



WHAT DO WE KNOW?

Vision 20/20 Model Performance in Community Risk Reduction

February 2020 | Marty Ahrens | Fire Analysis Research Manager

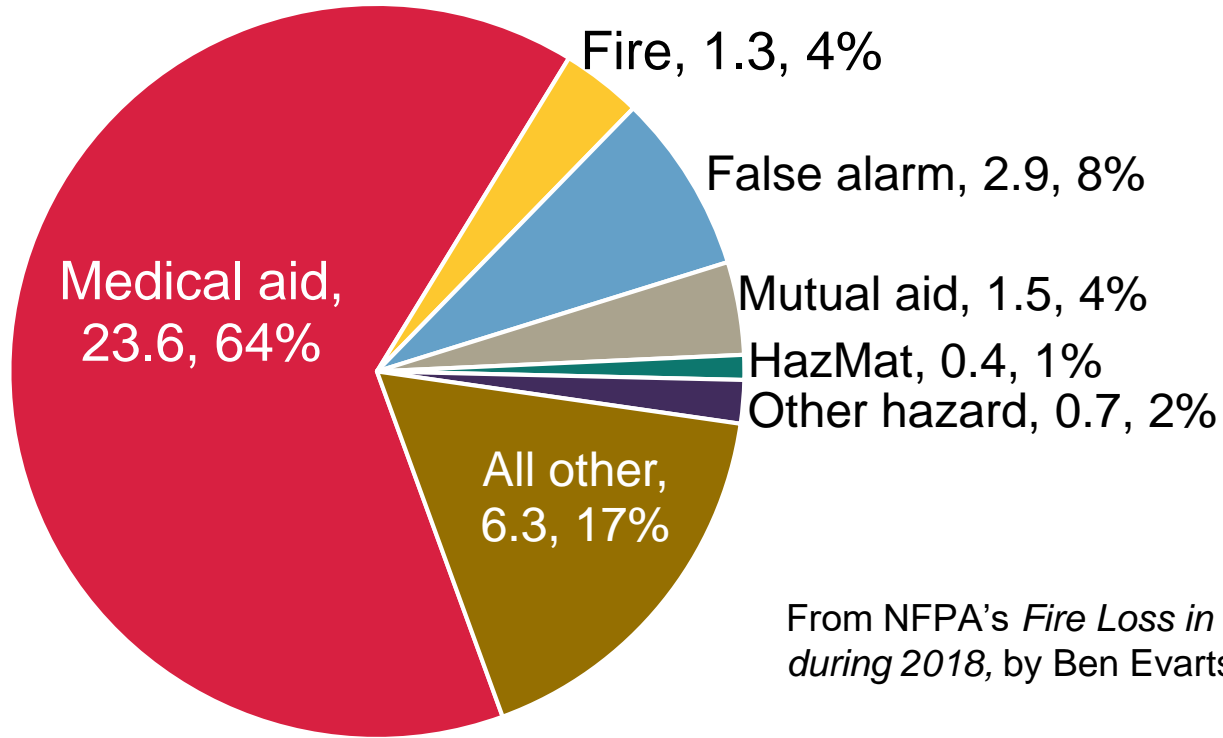
Overview

- Fire department responses
- Home structure fires
- Other types of FD calls
 - Brush, grass and forest fires
 - Carbon monoxide incidents
 - Vacant building fires
- Leading causes of fatal and non-fatal injuries
- RE-AIM evaluation framework

Presentation at [nfpa.org/CRR](https://www.nfpa.org/CRR)

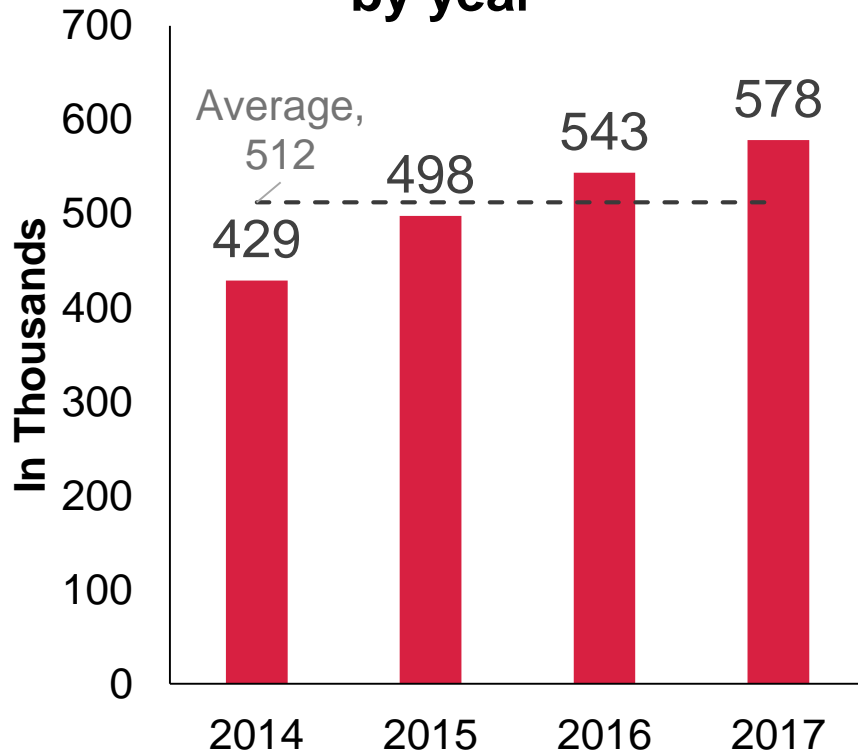


Local FD responses (in millions): 2018



From NFPA's *Fire Loss in the United States during 2018*, by Ben Evarts

“Assist invalid” FD calls by year



Assist invalid calls

- Fire departments respond to more assist invalid calls than structure fires in recent years
 - *What do we know about these situations?*
 - *Is there a prevention opportunity?*

Source: National estimates based on NFIRS and NFPA's fire experience survey

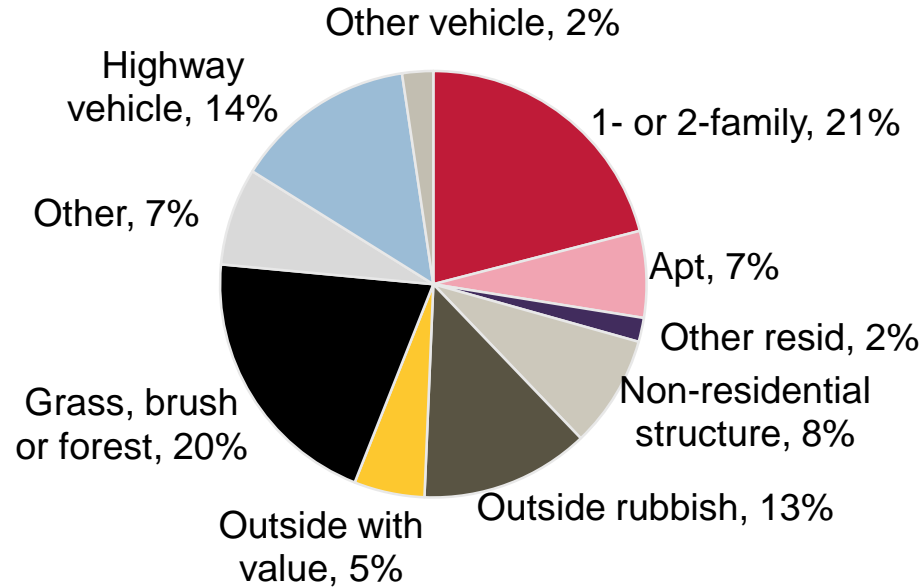


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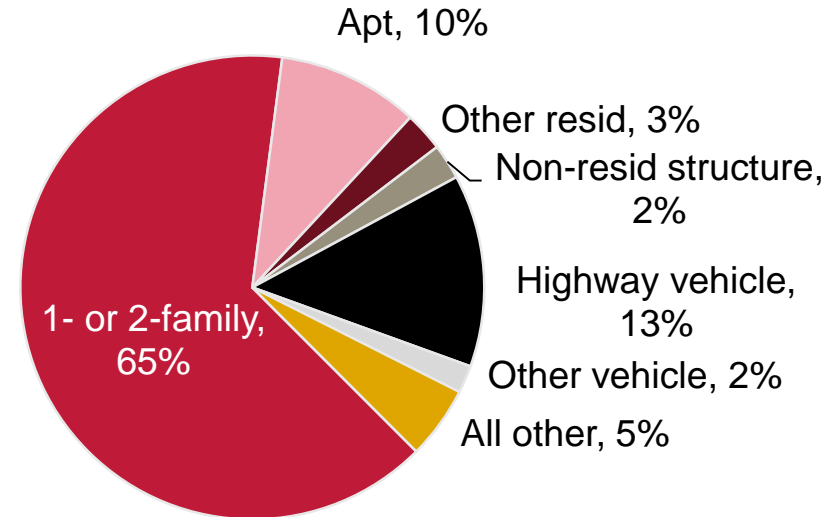
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Reported fires in 2018 by major property class or incident type

