured. It just specifies the type of fire during which the death occurred, such as home building, public building, forest fire.
The database realized by the INSERM- CepiDc is compiled from the medical death certificates completed by physicians. Since 2000, the causes of death are coded according to the tenth revision of the International Classification of Diseases of WHO. The data are based on the underlying causes of death selected by the WHO rules. This database includes all the fire deaths which occurred in France (Metropolitan and ultramarine): on the scene of the fire, during the transportation and at the hospital. Suicides by fire are also included in this database. INSERM-CepiDc uses CIM 10 codes: X00-X009, X01-X019, X02-X029, X03-X039, X04-X049, X05-X059, X06-X069, X08-X089, X09-X099, W35-W409, X97-X979."

Fire injuries subject to reporting (ISO TR 17755-1 page 9)

"Officially undetermined (No survey returned).
But actually the database realized by the Home Ministry - DGSCGC is implemented by the fire services.
The database realized by the Home Ministry - DGSCGC is implemented by the fire services. All the injuries which occurred on the scene of a fire are taken into account. Injuries (due to acute fire effects) of firefighters, fire officers, fire brigade personnel and other emergency responders are also reported.
Some elements of this database are published every year by DGSCGC through a special document. The 2012 edition (for 2011) detailed the number of French fire services which have contributed to the national database and the number of fire injuries which occurred on the scene of fires. This publication does not detail the age, gender, ethnicity (strictly forbidden by the law), activity when injured, type and severity of injury, behaviors that contributed to injury, part of body injured. It just specifies the type of fire during which the injury occurred, such as home building, public building, forest fire."

Victim characteristics (ISO TR 17755-1 page 13)

"The only information available in the two different fire French databases (Home Ministry-DGSCGC and INSERM- CepiDc) is the number in each type of building (home, public building)."

Property damage subject to reporting (ISO TR 17755-1 page 26)

"Undetermined."

Other losses subject to reporting (ISO TR 17755-1 page 30)

"Deaths and injuries of firefighters, fire officers, fire brigade personnel, and other emergency responders due to acute fire effects."

Location of fire (ISO TR 17755-1 page 32)

"Undetermined."

Reporting of type of construction (ISO TR 17755-1 page 52)

"Undetermined."

Reporting on building height and other building characteristics (ISO TR 17755-1 page 54)
"Undetermined."

Reporting and estimation of deliberately set fires (ISO TR 17755-1 page 56)
"No."

Reporting and estimation of natural cause fires (ISO TR 17755-1 page 60)
"Undetermined."

Reporting and estimation of exposure fires (ISO TR 17755-1 page 62)
"Undetermined."

Reporting and estimation of smoking materials and open flame fires (ISO TR 17755-1 page 65)
"Undetermined."

Reporting and estimation of heating and cooling equipment fires (ISO TR 17755-1 page 67)
"Undetermined."

Reporting and estimation of cooking and kitchen equipment fires (ISO TR 17755-1 page 71)
"Undetermined."

Reporting and estimation of clothes dryer fires (ISO TR 17755-1 page 74)
"Undetermined."

Reporting and estimation of entertainment equipment fires (ISO TR 17755-1 page 76)
"Undetermined."

Reporting and estimation of office equipment fires (ISO TR 17755-1 page 78)
"Undetermined."

Reporting of electrical and electrical distribution or lightning equipment fires (ISO TR 17755-1 page 62)
"Undetermined."

Presence and type of sprinkler or other extinguishing equipment (ISO TR 17755-1 page113)
"Undetermined."

Performance of sprinkler or other extinguishing equipment (ISO TR 17755-1 page115)
"Undetermined."

Presence and type of detection or alarm equipment (ISO TR 17755-1 page118)
"Undetermined."

Performance of detection or alarm equipment (ISO TR 17755-1 page122)
"Undetermined."

Presence of extinguishers or other manual extinguishing equipment (ISO TR 17755-1 page125)
"Undetermined."

Presence of smoke management or control equipment (ISO TR 17755-1 page127)
"Undetermined."

Reporting on fire doors, fire walls and other compartmentation (ISO TR 17755-1 page128)
"Undetermined."

ISO 17755-2

Nothing relevant

References of existing database/studies

Databases

At national level:

- French national fire statistics published every year (only in French) by the "General Direction of Civil Security and Crises Management" (DGSCGC) of the French Home Ministry. Official web site: **www.interieur.gouv.fr**.
- French national medical causes of deaths statistics published every year (only in French) by the Epidemiology Centre of medical causes of death (CEPIDC) of the National Health and Medical Research Institute (INSERM) itself placed under both the authority of the Ministry of Health and the Ministry of Research. Official web site: **www.cepidc.inserm.fr**.
- Within the Ministry of Ecology, the Bureau d'Analyse des Risques et Pollutions Industriels (BARPI) is responsible for gathering, analysing and disseminating feedback regarding industrial and technological accidents including fire. The BARPI manages the ARIA (Analysis, Research and Information on Accidents) database, specifically designed for industrial and technological accidents. Every year the BARPI publishes an inventory of technological incidents and accidents. Official web site: **https://www.aria.developpement-durable.gouv.fr/**

At local level:

- French Fire Departments fire statistics published every year (only in French) by each French Fire Department (SDIS or BSPP or BMPM).
- Thematic fire statistics published when it is necessary by some French Fire Department (SDIS or BSPP or BMPM).

Studies

Fire statistics

A few number of studies and scientific publications about fire statistics are on the Web. E.g.

- "Fire deaths in home fires in 2008" - BSPP – BPREV- 9 January 2009 – (in French)
- "Elements to assess cars arsons in 2015" – ONDRP – n° 13 – April 2017 – (in French)
- "Statistical analysis of intervention reports for fires resulting in casualties deceased on the spot in Paris area" – Pierre CARLOTTI, Dominique PARISSE, Nicolas RISLER - Fire Safety Journal n° 92 (2017) – Pages 77 to 79 – (in English)

Medical causes of deaths statistics

113 international scientific publications and 30 national scientific publications (from 1987 to 2020) about medical causes of deaths (among which fire deaths) are available on CEPIDC/INSERM web site. Most of them are in English.

Lasbeur L, Rigou A, Thélot B. Application de la méthode capture-recapture aux victimes décédées par incendie après transfert en milieu hospitalier, France métropolitaine, 2007. Saint-Maurice : Institut de veille sanitaire ; 2012. 26 p. http://www.invs.sante.fr

Abstract :

In France, the epidemiological surveillance of fire-related mortality is provided primarily from three sources: mortality data from French Epidemiological Centre for Medical Causes of Death - CépiDc (476 accidental deaths in 2008), the French Hospital Information System - PMSI (194 hospital deaths in 2008) and firefighters reporting (378 deaths in 2008). The objective of the study was to estimate the number of fire-related deaths in hospitals based on the capture-recapture method. The capture-recapture method is used to make population estimates from sources that have partially shared information. The principles and conditions of the capture-recapture method were considered. The method was applied to two data sources: CépiDc and PMSI, as the firefighters data was not homogeneous enough to be crossed with other data. The study was restricted to hospital deaths. In order to identify common cases, the matching variables used were the month of death, age, sex, and the death district.

The method enabled to estimate that there had been 252 fire-related deaths (95% CI = [134-370]) in hospitals in France in 2007. The exhaustivity of the two combined sources was 97% (85% for CépiDc and 79% for PMSI). The conditions of application of capture-recapture method were discussed: real cases, independence of sources, capture homogeneity, closed population, same period and geographical area.

The application of the capture-recapture method can be repeated annually. The whole approach aims to produce validated and generally acknowledged estimates, by date, gender, age, region, year after year, of the number of fire-related deaths in France.

Summaries of existing database

National level/French national fire statistics (DGSCGC-French Home Ministry)

The last published edition (fire statistics of 2018) is a document of 80 pages organized as followed:

1. Foreword
2. The actions
3. The personnel
4. The organisation
5. The equipment
6. The national fire departments indicators

This report contains information such as:

- The number of interventions for all type of activities: fire related, traffic accidents, personal assistance…
- Number of interventions by day,
- Number of interventions for 100 000 inhabitants,
- Number of interventions for types of buildings and the type of intervention missions (fire related, traffic accidents, personal assistance…),
- Duration of an intervention,
- Average number of intervention by day, by activity and type of building,
- Number of aggression by 100 000 hours of interventions,
- Number of victims by type of intervention (deaths, severe injuries, relative injuries)
- Number of victims by type of buildings (deaths, severe injuries, relative injuries)
- Number of enrolled fire fighters (civil, professional, military…)

BARPI yearly reports for industrial buildings

The report covers all type of accidents in the industrial sector for all types of buildings including plants, workshops, warehouses, construction sites, quarries, breeding farms, etc.
In 2019, most accidents occurred due to fires (59%), followed by material releases (41%) and finally explosions (4%). These percentages, however, remain variable depending on the activity sector: waste treatment, agriculture, woodworking, the rubber and plastics industry are more prone to fire phenomena, whereas the chemical and metallurgical industries as well as coking and refining are more prone to the discharge of dangerous or polluting materials.
This report contains information such as:

- Breakdown of accidents and dangerous phenomena by sector of activity
- Evolution of the annual number of deaths and injuries (all type of accidents)
- Breakdown of organisational causes (lack of feedback, training, control, procedures, risk assessment, etc.)
- Breakdown of consequences of accidents during transport of hazardous materials (explosion, fire, loss of hazardous materials, etc.)

Statistical analysis of intervention reports for fires resulting in casualties deceased on the spot in Paris area

Report/source:
Statistical analysis of intervention reports for fires resulting in casualties deceased on the spot in Paris area. Pierre Carlotti, Dominique Parisse, Nicolas Risler in Fire Safety Journal, 2017.
http://dx.doi.org/10.1016/j.firesaf.2017.05.017

Purpose:
This study analyses the data collected by the Laboratoire central de la Police Prefecture concerning fires which caused casualties deceased on the spot for the years 2012, 2013 & 2014 in the Paris region.

Data:

The geographic sector includes Paris and its surrounding counties (Hauts de Seine, Seine Saint-Denis, Val de Marne), namely more than 10% of the French population. The database covers interventions by the Paris Fire Department for fires (about 15,000) when a fire causes one or several casualties.

Key finding (s):
The origin of the fire was intentional for 19 deaths out of 124 (i.e. 15% of cases). In this case, they might be suicides (4 cases) or unintentional fire victims of an intentional fire. Out of the 108 fires that were analysed, the origin of the fire could be determined in 90 cases out of 108 (i.e. 83%).
In residential buildings, for 88 fires having caused 100 deaths, 26 fires caused 37 deaths, i.e. 35% of the recorded deaths. In four of the fires having caused 7 deaths, the flashover also reached the building staircase. In 43 fires having caused 44 deaths, i.e. 41% of the total number of deaths registered, the fire was limited to the room where the fire started: most often in a bedroom (20 fires having caused 20 deaths), then the living room and the lounge (10 fires having caused 10 deaths), last in the kitchen (9 fires having caused 9 deaths).
The origin of the alarm was registered for 92% of the fires analysed: the alert was given by someone who neither was a victim nor lived on the premises in 90% of the cases registered; it was given by a victim or a resident in 7% of cases; smoke detectors gave the alarm in only 3% of the cases.
A significant number of death occurs during the day, when people are not usually asleep, with 44% of death from 9am to 9pm. Knowing that 94% of the victims were found in their homes and that the home occupation rate is much lower in the daytime, this goes against general opinion that fires kill in majority when people are asleep.
The gender of the deceased is unknown for 8 victims. Males represent 58% of the deceased of known gender, females 42%.

A Multi-national Survey of Low-Energy and Smoking Materials Ignition Fires

Report/source:
Les victimes de brûlures : patients hospitalisés en France métropolitaine en 2011 et évolution depuis 2008 // burn victims: patients hospitalised in metropolitan france in 2011 and evolution since 2008 - Axelle Dupont, Anne Pasquereau, Annabel Rigou, Bertrand Thélot
Institut de veille sanitaire 2015

Purpose:
The goal of the study is to assess the number of hospitalizations for burns, and the severity of them and to confirm the importance of developing preventive actions and which type.

Data:
Data from the French National Hospital Discharge Programme were analysed over the period 2008- 2011 for metropolitan France. All hospitalisations in acute care hospitals with a principal diagnosis of burns, coded T20 to T32 in the International Classification of Diseases, 10th revision (ICD10), were analysed.

Key finding (s):
In 2011 in metropolitan France, 8,670 patients (living in metropolitan France) were hospitalised for burn, representing 11,651 hospitalisations. Children aged 0-4 year-old accounted for more than a quarter of all burn victims, and men for 63%. Among patients hospitalised in burn centers, 11.5% of them had a severe burn. The crude incidence hospital rate was 13.7 per 100,000 inhabitants. It was particularly high among children under 5 years old (60.7) and in men (17.9 vs 9.9 in women). The number of hospital deaths was 215, representing a fatality rate of 2.5 %.
These epidemiological results, consistent with the international literature, characterize patients with burns and their hospital care. They highlight the importance of developing prevention interventions, particularly among children, from the moment they start walking, and among the elderly, in whom burns are less frequent but more severe. They could be very useful for planning and organising hospital resources.

Application of the capture-recapture method to victims of fire-related deaths after being transferred to hospital

Report/source:
Lasbeur L, Rigou A, Thélot B. Application de la méthode capture-recapture aux victimes décédées par incendie après transfert en milieu hospitalier, France métropolitaine, 2007. Saint-Maurice : Institut de veille sanitaire ; 2012. 26 p. http://www.invs.sante.fr

Purpose:
The objective of the study was to estimate the number of fire-related deaths in hospitals based on the capture-recapture method.

Data:
In France, the epidemiological surveillance of fire-related mortality is provided primarily from three sources: mortality data from French Epidemiological Centre for Medical Causes of Death - CépiDc (476 accidental deaths in 2008), the French Hospital Information System - PMSI (194 hospital deaths in 2008) and firefighters reporting (378 deaths in 2008).
The capture-recapture method is used to make population estimates from sources that have partially shared information. The method was applied to two data sources: CépiDc and PMSI, as the firefighters data was not homogeneous enough to be crossed with other data. The study was restricted to hospital deaths. In order to identify common cases, the matching variables used were the month of death, age, sex, and the death district.

Key finding (s):
The method enabled to estimate that there had been 252 fire-related deaths (95% CI = [134-370]) in hospitals in France in 2007.
The exhaustivity of the two combined sources was 97% (85% for CépiDc and 79% for PMSI). The conditions of application of capture-recapture method were discussed: real cases, independence of sources, capture homogeneity, closed population, same period and geographical area.
The whole approach aims to produce validated and generally acknowledged estimates, by date, gender, age, region, year after year, of the number of fire-related deaths in France. It will help measure the effectiveness of regulatory measures such as those that require the installation of automatic autonomous smoke detectors by 2015 or the obligation for the tobacco industry to produce cigarettes that meet low ignition propensity standards.

Mortalité par accident de la vie courante en France métropolitaine, 2000-2010
Mortality from everyday accidents in mainland France, 2000-2010

Report/source:
Lasbeur L, Thélot B. Mortalité par accident de la vie courante en France métropolitaine, 2000-2010. Institut de veille sanitaire, 2014. http://www.invs.sante.fr/%20fr/Dossiers-thematiques/Maladies-chroniques-et-traumatismes/Traumatismes/Bases-de-donneesoutils/Mortalite

Purpose:
The objective of this work is to report the statistics of deaths from everyday accidents, with a focus on deaths by fire flames, between 2000 and 2010 in metropolitan France.

Data:
Deaths were selected when the underlying cause of death belonged to a reference list of codes of the ICD-10 corresponding to deaths from everyday accidents. The analyzes were mainly carried out according to the cause initial death, which is at the origin of the chain of causes leading to death and on which it is possible to act to avoid the latter. However, deaths from accidental falls are underestimated by this type of analysis. An additional analysis was therefore carried out, known as a "multiple cause", adding to the deaths from an initial cause "Falls" (codes W00-W19) deaths coded both as the underlying cause "exposure to unspecified factors" (code X59) and associated cause "fracture of the femur" (code S72).

Key finding (s):
The number of fire/flame deaths in 2010 was 513; the sex ratio was 1.5 (standardized male / female rate = 0.9 / 0.6). Overall, between 2000 and 2010 the standardized death rates decreased by 0.6% per year, this decrease was not significant. In 2010, the majority of deaths from fire-flames occurred at home: 60% of cases compared to 31% in hospitals or private clinics.
Main limitations of the HLCA mortality data:

- Underestimation of the number of deaths caused by a fire: example of deaths by accidental fall from a great height (code W13) or collision caused by the throwing or falling of an object (W20) which may occur during a fire.
- 20% of deaths for which the accidental cause is not known.

- Inclusion of accidents at work: it is not possible to differentiate them from everyday accidents, which probably corresponds to a few hundred deaths per year.
- The circumstances of the accident (place of occurrence, activity carried out, product in question) are not provided although they would constitute useful information for the implementation of appropriate prevention

Épidémiologie des hospitalisations pour brûlures en France : résultats 2011 et évolution depuis 2008
Epidemiology of hospitalizations for burns in France: 2011 results and changes since 2008

Report/source:
Pasquereau A, Thélot B. Hospitalisations pour brûlures à partir des données du Programme de médicalisation des systèmes d'information, France métropolitaine 2011et évolution depuis 2008. Institut de veille sanitaire ; 2014. 8 p. http://www.invs.sante.fr

Purpose:
The objective of this study was to describe, the socio-demographic profile and the care of people hospitalized for burns and to establish incidence rates and present developments since 2008, based on 2011 data from the Program for the medicalization of information systems in Medicine, Surgery, Obstetrics.

Data:
Hospital stays in 2011 in mainland France with a main burn diagnosis coded from T20 to T32 were analyzed . The severity of the burns was measured according to the extent of the body surface affected (codes T31 and T32), the presence of burns in the respiratory tract (code T27) and age. The severe burns were defined as meeting one of the following three conditions:
• burns covering at least 20% of the body surface in children under 5 years old;
• burns covering at least 30% of the body surface in people over 5 years old;
• presence of burns in the respiratory tract.

However, the extent of the affected body surface was not systematically documented. The study of the severity of burns thus focused only on stays in hospitals with a burn treatment center, in which the information rate was 85% (compared to 24% in other hospitals).

Key finding (s):
In 2011 in mainland France, 8,670 people were hospitalized for burns, corresponding to 11,824 hospital stays. More than 80% of patients were hospitalized only once during the year. Children under 15 were more often readmitted for burns than other patients:
they represented 2/3 of people hospitalized 4 or more times during the year.

Distribution by age and sex:
• 5,465 men (63%) and 3,205 women (37%): sex ratio of 1.7.
• Average age: 30.4 years.
• More than a quarter of the patients were between 0 and 4 years old. Of these, half were 1 year old.

Crude incidence rate: 13.7; age-standardized incidence rate: 13.4.
• Very high among children under 5 (61), higher among those aged 85 and over (14) than among adults (10).
• At all ages the incidence was higher in men than in women.
• The incidence was not homogeneous across the country: from 9.6 to 17.7.

Evolution 2008 to 2011:
- The number of people hospitalized for burns per year remains at the same level, nearly 9,000.
- The breakdown by age and sex of burn victims, the proportion of burns covered by hospitals with a burn treatment center, characteristics of people with severe burns and the incidence rates remain stable.
- Some changes for people who died in hospital from burns can be noted: the number and the case fatality rate increases slightly, as does the average age at death.

Existing definitions

There is no official definitions of terms and expressions for fire statistics in France.

Are there differences within the same country?

Due to the current lack of official definitions of terms and expressions for fire statistics, it is possible, and even probable, that differences exist in the definitions used by fire departments and Ministries.

Are there differences and contradictions with other domains?

Due to the current lack of official definitions of terms and expressions for fire statistics, it is possible that differences and contradictions with other domains also exist.

Identification of missing information

All terms and expressions dealing with fire statistics.

H2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

In France, in accordance to the ***Law nº 96-369 of 3 May 1996 (article 55)***, firefighters are in charge of the prevention, protection and fight of fires. They participate, with the other concerned services and professionals, to the protection and the response to all other accidents and disasters, to the assessment and the prevention of natural or technological risks and to emergencies.

Fire response organization

France is divided in 101 “departments”, an administrative level between a county and a region. Five of them are overseas territories (Guadeloupe, Martinique, Guyane, La Réunion, Mayotte).
Each of these 101 “departments” are defended against fire by a Fire Department (SDIS) which has the number of the “department: e.g. the Fire Department of the department “Calvados” (14) is SDIS 14. These SDIS are composed of civilian professional firefighters (in the main cities) and civilian volunteer firefighters (in the country).
There are two main exceptions:

1. the BMPM (Marseille Fire Battalion), a military professional firefighter’s unit from the Navy in charge of Marseille and its airport,
2. the BSPP (Paris Fire Brigade), a military professional firefighter’s unit from the Army in charge of Paris, the three departments around Paris and three main airports (Orly, Le Bourget and Roissy-CDG).

In 2018, France had 249 700 firefighters dispatched in:

1. 40 400 civilian professional firefighters (16 %)
2. 196 600 civilian volunteer firefighters (19 %)
3. 12 700 military professional firefighters (5 %)

Who collects data?

- The fire response report is filled and signed by the firefighter in charge of the operation. The information is then collected by the fire department (SDIS) then is sent to the Ministry of interior.
- The death certificate can be filled and signed only by a doctor. All death certificates are in theory collected by the Epidemiology Centre of medical causes of death (CEPIDC) of the National Health and Medical Research Institute (INSERM) placed under both the authority of the Ministry of Health and the Ministry of Research.
- The Laboratory of Paris Police (LCPP) investigates fires occurring in Paris when there are casualties. The LCPP collects and analyses the information at this level. This is only Police department that does this type of analysis and it is only for the city of Paris.

Who issues the data?

At the national level, a DGSCGC/Home Ministry civilian official.
At the local level, Fire Department officers in charge of fire statistics.

Are there different levels of collection?

For the fire statistics, there are two different levels of collections: national and local ("French department" which is equivalent of county), except for the Paris fire Brigade (BSPP) which is in charge of four French departments.

Identify disparities in data feedback

As mentioned previously, most of the disparities should come from the lack of definitions of fire terms and expressions.
Other important point: if fire statistics from the five overseas Fire Departments (SDIS 971, SDIS 972, SDIS 973, SDIS 974 and SDIS 976) are included in the national fire statistics, there is an important doubt regarding the other French overseas territories which are also part of EU or have special relations with EU, e.g. Saint-Martin, French Polynesia, New Caledonia, Wallis-et-Futuna, Saint-Pierre-et-Miquelon.

Where is the data stored?

French national fire statistics are stored by the "General Direction of Civil Security and Crises Management" (DGSCGC) of the French Home Ministry.
French local fire statistics are stored by each French Fire Department (SDIS or BMPM or BSPP).
French national medical causes of deaths statistics are stored by the Epidemiology Centre of medical causes of death (CEPIDC) of the National Health and Medical Research Institute (INSERM).

H3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

A civilian official from the Home Ministry (DGSCGC).

Purpose for which data is collected

The main purposes are:

5. To elaborate the budgets for fire departments
6. To optimize fire response time
7. To define and locate the fire and rescue stations
8. To define the volume of personnel and equipment

What are the methods used to fill the gaps where information is missing?

Unknown.

Is there follow up to data collected ?

Unknown but corrections from previous years are presented in the report issued the year after. Those are due to fire department that did not submit their data to the enquiry on time. This means that there is some sort of follow up.

Analyse potential cause and consequences in trends

1. French Fire Departments have reported 285 661 fires and 289 fire fatalities in 2016.
2. The number of fire fatalities has decrease of more than 58 % from 1982 to 2016.
3. The number of fire fatalities in home buildings has decrease of more than 28 % from 2008 to 2016 while the number of housing was in increase of more than 12 % during the same period.
4. More than 10 % of all fire fatalities in France from 2004 to 2010 are suicides.

5. In 2008, 32 % of all fire fatalities are dead at the hospital after their transportation from the fire location.

H4. ANALYSE EXISTING DATA

Determining the level of confidence

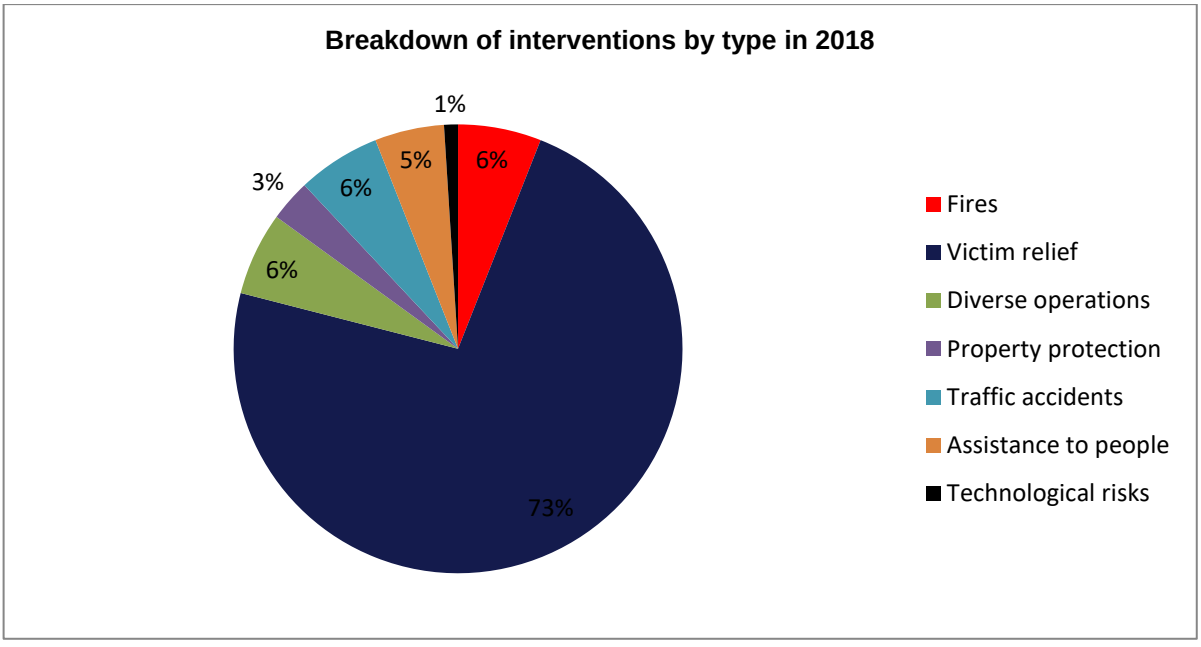
Medium, mostly due to the lack of definitions in the scope of fire statistics.

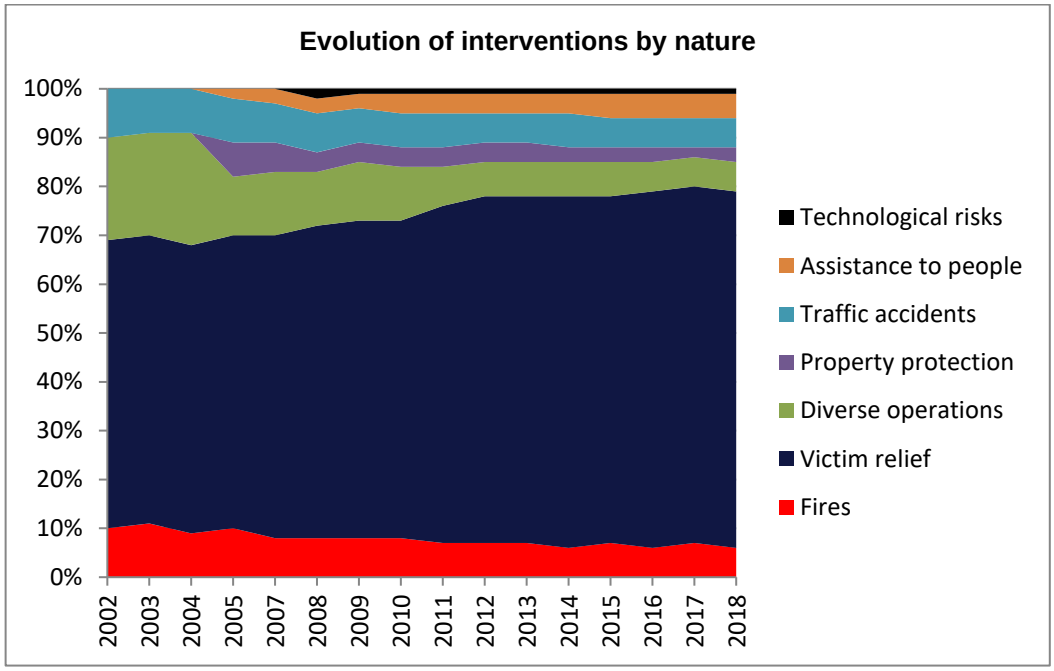
Pinpointing issues and limitations

- The lack of definitions for fire statistics words and expressions.
- The lack of methodology to fill the gaps where information is missing.
- The lack of training for the firefighters in charge of the fire response report.
- The database from the fire departments does not take into account the fire casualties occurring at the hospital or during their transportation to the hospital by EMS

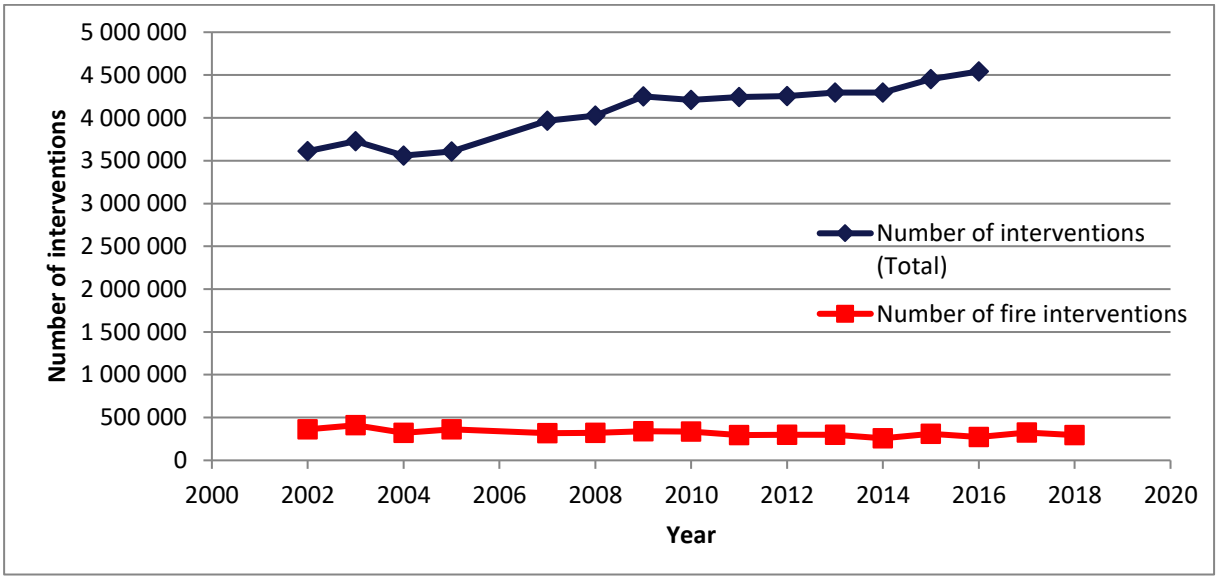
Examples

Fire activity accounted for 6 to 10 % of fire department activities since 2002. In 2018, it has accounted for only 6% of the total activity. The main activity being “victim relief” (73%) in 2018.



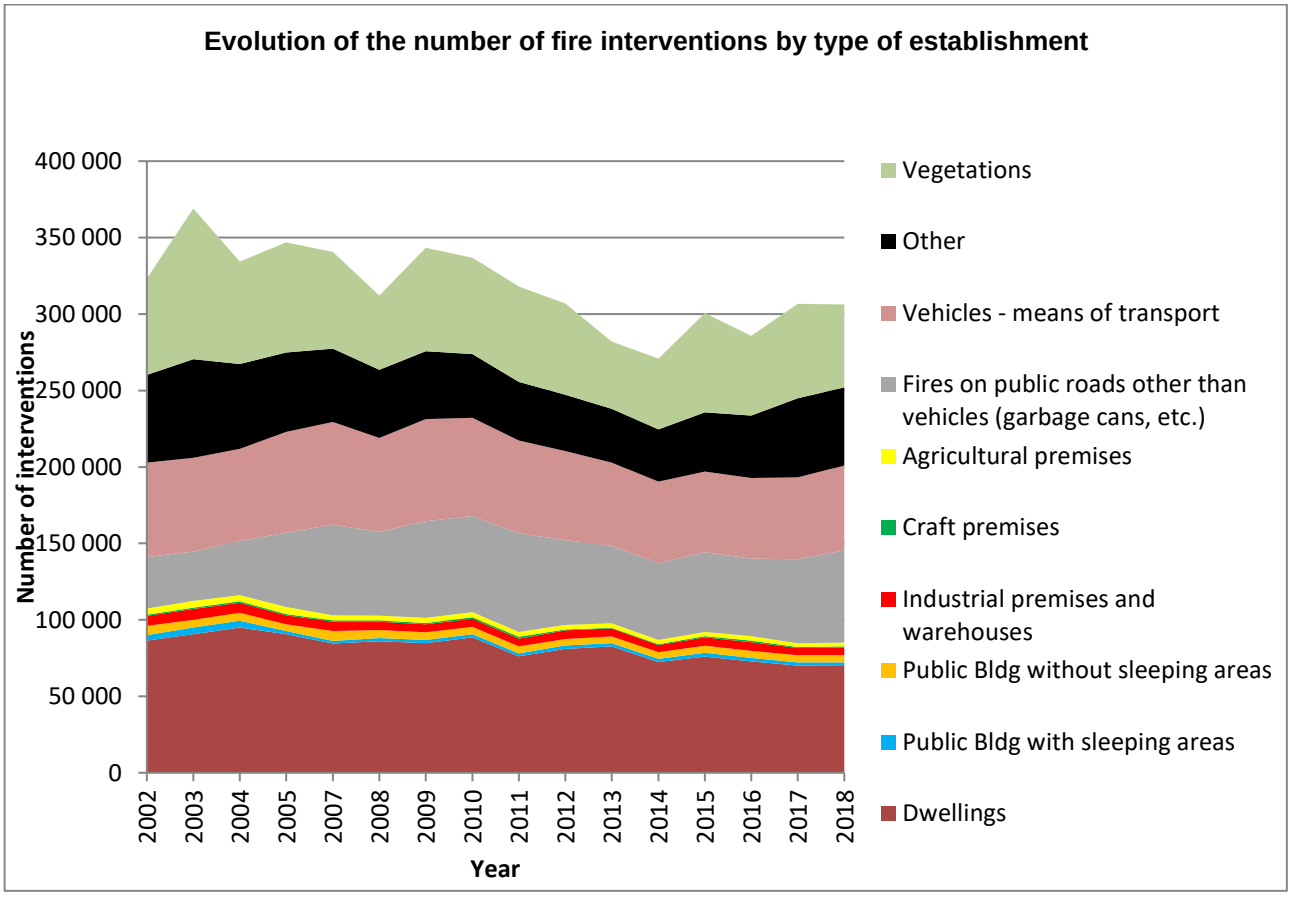


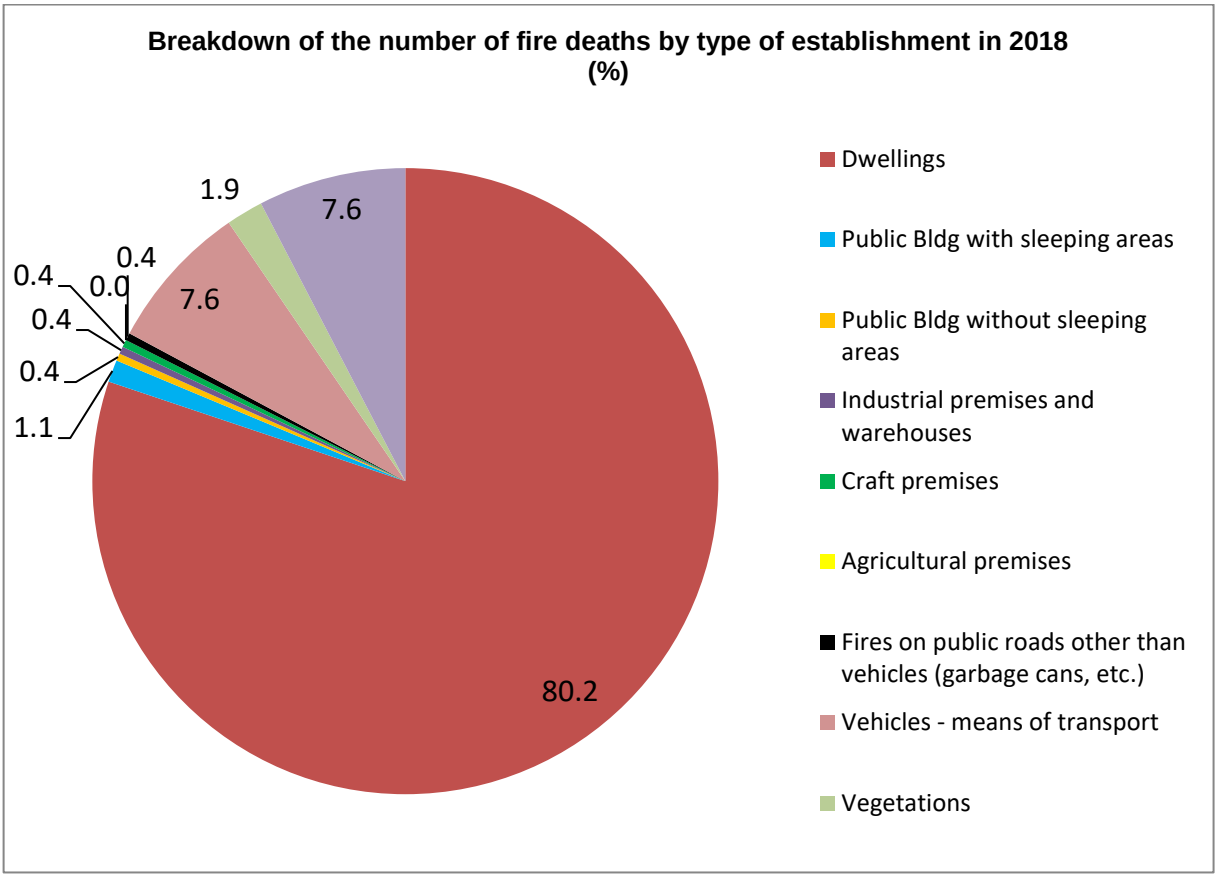
Although the number of fire department intervention has increased significantly in the last two decades, the number of fire interventions is relatively stable.

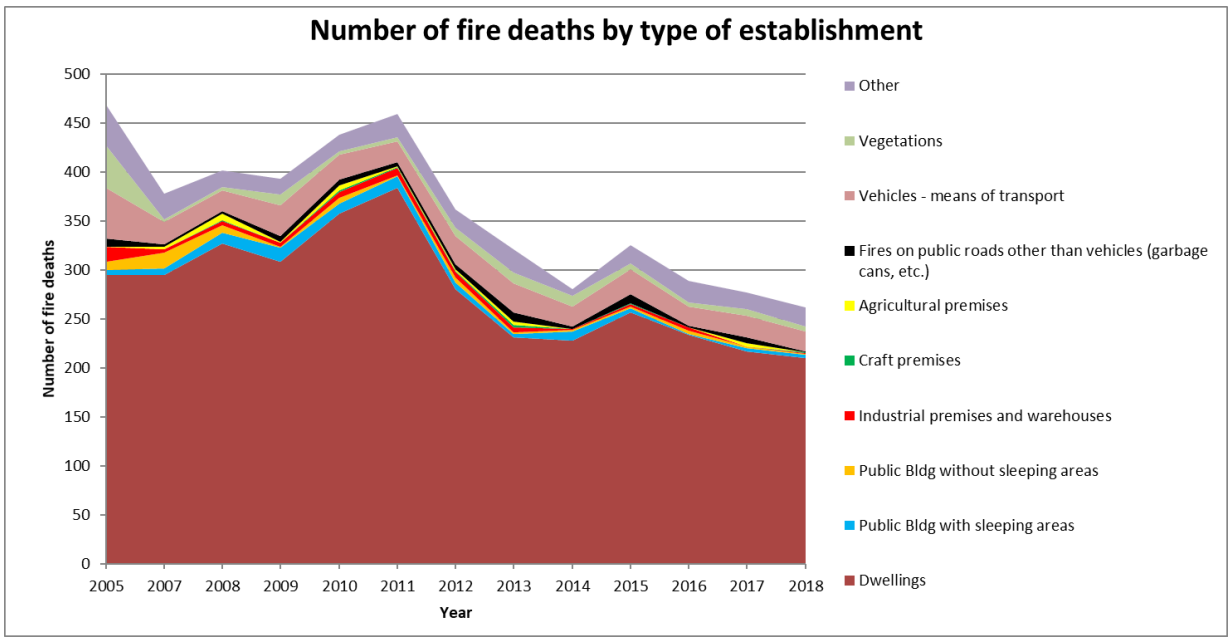


In 2018, the majority of fire interventions (by fire departments) was for dwelling fires (22.8%), followed by fire interventions on public roads (19.7%), vehicle fires (18.1%), vegetation fires (17.7%) and others (16.7%).

