

# Putting out the Flame: Exploring State Variations and Incident Dynamics in Firefighter Fatalities

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## Objectives

- Examine the firefighter fatality rate and leading causes of firefighter fatalities in the United States by region, from 2013-2023
- Analyze associations between sociodemographic factors and fatalities



## Background

- Data from the US Fire Administration found that 62 firefighters died from sustained injuries while on duty in 2019, 109 firefighters in 2020, and 141 firefighters in 2021 (USFA, 2023)
- In 2019, occupational exposures to fires, explosions, and vehicle-related crashes led to 30% of the firefighter fatalities (Fahy et al., 2020)
- Obesity rates correlate with cardiovascular issues, contributing to 40-50% of on-duty deaths among firefighters (Chizewski et al., 2021)
- Because firefighters must respond to all emergency events, their health, and readiness are crucial for public health
- Identifying differences in firefighter fatalities by state is important to prevent more premature deaths
- A fire department responds to a fire every 23 seconds and an increase of the intensity and size of wildfires due to climate change has strained firefighter resources, equipment, and led to insufficient training (USFA, n.d.)



## Methods

- Secondary data from National Institute for Occupational Safety and Health (NIOSH) Fire Fighter Fatality Investigation and Prevention Program from 2013-2023 in a cross-sectional retrospective correlational analysis
- Variables include:
  - **Rank:** Captain, Fire Chief, Lieutenant, Firefighter, and Other
  - **Age:** 17-24, 25-44, 45-54, 54-64, >65 years old
  - **Years served:** 0-10, 11-20, 21-30, 31-40, >40 years
  - **Sex:** Male or Female
  - **Nature of Fatality:** Asphyxiation, Crushed, N/A, COVID-19, Trauma, and Heart Attack
  - **Regions:** North, South, West and Midwest (see QR code for specific states)
- Calculated fatality rate by total # of fatalities divided by total # of firefighters and adjusted to per 100 firefighters
- Pearson chi-square tests and multinomial logistical regression conducted using SPSS to examine associations