Fires



Civilian Deaths



Home structure fires

Home structure fires in 2013-2017

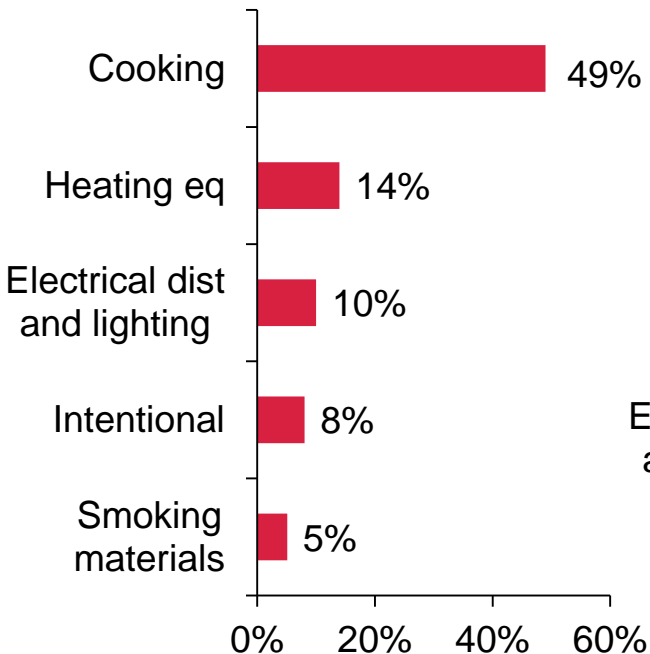
- Average of 354,400 reported fires per year in 2013-2017
 - Average of 2,620 civilian deaths and 11,220 civilian injuries annually
 - 69% of home fires in 1- or 2-family homes caused
 - 85% of home fire deaths
 - 65% of injuries
 - 52% of deaths were caused by the 19% of fires from 11 pm to 7 am
 - In 2011-2015, 32% of fatalities were sleeping

Calculating estimates

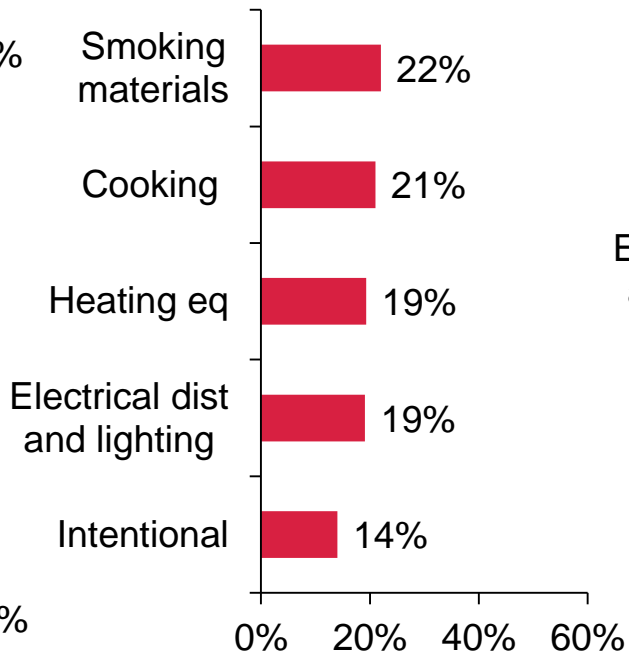
- Ratio from NFPA fire experience survey/NFIRS compensates for fires reported to FDS but not NFIRS
- Non-confined and confined fires analyzed separately for each causal data element
 - Unknowns typically allocated
- Leading causes pulled from multiple data elements
 - Scenario descriptions
 - Double counting occurs
- USFA uses cause hierarchy