Erreur ! Liaison incorrecte.


Evolution of the number of fire interventions by type of establishment
Number of interventions
400 000
350 000
300 000
250 000
200 000
150 000
100 000
50 000
0
2002
2003
2004
2005
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Year
Vegetations
Other
Vehicles - means of transport
Fires on public roads other than vehicles (garbage cans, etc.)
Agricultural premises
Craft premises
Industrial premises and warehouses
Public Bldg without sleeping areas
Public Bldg with sleeping areas
Dwellings


Breakdown of the number of fire deaths by type of establishment in 2018 (%)
1.9
7.6
0.4
0.4
0.0
7.6
0.4
0.4
1.1
80.2
Dwellings
Public Bldg with sleeping areas
Public Bldg without sleeping areas
Industrial premises and warehouses
Craft premises
Agricultural premises
Fires on public roads other than vehicles (garbage cans, etc.)
Vehicles - means of transport
Vegetations


Number of fire deaths by type of establishment
Number of fire deaths
500
450
400
350
300
250
200
150
100
50
0
2005
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Year
Other
Vegetations
Vehicles - means of transport
Fires on public roads other than vehicles (garbage cans, etc.)
Agricultural premises
Craft premises
Industrial premises and warehouses
Public Bldg without sleeping areas
Public Bldg with sleeping areas
Dwellings

I. DIAGNOSTIC SHEET FOR GERMANY

I1. TERMINOLOGY ISSUES

References of existing database/studies

Databases

At national level:

Fire statistics in Germany are no direct fire statistics. Statistics are dealing with fire operation. Operations are distinguished between.

- Small fire A: Can be extinguished using a small fire extinguishment equipment
- Small fire B: Can be extinguished using a C-pipe
- Medium fire: Can be extinguished by one first attendance using not more than three C-pipes
- Large fire: More than three C-pipes are used.

Furthermore false alarms and technical and medical help operations are listed.

- National cause of death statistics, ICD-10 and gender, e.g. exposition to flames, fire and smoke, official website (public available): https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Gesundheit/Todesursachen/_inhalt.html
- Operations of fire brigades, fire deaths and injuries, Deutscher Feuerwehrverband (DFV), only as paper book "Feuerwehrjahrbuch" (only in German, website including some data. https://www.feuerwehrverband.de/presse/statistik/))
- Injuries and fatalities from accidents (DGUV), https://www.dguv.de/de/zahlen-fakten/au-wu-geschehen/index.jsp
- Property loss: data collected by insurer Gesamtverband der Versicherer (GDV), website (with data: https://www.gdv.de/de/zahlen-und-fakten/versicherungsbereiche/hausrat-24100#Schaeden)
- Fire causes (insured fire incidents), collected by institute for fire cause investigation (for insurers), Institut für Schadenverhütung (IFV) website with data: https://www.ifs-ev.org/schadenverhuetung/ursachstatistiken/brandursachenstatistik/

At local level:

- Data collected by fire services, different data and formats, several fire services collect via an electronical system but not all. Often there is a fire service operation statistics (electronic) and a fire incident report (form to fill in). Example for such a form for fire incident report is given in uploaded documents, one form is to be submitted to DFV, it is called FEU 905 and it summarizes data for one year and is collected on national level by DFV (see above)
- Some "Länder" (countries) and some larger fire brigades collects data about fire incidents with a survey about prevention measures and effect of these measures on the fire development (form to fill in uploaded documents) For example: https://www.lfv-bayern.de/informationen/statistiken/
- Munich fire service collects data about fire incidents with a survey about prevention measures and effect of these measures on the fire development (form to fill in uploaded documents)
- Data, collected by German police: criminal statistics - fire causes, not public available

Studies

Fire statistics

vfdb collects data with several fire services in German which volunteered for the project. The report (Technischer Bericht) is in uploaded documents (abstract is in English, report is in German), vfdb website gives an overview of activities. Results are based on a about 5.000 fire service interventions on building fires.
http://www.ref14.vfdb.de/brandstatistik/brandschadenstatistik/

12.1.1. Summaries of existing database

The national German database is the cause of deaths statistic. It is organised according to ICD-10. Certain fire data can be derived by summarising different sub categories, e.g. exposed to fire, smoke and flames. However, smoke inhalation might be partly found under the category CO intoxication.
It depends on the death certificate in which category it is collected.

fire incident report (fire service, example uploaded – brand_ab2009_online_V1.pdf) includes: call, personnel, vehicles, equipment, other services on scene, fire size, fire area, fire laod, fire object, water supply, injured, rescued and death people

Existing definitions

In DIN 14010 definitions are made but they are not widely used in German provinces and data collections.

In the fire incident report (example uploaded: brand_ab2009_online_V1.pdf) definitions are used.

Fire data collected by Munich fire service gives defitions and an example report (uploaded form: 2017-05_Evaluierungsbogen_zu_Massnahmen_VBG_201904.pdf)

Insurers have definitions with regard to their collection aims.

Are there differences within the same country?

Yes, fire services are collecting data on local level and the systems and data differ.

Are there differences and contradictions with other domains?

Fire service, police and insurer are organising their data very differently- so an overall picture can’t be built.

Identification of missing information

So far, no uniform fire statistic has been enforced in Germany. All fire service interventions and statistics are obtained with different criteria in Germany. Due to this situation, there is a lack of statistical information on extensive fire service interventions and reasonable statistical findings on fire service intervention, on the fire phenomenon and on the effectiveness of fire protection measures.

Many detail information (building / first burning item / smoke detector us etc.) is missing. A start is made with the vfdb project with a form that has to be filled in by the fire service. Up to date it is a project which is voluntary. The link between fire causes and fire statistics is missing.

I2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

Fire departments are responsible for the prevention, protection and fight of fires (Including industry).Furthermore to the protection and the response to all other accidents and disasters all technical help. Several fire services are responsible for ambulance as well.

Fire response organisation

Professionals and volunteers on local level. Furthermore industrial fire brigades. Military sector is organised similar to professional fire brigade.

Who collects data?

The fire response report is filled and signed by the firefighter in charge of the operation.

Who issues the data?

The Länder issue summary reports.

Identify disparities in data feedback

A fire death might not be counted as fire death if the person is dying later in hospital and if the cause of death doesn't state a relation to fire / smoke / flames.

Where is the data stored?

Only the cause of death statistics are collected and stored centrally, all other statistics are collected and stored locally.

I3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

Nobody / everybody, no national or local entity for this issue. Used mainly for budget discussions.

Purpose for which data is collected

Death cause: determine cause of most deaths
Fire statistics (fire service): personnel / equipment / response times
Fire statistics (vfdb): research of how fires develop / effectiveness of measures etc.
Property losses: identification of most costly fires
Fire causes: police – determination of arson; IFV: insurance issues

What are the methods used to fill the gaps where information is missing?

No methods

Is there follow up to data collected ?

No

Analyse potential cause and consequences in trends

I4. ANALYSE EXISTING DATA

Determining the level of confidence

Medium. Partly different voluntary fire brigades are writing an operation report for a large fire. Finally it was one fire but in the statistic a larger number of reports are counted.

Pinpointing issues and limitations

The link between the different sources of data is missing. It is not possible to link data from insurer, police, fire service to gain information.

Trends in German fire statistic data

- Most fires and fatalities occur in residential building fires
- Fires and fatalities occur also often in nursing homes and hospitals
- Observation after bigger fires: the measures against fire spread work in general, the smoke spreads further than the fire and leads to damage / injuries (Munich fire service statistics), escape routes are blocked by smoke in significant number of fires (40 %) (TB – vfdb)
- High number of false alarms with automatic fire alarm systems
- Highest property loss in a few number of very big fire incidents

Summary of studies of fire data for the country

Technischer Bericht vfdb TB 14-01 vfdb-Brandschadenstatistik (Tecnical report vfdb TB 14-01 vfdb Fire Statiastic)

Report/source:
vfdb-Brandschadenstatistik, Untersuchung der Wirksamkeit von (anlagentechnischen) Brandschutzmaßnahmenherausgegeben von Sebastian Festag & Ernst-Peter Döbbeling, 1. Auflage Februar 2020
Technisch-Wissenschaftlicher Beirat (TWB)der Vereinigung zur Förderung des Deutschen Brandschutzes e.V. (vfdb)Postfach 4967, 48028 Münster

Purpose:
Fire protection measures target at the avoidance of fires in advance and at limiting the resulting damage as low as possible. Regarding the effectiveness of measures, there are only partial statistical findings available so far. Within the fire loss statistics project of the German Fire Protection Association e.V. (vfdb), the statistical effectiveness of fire protection measures is examined in detail. Hereby, 5,016 recorded fire service interventions on building fires with 1,216 real fires of 29 fire services are evaluated systematically an. On this basis, extensive statistical information for the incidences of fires handled by German fire service are derived. Evaluations on the distribution of building fires (partly specified in real fires and false alarms) are examined in this report.

Data:
Vfdb survey with German fire services, data on automated fire measures, data from insurers, data from fire services, data from Ministry (ICD-10)

Key finding (s):
So far, no uniform fire statistic has been enforced in Germany. All fire service interventions and statistics are obtained with different criteria in Germany. Due to this situation, there is a lack of statistical information on

extensive fire service interventions and reasonable statistical findings on fire service intervention, on the fire phenomenon and on the effectiveness of fire protection measures. On the one hand, the results support the fundamental gain in knowledge and experience and on the other hand, they provide completely new insights.

Schnell wie die Feuerwehr (Quick as the fire service)

Report/source:
H. Herweg, P. Wagner. Vfdb 4/2013, Vereinigung zur Förderung des Deutschen Brandschutzes e.V. (vfdb), Postfach 4967, 48028 Münster

Purpose:
Different definitions and uses of terms regarding the time until the fire service is on scene after the first call are discussed. If specific times are legislatively given the fire service have to provide enough fire stations and enough vehicles / personnel to fulfill this requirement. This is a cost factor.

Data:
Traffic data, mainly average speed in certain areas and day times. Speed of fire service vehicles.

Key finding (s):
Average speed of fire service vehicles in Berlin was 32 km/h in 2011. 70 % of these drives have been emergency rescue incidents. This is about 5 to 7 km/h quicker than average speed of individual motor traffic. Bigger fire service vehicles tend to have a lower average speed than smaller vehicles. However, the bigger vehicles tend to have shorter distances to travel as they are located in more stations in the city. The average speed is relatively stable regarding days of the week, months in the year and hours of the day.

Trautes Heim, (Un-)Glück allein! (My home is my (un-) safe castle!)

Report/source:
H. Herweg, P. Wagner, Trautes Heim, (Un-)Glück allein! Auswertung einer Stichprobe von 258 Brandtoten, vfdb 3/2014, Vereinigung zur Förderung des Deutschen Brandschutzes e.V. (vfdb), Postfach 4967, 48028 Münster

Purpose:
A comparison of fire statistics data in Germany, Austria and Switzerland.

Data:
Fire data from Germany, Austria and Switzerland

Key finding (s):
Most fires in Austria have 1 or 2 fatalities. Most fatalities occur in residential buildings. Smoke inhalation is more often than cause of death than flames / heat.
In Switzerland fires occur more often in residential buildings than in other buildings. Residential buildings are only responsible for 32% of the property losses (insured). The number of fire fatalities is small in Switzerland.
In Germany most fires have only 1 fatality. Most fatalities occur in residential buildings. Most fatalities are found in living and bed rooms.

Brandopfer in Berlin – Teil 1: Faktor Zeit (Fire fatalities in Berlin – part 1: factor time

Report/source:
P. Wagner, H. Herweg, Brandopfer in Berlin – Teil 1: Faktor Zeit, vfdb 2/2018, Vereinigung zur Förderung des Deutschen Brandschutzes e.V. (vfdb), Postfach 4967, 48028 Münster

Purpose:
Number of fires and fatalities in Berlin, years 1997 to 2015

Data
Data of Berlin fire service about fatal fires between 1997 and 2015.

Key finding (s):
Number of fires decreased in Berlin between 1997 and 2015. Although the number of fatalities deceased as well, that is not true for number of injuries.
Especially, the number of fatalities per fire did not decrease.
Fall and winter show more fire fatalities than the other seasons.

Brandopfer in Berlin – Teil 1: Faktor Raum (Fire fatalities in Berlin – part 2: factor area

Report/source:
P. Wagner, H. Herweg, Brandopfer in Berlin – Teil 1: Faktor Raum, vfdb 4/2019, Vereinigung zur Förderung des Deutschen Brandschutzes e.V. (vfdb), Postfach 4967, 48028 Münster

Purpose:
Number of fires and fatalities in Berlin, years 1997 to 2015

Data
Data of Berlin fire service about fatal fires between 1997 and 2015.

Key finding (s):
Numbers of fire that Berlin fire service attends is the highest number in Germany – as Berlin is by far the biggest city.
The area in the city cannot be directly connected to high number of fatalities, although a higher density in population leads generally to a higher number of fires and higher number of fatalities. .

J. DIAGNOSTIC SHEET FOR GREECE

J1. TERMINOLOGY ISSUES

References of existing database/studies

The database of the Hellenic Fire Corps.

- https://www.fireservice.gr/el_GR/synola-dedomenon (this weblink contains data including Fire Service's incidents, such as fires, floads, assistances, etc).
- https://www.fireservice.gr/el_GR/stoicheia-symbanton (another link, which gives the opportunity to user for searching with specific parameters, such as kind of incident, month of the year and year).
- https://www.fireservice.gr/el_GR/drasteriotetes-p.s. (the data of the each year are collected and presented, approaching them by specific steps, which are described below).

Instruction of use:
Hellenic Fire Corps: description of the using method for collection and presentation of the data.

- Each Fire Service in Greece (per region) is responsible for its incidents of the year, storing them written and electronically- in a database(Oracle).
- Department of IT and Communications of Fire Corps checking and processing the data through specific tools by Oracle Database e.g. PL/SQL Developer (creating queries with particular principles – criteria).
- The above results are presented through tables, statistic graphs (https://www.fireservice.gr/el_GR/drasteriotetes-p.s.). Please underlining at this point that the final results are announced at the beginning of the following year (each February).

Summaries of existing database

- type of incident (fire, assistance, etc),
- start time – ending time, duration of the incident,
- kind of fire
- type of staff participating in (staff of Hellenic Fire Service, military, volunteers, staff of foreign Fire Services e.g. earthquakes - Athens since 1999, etc.),
- Means: vehicles, air…
- kind of forest area - land (e.g. forest, marsh, agricultural area, etc),
- deaths and injured persons (personnel, citizens)

Existing definitions

Unknown

Are there differences within the same country?

There is one unique database for the whole country.

Are there differences and contradictions with other domains?

Unknown

Identification of missing information

Age of the personnel and citizens.

J2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

The mission of the Hellenic Fire Corps:

- Facing the consequences of natural, technological and other disasters, such as earthquakes, floods, chemical - biological - radiological - nuclear threats, as well as the rescue of people and material goods, which are endangered by them. For the above purpose, it utilizes the available scientific data and information, prepares, organizes and mobilizes the fire brigade, means and equipment and requests the assistance of other Authorities and Services.
- Rescue and provide all possible assistance to persons whose physical integrity are threatened or endangered by all kinds of accidents, such as air, rail, traffic, work, falling into lakes or rivers, being trapped in elevators or other places; and facilities, inaccessible mountainous areas, caves as well as the notification of the competent Services for their transfer to medical assistance or care institutions.
- The guarding and preservation of property that has been destroyed or threatened by fires or other disasters, until it is handed over to police or its owners. The maintenance and protection of social security from arson crimes.
- Establish and control the implementation of fire protection legislation. The certification of the volunteer firefighters, who are subject to the provisions of Law 1951/1991 and of the volunteers and volunteer groups, who are active within the mission of the Fire Brigade, but have not been organized according to the above provisions, as well as the fire safety staff of companies and other bodies, provided by fire protection legislation.

Who collects data?

The Hellenic Fire Corps collects the data. Besides, General Secretariat for Civil Protection and Forest Offices per region collect specific information, which is required by their sections.

Who issues the data?

The Hellenic Fire Corps.

Are there different levels of collection?

Data should be the same for the whole country.

Identify disparities in data feedback

The information which is necessary is collected and stored, all the rest information (e.g. license plates, names, age of the personnel, citizens, etc) is stored by the Fire Service per region in a file.
The Department of Analysis, Planning and Statistics of Fire Corps HQ is responsible for checking the data before publishing them.

Where is the data stored?

At the Hellenic Fire Corps.

J3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

The Hellenic Fire Corps. The statistics are published and available to civilians, ministry, institutes or others for use.

What are the methods used to fill the gaps where information is missing?

There is no a particular method due to the fact that all the required information is collected by each Fire Service per region and stored in the platform mentioned above.

Is there follow up to data collected ?

Department of IT and Communications of the Fire Corps HQ has a cooperation with each Fire Service per region in order to check and correct the data. During the year the information stored in the platform is checked by both sides. The most effective checking of the data is in September (forest fires) and also at the end of December of each year. After that, the above steps (describing in 1.2) are used in order to have the final result.

Analyse potential cause and consequences in trends

The Department of IT and Communications of Hellenic Fire Corps does not analyze the final result, but the produced one is available to be analyzed by others, who for example participate in dissertations, research programs, etc

J4. ANALYSE EXISTING DATA

Examples

- Information on the structure of the database is available for Greece.
- Then information on the number of fires is given and information about fire victims is displayed.
- For every fire there is specific information about the time and place.
- Forest fires wanted to play a particularly important role for Greece. For this reason, there is various information on this topic, both on the Internet and in specialist literature.
- Studying information about the fires in Greece is particularly difficult due to the language barrier.

https://www.fireservice.gr/el_GR/synola-dedomenon (this weblink contains data including Fire Service's incidents, such as fires, floods, assistances, etc).

Term	Description
Law	Name of the responsible administrative unit, e.g. Attica
Event Type	Event type is divided into 3 forms: lift intervention sheet, help sheet and fire report
Date Event Start	The date is specified in the format DD.MM.YYYY; Example: 01/08/2019.
Start time	The time is given in the format HH: MM; Example: 05:30.
Date Extinguishing	The date is specified in the format DD.MM.YYYY; Example: 01/08/2019.
Extinguishing Time	The time is given in the format HH: MM; Example: 05:30.
Municipality	The place of fire can be assigned to the name of the community.
Village	The location of the fire can be assigned to the name of the village within the municipality.
Space Description	there are 150 different object names: from agricultural area, agricultural installation, air transport, airport to warehouses general, waste places, wooden bridges and woodland.
Event Characterization	the event is characterized by the following terms: other cases, finding a missing person, opening doors, water pump, release from elevator, road release, removal of objects - collapses, people rescue, animal rescue, escape of dangerous, snowcents , large, medium, patient transport, transport of people, small, tank filling, floor washing, road washing, roof washing, preventive fire protection, saw drop, car accidents, false announcement

Term	Description
Total Fire. Vehicles	The number of fire engines used per event is given with a clear number; in 2019 the numbers were in the interval from 1 to 79.
Total Fire. Forces (in men and women)	The number of firefighters deployed per event is given with a unique number; in 2019 the numbers were in the interval from 0 to 728.
Total Firefighters Shipping	This term cannot be interpreted, so it is unclear; in 2019, the digits were in the interval from 0 to 8.
Accident Type	The accident types are also classified with the following three terms: rescue, release, accident.
Number of people involved by type	The number of people involved in each event is given with a unique number; in 2019 the digits were in the interval from 1 to 9.
Injured	The number of people affected by the event is given with a unique number; in 2019 the digits were in the interval from 0 to 5.
Deaths	The number of people affected by the event is given with a unique number; in 2019 the digits were in the interval from 0 to 3.
Disasters	The inputs "0" or "1" are available here; this is probably the definition for "1" - event is classified as a disaster.
Burns	The number of people affected by the event is given with a unique number; in 2019 the digits were in the interval from 0 to 4. The difference to "Injured" is unclear.

K. DIAGNOSTIC SHEET FOR HUNGARY

K1. TERMINOLOGY ISSUES

References of existing database/studies

Fire Damage Statistics Database (Tűzkárstatisztikai Adatbázis).
The national database is not open for public.

Summaries of existing database

- *data connecting to the following interventions:*
  - *fires*
  - *technical rescues*
  - *wildfires*
  - *fire investigations*
  - *carbon-monoxide incidents*
- *technical data of fire vehicles*

Existing definitions

There's a *guide on how to provide data from incidents.*

Are there differences within the same country?

There is only one unique database and data collecting system for the whole country. There are no other levels of databases.

Are there differences and contradictions with other domains?

Only the Disaster Management organization is collecting fire statistic data.

K2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

Firefighting and technical rescue.

Fire response organisation

- *Professional fire brigades (Disaster Management at national, county and local level)*
- *Municipal fire brigades*
- *Voluntary Fire Fighting Associations*
- *Industrial fire brigades*
- *Military fire services*

Who collects data?

Local fire brigades collects:
- Basic fire data:
- Number of fires by size
- Number of victims (deaths, injured, rescued persons, missing persons)
- Fires by fire objects (buildings types, sectors of industry, etc.)
- Fire damage

County Directorate for Disaster Management collects:

- Fire causes

Who issues the data?

The National Directorate General for Disaster Management (NDGDM) annually issues the requested data for the Central Statistics Bureau.

Are there different levels of collection?

There is only one type of data collection and database, so there are no differences in collection.

Identify disparities in data feedback

If the NDGDM finds missing or wrong data, they call and warn the fire brigade responsible for collecting the data to fill in the missing data.

Where is the data stored?

At national level on the National Directorate General for Disaster Management.

K3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

The National Inspectorate General for Fire Services at National Directorate General for Disaster Management.

Purpose for which data is collected

Database is analysed to determine the need of any other special vehicle, device etc. to work more effectively, or which field of fire prevention needs more propagation in the coming period, etc.

For example we analysed the wildfires and we experienced that the wildfires size are mostly under 1 hectare, therefore we purchased fast response, easy moving pickup trucks equipped with special water mist system designed for wildfires.

Data is provided to the public, national or international organizations, when it is requested.
Data is mostly use data internally, to develop the rescue fire protection and fire prevention.

Is there follow up to data collected ?

The data uploaded to the database are randomly checked by the National Inspectorate General for Fire Services at National Directorate General for Disaster Management.

K4. ANALYSE EXISTING DATA

Pinpointing issues and limitations

Data is not public.

Examples

- The fire protection system in Hungary is structured centrally. For this reason, the numbers for the fire statistics are also recorded and evaluated centrally.
- In the publications, the focus is mainly on the number of fires and their victims.
- With regard to fire damage, a distinction is essentially made between industry, agriculture and private housing.
- The results of the analyzes are presented in tables, graphs and on the map of Hungary.

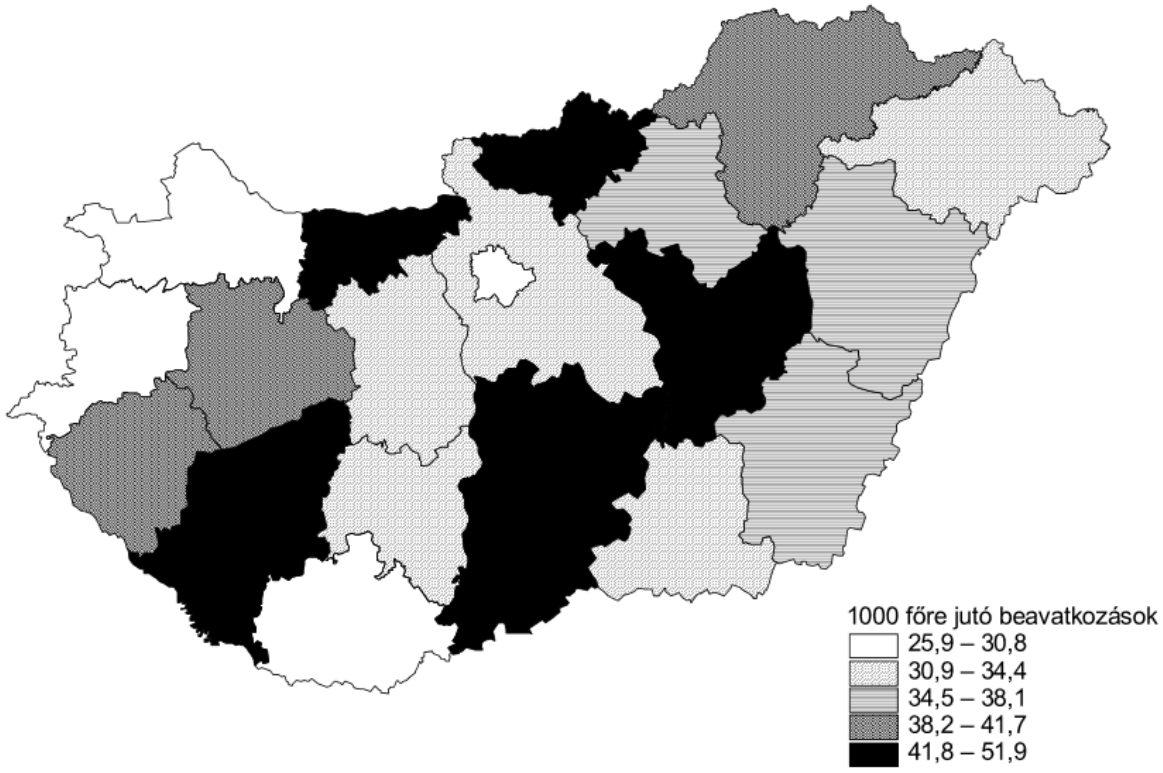


Figure 1: Number of firefighting's and technical rescues per 1000 people, 1998–2005 average

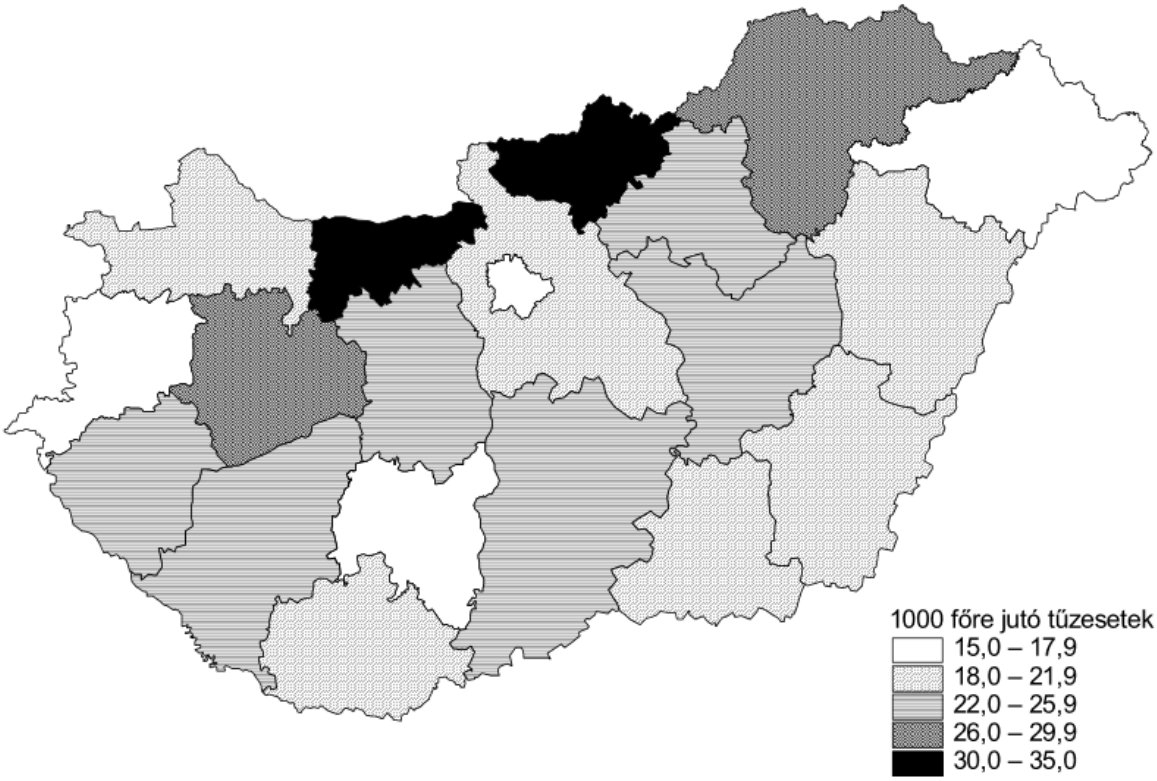


Figure 2: Number of fires per 1000 inhabitants, 1998–2005 average

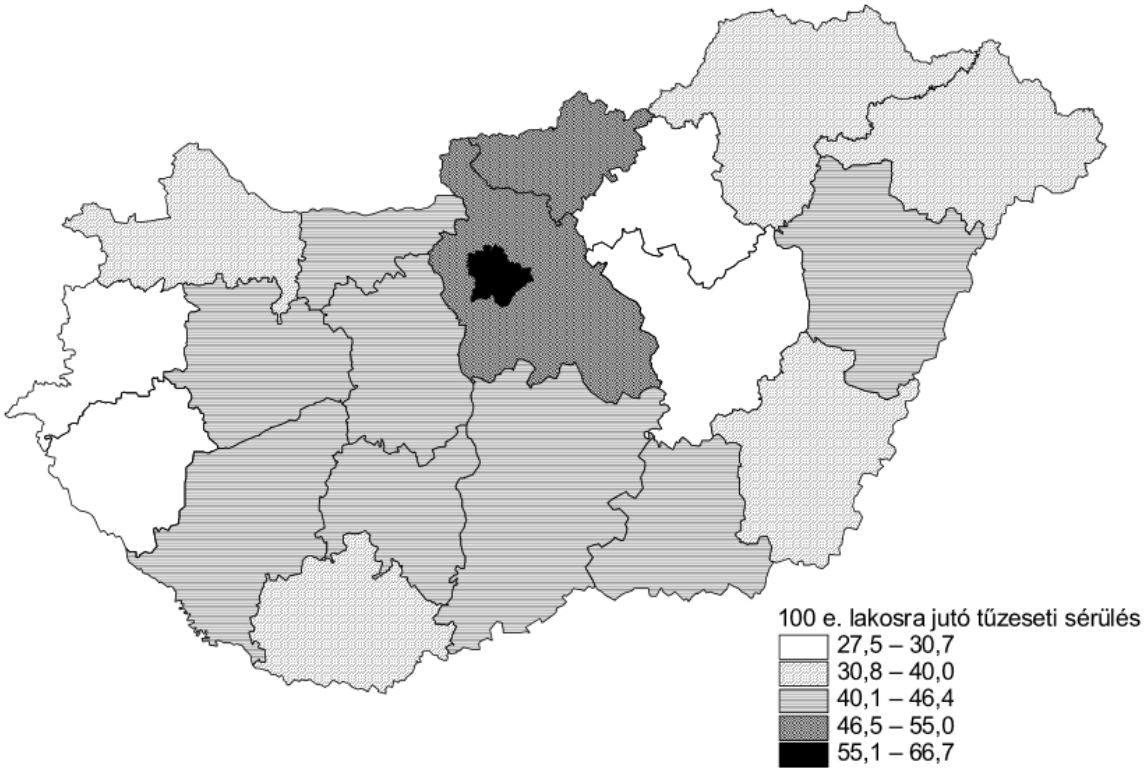


Figure 3: Fire injuries per 100 thousand inhabitants, average 1998–2005

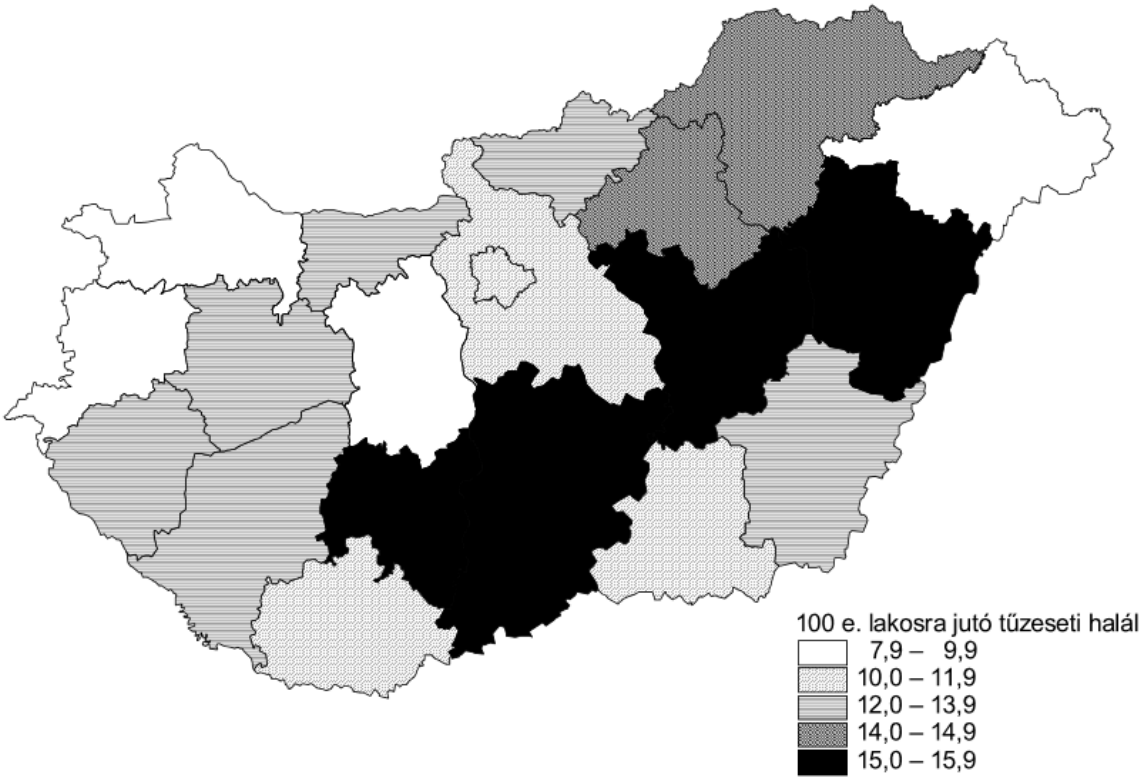


Figure 4: Fire deaths per 100,000 inhabitants, average 1998–2005

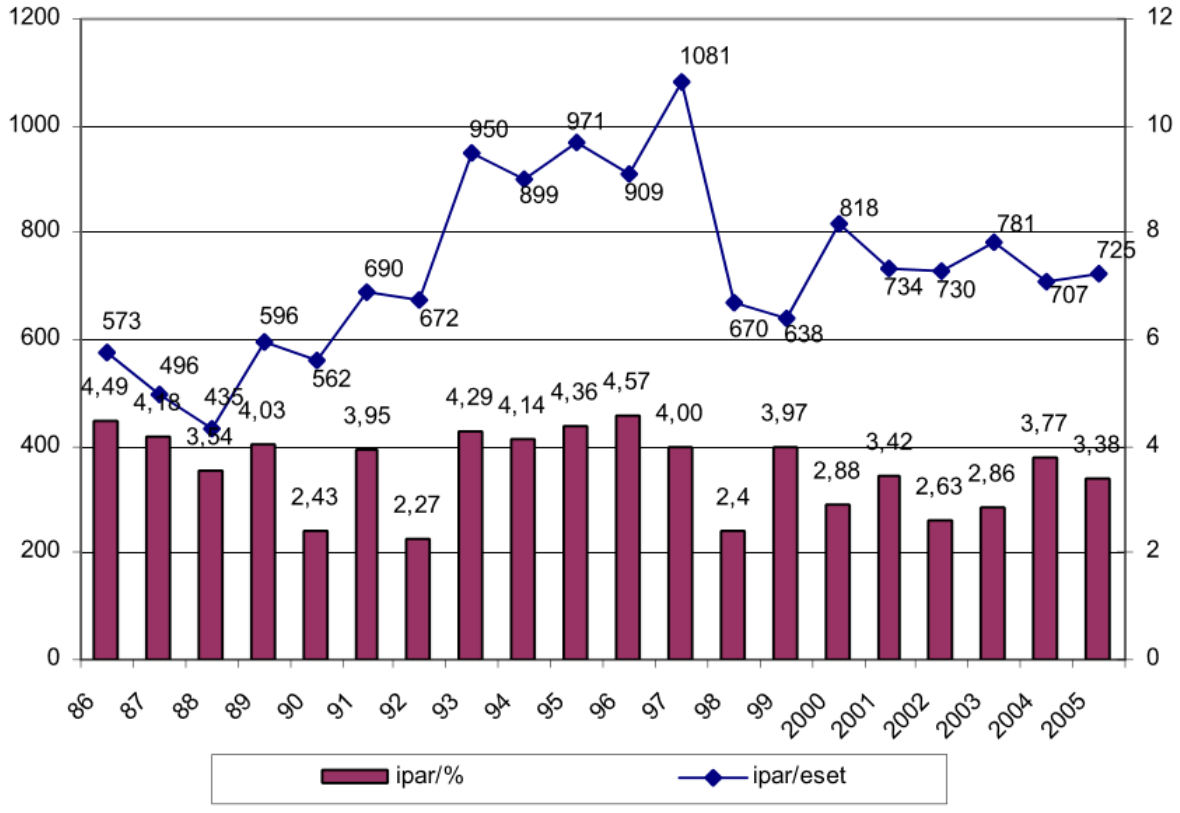


Figure 5: Number and proportion of industrial fires relative to total fires

L. DIAGNOSTIC SHEET FOR ITALY

L1. TERMINOLOGY ISSUES

References of existing database/studies

Statistica interventi, Corpo Nazionale Vigili del Fuoco:
http://www.vigilfuoco.it/aspx/page.aspx?IdPage=450

Summaries of existing database

- Urgent technical rescue events performed at national level;
- Interventions of urgent technical rescue held at regional level;
- Interventions of urgent technical rescue carried out at provincial level;
- Time distribution of rescue interventions;
- Relations and statistical analysis of the interventions data;
- Urgent technical rescue interventions referred to the human resources of the fire departments;
- Fuel consumption;
- Victims and injured detected during the rescue events;
- and Prevention and fire surveillance [1].
- Information is mainly about incident types, causes, substances, time distribution of rescue intervention, victims and injured people
-

Existing definitions

No definitions available. Detailed classification for each field recorded is provided.

Are there differences within the same country?

No differences within the same country. However, data are subdivided into provincial, regional and central levels.

L2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

“The Italian National Fire Brigade is included in the Ministry of Internal Affairs, as structure committed to public rescue within the whole nation, also for what concerns civil defence, prevention and extinction of fire, in order to ensure the safeguard human life and the protection of goods and of the environment”.

“Moreover, the National Fire Brigades Corp, thereinafter often aliased ad CNVVF (as by the Italian Corpo Nazionale dei Vigili del Fuoco), is the fundamental component of the national system for civil protection, acting in case of natural disaster in coordination the main authority in this field - the National Civil Proction Department” [1].

Fire response organisation

“To deliver on its institutional mandate, in compliance with the principle of proximity to the citizens’ needs, the CNVVF is articulated in Regional Directions (Direzioni Regionali), Provincial Fire Departments (Comandi Provinciali), Fire Stations of Professional Fire Fighters (Distaccamenti Vigili del Fuoco Permanenti), Fire Stations of Voluntary Fire Fighters (Distaccamenti Vigili del Fuoco Volontari)” [1].

Who collects data?

"The collection of data is conducted by the STA-RI (Statistics and Report of Intervention) web-based software, used by the crew commander while compiling the intervention report on digital support on a standardized frame called "VF-41" [1].

Who issues the data?

"The Central Statistics Service has been editing the Statistic Annual Report of the CNVVF for several years, with the aim to standardize and spread out the information, in a fully available way also for users outside the Administration, as well as to acknowledge of the work for the CNVVF" [1].

Are there different levels of collection?

Data are subdivided into provincial, regional and central levels.

Where is the data stored?

"New centralized web platform configured as a web portal, through which it is possible to access the new STAT-RI web procedure, as well as other services, such as the online consultation of all documentation related to the procedure (management and configuration manuals), information regarding development groups, ways to require technical support, other collateral services" [1].

