Homelessness and Drug Toxicity*

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

1 Introduction

You can and should cross-reference sections and sub-sections. We use R Core Team (2023) and Wickham et al. (2019a).

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

2 Data

We obtained our data from the City of Toronto **opendatatoronto** database portal, using the 'opendatatoronto' package (Gelfand 2020) and the statistical programming language **R** (R Core Team 2023). I used the **tidyverse** package for data manipulation (Wickham et al. 2019b) and **kableExtra** for table formatting (Zhu 2021). The header includes two lines of code **"usepackage{float}"** which allows the use of float in R markdown and the line **"floatplacement{figure}{H}"** (user9112767 2018) which keeps the tables and figures locked in the specific place where they are written in R markdown.

This data set records reports of homeless deaths across Toronto and records the details of the deceased. The data records the **year of death, cause of death, age group, gender, and number of deaths** for every report. The data classifies cases by age group rather than specific ages, age groups are grouped by 20 year age gaps (E.g. "20 to 39 Years") except for the first group which is **"<20"** and the last group which is **"60+"**. Gender is identified and reported as **"Male"** or **"Female"**. Year of death is simply as the year the deaths were reported, starting from **2017** up until **2023**. Cause of deaths are classified as follows: **"Accident"**, **"Cancer"**, **"Cardiovascular Disease"**, **"Covid-19"**, **"Drug Toxicity"**, **"Homicide"**,

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*Code and data are available at: https://github.com/MohidSharif/Drug-Toxicity-and-Homelessness..

"Pneumonia", "Other", "Suicide", and "Unknown/Pending". And the number of deaths is simply the number of deaths provided in that report.

Since we are only interested in deaths due to drug toxicity, we simplified the data and created two datasets. First the data was cleaned to remove any **"Unknown"** or **empty** values. Then causes of death due to **Drug Toxicity** were isolated and all others were removed from the dataset. We then created two datasets, one highlighting the number deaths per year for each gender and one for the number of deaths per year for each age group. Since case in the data set reported multiple deaths, therefore all counts from each report had to be added to their respective grouping to create a new death count variable for the two datasets. Using these new datasets we can now compare and analyze the death trend oover the years for each gender and age group.

Table 1 shows the data associated with cases reported as "death due to drug toxicity".This data shows us year, age group, gender and count of each reported case of drug toxicity.

Table 1: Age Group Deaths Due to Drug Toxicity

Year	Age Group	Deaths
2017	<20	0
2017	20-39	13
2017	40-59	15
2017	60+	3
2018	<20	0
2018	20-39	16
2018	40-59	15
2018	60+	2

Table 2 shows the data associated with cases reported as "death due to drug toxicity".This data shows us year, age group, gender and count of each reported case of drug toxicity.

Table 2: Gender Deaths Due to Drug Toxicity

Year	Gender	Deaths
2017	Male	26
2017	Female	5
2018	Male	22
2018	Female	11
2019	Male	26
2019	Female	13
2020	Male	57