Leading causes of home structure fires: 2013–2017

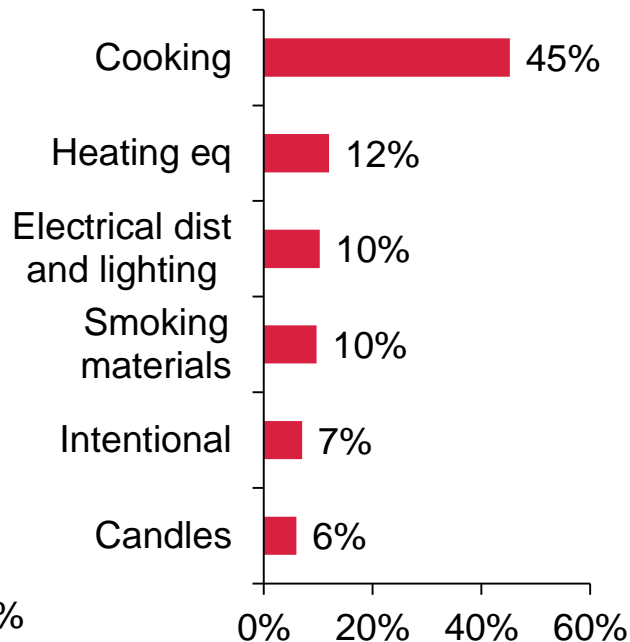
A. Fires



B. Deaths

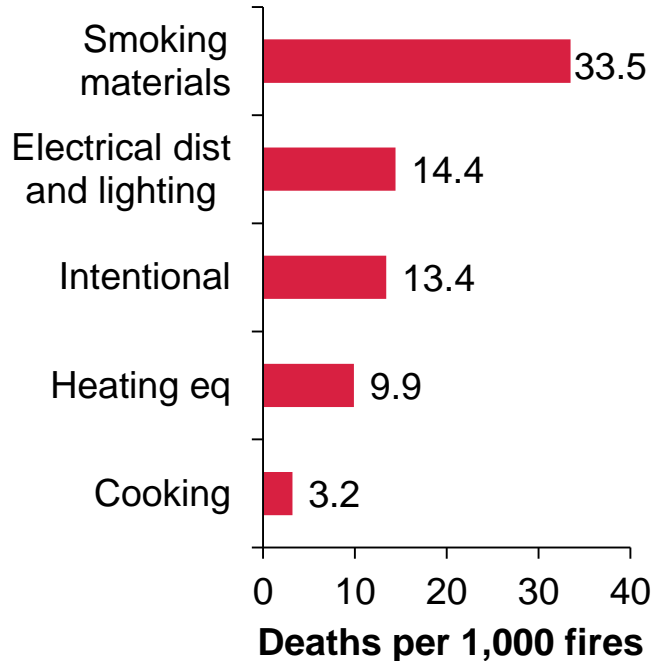


C. Injuries

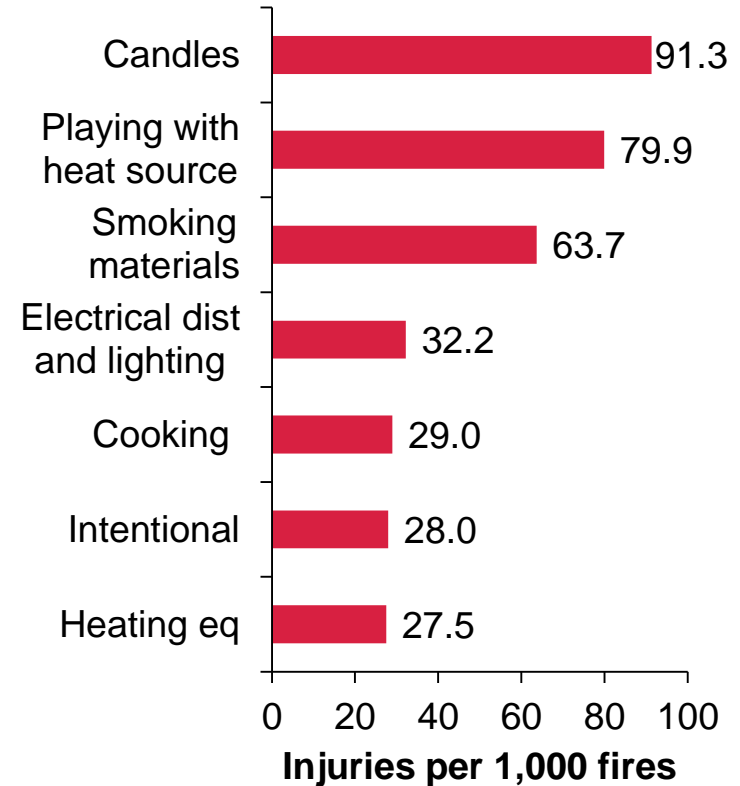


Home fire death and injury rate per 1000 reported fires, by cause: 2013–2017

A. Death rates

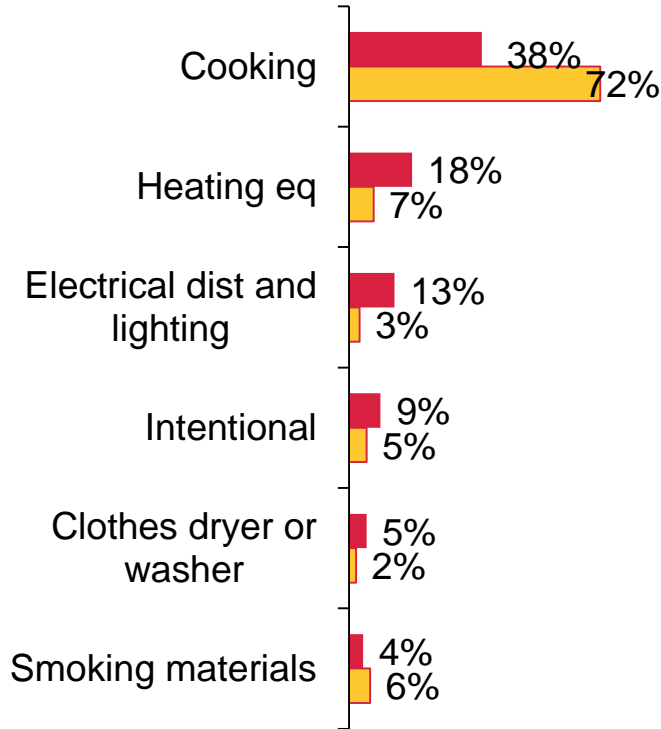


B. Injury rates

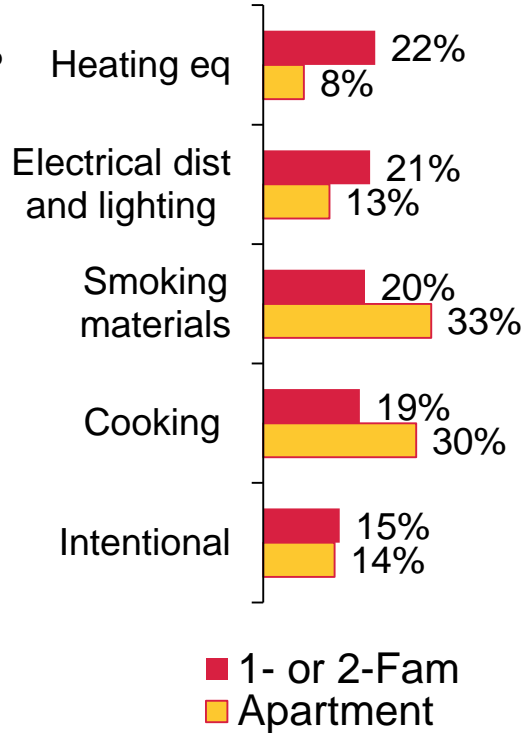


Leading causes of fires in 1- or 2-family vs apt fires: 2013–2017

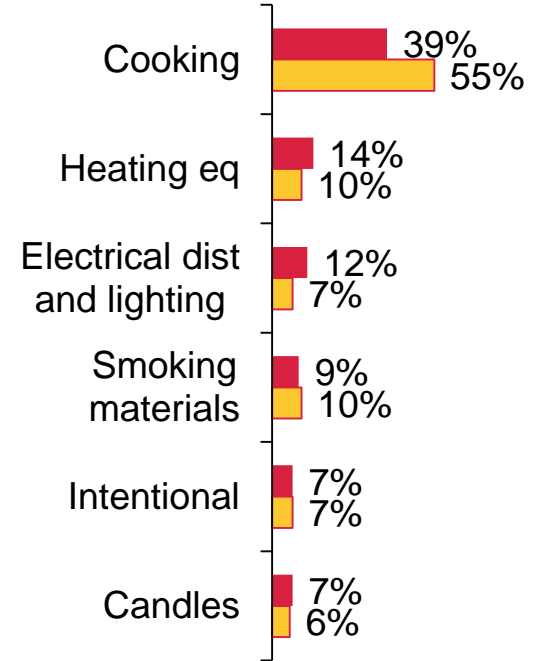
A. Fires



B. Deaths

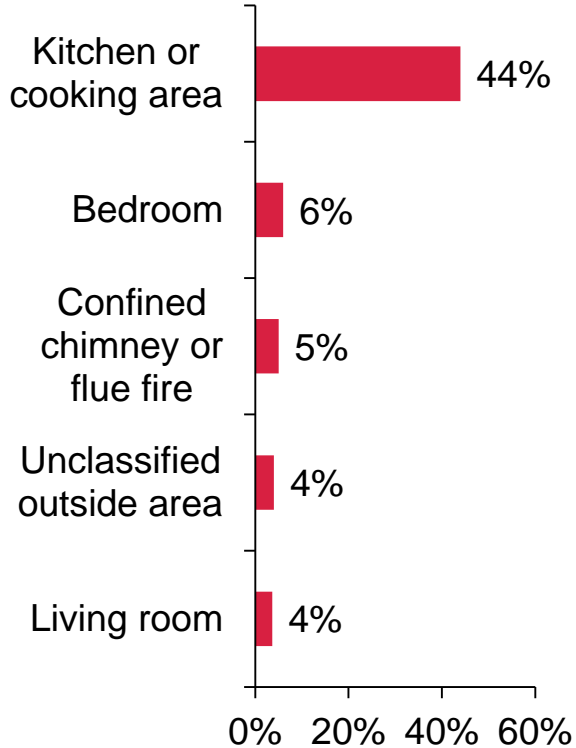


C. Injuries

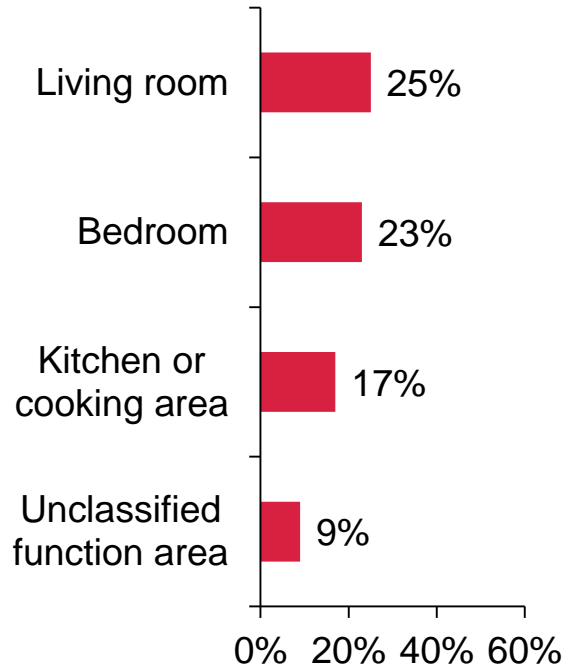


Leading areas of origin in home structure fires: 2013–2017

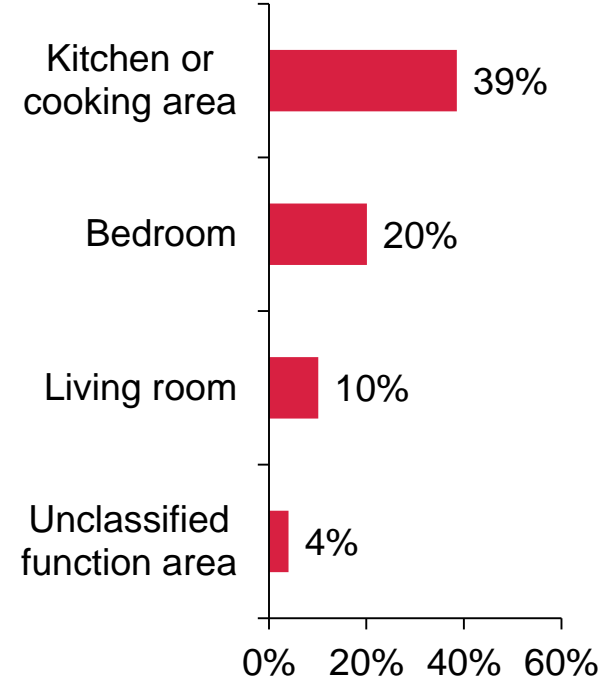
A. Fires



B. Deaths

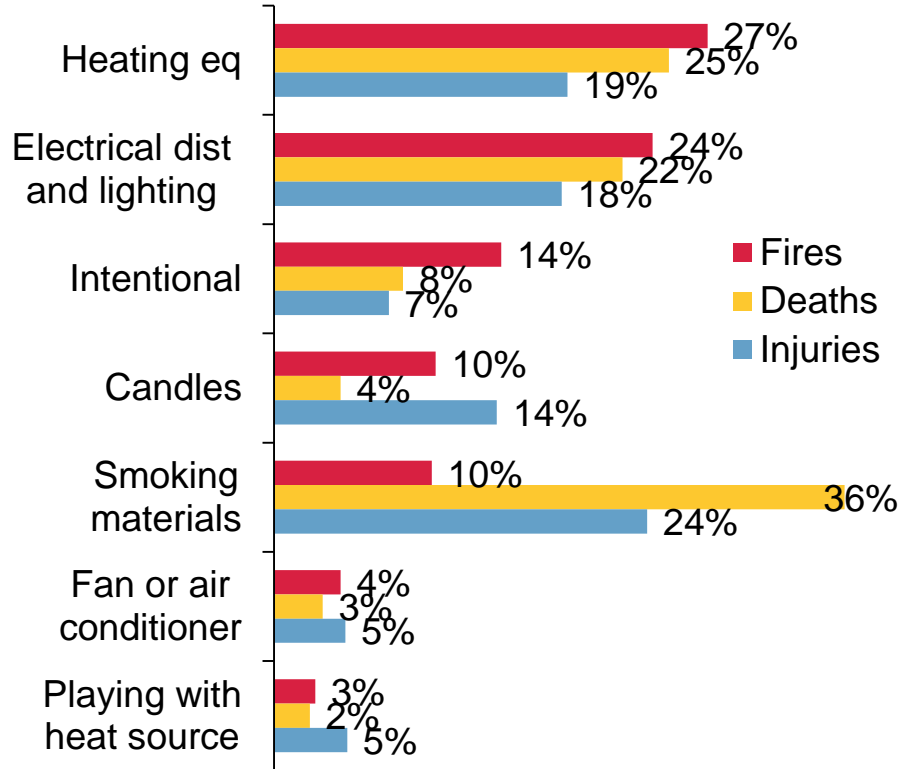