L3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

"The circular letter n°1 dated 2 Jan. 2003, sentenced the institution of the Statistical Service of the C.N.VV.F., articulated as follows

- Central Statistic Service at the Cabinet of the Head of the CNVVF (Bureau of Direct Collaboration of the Head of the C.N.VV.F);
- Regional Statistic Services inside the Regional Directions of the C.N.VV.F;
- Statistical Services inside the Provincial Fire Departments" [1].

Purpose for which data is collected

"Statistics plays a crucial role, both for planning of the operative actions and for the more general execution of the institutional tasks, to support continuous institutional update, through the monitoring and analysis of the activities, as well as the effective use of available resource and the bettering of the services delivered to the community" [1].

What are the methods used to fill the gaps where information is missing?

"STAT-RI application that allows the electronic compilation of the same data included in the VF-41 form, such as time and place, type of accident, cause, substance involved, injured/deads, etc.

This application is perfectly integrated with SO115 software, - the software used in the operating rooms - allowing the person compiling the form to import, thanks to the card code, all information already inserted by the operator in the control room. At the same time, this mechanism ensures the integrity of all data treated by SO115 and STAT-RI system" [1].

Is there follow up to data collected ?

“The National Fire Brigades use a Business Intelligence software for the analysis of the synthetic data of the activities done by the Fire Fighters. The acronym BI stands for process of search, collection, handling and transformation of data in information, to be used in the decision taking activities. These software, by exact, updated and pertinent info given on the referring scenarios, make possible to the managerial levels to determine the so-called strategical decisions” [1].

Analyse potential cause and consequences in trends

“The Central Statistic Service has been editing the Statistic Annual Report of the CNVVF for several years, with the aim to standardize and spread out the information, in a fully available way also for users outside the Administration, as well as to acknowledge of the work for the CNVVF” [1].

L4. ANALYSE EXISTING DATA

Determining the level of confidence

“The mechanism adopted ensures the integrity of all data treated by SO115 and STAT-RI system” [1].
No other comments are present related to the level of confidence of the data.

Pinpointing issues and limitations

Limitations are given by the limited fields recorded in terms of pre and post fire conditions of buildings subjected by fire incidents. For example, it would be important to collect data related to the quantification of damage.

Example

Reference period: January 1, 2017 - December 31, 2017

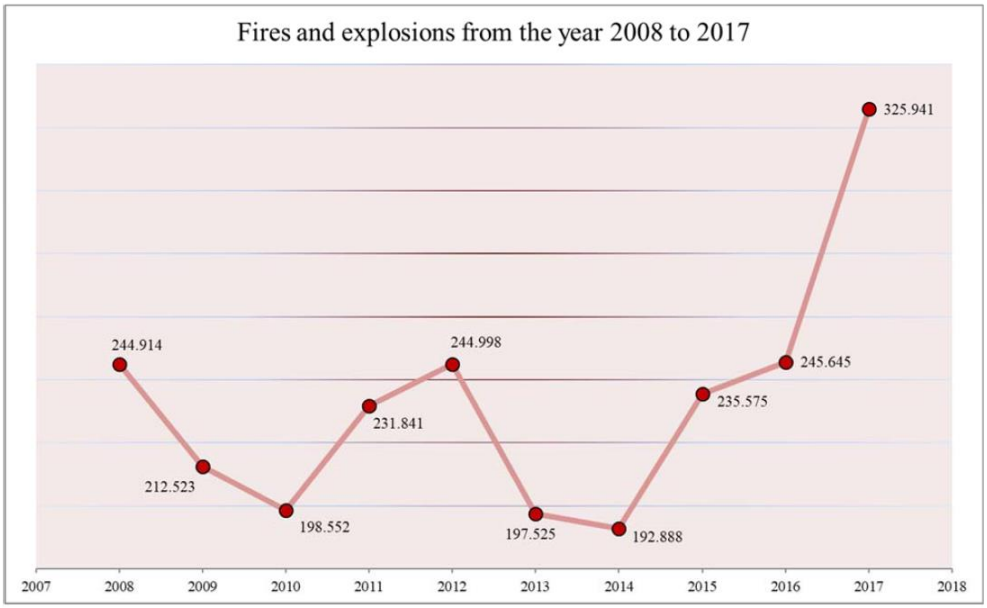


Figure 24: Fire and explosions from 2008 to 2017 [1]

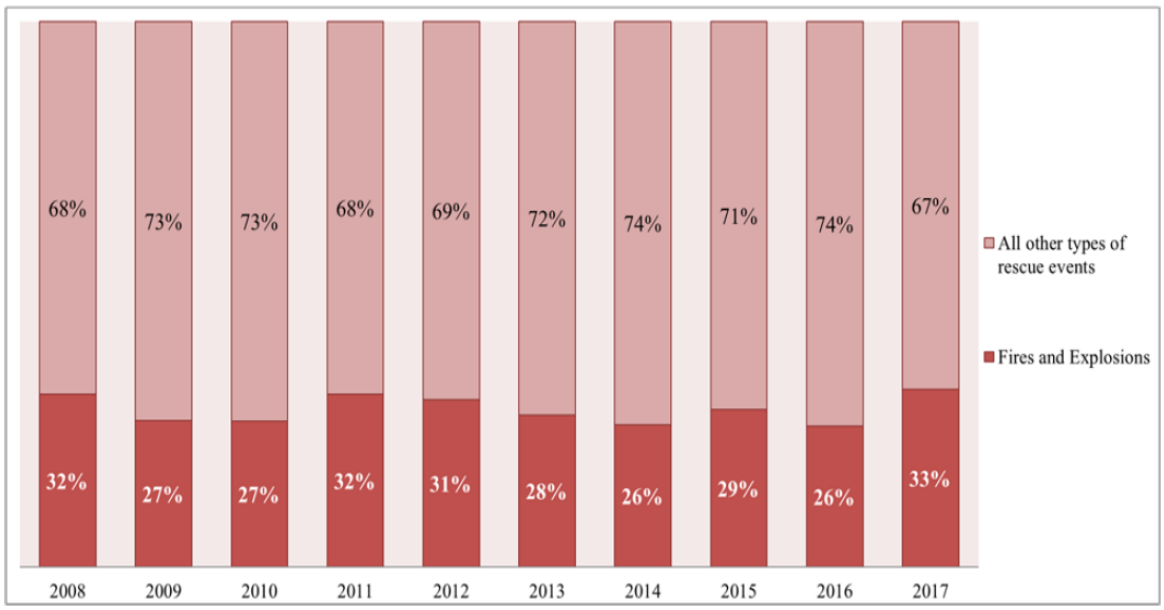


Figure 25: Percentage, year by year, of the type "Fires and Explosions", vs. the total amount of rescue events [1]

Table 13: Places with frequency of fire higher than 0.2% for the "Fires and Explosions "type [1]

PLACE	DETAIL OF THE PLACE	Fires and Explosions	
		No.	%
Places for Specific Uses	Others	1.317	0,4%
Residential Places and Homes	Private flats and Homes	36.661	11,2%
	Generic Building	10.466	3,2%
	Others	5.835	1,8%
	Private Parkings	2.026	0,6%
	Gypsis Camps	1.674	0,5%
	Temporary Buildings	936	0,3%
	Waste Storage Rooms	718	0,2%
	Switchboard Room	670	0,2%
Storages of Solid Combustibles	Storages of Waste	1.182	0,4%
	Storages of Forages and Straw	1.101	0,3%
Commercial and Sales Stores	Restaurant and Canteens	979	0,3%
Agricoltural and Farming Places	Fields	52.112	16,0%
	Rural Areas	22.601	6,9%
	Forest and Woods	22.301	6,8%
	Others	4.683	1,4%
	Tree Covered Areas	4.487	1,4%
	Agricoltural Building	1.439	0,4%
	Storage Buidings	1.357	0,4%
Traffic and Parking Areas	Urban Roads and Squares	58.577	18,0%
	Extraurban Roads	26.381	8,1%
	Highway and High Density Urban Roads	4.538	1,4%
	Inner Yard of Buildings	3.771	1,2%
	Out door Parking	2.400	0,7%
	Gardens	1.876	0,6%
	Rail Areas	915	0,3%
	Others	757	0,2%
Mountain Areas	Others	1.111	0,3%
Other Places	Others	3.160	1,0%
	River and Inland Water	1.293	0,4%
	Seashore Areas	1.159	0,4%
*	*	28.953	8,9%
Total			94,3%

(*) Rescue event report still open, data partially inserted.

Table 14: Causes with frequency of fire higher than 0.1% for the "Fires and Explosions" type [1]

CAUSE	DETAIL OF THE CAUSE	Fires and Explosions	
		No.	%
Causes provoking need of Rescue to Persons	Not Being Possible to Evaluate	1.299	0,4%
Causes of Accident of Transportation Means and Vehicles	Lack of Attention	424	0,1%
Cause of Fire Ignition	Chimney and/or Owen Ducts	13.101	4,0%
	Cigarette Butts and Matches	6.499	2,0%
	Electrical Causes	11.796	3,6%
	Fault on Heating Production Plants	333	0,1%
	Fireworks	361	0,1%
	Glitter from Friction of Mechnical Parts	650	0,2%
	Household Appliances	1.025	0,3%
	Lack of Safety and Cautional Measures of Management	1.612	0,5%
	Lighting	579	0,2%
	Other	20.547	6,3%
	Over Heating of Engines and Machines	1.470	0,5%
	Selfcombustion	1.784	0,5%
Malicious / Intentional Causes	Probabily Fault Origined Causes	2.790	0,9%
	Probabily Maliciuos/Intentional	13.129	4,0%
Not Being Possible to Evaluate	Not Being Possible to Evaluate	202.480	62,1%
Causes of Other Types of Intervention	Bad Working of Plants and or Machnery	927	0,3%
	General Lack of Attention	2.356	0,7%
	Others	6.870	2,1%
	Unforeseen Causes	3.429	1,1%
*	*	29.569	9,1%
TOTAL			99,1%

(*) Rescue event report still open, data partially inserted.

REFERENCE:

[1] Ministero dell'Interno, "Statistical yearbook of the Italian National Fire Birgades," 2018.

M. DIAGNOSTIC SHEET FOR LUXEMBURG

M1. TERMINOLOGY ISSUES

References of existing database/studies

The CGDIS uses two main databases:

- One database with all the operational information from the coordination center
- One database with the reports of the incident commanders

Summaries of existing database

The database with all the operational information from the coordination center includes the different timestamps (hour of emergency call, departures and arrival times of vehicles, etc.) as well as a list of all alerted vehicles and staff.

The database with the reports of the incident commanders includes details on the incidents like the type of incident, the number of victims, the type of burning object, the size of the fire, etc.

Existing definitions

Fire statistics make the difference between burning objects (includes vegetation), vehicles or buildings. Each category has several under-categories to specify the data.

Are there differences within the same country?

No, one organization for the whole country.

Are there differences and contradictions with other domains?

Unknown

12.1.2. Identification of missing information

Both databases are not linked yet, so the full data cannot be compared and analyzed automatically. To get all the information, the data has to be combined manually with a lot of invest.

M2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

Rescue service (ambulances & medical aid)
Fire prevention & fire fighting for all types of fire (structural, industrial, vegetation, airport…)
CRBN operations
Technical assistance
Public warning, information and training

Fire response organisation

The Luxembourgish Fire and Rescue Corps (CGDIS) is a Public establishment under the supervision of the Minister of Home Affairs. It reunites all public rescue services in Luxembourg.

The operational staff are all civilians (volunteers & full-time professionals) who are supported by a civil administrative and logistic staff.

Who collects data?

The CGDIS collects all data on interventions of fire and rescue services.
The police collects all data on fire victims and fire deaths.

Who issues the data?

The CGDIS has specialized staff for analyzing and treating the data.

Are there different levels of collection?

All data are collected on a national level but always with details on the incident location, so that a more precise analysis (e.g. for a town) is possible.

Identify disparities in data feedback

Unknown

Where is the data stored?

On secured servers within the CGDIS organization.

M3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

The CGDIS has specialized staff for analyzing and treating the data, so that the interpreting is intern.
On demand, the CGDIS can also provide statistics for other public authorities, like the police or the ministry.

Purpose for which data is collected

- Requirements planning and improvement of the service capacities
- Documentation in case of questions or jurisdictation
- Quality management

What are the methods used to fill the gaps where information is missing?

Feedback from the users is collected, analyzed in working groups and if necessary, the databases and reporting systems are adapted.

Is there follow up to data collected ?

Not yet, but planned to be implemented.

Analyse potential cause and consequences in trends

unknown

M4. ANALYSE EXISTING DATA

Determining the level of confidence

High for the data that is collected mainly automatically (like the time of the emergency call) and can therefore not be changed.
Medium for the data that is collected mainly manual (like the incident reports) and therefore always has a subjective influence.

N. DIAGNOSTIC SHEET FOR THE NETHERLANDS

N1. TERMINOLOGY ISSUES

Methods of estimation

The Netherlands fire database is managed by IFV since 2018, till 2018 it was managed by CBS. Since 2014 the number of subjects to reporting are minimized and collected automatically via the incident control room of the Safety Regions.

Since 2008 the Fire Service Academy of the Institute for Safety (IFV) gathers data on fatal residential fires in the Netherlands. In this process the Fire Service Academy cooperates with the fire brigades and fire investigation teams involved in these fires. The collection, content check and analysis is carried out by researchers.

Fires subject to reporting
Yes
Both IFV and CBS report the total incidents, telephonically reported incidents, automatically reported incidents, and the fires in which the fire brigade unit arrived on site, also per hour and week and per Safety Region.

Fire deaths subject to reporting
Yes
CBS collects the fire deaths based on a doctor's report. Including homicide and suicide.
IFV collects the fire deaths due to a fatal residential fire. The definition of a fatal residential fire is 'a fire involving civil fatalities due to fire, which took place in a building with a residential function or another 'housing related' object and is not caused intentionally. Including i.e. care homes. Excluding arson, homicide and suicide.

Fire injuries subject to reporting (ISO 17755-1, page 9)
Yes, number of people with burns entering the emergency room via 'Letsel Informatie Systeem (LIS)' and number of hospital admissions due to burns via 'Landelijke Basisregistratie Ziekenhuiszorg (LBZ)'

Victim characteristics (ISO TR 17755-1 page 13)
Yes

National database:
- Gender
- Age of victims

Fatal Residential Fire database:
- Gender
- Living situation
- Age of victims
- Degree of ability to leave without assistance
- Ways of discovering the fire and first reaction
- Locations of victims
- Moment of finding and situation of victim
- Moment and circumstance of death

Property damage subject to reporting (ISO TR 17755-1 page 26)
Yes, National database until 2014

Other losses subject to reporting (ISO TR 17755-1 page 30)

Location of fire (ISO TR 17755-1 page 32)
Yes
National database: till 2014
The CBS separates the locations of fire in
- small interior fire

- (medium) large interior fire
-chimney fire
- outdoor fire
- room of fire origin (for residential fires)
- type of building function (office, residential, industry etc)
- type of residential building

Fatal Residential Fire database:
- Location of room of fire origin.
- Location of fire related to location of victim
- Type of residential building: Houseboat, Basement home, Home above business/store, Home divided in apartments, Recreational home/caravan/chalet, Blocks of flats with a communal stairwell that serves as an entrance hall, Single-family home (detached), Gallery flat with indoor partitioning structure/closed gallery, Single-family home (Not detached) and a Gallery flat with an open gallery.
- Degree of smoke development
- Degree of fire spread

Reporting of type of construction (ISO TR 17755-1 page 52)
yes
Fatal Residential Fire database:
- type of construction if it has contributed to the fire or smoke development

Reporting on building height and other building characteristics (ISO TR 17755-1 page 54)
Yes
- year of construction of the building
- position of internal doors
- smoke alarms

Reporting and estimation of deliberately set fires (ISO TR 17755-1 page 56)
Yes, in national database till 2014
Not in Fatal Residential Fire database

Other causes of fire:
Yes (in national database till 2014)

- **Reporting and estimation of natural cause fires** (ISO TR 17755-1 page 60)
- **Reporting and estimation of exposure fires** (ISO TR 17755-1 page 62)
- **Reporting and estimation of smoking materials and open flame fires** (ISO TR 17755-1 page 65)
- **Reporting and estimation of heating and cooling equipment fires** (ISO TR 17755-1 page 67)
- **Reporting and estimation of cooking and kitchen equipment fires** (ISO TR 17755-1 page 71)
- **Reporting and estimation of clothes dryer fires** (ISO TR 17755-1 page 74)
- **Reporting and estimation of entertainment equipment fires** (ISO TR 17755-1 page 76)
- **Reporting and estimation of office equipment fires** (ISO TR 17755-1 page 78)
- “
- **Reporting of electrical and electrical distribution or lightning equipment fires** (ISO TR 17755-1 page 62)

Presence and type of sprinkler or other extinguishing equipment (ISO TR 17755-1 page113)
No

Performance of sprinkler or other extinguishing equipment (ISO TR 17755-1 page115)
No

Presence and type of detection or alarm equipment (ISO TR 17755-1 page118)
Yes, in Fatal Residential fire database

Performance of detection or alarm equipment (ISO TR 17755-1 page122)
Yes, in Fatal Residential fire database

Presence of extinguishers or other manual extinguishing equipment (ISO TR 17755-1 page125)
No

Presence of smoke management or control equipment (ISO TR 17755-1 page127)
No

Reporting on fire doors, fire walls and other compartmentation (ISO TR 17755-1 page128)
No

References of existing database/studies

https://www.cbs.nl/en-gb/news/2020/10/fire-service-attending-to-more-non-fire-incidents

https://opendata.cbs.nl/statline/#/CBS/en/dataset/37441eng/table?ts=1597787694644

https://opendata.cbs.nl/statline/#/CBS/en/dataset/37511eng/table?ts=1597787941845

https://www.ifv.nl/kennisplein/Documents/20170307-BA-Fatal-residential-fires-in-the-Netherlands-2016.pdf

https://kerncijfers.ifv.nl/dashboard/fatale-woningbranden

Summaries of existing database

National database (Statistics Netherlands (CBS) / Institute for Safety (IFV), Fire Service Academy)
Until 2014, CBS collected data on firefighting organisation, fires and emergency services via questionnaires. These were filled in by the fire brigades after each indication. Fewer fire brigades supplied data in recent years. The quality of the data also decreased due to the fact that 'unknown' was ticked more often.
The CBS published an extensive annual publication of the data up to and including 2013. In 2014, a different method of data collection was used, based on the data from the control room registrations. The data collection has now been transferred to the IFV.
Since August 2020, the IFV's Knowledge Centre for Information-Oriented Safety, in cooperation with the safety regions, now publishes the Key Incident figures of the fire brigade every month. Up to 2019, the CBS published the figures for fires and emergency services. A different calculation method and definitions have been used for the new dashboard. As a result, it is not possible to compare the CBS and IFV figures.

The Key Incident figures provide insight into the number and type of incidents received by the fire brigade control rooms and into the response times of the fire brigade for these incidents. The data is published monthly afterwards in an online dashboard.
Subjects:
- Number of fires for which fire service is called
- number of fires at which fire service was ‘on scene’
- Number of residential fires for which fire service is called
- Number of residential fires at which fire service was ‘on scene’
- Median of handling time fire incidents
- Median of extinguishing time fire incidents
- Median of driving time fire incidents
- Median of turnout time fire incidents (processing time + of extinguishing time + driving time)

Fatal Residential Fires (Institute for Safety (IFV), Fire Service Academy)
Started in 2008. Survey is based on result of scientific study (PhD) ‘Understanding Human Behaviour in Fire’. The Fire Service Academy of the Institute for Safety (IFV) structurally gathers data on fatal residential fires in the Netherlands. In this process the Fire Service Academy cooperates with the fire brigades
and fire investigation teams involved in these fires. They provide data on fatal residential fires through a questionnaire. The respondents are approached based on information from press reports about a fatal residential fire in their region. In this way fatal residential fires where the fire service did not assist are

included. An example of this is a fire that has already been extinguished at the time of discovery.

The subjects in the survey are related to four types of aspects, namely 'Building characteristics', 'Fire characteristics', 'Human characteristics' and 'Intervention characteristics'. Subjects:
- Fire cause
- Object of fire origin
- Room of fire origin
- Moments of occurrence, of reporting and response time
- Fire dynamics
- Accelerating factors
- Type of home
- Year of construction and housing tenure
- Smoke detectors
- Position of internal doors
- Contribution of structural characteristics
- Injured and in first instance rescued victims
- Living situation, gender and age of fatal victims
- Degree of ability to leave without assistance
- Ways of discovering the fire and first reaction
- Locations of victims
- Moment of finding and situation of victim
- Moment and circumstance of death

The data is published in an annual report. In addition, data is published every quarter via an online dashboard. These data are provisional data and are updated every quarter.

Existing definitions

National database (until 2014):

Professional fire brigade personnel
The part of the fire brigade staff that has fire brigades as their main job.

Indoor fire
Fire in a (more or less) closed space, e.g. in buildings.

Fire (legal)
Smoke or fire development from which a fire report is received by the fire brigade. A distinction is made between chimney fires, indoor fires and outdoor fires.

Fire report
Report for firefighting to the fire brigade; including discharge alarms.

Fire brigade
Public organisation responsable in particulaire for fire prevention, firefighting and technical assistance. The organisation is part of a safety region.

Exterior fire
Fire in the open air, which generally does not involve buildings.

Large or medium-sized indoor fire
Indoor fire where the first extinguishing unit to be extinguished requires the strengthening of at least one other extinguishing unit.

Minor internal fire
Inner fire where the extracted unit does not need reinforcement. Lower fire-fighting personnel Fire-fighting personnel at grade levels

Release alarm
Deliberate or unintentional fire report or emergency assistance report to the fire brigade, which does not subsequently prove to be a fire or required assistance.

Response time of the fire brigade
Time lapse between the moment when a fire is reported and the moment when the first fire engine reaches the scene of the fire. The emergence time is equal to the sum of the extinguishing time and the driving time of the fire brigade.

Rescue by fire brigade
The liberation of people by the fire brigade from a situation they cannot get out of on their own. The situations concern events that do not involve a fire, but in which the help of the fire brigade is called in.

Driving time of the fire brigade
Time it takes for the first fire engine to leave the fire station to reach the site of the fire.

Chimney fire
Fire in a smoke duct.

Victim of fire
Dead or injured as a result of an event for which the assistance of the fire brigade has been called in, for example in the event of a fire. This may also involve an aid worker.

Breakdown time of the fire brigade
Time lapse between the moment a fire is reported and the moment the first fire engine leaves the barracks.

Safety region
The safety region is a form of cooperation between municipalities in a region, which jointly arranges the assistance of the fire brigade, ambulance services, police and municipal services. As of 1 January 2014, all fire-fighting tasks have been transferred to the safety regions.

Voluntary fire brigade personnel
Fire brigade personnel who have fire brigade duties as an extra job. This part of the fire brigade staff is on call in the event of calamities and also attends training courses for this purpose. In return, they receive compensation and an annual statement of this compensation.

Database Fatal Residential Fires

Fatal Residential Fire
A fatal residential fire is a fire involving civil fatalities due to fire, which took place in a building with a residential function or another 'housing related' object and is not caused intentionally.

Note:
These are the residential fires with fatal outcome where it is certain that there was no arson, murder or suicide. Residential fires with a fatal outcome intentionally caused by accountable adults are excluded from the study. Other types of arson are included in the analysis, for example, fires caused by children playing or confused adults.

Are there differences within the same country?

The regional registration methods have been changed for a number of control rooms from 2013 to 2014. This has had a particular impact on the 2013 figures for some regions.
Due to the calculation method used by the CBS, whereby specific demarcations and definitions are used, the figures in the table may differ from the administrative reports of the safety regions.

Are there differences and contradictions with other domains?

Possibly.

CBS publishes data on causes of death. The cause of death codes used are taken from the list of 'three-character categories' of the International Statistical Classification of Diseases and Related Health Problems (ICD, 10th revision) of the World Health Organization (WHO).
For each deceased person, a death cause declaration (B form) is filled in by a doctor who examines the deceased person. This is usually the attending physician, sometimes an acting physician, a municipal coroner or a physician appointed by the Public Prosecutor.

Identification of missing information

National database
No information

Database Fatal Residential Fires
Fire Service Academy of the Institute for Safety (IFV) checks that the questionnaire is complete. In case of unclear or missing information, the respondent will be contacted.

N2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

The safety region is responsible for firefighting in that region. The safety region has the following tasks relating to fire brigade care:

- Preventing, limiting and fighting fires.
- Limiting and fighting the risk to people and animals in the event of an accident.
- Other authorities and organizations advise on fire care, fire fighting and fire prevention.
- Prevent, limit and fight accidents involving hazardous substances.

The fire brigade also carries out tasks that fall under disaster control and crisis management. The fire brigade is led by a commander.

Fire response organisation

The fire brigade is a government organization. The repressive service consists of about 20% professional staff and 80% volunteers. Professional staff and volunteers must meet the same requirements in terms of education, training and mental and physical condition.
Each safety region employs fire investigators. These officers often have a repressive background and have received national training as fire investigators.

Who collects data?

National database
Control room Services Centre of the Police in Driebergen provides the data
The data for this statistic comes from the registration system Integrated Control Room System of the 112 alarm centers in the Netherlands.
The processing of GMS data is based on the national and regional protocols used by control rooms for registration in GMS.

Database Fatal Residential Fires
The Fire Service Academy of the Institute for Safety (IFV) gathers data on fatal residential fires in the Netherlands.
The fire brigades and fire investigation teams involved in the fires provide data on fatal residential fires.

Who issues the data?

Statistics Netherlands (CBS)

Institute for Safety (IFV)

Identify disparities in data feedback

In the study on Fatal Residential Fires we observed that if the collected data is published in useful information for policy making, the respondents are more likely to provide the data.

Where is the data stored?

Statistics Netherlands (CBS)

Institute for Safety (IFV)

N3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

Statistics Netherlands (CBS)

Institute for Safety (IFV)

Purpose for which data is collected

- Insight in risk factors
- Policy making
- Fire safety campaign

Is there follow up to data collected?

National database: No

Database Fatal Residential Fires: Yes

Analyse potential cause and consequences in trends

Yes, for fatal residential fires

N4. ANALYSE EXISTING DATA

Determining the level of confidence

High for Fatal Residential Fires, because of the completeness, input of data by fire investigators, and verification of data by researchers

Arguable for the actual national database, as the data is gathered automatically by the emergency control room, without a thorough check for accuracy, and collected for other purposes, not in first place for statistics. However, the data has a high degree of completeness and a the method can be completed with a thorough check for accuracy

Pinpointing issues and limitations

The data is only as reliable as the effort put into registering the data correctly. The necessity and usefulness of the data collection must be made clear on the input side. It is desirable that the person who has an interest in correct output is also responsible for the input. Frequent sharing and interpretation of the data (to those who provide the data) helps to improve the quality of the input.

In the Netherlands, the investigation into Fatal Residential Fires has actually led to changes in the law. For example, based on the results of the study, the requirement for smoke detectors in existing homes has been established. The results were also used for the annual fire prevention campaigns. For example, because of a relatively large number of elderly people who died in fire, the campaign focused on the elderly. This relationship between statistics and application ensures that there is a great will to contribute. On the other hand, the effort is not that great either, because it only concerns a limited number of incidents that are extensively registered.

O. DIAGNOSTIC SHEET FOR NORWAY

O1. TERMINOLOGY ISSUES

References of existing database/studies

DSB (The Norwegian Directorate for Civil Protection): https://www.brannstatistikk.no/brus-ui/

Some older studies of fatal fires (2005-2014) by a independent, state owned Swedish institute (RISE)
Link: https://risefr.no/media/publikasjoner/upload/2017/a17-20176-1-analyse-av-dodsbranner-i-norge-i-perioden-2005-2014.pdf

Summaries of existing database

It is an overview over all the reported fires by the fire department. (for public use)
You can get a more detail information from the fire department in specific cases. (BRIS Rapport)
There is also published a yearly report.

Existing definitions

Unknown.
The fire brigade officers, regardless if they are fulltime / halftime / professionals or volunteers – they fill in information in partly “drop down field” database.

More detailed information require most likely interviews with DSB-officers (task 1)

Are there differences within the same country?

No, Norway only have this national system for reporting.

Are there differences and contradictions with other domains?

Most likely / because no definitions / free text / only 30% manual input by fire brigades, other institutions (health authorities, police etc.).

Identification of missing information

Cause of fire is only a best guess from the fire department... The police are only reporting about 25-30% of their findings about the fire, so there is lack of correct information.

Insurance are investigating fires, but the data is not collected – There would probably more accurate information here.
Generally it also depends on the firefighter / officer who put´s in the information (lack of definitions).

O2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

Fires and other incidents – according to the department for justice and emergency.
See also: https://lovdata.no/dokument/SF/forskrift/2002-06-26-729/KAPITTEL_3#KAPITTEL_3

Fire response organisation

Professionals and volunteers – according to the Norwegian laws :

See also : https://lovdata.no/dokument/SF/forskrift/2002-06-26-729?q=dimensjonering%20av%20brannvesenet

Who collects data?

Fire department collects all aspects of the fire.
Police collects only 25-30% data from the fire that they are working with.

Who issues the data?

DSB (The Norwegian Directorate for Civil Protection)

Are there different levels of collection?

Only National / DSB

Identify disparities in data feedback

Lack of definitions which can lead to misunderstanding – 30% detailed information / 70 % automated-

Where is the data stored?

DSB (The Norwegian Directorate for Civil Protection)

O3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

DSB (The Norwegian Directorate for Civil Protection) / respectively the ministry of justice / emergency

Purpose for which data is collected

Fire preventive actions – and probably also other purposes (response time, etc.)

What are the methods used to fill the gaps where information is missing?

30 % of the fires are reported more detailed where police and other departments are involved afterwards – and contribute to the database.

Is there follow up to data collected ?

We don´t know that (yet)

Analyse potential cause and consequences in trends

For example: https://www.dsb.no/reportasjearkiv/brannstatistikk-2018/ - a link to a yearly report – see diagrams. But statistics include all kind of fires (not only buildingfires) and are naturally also focused on fatalities and other general data (not very detailed).

O4. ANALYSE EXISTING DATA

Determining the level of confidence

Lack of definitions / automatic input versus manual (70/30)

Pinpointing issues and limitations

The statistics will not be accurate is long as the data inn is not correct.. it will be difficult to make preventing actions when they only make best guess in cause of fire.
Police is only reporting inn 25-30% of the fires they are working with.

Insurance, who investigate most fires are not reporting to the DSB (The Norwegian Directorate for Civil Protection). So a lot of data is missing in the official reports.

P. DIAGNOSTIC SHEET FOR POLAND

P1. TERMINOLOGY ISSUES

References of existing database/studies

All statistical data collected by SFS State Fire Service.
https://www.gov.pl/web/kgpsp/interwencje-psp-lata-2010-2019-zestawienia and https://dane.gov.pl/institution/22,komenda-glowna-panstwowej-strazy-pozarnej. Collected fire data include, e.g. building description, fire consequences with costs, fatalities and wounded, fire response time, etc.

Summaries of existing database

The main area with are covered by the information from the intervention are:

- type of the incident (fire, local threats, false alarm),
- location of the incident, facility and owner (closed catalog),
- operational times of the incident,
- forces and resources used during the incident,
- types of rescue operations (closed catalog),
- equipment used in rescue operations (closed catalog),
- place of activities (inside the facility, floor, etc.),
- consumption of water, extinguishing agents,
- medical rescue operations, fatalities and casualties,
- the size of the event, the size of the facility, estimated losses, estimated property rescued,
- preventive data about the facility: presence and operation of fire prevention measures, access to the facility, etc.,
- personal data of persons managing rescue operations and medical rescue operations
- descriptive data of the event: description of the course of rescue operations, threats and difficulties, used and damaged equipment, etc.

Existing definitions

Unknown.

Are there differences within the same country?

No. All data are collected, processed and analyzed in the State Fire Service Decision Support System (DSS). The functional and informative scope of the software covers all areas of the SFS activity, with particular emphasis on the tasks performed by the rescue units. The main task of the DSS is to support the duty service in handling reports and events, coordinating rescue operations, and preparing documentation of the actions carried out.

P2. STATISTICS COLLECTION ISSUES

Fire response organisation

Volunteers and professionals.

Who collects data?

Fire brigades for building fires. Also Police, State Medical Rescue and emergency call centers have their own Decision Support Systems but only in their authority (law enforcement, medical rescue and emergency call).

Who issues the data?

The State Fire Service (SFS) of Poland, supervised by the Minister of the Interior and Administration

Are there different levels of collection?

Only on state level

Where is the data stored?

All data are collected, processed and analyzed in the State Fire Service Decision Support System (DSS). The functional and informative scope of the software covers all areas of the SFS activity, with particular emphasis on the tasks performed by the rescue units. The main task of the DSS is to support the duty service in handling reports and events, coordinating rescue operations, and preparing documentation of the actions carried out. The detailed scope of data collected by the SFS from the intervention of fire protection units is specified in Annex 6 to the Regulation of the Minister of Interior and Administration of July 3, 2017 on the detailed organization of the National Firefighting and Rescue System (Journal of Laws 2017, item 1319).

Who is interpreting the statistics

State Fire Service

P4. ANALYSE EXISTING DATA

Examples

Definition for fire by size

BASIC DEFINITIONS			
FIRE CLASSIFICATION			
SIZE	Typical objects F – surfice; V - volume	Cultivations, Forests F - surfice	Fire streams (FS)
SMALL FIRE	- F do 70 m^2 - V do 350 m^3	F < 1 ha	FS < 4
MEDIUM FIRE	- F 71-300 m^2 - V 351-1500 m^3	1 < F < 10 ha	5 < FS < 12
LARGE FIRE	- F 301-1000 m^2 - V 1501-5000 m^3	10 < F < 100ha	13 < FS < 36
VERY L. FIRE	- F > 1000 m^2 - V > 5000 m^3	F > 100 ha	FS > 36

The main fire causes in Poland for 1993-2003

	Major causes of fires	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
		[%]										
1	Arson	34,5	31,8	32,8	40,1	41,3	41,7	41,7	41,7	41,7	42,7	46
2	Carelessness	33,4	35,2	34,8	32,2	31,7	30,4	32,4	31,9	29,1	31,3	32,4
3	Unknown	10,3	10,3	9,4	8	8,4	9,4	9,2	10,5	9,7	10,9	10,4
4	Others	6,9	5,8	5,9	5,2	5,2	5,4	5,9	5,9	5,9	3,1	2,7
5	Electric appliances	8,8	7,6	7,4	6,6	6,3	6,2	5,5	4,9	5,2	4,4	2,9
6	Heating devices	2,6	4,6	5,4	5	4,4	4,5	2,8	2,4	4,3	3,7	2,9
7	Means of transport	2,5	2,7	2,5	2,1	1,9	1,8	1,8	1,7	2,1	1,8	1,4
8	Technological processes, storages	1	2	1,8	0,8	0,8	0,6	0,7	0,6	2	2,1	1,3
	TOTAL	100	100	100	100	100	100	100	99,6	100	100	100

Structure of interventions in Poland for 1993-2003

	Interventions		Fires		Local threats		False alarms	
Year	Number	[%]	Number	[%]	Number	[%]	Number	[%]
1993	113 378	100	72 401	63,9	30 109	26,6	10 868	9,5
1994	148 389	100	96 954	65,3	39 751	26,8	11 684	7,9
1995	159 356	100	96 595	60,6	52 028	32,7	10 733	6,7
1996	186 282	100	109 388	58,7	67 152	36,1	9 754	5,2
1997	240 448	100	119 448	49,7	111 669	46,4	9 331	3,9
1998	218 538	100	115 557	52,9	93 981	43	9 000	4,1
1999	250 168	100	136 284	54,5	103 640	41,4	10 244	4,1
2000	269 846	100	135 889	50,4	122 983	45,6	10 974	4
2001	293 761	100	116 601	39,7	166 911	56,8	10249	3,5
2002	360 294	100	151 026	41,9	197 491	54,8	11 777	3,3
2003	402 883	100	220 885	54,8	169 221	42	12 807	3,2

Q. DIAGNOSTIC SHEET FOR ROMANIA

Q1. TERMINOLOGY ISSUES

Existing definitions

The definitions used for fire statistics are so far unknown.

Are there differences within the same country?

The fire data are recorded uniformly across the country.

Are there differences and contradictions with other domains?

No, there is only one nationally authorized body for fire statistics.

Identification of missing information

Since there is no overview of the data structure, no assessment can be made with regard to missing data.

Q2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

National emergency/ disaster management authority: General Inspectorate for Emergency Situations, Ministry of Internal Affairs

Main tasks:

- Coordinating the implementation of emergency management actions and measures on national territory.
- Coordinating all organizations involved in the management of emergencies according to international regulations.
- Communicating the decisions made by the Government or by the National Committee (through its Technical Secretariat) to the authorities of central public administration in order to secure coordinated management of emergencies.

Fire response organisation

There are around 350 fire stations in Romania. Around 700 fire engines and 120 fire ladders are available. The fire brigade staff is divided as follows: 26,900 professional firefighters and around 103,000 volunteer firefighters.

Who collects data?

General Inspectorate for Emergency Situations, Ministry of Internal Affairs

Who issues the data?

General Inspectorate for Emergency Situations, Ministry of Internal Affairs

Are there different levels of collection?

Nationwide data collection

Identify disparities in data feedback

Unknown

Where is the data stored?

General Inspectorate for Emergency Situations, Ministry of Internal Affairs

Q3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

General Inspectorate for Emergency Situations, Ministry of Internal Affairs

Purpose for which data is collected

- Reducing the environmental damage caused by fires
- Creation of stable fire-resistant infrastructure
- Reducing fire damage
- Elimination of the main causes of fire
- Increasing fire safety in the most important fire objects
- Increasing fire safety for children and the elderly
- Reducing the number of fires
- Reduction in the number of fire victims

Q4. ANALYSE EXISTING DATA

Determining the level of confidence

The database is not freely accessible. Written inquiries should be directed to the General Inspectorate for Emergency Situations, Ministry of Internal Affairs.

Examples

- In Romania, only statistical information on fires is available from the CTIF sources.
- The state's fire protection system is structured centrally.
- Statistical information is available on the number of fires, the number of technical assistance missions, the number of medical rescues and for false alarms.
- A distinction is made between building fires, chimney fires, vehicle fires, forest fires and other fires.
- In terms of the number of victims, a distinction is made between the dead and the injured. Information on fire fighters who have had an accident also exists.
- There is information about the causes of fatal fires. A distinction is made between victims who have lost their lives through fire smoke or who have had an accident through trauma. However, it is not possible to distinguish whether fire victims were surprised in their sleep or whether they lost their lives due to alcohol or drugs.

Statistical data (year 2006)	ROMANIA	BUCHAREST
Population (thous. inh)	**21.537**	**1.931**
Area (sq.km)	**238.391**	**238**
Total number of calls a year	**42.309**	**2.679**
-fires	**12.926**	**1.549**

Statistical data (year 2006)	ROMANIA	BUCHAREST
-accidents	**3.259**	**451**
-technical aid	**-**	**-**
-medical aid	**16.001**	**103**
-false calls	**2.412**	**189**
-other	**7.711**	**387**
Total number of fires	**12.926**	**1.549**
-structure (without chimneys)	5.091	663
-in chimneys	1.563	58
-vehicle	1.335	208
-forests	136	-
-grass, bushes	1.306	236
-rubbish	312	1
-other fires	3.283	383
Number of fire deaths	**220**	**27**
Number of fire injuries	**348**	**49**
Number of firefighters death	**-**	**-**
Number of firefighters injuries	**28**	**15**
Number of firefighters	**169.885**	**3.019**
-professionals (full time)	19.969	1.926
-part time	-	-
-volunteers	149.916	1.093
Additional data		
Number of fire deaths in structure fires	**220**	**27**
by cause of fire deaths:		
-burns	**138**	**13**
-smoke installation	69	12
-physical trauma (fracture, injury…)	13	2
-other	-	-
by conditions before injury:		
-asleep	no available	no available
-impaired by alcohol or other drugs	no available	no available
-physical handicap	no available	no available
-other	no available	no available

R. DIAGNOSTIC SHEET FOR RUSSIA

R1. TERMINOLOGY ISSUES

References of existing database/studies

The creation of the fire statistics of the Russian Federation is based on a law, the content of which can be read at the following link:
https://bazanpa.ru/mchs-rossii-prikaz-n625-ot24122018-h4304693/.
There are many articles regarding fire statistics available.
For example this link:
https://sites.google.com/site/statistikapozaro/articl.
Publications are in Russian language.

