

# Outbreaks in Toronto Healthcare Institutions After COVID-19\*

Analysis of the Frequency Trends and the Causative Agent

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In Canada, outbreak incidence has been slowly increasing from June 2024 up to the beginning of the accumulating data period on August 10, 2024. (ADD CITATION <https://health-infobase.canada.ca/covid-19/>) Using the ‘Outbreaks in Toronto Healthcare Institutions’ dataset, we show how the trends of outbreak occurrence has been over the 5 years after COVID-19. (specify headline result). (implications).

## 1 Introduction

You can and should cross-reference sections and sub-sections. We use R Core Team (2023), ([opendatatoronto?](#)) and Wickham et al. (2019).

The remainder of this paper is structured as follows. Section 2....

## 2 Data

Figure 1 shows the total number of outbreaks reported in Toronto healthcare institutions over the time period of 2020 to 2024. We can see that the numbers seem to decrease by the end of 2021, but exponentially increase from the start of 2022. A trend of relatively high outbreak occurrence rate continues till 2024.

Contrary to the expectation that the number of outbreaks would have increased the most rapidly immediately after COVID-19, the analysis with actual data shows that the number of outbreaks is on the rise as we approach 2022. Since there are various variables that can

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\*Code and data are available at: [https://github.com/koyunkyung/toronto\\_outbreaks](https://github.com/koyunkyung/toronto_outbreaks)

