2023 Ontario Monthly Communicable Disease Cases Study*

Discussions and Graphs

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This study analyzes the Monthly Communicable Disease cases for Ontario in 2023, focusing on 3 mainly cosiderred disease: HIV, Salmonellosis, and Sporadic Influenza. This paper presenst the general graphs for each disease, dicusses the genral trends, and further analysis.

1 Introduction

In 2023, Ontario, Canada, experienced distinct trends in the prevalence of communicable diseases such as HIV, Salmonellosis, and Sporadic Influenza. Monitoring and analyzing the seasonal patterns of these diseases is crucial for public health.

HIV, a chronic and life-threatening condition caused by the human immunodeficiency virus, has shown relatively stable case numbers throughout the year.

Salmonellosis is an infection caused by the Salmonella bacteria, typically contracted through the consumption of contaminated food or water. It commonly results in gastrointestinal symptoms such as diarrhea, fever, and abdominal cramps.

Influenza, commonly known as the flu, is a highly contagious respiratory illness caused by influenza viruses.

This paper aims to analyze the statistical trends of these three diseases in Ontario throughout 2023, providing a general overview of their seasonal patterns. We also identify potential drivers of these trends and discuss their implications for public health policy. The findings will contribute to a better understanding of disease dynamics in the region and then support the development of prevention and strategies.

*Code and data are available at: https://github.com/Ruiyang-Wang/STA304-Paper-1.git

We use data and codes from R Core Team (2023), Gelfand (2022), and Wickham et al. (2019). The exact data is from Toronto (2023).

The remainder of this paper is structured as follows. Section 2 Section 3 Section 3.1 Section 3.2 Section 3.3

2 Data Summary

Our data is from Gelfand (2022), named "Monthly Communicable Disease Surveillance". The time range of the whole dataset is from 2016 to 2024. We only extract 3 classic diseases in this dataset for simplification, and set the year of analysis to 2023, which is the most recent full-year data and most unaffected data by COVID-19 after the 2019 Pandemic.

3 Specific Disease Analysis

3.1 HIV

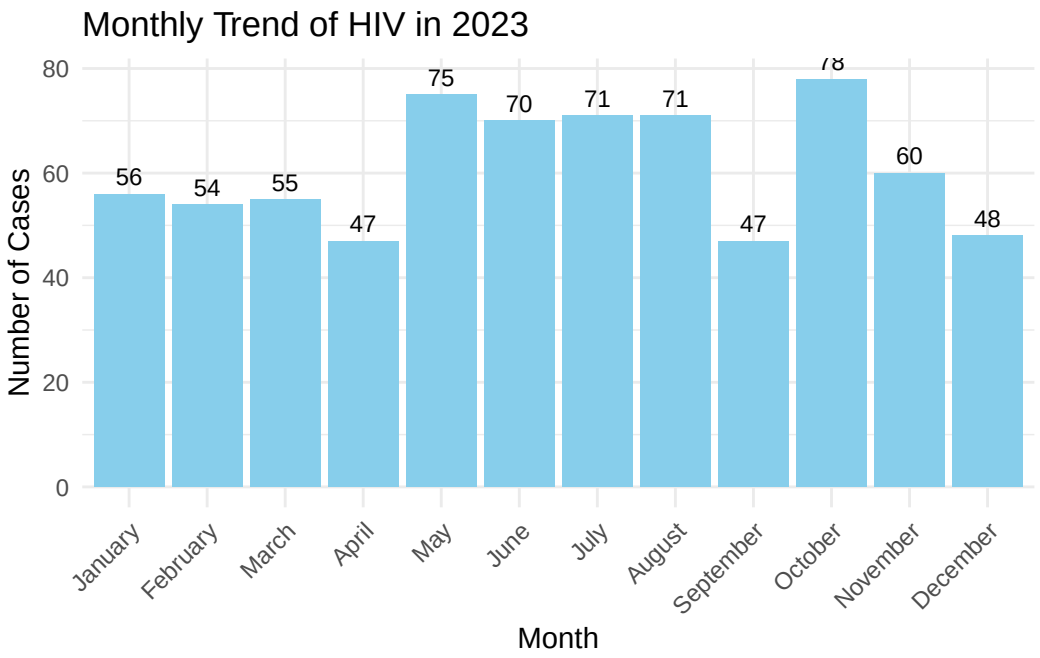

Figure 1: Monthly cases of HIV

3.1.1 Characteristics of HIV in 2023

- The number of HIV cases ranges from around 47 to 78 per month.
- There are noticeable fluctuations throughout the year, with peaks in May and October and a significant drop in April and September.
- The case count is relatively stable in other months, hovering between 50 and 75 cases.

3.1.2 Summary

HIV cases in Ontario displayed moderate monthly fluctuations, with notable peaks in May and October. These variations could be influenced by changes in testing rates or social behaviors.