| 2020 | Female | 17 |

Talk more about it.
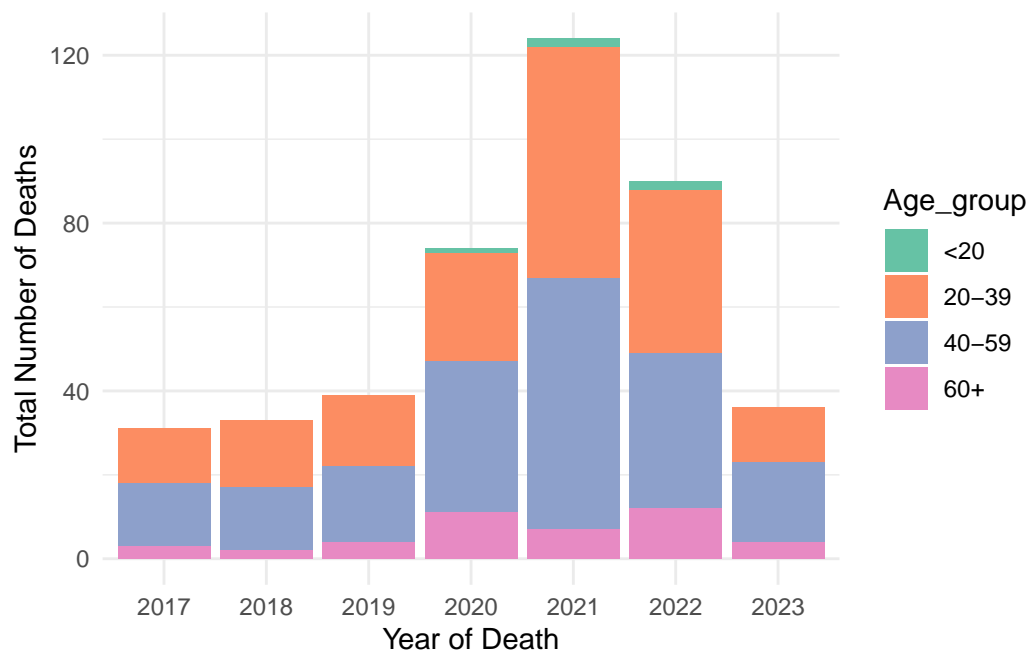
Talk way more about it.
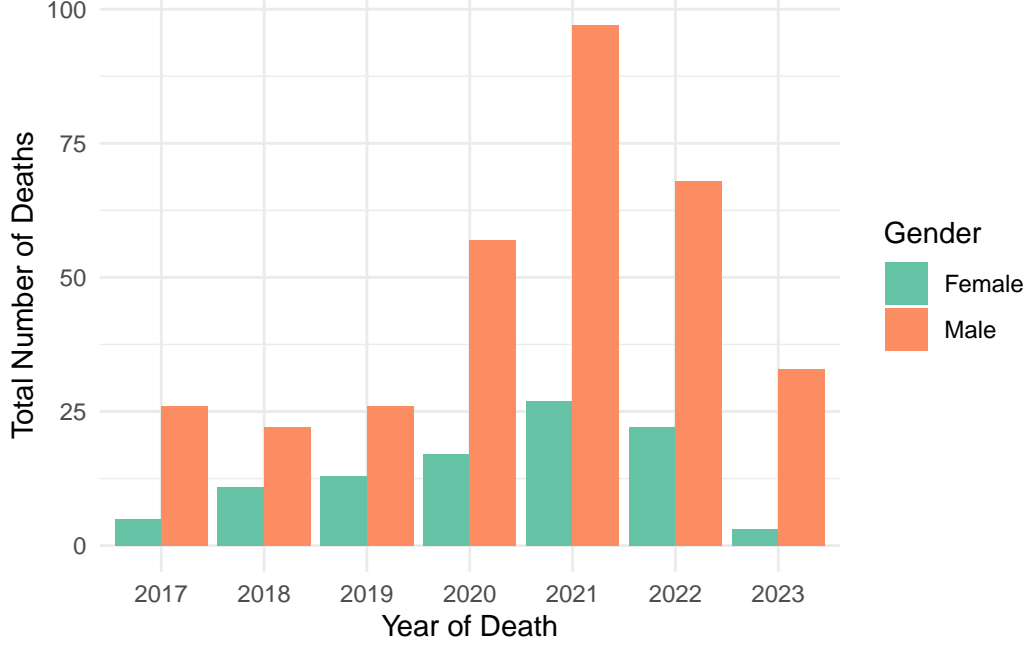

Figure 1: Deaths Per Year for Age Group

Figure 2: Deaths Per Year per Gender

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.