## Results

• Total number of deaths of firefighters from 2013-2023 is 1017

Figure 1. Proportion of Age Groups of Firefighter Fatalities, 2013-2023

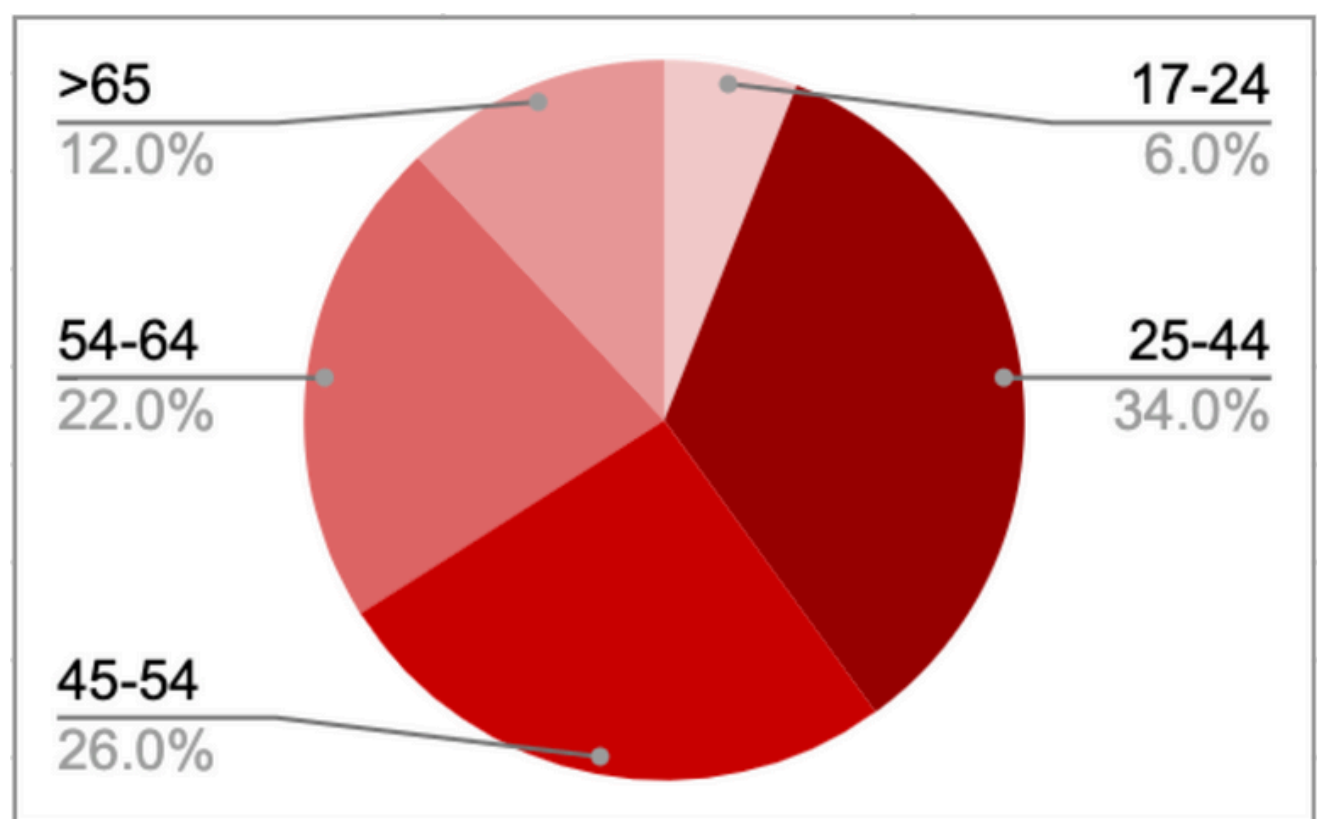


Figure 2. Proportion of Rank of Firefighter Fatalities, 2013-2023\*

