

Exploring Toronto Fire Incident Data*

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Fire events pose a significant challenge in urban environments, as a threat to property and public safety. Understanding the frequency and costs of fire damage is essential for urban planners and local government to prepare and prevent such incidents.

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*Code and data are available at: [LINK](#)

2 Introduction

Fire events pose a significant challenge in urban environments, as a threat to property and public safety. Understanding the frequency and costs of fire damage is essential for urban planners and local government to prepare and prevent such incidents. This is especially important in Toronto's downtown area which is home to approximately 16,000 people per square kilometer ().

In the following analysis we will break down the financial impacts of these events from fire incident data provided by opendatatoronto. Gaining insights into the types of locations that are most commonly affected and those that experience more severe damage. also gaining insights into how the data changes in downtown environments.

The analysis will be done using R (R Core Team (2022)) using dplyr ((citedplyr?)) and tidyverse ((citetidyverse?)). All graphs were generated by ggplot2 ((citegg?))

3 Data

The data is provided by opendatatoronto (**opendatatoronto?**) and includes fire incidents as defined by the Ontario Fire Marshal (OFM) up to December 31st, 2022. The Dataset included much information but for this analysis we will be focusing on the Computer Aided Dispatch event types data and the estimated dollars lost as this data will provide insight into where the costly incidents are taking place. Further we will look into these high costing locations analysing the source of these events to better understand why some locations host more frequent and costly incidents. This data is not available for all events thus some of the data is undetermined.

In the figures below some data is omitted as outliers to tell a clear story with the data. Further many insignificant variables are grouped into a single category. This is so to focus the analysis on those factors that are contributing significantly to the data.

4 Analysis

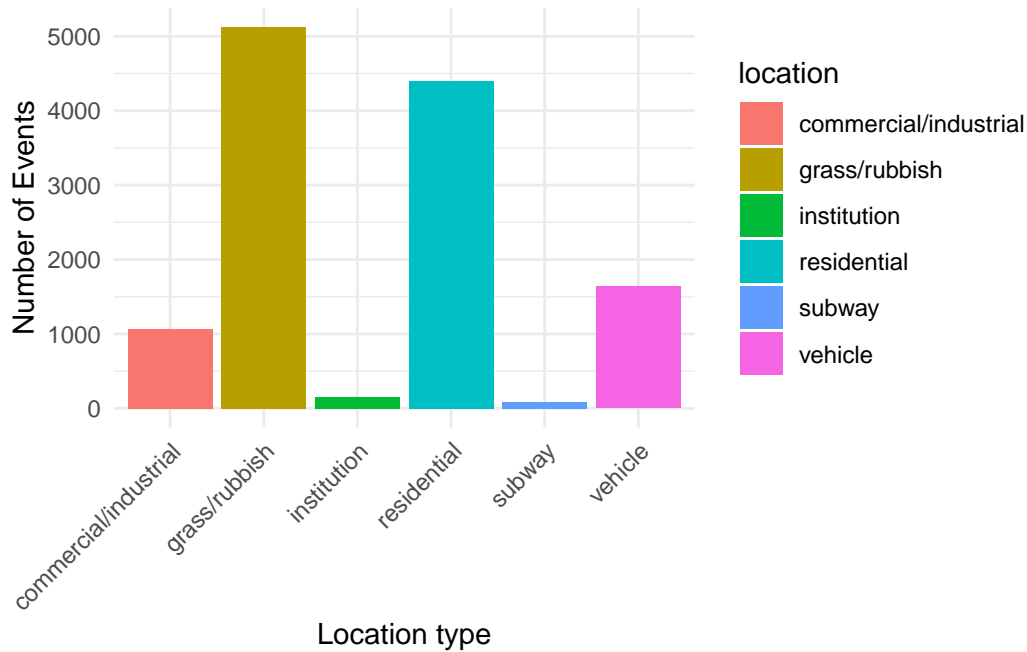


Figure 1: Counts of fire Incident

This data shows where across the GTA most fire incidences are occurring giving a clear understanding of where the most common places fire incidences occur. Locations outside or holding garbage are clear hotspots from this graph however as figure 2 shows the damage being done here is not as damaging as fires in other locations. This is not unexpected as damage originating garbage or grass fires are unlikely to be heavily represented in financial data. For policy makers this information should highlight an area that is in need of a solution. As figure 2 shows financially the benefit is prioritizing other types of incidents.