C. Injuries

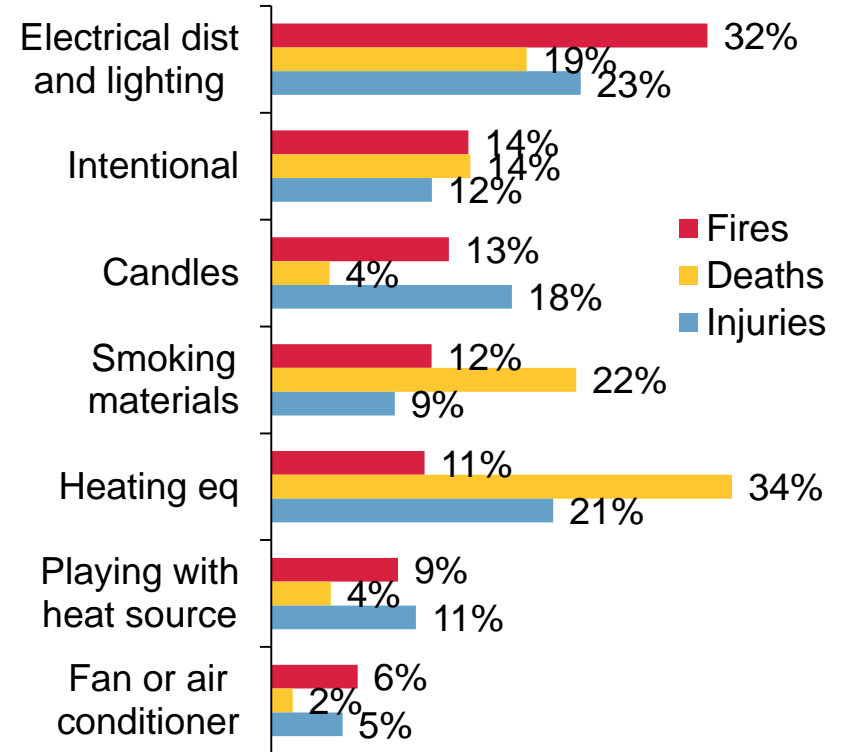


Leading causes of living room and bedroom fires: 2013–2017

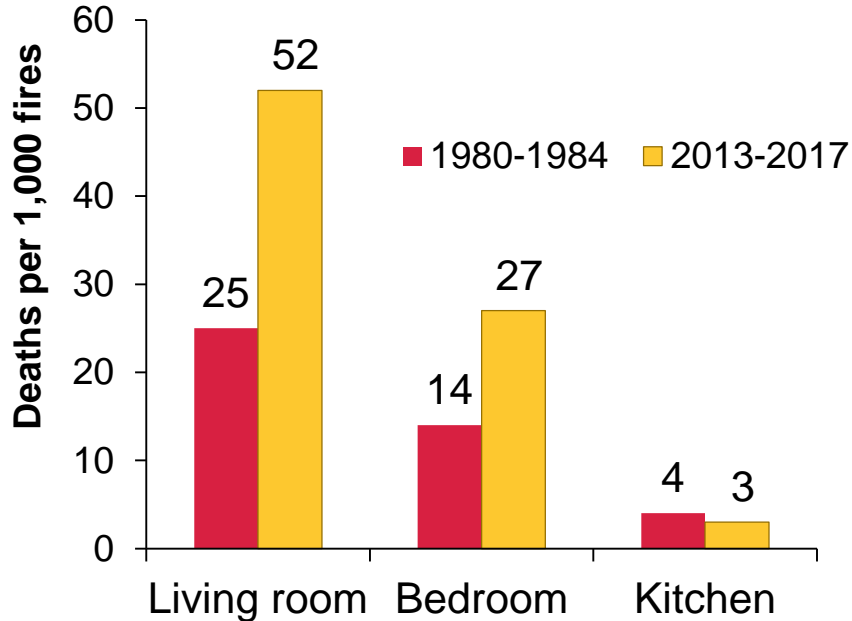
A. Living room



B. Bedroom



Deaths per 1,000 fires in leading areas of origin



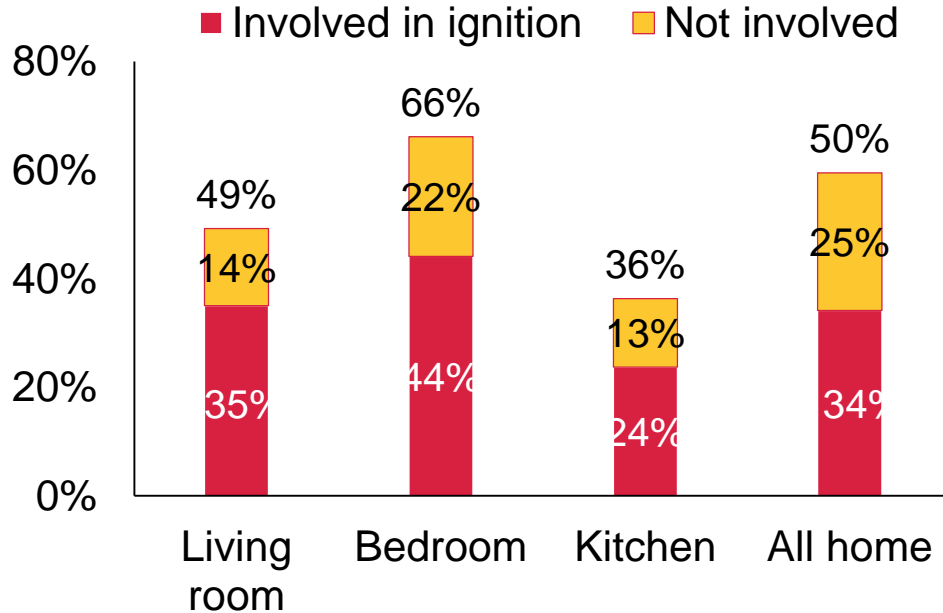
Death rates from reported fires starting with

- upholstered furniture
- mattresses or bedding

are more than twice as high in current period

Harder to save those who are intimate with ignition

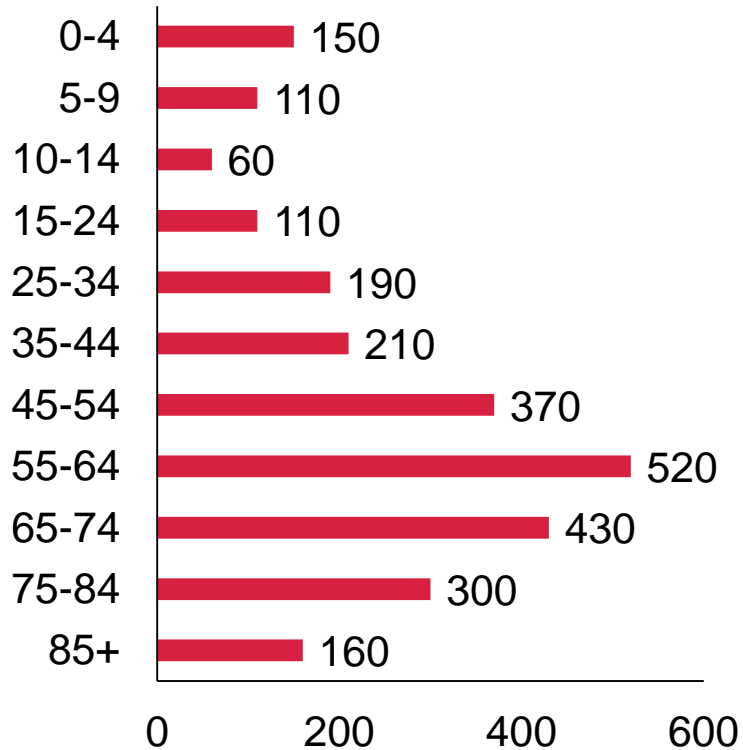
Home fire deaths in area of origin
2013–2017



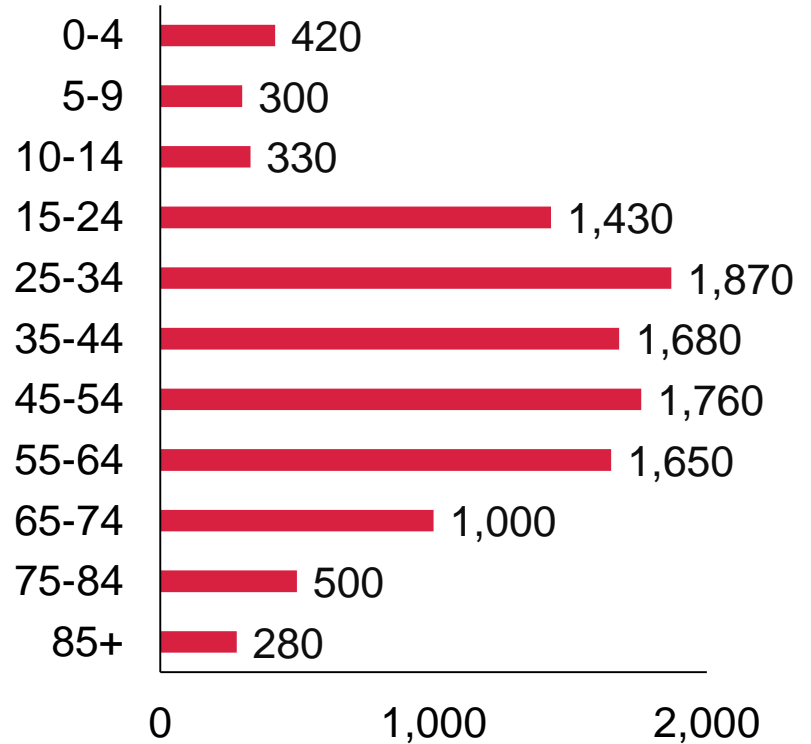
Fatal injuries can occur at the very beginning of fire

- One in five victims had a physical disability
- Older adults may not be able to move as quickly
 - Clothing ignitions