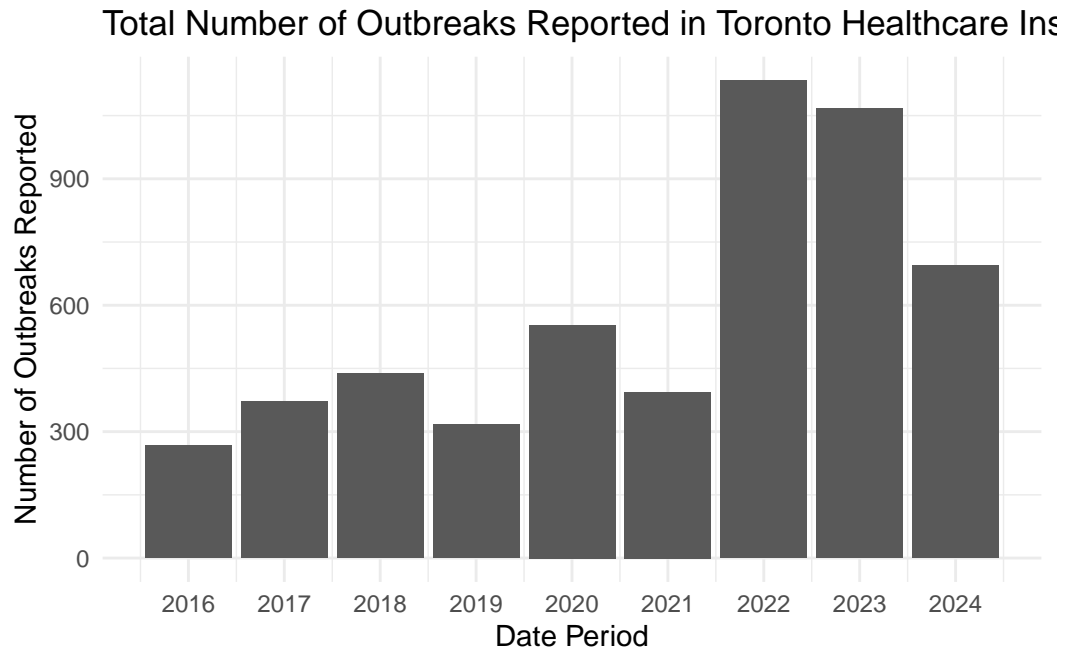


Figure 1: Total Outbreaks Count in Toronto Healthcare Institutions

### Number of Outbreaks Reported by Setting

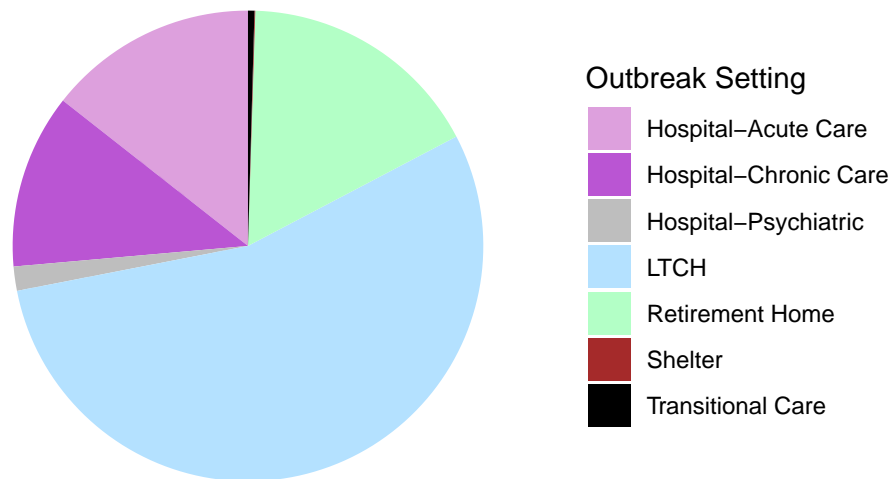
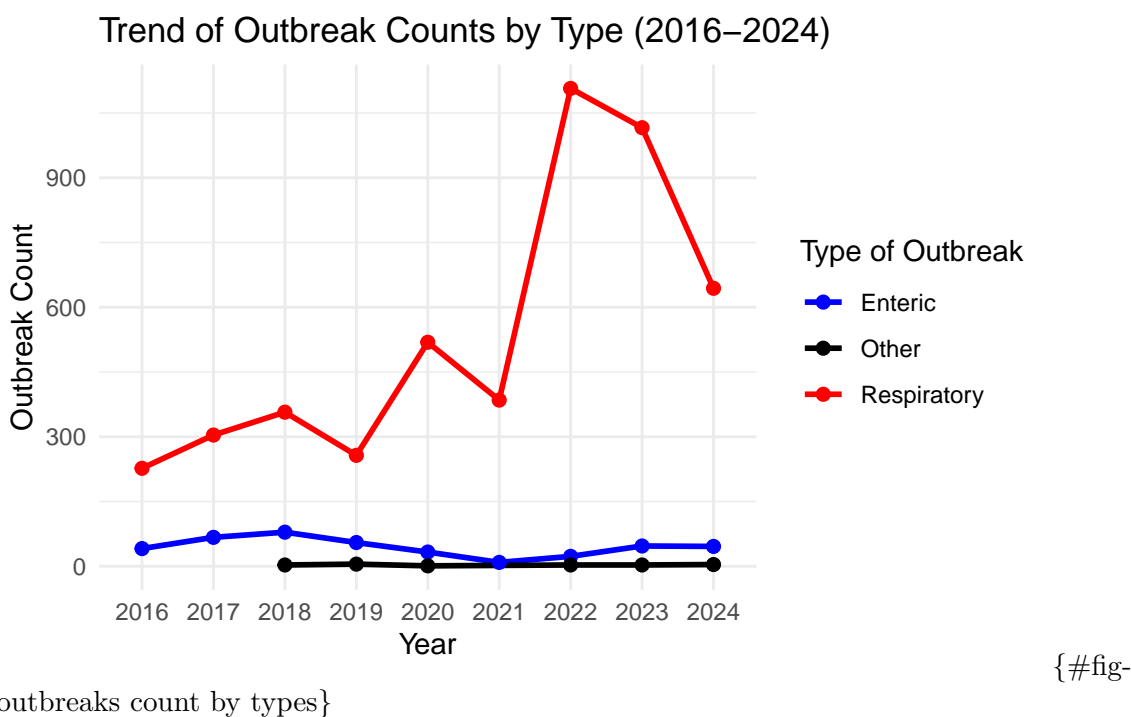


Figure 2: Outbreaks Count by Outbreak Settings

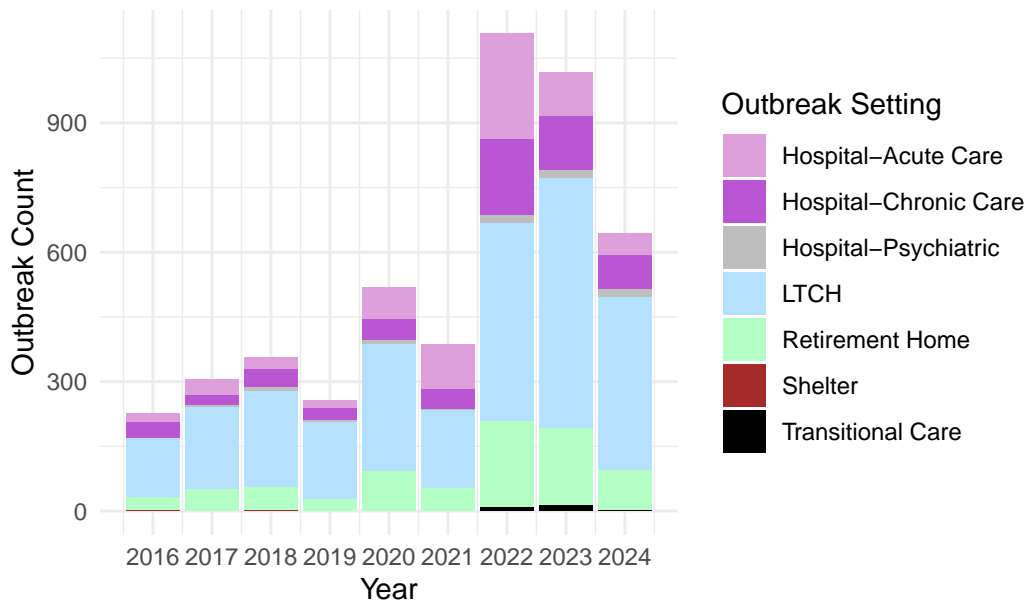
affect the result above, we would like to consider this one by one and proceed with an accurate analysis of the outbreak occurrence situation. `### NEED TO MODIFY` # check for factors such as comparing the number of outbreaks as a whole vs. only in healthcare institutions # would the `_begin`, `_end` sorting of timeline affect the shape of the graph above? # search for background information of healthcare environments in Canada that could relate to the data above