We see the areas of true damage is occurring in these industrial and residential incidents. These are not only the area of financial concern but also where the safety of the populus is most at risk.

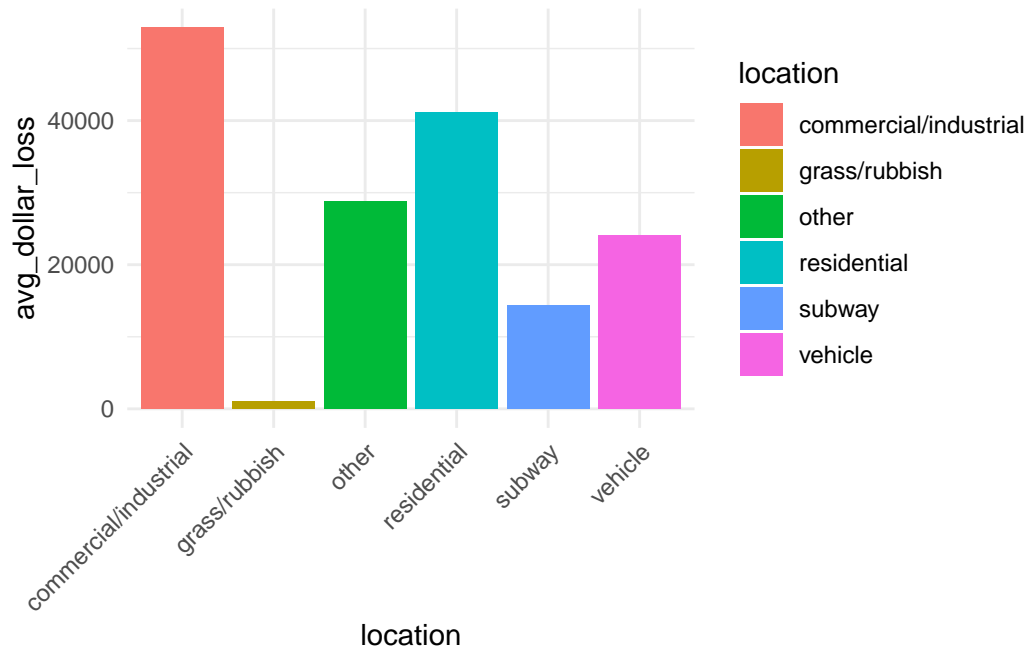


Figure 2: Incident type damages

In a metropolitan city like Toronto comparing downtown's data exclusively is key to helping the most amount of people in the smallest area. And perhaps correlated with the wealth and number of residents downtown we do get variation in the data.