3.2 Salmonellosis

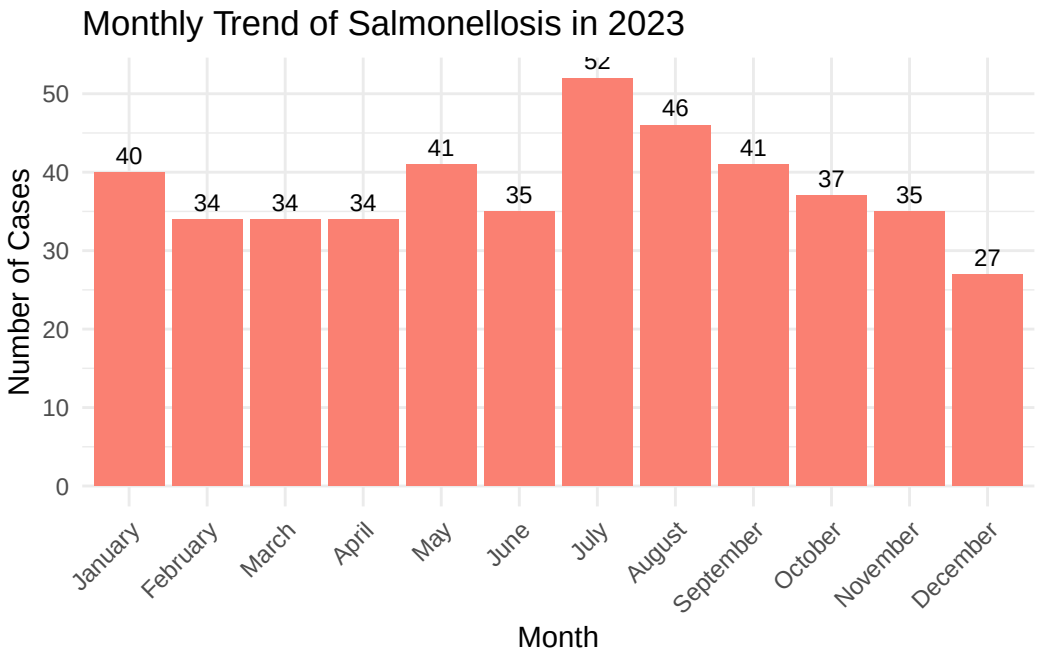

Figure 2: Monthly cases of Salmonellosis

3.2.1 Characteristics of Salmonellosis

- The number of cases is relatively low, ranging from 27 to 52 per month.

- There is a significant peak in July, with a steady increase from April, followed by a decline from August to December.
- Salmonellosis cases are highest in summer months, which is consistent with the bacteria's transmission patterns.

3.2.2 Summary

Salmonellosis cases peaked in the summer months, particularly in July, likely reflecting increased risk factors such as outdoor food consumption and higher temperatures.

3.3 Sporadic Influenza

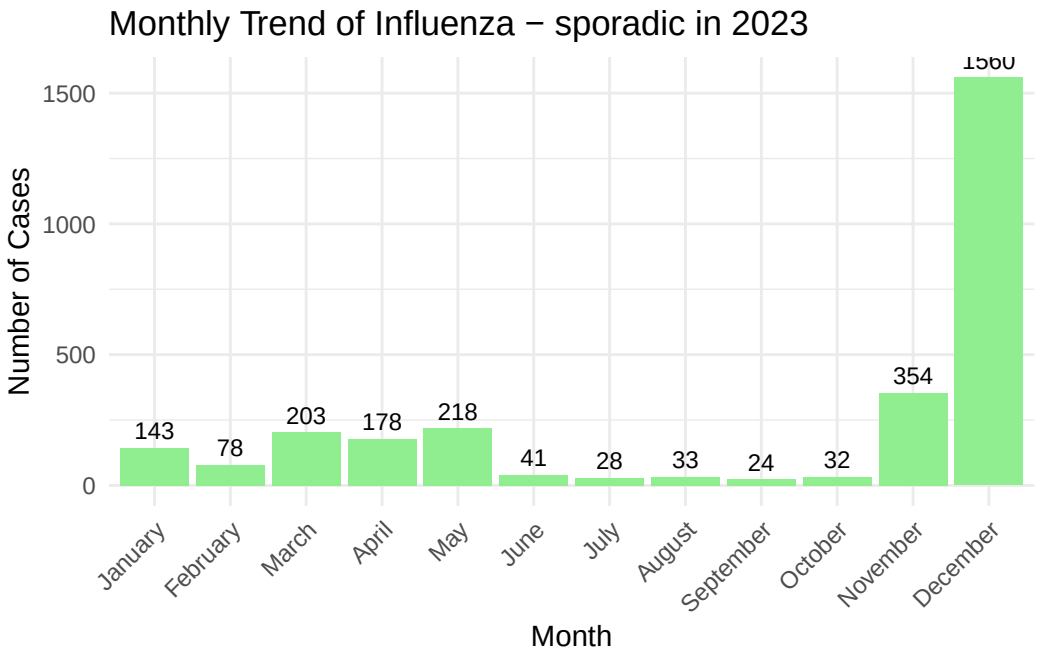

Figure 3: Monthly cases of Sporadic Influenza

3.3.1 Characteristics

- There is a sharp increase in cases in December, reaching a peak of 1560 cases, while the rest of the year shows relatively low numbers.
- A smaller peak in March and a gradual increase from October to November indicate sporadic activity.

3.3.2 Summary

Sporadic Influenza cases spiked sharply in December, marking the onset of the flu season. A smaller peak in March suggests occasional outbreaks earlier in the year.

3.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

Appendix

A Additional data details

B References

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Gelfand, Sharla. 2022. *Opendatatoronto: Access the City of Toronto Open Data Portal*. https://CRAN.R-project.org/package=opendatatoronto.

R Core Team. 2023. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Toronto, City of. 2023. “Monthly Communicable Disease Surveillance Data.” https://open.toronto.ca/dataset/monthly-communicable-disease-surveillance-data/.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D’Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019. “Welcome to the tidyverse.” *Journal of Open Source Software* 4 (43): 1686. https://doi.org/10.21105/joss.01686.