Summaries of existing database

The name of the related law is: Order of the Ministry of the Russian Federation for Civil Defence, Emergencies and Elimination of Consequences of Natural Disasters (EMERCOM of Russia) dated 12.24.2018 N 625 "On the formation of electronic databases for accounting for fires and their consequences" (together with the "Procedure for filling out and submitting a fire accounting card")

Data is collected for every fire that occurred in the country for one year.
Each fire is characterized by approximately 100 parameters.
The database consists of the following parts:

1. General information
2. Object of fire
3. Consequences of fire
4. Saved (evacuated) by fire
5. Development and extinguishing the fire
6. Firefighting forces and means
7. Information about the dead and injured
8. Additional Information

Brandtote in Russland (Fire deaths in Russia)
Report/source:
S. Sokolov, P. Wagner, Brandtote in Russland, vfdb 2/2014 Vereinigung zur Förderung des Deutschen Brandschutzes e.V. (vfdb), Postfach 4967, 48028 Münster

Purpose:

Investigation about the Russian situation regarding fire safety of the citizens.

Data:
Russian fire statistics 2012

Key finding (s):
About 74 % of fire fatalities are male. Regarding the age pensioners are at highest risk of dying in a fire.
Most fatalities in residential building fires are found in living and bed rooms.
Cigarettes, together with matches, lighter and candles are the most frequent fire causes.
Although number of fires in Russia is lower than in Germany the fatalities per million citizens are significantly higher.

Existing definitions

All 100 parameters have definitions.
The definitions of the parameters are described in the appendix to this document.

Are there differences within the same country?

No, the database is uniform for the entire federation and is legally binding.

Are there differences and contradictions with other domains?

The EMERCOM of Russia is the sole responsible ministry.

Identification of missing information

The content of the database completely covers the quality and quantity of data on fire incidents required in the state.

R2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

State (federal) fire service is responsible for data collection. A fire record card is used for this.

The main activities of State Fire Service described as follows:

- Organization of the development and implementation of state measures aimed at preventing fires;
- Increasing the efficiency of fire protection of settlements and enterprises;
- Organization and implementation of state fire supervision;
- Extinguishing fires and carrying out related priority emergency rescue operations in settlements and at facilities;
- Professional training of personnel for fire-fighting rescue operations.
- Research and development work in the field of fire safety.

Fire response organisation

State (federal) fire service EMERCOM of Russia

Who collects data?

State (federal) fire service EMERCOM of Russia

Who issues the data?

State (federal) fire service EMERCOM of Russia

Are there different levels of collection?

Data is collected for each fire (about 100 parameters), which can be analyzed at different levels.
There are some kinds of fire service in Russia:

1. professional - state (federal) and state (territorial) fire service
2. professional local (municipal),
3. volunteer fire service,
4. private fire service,
5. some ministries have own fire services (for example Ministry of Defense).

But State fire service is responsible for fire statistics in the Russian Federation. All fire brigades collects the data and send them to EMERCOM who will analyses the data.

Identify disparities in data feedback

The data collection work is essentially easy and clear based on the criteria given for each parameter. Only a very small proportion of data records contain errors.

Where is the data stored?

All-Russian Scientific Research Institute of Fire Protection EMERCOM of Russia.

R3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

Mainly departments of State fire service, scientific and educational organizations EMERCOM of Russia.

Purpose for which data is collected

To monitor the situation with fires in the country

What are the methods used to fill the gaps where information is missing?

It is allowed that some of the database fields may be empty.

Is there follow up to data collected ?

There is a period of time when the database can be updated

Analyse potential cause and consequences in trends

Fire safety report published annually.

National fire safety programs (reduce fires and fire deaths at some objects and etc.) are also periodically developed.

R4. ANALYSE EXISTING DATA

Determining the level of confidence

The owner of the database is the state fire service, but other organizations can obtain permission from the database.
General statistics are publicly available (annual report in PDF format), but permission from the fire department is required to obtain detailed database data.

Pinpointing issues and limitations

The owner of the database is the state fire service, but other organizations can obtain permission from the database.
General statistics are publicly available (annual report in PDF format), but permission from the fire department is required to obtain detailed database data. Any person or organization can analyze and interpret statistics.

Examples

The Russian Federation extends over 17 vegetation zones, which have corresponding influences on the lives of the people living there. Russia is divided into eleven time zones. The Civil Protection Ministry of the Russian Federation (abbreviation, English EMERCOM) is the Civil Protection Ministry of the Government of Russia.

The organization was founded on December 27, 1990. In 1994 it became a ministry and since 2002 the fire brigade has been subordinate to it. Russian State Fire Service is the highest fire service body of the Russian Federation. A part of the Ministry of Emergency Situations since 2001, the State Fire Service is divided into the Federal Fire Service and the Fire Service of the Federal Subjects of Russia. State Fire Service's 220,000 personnel operate out of 13,600 buildings and structures, including 4,000 plus fire stations containing 18,634 fire appliances and 49 fireboats. The State Fire Service divisions participate in over two million operations a year, rescue over 90,000 lives, save property evaluated as high as 120 billion rubles.
Regarding the system of fire statistics one can say:

- A nationwide uniform system was created.
- Differentiated analyzes depending on the part of the country, administrative zone, etc. are possible.
- The detection takes place via a card for fire detection and comprises 8 parts. More than 100 parameters characterize all conceivable situations.

S. DIAGNOSTIC SHEET FOR SLOVAKIA

S1. TERMINOLOGY ISSUES

References of existing database/studies

For the purposes of statistical monitoring of fires, District Head-Offices of the Fire and Rescue Corps via fire investigators process data on fires that have occurred in their territory

https://www.minv.sk/?Kontakty_PTEU

Every year a statistical yearbok is published by the Minsitry, the last English version is from 2011 (uploaded document).

Summaries of existing database

In detail, basic recorded data on fires include: date of receiving a notification of fire, date of fire observation, time of receiving a notification, time of fire observation, address, owner, user, information whether the object is insured, direct damage, consequential damage, salvaged values, number of fatalities, number of injured persons, ownership, nature of damage, branch of economic activities in which the fire occurred, place and space of fire origin, fire cause, ignition source, material first ignited, subsequent burning material. Depending on whether it is a building or a car, data are further specified.

At the beginning of each month the above mentioned data are sent to the Fire Research Institute of the Ministry of Interior of the Slovak Republic, where they are further processed and analyzed according to various indicators.

The basic statistics resulting from collected data include: number of fires, direct damage, number of fatalities, number of injured persons, salvaged values and consequential damage.

S2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

Fire, technical rescue operations, medical assistance, rescue works during floods, rescue activities in heights

Fire response organisation

In 2011 members and employees of fi re units (common name for different firefighter's formations) in the Slovak Republic carried out 53 258 runs on the whole. Thereof, 16 046 attendances were due to fi res, 29 634 ones were due to rescue and technological responses including traffic accidents, ecological accidents and floods, 3 116 ones were due to false alarms and 6 204 runs were performed within variety of trainings.

There were 33 115 runs performed by the FRC members in the year 2011; there of 13 891 were by reason of fire; 16 681 were by reason of rescue and technical rescue operations (traffic accidents – 6 656; ecological interventions – 938; medical assistance, rescue works during floods, rescue activities in heights, on and under water surface and other aid – 15 743); 919 alarms were false and 1 624 attendances were made in terms of tactical and verification trainings. In comparison to the year 2010, the total number of the FRC members' runs fell by 2 539, while the fire interventions rose by 3 912, the number of rescue, technical rescue and ecological interventions fell by 6 408, the number of false alarms fell by 131 and the number of runs in terms of training reasons rose by 88 against the last year.

S3. ANALYSE EXISTING DATA

Examples

Table 1: Structure of fire brigade calls (interventions) in Slovakia for year 2018 and 2019

Structure of Fire Brigade Calls	**2018**	**2019**
fire	9 288	9 602
technical intervention	10 693	11 330
car accident	8 454	8 185
dangerous substance	873	899
training	1 348	1 330
false alarm	670	647
together	**31 326**	**31 993**

Table 2: Slovakia - Injured and killed persons in fires in 2009 - 2019

Year	Deaths	Injured
2009	56	245
2010	41	244
2011	56	267
2012	44	232
2013	45	210
2014	44	196
2015	54	242
2016	52	201
2017	55	224
2018	49	194
2019	45	343

Table 3: Slovakia – Fires by fire objects in 2018 - 2019

	2018	**2019**
buildings and objects	2646	2489
means of transport	1057	976
external environment	4804	5316
other fire	781	821
Total	9288	9602

Table 4: Slovakia – consequences of fires in 2015 - 2019

	2015	2016	2017	2018	2019
Fires	10999	8807	10312	8973	9304
Direct Damage, €	42010875	33590660	31648830	40094650	36979615
Indirect damage, €	332825	99280	866730	10257305	865180
Saved property, €	213712185	177630250	198196560	321740940	229741925
Killed	54	53	55	49	41
Injured	242	206	224	195	296
Population	5426000	5435000	5443000	5450000	5458000

The following comments can be made to the high fire statistics of Slovakia:

- In 2018 and 2019, a little more than 30,000 fire service calls were registered in Slovakia. Fires of the order of 9,000 to 10,000 are to be found among these operations.
- The country's fire statistics also show information on deaths and injuries in fires.
- The fire statistics also differentiate between fire objects. The majority of all fires occur outdoors. This was followed by buildings and other objects.
- The consequences of the fires are characterized using various parameters. The direct fire damage and the indirect fire damage should be emphasized. The statistics also show the material values that could be saved from fires.
- The number of fire deaths and the number of people injured in fires has been comparatively stable in recent years.
- When it comes to the causes of the fire, the statistics differentiate whether it was caused by a known person or whether the perpetrator was unknown. Cases of suicide are also reported.
- Particular attention is paid to the question of whether children are to be found among the causes of fires.
- If the causers of the fires are adults, the following parameters are examined: smoking, setting fire to waste, correct operation of equipment or careless handling of open flames. The electricity factor dominates among the technical causes.
- The fire statistics of Slovakia examine the distribution of fires over the hours of the day, on the days of the week and also on the months of the year. All parameters already mentioned above are also taken into account.

With regard to the distribution of the fires across the individual economic sectors, the following can be stated. A particularly large number of fires can be found in the housing sector. There are also large numbers of fires in the waste management sector. When it comes to fire damage, the wood processing industry, transport and building management come first.

T. DIAGNOSTIC SHEET FOR SPAIN

T1. TERMINOLOGY ISSUES

References of existing database/studies

Fundación Mapfre and APTB (professional association of fire fighters) and publish every year an annual report named “Estudio de víctimas de incendios en España”.

UNESPA (association of insurers) also publishes an annual report (¡fuego! los incendios asegurados) based on data from insurers.

María Fernández-Vigil Iglesias, University of Navarra. Title: Seguridad contra incendios en viviendas de personas mayores en España. Caracterización del problema y propuesta de soluciones". PhD thesis (2020).

Fernández-Vigil, M., Gil Rodríguez, B. & Echeverría Trueba, J.B. Fire Safety Strategies to Reduce Mortality in Dwellings Occupied by Elderly People: The Spanish Case. Fire Technol 56, 2257–2281 (2020). https://doi.org/10.1007/s10694-020-00972-4

Fernández-Vigil, M., Echeverría Trueba, B. Elderly at Home: A Case for the Systematic Collection and Analysis of Fire Statistics in Spain. Fire Technol 55, 2215–2244 (2019). https://doi.org/10.1007/s10694-019-00852-6

Summaries of existing database

Estudio de víctimas de incendios en España
It is a document prepared on the basis of data provided by the Fire Services themselves of the entire nation and by the Legal Medicine Institutes of the different autonomous communities and provinces

- Example of published data:
- Number of interventions due to fires and explosions;
- number of fire and explosion victims.
- Distribution of fatalities by:
  - Age,
  - Gender,
  - Month, Day, Hour,
  - Region,
  - Type of building.

¡fuego! los incendios asegurados
To carry out this report, a database has been generated with information on 22 insurers (see annex), which can be estimated to have just over 75% of the Spanish market by turnover. The figures provided by these entities allow us to estimate the aggregate costs of the insured fires in the 2018-2019 period at about 422 million euros. Home and industry insurance are the main components of this cost.
Example of published data:

- Estimated distribution of the cost of insured fires by type of buildings.
- Insured assets from fire, according to the size of the municipality where they are located and cities.
- Distribution of the severity (derived from cost) of fires, by type of insurance.
- Average severity of fires, according to the type of insurance.
- The 50 municipalities with the most insured assets from fires.
- Provincial distribution of fires, insured assets and population.
- Ratio of the average severity of the fire to the average disposable income of the municipality.
- Fire intensity ratios, according to the type of insurance
- Fire intensity ratios, by province.
- Fire intensity ratios, by cities.

Existing definitions

Fire deaths: all those people who have been counted as fatalities of fire or explosion:

- They have died at the scene of the fire.
- They have died after being hospitalized as a direct consequence of the accident that occurred.
- Deaths in fire or explosion in vehicles have not been taken into account when the cause of death was the forces generated by the collision itself. They have been counted when fire or explosion occurs with accident, but death is due to fire.
- The victims of explosions of pyrotechnic devices intentionally manipulated in popular celebrations, nor the victims of voluntary exposure to fire, firecrackers, etc. have been taken into account.
- Those deaths that have been classified as suicides have not been considered victims of fires.
- Neither have they been considered those caused by fire or explosions intentionally, with the purpose of committing a homicide or as a way to hide a violent death.
- The deaths of accidents caused by people have been counted when there has been no intention to cause physical harm to the victims (at the end of the study).
- When counting the victims of fire or explosion and assigning them to each Fire Service in particular, both the data provided by the Services themselves, as well as data collected through the media, have been taken into account, but provided that are ratified by the Institutes of Legal Medicine (IML). This clarification is necessary since, if a person has died in the hospital as a result of injuries caused in a fire or an explosion, despite the fact that they may not have been counted as deceased by the Fire Service that attended the accident, yes it has been included in this study and, therefore, assigned to said Fire Service. The same occurs in small incidents that have not even been attended by the Fire Services, but in which a death has occurred as a result of any of the type accidents contemplated in this study.

Are there differences within the same country?

No, it covers 100% of the territory of the Spanish State.

Are there differences and contradictions with other domains?

Unidentified.

Identification of missing information

Information has been obtained on all localized fatalities, although in some cases full details of the victim or the circumstances surrounding the fire have not been obtained.

As it was mentioned above, data is provided by Fire Services. However, there are some Services which do not have collection of data (they are too small, or they don't have enough staff to carry out the collection task), and some others which don't provide their data every year.
In addition, the fire data collection is different in each Fire Service (there is not a national fire incident database), so basic data (as the age of the victim, for example) is missing in several cases.

T2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

There is a Spanish law (RD 1053/1985) which establishes that Fire Services are in charge of the data collection in each intervention, and the General Directorate of Civil Protection should process the information and publish it each year. However, there are not Official Statistics since 1994, due to lack of funding.

Fire response organisation

It is different in each municipality, region, community… Sometimes they are volunteers, sometimes they are professionals

Who collects data?

Data published by APTB and MAPFRE are developed from data detailed by fire departments on fires with fatalities and crossed with the Legal Medicine Institutes. It is a private-funded initiative.

Who issues the data?

Fundación Mapfre and APTB issues the data. However the raw data is not published. Here is the collection process in chronological order:
1. Definition of the work team.
2. Review of the questionnaires to collect the data required for the preparation of the study.
3. Collection of information:
   - Request to complete the questionnaires. Demand made through electronic means and by telephone to collaborating entities and organizations, affecting the network of people who collect data from all the actions of the services involved in fires or explosions.
   - Ratification with the sources of the information collected by the working group: Firefighters with interventions with fatalities.
4. Verification with the Legal Medicine Institutes that the death of the person involved was due to the accident itself, since sometimes it occurs for a different reason before the fire started or an attempt is made to hide a violent death with an intentionally caused fire.

Identify disparities in data feedback

In all claims with fatalities, sufficient data have been obtained to be able to treat said information in a homogeneous manner. However, in any case it is still possible that in some fields the classification of the information is not sufficiently standardized and not all the Services have used exactly the same criteria. In an attempt to reflect reality as faithfully as possible, when eventually the information has not been possible to obtain with the due level of detail, the data recorded in previous years have been prorated or used, in which case it has been conveniently indicated in the corresponding boards.

There is a basic standardized document to collect data « Parte Unificado de Actuación », but most of the Fire Services don't use it, and they have their own way to collect data, depending on their resources. It is variable between different regions.

T3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

APTB and MAPFRE (authors of the reports)

Purpose for which data is collected

To provide recommendations to regulators and prevention campaigns

Examples from 2018 report:
- Taking into account that 78% of the accidents have occurred in homes, and that in these 70.8% of the deaths have been due to smoke inhalation, it is considered essential to install detection systems in private homes, supporting any legislative initiative that equates us in terms of the installation of detectors in homes to neighboring countries such as France or England, where such devices are mandatory.

- 77.1% of deaths are concentrated in the coldest months of the year, so prevention campaigns should continue aimed at the correct use and maintenance of heating systems in homes, as well as the abandonment of traditional systems but highly dangerous, such as braziers or old stoves.

- Prevention campaigns should be intensified in those municipalities with less than 20,000 inhabitants, and especially in those with less than 5,000, since they are the most affected by the number of deaths

due to the fact that most of them lack their own Fire Service. Faced with the material and economic impossibility of providing each town with a Fire Station, it must be committed to training and informing citizens from the Public Administrations.

- It is essential to have a regulation or legislation that unifies criteria for action, training, equipment and organization of all the Fire Department in Spain. It will be the only way to guarantee the correct development of issues such as fire prevention and investigation

Analyse potential cause and consequences in trends

The striking decrease in the number of deaths in 2018 compared to the bad results of 2016 and 2017 can be attributed to the better weather conditions of the year with respect to both previous ones, and with the possible incidence of awareness campaigns and the progressive installation of smoke detectors in the homes of people from risk groups (especially those over 64 who live alone or have some degree of dependency).

T4. ANALYSE EXISTING DATA

Determining the level of confidence

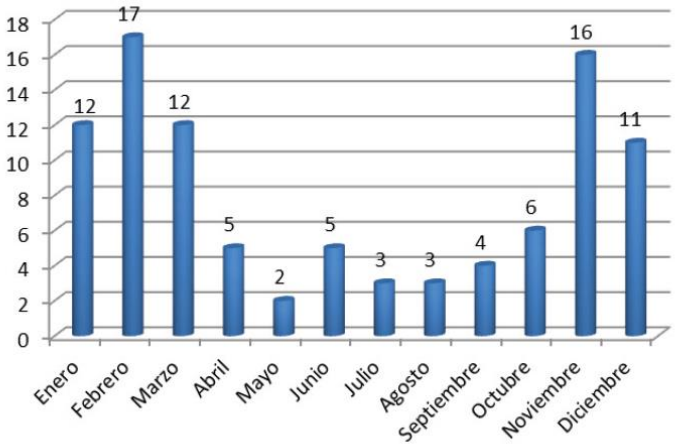
The percentage of data on deaths due to fire or explosions that this study presents reaches 98 percent of the Fire Services of all Spain that have intervened in accidents with deaths, and 97 percent in the case of forensics of the entire territory national.

Pinpointing issues and limitations

Fire investigations are neglected by the Fire Services, which means that in many of the accidents there is not enough data to establish the cause of the fire or the reason for the fire deaths. These data would be useful to improve fire prevention systems.

Examples

Seasonal effect: In the warm months there were 22 deaths (from April to September, both included), compared to the 74 deaths in the cold months. In particular, 17 deaths in February, and 16 in November, those are the two worst months of 2018.



Age effect: The age group >64 years accounts for almost half of the victims in dwellings (in 2018, as every year); the total number of fatalities (96) in 2018 fell to 2.05 deaths per million inhabitants, while that corresponding to the group >64 years accounts for to 4.83 deaths per million.

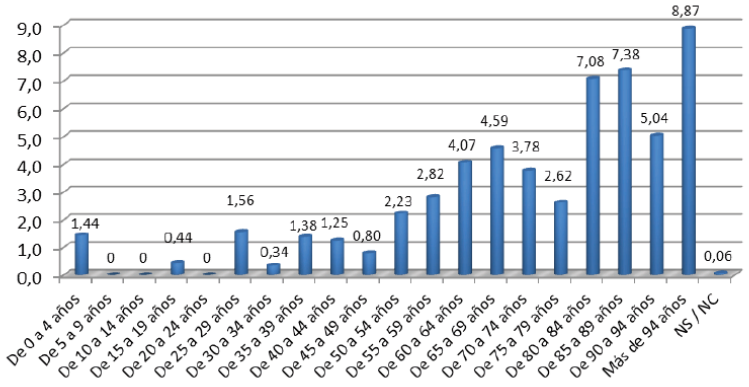
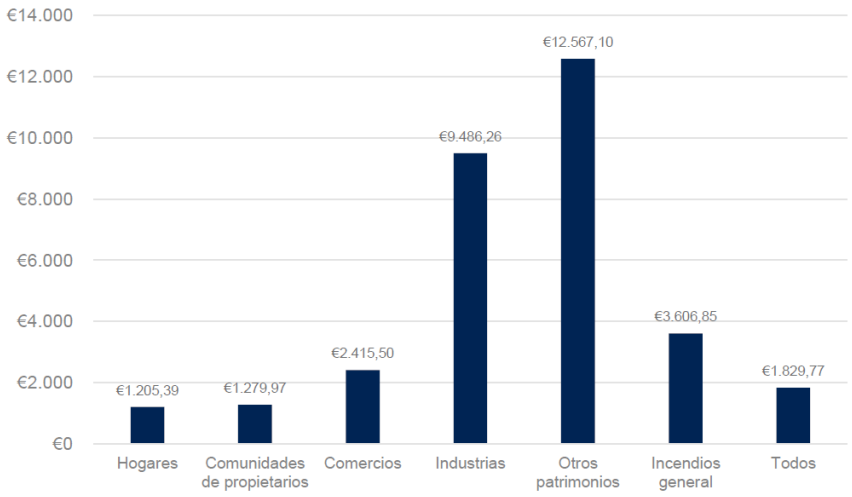


Figura 12. Índice de fallecidos por grupos de edad en viviendas por millón de habitantes.
Fuente: elaboración propia a partir de los datos de Servicios de Bomberos e IML

The severity of fires is derived from their cost. In other words, the study assumes that the more the insurer has had to pay, the more serious the fire has been. The distribution of costs by type of insurance very considerably reduces the role of the home. Household fires tend to have a lower cost than that produced in businesses and industries, which makes the latter especially gain a weight in costs (that is, in severity or in the aggregate loss generated by the fires).

The impressions derived from the pure distribution of gravity by typologies are fully confirmed when the average costs are found. The average fire in homes causes damages of 1,200 euros. This amount is comparatively much lower than that observed in fires in other types of buildings, such as industries or other assets (where schools, hotels, etc. are located), which are around or exceed 10,000 euros.

Ilustración 6: Gravedad media de los incendios, según el tipo de seguro.



U. DIAGNOSTIC SHEET FOR SWEDEN

U1. TERMINOLOGY ISSUES

Methods of estimation

The fire statistics in Sweden are to a large extent based on the incident reports recorded by the municipal fire and rescue service on each incident/accident they respond to. The reporting is conducted in a local IT-system, and most data is sent to a central database at the Swedish Civil Contingencies agency (MSB), who then publish statistics via the IDA system which contains data from 1998.

Prior to 2018 there were three systems (Alarmos, Core or Daedalos) used by the fire and rescue services when reporting incidents. However, since 2018-01-01 all fire and rescue services in Sweden report their incidents in Daedalos. The contents of the incident report have been revised in 2005 and 2016. It took the slowest municipal brigade two years to introduce the latest version, called "Händelserapporten". We are currently working on the first revision of händelserapporten, to be implemented by 1st January 2022.

The IDA system can be accessed by anyone at ida.msb.se. Some basic tables can be accessed without login, one can create one's own tables by logging in. The quality and reliability of the statistics is assessed yearly by MSB[1].

For e.g. researchers it is also possible to get more detailed data/analysis by making a request to the statisticians at MSB as not all fields in the incident report are available to the public due to e.g personal integrity.

The database contains all type of incidents/accident that the rescue service responds to, not only fires.

Statistics Sweden https://www.scb.se/en/ keeps statistics on much data in Sweden (economy, number of people in households etc.). Data can be retrieved from there by anyone at https://www.statistikdatabasen.scb.se/pxweb/en/ssd/.

Statistics on fatalities is kept by the National Board of Health and Welfare (Socialstyrelsen) https://www.socialstyrelsen.se/statistik-och-data/register/alla-register/dodsorsaksregistret/. Socialstyrelsen provides information on all the data in the database (definitions), death cause is organised according to ICD-10. Anybody can get statistics from the database on https://sdb.socialstyrelsen.se/if_dor/val.aspx.

Socialstyrelsen also have a comprehensive database covering all in-patient treatments in Swedish hospitals. This is an important source for researchers studying fire injuries.

MSB maintain a database on fatal fires and fire victims, and publish statistics on IDA. Data is combined from the relevant authorities so that fire fatalities can be associated with a specific fire incident. In addition, there are cases when rescue services do not respond to a fatal fire, this can e.g. be when someone is living in remote areas and the fatal fire is discovered a couple of weeks after the fire actually occurred. The statistics for the period 1999 – 2015 are considered to be of very high quality due to the use of data from the National Forensic Centre. Unfortunately MSB has not been able to access forensic data from 2016 and until the Swedish government clarify the legal situation, the statistics onwards are considered preliminary https://ida.msb.se/ida2#page=e3d46ba0-8f87-4ab7-b28d-7b950cd8a43. A description of the fatal fires database is provided by Johnson et al.[2]

Insurance companies also collects statistics; however, their statistics is not very detailed, and they can in many cases not differ between a fire and a thunder incident. The statistics is available at https://www.svenskforsakring.se/statistik/skadeforsakring/skadestatistik-per-skadeart/brand-och-aska/.

Brandskyddsföreningen collects data on fires from media. This data is not available.

[1] MSB, Kvalitet i MSB:s insatsstatistik 2019, https://ida.msb.se/dokument/insatsstatistik/kvalitet2019/Kvalitetsdeklaration2019.pdf

[2] Jonsson A., Bergqvist A., Andersson R. "Assessing the number of fire fatalities in a defined population", Journal of Safety Research, Vol 55 December 2015, pp 99-103

There has been and collection of more detailed residential fire statistics in the project “Lärande från bostadbrand” initiated by MSB. Only a few fire and rescue services have participated in this project.

Summaries of existing database

The database is online available at MSBs website.

Existing definitions

Complete definitions of the different fields in the incident reporting system is available, however it is all in Swedish. Some definitions/terms for residential fires that might be useful are translated below

- Year (År)
- Name of Rescue service (Räddningstjänst), in many cases similar to municipality
- County (Län)
- Municipality (Kommun)
- Type of Municipality (kommungrupp) Suburban to big city, Suburban to larger cities, Rural Municipality, Sparsely populated region, Densely populated region
- Commuter municipality, Big city, Larger city, Tourism city, Production city
- Building (Byggnad) type of building (gas station, student house, vacation house, hotel, jail, defence building, school, industry, farm, dwelling, outside, hospital, etc.)
- Building type (Byggnadsgrupp) (public building, other, dwelling, outside, industry or unknown)
- Month (Månad)
- Day of the month (Dag)
- Day of the week (Veckodag)
- Date (datum)
- Cause of fire (Brandorsak)
- Size of fire upon arrival (Omfattning vid ankomst)
- Total size of fire (Brandens totala omfattning)
- Smoke detector present (brandvarnarförekomst)
- Start room (startutrymme)
- Start item (startföremål)

MSB plan to publish a homepage with an English translation of the entire contents of the revised händelserapport by the end of 2020.

Terminology is also discussed in appendix 2 of Andersson et. al.[3]

Are there differences within the same country?

Since it is different fire and rescue services and individuals that report to MSB there will be some differences. However, MSB has developed documentation and an online education (http://cursnet.srv.se/fortb/hr/start0/) to support individual fire and rescue services and reporters in the reporting.

Prior to 2018 there were three systems (Alarmos, Core or Daedalos) used by the fire and rescue services when reporting incidents. However, since 2018-01-01 all fire and rescue services in Sweden report their incidents into the same system.

Are there differences and contradictions with other domains?

Classifications in fire statistics from insurance companies do not correspond to those used by the fire and rescue service.

Identification of missing information

[3] Andersson P, Johansson N, Strömgren M. ”Characteristics of fatal residential fires in Sweden” SP-report 2015:53

The quality and reliability of the statistics is assessed yearly by MSB[4].

There have been issues with missing data when different systems (Alarmos, Core or Daedalos) where used at different fire and rescue services.

There has previously been some double counting of incidents when serval fire and rescue services from different municipalities/regions are involved. This has been corrected in the yearly quality control done by MSB. The routines at joint incidents have been improved in 2020 and MSB expect this to more or less eliminate problems with double counting.

Due to incident report content revisions and changes in local routines for recording data, there is a potential to over-interpret discontinuities in some time series. MSB has conducted some minor analysis of this. However, it is something that the individual user needs to be aware of and asses if it can be a problem in each individual case.

U2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

After each incident, the fire and rescue service documents what has happened and which measures that have been taken. Each rescue service has appointed a statistics coordinator, who coordinates their organization's reporting to national statistics.

After an accident it is, according to law[5], the responsibility of the municipality to a reasonable extent clarify the causes of the accident, the course of the accident and how the operation has been carried out.

MSB continuously monitors the inflow of reports from the respective rescue services and, if necessary, contact the relevant statistics coordinator to inquire about the cause to late reporting or inform about detected errors in the organization reports.

Fire response organisation

The municipality is responsible for the local rescue service according to law[6]. The Swedish state is responsible for rescues service in the areas of aviation, sea and mountains.

Who collects data?

The rescue service fills in the incident reports and MSB collects it.
The police conduct fire investigations, often in close cooperation with the local fire and rescue service. Police investigations are not freely available, at least until criminal charges are made.

The National Forensics Centre have detailed information from post mortems for nearly all fire victims.

The Socialstyrelsen collects data on deaths.

Who issues the data?

MSB

[4] MSB, Kvalitet i MSB:s insatsstatistik 2019, https://ida.msb.se/dokument/insatsstatistik/kvalitet2019/Kvalitetsdeklaration2019.pdf
[5] Lag (2003:778) om skydd mot olyckor
[6] Lag (2003:778) om skydd mot olyckor

Are there different levels of collection?

All data in the IDA database is national, but it is possible to break down the data on municipality level. It is also possible to break data down into the small areas defined by Statistics Sweden for all detailed local and regional statistics.

Identify disparities in data feedback

Data is used by governmental bodies and research.

Where is the data stored?

In databases hosted by each relevant local or national authority.

U3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

Since the data is open everyone can interpret the data.

There are a lot of different publications that has been made using the statistics over the years. These have been issued by MSB and by universities like Lund and Karlstad Universities, as well as research institutes such as RISE. Individual municipalities (often represented through the local fire and rescue service) frequently analyse statistical data as a basis for the local planning.

Purpose for which data is collected

MSB:s statistics are intended to shed light on which accidents the municipal rescue service respond to and what measures are taken in the event of these accidents. The overall purpose is to streamline society's work to protect against accidents through increased knowledge about accidents and measures taken. Society is constantly changing and the need to be able to follow the development of accidents over time is considered particularly important.

What are the methods used to fill the gaps where information is missing?

MSB reviews the quality of the statistics yearly and reports if data is missing.

Is there follow up to data collected ?

The fire and rescue services can update and resubmit the incident report (händelserapport) if they become aware of new information which makes a revision necessary. The statistics published by MSB include all revisions up to the publishing date. For example, if a fire and rescue service update a report from 2018, then the revision will be included in that year’s statistics on the next annual release of new statistics.

Analyse potential cause and consequences in trends

It is easy to identify trends with statistical tools. However, there would appear to be quite a lot of random variation and many “trends” that seem to exist in time series are not significant when tested rigorously. It is often extremely difficult to identify what has caused any trend.

U4. ANALYSE EXISTING DATA

Determining the level of confidence

High in the data collected by authorities. The insurance company data is limited.

Pinpointing issues and limitations

Regarding data in the IDA database:

- Some double counting in data, usually discovered and corrected by MSB
- Due to changes in the way data is collected there are possible breaks in the time series (2005 and 2018)
- Some issues with missing data due to different systems at different fire and rescue services prior to 2018.

Examples of work and conclusions based on previous studies of fire statistics in Sweden

Fatal fires

In a report[7] based on publicly available data from MSB (the IDA database, see section 0) the following conclusions were drawn about fatal fires:

- Slightly more than 1% of the residential fires result in at least one fatality
- A fatal residential fire is often large when the rescue service arrives at the scene
- Fatal residential fires occur more commonly in the late night/early morning
- Usually only one person is present in the fire compartment when the rescue service arrives to a fatal residential fire
- There is only marginal differences regarding the presence of smoke detectors in residential fires and fatal residential fires.
- Both fatal residential fires and residential fires are less common in and around larger cities
- Fires starting in beds, sofas, armrest chairs or clothing results more often in fatalities than other start items while fires starting on the stove, in the fireplace or the chimney seldom results in fatalities compared to the number of these fires.
- Fires starting in the living room or bedroom result more often in fatalities than fires starting in other rooms.
- Smoking is a common cause in fatal residential fires while lightning, forgotten stove, chimney fire, technical malfunction and re-ignition seldom results in fatalities compared to the number of this type of fires.
- The likelihood of dying in a residential fire might be somewhat higher for a person living in an apartment than for a person living in a single-family house. However, the differences are small and given the uncertainties in the number of people living in different types of dwellings it might be that there is no difference.
- The number of floors in a building does not seem to differ between fatal and nonfatal fires.
- The fire start floor in an apartment building seems to be slightly higher in fatal fires than in non-fatal fires.

For more information about the study and the conclusions drawn please view the report[2].

This report is also the basis, together with other Swedish studies on fatal fires, for recommendations on measures to take in order to decrease the number of fatalities in fires[8]. Measures recommended includes:

- Continued work to increase the use of smoke detector in homes, both in terms of number of smoke detectors and better smoke detectors
- Information by e.g., increased awareness of informative webpages like “Din säkerhet (your safety)”

[7] Andersson, P., Johansson, N. & Strömgren, M. (2015) Characteristics of fatal residential fires in Sweden, SP report 2015:53, Borås, Sweden.
[8] Andersson, P., Arias, S., Arvidson, M., Frantzich, H., Larsson, I., Vermina Lundström, F., Nilsson, D., Runefors, M., (2018) Riskreducerande åtgärder för dödsbränder i bostäder, RISE report 2018 :37, report in swedish

- Increased fire safety for people under home care.
- Fire performance requirements for furniture
- Continued and improved follow up on fatal fires
- More emphasis on fire safety in updates of the building regulations even if it cannot be proven that the measures are cost effective
- Continued research on fire safety for people e.g., on better smoke detectors, tools for evaluating the efficiency of different measures, and on fires with unknown cause.

School fires

In a recent report[9] based on publicly available data from MSB (the IDA database, see section 0) the following conclusions were drawn about school fires:

- The number of fires in schools building have varied between 300 to 500 during the last 20 years.
- Arson is the most frequent cause (around 50% in average) of school fires.
- There is a steep increase of school and preschool fires in Sweden during after 2015. It is also clear that this increase is due more fire caused by arson.
- There is a clear difference of the room of origin between school fires and preschool fires. This indicates that there are some differences in the characteristics of these fires. It is also clear that fires in "Bathroom/toilet" have increase substantially during the last three years in schools.
- The number of fires during school hours have increased during the last couple of years. There is also an indication that the number of school fires during the night and early morning is decreasing.
- The analysis presented shows that the severe and costly fires have not increased, rather it is the number of small and more moderate fires that have increased. These fires occur during school hours in secluded spaces like toilets and corridors.

For more information about the study and the conclusions drawn please view the report[3].

Examples of fire trends in Sweden based on national fire statistics

The following graphs have been developed to illustrate the type of data available in the national fire statistics in Sweden. All the data have been retrieved from the IDA which is maintained by MSB.

Fatal fires

The database on fatal fires includes a total of 1,871 fire incidents (including 2,046 fatalities) from 1999 to 2015. The following data is a selection of the data from the fatal fires database. Note that data from 2016-2019 is also available in a preliminary dataset (353 fire incidents including 363 fatalities).

[9] Johansson, N., McNamee, M. & van Hees, P. (2020) ANLAGD BRAND i skolor och förskolor, report 3230, Lund University, Sweden. (report in Swedish)

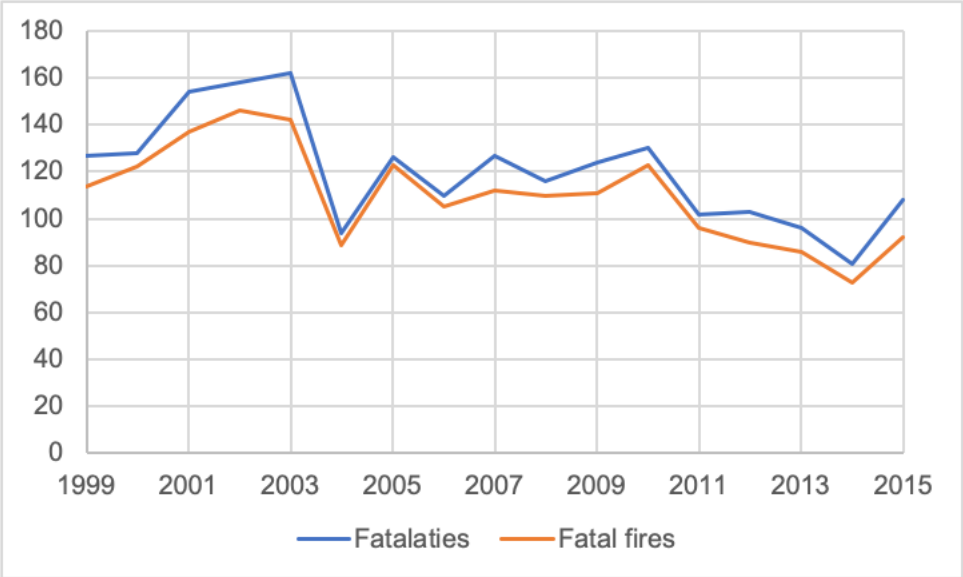


Figure 26 : Number of fatal fires and fire fatalities in Sweden.

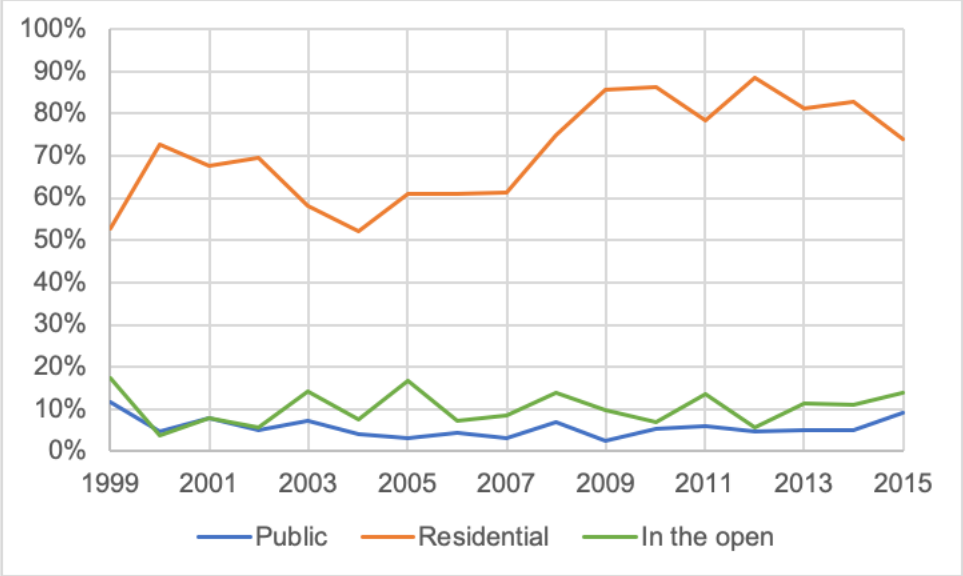


Figure 27 : Distribution of fire fatalities in different building categories.

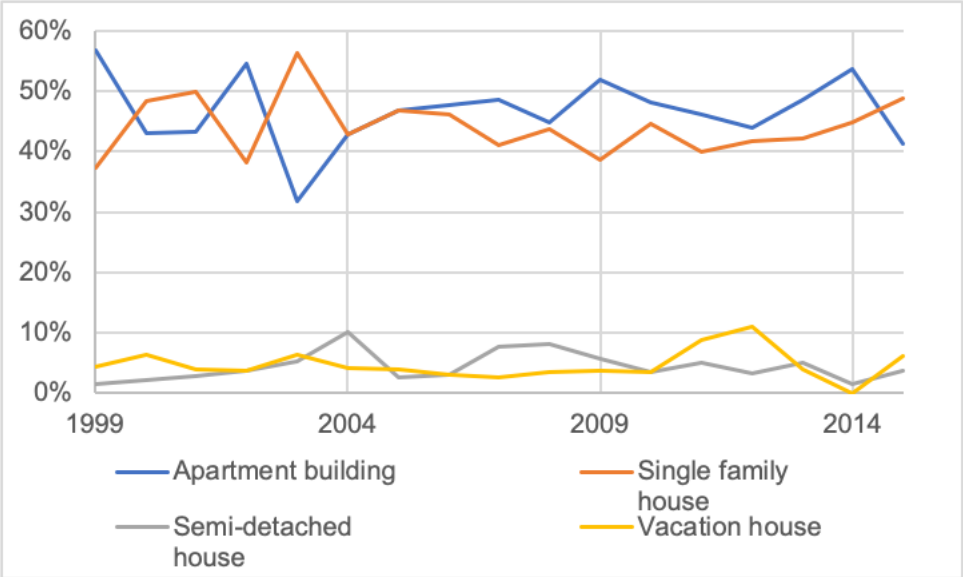


Figure 28 : Distribution of fire fatalities in different types of residential buildings.

