My title*

My subtitle if needed

First author Another author

January 25, 2024

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

1 Introduction

Toronto's shelter system provides a temporary home to those who are in need of one. The system is essential for Toronto's homeless population and refugees as the shelters uphold standards that support meals and laundry accommodations, mental health and harm reduction services, and a host of counselors to direct and aid individuals acquire permanent housing. Although the shelters provide a multitude of services and aid to secure permanent housing for the unhoused, there are still many who return to shelters after securing housing.

The affordable housing crisis is directly contributing to Toronto's shelter availability crisis. As Toronto's housing market has skyrocketed in the past few years, it is no wonder why Toronto's shelters are receiving significantly more visitors. According to CBC News, an estimated average of at least 273 individuals were turned away from shelters in June 2023 (), which was a record high for Toronto shelters. The amount of families seeking warm beds has been unmatched and as Toronto's winters can be extremely frigid, shelter availability is becoming increasingly more critical.

The goal of this paper is to analyze the demographics that utilize Toronto's shelter system. Varying age groups that utilize shelters are of particular interest. In addition, this paper is also concerned with the actively homeless population and different demographics, such as refugees and single adults, that stay in shelters. Analyzing and studying Toronto's shelter system data can reveal those within society that are struggling the most with securing housing.

The remainder of this paper is structured as follows: the Data section details the collection and processing of Toronto's shelter system data and displays tables and graphs that help illustrate

*Code and data are available at: LINK.

trends found in the data. The following Discussion section analyzes and draws conclusions from the tables and graphs exhibited in the previous section.

2 Data

The data utilized in this paper was retrieved from the City of Toronto's Open Data Portal. The statistical programming language R was used to retrieve, clean, and process the data. In particular, the following R packages were used: opendatatoronto and tidyverse for data acquistion, and janitor for data cleaning and processing.

The shelter system data acquired from the City of Toronto's Open Data Portal provided monthly statistics of Toronto's shelters from January 2018 to December 2023. For each month, the data set included information for the entire population, chronic visitors, refugees, families, youth, single adults, and non-refugees. The information of interest for each of those demographics are the number of individuals that returned to shelters after previously acquiring housing, those that are new to the shelter system, those that are actively homeless, those that identify as male and female, and the number of individuals in each age group in that demographic. The age groups consist of visitors under 16, 16 to 24, 25 to 44, 45 to 64, and 65 years of age or older.

Table 1: Sample set of Toronto shelter system data from 2018 to 2023

Date	Population Group	Returned from Housing	New to Shelter	Actively Homeless	Age Under 16	Age 16-24	Age 25-44	Age 45-64	Age 65+	Males	Females
Jan-18	All Population	46	1106	7958	1233	1111	2901	2291	422	4963	2912
Jan-18	Chronic	11	317	2532	223	346	716	1000	247	1632	870
Jan-18	Refugees	4	651	2408	914	241	961	270	22	1219	1177
Jan-18	Families	0	561	2277	1232	187	687	153	18	968	1308
Jan-18	Youth	12	116	924	0	924	0	0	0	571	312
Jan-18	Single Adult	34	429	4757	0	0	2214	2138	404	3424	1292
Jan-18	Non-refugees	42	455	5550	319	870	1940	2021	400	3744	1735

Date	Population Group	Returned from Housing	New to Shelter	Actively Homeless	Age Under 16	Age 16-24	Age 25-44	Age 45-64	Age 65+	Males	Females
Feb-18	All Population	78	947	8132	1271	1094	2971	2364	432	5093	2959
Feb-18	Chronic	11	217	2541	202	362	707	1017	253	1652	862
Feb-18	Refugees	8	490	2491	965	253	951	303	19	1264	1214
Feb-18	Families	4	435	2336	1268	197	688	167	16	1007	1328
Feb-18	Youth	19	91	893	0	893	0	0	0	556	301
Feb-18	Single Adult	55	421	4903	0	0	2283	2197	416	3530	1330
Feb-18	Non-refugees	70	457	5641	306	841	2020	2061	413	3829	1745