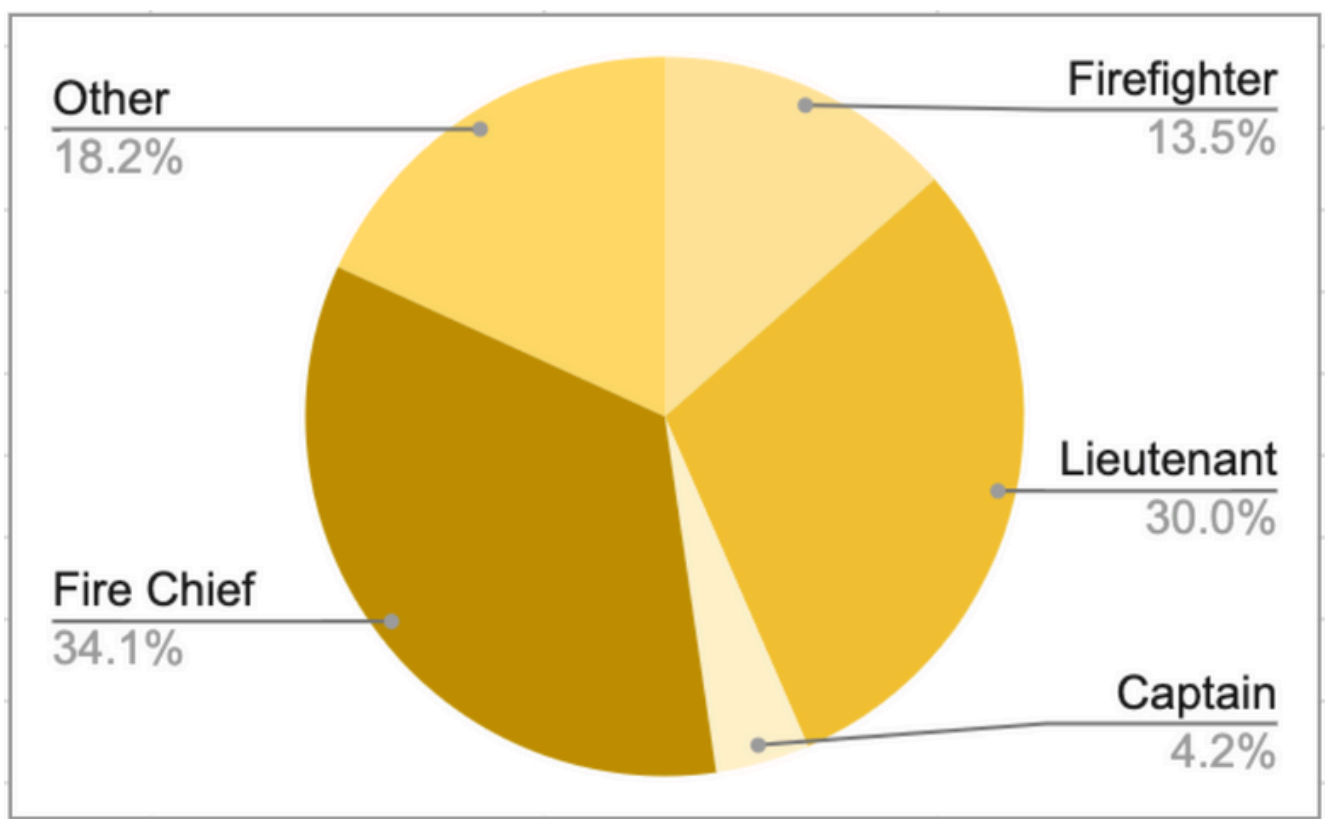


Figure 3. Proportion of Years Served of Firefighter Fatalities, 2013-2023\*

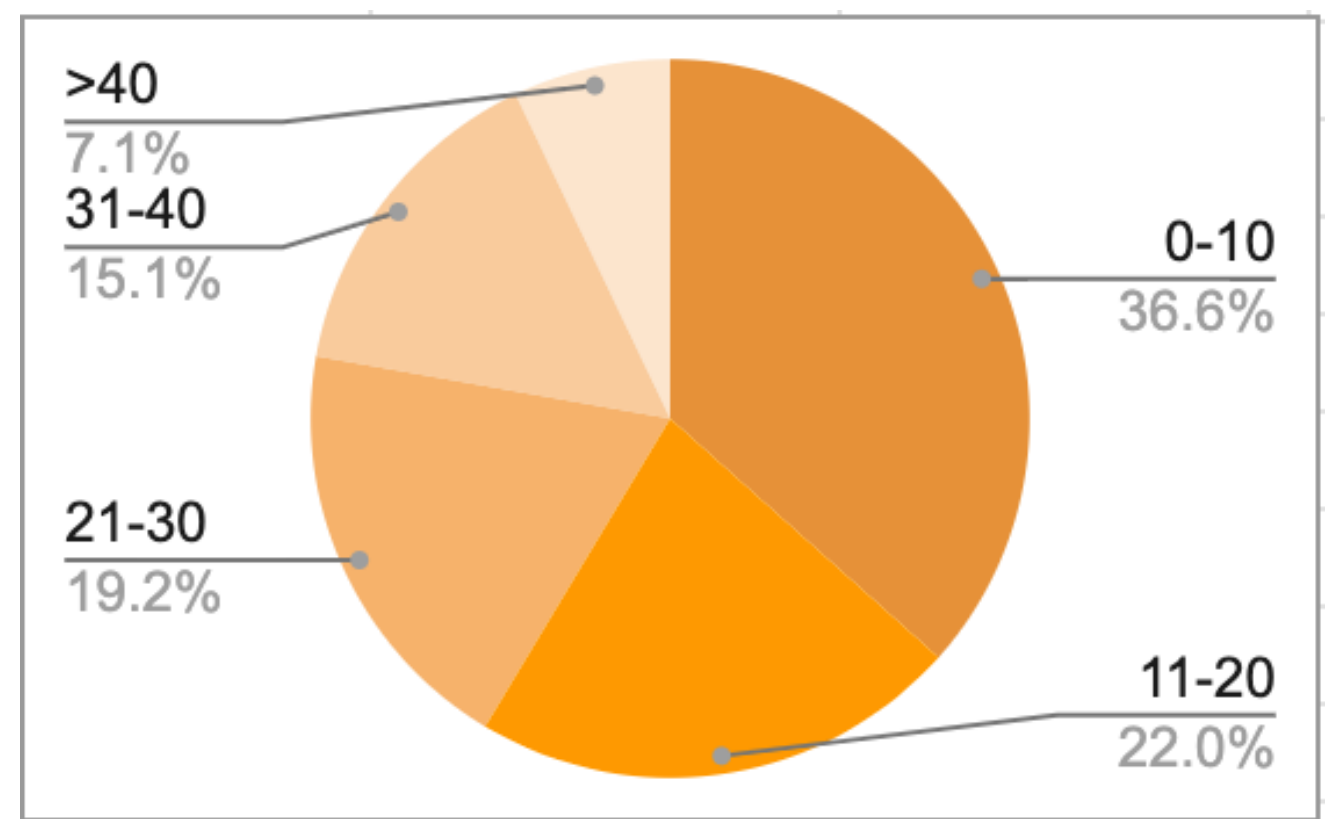
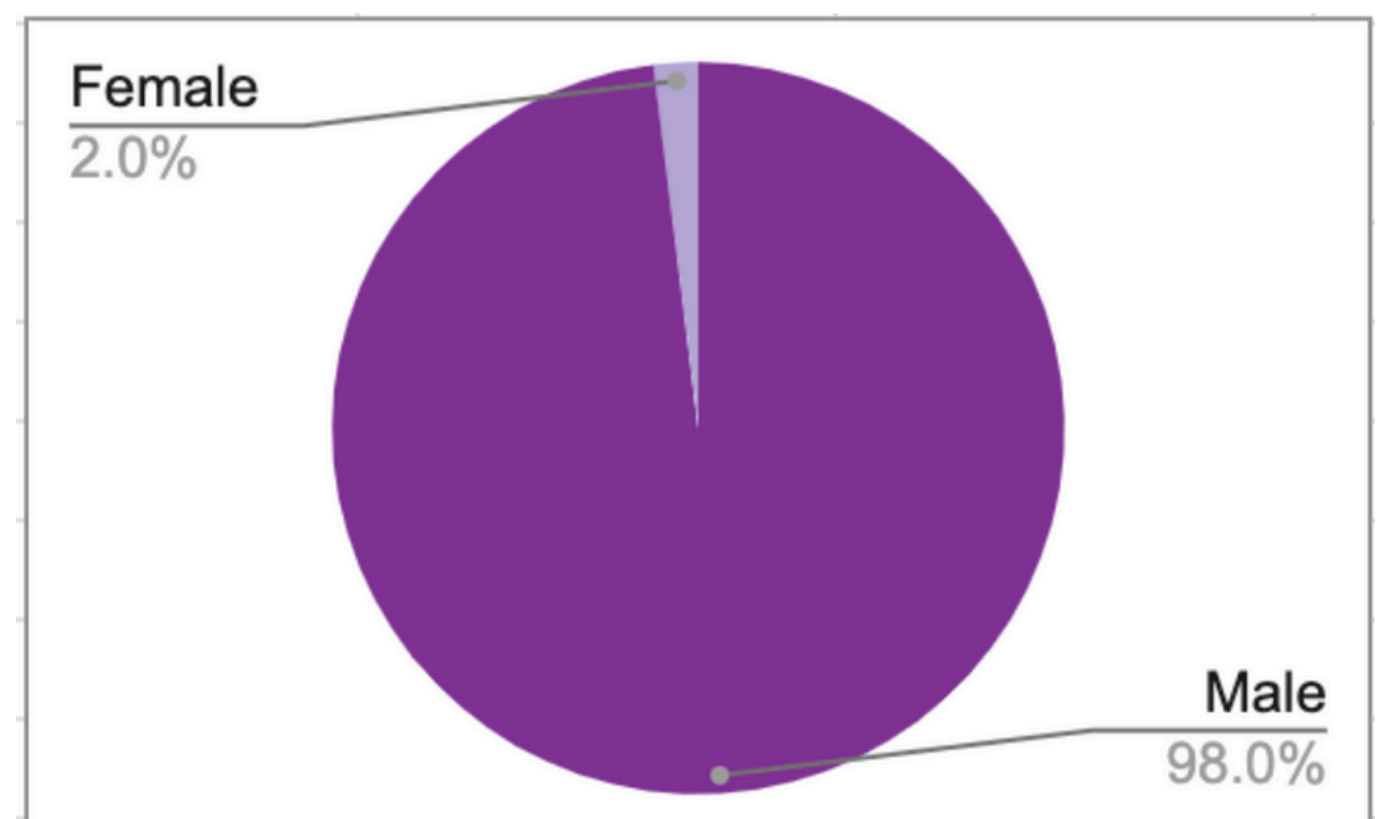


Figure 4. Proportion of Sex of Firefighter Fatalities, 2013-2023\*



• In Figures 1-4, statistical significant associations reported between the firefighter fatalities and sociodemographic characteristics: rank (p<.001), years served (p<.001), & sex (p=.04)

Figure 5. Percent Fatality Rate Per 100 Firefighters Across 4 U.S. Regions, 2013-2023