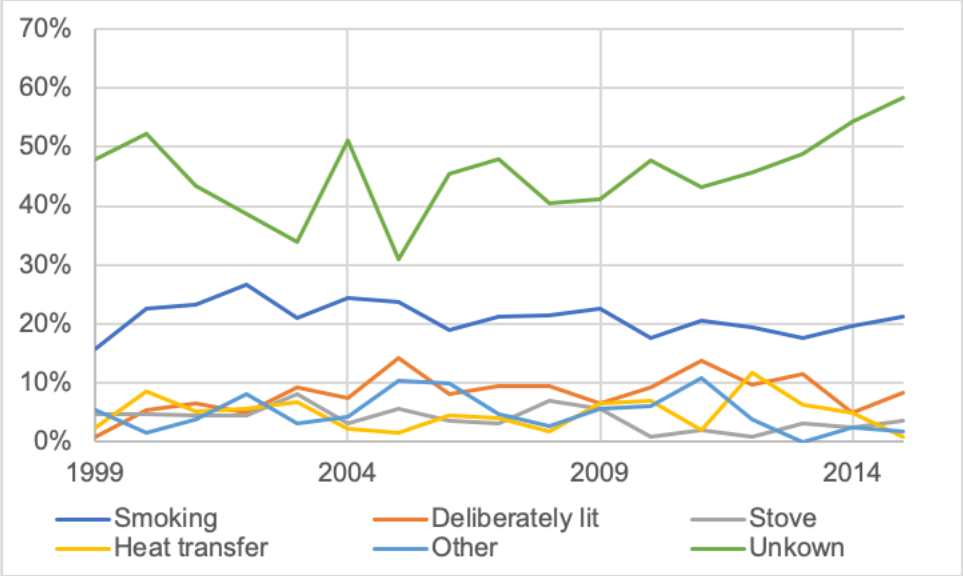


Figure 29 : Distribution of fire fatalities for different fire causes

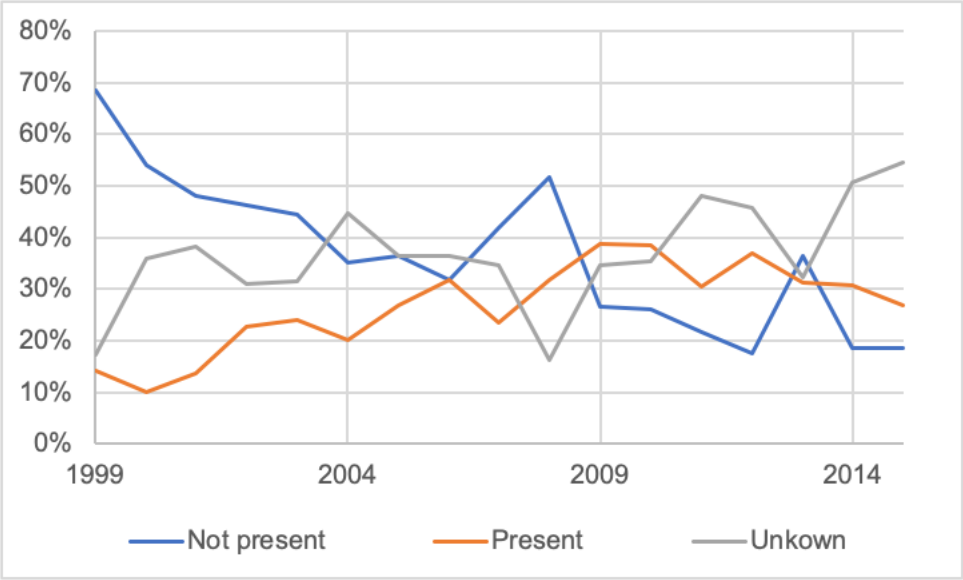


Figure 30 : Smoke alarms presence in fatal fires.

School fires

The database on building fires includes a total of > 230,000 fire incidents in buildings from 1998 to 2019. The following data is a selection of the data from the building fires database.

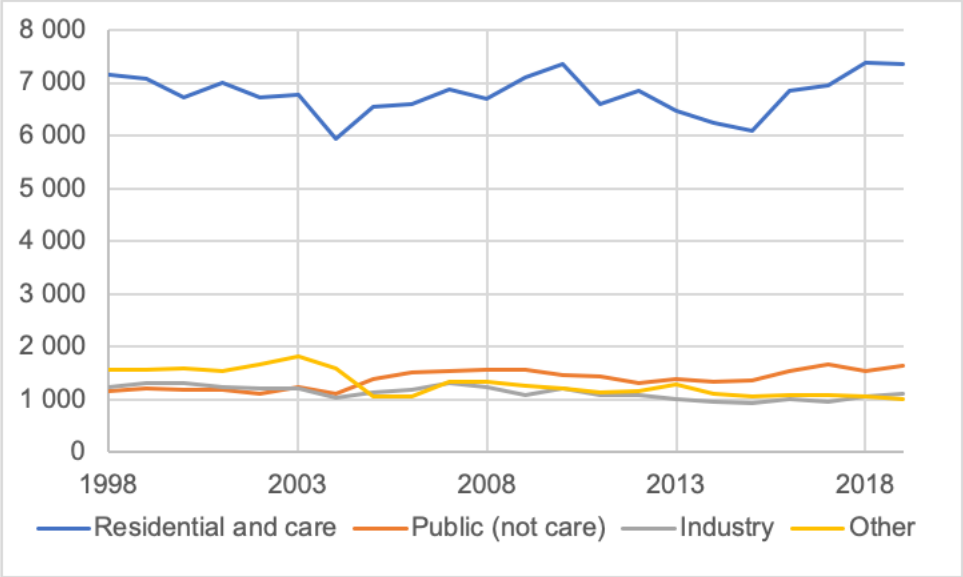


Figure 31 : Number of fires in different building categories.

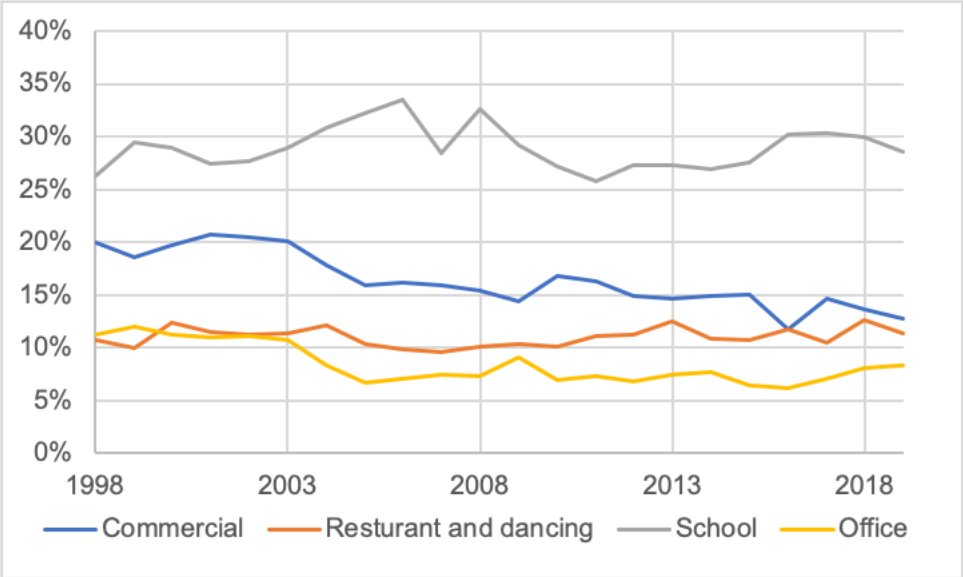


Figure 32 : Distribution of the four most common types of buildings in « Public» building category

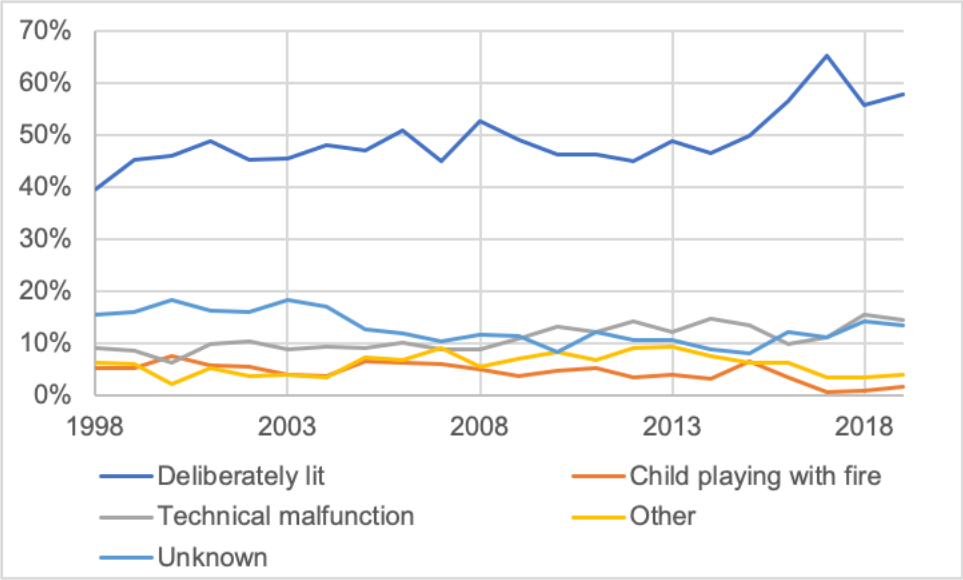


Figure 33 : Distribution of the five most common fire causes in School buildings.

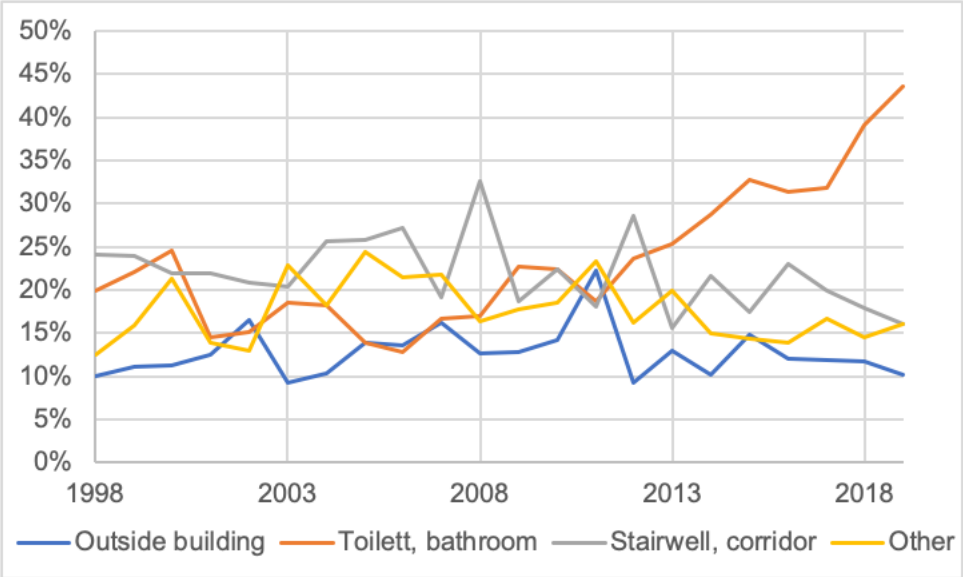


Figure 34 : Distribution of the four most common places of origin in school building fires.

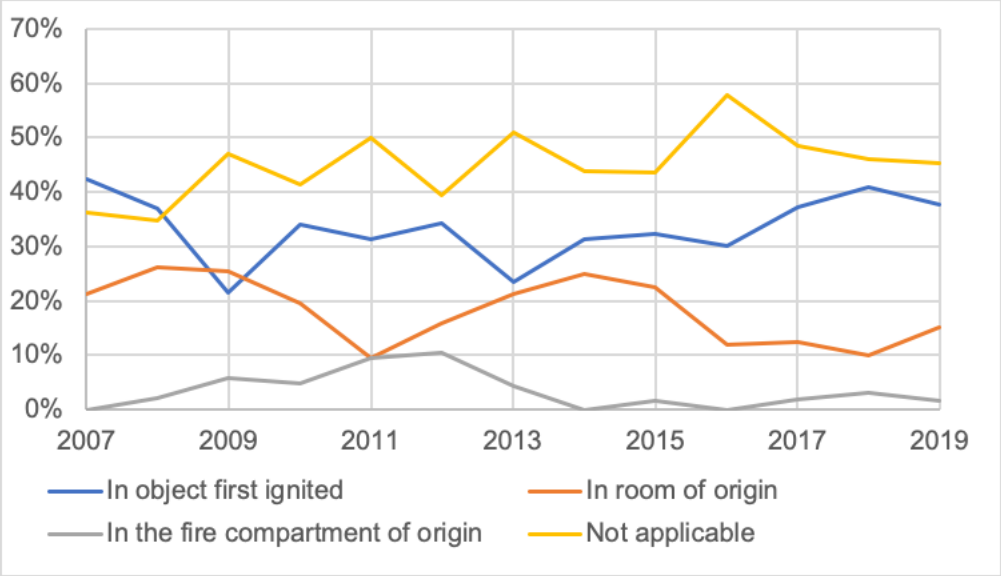


Figure 35 : Damage estimate for “toilet, bathroom” school fires.

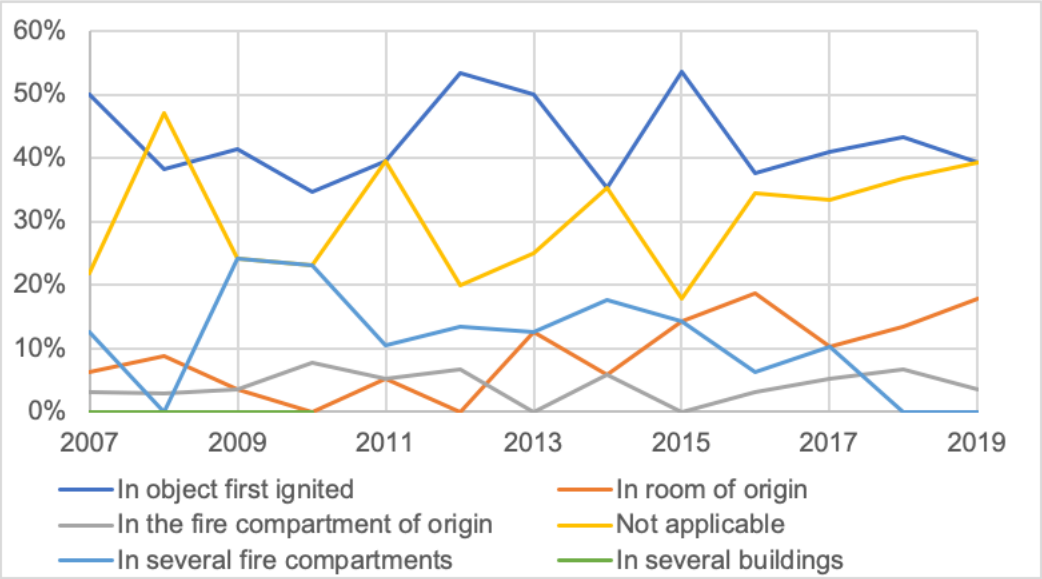


Figure 36 : Damage estimate for "outside building" school fires.

V. DIAGNOSTIC SHEET FOR SWITZERLAND

V1. TERMINOLOGY ISSUES

References of existing database/studies

Database

- Statistics from Fire service regarding firefighting interventions (FKS / CSSP)
  Erreur ! Référence de lien hypertexte non valide.https://www.swissfire.ch/der-sfv/fakten-zur-feuerwehr/ (documents uploaded)

- Building damage statistics from APIRE (Association of Public Insurance Companies for Real Estate) or Vereinigung kantonaler Gebäudeversicherungen (VKG) or AECA in French
- Statistics of deaths following building fires from APIRE (Association of Public Insurance Companies for Real Estate) or Vereinigung kantonaler Gebäudeversicherungen (VKG) or AECA in French https://www.vkg.ch/de/versicherung/rueckversicherung?banner=1

Studies

- Vereinigung kantonaler Feuerversicherungen VKF, Personenrisiken aus Brand (fire risks for people) (document uploaded) 2018,

- ETH Zürich. Wirtschaftliche Optimierung im vorbeugenden Brandschutz 2012 (document uploaded)

- Brandprävention und Tabakprodukte, Situation in der Schweiz, Bericht im Auftrag des Bundesamtes für Gesundheit 2010

- Risque pour les personnes en protection incendie, Marcel Bürge & Katharina Fischer, 2018 in Association des établissements cantonaux d'assurance incendie AEAI

- Analyse de données à long terme relatives à des dommages causés à des bâtiments sur plusieurs années – 2011 (AEAI) - (documents uploaded)

Summaries of existing database

Data related to fire:

- Date of fire,
- Fire causes,
- Fire damage,
- Fire deaths,
- Injuries,
- Type of building,
- Insurance value,
- Other data are collected by the insurance but not necessarily analysed or shared with KGV.

Existing definitions

Causes of claims ("AEAI code")

Heating installations
Living room fireplaces
Stoves
Central heaters
Industrial heaters and other large installations
Smoke channels
Combustion residues
Other

Specific household (without heating systems)
- Matches, lighters
- Cigars, cigarettes, pipes
- Candles
- Welding, brazing
- Fireworks
- Other

Spontaneous combustion
- Hay
- Other

Explosions
- Gas explosions
- Explosions of explosive materials (without attacks)

Electricity
- Defective installations
- Defective devices
- Devices used improperly

Lightning
- Direct lightning strikes
- Indirect lightning strikes

Arson
- By the owner or a relative
- By a third party
- By strangers

Other known causes
- Mechanical energy, friction
- Motor vehicles
- Other

Unknown causes

There is a guide for defining 15 building types and their codifications. (Guide to the new assignement code)

Are there differences within the same country?

Yes. The codification of the causes of fire ("AEAI code") and of the assignment of buildings is only for use in cantons with an ECA (Cantonal Insurance Establishment). Private insurances that cover buildings in the other seven cantons do not use this code.

Are there differences and contradictions with other domains?

None identified

V2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

Fires, technical incidents, ambulance, natural hazards

Fire response organisation

Organised in regions (Cantons), is part of the military system
85000 active fire fighters in 1300 fire service organisations – 16 professional fire services and 189 company and industrial fire services.
Fire service depends organisational on the insurer of the part of the country (Canton).

Who collects data?

Fire services and Public Insurance Companies for Real Estate (PIRE) collect fire data (including fire deaths and fire causes) as the fire services are in the responsibility of the insurer / ministry. Data are then gathered by the insurance association (APIRE) who analyses them. They collect data from 19 out of 26 Cantons; this covers 80% of the country's buildings.

Who issues the data?

Fire service, Insurance

Are there different levels of collection?

Methodology can defer from canton to canton.

Identify disparities in data feedback

The 19 cantons including ECA (Cantonal Insurance Establishment) collect data in a fairly standardized way, but which differs from that of the other seven cantons.

Where is the data stored?

In each ECA (Cantonal Insurance Establishment) then it is aggregated by the insurance association (APIRE)

V3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

The insurance association (APIRE)

Purpose for which data is collected

Insurance visibility and for prevention campaigns.
Also, the steering group responsible for drawing up the 2025 fire protection prescriptions analysed the statistics to establish the essential bases for decision-making with a view to the new orientation of the fire protection prescriptions.

What are the methods used to fill the gaps where information is missing?

Not filled

Is there follow up to data collected ?

No

Analyse potential cause and consequences in trends

The following analyses were made by the steering group responsible for drawing up the 2025 fire protection prescriptions (extracted from: Analyse de données à long terme relatives à des dommages causés à des bâtiments sur plusieurs années – 2011 (AEAI) - (documents uploaded)):

- In over 90% of fatal fires, only one person dies. Fires killing more than 2-3 people are very rare.
- Most deaths occur in residential buildings (CH: over 80% of deaths caused by fires); however, this type of building also represents the majority of the real estate portfolio.
- In relation to their share in the real estate portfolio, the following allocation categories are particularly at risk (in descending order):
    - hospitals and medico-social establishments
    - residential buildings including other uses;
    - hotels and restaurants
    - agricultural housing buildings
- The statistics available do not show any influence on the type of construction or the number of floors.
- Fatal fires are most often (descending order) caused by:
    - Cigarettes, candles, matches, etc.
    - Kitchen equipment, equipment and electrical network
    - Explosions
    - Arson
- Heating installations (international mainly space heatings, not central heating)
- In around a quarter of the deaths in Switzerland, the cause of the fire is undetermined.
- The risk of injury (without fatal consequences) is particularly high in kitchen fires.
- Most fatal fires are man-made (most of the time through negligence, and some of them intentionally). Technical failures play a minor role.
- The most important "thermal loads" in the occurrence of fatal fires are the following objects or materials (in apartments):
    - furniture, especially sofas and armchairs
    - bedding, mattress
    - clothing, textiles
- The main factors of death following the development of a fire in the apartments include:
    - exits or visibility blocked by fire or smoke
    - problems related to escape routes
    - problems related to the flight of victims
- The likelihood of dying in a building fire increases significantly with age.
- The probability of injury in adulthood is much less dependent on age.
- Men are more likely to die in building fires than women.
- For victims, the main risk factors are:
    - be asleep (at the time of the fire)
    - have reduced mobility (especially the elderly)
    - being under the influence of alcohol (more men than women)
- The following socio-economic factors also play a role:
    - Type of household, type of apartment
    - Income, education level, unemployment
- In small municipalities (generally rural), the death rate (relative to the number of inhabitants) is higher than in large municipalities and in cities.
- More than half of the victims die in the room or in the area where the fire started. An even greater percentage of victims are directly involved in the fire, in part of their absence (eg stove left on).
- From a medical standpoint, smoke poisoning (alone or in combination with burns) is by far the most common cause of death.
- Working smoke detectors can reduce the death rate from fires in residential buildings by about half. However, the effectiveness of smoke detectors is reduced by the following:
    - Even in countries where smoke detectors are mandatory, households, where the risk of fire is higher, clearly not all have them.

  - The groups most at risk (eg people with reduced mobility, the elderly, smokers, people under the influence of alcohol) do not benefit much from the benefits of smoke detectors in the event of a fire.
  - Due to the low potential to save lives, a study carried out in 2012 concluded that, despite the low costs, an obligation to install smoke detectors in Swiss residential buildings is not proportionate. (from the economic point of view at least)
- The following additional measures could help reduce the number of deaths in residential buildings:
  - good maintenance of electrical systems and appliances
  - reduced ignition energy cigarettes (fire safe cigarettes)
  - fireproof bedding, sofas, armchairs or clothing
  - automatic extinguishing systems (residential sprinkler)

V4. ANALYSE EXISTING DATA

Determining the level of confidence

Data quality is not sufficient for decision-making.

Pinpointing issues and limitations

- Fire deaths at the hospital or in the ambulance are not accounted.
- Some codifications are very vague, for example in the causes of fire; there is no category for fires from PV panels or from Li-ion batteries.
- Anyone can fill the inspection sheet; can be made by investigators, architects, police or firefighter…

Examples

Extracted from: Analyse de données à long terme relatives à des dommages causés à des bâtiments sur plusieurs années – 2011 (AEAI)

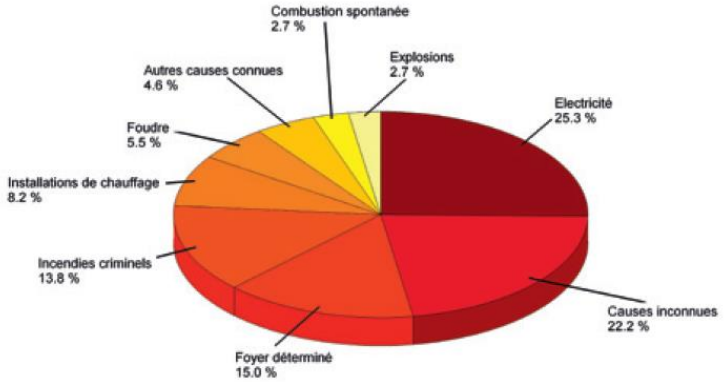


Illustration 47. Part relative des causes d'incendie pour tous les ECA, sur la base du montant de dommages, pour la période de 1991 à 2010 (indexation sur la somme d'assurance).

Figure 47 shows the average share of the different causes of fire in the damage to buildings over the last 20 years. The large proportion of unknown causes raises questions. By definition, these causes cannot be investigated further. The high proportion of fires caused by a particular focus clearly shows the importance of responsible behavior when handling matches or lighters.

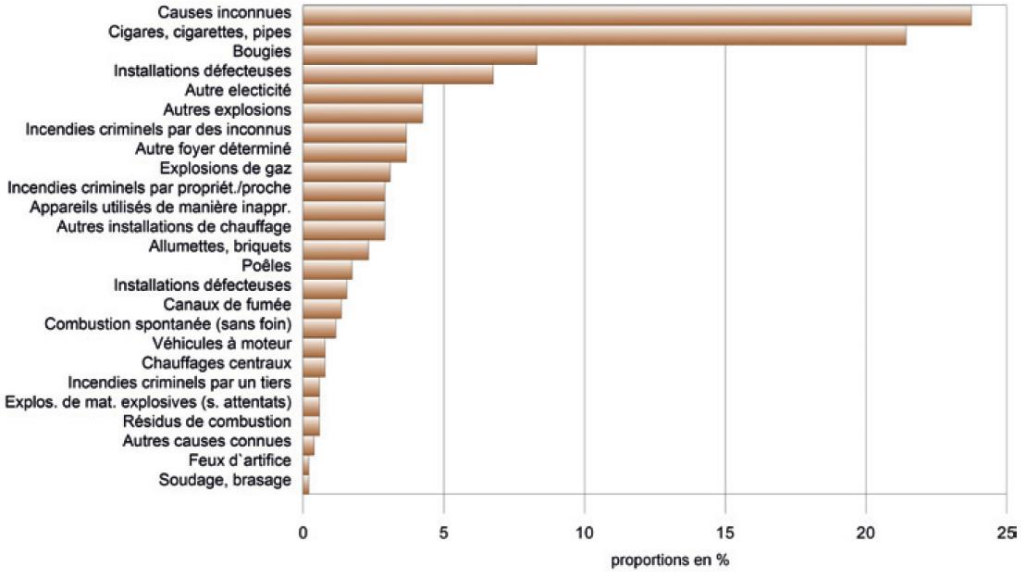


Illustration 59. Causes de décès dus aux incendies en Suisse sur la période de 1991 à 2010.

Figure 59 shows the importance of the causes of fatal fires (usually) attributable to people:

- 30% of cases are due to cigars, cigarettes, pipes or candles and would therefore be easily preventable.
- With 16%, the proportion of cases due to electricity ("defective devices", "defective installations", "devices used inappropriately", "other") is also high. Due to the omnipresence of electricity in our daily lives, the danger associated with this source of energy seems underestimated.
- Representing at least 8% of fatal fires, the share of arson (sum of the three categories) is frightening, not to mention the cases attributed to the category "unknown causes".

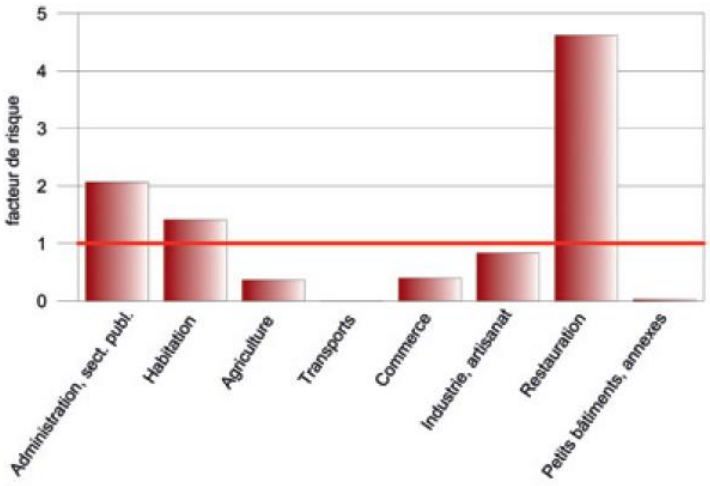


Illustration 62. Risque de mortalité en fonction de l'affectation du bâtiment en Suisse pour la période de 1991 à 2010; risque moyen = 1.

Illustration 62 shows the different risks in the event of presence in buildings of each category of assignment.

It should be noted that in addition to the use of the building, the probability of being in the building (number of people in the building x time spent in the building per day) also largely determines the risk: this probability is relatively high for residential houses as well as for administrative and public buildings; on the other hand, it is low for buildings in the transport category or for small buildings and outbuildings. For administrative buildings and public buildings, however, the increased risk is largely due to the sub-category "hospitals and specialized care homes", which figure 62 indirectly reveals.
Notable fact, but known for a long time: the high risk for buildings in the "hotel" category. The assignment plays a major role here: in these buildings, we work almost 24 hours a day with high temperatures (kitchens), and there are often many rooms equipped with own heating and electrical appliances (television). In addition, large quantities of combustible materials are usually stored there (gas, oil, grease, methylated spirits, cleaning products), and the average number of people present is high. It is to be hoped that the smoking bans that have come into force in recent years will help reduce this risk.

W. DIAGNOSTIC SHEET FOR THE UNITED KINGDOM

W1. TERMINOLOGY ISSUES

Information from ISO 17755-1 & -2

Methods of estimation (ISO 17755:2014, page 3)
The United Kingdom's Incident Reporting System (IRS) is based on separate reports on each incident requiring a response by a fire brigade. There is a national standard for coding of incidents.
All fire brigades are participants, and all are required to report on all incidents; therefore, the design is a census and there is no adjustment for missing data. Analysis is by counting only.
Most reports are completed by firefighters who lack extensive training in fire investigation, but an estimated 10% of reports are completed by personnel with extensive training in fire investigation.
The U.K. also conducts periodic household surveys, which provide regular estimates of the percentage of all home fires reported to fire brigades. The U.K. estimates that brigades are called to 1/5 of home fires.

Fires subject to reporting (ISO 17755:2014, page 5)
A fire is an incident, attended by a local authority, of uncontrolled burning involving flames and/or heat and/or smoke. An unknown number of departments employ truncated/reporting thresholds. These thresholds are determined on a department by department basis. Fire does *not* include the following except when they cause fire or occur as a consequence of fire:

- Explosions*
- Lightning
- Electrical discharge

* Fireworks/petrol bombs which extinguish themselves and do not cause damage are not reportable as a fire incident, but instead as a False Alarm, unless firefighting action is required, in which case, it will be a fire incident.
All fires included in the official definition, given in the document named "Incident Recording System (IRS) Help and Guidance – version 2.3", should be reported.
Fires are categorized for analysis and reporting purposes according to major incident type in the following way:

- Primary fire: includes all fires in buildings, vehicles and most outdoor structures or any fire involving casualties, rescues or fires attended by five or more pumping appliances.
- Secondary fire: an incident that did not occur at a Primary location, was not a chimney fire in an occupied building, did not involve casualties (otherwise categorised as a Primary incident) and was attended by four or fewer pumping appliances (otherwise categorized as a Primary incident).
- Chimney fires: any fires in buildings where the fire was contained within the chimney structure and did not involve casualties, rescues or attendance by five or more pumping appliances.

Fire deaths subject to reporting (ISO 17755:2014, page 7)
For United-Kingdom, the definition of a fire fatality is given in the document named "Incident Recording System (IRS) Help and Guidance – version 2.3" question 3.5: "*Killed/ Fatality - a person who has died as a direct or indirect result of injuries received at the incident*" and specified at question 9.21": "*in general, fire-related deaths are those that would not have otherwise occurred had there not been a fire*".

Fire injuries subject to reporting (ISO 17755:2014, page 10)
For United-Kingdom, the definition of a fire injury is given in the document named "Incident Recording System (IRS) Help and Guidance – version 2.3" question 3.5: "*Injured/Non fatal - a person injured as a direct result of the incident (but not fatally injured) who required first aid (provided by anyone) at the scene or more medical treatment than could be given at the accident. This includes any person advised to attend hospital or see a doctor, whether or not they actually follow up the advice*".
All should be recorded. Completeness is believed to be good including all physical injuries, not just burns and smoke.

Victim characteristics (ISO 17755:2014, page 16)
Age
Gender
Ethnicity
Where was the victim when the fire started?
— Room, cabin or compartment of origin

— Different room, cabin or compartment on floor of origin
— Floor above origin (includes mezzanine above floor of origin)
— Two or more floors above origin
— One floor below origin – includes stairway leading down from floor
— Two or more floors below origin
— Outside building, vehicle etc. of origin
— Seat of fire unknown or multi-seated (and above non applicable)
— Location of person unknown
— Not applicable
— Other location

Where was the victim found?

— Room, cabin or compartment of origin
— Different room, cabin or compartment on floor of origin
— Floor above origin
— Two or more floors above origin
— One floor below origin
— Two or more floors below origin
— Outside building, vehicle etc. of origin
— Seat of fire unknown or multi-seated (and above non applicable)
— Location of person unknown
— Not applicable
— Other location

What role did the victim play in the incident?

— Firefighter on duty
— Other emergency service personnel
— Resident/occupant
— Passer by
— Driver
— Passenger
— Visitor
— Employee in workplace
— Customer in shop
— Other FRS personnel on duty
— Other

Was victim rescued?

— Yes
— No

If rescued, where was the victim rescued from?

— Room, cabin or compartment of origin
— Different room, cabin or compartment on floor of origin
— Floor above origin (includes mezzanine above floor of origin)
— Two or more floors above origin
— One floor below origin – includes stairway leading down from floor
— Two or more floors below origin
— Roof
— Outside building of origin
— Not applicable
— Other

Circumstances of fatal casualty

— Thought to be already dead when firefighter arrived
— Unable to resuscitate, confirmed dead at scene
— Unable to resuscitate, confirmed dead at hospital
— Alive on leaving scene, but died later
— Not known

Has the casualty been reconciled against the appropriate death certificate? Was the death/injury fire related?

— Yes (in general, fire related deaths are those that would not have otherwise occurred had there not been a fire)

— No
— Don’t know
What is your understanding of the cause of the death?
— Overcome by gas, smoke or toxic fumes; asphyxiation
— Burns – severe
— Combination of burns and overcome by gas/smoke
— Shock/anaphylactic shock
— Other medical condition
— Fracture
— Other physical injury
— Cuts/lacerations
— Impalement
— Drowning
— Hypothermia
— Heat exhaustion
— Back/neck injury (spinal)
— Head injury
— Chest/abdominal injury
— Chest pain/Heart condition/Cardiac arrest
— Other
— Unknown
What were the circumstances of the victim?
— Bedridden
— Chair-ridden
— Other immobility
— Suspected under influence of alcohol
— Suspected under influence of drugs
— Discovering fire
— Fell onto fire
— Fighting fire (including attempts)
— Trapped by fire because unaware (e.g. asleep)
— Trapped by fire other than unaware
— Trapped by collapse of structure
— Trapped by smoke
— Injured escaping
— Injured rescuing person
— Injured rescuing property or animals
— Injured being rescued
— Injured by blast
— Return to fire
— Intentionally sustained at start of fire (e.g. suicides and attempts)
— Injury accidentally sustained at start of fire
— Not applicable
— Other
— Unknown

Property damage subject to reporting (ISO 17755:2014, page 27)
From the document named “Incident Recording System (IRS) Help and Guidance – version 2.3” part “On attendance –Damage, the damages are the total loss to the structure and contents, including contents damaged by fire, heat, smoke, water.
Monetary damages are not included in national analyses, which defer to insurance companies. Measures used at the national level are:
— Indoor area damaged (for example, square meters in a building):
- Should be reported as required in the document named “Incident Recording System (IRS) Help and Guidance – version 2.3” **question 8.20**, “the estimated flame and/or damage on arrival”.
- Should be reported as required in the document named “Incident Recording System (IRS) Help and Guidance – version 2.3” **question 8.24**, “the horizontal area damaged by flame and/or heat at stop”.

- Should be reported as required in the document named “Incident Recording System (IRS) Help and Guidance – version 2.3” **question 8.25**, “the horizontal area damaged by flame and/or heat and/or smoke and/or water at stop”.

— Outdoor area damaged (for example, acres in a wildfire):

- Should be reported as required in the document named “Incident Recording System (IRS) Help and Guidance – version 2.3” **questions 8.35 and 5.16a**, “the estimated outdoor fire damage by flame and/or heat and/or smoke”.

— Number of rooms damaged:

- Should be reported as required in the document named “Incident Recording System (IRS) Help and Guidance – version 2.3” **question 8.20**, “the estimated extent of flame and/ or heat damage on arrival”.
- Should be reported as required in the document named “Incident Recording System (IRS) Help and Guidance – version 2.3” **question 8.22**, “the extent of flame and/or heat damage at stop”.

— Number of floors damaged:

- Should be reported as required in the document named “Incident Recording System (IRS) Help and Guidance – version 2.3” **question 8.20**, “the estimated extent of flame and/ or heat damage on arrival”.
- Should be reported as required in the document named “Incident Recording System (IRS) Help and Guidance – version 2.3” **question 8.22**, “the extent of flame and/or heat damage at stop”.

Spread from one primary property to another primary property (or a secondary property) will only show the damage for the first property damaged. Only the distance, in meters, between the incident location and the neighbouring property(s) will be shown.

Spread from ‘secondary’ (e.g. some outdoor structure types) property to a primary property (including all vehicles & buildings that are not derelict) will only show the damage to the primary property.

Other losses subject to reporting (ISO 17755:2014, page 29)

— Deaths and injuries of firefighters, fire officers, fire brigade personnel, and other emergency responders due to acute fire effects.

— Other fatal or non-fatal injuries or illnesses of firefighters, fire officers, fire brigade personnel, and other emergency responders sustained while on-duty.

Locations of fires based on survey responses (ISO 17755:2014, page 32)

The U.K. has 295 categories, including 21 dwelling categories (private residential), 18 other residential, and 160 non-residential buildings. The complete list can be downloaded from https://www.gov.uk/government/publications/incident-recording-system-for-fire-and- rescue-authorities.

Specific types of buildings and other structures (ISO 17755:2014, page 33)

The UK is not present in this section.

Specific types of rooms and other areas (ISO 17755:2014, page 46)

For Dwellings

— Airing/drying cupboard
— Bathroom/toilet
— Bedroom
— Bedsitting room
— Chimney
— Conservatory
— Corridor/hall
— Dining room
— External fittings
— External structures
— Garage
— Indoor swimming pool
— Kitchen
— Lift/lift shaft/motor room
— Living room
— Refuse store
— Roof space
— Roof
— Sauna

— Stairs
— Under stairs (enclosed storage area)
— Utility room
— Open plan area
— Other
— Not known

For Other Residential

— Airing/drying cupboard
— Bar/canteen/restaurant/mess
— Bathroom/toilet
— Bedroom
— Bedsitting room
— Boiler room
— Cell
— Chimney
— Class room
— Cloakroom
— Common room/staff room/day room
— Conservatory
— Corridor/hall
— Dining room
— Dormitory
— External fittings
— External structures
— Garage
— Indoor swimming pool
— Kitchen
— Laundry room
— Lift/lift shaft/motor room
— Meeting room
— Office
— Power house/plant/generator
— Reception area
— Refuse store
— Roof space
— Roof
— Sauna
— Stairs
— Store room
— Under stairs (enclosed storage area)
— Utility room
— Ward/sick bay
— Other
— Not known

For Non Residential Building

— Barn
— Bathroom/toilet
— Boiler room
— Canteen/restaurant
— Chimney
— Cloakroom
— Conservatory
— Corridor/hall
— External fittings
— External structures
— Garage
— IT server/mainframe room
— Kitchen
— Lift/lift shaft/motor room

— Meeting room
— Office
— Parking garage
— Power house/plant/generator
— Process/production room
— Reception area
— Refuse store
— Roof space
— Roof
— Shop floor/showroom/display hall
— Stairs
— Store room
— Under stairs (enclosed storage area)
— Utility room
— Other
— Not known
Other areas are specified for each of several types of vehicles.