Home fire deaths by age: 2013-2017



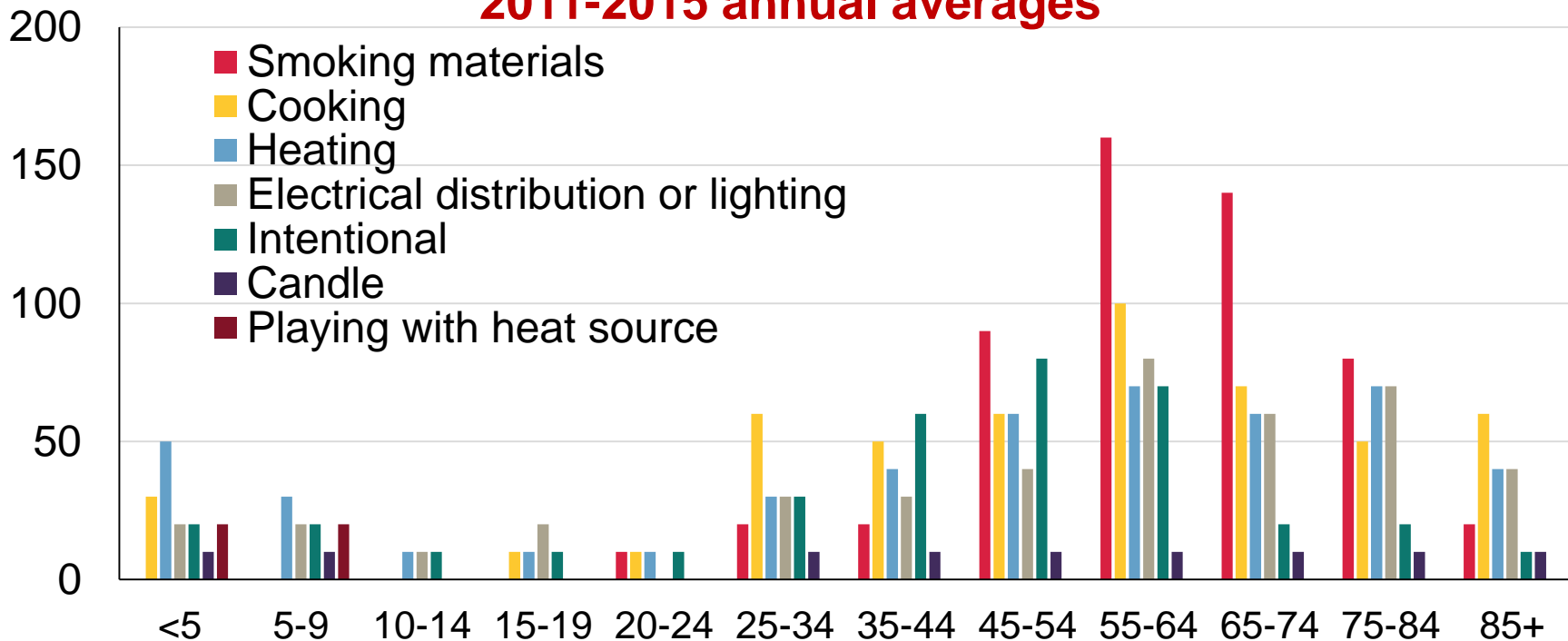
Home fire injuries by age: 2013-2017



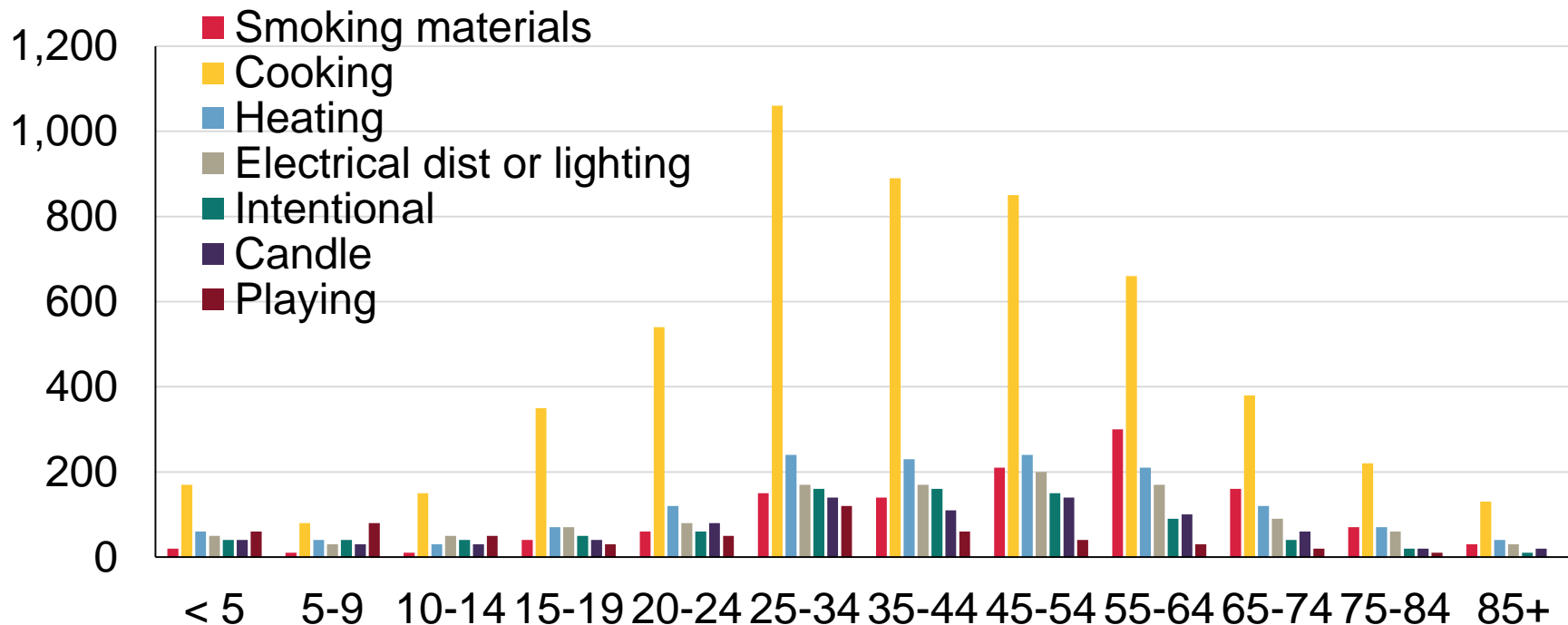
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Home fire deaths by age group and fire cause 2011-2015 annual averages

