Park Washroom Facilities*

Is the distribution of Park Washroom Facilities in the City of Toronto even?

Haoan Wang

September 24, 2024

This paper examines public washroom facilities managed by the City of Toronto's Parks, Forestry, and Recreation (PFR) division. Using data from the City of Toronto's Asset Management System, it analyzes the availability of washrooms in parks, portable toilets, and facilities inside community centers, schools, and other recreational buildings. Only washrooms open for public use are considered, excluding private or staff-only facilities. The analysis is based on data validated by on-site parks supervisors and inter-divisional staff, providing a comprehensive overview of public washroom access in Toronto's parks and recreation system.

```
library(tidyverse)
```

```
-- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
v dplyr     1.1.4     v readr     2.1.5
v forcats   1.0.0     v stringr   1.5.1
v ggplot2   3.5.1     v tibble    3.2.1
v lubridate 1.9.3     v tidyr     1.3.1
v purrr     1.0.2
-- Conflicts ------------------------------------------ tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to beco
```

```
library(ggplot2)
library(dplyr)
library(readr)
library(janitor)
```

*Code and data are available at: https://github.com/s1lentw/paper1

```
Attaching package: 'janitor'

The following objects are masked from 'package:stats':

    chisq.test, fisher.test
```

```
library(opendatatoronto)
library(knitr)
library(readr)
```

1 Introduction

Public washroom facilities are an essential form of social infrastructure in urban environments. They serve a range of purposes, from providing accessible sanitation for park visitors to supporting recreational activities and promoting public health. More importantly, they are available for free to all members of the public, making them a vital service for individuals of diverse backgrounds, including those experiencing homelessness or transient visitors. These facilities are not just practical necessities, but also act as inclusive spaces that promote equity and accessibility in public areas. In a city where many services are privatized or commodified, public washroom facilities remain a key component of social welfare.

The City of Toronto's Parks, Forestry, and Recreation (PFR) division manages these washroom facilities across the city's parks and recreational spaces. With facilities ranging from permanent washroom buildings to portable toilets, they are located in parks, community centers, and sports complexes, ensuring that both residents and visitors have access to essential services. Additionally, these washrooms are placed strategically across Toronto's vast park system to meet the needs of different communities. However, the distribution of these facilities may vary depending on the neighborhood, park usage, and the city's development priorities, raising questions about equitable access to these vital resources.

This paper aims to assess the distribution of public washroom facilities across Toronto's parks, focusing on their availability in the city's 25 wards. The analysis will explore the number of washroom facilities in each ward, their types (permanent vs. portable), and the accessibility for diverse populations. The findings will highlight whether certain areas of the city are underserved in terms of public washroom access and suggest where future facilities might be needed or existing ones expanded. Future research could also investigate demographic factors, such as income levels, to determine if washroom facilities are disproportionately located in lower- or higher-income neighborhoods, helping to ensure equitable access to public infrastructure.

2 Data

2.1 Data tools

The data utilized in this study was obtained from the OpenData Toronto portal via the opendatatoronto library (Gelfand 2022). Data cleaning and analysis were performed using the open-source statistical programming language R (R Core Team 2023). The libraries tidyverse (Wickham et al. 2019), janitor (Firke 2023), knitr (Xie 2022), dplyr (Wickham et al. 2023), and lubridate (Grolemund and Wickham 2011) were employed for simulation, cleaning, and testing. Visualizations were created using ggplot2 (Wickham 2016).

2.2 Overview of Dataset

The selected dataset was operated by the City of Toronto Parks, Forestry and Recreation (PFR) division. In the dataset we contains the washroom facilities like: washroom buildings in parks; portable toilets in parks; or washrooms located inside community centres, schools, pool buildings, rink buildings, fieldhouses and clubhouses. Only washrooms open for public use have been identified in this dataset. This dataset does not include washrooms that may be private or used by members/staff only. The chosen variables of analysis were the Location, The details of the location, Type of the washroom, Accessible, and the status of this washrooms.(0 = closed 1 = open 2 = service alert) See `Table 1` for an overview of the data.

```
Rows: 418 Columns: 17
-- Column specification --------------------------------------------------------
Delimiter: ","
chr  (12): location, alternative_name, type, accessible, hours, location_det...
dbl   (4): _id, id, asset_id, Status
dttm  (1): PostedDate

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

Location	Location Details
Bellevue Square Park	Located at the east end of the playground.
Colonel Danforth Park	Located on the pathway west of the parking lot.
East Point Park	Entrance is located on the outside of the Softball Complex.
Port Union Village Common Park	Located on the pathway between parking lot and the playground.
Adams Park	Located on the pathway west of the splash pad.
E.T. Seton Park	Located on the pathway between the north parking lot and archery range.

Table 1: Sample of Toronto Park Washroom Facilities

The most interesting data to study in the entire database are these six sets. Through this data, we aim to research and discuss the distribution of toilets, the usage time of toilets, and their current status.

```
# A tibble: 2 x 2
  type              count
  <chr>             <int>
1 Portable Toilet      74
2 Washroom Building   344
```

Talk way more about it.

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 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 **?@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…

Examining how the model fits, and is affected
by, the data

Figure 1: **?(caption)**

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