Reporting of building height and other characteristics (ISO 17755:2014, page 54)
— Number of stories
— Level or floor where fire began. Floor 0 = ground floor.
— Structure status, such as vacant, under construction, or under demolition. Under “Is the building normally occupied?”, there are these choices:
- Yes – occupied
- No – unoccupied permanently (vacant) - No – under construction

Reporting and estimation of deliberately set fires (ISO 17755:2014, page 57)
Yes (under Question 5.15 – Cause/Motive) reported as “Deliberate – own property”, “Deliberate – other’s property” and “Deliberate – unknown owner”. Also (under Question 8.1 – Cause of the fire), each of three types of deliberate fire is subdivided as to
— Bomb or incendiary device
— Suicide (including attempted suicide): setting fire to self
— Homicide (including attempted homicide): setting fire to other person
— Heat source and combustibles brought together deliberately
All four loss measures reported as well as fire brigade deaths and injuries
Classification as deliberate – some by trained arson investigators, some by fire officers on the scene with no arson training
Statistical analysis of deliberate fires includes some fires with unknown cause or cause still under investigation
Reporting of fireplay (under Question 8.1 – Cause of the fire) as Accidental – Playing with fire, and no fires are categorized as both deliberate and fireplay. Coding manual emphasizes that there are no presumptions about age of firesetter.
Other information relevant to motive (under Question 8.3 – Caused by) can be used to isolate juvenile firesetters:
— Child (age 9 or younger) — Youth (age 10-17)
— Adult (age 18-64)
— Elderly (age 65 or more) — Age not known

Reporting and estimation of natural cause fires (ISO 17755:2014, page 61)
Yes, reported as “Accidental/Natural occurrence” under Question 8.1, Cause of the fire, and as “Natural occurrence” under Question 8.4, Main source of ignition. No detailed breakdowns reported.

Reporting and estimation of exposure fires (ISO 17755:2014, page 62)
Yes, reported as “Spread from secondary fire” under Question 8.4, Main source of ignition. No detailed breakdowns reported.

Reporting and estimation of smoking material and open flame fires (ISO 17755:2014, page 65)
Yes, can be reported under Main Source of Ignition:

— Match
— Candle
— Cigarette lighter
— Smoking materials, including cigarettes, cigars and tobacco
— Oil or incense burners (listed under “Smoking Related” but not listed with smoking mate- rials for any other country and can be analyzed separately)
— Welding or cutting equipment (listed under “Industrial Equipment”; grouped with open flame heat source for some countries but not others)
— Naked flame

Reporting and estimation of heating and cooling equipment fires (ISO 17755:2014, page 68)
Yes, can be reported under Main Source of Ignition:
— Heater/Fire, including open fire
— Patio heating equipment
— Central heating/hot water
— Other heating equipment
— Separate water heating
— Food warming equipment (not cooking); listed under heating equipment but would be analyzed with cooking equipment in some other countries
— Chimney; also can be checked as a property having fire, separating such fires from all other fires in or on a building
A separate data element records fuel or power source for equipment.

Reporting and estimation of cooking and kitchen equipment fires (ISO 17755:2014, page 72)
Yes, can be reported under Main Source of Ignition:
— Cooker including oven
— Ring or hot plate as separate appliance
— Microwave oven
— Grill or toaster
— Barbecue
— Camping stove
— Deep fat fryer
— Other cooking appliance
— Refrigerator or freezer
— Dishwasher
— Electric kettle
A separate data element records fuel or power source for equipment.

Reporting and estimation of clothes dryer fires (ISO 17755:2014, page 75)
Yes, can be reported under Main Source of Ignition:
— Washing machine
— Tumble dryer
— Spin dryer
— Combined washer/dryer
A separate data element records fuel or power source for equipment.

Reporting and estimation of entertainment equipment fires (ISO 17755:2014, page 77)
Yes, can be reported under Main Source of Ignition:
— Television
— Audio equipment
— Video/DVD
— Other electrical visual equipment, including closed circuit television and satellite receivers
A separate data element records fuel or power source for equipment.

Reporting and estimation of office equipment fires 7(ISO 17755:2014, page 78)
Yes, can be reported under Main Source of Ignition:
— PC (personal computer) equipment, domestic use only
— Copier or printer
— Vending equipment

— PC (personal computer)
— Other computer equipment
— Telephone, answering machine, or fax machine
A separate data element records fuel or power source for equipment.

Reporting of electrical and electrical distribution or lighting equipment fires 8 (ISO 17755:2014, page 82)
Yes, can be reported under Main Source of Ignition:
— Battery charger
— Fairy lights
— Spot lights
— Other incandescent light bulbs
— Fluorescent lights
— Other lights
— Power source apparatus – batteries, generators
— Wiring, cabling, or plugs
A separate data element records fuel or power source for equipment.

Reporting of other appliance and equipment fires 8(ISO 17755:2014, page 86)
Yes, can be reported under Main Source of Ignition:
— Vacuum cleaner
— Iron
— Trouser press
— Extractor fan
— Electric blanket
— Hair dryer
— Blow lamp/paint remover
— Gardening equipment
— Other domestic style appliance
— Kiln, oven or furnace
— Industrial dryer
— Manufacturing equipment
— Lift or dumb waiter
— Other industrial equipment
— Other categories for use with vehicles only
— Other appliance or equipment
A separate data element records fuel or power source for equipment.

Reporting of item first ignited in terms of form and function (ISO 17755:2014, page 97)
Yes, can be reported under Item First Ignited:
— Trees
— Crops
— Grassland/heath/scrub
— Straw/stubble
— Leaves
— Hedge
— Other vegetation
— Cooking oil or fat
— Other food
— Animal products
— Bedding
— Clothing
— Other textile
— Bed or mattress
— Upholstered furniture
— Other furniture
— Floor covering
— Window covering
— Lampshade

— Other or unspecified furnishing
— Roof
— External fitting
— Other structural, fixture or fitting – external
— Internal fitting
— Wiring insulation
— Other structural, fixture or fitting – internal
— Raw foam
— Raw rubber
— Raw plastic
— Fireworks (also listed under Major Source of Ignition)
— Explosives or ammunition (also listed under Major Source of Ignition)
— Gas
— Petrol or oil product
— Paint, varnish, resin, or creosote
— Chemical in raw state
— Decoration
— Christmas tree
— Rubbish or waste
— Recycling of paper or cardboard
— Recycling other
— Paper or cardboard
— Other paper or cardboard
— Garden shed
— Other wooden objects including fence
— Other item

Reporting of item first ignited in terms of material composition (ISO 17755:2014, page 101)
Yes, all coding is integrated into coding for item first ignited in terms of form and function, in Table 20c (Reporting of item first ignited in terms of form and function
Reporting of factors in ignition)
Yes. These are the factors under the Accidental section of “What was the cause?” excluding those already cited for intentional and fireplay fires:
— Faulty fuel supplies (separately for gas, electricity, and petrol product)
— Faulty leads to equipment or appliance
— Fault in equipment or appliance
— Cooking (separating deep fat fryers from other equipment but not isolating unattended cooking or other specific behavioral errors)
— Negligent use of equipment or appliance
— Careless handling due to sleep or unconsciousness
— Careless handling due to careless disposal
— Careless handling due to knocking over
— Combustible articles too close to heat source or fire (and vice versa)
— Person too close to heat source or fire
— Vehicle crash or collision
— Chimney fire
— Bonfire going out of control
— Other intentional burning going out of control
— Accumulation of flammable material
— Natural occurrence
— Overheating due to unknown cause
Also a separate data element captures human factors contributing to ignition
— Disabled
— Distraction
— Temporary lack of physical mobility
— Other medical condition or illness
— Falling asleep or asleep
— Excessive and dangerous storage

— Other
— And there is a Yes/No data element on suspected drugs/alcohol as a contributory factor

Reporting of factors in ignition (ISO 17755:2014, page 106)
Yes. These are the factors under the Accidental section of “What was the cause?” excluding those already cited for intentional and fireplay fires:
— Faulty fuel supplies (separately for gas, electricity, and petrol product)
— Faulty leads to equipment or appliance
— Fault in equipment or appliance
— Cooking (separating deep fat fryers from other equipment but not isolating unattended cooking or other specific behavioral errors)
— Negligent use of equipment or appliance
— Careless handling due to sleep or unconsciousness
— Careless handling due to careless disposal
— Careless handling due to knocking over
— Combustible articles too close to heat source or fire (and vice versa)
— Person too close to heat source or fire
— Vehicle crash or collision
— Chimney fire
— Bonfire going out of control
— Other intentional burning going out of control
— Accumulation of flammable material
— Natural occurrence
— Overheating due to unknown cause
Also a separate data element captures human factors contributing to ignition
— Disabled
— Distraction
— Temporary lack of physical mobility
— Other medical condition or illness
— Falling asleep or asleep
— Excessive and dangerous storage
— Other
— And there is a Yes/No data element on suspected drugs/alcohol as a contributory factor

Reporting of factors in fire growth (ISO 17755:2014, page 108)
Yes. Item Mainly Responsible for Spread of Fire uses same choices as Item First Ignited (see Table 20D, Reporting of item first ignited in terms of material composition). Also some data elements on explosions, dangerous substances involved.

Presence and type of sprinkler or other extinguishing equipment (ISO 17755:2014, page 114)
Yes, included in reporting under “Active Firefighting Systems present in vicinity of fire (origin of fire).”
Question 7.11 is whether any active safety system was present, yes or no.
Type of system; multiple types of systems can be checked:
— Sprinklers
— Water mist
— Gaseous system – halon
— Gaseous system – other
— Drencher
— Foam
— Powder
— “Other” [which could be automatic extinguishing equipment or other active firefighting system]
Location of system relative to fire:
— In room of origin
— On same floor
— Different floor

Performance of sprinkler or other extinguishing equipment (ISO 17755:2014, page 116)
Whether the system operated, answered for each system:

— No
— Yes but did not raise alarm
— Yes and raised alarm
Number of sprinkler heads operating (asked only for sprinklers).
Answers are 0,1,2,3,4,5, more than 5, and unknown.
System's impact upon fire:
— Extinguished
— Contained or controlled
— Did not contain or control
— Unknown
Main reason why system did not function as intended
— System not set up correctly or not installed correctly
— System damaged by fire
— Fault in system (such as defective system, lack of maintenance, heads painted over)
— System turned off
— Fire in area not covered by system
— Other
— Unknown

Presence and type of detection or alarm equipment (ISO 17755:2014, page 119)
Yes, included in reporting.
How the fire was discovered.
— Automatic fire alarm
— Person
— Other, including discovery by animal
Was any active safety system present?
— Yes
— No
Type of system.
— Smoke alarm – 1 year battery
— Smoke alarm – long life battery
— Smoke alarm – mains
— Smoke alarm – mains and battery
— Smoke alarm – battery type not known
— Mains security system including smoke alarm — Other, including system with central panel **Location relative to fire:**
— In room of origin
— On same floor
— Different floor

Performance of detection or alarm equipment (ISO 17755:2014, page 123)
Did the system operate? Answered for each system:
— No
— Yes but did not raise alarm
— Yes and raised alarm
Main reason why system did not function as intended
Reasons allowed when answer to above is No
— Alarm battery missing
— Alarm battery defective
— System not set up correctly
— System damaged by fire
— Fire not close enough to detector
— Fault in system
— System turned off
— Fire in area not covered by system
— Detector removed
— Alerted by other means
Reasons allowed when answer to above is Yes but did not raise alarm

— Alarm was raised before the system operated
— No person in earshot
— Occupants did not respond
— No other person responded
Reasons allowed in all cases
— Other
— Unknown
Was anyone in the building at the time of the fire?
— Yes
— No
Is the building normally occupied?:
— Yes – occupied
— No – unoccupied permanently (vacant) [excludes derelict properties]
— No – under construction [and not habitable]
— Not known

Presence of extinguishers or other manual extinguishing equipment (ISO 17755:2014, page 126)
Yes, included in reporting under main action taken by "the general public" prior to arrival [of fire brigade] – clarified to mean the **main method of firefighting**. Fire extinguishers and use of hose reels are two of the coding options; these are the others:
— Removal from heat source
— Fuel supply disconnected
— Smothering
— Water from bucket/container
— Water from garden hose
— Beaten out
— Work team [clarified to mean a trained private team and not just a fire warden]
— Other
Not known
Possibly relevant are the choices on fixed firefighting facilities present:
— Dry risers
— Wet risers
— Firefighting lift
— Firefighting shaft
— Foam makers/drenchers/downcomers
— Smoke extraction/ventilation
— Other
For each type checked above, a separate data element asks whether it was used, Yes or No. Another data element asks for reasons if it was not working:
— Poor maintenance
— Vandalism
— Damaged by fire

Presence of smoke management or control equipment (ISO 17755:2014, page 127)
Yes, "smoke extraction or ventilation" is one of seven choices included in reporting under fixed firefighting facilities. One data element can be used to indicate presence of the equipment, a second data element can be used to report whether it was used, and a third data element can be used to record reasons if it was not working:
— Poor maintenance
— Vandalism
— Damaged by fire

Reporting on fire doors, fire walls and other compartmentation (ISO 17755:2014, page 129)
Yes, included in reporting.
Compartmentation performance
— Stopped/checked spread
— Breached – current building work (refers to construction work currently underway)
— Breached – previous building work (refers to construction work completed)
— Breached – fire doors left open or incorrectly fitted (includes smoke doors)

— Damage to compartmentation
— Fire spread through gaps or voids in construction (for example, ducts)
— No compartmentation in building [examples cited are warehouses and supermarkets, where there are large undivided spaces]
— Other
Elements related to compartmentation under **Means of Escape**:
— Okay – no visible concerns
— Exits locked
— Exits blocked (for example, materials stored blocking exit)
— Exit route blocked by smoke/flames
— Poor implementation such as doors swing the wrong way or complicated exit path — Contents contributing to abnormal fire spread/smoke production
— Other

References of existing database/studies

DATABASES:
England, Home Office
Website: https://www.gov.uk/government/collections/fire-statistics
Dwellings fire statistics dataset [1]
Other building fire statistics datasets [2]

Northern Ireland, Northern Ireland Fire and Rescue Service:
Website: https://www.nifrs.org/?s=fire+statistics

Scotland, Scottish Fire and Rescue Service [3]
Website: https://www.firescotland.gov.uk/about-us/fire-and-rescue-statistics.aspx

Wales, Welsh Government [4]
Website: https://gov.wales/fire-and-rescue-incident-statistics

STUDIES:

- Manes, M., & Rush, D. (2018). A Critical Evaluation of BS PD 7974-7 Structural Fire Response Data Based on USA Fire Statistics. Fire Technology, 55(4), 1243–1293. https://doi.org/10.1007/s10694-018-0775-2
- Manes, M., & Rush, D. (2020). Assessing fire frequency and structural fire behaviour of England statistics according to BS PD 7974-7. Fire Safety Journal. https://doi.org/10.1016/j.firesaf.2020.103030
- Ramachandran, G. (1993). Early detection of fire and life risk. Fire Engineers Journal, 53(171), 33–37.
- Ramachandran, G., & Charters, D. (2011). Quantitative risk assessment in fire safety. Routledge. https://doi.org/10.4324/9780203937693
- Rutstein, R. (1979a). The estimation of the fire hazard in different occupancies types. Fire Surveyor, 8(2), 21–25.
- Rutstein, R. (1979b). The probability of fire in different sectors of industry. Fire Surveyor, 8(1), 20–23.
- Rutstein, R., & Cooke, R. A. (1979). The value of fire protection in buildings. Home Office, Scientific Reserach and Development Branch.

Summaries of existing database

Data is subdivided into England, Northern Ireland, Scotland and Wales.
England fire statistics of the Home Office presents fire safety data related to fire incidents, causes, consequences, fatalities/casualties, response time, alarms and automatic extinguishing systems.
Fire statistics in **Northern Ireland** is not publicly available.
The fire statistics in **Scotland** of the Scottish Fire and Rescue Service contains information related to Incident type, property type, fatalities and casualties, fire stations and workforce.
In **Wales**, the fire statistics of the Welsh Government publicly available covers fire incident, location, cause, motive, casualties, response time, smoke alarms.

Existing definitions

The complete list of definitions is available in the following documents:
England [1], [2]; **Scotland** [3] and **Wales** [4]

Are there differences within the same country?

Yes, a unique national database is not available, and the fire safety data are subdivided into England, Northern Ireland, Scotland and Wales. Northern Ireland Fire and Rescue Service statistics does not use the IRS system and does not publish comparable statistics.

Are there differences and contradictions with other domains?

Yes, there are differences in the fields recorded in the various statistics within the same nation.

Identification of missing information

England statistics appears to provide the highest number of fields publicly available after a fire incident while Scottish fire statistics does not have data on the quantification of damage and presence of alarms or automatic extinguishing systems. Finally, Welsh fire statistics has fire safety data also on fire causes and motive and only on smoke alarms.

W2 - STATISTICS COLLECTION ISSUES

Fire department responsibilities

England: When the Fire and Rescue Service attends an incident, the details are uploaded to the Incident Recording System.

Scotland: When the Scottish Fire and Rescue Service attends an incident, the details are uploaded to the Incident Recording System run by the Home Office.

Wales: When the Fire and Rescue Authorities in Wales attend an incident, the details are submitted to the Home Office.

Fire response organisation

The Fire Service in the United Kingdom operates and follows different administrative legislations in England, Northern Ireland, Scotland and Wales.

Who collects data?

England: fire safety data are collected by the Fire and Rescue Service in the aftermath of an incident.

Scotland: fire safety data are collected by the Scottish Fire and Rescue Service in the aftermath of an incident.

Wales: fire safety data are collected by the Fire and Rescue Authorities in Wales in the aftermath of an incident.

Who issues the data?

England: the vast majority of statistics for England are produced by the Home Office.

Scotland: “Prior to October 2015, these statistics were produced by the Scottish Government and accredited by the United Kingdom Statistics Authority as National Statistics (signifying full compliance with the Code of Practice for Statistics). Subsequently they have been produced by SFRS in voluntary compliance with the Code of Practice for Statistics. However, as SFRS are not currently named in legislation as producers of Official Statistics, it was no longer possible for these statistics to be designated as National Statistics. SFRS are continuing to work towards becoming named as producers of Official Statistics with a view to regaining accreditation as National Statistics for this series. SFRS has agreed to being named as producers of Official Statistics in upcoming legislation” [3].

Wales: the Welsh Government compiles the statistics in the bulletin based on reports submitted by FRAs to the Home Office.

Are there different levels of collection?

Currently no national data is collected, and they are published according to their origin (England, Scotland and Wales)

Where is the data stored?

England: databases are stored in the archive of the Home Office.

Scotland: databases are stored in the archive of the Scottish Fire and Rescue Service and accessible through the Scottish Governments ScotStat service.

Wales: databases are stored in the archive of the Welsh Government.

W3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics

England: “Data received by the Home Office undergo a quality assurance process to ensure the data is fit-for-purpose and published to the highest possible standard. Any data quality issues are flagged and subsequently resolved with FRSs” [5].

Scotland: “The SFRS Data Services team run exception checking scripts on the IRS database to identify potential errors which are subsequently manually checked” [3].

Wales: Welsh Government applies further validation and verification to the data extract from the IRS.

Purpose for which data is collected

In **England**, the uses of fire statistics are:

- Informing the general public;
- Policy making and monitoring;
- Fire and rescue service;
- Third parties;
- Informing public marketing campaigns;
- The Office for National Statistics;
- Inspections and auditing;
- and National and international comparisons.

Users are:

- Ministers;
- Members of Parliament;
- Fire and rescue authorities and services;

- Other colleagues within the Home Office;
- Other government departments HMICFRS;
- Trade Unions;
- Journalists;
- Chartered Institute of Public Finance and Accountancy;
- Local Government Association;
- Individual citizens and private companies;
- Students, academics and universities;
- and Charities [5].

In **Scotland**: all the users who may be interested, use a range of fire statistics or are involved in the production of fire and rescue related statistics.

In **Wales**: the uses of fire statistics are:
- to advice to Ministers;
- to measure government targets and key performance indicators;
- to provide context and evidence for the Welsh Government's policies;
- fire service comparisons and benchmarking;
- to compare fires and the fire service in Wales with other countries;
- to inform the debate in the National Assembly for Wales and beyond;
- to assist in fire research and analysis;
- and to provide information on FRSs' performance and activities to citizens and communities in Wales.

Users are:
- Ministers;
- Assembly Members and the Members Research Service in the National Assembly for Wales;
- The Office for National Statistics;
- Department for Communities and Local Government;
- Chartered Institute of Public Finance and Accountancy;
- Fire and Rescue Authorities and Services;
- Welsh Local Government Association;
- Students, academics and universities;
- Other colleagues within the Welsh Government;
- Other government departments;
- Individual citizens and private companies;
- and Charities [6]

What are the methods used to fill the gaps where information is missing?

In **England**: "Information about the incident attended is input by a member of the attending fire crew and then quality assured by their line manager. The IRS consists of up to 175 questions, not all of which are asked for every incident. The IRS has on-line data entry with in-built validation rules which ensures that basic validation errors are avoided. However, there is more detail on the QA process in the previous section. Following the transition to the online IRS in 2009, the main types of errors in the data is thought to relate to recording and classification errors. The level of missing data on fields is very low, with such missing data reported as unknown and therefore no grossing, imputation or other estimation methods are used" [5].

In **Scotland**: "The officer in charge of an incident enters data to the IRS using software forms with inbuilt validation rules. The SFRS Data Services team then run exception checking scripts on the IRS database to identify potential errors which are subsequently manually checked. Further quality assurance is completed by cross checking incidents details with control room logs" [3].

In **Wales**: "due to time and resource constraints, we sometimes either record data as missing or we seek to impute the data. If we impute or change any data, then we inform the data provider of this and give them a chance to comment or challenge this. This is a compromise to resolve validation issues and does not impact significantly on the usability of the dataset" [6].

Is there follow up to data collected ?

In **England**: “In order to ensure the IRS data is complete, Home Office statisticians carry out monthly monitoring of the number of incidents submitted as discussed in the quality assurance section” [5].

In **Scotland**: “After the most severe fire incidents the SFRS fire investigation team complete a report on the details of the incident. Following these reports the IRS record is amended to reflect the findings where necessary. SFRS Data Services use these reports to crosscheck the IRS records” [3].

In **Wales**: “If we impute or change any data then we inform the data provider of this and give them a chance to comment or challenge this” [6].

Analyse potential cause and consequences in trends

In **England**, the Home Office investigate how causes and consequences vary over the years.

In **Scotland**, the Scottish Fire and Rescue Service publishes reports investigating how causes and consequences vary over the years.

In **Wales**, the Welsh Government publishes reports investigating how causes and consequences vary over the years.

W4. ANALYSE EXISTING DATA

Determining the level of confidence

In **England**: “Fire Statistics team run some specific checks before publishing the data.
Accuracy can be broken down into sampling and non-sampling error.
The data requested and provided by FRSs are not required under legislation, but we aim to achieve 100 per cent response for all fire and rescue collections, therefore reducing sampling error to the minimum. In order to ensure the IRS data is complete, Home Office statisticians carry out monthly monitoring of the number of incidents submitted as discussed in the quality assurance section.
Non-sampling error includes areas such as coverage error, non-response error, measurement error, processing error.
We aim to reduce non-sampling error through the provision of guidance about the data collections and the definitions of the data items. There are validation checks within the IRS to ensure that data is of good quality and fit-for-purpose” [5].

In **Scotland**: “the high level totals for primary fires, secondary fires, chimney fires, false alarms and non- fire incidents have a very low margin of error (below 1%) as categorisation issues would largely effect subcategories” [3].

In **Wales**, “the production of Welsh fire statistics follows a quality strategy”. Moreover, “accuracy can be broken down into sampling and non-sampling error. Non-sampling error includes areas such as coverage error, non-response error, measurement error, processing error. The fire data requested and provided by fire and rescue services are not required under legislation but we aim to achieve 100 per cent response for all fire collections. There will only be sampling error where there is missing data.
We aim to reduce non-sampling error through the provision of significant guidance about the data collections and the definitions that should be adhered to. We put the data through multiple validation checks to ensure that data is of good quality and fit for purpose” [6].

Pinpointing issues and limitations

In **England**: despite the review process, “there are likely to be some inaccuracies in the data due to reporting or keying errors, such as misclassification or missing cases” [5].

In **Scotland**: “As quality assurance is an ongoing process and we currently have no automated means to cross check the IRS logs with control room logs, it is difficult to accurately estimate the ‘true’ error margin, either at the time of publication or following revision, of the subcategories of incidents or casualties. There may be some miscategorisation which has yet to be addressed, or is not possible to address without access to another data source” [3].

In **Wales**, “due to time and resource constraints, we sometimes either record data as missing or we seek to impute the data. If we impute or change any data then we inform the data provider of this and give them a chance to comment or challenge this. This is a compromise to resolve validation issues and does not impact significantly on the usability of the dataset” [6].

Examples

ENGLAND
Period: April 2019 to March 2020

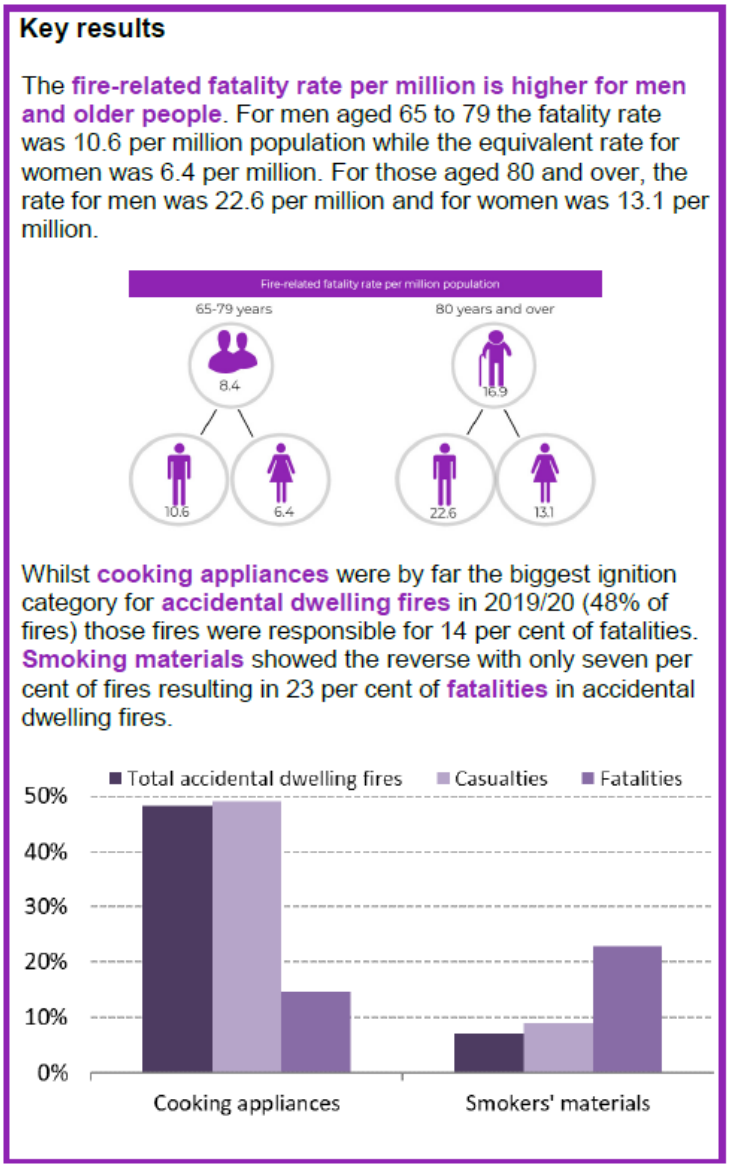


Figure 37 : Key results England fire statistics [7]

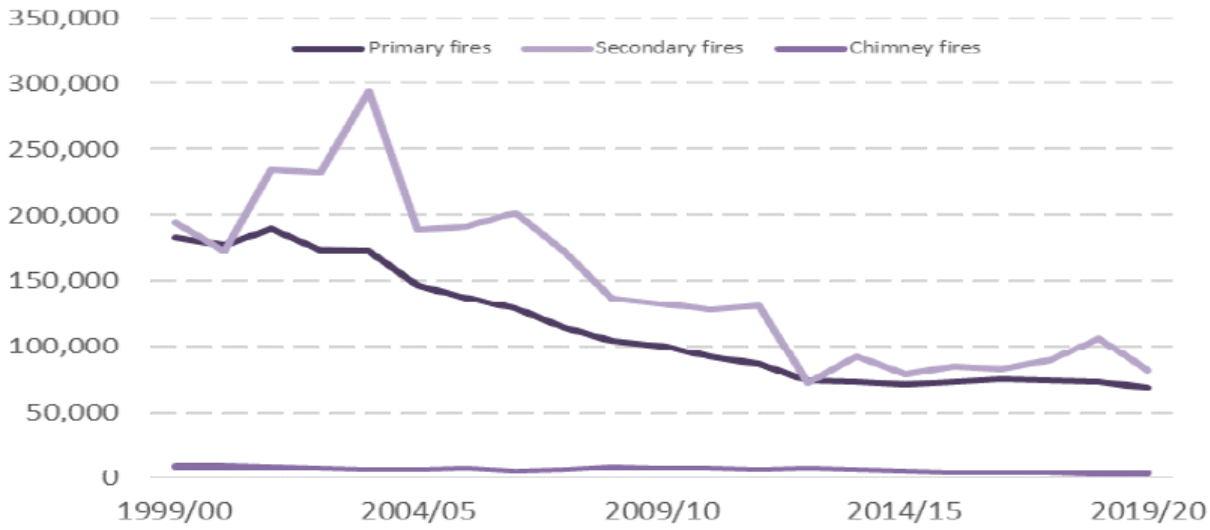
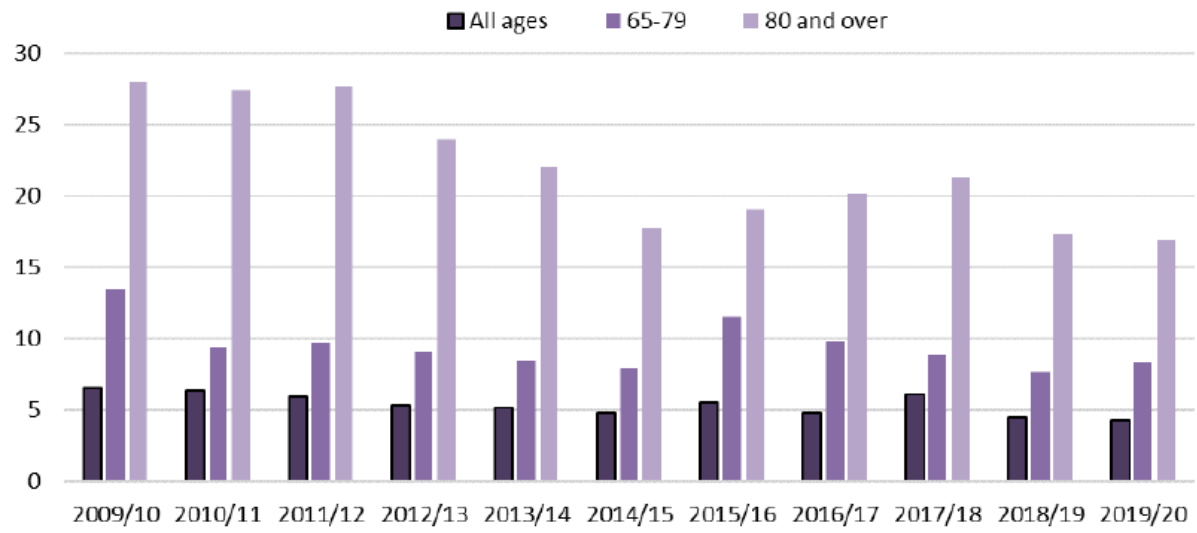
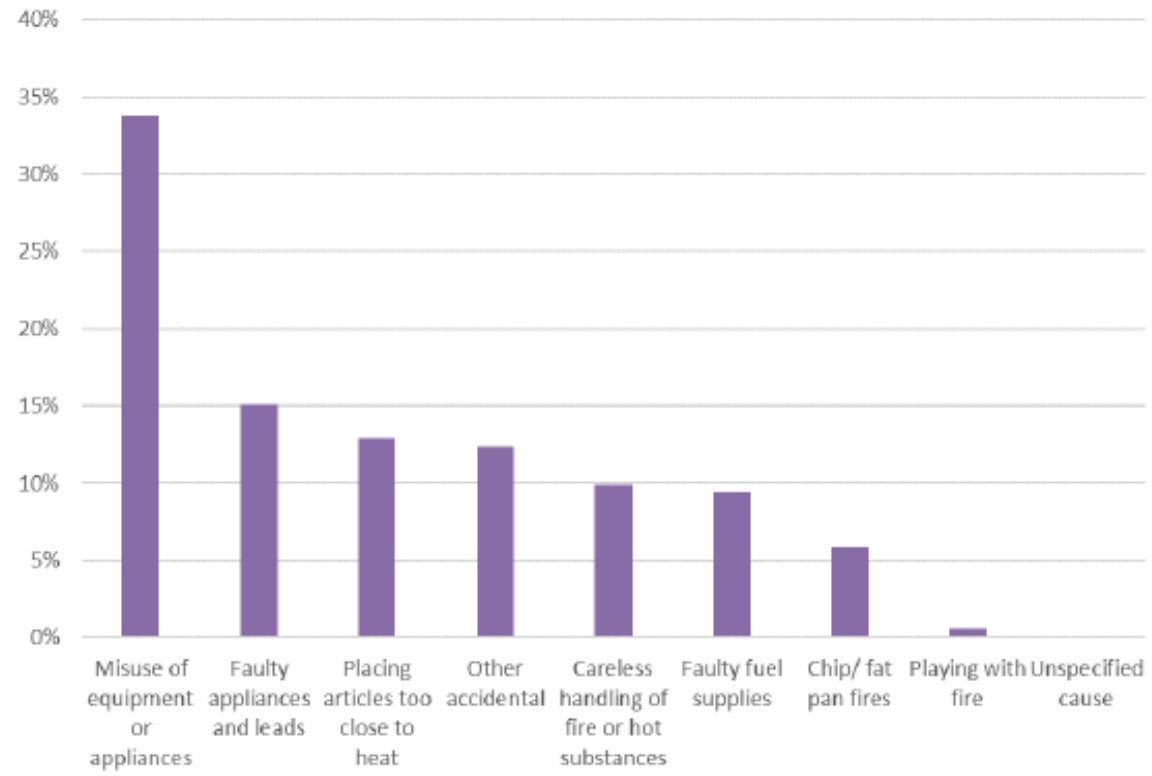


Figure 38 : Fires attended by type of fire, England; 2003/04 to 2019/20 [7]



Source: Home Office. **FIRE0503a**

Figure 39 : Fatality rate (fatalities per million people) for all ages and selected age bands, England; 2009/10 to 2019/20 [7]



Source: Home Office, FIRE0601

Figure 40 : Percentage of fires in accidental dwelling fires by cause of fire, England; 2019/20 [7]

SCOTLAND

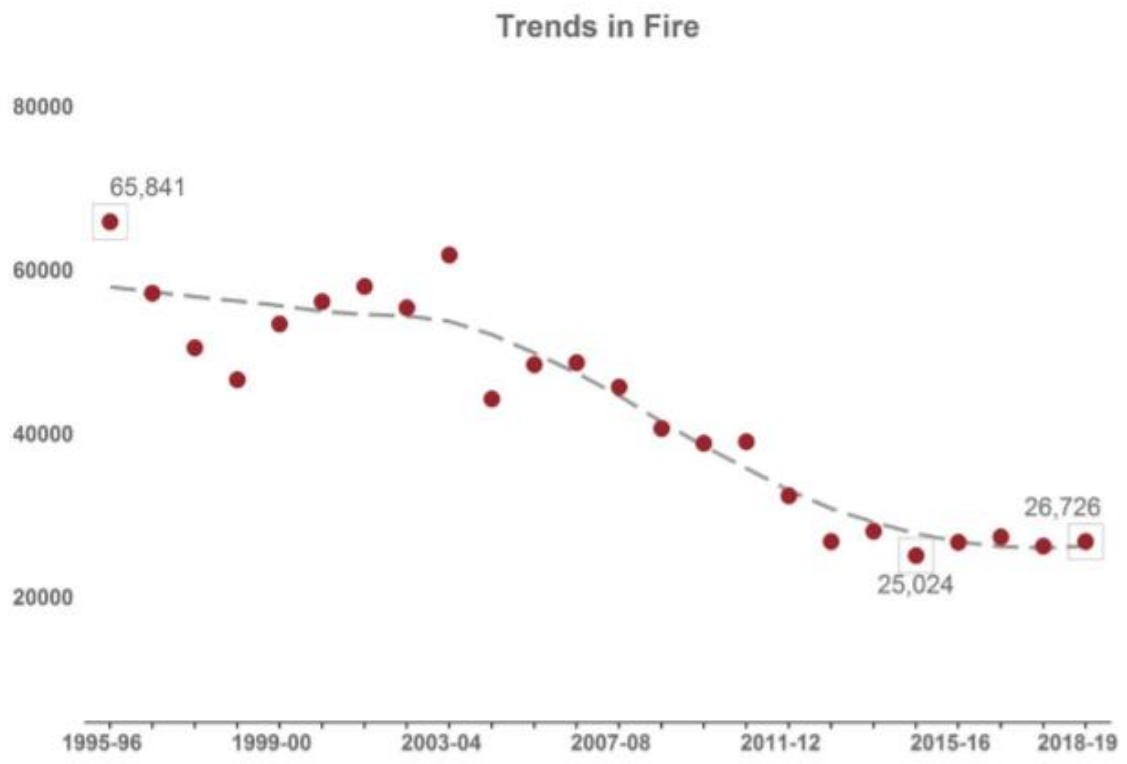


Figure 41 : Long-term trend in fire [8]

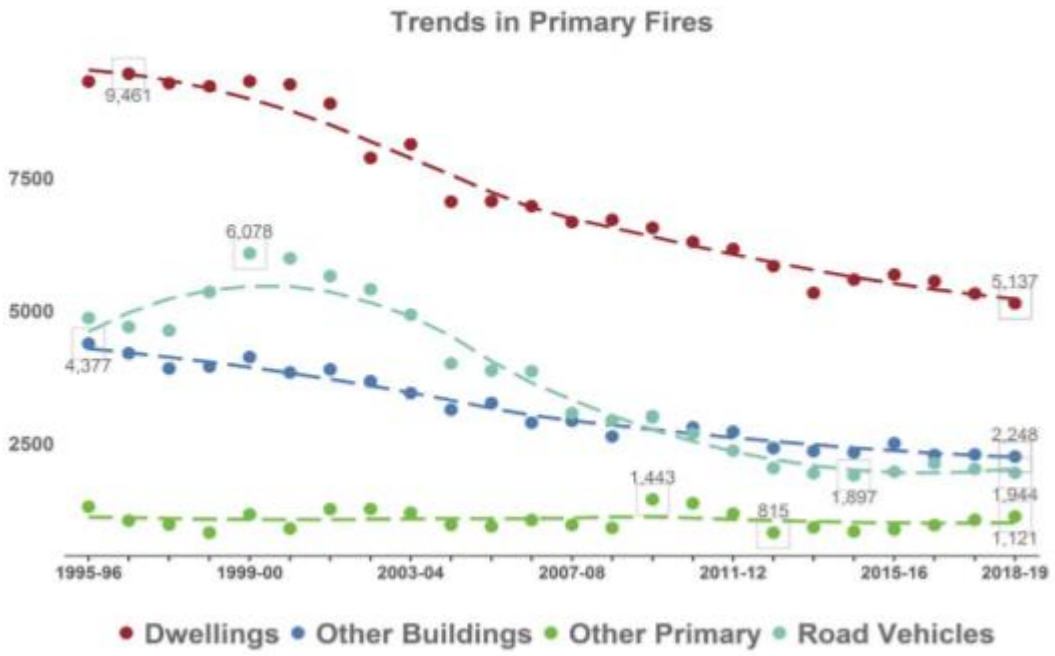


Figure 42 : Primary fire trends [8]