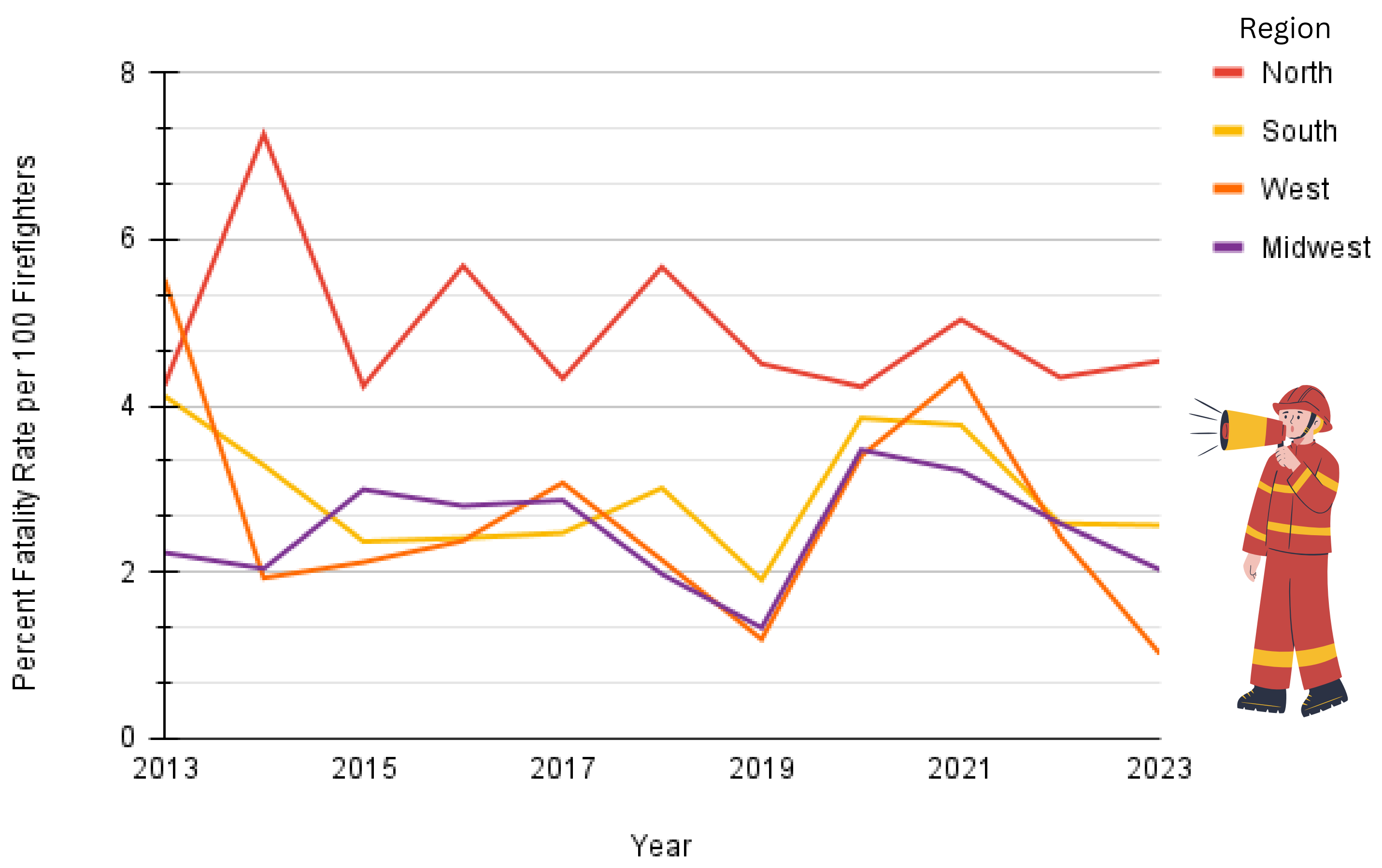
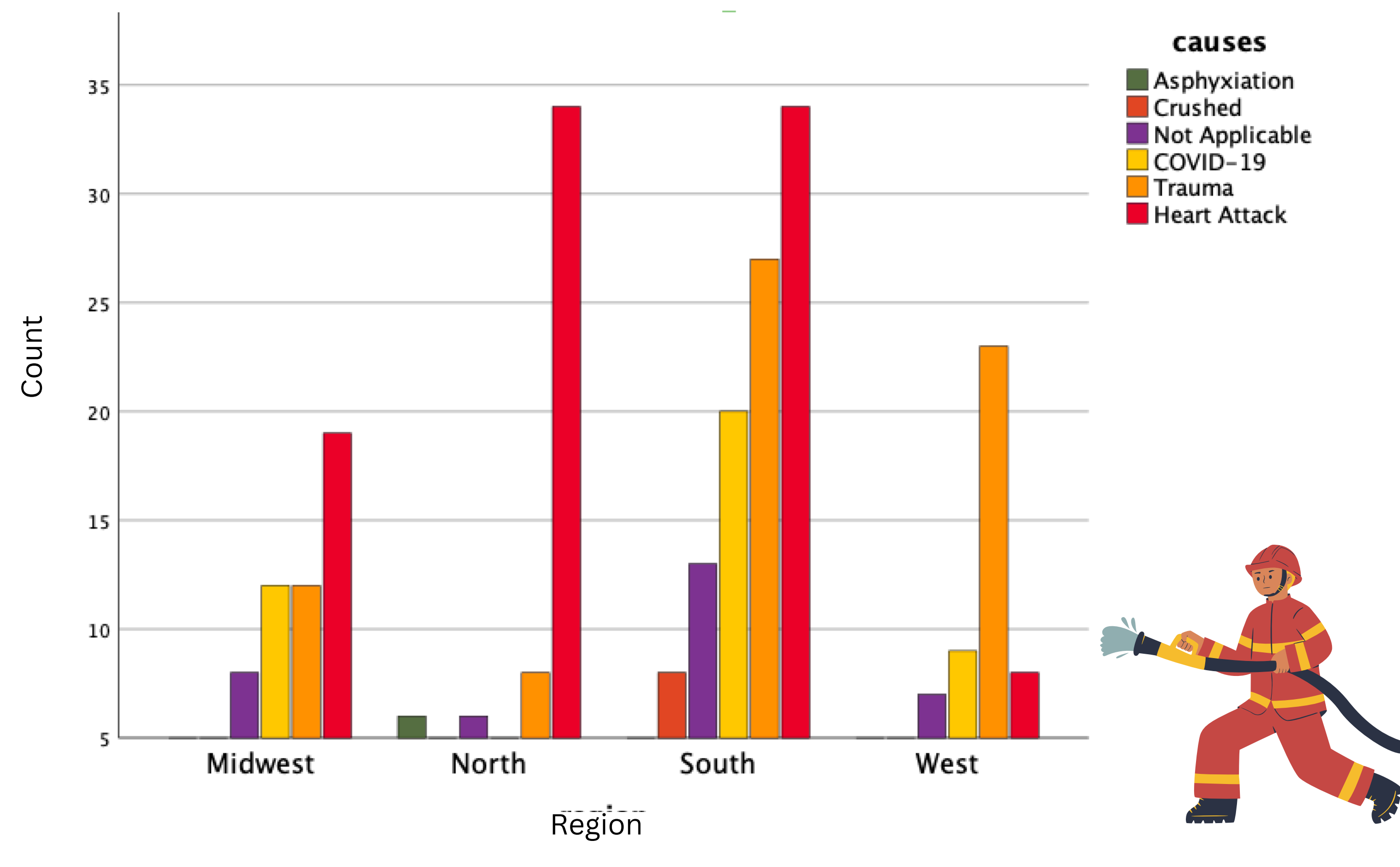