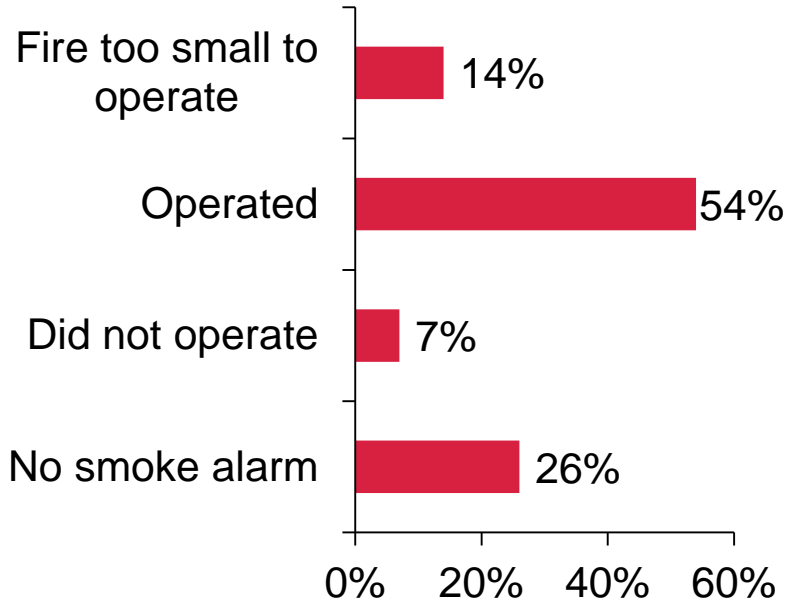


Home fire injuries by age group and fire cause 2011-2015 annual averages

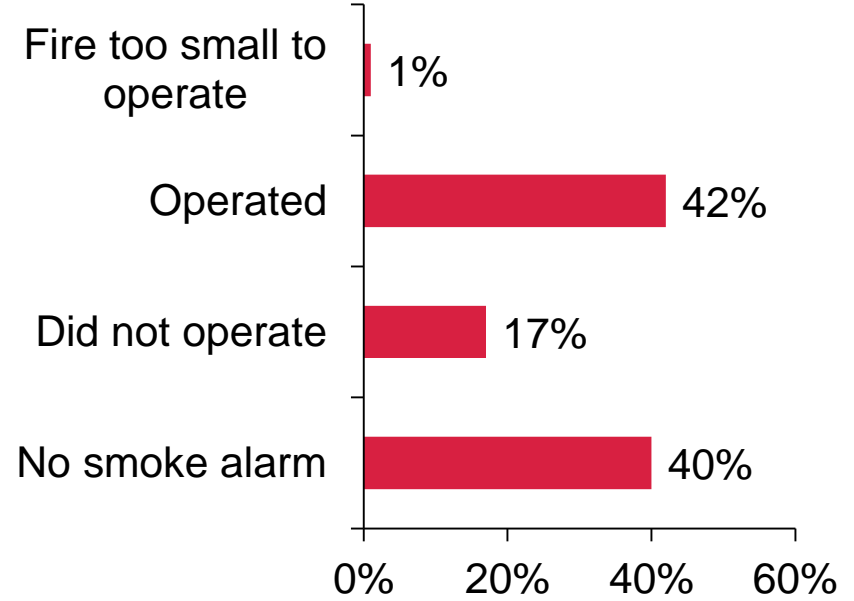


Smoke alarms in home fires: 2013–2017

A. Fires



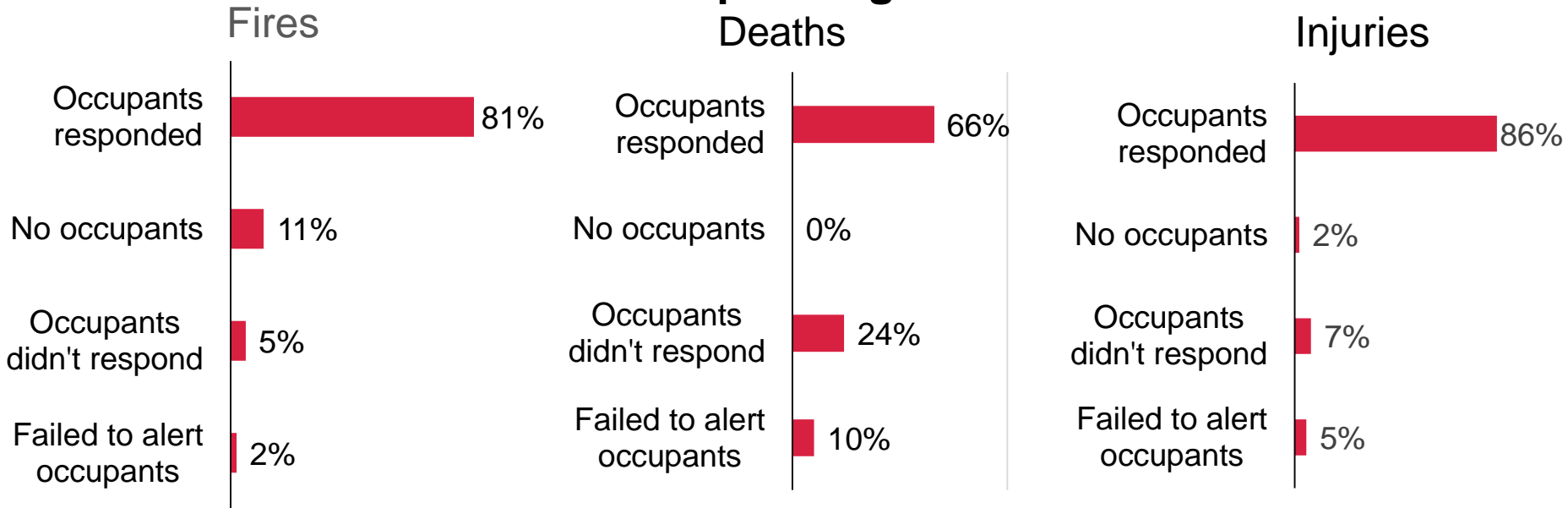
B. Deaths



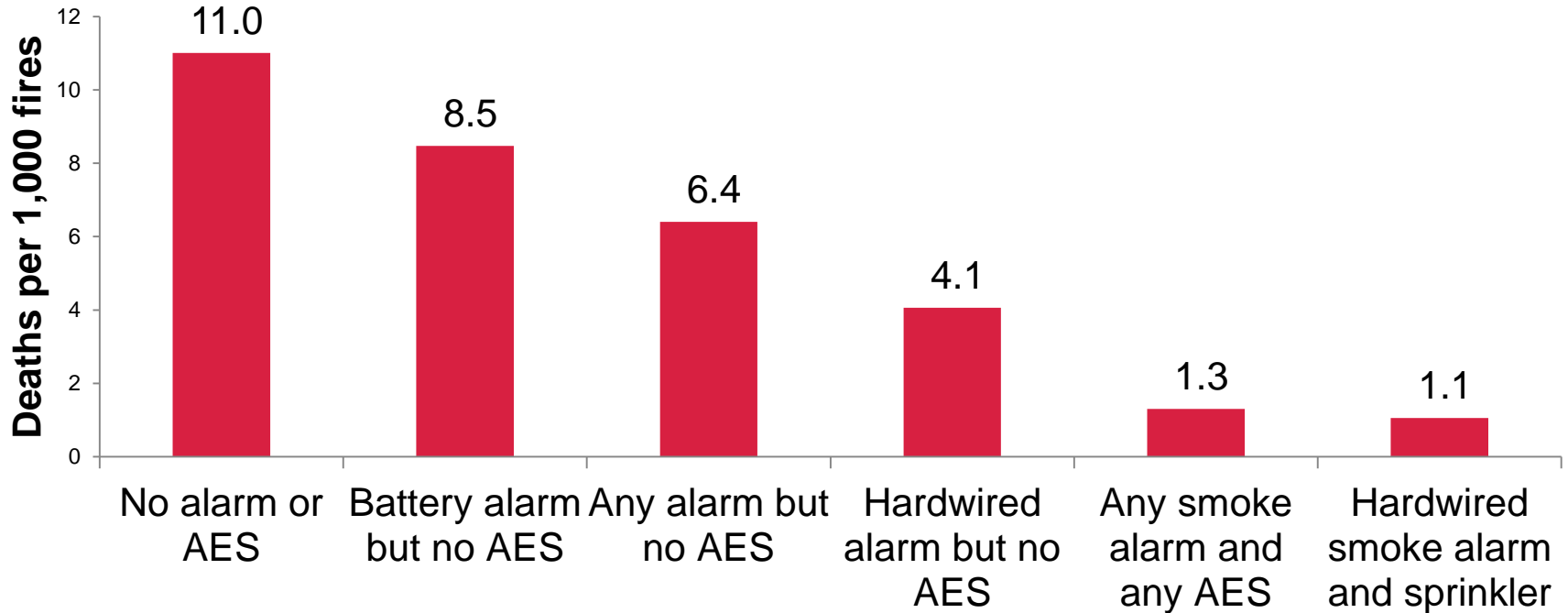
When present in 2012-2016, home smoke alarms Operated in 88% of large enough fires

- 71% of the deaths and 88% of injuries

Effectiveness of Operating Smoke Alarms



Fire death rate per 1,000 reported home structure fires by presence of smoke alarms and AES: 2012–2016



When present in 2012-2016, home fire sprinklers

- Operated in 94% of large enough fires
 - Were effective 97% of incidents operating
 - Operated effectively in 92% of the fires
- Only 1 sprinkler operated 89% of the time
 - 5 or fewer in 99%
- Sprinklers were present in only 7% of home fires

CPSC's survey of unreported fires in 2004-2005

- 97% of home fires were handled without the fire department
- Older adults less likely to have fires
- Smoke alarms were more likely to have operated and alerted when on every floor, interconnected
- Reported and unreported fires both fell from earlier survey

Greene, Michael A. and Craig Andres. *2004-2005 National Sample Survey of Unreported Residential Fires*. US Consumer Product Safety Commission, 2009.

<https://www.cpsc.gov/s3fs-public/UnreportedResidentialFires.pdf>.



Other types of FD calls

Brush, grass and forest fires

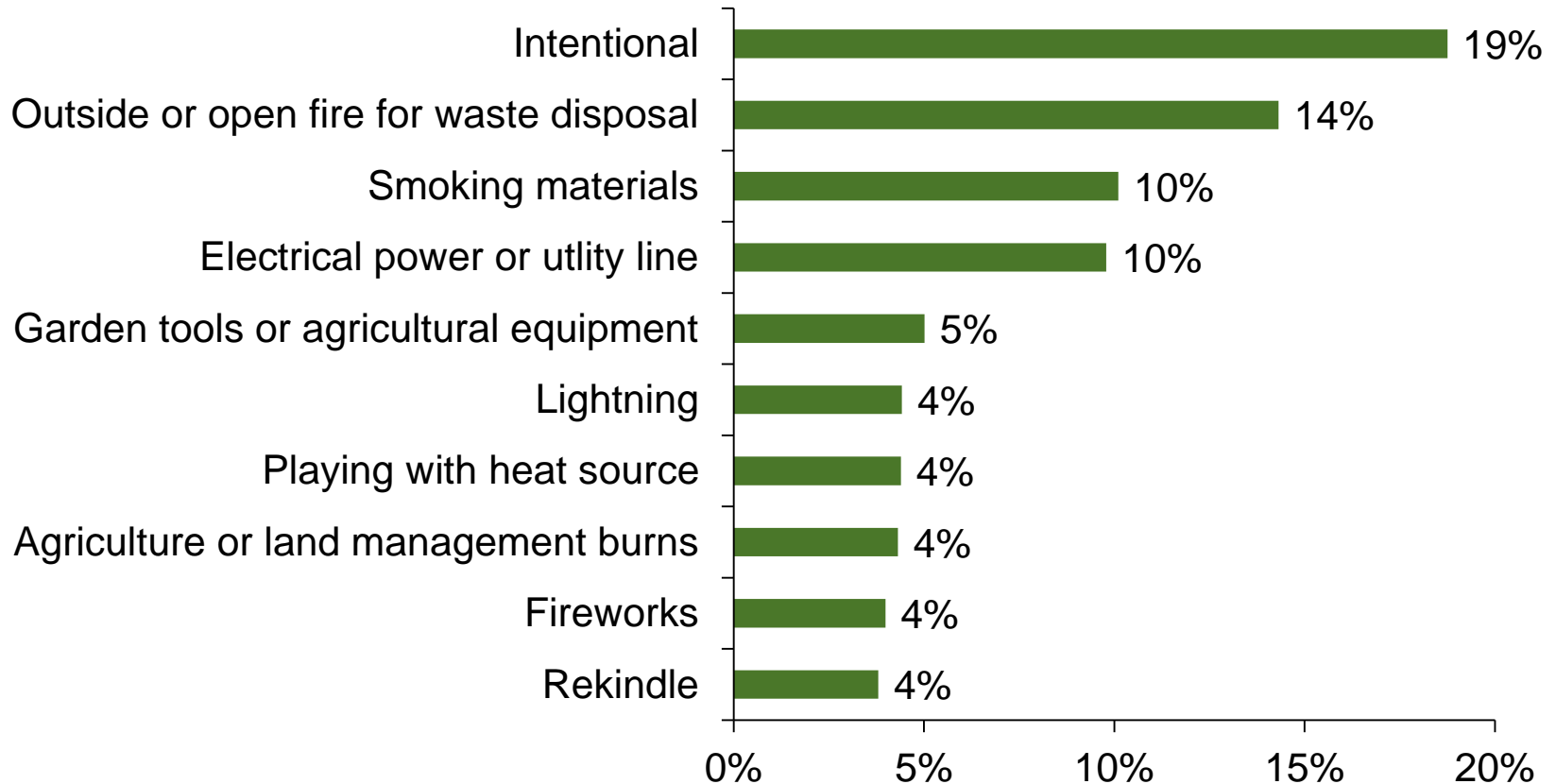
Carbon monoxide

Vacant building fires

Brush, grass and forest fires

- Local FDs responded to average of 306,000 such fires per year in 2011-2015
 - 23% of fires
 - 60% burned less than 1 acre
 - 10 acres were consumed in 5%
 - More than 9,000 buildings per year were involved
- Vegetation was first ignited in 6,200 home structure fires per year

Local fire department responses to brush, grass, or forest fires by major cause: 2011-2015