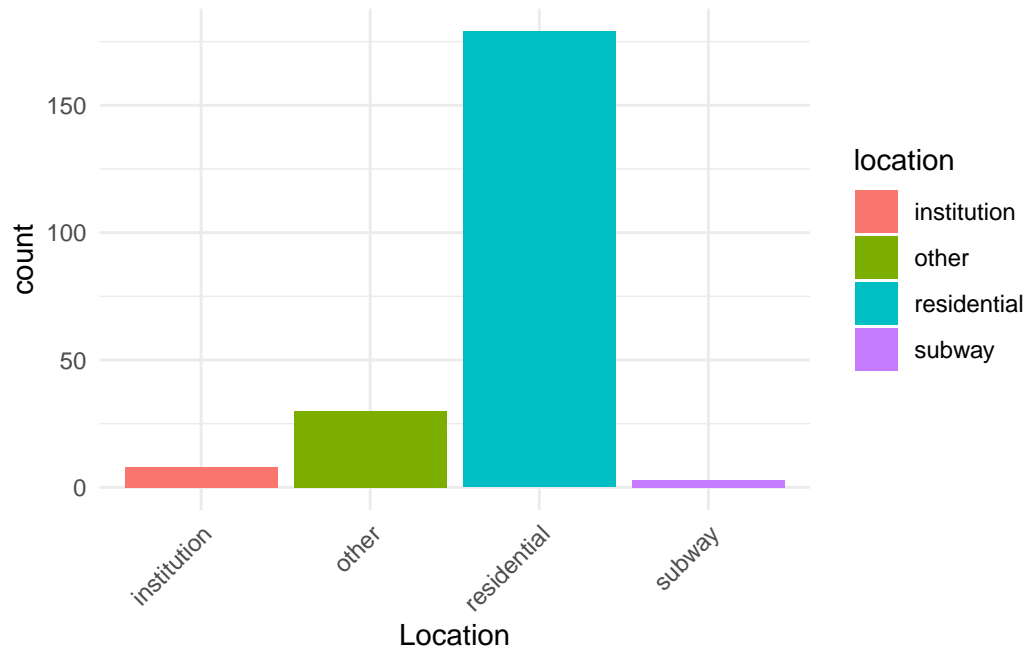


Figure 3: Downtown incident cost

[] Highlight how residential downtown is the highest threat area and cost in downtown [] look at causes of the fires in next fig [] policy makes can highlight these as focuses on safety in the highly populated areas

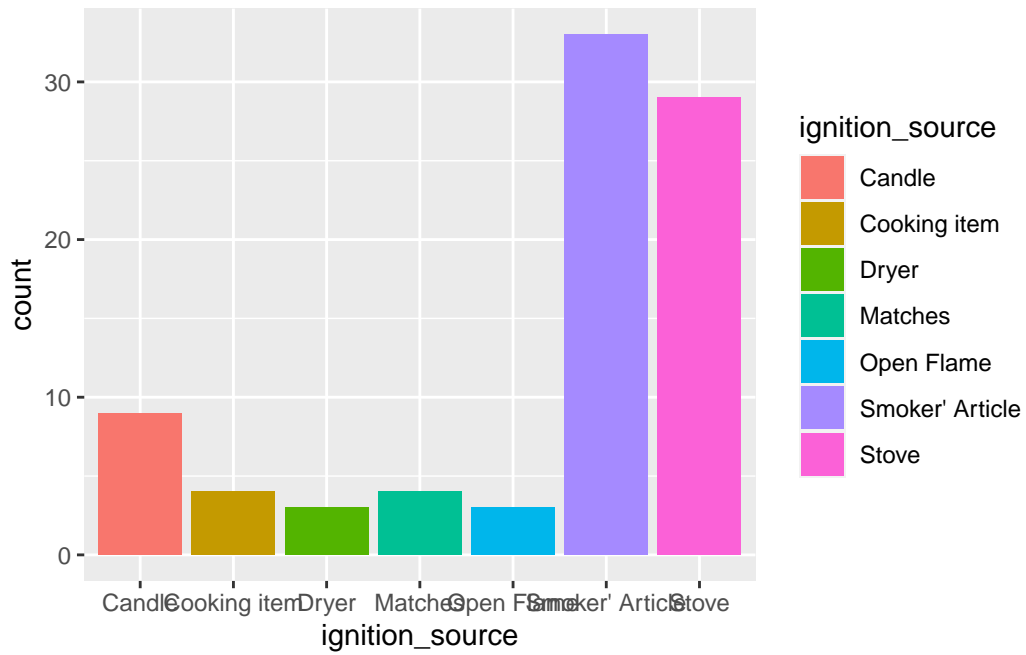


Figure 4: Most Common Downtown Residential Ignition Sources

R Core Team. 2022. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. <https://www.R-project.org/>.