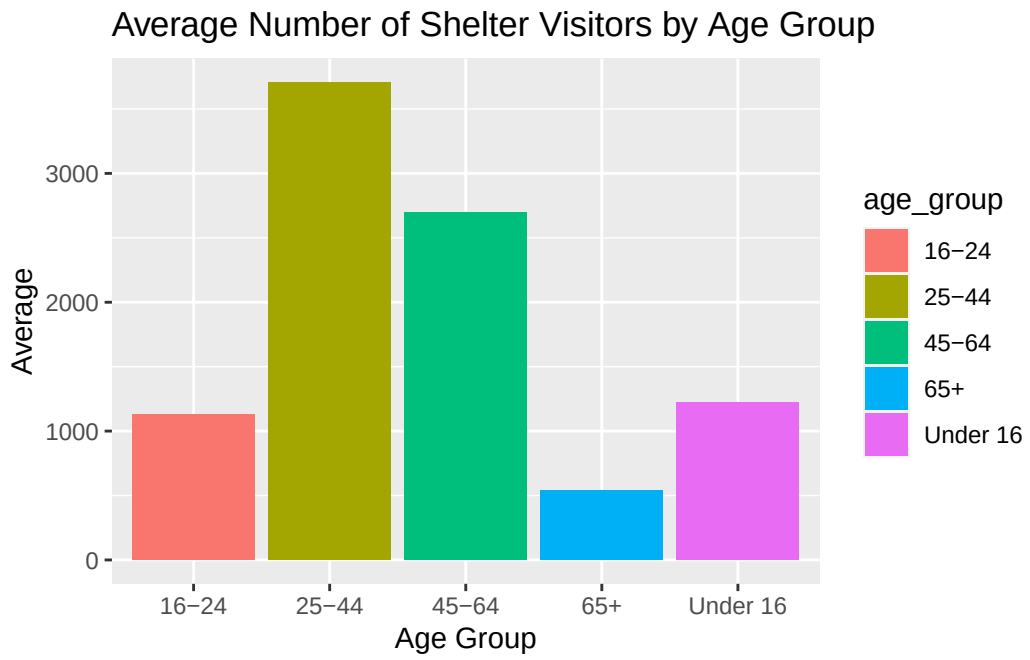

Figure 1: The average of all shelter visitors in each age group over 6 years from 2018 to 2023