Carbon monoxide

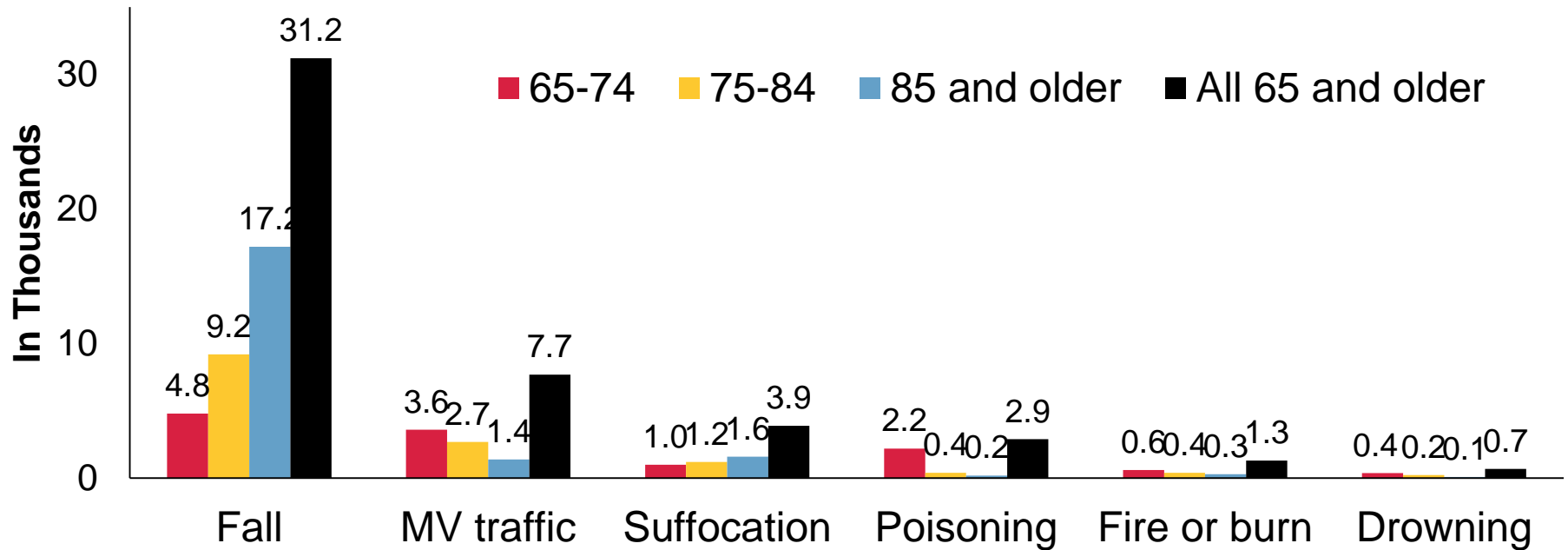
- Average of 380 unintentional deaths per year in 2013-2017
 - Excludes fire deaths
 - Obtained from <https://wonder.cdc.gov/mcd.html>
 - Multiple cause of death - ICD-10 Codes: T58 (Toxic effect of carbon monoxide)
 - Underlying cause of death - ICD-10 Codes: X47 (Accidental poisoning by and exposure to other gases and vapors)“
- FD responses in 2016:
 - 79,600 CO incidents (Some may be false)
 - 91,400 CO alarm malfunctions, 68,000 unintentional false alarms

Vacant building fires: 2011-2015

- Average of 30,200 structure fires per year caused
 - 60 civilian deaths, 160 civilian injuries, 3,310 firefighter injuries and \$710 million in property damage annually
 - 6% of reported structure fires, but 13% of FF structure fire injuries
 - Total of 20 FF fatalities in 2007-2016 in 17 fires at properties that were vacant, or under demolition or renovation
- Half were intentional
 - 61% of unsecured vs. 35% of secured
- More likely to spread beyond structure
 - 12% of unsecured and 9% of secured spread beyond

Leading causes of fatal and non-fatal injuries of all types

Leading causes of unintentional injury deaths in 2017 among those 65 or older



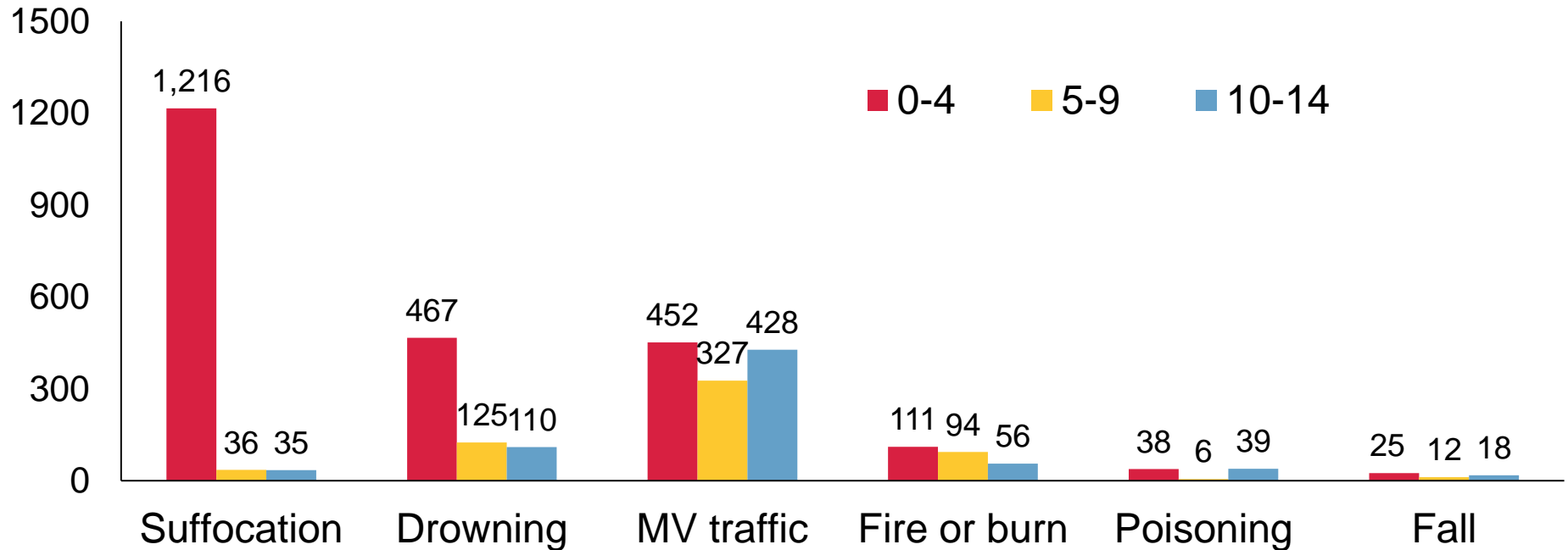
Source: CDC's WISQARS: Leading Causes of Death Report for Unintentional Injuries



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Leading causes of unintentional injury deaths in 2017 among those under 15



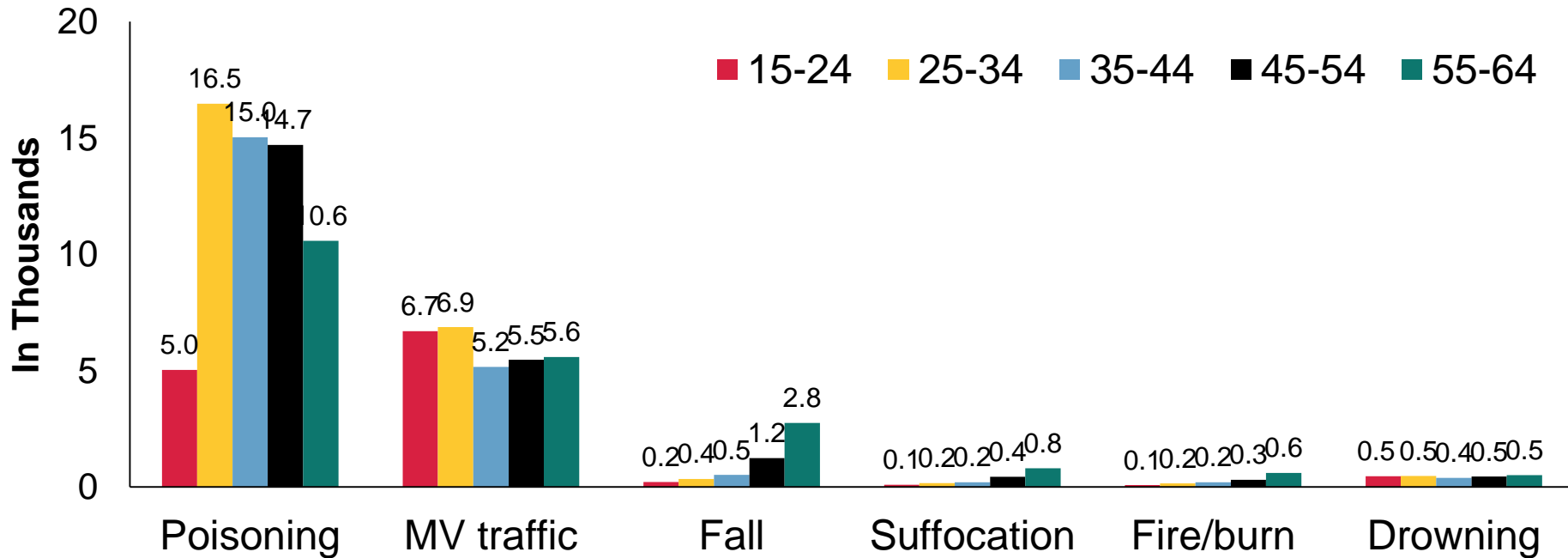
Source: CDC's WISQARS: Leading Causes of Death Report for Unintentional Injuries



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Leading causes of unintentional injury deaths in 2017 among those 15-64