### 3 Result

To dive deeper into the causations of this trend in outbreak reports, we show the frequency trend of top-3 causative agents respectively over the same time period (`?@fig-causations`).



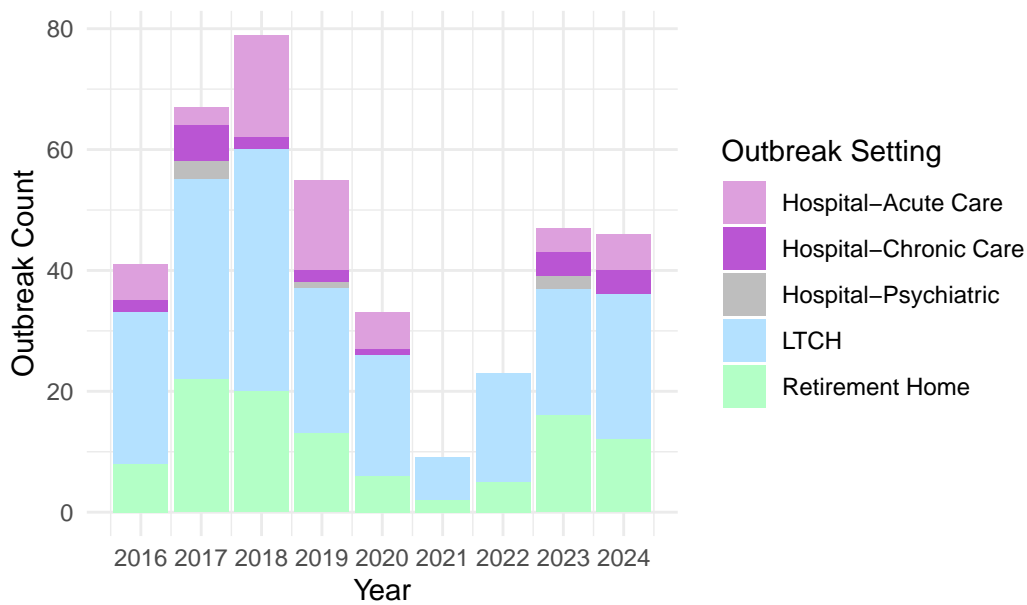
### Annual Respiratory Outbreak Counts by Setting



{#fig-

respiratory outbreaks count by outbreak settings}

### Annual Enteric Outbreak Counts by Setting



{#fig-

enteric outbreaks count by outbreak settings}

Talk way more about it.

## **4 Discussion**

### **4.1 First discussion point**

analyze the total outbreak frequency trend over the time period given. (in relation to the social/political background in healthcare)

### **4.2 Second discussion point**

figure out what might be the main causative agent for the rapid increase in outbreak reports starting from 2022. acknowledging the causative agent that we should be aware of might help us prevent further outbreak increase from happening -> know what is causing this rise in outbreak reports and research about that specific disease settings

### **4.3 Third discussion point**

from the results of the data analysis above, discuss a way we could prevent further increase of outbreak occurrence. in largely three dimensions: personal/ society/ government

### **4.4 Weaknesses and next steps**

Dividing a year into just two could influence the analysis result. (ex. weather affecting the outbreak occurrence) Many 'N/A', 'Unable to identify' data in Causative Agent.

For further inspection, taking the place information in consideration might also have been meaningful.

## **Appendix**

INFO OF RAW DATA, CONDITIONS OF DATA COLLECTION, ETC

### **A Additional data details**

NEED TO MODIFY

## B References

NEED TO ADD REFERENCES

- R Core Team. 2023. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. <https://www.R-project.org/>.
- Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Golemund, et al. 2019. “Welcome to the tidyverse.” *Journal of Open Source Software* 4 (43): 1686. <https://doi.org/10.21105/joss.01686>.