Toronto's Homelessness Crisis*

A Preliminary Analysis of Deaths by Month

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First sentence. Second sentence. Third sentence. Fourth sentence.

1 Introduction

There is a general sense that the homeless crisis in Toronto is getting worse (Katawazi 2024). A recent study (Richard et al. 2024) indicates that, on average, homeless Torontonians are 17 years younger than those who have not experienced homelessness. As the lead author Lucie Richard laments in an interview about the study, there is a lack of cause of death information to help better pinpoint interventions to reduce premature death (Katawazi 2024). Given the lack of cause of death information, it is worthwhile exploring the data that does exist. Toronto Public Health (TPL) has been collecting data on homeless deaths by month since January 2017. We explore this data set and determine what stories the data tells us. These stories may help inform leadership of governmental and non-governmental agencies better utilize their scarce resource in the creation of more effective intervention initiatives reduce deaths among Toronto's homeless population.

2 Data

In this report, we explore the 'Deaths of People Experiencing Homelessness' data set (Data 2024) which was collected using the Open Data Toronto Library (Gelfand 2022) utilizing the statistical programming software R (R Core Team 2023).

*Code and data are available at: https://github.com/MarcusBarnes/Toronto_Homeless_Deaths.

2.1 Deaths of People Experiencing Homelessness Statistics

For the purposes of this dataset, Toronto Public Health (TPH), defines homelessness as "the situation of an individual or family without stable, permanent, appropriate housing, or the immediate prospect, means and ability of acquiring it" (Data 2024). Since January 2017, TPH has counted the number of deaths of people experiencing homelessness by year and month. The deaths are reported to TPH by the Shelter, Support and Housing Administration (SSH), community partner organizations and the Coroner's Office (Data 2024).

3 Analysis

3.1 Summary Statistics

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   1.00    8.00   11.00   12.17   15.00   26.00
```

3.2 Model set-up

3.2.1 Model justification

4 Results

5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Second discussion point

5.3 Third discussion point

5.4 Weaknesses

Weaknesses and next steps should also be included.

5.5 Next Steps

As the dataset under investigation is an example of time series data, are there motifs in the dataset which may provide us more insights? There is a powerful Python library created for exploring motifs in time series data called STUMPY (Law 2019). By using the `reticulate` package (Ushey, Allaire, and Tang 2024), it's possible to use STUMPY within R as demonstrated in a relevant tutorial (frankiethull 2024).

Appendix

A Additional data details

B Model details

B.1 Posterior predictive check

B.2 Diagnostics

References

Data, Toronto Open. 2024. "Deaths of People Experiencing Homelessness." Toronto Public Health. https://open.toronto.ca/dataset/deaths-of-people-experiencing-homelessness/.

frankiethull. 2024. "Stumpyr: STUMPY Tutorial in r." *GitHub Repository*. https://github.com/frankiethull/stumpy-r-tutorial; GitHub.

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

Katawazi, Miriam. 2024. "Torontonians Dealing with Homelessness Are Dying Younger and It's Getting Worse, New Study Finds," August. https://toronto.ctvnews.ca/torontonians-dealing-with-homelessness-are-dying-younger-and-it-s-getting-worse-new-study-finds-1.6995144.

Law, Sean M. 2019. "STUMPY: A Powerful and Scalable Python Library for Time Series Data Mining." *The Journal of Open Source Software* 4 (39): 1504.

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

Richard, Lucie, Brooke Carter, Rosane Nisenbaum, Michael Brown, Mikaela Gabriel, Suzanne Stewart, and Stephen W Hwang. 2024. "Disparities in Healthcare Costs of People Experiencing Homelessness in Toronto, Canada in the Post COVID-19 Pandemic Era: A Matched Cohort Study." *BMC Health Services Research* 24 (1): 1074.

Ushey, Kevin, JJ Allaire, and Yuan Tang. 2024. *Reticulate: Interface to 'Python'*. https://CRAN.R-project.org/package=reticulate.