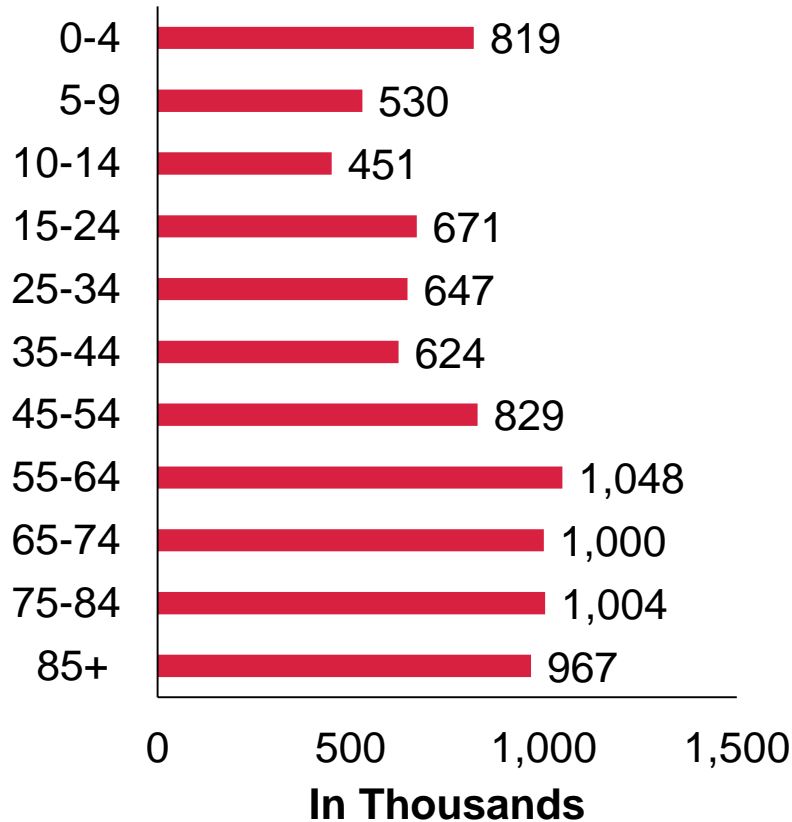
Source: CDC's WISQARS: Leading Causes of Death Report for Unintentional Injuries



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Unintentional fall injuries seen at EDs in 2017 by age



8.6 million unintentional fall injuries seen at EDs in 2017

- Leading cause of non-fatal unintentional injuries in children under 10 and people 25 or older
 - 2nd leading cause in people 10-24

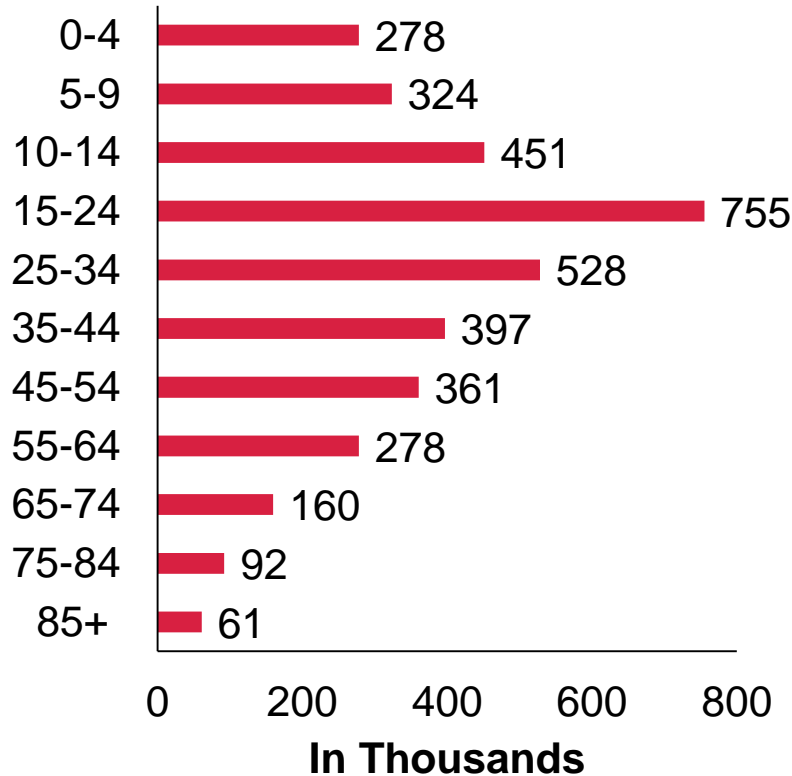
Source: CDC's WISQARS



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Unintentional struck by/against injuries seen at EDs in 2017 by age

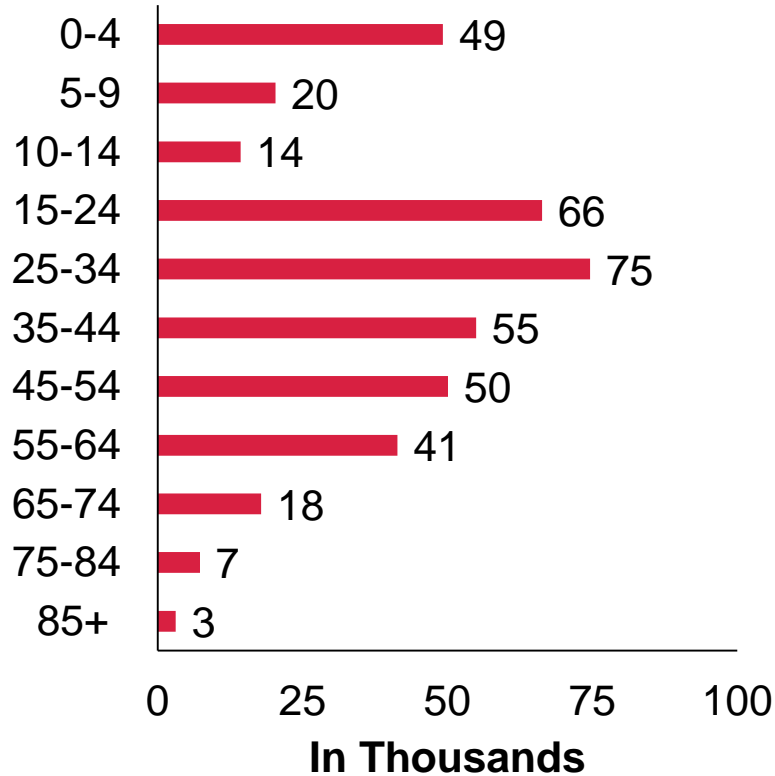


3.7 million unintentional struck by/against injuries

- Leading cause of unintentional injuries in 15-24 age groups
 - 2nd leading cause overall, under 10, and 85+
 - Ranked 3rd among 25-44 and 55-64
- Sports, cell phone use, etc.



Unintentional fire or burn injuries seen at EDs in 2017 by age



Almost 400,000 fire or burn injuries

- Ranked 7th for infants, 8th for 1-4
 - Not in top 10 for other age groups
 - Children are frequent victims of scalds and contact burns
- Many burns were workplace injuries



Get more injury data

- CDC's WISQARS at <https://www.cdc.gov/injury/wisqars/index.html>
 - More causes available
 - Fatal injury data (death certificates) is available at state level
 - Will only show results with at least 10
 - Can use multiple years
 - Non-fatal injuries are national estimates only of ED visits
 - From CPSC's National Electronic Surveillance System (NEISS)
- See [cpsc.gov/Research--Statistics/NEISS-Injury-Data](https://www.cpsc.gov/Research--Statistics/NEISS-Injury-Data) for product-related injuries

RE-AIM evaluation framework

RE-AIM evaluation framework

1999 *American Journal of Public Health* article by Glasgow, Vogt and Bowles

REACH	Percent, representativeness of participating
EFFICACY	Effectiveness, positive and negative outcomes, indirect benefits, opportunity cost
ADOPTION	Proportion, representativeness of organizations adopting program
IMPLEMENTATION	Were program, protocols followed by individuals and organizations?
MAINTENANCE	Institutionalization and long-term behavior change



References to 2-RE-AIM articles

- “Evaluating the Public Health Impact of Health Promotion Interventions: The RE-AIM Framework”
 - ~3400 citations
 - <https://ajph.aphapublications.org/doi/pdfplus/10.2105/AJPH.89.9.1322>
- “Using The RE-AIM Framework to Evaluate A Community-Based Smoke Alarm Installation Program”
 - Stephens-Stidman, McCoy, Roper, Campa, Barnard, and Istre
 - *Journal of Preventive Medicine and Care, 2016*
 - <https://www.oap-lifescience.org/article/324/jpmc-16-1118.pdf>

In conclusion...

Fire service is already involved in many risk areas

- Most involved with fire
 - Messaging often can include burns
 - Home fires cause more deaths and injuries than other fires
- Falls, crashes, and other situations cause more deaths and injuries than fires
- What do you already know about your community?
 - Are you collecting usable data?

NFPA reports, custom analyses and methods

- [Fire Loss in the United States during 2018, pub 2019](#)
- [Home Structure Fires - 2019](#)
- [Home Fire Victims by Age and Gender - 2018](#)
- [Brush, Grass and Forest Fires – 2017](#)
- [Smoke Alarms in US Home Fire - 2019](#)
- [US Fire Death Rates by State](#) & tool to compare rates, demographics
- [Fires by Occupancy or Property Type tool](#)
- “Carbon Monoxide Incidents” - 2019
- “Fires in Vacant Buildings” – 2018
- [“How the NFPA National Estimates Are Calculated for Home Structure Fires”](#)
- [“NFPA’s Methodology and Definitions Used in ‘Leading Causes of Structure Fires’ Tables”](#)

Compare fire deaths by state tool

- Up to 5 states or all US at a time
 - Uses death certificate data from National Center for Health Statistics accessed through CDC's WISQARS
- Average fire and fire death rates by year
 - Mostly 5-year averages back to 1981-1985
- Demographic and risk factors
 - Race and ethnicity
 - Poverty
 - Adult smokers
 - People with a disability



RESEARCH

Select a Type of Fire

- Outside or Unclassified Fire
- Structure Fire
- Vehicle Fire

Number of Fires Reported to Local Fire Departments in the United States by Property Use: 2013-2017 Annual Averages

Major Property Class (click here to expand)	Fires	Civilian deaths	Civilian injuries	Property loss
1 - Assembly	15,636	13	184	\$342,620,307
2 - Educational	4,859	1	56	\$57,357,147
3 - Health Care, Detention & Correction	6,682	4	169	\$60,239,417
4 - Residential	382,397	2,739	11,672	\$7,298,475,292
5 - Mercantile or Business	18,582	15	308	\$852,387,668



Other resources

- scholar.google.com/
- usfa.kohalibrary.com/app/search
- <https://www.cdc.gov/injury/wisqars/index.html>
- saferproducts.gov/
- <https://www.cpsc.gov/Research--Statistics/NEISS-Injury-Data>
- nfpa.org/CRR

- And most importantly,

EACH OTHER!!

Thank you!