Figure 6. Number of Fatality Types Across 4 U.S. Regions, 2021-2023



- The North region in the U.S. reported the highest fatality rate over the 10-year period and the only region with an upward trend in fatalities
- West, South, and Midwest regions were found to have similar trends across the 10 years
- Statistically significant association between injury and the region (p<0.001)
- Heart attack was highest in Midwest, North and South region while trauma was highest in the West region

## Conclusion

- Significant associations comparing sociodemographic factors and nature of injury suggest inexperienced firefighters may require more robust field experience to combat premature fatalities
- The North region had the highest percent of fatality rate suggesting that firefighters in the North may face more hazardous conditions or disparities in resources, training, and safety protocols
- The main causes of nature of injury are heart attacks, trauma, and COVID-19 from 2021-2023 suggesting that more obesity and cardiovascular prevention practices should be integrated in firefighter programs
- Recommendation for NIOSH and the U.S. Fire Administration to set occupational guidelines for firefighters to combat distinct threats to firefighters across the U.S. regions

### Limitations

- Data for total employed firefighters in each region were estimated (excluding self-employed), which may have impacted the accuracy of our percent fatality rate
- Causes of fatalities categorized as "not applicable" may affect accuracy of the test results

## Acknowledgments

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More Details: States in 4 Regions and References