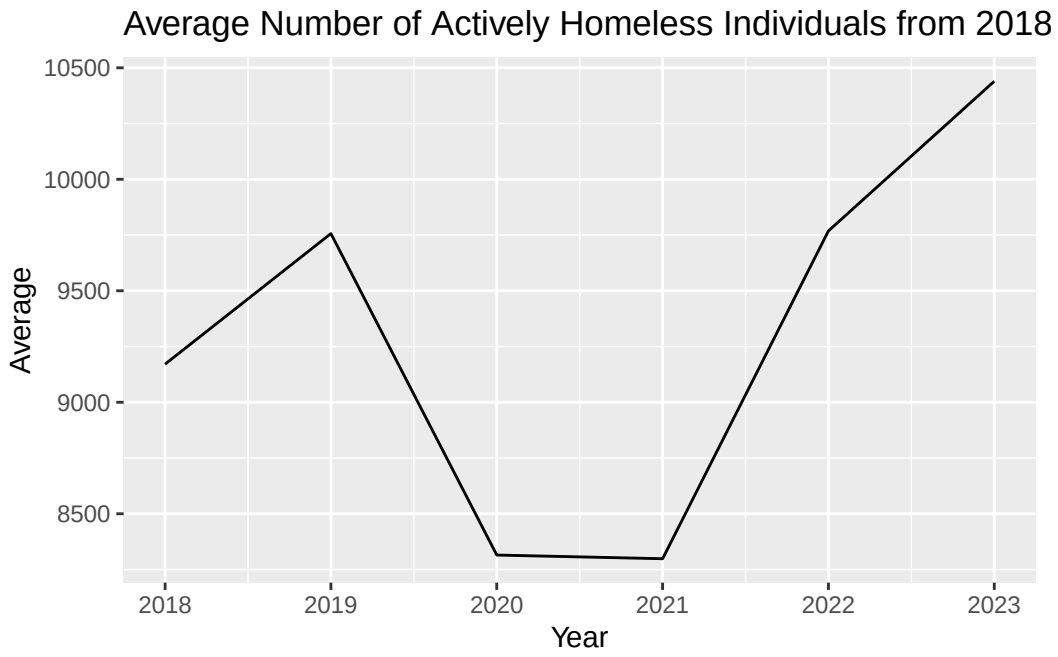

Figure 2: The average number of actively homeless people from 2018 to 2023

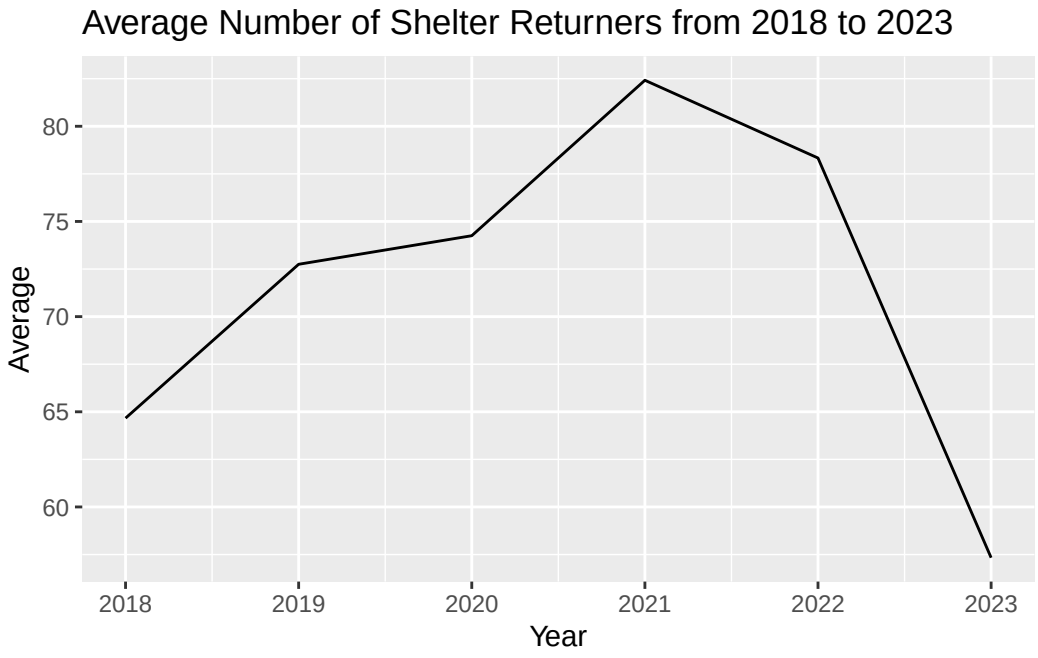

Figure 3: The average of number of visitors who returned to shelters from 2018 to 2023

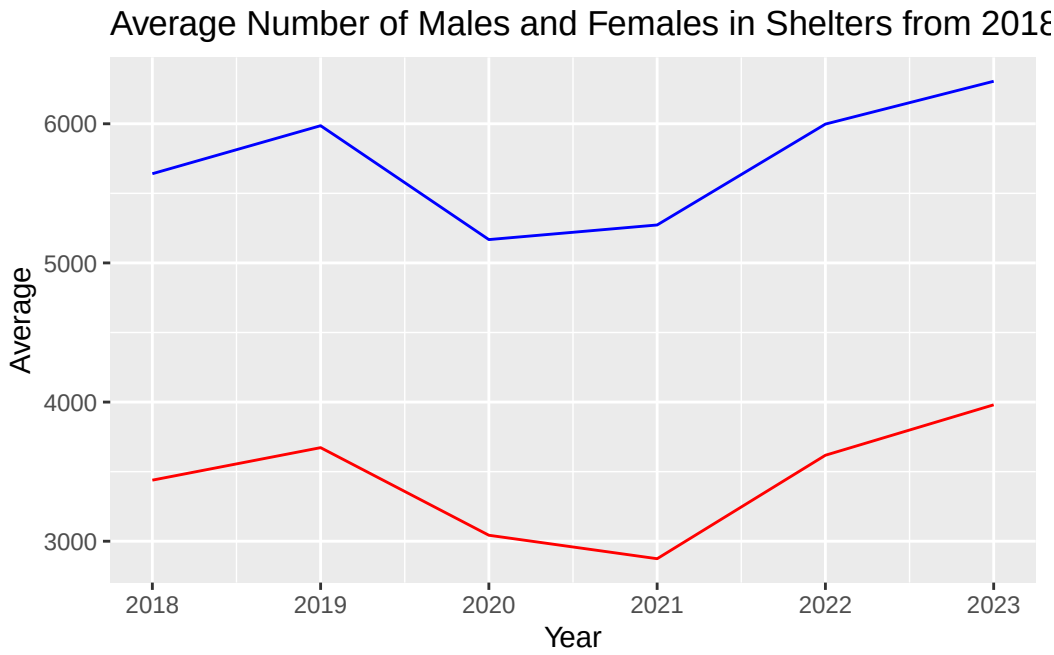

Figure 4: The average of all shelter visitors in each age group over 6 years from 2018 to 2023

3 Model

The goal of our modelling strategy is twofold. Firstly,...

Here we briefly describe the Bayesian analysis model used to investigate... Background details and diagnostics are included in Appendix B.

3.1 Model set-up

Define y_i as the number of seconds that the plane remained aloft. Then β_i is the wing width and γ_i is the wing length, both measured in millimeters.

$$y_i|\mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \tag{1}$$
$$\mu_i = \alpha + \beta_i + \gamma_i \tag{2}$$
$$\alpha \sim \text{Normal}(0, 2.5) \tag{3}$$
$$\beta \sim \text{Normal}(0, 2.5) \tag{4}$$
$$\gamma \sim \text{Normal}(0, 2.5) \tag{5}$$
$$\sigma \sim \text{Exponential}(1) \tag{6}$$

We run the model in R (R Core Team 2022) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors from `rstanarm`.

3.1.1 Model justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular...

We can use maths by including latex between dollar signs, for instance θ.

4 Results

Our results are summarized in **?@tbl-modelresults**.

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 and next steps

Weaknesses and next steps should also be included.

Appendix

A Additional data details

B Model details

B.1 Posterior predictive check

In **?@fig-ppcheckandposteriorvsprior-1** we implement a posterior predictive check. This shows...

In **?@fig-ppcheckandposteriorvsprior-2** we compare the posterior with the prior. This shows...

B.2 Diagnostics

?@fig-stanareyouokay-1 is a trace plot. It shows... This suggests...

?@fig-stanareyouokay-2 is a Rhat plot. It shows... This suggests...

References

Goodrich, Ben, Jonah Gabry, Imad Ali, and Sam Brilleman. 2022. "Rstanarm: Bayesian Applied Regression Modeling via Stan." https://mc-stan.org/rstanarm/.

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