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

Table 3: Explanatory models of flight time based on wing width and wing length

	Gender Only	Age Only	Age and Gender
(Intercept)	9.63	10.11	9.92
	(1.04)	(0.71)	(1.18)
gendersMale	0.74		0.24
	(1.15)		(1.23)
age_groups20-39		0.32	0.36
		(1.22)	(1.22)
age_groups40-59		−3.13	−3.08
		(1.75)	(1.78)
age_groups60+		1.30	1.25
		(1.94)	(1.99)
Num.Obs.	35	35	35
R2	0.018	0.170	0.190
R2 Adj.	−0.073	−0.123	−0.180
Log.Lik.	−88.599	−86.748	−86.975
ELPD	−90.9	−91.1	−92.1
ELPD s.e.	3.9	3.5	3.5
LOOIC	181.7	182.2	184.2
LOOIC s.e.	7.9	7.0	6.9
WAIC	181.7	181.8	183.8
RMSE	2.98	2.79	2.79

We run the model in R (R Core Team 2023) 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 Table 3.

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

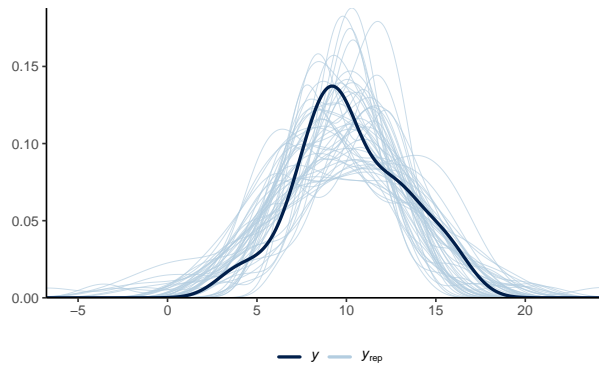Weaknesses and next steps should also be included.

Appendix

A Additional data details

B Model details

B.1 Posterior predictive check

In Figure 3 we implement a posterior predictive check. This shows...

(a) Posterior prediction check

Figure 3: Examining how the model fits, and is affected by, the data

B.2 Diagnostics

Figure 4 is a trace and rhat plot. It shows... This suggests...
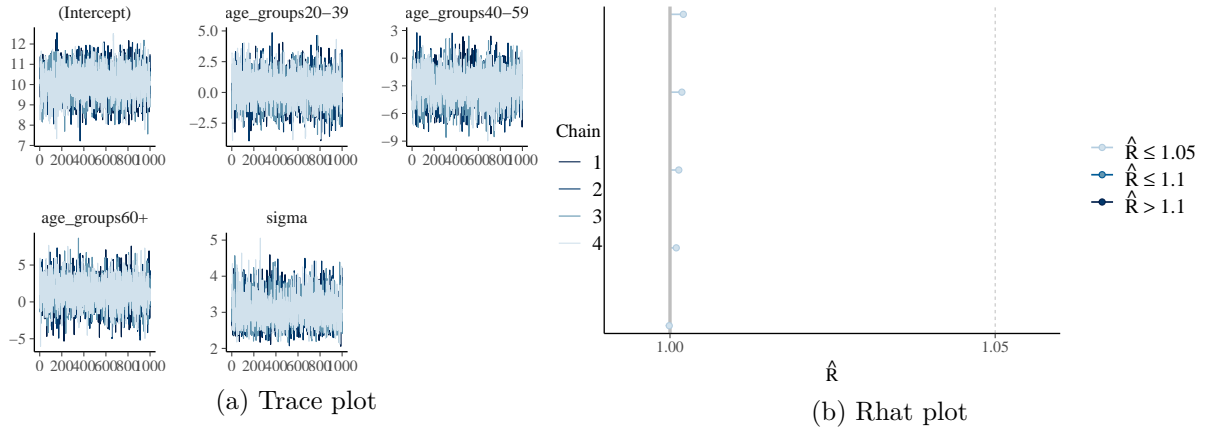
(a) Trace plot

(b) Rhat plot

Figure 4: Checking the convergence of the MCMC algorithm

References

Gelfand, Sharla. 2020. *Opendatatoronto: Access the City of Toronto Open Data Portal*.

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

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

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