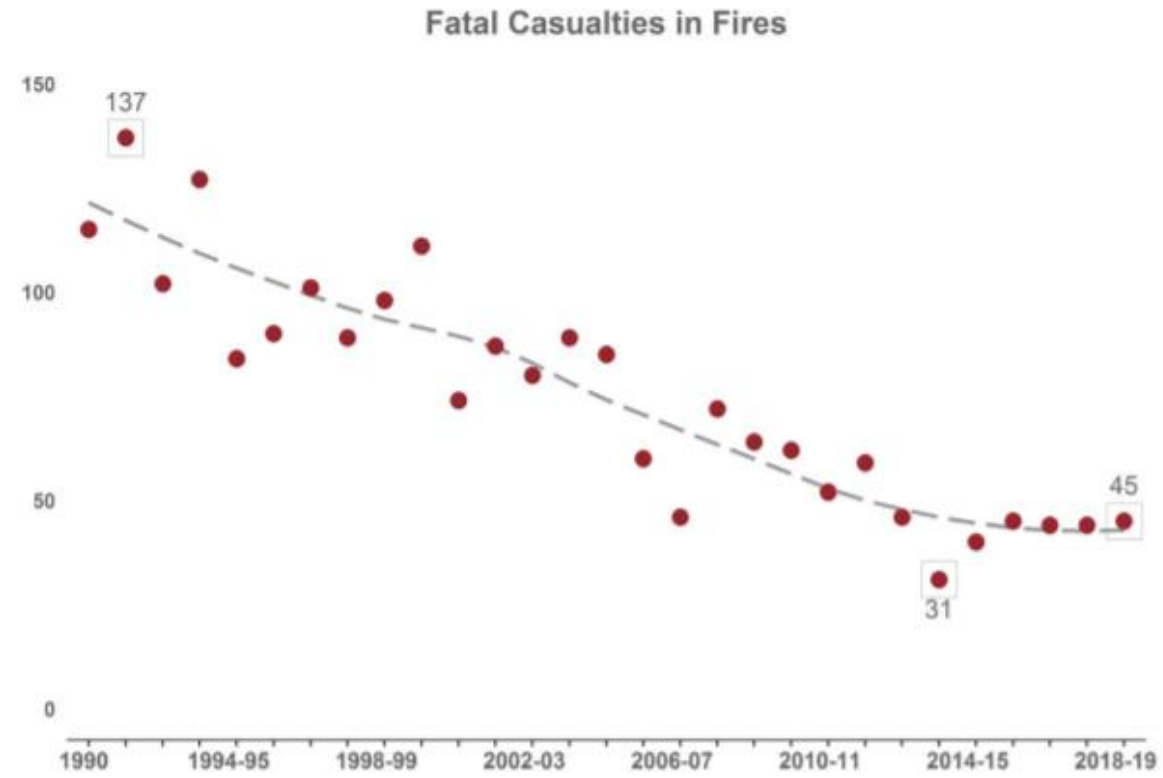


Figure 43 : Long-term trend in fatal fire casualties. Note that the series changed from calendar year to financial year after 1993 [8]

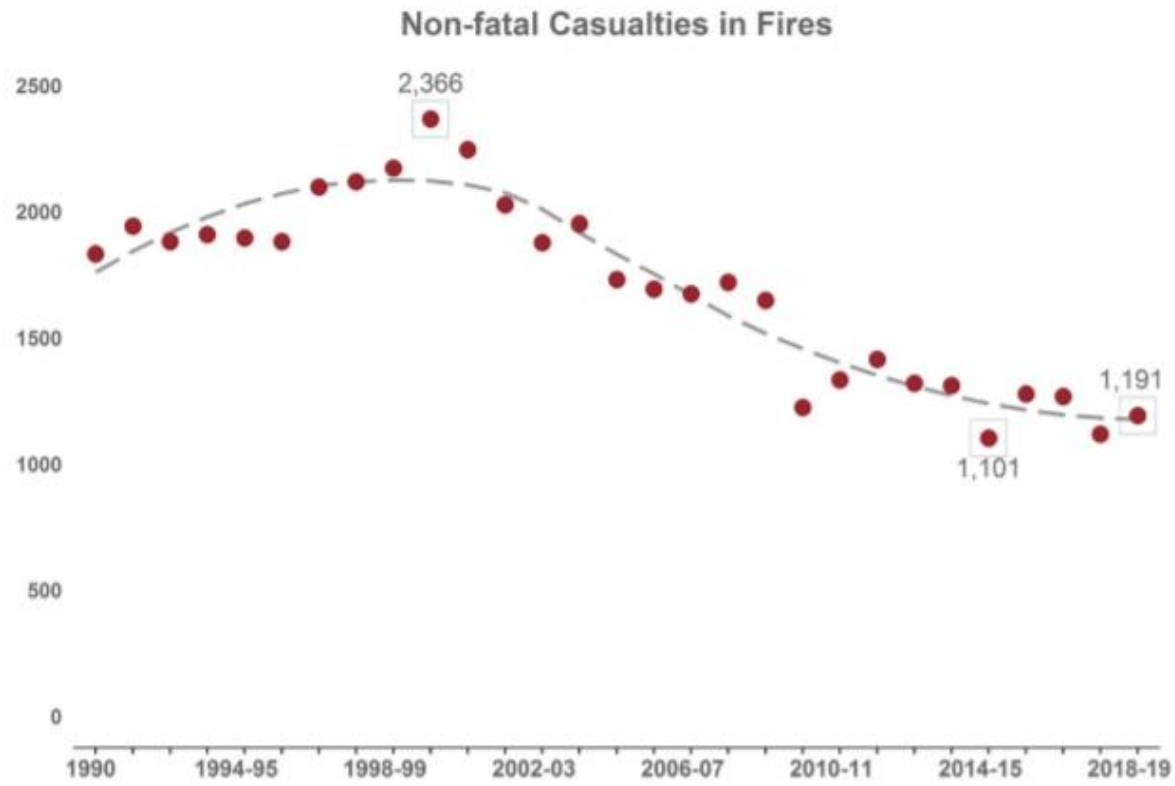


Figure 44 : Long-term trend in non-fatal fire casualties. Note that the series changed from calendar year to financial year after 1993 [8]

WALES

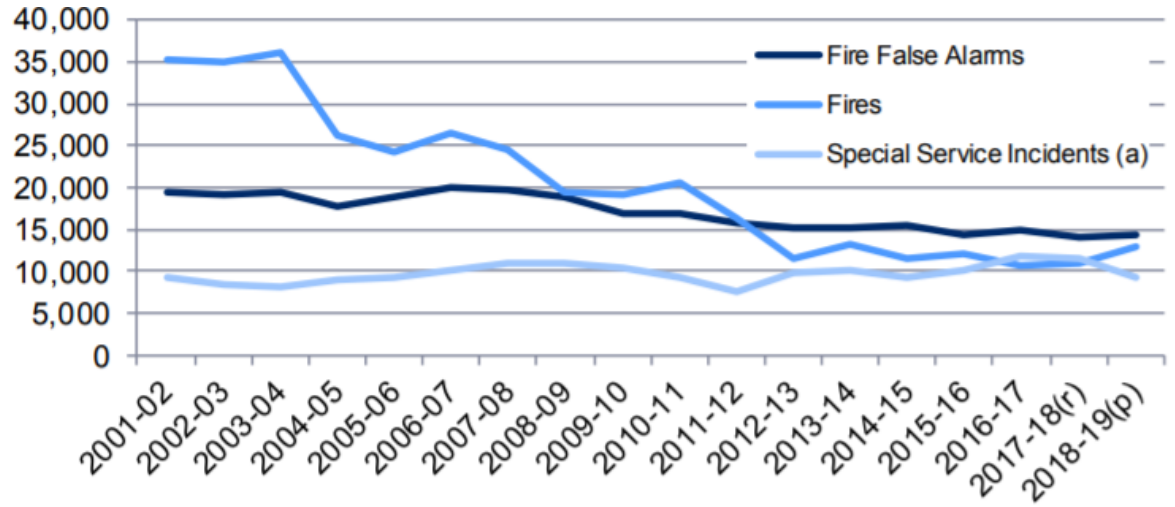
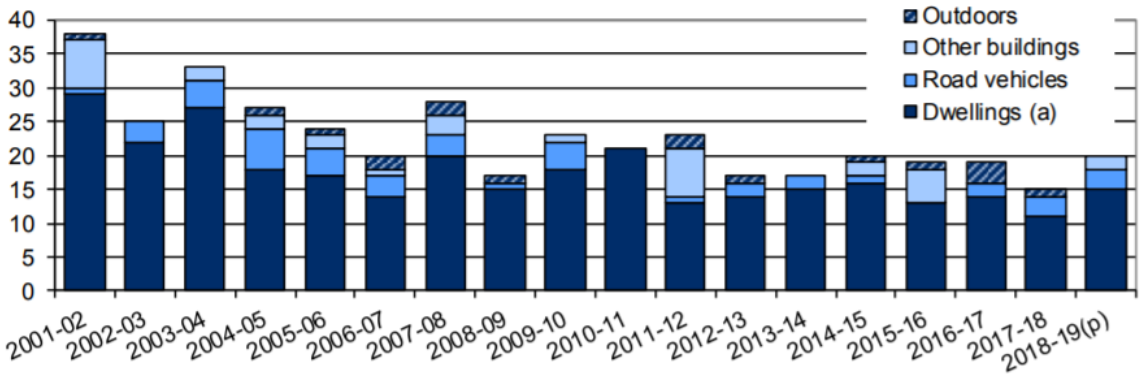


Figure 45 : Number of fire, SSI and fire false alarm attendances [4]



(a) Includes caravans, houseboats and other non-building structures used solely as a permanent dwelling.
(p) Provisional data.

Figure 46 : Number of fatal casualties from fires by location [4]

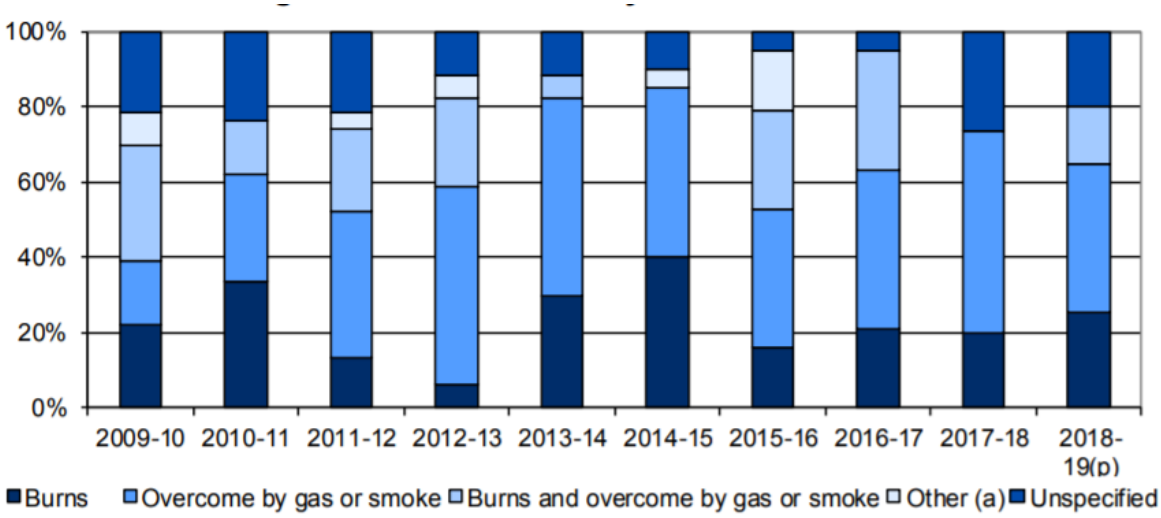


Figure 47 : Percentage of fatal casualties by cause of death [4]

REFERENCES:

[1] Home Office, “Publishing Incident Recording System data on the fire and rescue service at an Incident Level: Dwelling Fires Dataset Guidance,” 2017.
[2] Home Office, “Publishing Incident Recording System data on the fire and rescue service at an incident level: ‘Other building’ fires dataset guidance,” 2017.
[3] Scottish Fire and Rescue Service, “Guidance notes on fire and rescue incident statistics (Scotland) 2018-19,” 2019.
[4] Welsh Government, “Fire and Rescue Incident Statistics 2018-19,” 2019.
[5] Home Office, “Fire and rescue incident statistics. Methodology and quality report.,” 2020.
[6] Welsh Government, “Quality Report for Welsh Fire Statistics,” 2012.
[7] Home Office, “Detailed analysis of fires attended by fire and rescue services. England, April 2018 to March 2019,” 2020.
[8] Scottish Fire and Rescue Service, “Fire and Rescue Incident Statistics (Scotland) 2018-2019,” 2019.

X. DIAGNOSTIC SHEET FOR USA

X1- TERMINOLOGY ISSUES

Information from ISO 17755-1 & -2

The National Fire Incident Reporting System (NFIRS) is based on separate reports on each incident requiring a response by a fire department and each casualty associated with a reported incident. There is a national manual for coding of incidents, overseen by the U.S. Fire Administration, which administers NFIRS.

Fire department participation is voluntary, which means a significant fraction of fire departments do not participate, and some participating fire departments do not report every year. Therefore, NFIRS data is projected using a second database, the NFPA fire experience survey, which is based on summary information reported from a stratified random sample of fire departments. The methods used by most analysts to combine these databases for analysis are documented, but there is no national standard for analysis.

Most reports (60-89%) are completed by firefighters who lack extensive training in fire investigation, but some (11-40%) are completed by professionals with extensive training.

Fires subject to reporting (ISO 17755-1, page 5)
All fires that result in a fire department response should be reported. An unknown number of departments employ truncated/reporting thresholds. These thresholds are determined on a department by department basis.

Fires are categorized for analysis and reporting purposes according to major incident type in the following way:

— Structure fire: includes building fire, fire in structure other than a building, four types of mobile properties used as a fixed structure, such as a manufactured home, and six types of “confined” fires, such as a chimney or flue fire, for which detailed reporting is not required
— Vehicle fire: includes nine categories of vehicles
— Outside rubbish or trash fire: includes six categories of trash fires, which also do not require detailed reporting, including outside trash receptacle and two types of landfills
— Vegetation fire: includes four types of cultivated vegetation and four types of other natural vegetation
— Special outside fire: includes outside storage, outside equipment, outside explosion without sustained fire, outside mailbox, and unclassified special outside fire
— Unclassified (other)

The other database used for calibration does not estimate property damage for non-cultivated natural vegetation, which is a problem for estimates of wildland fire damages.

Fire deaths subject to reporting (ISO 17755-1, page 8)
For United States of America, a fire fatality is “***a person who is killed as a result of a fire, including death from natural or accidental causes sustained while involved in the activities of fire control, attempting rescue, or escaping from the dangers of the fire***”.

Independent of fire incident data collection, a fire related death will be captured when exposure to fire, fire products, or explosion was the underlying cause of death or was a contributing factor in the chain of events leading to death, as reported on the death certificate through vital records reporting channels.

Examples of circumstances that can lead to exclusion of a death, include automobile collision resulting in fire, in which the fire caused death may not be identified as fire deaths. Deaths captured through coroners/vital records reporting channels are dependent upon recording personnel ability to determine original cause of a fire-related condition that contributes to death.

Examples of deaths that may be missed include deaths that occur after the fire incident report is completed – not necessarily just due to extended time lag. Closing the loop between medical and fire reporting systems requires a degree of coordination that does not happen in an unknown number of instances. Although not common, there may be some fire departments that do not report fire deaths on NFIRS records.

Governmental and Non-Governmental Organizations (NGOs) may choose specific ICD-10 codes for inclusion in analysis of vital records data, depending upon the scope of the study. United States Fire Administration (USFA) uses ICD-10 codes F63.1, W39-W40, X00-X09, X75-76, X96-97, Y25-26, and Y35.1 to define fire deaths.

Fire injuries subject to reporting (ISO 17755-1, page 10)
A fire injury is a person who is injured as a result of a fire, including injuries from natural or accidental causes sustained while involved in the activities of fire control, attempting rescue, or escaping from the dangers of the fire.

Injuries are also captured by a sample survey of hospital emergency rooms and reported to the Consumer Product Safety Commission (National Electronic Injury Surveillance System, NEISS).

Fire injuries that occur in a combination of injuries from an overarching event, such as earthquake or automobile accident, may not be recorded as fire injuries, and non-fire injuries in such circumstances may be recorded as fire injuries when they were not fire injuries.

Other injuries that may be missed include injuries discovered after fire department has closed report, injuries masked by pre-existing conditions, and injuries noticed and treated only by the victim. Also, some fire departments may not report fire injuries on NFIRS records, and far more fire injuries occur in (typically small) fires not reported to fire departments than in reported fires.

Reporting on victim characteristics (ISO 17755-1, pages 20-25)
Gender
Age
Race
Ethnicity
Severity
— Minor
— Moderate
— Severe
— Life threatening
— Death
— Undetermined
Cause of injury
— Exposed to fire products
— Exposed to hazardous materials other than smoke
— Jumped in escape attempt
— Fell, slipped or tripped
— Caught or trapped
— Structural collapse
— Struck by or contact with object
— Overexertion or strain
— Multiple causes
— Other (unclassified or unknown type) cause of injury
— Undetermined
Human factor contributing to injury
— Asleep with no known impairment
— Unconscious
— Possibly impaired by alcohol
— Possibly impaired by other drug or chemical

— Possibly mentally disabled
— Physically disabled
— Physically restrained
— Unattended or unsupervised person
— No factor

Factor contributing to injury

— Crowd situation or limited exits
— Mechanical obstacles to exit
— Locked exit or other problem with exit
— Problem with quick-release burglar or security bar
— Burglar or security bar or intrusion barrier
— Window type or size impeded egress
— Other (unclassified or unknown type) egress problem
— Exit blocked by flame
— Exit blocked by smoke
— Vision blocked or impaired by smoke
— Trapped above fire
— Trapped below fire— Other (unclassified or unknown type) fire pattern
— Unfamiliar with exits
— Excessive travel distance to nearest clear exit
— Chose inappropriate exit route
— Re-entered building
— Clothing caught fire while escaping
— Other (unclassified or unknown type) escape
— Roof collapse
— Wall collapse
— Floor collapse
— Other collapse
— Trapped in or by vehicle
— Vehicle collision or rollover
— Other (unclassified or unknown type) vehicle-related factor
— Unvented heating equipment
— Improper use of heating equipment
— Improper use of cooking equipment
— Other (unclassified or unknown type) equipment-related factor
— Clothing burned not while escaping
— Overexertion
— Other (unclassified or unknown type) factor
— No factor

Activity when injured

— Escaping
— Rescue attempt
— Fire control
— Returning to vicinity of fire before control of fire
— Returning to vicinity of fire after control of fire
— Sleeping
— Unable to act
— Irrational act
— Other (unclassified or unknown type) activity
— Undetermined

Location at time of incident

— In area of origin and not involved in starting the fire
— Not in area of origin and not involved in starting the fire
— Not in area of origin and involved in starting the fire
— In area of origin and involved in starting the fire
— Other location
— Undetermined

General location at time of injury

— In area of origin

— In building of origin but not in area of origin
— Outside but not in area of origin
— Undetermined

Specific location at time of injury – Same choices as for Area of Origin of fire

Primary apparent symptom

— Smoke inhalation
— Hazardous fumes inhalation
— Breathing difficulty or shortness of breath
— Burns and smoke inhalation
— Thermal burn only
— Scald burn
— Chemical burn
— Electric burn
— Cut or laceration
— Stab or puncture wound
— Gunshot or projectile wound
— Contusion or bruise
— Abrasion
— Dislocation
— Fracture
— Strain or sprain
— Swelling
— Crushing
— Amputation
— Cardiac symptoms
— Cardiac arrest
— Stroke
— Respiratory arrest
— Chills
— Fever
— Nausea
— Vomiting
— Numbness or tingling
— Paralysis
— Frostbite
— Other (unclassified or unknown type) sickness
— Miscarriage
— Eye trauma or avulsion
— Drowning
— Foreign body obstruction
— Electric shock
— Poison
— Convulsion or seizure
— Internal trauma
— Hemorrhaging
— Disorientation
— Dizziness, fainting, or weakness
— Exhaustion or fatigue
— Heat stroke
— Dehydration
— Allergic reaction
— Drug overdose
— Alcohol impairment
— Emotional stress
— Mental disorder
— Shock
— Unconscious
— Pain only
— Other (unclassified or unknown type) primary apparent symptom

— Undetermined
Primary area of body injured
— Head
— Neck or shoulder
— Thorax
— Abdomen
— Spine
— Upper extremities
— Lower extremities
— Internal
— Multiple body parts
There are additional, more detailed choices for firefighter casualties.

Property damage subject to reporting (ISO 17755-1, page 29)
Rough estimation of the total loss to the structure and contents, in terms of the cost of replacement in like kind and quantity. This estimation includes contents damaged by fire, smoke, water and overhaul.

Data exclude indirect loss, such as business interruption, temporary housing for displaced residents, and loss of use of equipment. Some individual FDs use reporting thresholds based on direct dollar loss. Measures used are:
— Monetary value of loss
— Outdoor area damaged (for example, acres in a wildfire)
— Percentage of total area that was damaged
— Number of buildings, structures or vehicles damaged
— In a structure, qualitative confinement of fire (such as confined to object of origin, confined to room of origin)

Damage not readily apparent at time of investigation/reporting may not be reported. Some damage may be present but not reported by fire departments. Also, there may be some fire departments that do not report direct property damage at all on NFIRS records.

Other losses subject to reporting (ISO 17755-1, page 31)
— Deaths and injuries of firefighters, fire officers, fire brigade personnel, and other emergency responders due to acute fire effects.
— Other fatal or non-fatal injuries or illnesses of firefighters, fire officers, fire brigade personnel, and other emergency responders sustained while on-duty.
— Deaths and injuries… acute fire effects: Scope of NFIRS includes all injuries, deaths, or exposures to fire service personnel, including casualties that occur in conjunction both with incident responses and with non-incident events such as station duties or training; similar scope for NFPA survey.
— All on duty firefighter fatalities are captured in a separate firefighter fatality database maintained by the USFA, which claims essentially 100% coverage of the nation. This includes deaths temporally distant from the original incident.

Note: there are other federal agencies and non-governmental organizations that collect and report various disparate fire loss data, that go beyond the scope of this survey.

Locations of fires based on survey responses (ISO 17755-1, page 32)
— Separate reporting of single family dwellings, buildings with multiple private housing units, and commercial residential properties, such as hotels, dormitories
— All residential properties reported together but distinguished from other buildings
— All buildings with private housing units reported together but distinguished from other buildings.

Specific types of buildings and other structures (residential only) (ISO 17755-1, page 40)
Residential
— One- or two-family dwelling, including manufactured home
— Multi-family dwelling

— Boarding or rooming house
— Hotel or motel
— Residential board and care
— Dormitory
— Sorority or fraternity house
— Barracks
— Other residential

Specific types of rooms and other areas (ISO 17755-1, page 49-51)

Means of Egress
— Hallway or corridor
— Exterior stairway
— Interior stairway
— Escalator
— Lobby
— Other egress/exit

Assembly or Sales Area
— Assembly area with fixed seats for 100 or more people
— Assembly area without fixed seats for 100 or more people
— Assembly area for less than 100 people
— Common room, den, family room, living room, lounge, sitting room
— Sales area or showroom
— Art gallery, exhibit hall, library
— Swimming pool
— Other assembly or sales area

Function Area
— Bedroom for fewer than five people
— Bedroom for five or more people
— Dining room, bar, cafeteria
— Kitchen or cooking area
— Bathroom, checkroom, lavatory, locker room
— Laundry area
— Office
— Personal service area
— Other function area

Technical Processing Area
— Laboratory
— Photography area
— First-aid area
— Operating room
— Computer room
— Performance or stage area
— Projection room
— Processing or manufacturing area
— Other technical processing area

Storage Area
— Storage room, area, tank or bin
— Closet
— Tool or supply storage
— Records storage
— Shipping or receiving area
— Trash chute
— Garage
— Other storage area

Service Area
— Elevator shaft
— Conduit, pipe, utility, or ventilation shaft
— Light shaft
— Laundry or mail chute

— Duct
— Display window
— Conveyor
— Other service area

Service or Equipment Area

— Machinery room or area
— Heating room or area
— Switchgear area or transformer vault
— Incinerator area
— Maintenance shop or area
— Test cell
— Pressurized air enclosure
— Enclosure with enriched oxygen atmosphere
— Other service or equipment area

Structural Area

— Crawl space or substructure area
— Exterior balcony
— Ceiling/floor assembly or space between stories
— Attic or concealed roof/ceiling space
— Wall assembly or concealed wall space
— Exterior wall surface
— Exterior roof surface
— Awning
— Other structural area

Reporting of type of construction (ISO 17755-1, page 53)
No, not included in reporting since 1999. Type of construction was included in fire incident reporting during 1980-1998 with these codes. Definitions are made more specific by reference to the categories of construction defined by model building codes of the time:
— Fire resistive
— Heavy timber
— Protected noncombustible or some type of limited combustible
— Unprotected noncombustible or the other types of limited combustible
— Protected ordinary
— Unprotected ordinary
— Protected wood frame
— Unprotected wood frame
— Unclassified
— Unknown

Reporting of building height and other characteristics (ISO 17755-1, page 54)
— Height of building. Stories at or above grade / Stories below grade
— Level or floor where fire began
— Structure status, such as vacant, under construction, or under demolition.

Reporting and estimation of deliberately-set fires (ISO 17755-1, pages 58-59)
(under Cause of Ignition) reported as “Intentional”.

All four loss measures reported as well as fire department deaths and injuries

Classification as deliberate – some by trained arson investigators, some by fire officers on the scene with no arson training, some by police or other law enforcement personnel (through separate database, Federal Bureau of Investigation’s Uniform Crime Reports), some by insurance investigators or other insurance personnel

Statistical analysis of deliberate fires includes some fires with unknown cause or cause still under investigation

Reporting of fireplay (under Factor Contributing to Ignition) and fires can be categorized as

both intentional and fireplay. Under Human Factor Contributing to Ignition, can check “Age was a factor” and then age of person can be entered but is often left blank.
— Optional Arson Module offers data elements to report on:
— Case status (for example, open, closed, inactive)
— Availability of material first ignited (refers to whether fire-starting materials were available at scene or transported to scene)
— Suspected motivation factors (see details below)
— Apparent group involvement (including gangs, organized crime, hate groups)
— Entry method (how the firesetter entered the property)
— Extent of fire involvement on arrival of fire department
— Type of incendiary device used, if any
— Other investigative information (including code violations, other indicators of vulnerability of property, possible motives for fraud, evidence of other criminal activity on site)
— Property ownership
— Initial observations (including status of doors and windows)
— Laboratory used (for analysis of evidence)
— Characteristics of subject (for juvenile firesetters), including age, gender, race, ethnicity, family type, motivation (see below), disposition of case motivation factors (not limited to juvenile firesetters)
— Extortion
— Labor unrest
— Insurance fraud
— Intimidation
— Void contract or lease
— Personal
— Hate crime
— Institutional
— Societal
— Protest
— Civil unrest
— Fireplay or curiosity
— Vanity or recognition
— Thrills
— Attention or sympathy
— Sexual excitement
— Homicide
— Suicide
— Domestic violence
— Burglary
— Homicide concealment
— Burglary concealment
— Automobile theft concealment
— Destroy records or evidence
— Other suspected motivation
— Unknown motivation
Suspected motivation or risk factors (limited to juvenile firesetters)
— Mild curiosity about fire
— Moderate curiosity about fire
— Extreme curiosity about fire
— Diagnosed or suspected attention deficit (hyperactivity) disorder
— History of trouble outside school
— History of stealing or shoplifting
— History of physically assaulting others
— History of fireplay or firesetting
— Transiency
— Other
— Unknown

Reporting and estimation of natural cause fires (ISO 17755-1, page 61)
Yes, recorded as “Act of nature” under Cause of Ignition.

Also, recorded as any of seven choices under Factor Contributing to Ignition:
— High wind
— Storm
— High water, including floods
— Earthquake
— Volcanic action
— Animal
— “Other” (unclassified or unknown-type) natural condition

Additional details may be provided in the Chemical or Natural Heat Source section under Heat Source:
— Sunlight
— Spontaneous combustion or chemical reaction
— Lightning discharge
— Other static discharge
— Other (unclassified or unknown-type) chemical or natural heat source

“Sunlight” and “lightning discharge” are clearly natural causes and are not identified under any other data element. “Spontaneous combustion or chemical reaction” and “other static discharge” can arise from natural or other causes and so would not be sufficient by themselves to designate a fire as natural, although they would provide additional detail for a fire designated as natural under Cause or Factor Contributing to Ignition.

Reporting and estimation of exposure fires (ISO 17755-1, page 62)
Yes, recorded in three places.
First, can be reported as Exposure Number greater than zero.
Second, can be reported with any of five choices for mechanism of heat transfer from another fire under Heat Source:
— Direct flame or convection currents
— Radiated heat
— Flying brand, ember or spark
— Conducted heat
— Other (unclassified or unknown-type)
Also, recorded as one of the six choices in the Fire Spread or Control section of Factor Contributing to Ignition, but this is difficult to interpret because another of the six choices in the same section is “Other (unclassified or unknown type) fire spread or control” which could mean some exposure fires and some other fires.

Reporting and estimation of smoking material and open flame fires (ISO 17755-1, page 65)
Yes, can be reported with any of five choices for mechanism of heat transfer from another fire in the Other Open Flame or Smoking Materials part of Heat Source:
— Cigarette
— Pipe or cigar
— Undetermined smoking material
— Match
— Lighter
— Candle
— Warning or road flare
— Backfire from internal combustion engine
— Flame or torch used for lighting
— Other (unclassified or unknown type) open flame or smoking material
Also, “hot ember or ash” is a choice under the Hot or Smoldering Object part of Heat Source, as are several unrelated categories, all linked to “other (unclassified or unknown type) hot or smoldering object”. Torches are now choices under Equipment Involved in Ignition, as are “cigarette lighter,” “charcoal or utility lighter” and “novelty lighter”. There are four choices for torches:
— Welding torch
— Cutting torch
— Burner
— Soldering equipment

Reporting and estimation of heating and cooling equipment fires (ISO 17755-1, page 69)
Yes, can be reported with any of 26 choices under Equipment Involved in Ignition:
— Air conditioner
— Heat pump
— Fan
— Humidifier
— Ionizer
— Portable dehumidifier
— Evaporative cooler or cooling tower
— Masonry fireplace
— Factory built fireplace
— Fireplace with insert
— Heating stove
— Chimney or vent connector
— Brick, stone or masonry chimney
— Metal chimney
— Other (unclassified or unknown type) fireplace or chimney
— Local built-in furnace or heating unit
— Furnace or other central heating unit
— Boiler
— Heater, including floor furnace, wall heater and baseboard heater, excluding two types of heaters listed immediately below (also excludes hot water heater)
— Catalytic heater
— Oil-filled heater
— Heat lamp
— Heat tape
— Water heater
— Steam line, heat pipe, or hot air duct
— Unclassified or unknown type heating, ventilation or air conditioning equipment
Other data elements record fuel or power source and portability.
Fires can be reported as any of six specific types of confined fires – for which much less detailed reporting is permitted – and two of the six refer to types of heating equipment (fuel burner or boiler, chimney or flue).

Reporting and estimation of cooking and kitchen equipment fires (ISO 17755-1, page 73)
Yes, can be reported with any of 28 choices under Equipment Involved in Ignition:
— Blender, juicer, food processor or mixer
— Coffee grinder
— Can opener
— Knife
— Knife sharpener
— Coffee maker or teapot
— Food warmer or hot plate
— Kettle
— Popcorn popper
— Pressure cooker or canner
— Slow cooker
— Toaster, toaster oven, or countertop broiler
— Waffle iron or griddle
— Wok, frying pan or skillet
— Bread-making machine
— Deep fryer
— Grill, hibachi or barbecue
— Microwave oven
— Oven or rotisserie
— Range with or without oven
— Steam table or warming drawer or table
— Dishwasher
— Freezer separate from refrigerator
— Garbage disposer

— Grease hood or duct exhaust fan
— Ice maker separate from refrigerator
— Refrigerator or combined refrigerator/freezer
— Unclassified or unknown type kitchen or cooking equipment
Other data elements record fuel or power source and portability.
Fires can be reported as any of six specific types of confined fires – for which much less detailed reporting is permitted – and one of the six refer to types of cooking equipment (cooking vessel).

Reporting and estimation of clothes dryer fires (ISO 17755-1, page 75)
Yes, can be reported with any of 3 choices under Equipment Involved in Ignition, which are linked along with many other choices to a partially specified choice (other (unclassified or unknown type) personal or household equipment):
— Clothes dryer
— Washer/dryer combination
— Washing machine
Other data elements record fuel or power source and portability.

Reporting and estimation of entertainment equipment fires (ISO 17755-1, page 77)
Yes, can be reported with any of 21 choices under Equipment Involved in Ignition, which are linked along with many other choices to a partially specified choice (other (unclassified or unknown type) electronic or other electrical equipment):
— Guitar
— Piano or organ
— Musical synthesizer or keyboard
— Other (unclassified or unknown type) musical instrument
— Audio CD (compact disc) player
— Laser disk player, including DVD player or recorder
— Radio, excluding two-way radios
— Two-way radio
— Record player, phonograph, turntable
— Audio speaker as separate components
— Stereo equipment, including receivers, amplifiers, and equalizers
— Tape recorder or player
— Other (unclassified or unknown type) sound recording or receiving equipment
— Cable converter box
— Film, slider or overhead projector
— Television (TV)
— VCR (video cassette recorder) or VCR-TV combination
— Electronic video game
— Camcorder or video camera
— Photographic camera and equipment
— Other (unclassified or unknown type) video equipment
Other data elements record fuel or power source and portability.

Reporting and estimation of office equipment fires (ISO 17755-1, page 79)
Yes, can be reported with any of 16 choices under Equipment Involved in Ignition, which are linked along with many other choices to a partially specified choice (other (unclassified or unknown type) electronic or other electrical equipment):
— Computer
— External computer storage device, including tape or disk drive
— External computer modem
— Computer monitor
— Computer printer
— Computer projection device, LCD panel, or projector
— Other (unclassified or unknown type) computer device
— Adding machine or calculator
— Telephone or answering machine
— Cash register
— Copier

— Fax machine
— Paper shredder
— Postage or shipping meter equipment
— Typewriter
— Other (unclassified or unknown type) office equipment
Other data elements record fuel or power source and portability.

Reporting of electrical and electrical distribution or lighting equipment fires (ISO 17755-1, pages 83-84)
Yes, **electrical fires** can be reported with any of 8 choices in the Electrical Failure or Malfunction section of Factor Contributing to Ignition:
— Water-caused short circuit arc
— Short circuit arc from mechanical damage
— Short circuit arc from defective or worn insulation
— Unspecified short circuit arc
— Arc from faulty contact or broken conductor
— Arc or spark from operating equipment
— Fluorescent light ballast
— Other (unclassified or unknown type) electrical failure or malfunction
The **nature of the electrical failure** can be inferred to some degree from entries under Heat Source. The following are the eight most frequently reported Heat Source entries for fires reported under Electrical Failure or Malfunction as electrical-failure fires, in U.S. homes:
— Electrical arcing
— Unclassified heat from powered equipment
— Unclassified heat source
— Radiated or conducted heat from operating equipment
— Spark, ember or flame from operating equipment
— Unclassified hot or smoldering object
— Heat or spark from friction
— Molten or hot material
Yes, **electrical distribution or lighting equipment fires** can be reported with any of 40 choices under Equipment Involved in Ignition:
— Electrical power (utility) line
— Electrical service supply wires, from utility pole to meter box
— Electrical meter or meter box
— Electrical wiring from meter box to circuit breaker or fuse box or panel board
— Panel board or switchboard
— Electrical branch circuit wiring or cable
— Outlet or receptacle
— Wall switch
— Ground fault interrupter, portable or plug-in
— Other (unclassified or unknown type) electrical wiring
— Distribution-type transformer
— Overcurrent disconnect equipment
— Low-voltage transformer
— Generator
— Inverter
— Uninterrupted power supply
— Surge protector
— Battery charger or rectifier
— Battery
— Table, floor or desk lamp
— Lantern or flashlight
— Incandescent light fixture
— Fluorescent light fixture or ballast
— Halogen light fixture or lamp
— Sodium or mercury vapor light fixture or lamp
— Portable work or trouble light
— Light bulb

— Other (unclassified or unknown type) lamp or lighting
— Night light
— Decorative light on line voltage
— Decorative or landscape lighting on low voltage
— Sign
— Electric fence
— Traffic control device
— Lightning rod
— Detachable power cord or plug
— Permanently attached appliance power cord or plug
— Extension cord
— Other (unclassified or unknown type) cord or plug
— Other (unclassified or unknown type) electrical distribution, lighting or power transfer Equipment

Reporting of other appliance and equipment fires (ISO 17755-1, pages 87-91)
Yes, can be reported with many choices under Equipment Involved in Ignition, including the following choices that have not been listed under prior entries in this report:
— Power saw
— Power lathe
— Power shaper, router, joiner, planer
— Power cutting tool
— Power drill or screwdriver
— Power sander, grinder, buffer, polisher
— Power hammer
— Power nail gun or stapler
— Other (unclassified or unknown type) power tool
— Paint dipper
— Paint flow coating machine
— Paint mixing machine
— Paint sprayer
— Coating machine
— Other (unclassified or unknown type) painting tool
— Air compressor
— Gas compressor
— Atomizing equipment
— Pump
— Wet/dry vacuum
— Hoist, lift or crane
— Powered jacking equipment
— Drilling machinery or equipment
— Other (unclassified or unknown type) hydraulic equipment
— Heat-treating equipment
— Incinerator (also can be reported separately as a type of confined fire)
— Industrial furnace, oven or kiln
— Tar pot or tar kettle
— Casting, molding or forging equipment
— Distilling equipment
— Digester or reactor
— Extractor or waste recovery machine
— Conveyor
— Power transfer equipment
— Power takeoff
— Powered valves
— Bearing or brake
— Picking, carding, or weaving machine
— Testing equipment
— Gas regulator
— Separate motor
— Internal combustion engine

— Printing press
— Car washing equipment
— Other (unclassified or unknown type) shop tool or industrial equipment
— Dental, medical or other powered bed or chair
— Other dental equipment
— Dialysis equipment
— Medical imaging equipment
— Medical monitoring equipment
— Oxygen administration equipment
— Radiological equipment
— Medical sterilizer
— Therapeutic equipment
— Other (unclassified or unknown type) medical equipment
— Transmitter
— Telephone switching gear
— Television monitor array
— Studio-type television camera
— Studio-type sound recording or modulating equipment
— Radar equipment
— Amusement ride equipment
— Ski lift
— Elevator or lift
— Escalator
— Microfilm or microfiche viewing equipment
— Photo processing equipment
— Vending machine
— Non-video arcade game
— Water fountain or water cooler
— Telescope
— Electron microscope
— Other laboratory equipment
— Other (unclassified or unknown type) commercial or medical equipment
— Combine or threshing machine
— Hay processing equipment
— Farm elevator or conveyor
— Silo loader, unloader, screw/sweep auger
— Feed grinder, mixer, blender
— Milking machine
— Pasteurizer
— Cream separator
— Farm or garden sprayer
— Chain saw
— Weed burner
— Lawn mower
— Lawn or landscape trimmer or edger
— Lawn vacuum
— Leaf blower
— Mulcher, grinder or chipper
— Snow blower or thrower
— Log splitter
— Post hole auger
— Post driver or pile driver
— Tiller or cultivator
— Other (unclassified or unknown type) garden tool or agricultural equipment
— Trash compactor (also can be reported separately as a type of confined fire)
— Hot tub or whirlpool
— Swimming pool equipment
— Other (unclassified or unknown type) floor care equipment
— Electric broom

— Carpet cleaning equipment
— Floor buffer, waxer or cleaner
— Vacuum cleaner
— Comb or hair brush
— Curling iron
— Electrolysis equipment
— Hair curler warmer
— Hair dryer
— Lighted makeup mirror
— Electric razor or shaver
— Sunlamp or suntan equipment
— Electric toothbrush
— Other (unclassified or unknown type) portable appliance designed to produce heat
— Baby bottle warmer
— Electric blanket
— Heating pad
— Clothes steamer
— Clothes iron
— Automatic door opener
— Burglar alarm
— Garage door opener
— Gas detector
— Intercom
— Smoke or heat detector or fire alarm
— Thermostat
— Ashtray
— Fire extinguishing equipment
— Insect trap
— Timer
— Model vehicle
— Powered toy
— Woodburning kit
— Clock
— Gun
— Jewelry-cleaning machine
— Scissors
— Sewing machine
— Shoe polisher
— Non-medical sterilizer
— Other (unclassified or unknown type) personal or household equipment
— Other (unclassified or unknown) equipment
— No equipment
— Undetermined

Other data elements record fuel or power source and portability.
Fires can be reported as any of six specific types of confined fires – for which much less detailed reporting is permitted – and two of the six refer to these other types of equipment (incinerator, commercial compactor).

Reporting of item first ignited in terms of form and function (ISO 17755-1, pages 99-101)
Yes, can be reported with many choices under Item First Ignited:
— Exterior roof covering
— Exterior sidewall covering
— Exterior trim or appurtenance including door or porch
— Floor covering
— Interior wall covering
— Interior ceiling covering
— Structural member or framing
— Thermal or acoustical insulation
— Other (unclassified or unknown type) structural component or finish
— Upholstered furniture

— Non-upholstered chair or bench
— Cabinetry
— Ironing board
— Appliance housing or casing
— Household utensil
— Other (unclassified or unknown type) furniture or utensil
— Mattress or pillow
— Bedding
— Linen other than bedding
— Clothing not on a person
— Clothing on a person
— Curtain, blind, drapery or tapestry
— Fabrics and yard goods
— Luggage
— Other (unclassified or unknown type) soft goods or clothing
— Christmas tree
— Decoration
— Sign
— Chips
— Toy or game
— Awning or canopy
— Tarpaulin or tent
— Other (unclassified or unknown type) adornment or recreational material
— Box or bag
— Raw materials being used to make a product
— Empty pallet or skid
— Cord, rope, twine or yarn
— Packing or wrapping material
— Baled goods or material
— Bulk storage
— Palletized material
— Rolled or wound material
— Other (unclassified or unknown type) storage supplies
— Atomized or vaporized liquid
— Flammable liquid or gas in or escaping from combustion engines
— Flammable liquid or gas in or escaping from final container or pipe before engine or burner
— Flammable liquid or gas in or escaping from container or pipe
— Uncontained flammable liquid or gas
— Pipe, duct, conduit or hose
— Pipe, duct, conduit or hose covering
— Filter
— Other (unclassified or unknown type) liquid, piping or filter
— Agricultural crop
— Light vegetation excluding crop
— Heavy vegetation excluding crop
— Animal, living or dead
— Human, living or dead
— Cooking materials
— Feathers or fur not on a bird or animal but not processed into a product
— Other (unclassified or unknown type) organic material
— Electrical wire or cable insulation
— Transformer or transformer fluid
— Conveyor, drive or V-belt
— Tire
— Railroad tie
— Fence or pole
— Fertilizer
— Pyrotechnics or explosives
— Book

— Magazine, newspaper, writing paper
— Adhesive
— Dust, fiber or lint
— Film or residue
— Rubbish, trash or waste
— Oily rags
— Multiple items first ignited
— Other (unclassified or unknown type) item first ignited
— Undetermined

Reporting of item first ignited in terms of material composition (ISO 17755-1, pages 102-103)
Yes, can be reported with any of many choices under Type of Material First Ignited (reporting not required for organic or general materials):
— Natural gas
— Liquefied petroleum (LP) gas
— Anaesthetic gas
— Acetylene gas
— Hydrogen
— Other (unclassified or unknown type) flammable gas
— Class 1A flammable liquid
— Class 1B flammable liquid excluding gasoline
— Class II combustible liquid
— Gasoline
— Class 1C flammable liquid
— Class IIIA combustible liquid
— Class IIIB combustible liquid
— Other (unclassified or unknown type) flammable or combustible liquid
— Fat or grease
— Non-food grease
— Polish, paraffin or wax
— Adhesive, resin, tar or glue
— Applied paint or varnish
— Combustible metal
— Solid chemical
— Radioactive material
— Other (unclassified or unknown type) volatile solid or chemical
— Wood chips, sawdust or wood shavings
— Round timber
— Sawn wood
— Plastic
— Rubber excluding synthetic rubber
— Cork
— Leather
— Hay or straw
— Grain or natural fiber
— Coal or coke
— Food or starch
— Tobacco
— Other (unclassified or unknown type) natural product
— Plywood
— Fiberboard or particleboard
— Wood pulp
— Paper
— Cardboard
— Other (unclassified or unknown type) wood or paper
— Fabric or fiber excluding fur and silk
— Fur or silk
— Wig
— Human hair

— Plastic-coated fabric
— Other (unclassified or unknown type) fabric, textile or fur
— Linoleum
— Oil cloth
— Asphalt-treated material
— Other (unclassified or unknown type) material compounded with oil
— Multiple types of material
— Other (unclassified or unknown type) type of material
— Undetermined

Reporting of factors in ignition (ISO 17755-1, page 107)
Yes, these are the choices under Factor Contributing to Ignition, excluding those cited earlier:
— Abandoned or discarded material or product
— Heat source too close to combustibles
— Cutting or welding too close to combustibles
— Flammable liquid or gas spilled
— Improper fuelling technique
— Flammable liquid used to kindle fire
— Washing or painting part or material with flammable liquid
— Improper container
— Other (unclassified or unknown type) misuse of product or material (also linked to “playing with fire”)
— Automatic control failure
— Manual control failure
— Leak or break
— Worn out
— Backfire
— Improper fuel used
— Other (unclassified or unknown type) mechanical failure or malfunction
— Design deficiency
— Construction deficiency
— Installation deficiency
— Manufacturing deficiency
— Other (unclassified or unknown type) design, manufacturing or installation deficiency
— Collision, knock down, run over, turn over.
— Accidentally turned on or not turned off
— Equipment unattended
— Equipment overloaded
— Failure to clean
— Improper start-up or shutdown procedure
— Equipment not used for intended purpose
— Equipment not operated properly
— Other (unclassified or unknown type) operational deficiency
— Rekindle
— Outside or open fire for debris or waste disposal
— Outside or open fire for warming or cooking
— Agriculture or land management burn
— Other (unclassified or unknown type) fire spread or control (also linked to exposure fire)
— Other (unclassified or unknown type) factor contributing to ignition

Reporting of factors in fire growth (ISO 17755-1, pages 108-111)
Yes, a data element on Primary Item Contributing to Fire Spread is available with the same choices shown for Item First Ignited.
Also can be reported with any of the many choices under Fire Suppression Factors, shown below.
— Roof collapse
— Roof assembly combustible
— Ceiling collapse
— Holes or openings in walls or ceilings
— Wall collapse
— Difficult to ventilate

— Combustible interior finish
— Balloon construction
— Internal arrangement of partitions
— Internal arrangement of stock or contents
— Floor collapse
— Lack of fire barrier walls or doors
— Transoms
— Attic undivided
— Insulation combustible
— Stairwell not enclosed
— Elevator shaft
— Dumbwaiter
— Vertical duct
— Rubbish or laundry chute
— Supports unprotected
— Composite plywood I-beam construction
— Composite roof/floor sheathing construction
— Wood truss construction
— Metal truss construction
— Bars on windows or other fixed burglar protection assemblies
— Quick release failure of bars on windows or doors
— Previously damaged by fire
— Other (unclassified or unknown type) building construction or design
— Door left open or outside door unsecured
— Fire door blocked or did not close properly
— Violation of applicable or locally adopted fire, building or life safety code
— Illegal or clandestine drug operation
— Intoxication by alcohol or other drugs
— Riot or civil disturbance
— Person interfered with operation
— Accelerant used
— Other (unclassified or unknown type) act or omission
— Aisle blocked or improper width
— Significant and unusual fuel load from structure components
— Significant and unusual fuel load from contents of structure
— Significant and unusual fuel load outside from natural environment conditions
— Significant and unusual fuel load from man-made condition
— Improper storage
— Radiological hazard on-site
— Biological hazard on-site
— Cryogenic hazard on-site
— Hazardous chemical, corrosive material or oxidizer
— Flammable or combustible liquid hazard
— Explosives hazard present
— Decorations
— Natural or other lighter-than-air gas present
— Liquefied petroleum (LP) or other heavier-than-air gas present
— Combustible storage extending more than 12 feet above ground
— High rack storage
— Other (unclassified or unknown type) on-site materials
— Delayed detection of fire
— Delayed reporting of fire
— Alarm system malfunction
— Alarm system shut off for valid reason
— Alarm system inappropriately shut off
— Unable to contact fire department
— Information incomplete or incorrect
— Communications problem
— Blocked or obstructed roadway

— Poor or no access for fire department apparatus
— Traffic delay
— Trouble finding location
— Size, height or other building characteristic delayed access to fire
— Power lines down or arcing
— Poor access for firefighters
— Secured area
— Guard dog
— Aggressive animal excluding guard dog
— Suppression delayed due to evaluation of hazardous or unknown materials at incident scene
— Locked or jammed door
— Apparatus failure before arrival at incident
— Hydrant inoperative
— Air space restriction
— Military activity
— Closest apparatus unavailable
— Other (unclassified or unknown cause) delay
— Automatic fire suppression system problem
— Automatic sprinkler or standpipe connection problem
— Water supply (private) inadequate
— Water supply (public) inadequate
— Electrical power outage
— Delayed reporting of fire
— Alarm system malfunction
— Alarm system shut off for valid reason
— Alarm system inappropriately shut off
— Unable to contact fire department
— Information incomplete or incorrect
— Communications problem
— Blocked or obstructed roadway
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— Other (unclassified or unknown cause) delay
— Automatic fire suppression system problem
— Automatic sprinkler or standpipe connection problem
— Water supply (private) inadequate
— Water supply (public) inadequate
— Electrical power outage

Presence and type of sprinkler or other extinguishing equipment (ISO 17755-1, page 114)

Presence; only one system can be reported.

— Present
— Partial
— None present
— Undetermined

Type of system; choose the system present in the area of fire origin, and if there are multiple systems in the area, choose the system designed to protect the hazard where the fire started:
— Wet-pipe sprinkler system
— Dry-pipe sprinkler system
— Other sprinkler system (including deluge or pre-action sprinkler system)
— Dry chemical system
— Foam system
— Halogen-type system (including nonhalogenated systems that operate on same principle)
— Carbon dioxide system
— Other special hazard system
— Undetermined

Performance of sprinkler or other extinguishing equipment (ISO 17755-1, page 116)
Operation of system
— Operated and was effective
— Operated and was not effective
— Fire too small to activate system
— System did not operate
— Other operation
— Undetermined
Number of sprinkler heads operating.
Reason for system failure [or ineffectiveness]
— System shut off
— Not enough agent discharged to control the fire
— Agent discharged, but did not reach the fire
— Inappropriate system for the type of fire
— Fire not in area protected by the system
— System components damaged
— Lack of maintenance, including corrosion or heads painted
— Manual intervention defeated the system
— Other reason system not effective
— Undetermined

Presence and type of detection or alarm equipment (ISO 17755-1, page 120)
Yes, included in reporting.
Presence within designed range of fire; only one system can be reported.
— Present
— None present
— Undetermined
Type of detector; choose the system present in the area of fire origin:
— Smoke detector
— Heat detector
— Combination smoke and heat detector in a single unit
— Sprinkler, water flow detection
— More than one type present
— Other detector type
— Undetermined
Detector power supply:
— Battery only
— Hardwire only
— Plug-in
— Hardwire with battery backup
— Plug-in with battery backup
— Mechanical, including spring-wound, stored pressure source
— Multiple detectors and power supplies
— Other detector power supply
— Undetermined

Performance of detection or alarm equipment (ISO 17755-1, page 124)

Operation

— Fire too small to activate detector
— Detector operated
— Detector failed to operate
— Undetermined

Effectiveness.

— Detector alerted occupants, occupants responded
— Detector alerted occupants, occupants failed to respond
— There were no occupants
— Detector failed to alert occupants
— Undetermined

For confined fires, where reduced reporting is permitted, there is a mandatory question that covers some of this information

— Detector alerted occupants
— Detector failed to alert occupants
— Unknown

Reason for system failure [or ineffectiveness]

— Power failure or hardwired detector shut off or disconnected
— Improper installation or placement of detector
— Defective detector
— Lack of maintenance, including not cleaning
— Battery missing or disconnected
— Battery discharged or dead
— Other detector failure reason
— Undetermined

Presence of extinguishers or other manual extinguishing equipment (ISO 17755-1, page 126)
No, not included in reporting.

Presence of smoke management or control equipment by country (ISO 17755-1, page 127)
No, not included in reporting.

Reporting on fire doors, fire walls and other compartmentation (ISO 17755-1, page 129)
No, not included in reporting since 1999. During 1980-1983, the USA used codes similar to those still used in Canada. Some of those codes were used until 1998.

References of existing database/studies

"Conquering the Unknowns" (2014). Report by the National Association of State Fire Marshals Fire Research and Education Foundation.

Butry, DT, Thomas, DS. (2012). Evaluating Potential Bias in Non-Randomly Reported Fire Incident Data. National Institute for Standards and Technology. Technical Note 1770. https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=912210

Anderson, A, Ezekoye O. (2017). Exploration of NFIRS Protected Populations Using Geocoded Fire Incidents. *Fire Technology*. https://i-psdi.org/assets/research/exploration-of-nfirs-protected-populations-using-geocoded-fire-incidents.pdf

United States Fire Administration. (2017). Review and Assessment of Data Quality in the National Fire Incident Reporting System. https://www.usfa.fema.gov/downloads/pdf/publications/nfirs_data_quality_report.pdf

NFPA 901, Standard Classifications for Incident Reporting and Fire Protection Data www.nfpa.org/901

Summaries of existing database

The National Fire Incident Reporting System (NFIRS) relies upon local fire departments to collect and submit data to state fire protection agencies or through their server partitions. Data is then processed by the state agencies and submitted or released to the National Fire Data Center. NFIRS was created following the publication of *America Burning* in 1973 by the National Commission on Fire Prevention and Control. This report culminated in the passage of the Federal Fire Prevention and Control Act of 1974, which authorized the USFA to gather and analyze information on the magnitude of the nation's fire problem, as well as its detailed characteristics and trends. NFIRS has been through several iterations since its initial release. USFA has developed a standard data collection package that includes separate forms for incidents and casualties (fatal and non-fatal, firefighters and civilians), a coding structure for data processing purposes, reference guides, computer software and procedures, documentation and a National Fire Academy training course for utilizing the system. While reporting is voluntary at the federal level, different states have different reporting requirements, ranging from mandatory for all incidents to completely voluntary.

Existing definitions

A data dictionary with a list of definitions is available here.

Are there differences within the same country?

Incident reports and data elements are standardized. Completeness of data entered into incident reports may vary by locality.

There are differences in interpretation. "Burnt food" may be considered a fire, excessive heat, a smoke scare, or a false alarm. The data dictionary is used in software but lacks detail found in the is used in software but lacks detail found in the *NFIRS 5.0 Complete Reference Guide* See

- https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Emergency-responders/osNFIRSIncidentType.ashx?la=en
- https://www.usfa.fema.gov/downloads/xls/NFIRS_Spec_Tables_2013.xls
- https://www.usfa.fema.gov/downloads/pdf/nfirs/NFIRS_Complete_Reference_Guide_2015.pdf

It appears that career firefighters are more likely to document firefighter injuries.

Many non-fatal civilian injuries are not captured by the fire service. See CSPC's 2005 analysis, *Estimates of Fire Injuries Treated in Hospital Emergency Departments* by David Miller at: https://www.cpsc.gov/s3fs-public/pdfs/neissfire.pdf . He found that an estimated 21,174 of 48.202 civilian non-arson fire injuries resulted from residential or consumer-product fires attended by fire departments from July 1, 2002 to June 30, 2003. NFPA estimated totals of 18,425 civilian injuries in 2002, and 18,125 in 2003, including injuries caused by arson. Some of the injured may have left the scene before the fire department arrived or been transported by a non-fire department organization.

Are there differences and contradictions with other domains?

There are no differences within NFIRS domains. However, there are some differences with the ICD-10 coding of death certificates. For instance, NFPA counted the fatalities in the World Trade Center and Pentagon attacks as fire deaths, The death certificates called them terrorism. It can also be unclear to determine when vehicle fire deaths should be counted as transportation events rather than fires in the ICD-10 codes.

Small fires that did not require suppression but result in death – such as fatal burns caused by smoking while on oxygen -- may be considered EMS and not fire deaths based on the responder. , who may be emergency medical crews not affiliated with the fire department.

NFPA's estimates of fire deaths derived from our fire department experience survey seem close to fire death data. See pages 7-8 of NFPA's 2019 report, *US Fire Death Rates by State* at: http://www.nfpa.org//-/media/Files/News-and-Research/Fire-statistics-and-reports/US-Fire-Problem/osstate.pdf

Identification of missing information

Missing data is a long-established problem with NFIRS. Undetermined or missing information on fire cause is a particular concern and is seen to be especially prevalent in the case of more serious fires, as indicated in a 2014 report by the National Association of State Fire Marshals Fire Research and Education Foundation.

Some jurisdictions refuse to report dollar loss. Some have policies that require causal information to be reported as undetermined when fires are referred for investigation.

To make it easier for firefighters, information about causal factors and details on fire protection are not required for six types of structure fires, collectively called confined fires. These include: confined cooking fires, confined chimney or flue fires, confined fuel burner or boiler fires (mostly oil burner blowbacks), confined compactor fires, confined incinerator fires, and rubbish trash fires in or on a structure that did not extend to the structure or other contents. The type of material first ignited is not required for certain types of items first ignited, such as cooking materials, including food, dust, electrical wire, etc.

Some data elements were left optional. "None" is a choice in some data elements such as factor contributing to ignition and equipment involved in ignition that can seem like an easy out.

NFPA's Fire Experience Survey uses population and survey data to get big picture estimates that include fires reported to local fire departments but not in NFIRS.

USFA has been exploring the possibility of using more in-depth analysis of NFIRS to identify and compensate for unreported fires. See the 2017 white paper, National Fire Estimation Using NFIRS Data at https://www.hsdl.org/?view&did=828558.

X2. STATISTICS COLLECTION ISSUES

Fire department responsibilities

Fire departments are responsible for entering data with key details from the incidents for which they are dispatched, which include not only fires, but also emergency medical services, severe weather and natural disasters, and other incidents. Separate reports are filed for incidents and, if applicable, casualties (fatal and non-fatal). Firefighter casualties and civilian casualties utilize separate reports.

Fire response organisation

Municipal fire departments (volunteer, career, and mix) participate. Department of Defense also participates, but their data is not publicly released. NFIRS and NFPA estimated generally do not include data from federal or state firefighting organizations or industrial fire brigades.

Who collects data?

Fire departments are responsible for collecting data on calls that they respond to. In addition to fires, they include reports for emergency medical services, vehicle accidents, weather or natural disasters, and hazardous conditions. Incident reports of firefighter injuries include injuries during incident responses as well as non-incident events.

Police provide some data on arson and arson arrests to Federal Bureau of Investigation's (FBI's) Uniform Crime Reporting System. https://www.fbi.gov/services/cjis/ucr

Fire investigators can provide data to the Alcohol, Tobacco and Fire Arms' (ATf's) Bomb Arson Tracking System and use its case management features. See https://www.atf.gov/explosives/bomb-arson-tracking-system-bats. ATF also participates in some investigations.

The Chemical Safety Board investigates incidents involving chemicals. See https://www.csb.gov/about-the-csb/

The US Consumer Product Safety Commission's (CPSC's) National Electronic injury Surveillance System (NEISS) collects data from a sample of hospital emergency departments about injuries caused by consumer products, and records if fire was involved and if the fire department attended. See https://www.cpsc.gov/Research--Statistics/NEISS-Injury-Data

NEISS collects less information is collected when a consumer product was *not* involved. Fires or burns are grouped together are grouped together in a database of non-fatal injuries. See: https://www.cdc.gov/injury/wisqars/nonfatal.html

The National Center for Health Statistics collects vital statistics, including death certificates. These may be accessed at https://www.cdc.gov/injury/wisqars/fatal.html.

NFPA collects summary data from a subset of local fire departments to estimate fires, civilian deaths and injuries, firefighter injuries and direct property damage from fire by broad incident type and property class through its fire experience survey (FES). Surveys are sent to all departments protecting at least 5,000 and a random sample of departments from less populated areas.

Who issues the data?

State programs at the state level. The United States Fire Administration provides the national database to interested parties. Narratives are not included in the public data release.

NFPA, USFA, and CPSC all release some type of national estimates of the fire problem with CPSC focusing on residential fire losses.

Are there different levels of collection?

Data at the state level includes data submitted by local fire departments. National data includes data on all incidents submitted by state agencies. Local fire departments may analyse their own data. NFPA, CPSC, USFA, consulting firms, students, etc. analyse the data

Identify disparities in data feedback

Since data is collected at local levels -- which vary by resources, staffing, and leadership – there are substantial opportunities for disparities between jurisdictions related to the completeness and accuracy of data. Different fire departments and states provide different levels of quality control.

Where is the data stored?

State agencies house information submitted by local fire departments on their systems or in partitions on the federal server, or some combination of the two. The National Fire Data Center is the custodian of data at the national level.

X3. STATISTICS INTERPRETATION ISSUES

Who is interpreting the statistics?

Each organization determines their approach to handling unknowns (and deciding what should be classified as unknown) and deciding how to group things.

Purpose for which data is collected

NFIRS data may be used by fire prevention and public education programs to target at- risk groups or to address critical problems, fire officials use the data in decision making that affects the allocation of firefighting resources, and consumer groups and litigators may use the data to assess product fire incidence. The NFIRS report may stand as the public record of an event. Engineers use it for modeling. Policymakers and administrators may use data to justify budgets and or support legislation related to fire issues. Regulators may use it in the evaluation of performance-based designs. Media uses it for context,

What are the methods used to fill the gaps where information is missing?

USFA seeks to accommodate missing information by including an “undetermined” option for many data elements and encouraging fire departments to update reports if and when a determination is made. In practice, however, information appears to be rarely updated once the undetermined selection is made. USFA does not make post-hoc statistical adjustments to its data in order to account for data gaps. The National Fire Protection Association, which uses NFIRS data in its own analyses, does apply a “scaling factor” in order to compensate for fires reported to fire departments but not to NFIRS, and allocate unknown values proportionally among known values. USFA uses a cause hierarchy of multiple data elements. If a fire does not “fit” anywhere, it is considered unknown. While NFPA allocates unknowns separately for each data element, USFA allocates only those that make it through the hierarchy\. NFPA also allocates unknowns when sufficient data are provided for optional data elements.

Is there follow up to data collected ?

State program managers are responsible for cleaning data and reconciling inconsistencies prior to submission to the national level. Although causal information for incidents under investigation can be updated once an investigation is complete, this is frequently not done. While local records can be updated at any time, once the federal database is released, updates will not be incorporated

Analyse potential cause and consequences in trends

Data indicate that fires and losses in the U.S. have dropped dramatically since the early 1970s. Undoubtedly a number of factors play a role in this decline, but education, the adoption of more stringent fire codes, and increased use of fire detection are key factors. The recognition of fires as a serious problem in need of intervention and the introduction of NFIRS in the 1970s as a way to document where problems lay and solutions might be targeted must certainly be recognized as a vehicle for reducing the threat of fire.

X4. ANALYSE EXISTING DATA

Determining the level of confidence

USFA reports that approximately 75 percent of fires reported in the U.S. are included in the NFIRS database. More than 24,000 fire departments participated in NFIRS in 2018. In addition, 38 fire departments representing protected populations of more than 500,000 residents participate in NFIRS. Because NFIRS was not designed as a statistical sample, it is hard to determine levels of confidence. In addition, tensions exist between fire authority needs and NFIRS guidelines. For example, NFIRS has advised fire departments not to use NFIRS to report fatal fires if the fire department did not respond to them. See: usfa.fema.gov/data/nfirs/support/nfirsgrams/nfirsgram_reporting_deaths_no_response.html.

However, a state may wish to have all of the fire deaths in their NFIRS database for analysis.

Little attention has been paid to the reliability of the data. It is clear that many firefighters who are doing their best to complete the reports disagree about how the reports should be coded.

A study of representativeness relating NFIRS to NFPA's FES was published in 2011, See: reginfo.gov/public/do/DownloadDocument?objectID=53926600

Pinpointing issues and limitations

- The United States Fire Administration places a heavy reliance upon states as cooperative partners in administering the NFIRS program. USFA shoulders significant developmental costs and responsibilities, but much of the cost burden for NFIRS is carried by the states. No federal funding is provided to states for personnel, and USFA provides no guidelines for the staffing of state NFIRS programs. Consequently, the levels and form of staffing and the resources available to NFIRS programs varies from state to state. Staffing for better-resourced state NFIRS programs may include multiple administrative, research, and support staff. Other states with fewer resources may rely upon a single person. Some state programs include full-time research analysts, while others rely upon administrators, information technology staff, or investigators to run their programs, often on a part-time basis.

  Resource disparities also influence the level and sophistication of the technology utilized by state NFIRS programs. USFA provides basic – but not particularly sophisticated – software to states at no cost, but individual fire departments or states can choose their own software. Some state programs provide licenses to a specific software vendor, and large fire departments may have software integrated with computer assisted dispatch in custom systems. The variety of systems within and between states makes it difficult to introduce changes in the NFIRS system. In addition, because USFA is within the U.S. Department of Homeland Security, security requirements also complicate the introduction of changes and makes them more expensive.

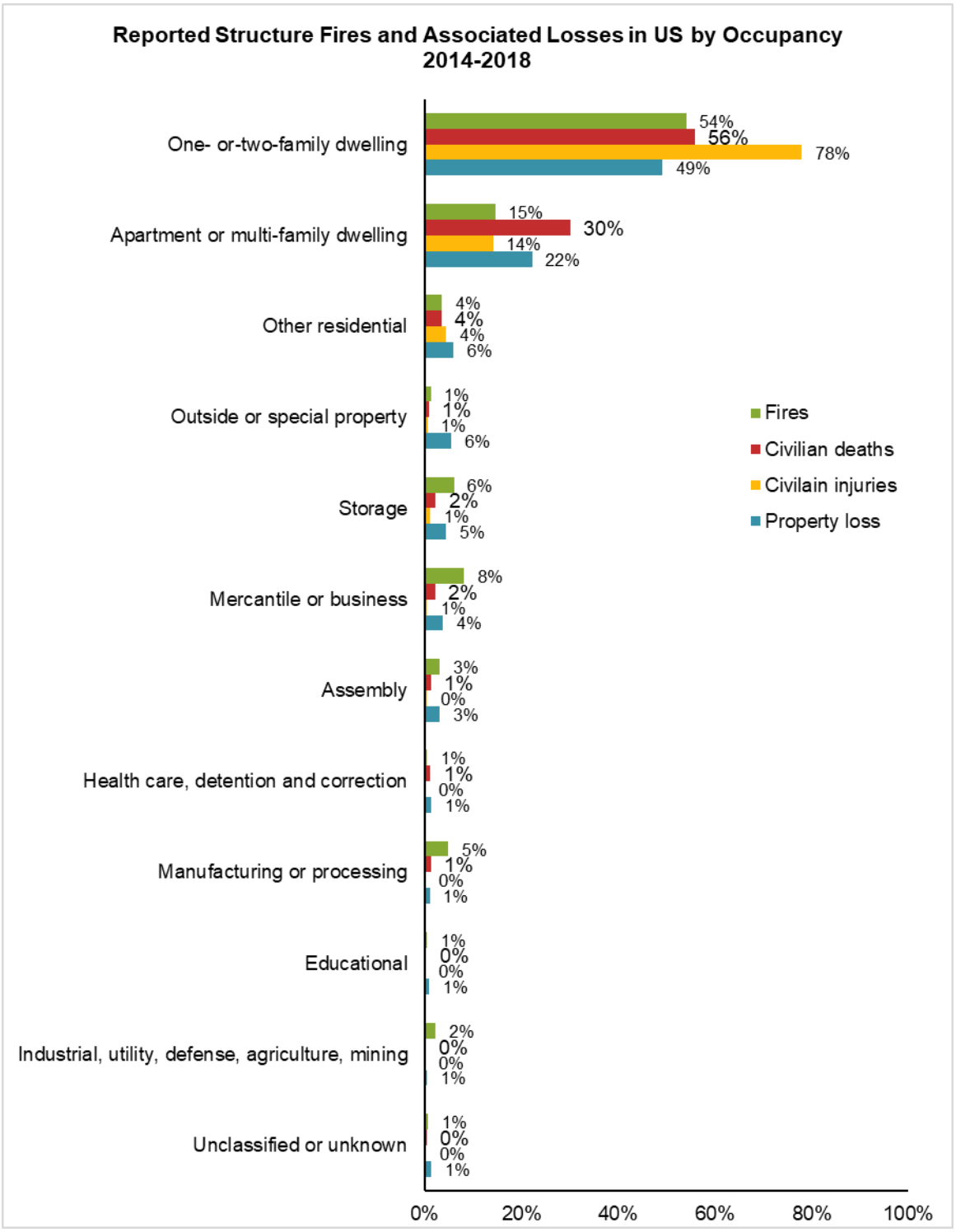
  It is also important to recognize that funding at both federal and state levels is subject to the vicissitudes of both the policy environment and economic conditions, making the sustainability and consistency of support for NFIRS a potential ongoing challenge.

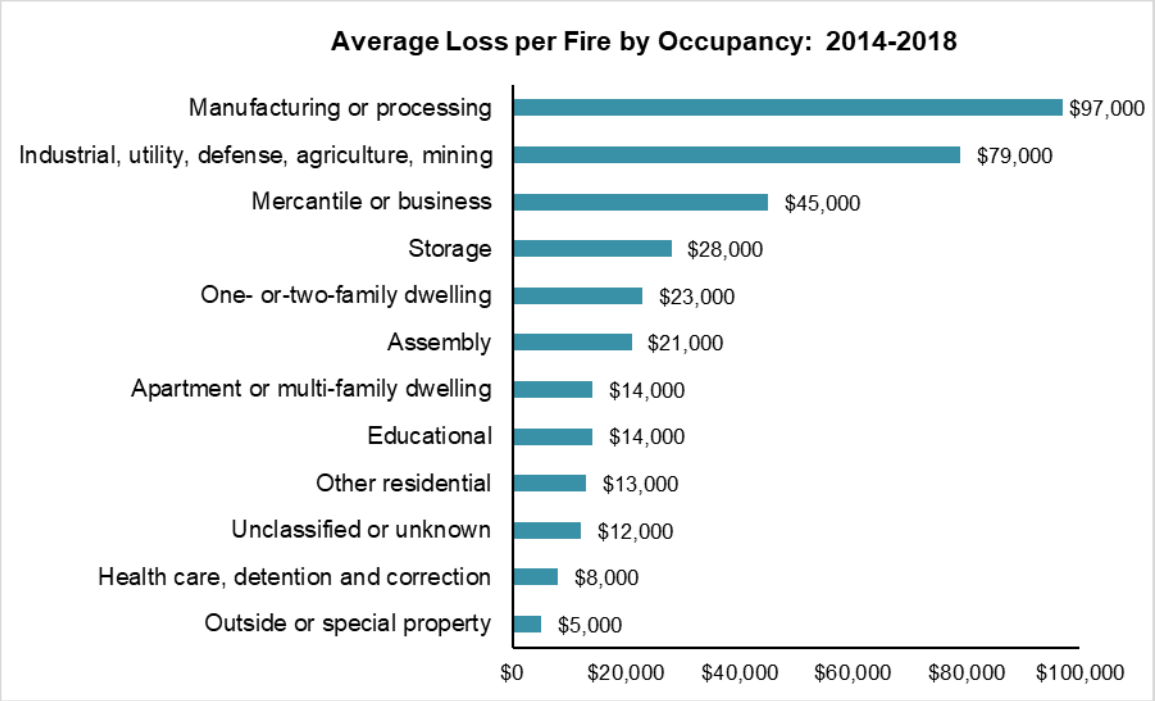
- As indicated, missing data is a serious issue which compromises data quality. The reliance on firefighters as primary data collectors is a recognized barrier inasmuch as firefighters are not trained researchers and have substantial responsibilities that can diminish attention to data collection and reporting. Liability concerns can also discourage complete reporting of information. Funding and resource limitations can undermine support for data collection, including participation in training and access to computer and software support. Another issue with respect to the completeness and accuracy of reporting is that NFIRS codes are seen to be overly complex, resulting in frustration that can deter reporting.

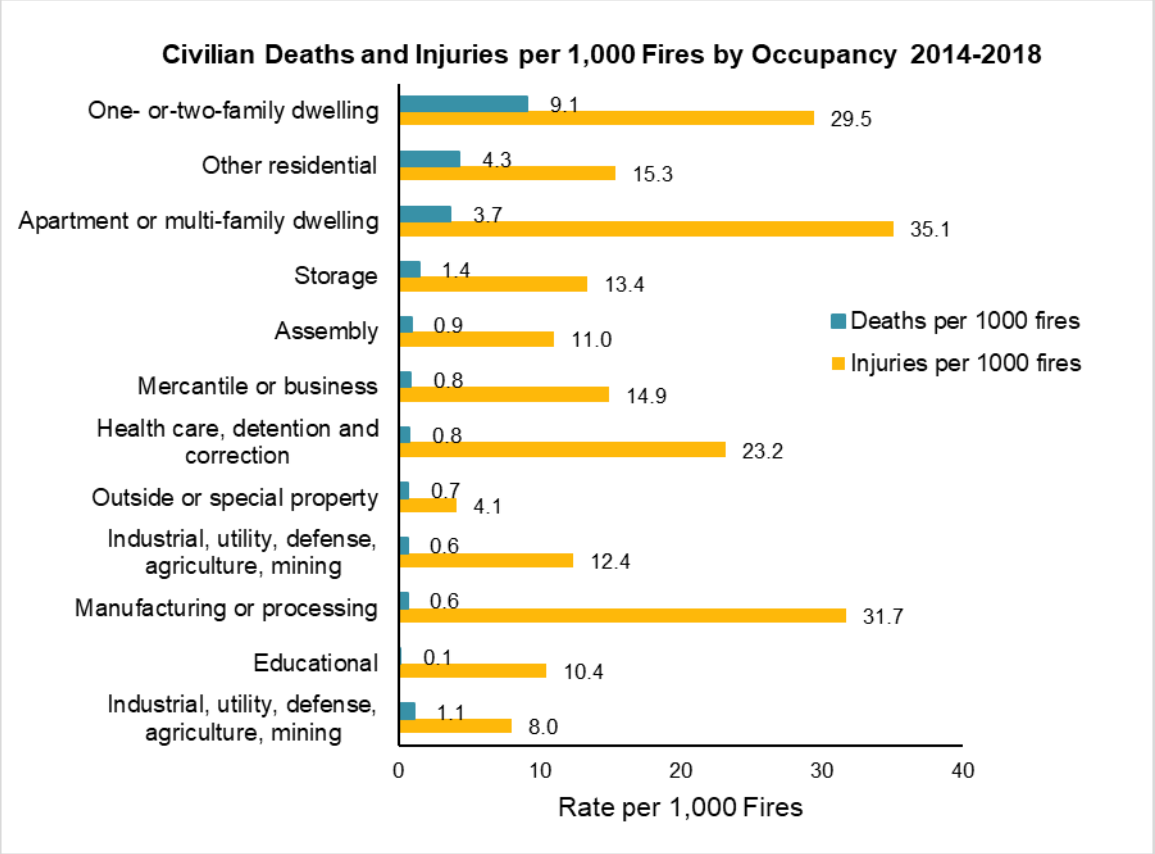
  Efforts to improve quality of data with new relational edits have at times had unintended consequences. For example, requiring a valid equipment involved in ignition when heat source or factor contributing to ignition resulted in more unknowns in those fields. This edit was later removed.

Because the list of code choices is so long for many data elements, many fire departments use cheat sheets with the most commonly used code choices. More rarely used codes may be completely forgotten.

Examples

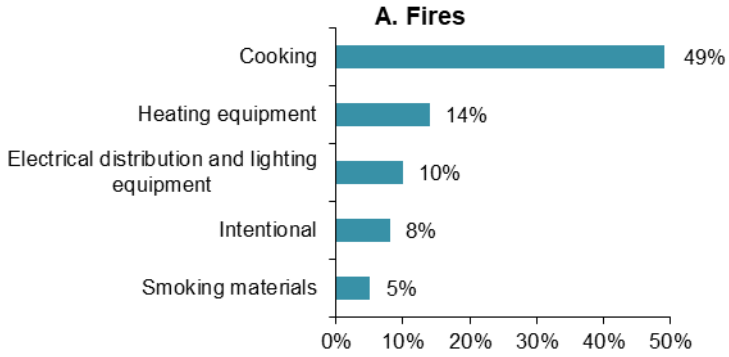


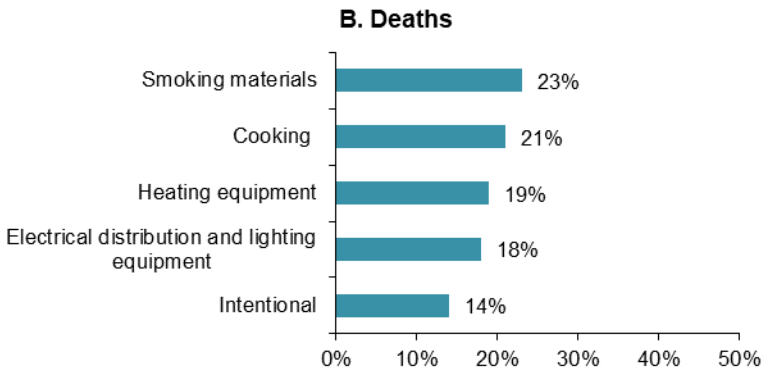


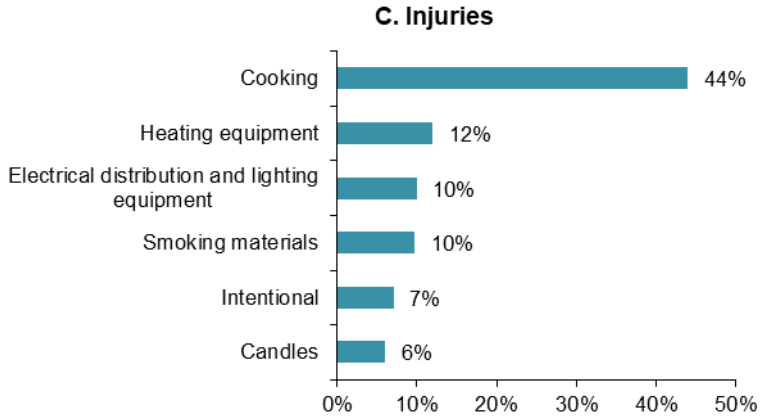


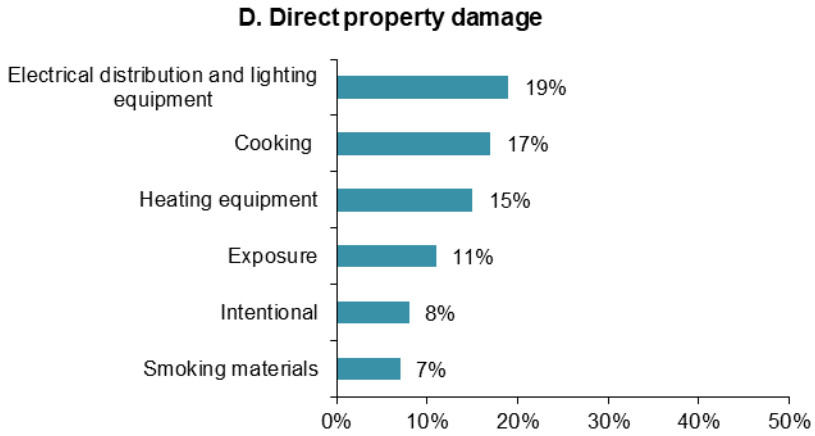
Key Findings from NFPA's Fire Experience Survey (https://www.nfpa.org//-/media/Files/News-and-Research/Fire-statistics-and-reports/US-Fire-Problem/osFireLoss.pdf):
In 2019, local fire departments responded to an estimated 1.3 million fires. These fires caused roughly 3,700 civilian fire deaths and 16,600 reported civilian fire injuries. Property damage was estimated at $14.8 billion.

Key Findings from NFPA Home Structure Fire Report:
During 2014 - 2018, US fire departments responded to an estimated average of 353,100 home structure fires per year. These fires caused an annual average of 2,620 civilian deaths, 11,030 civilian fire injuries, and $7.2 billion in direct property damage.
Sixty-nine percent of reported home fires in 2014–2018 were in one- or two-family homes, including manufactured homes. These fires caused 85 percent of home fire deaths, 65 percent of home fire injuries, and 79 percent of the direct property damage from home fires.
Most home fires and fire casualties result from five causes: cooking, heating equipment, electrical distribution and lighting equipment, intentional fire setting, and smoking materials. Over the five-year period of 2014–2018 as a whole, cooking was the leading cause of home fires and home fire injuries, while smoking was the leading cause of home fire deaths.
Leading causes of home structure fires: 2014–2018









Key Findings from NFPA Fires in Structures under Construction or undergoing Major Renovation report (https://www.nfpa.org/News-and-Research/Data-research-and-tools/Building-and-Life-Safety/Fires-in-Structures-Under-Construction-or-Renovation):
Local fire departments responded to an estimated average of 3,840 fires in structures under construction and 2,580 fires in structures under major renovation per year in 2013-2017. The fires in structures under construction caused an average of four civilian deaths, 49 civilian injuries, and $304 million in direct property damage annually, while those in structures under major renovation caused averages of eight civilian deaths, 52 civilian injuries, and $104 million in direct property damage annually.