Torontonians Prefer to Get Married in the Warmer Half of the Year*

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We examine marriage licenses obtained in the city of Toronto in the year 2022 and 2023 by months, dividing the year into warm months (April, May, June, July, August, September) and cold months (October, November, December, January, Febuary, March). We found that the number of marriage licenses obtained in 2022 increased by 117% between cold and warm months and 68% in 2023. This supports our hypothesis that Torontonians prefer to get married during the warmer half of the year.

1 Introduction

According to Pantazi (2017), summer is the hottest time to get married due to more dress options, the opportunity to have an outdoor wedding, and relatively easier travel among other reasons, but is this actually true in Toronto? Toronto is a city known for cold weather in the winter with snow from October to March (Gough et al. (2014)). This means that we expect the amount of marriage licenses obtained in Toronto should increase during the warm months of April through September and decrease during the cold months of October through March. By knowing whether or not more marriages occur during the summer months, prospective couples in Toronto can plan ahead and avoid peak seasons for applying for a marriage license and any delays that result.

In the Data section, we download marriage license data from opendatatoronto(Gelfand (2022)), a database maintained by the City of Toronto. This dataset features the number of marriage licenses issued in Toronto by month, beginning January 1 2011. We will be looking at data from 2023 and 2022, as well as any changes in the number of marriage licenses between the two years.

*Code and data are available at: https://github.com/Diana-Guanzhi-Liu/Analysis-of-Toronto-Marriages

We formulate our hypothesis to be that there are more marriage licenses obtained in warm months of April to September than cold months of October to March because Torontonians prefer to get married during the warmer half of the year. We analyzed the data in the Results section by plotting the number of licenses against the month in which they were obtained so we can see the change in the number of marriage licenses from month to month. Since there are only 12 data points in each graph, we are also able to label each observation with the exact number of marriage licenses issued. Then we calculated the total amount and the average amount of marriage licenses in the warm months and cold months of each year, and the percent change between them. Our results show that our hypothesis is correct with the number of marriage licenses steadily increasing from February to May, peaking around July, then decreasing between September and November before hitting its lowest in January. This cyclic nature can be observed for both 2022 and 2023.

*insert discussion in intro

2 Data

Our data is Marriage Licence Statistics from Open Data Toronto (Gelfand (2022)) which contains data sets maintained by the City of Toronto. The Marriage Licence Statistics dataset consists of monthly number of marriage licenses obtained from 2011 to 2023 in the Greater Toronto Area, it was last updated 2024-01-14. No similar data sets could have been used because this dataset is the only one of marriage licences. Looking at (Figure 1), the Marriage Licence Statistics dataset contains only four variables: x_id, civic centres, marriage licenses, and date, but only civic centres, marriage licenses, and date were used in our analysis. The data was cleaned and analysed using the statistical software R (R Core Team (2022)) with the assistance of tidyverse (Wickham et al. (2019)), dyplr (Wickham et al. (2023)), ggplot2 (Wickham (2016)), tinytex (Xie (2023)), gt (Iannone et al. (2022)), and stringr ((**stringr?**)).

We selected the past two years due to some 2021 data being missing and the fact that Covid-19 in 2020 caused a significant decrease in the number of marriage licenses that were obtained all year compared to other years (Wagner, Kate H. Choi, and Cohen (2020)).

X_id	CIVIC_CENTRE	MARRIAGE_LICENSES	TIME_PERIOD
11101	ET	80	2011-01
11102	NY	136	2011-01
11103	SC	159	2011-01
11104	TO	367	2011-01
11105	ET	109	2011-02
11106	NY	150	2011-02

Figure 1: Sample of Raw Marriage License Data in Toronto

2.1 Civic Centres

CIVIC_CENTRE is the second column in Figure 1 and contains a two letter abbreviation of the city in which the marriage licenses are issued, ET for Etobicoke, NY for North York, SC for Scarborough, and TO for Toronto. Each civic centre has its own row of corresponding date, number of marriage licenses, and id. During the data cleaning process, we filter out ET, NY, and SC so we can focus on Toronto. After filtering, we will not need the variable anymore (**?@fig-cleaned_toronto_marriages**).

2.2 Marriage Licenses

MARRIAGE_LICENSES is the 3rd column in Figure 1 and denotes how many licenses were obtained. It is important to note that obtaining a marriage license is separate from the wedding ceremony itself, but the two often take place consecutively because a marriage license is required in the province of Ontario to become legally married ("Marriage Services" (2024)).

There are 12 observations per year for each month (Figure 2). This makes 24 observations for 2022-23 between 472 and 1758, with an average of 1043.3 marriage licenses obtained.

2.3 Date (Month)

TIME_PERIOD is the month in which the marriage licenses were obtained in a yyyy-mm date format. When we clean the data, we must add a -dd to the end of each date value in order for the dates to be in an unambiguous format. Then the date is filtered by year to separate 2022 and 2023 from the rest of the dataset.

2.4 Cleaned Data

Date	Marriages
2022-January-01	472
2022-February-01	536
2022-March-01	1220
2022-April-01	1265
2022-May-01	1269
2022-June-01	1658

Figure 2: Sample of Cleaned Marriage License Data in Toronto by Month in 2022

After the data we need has been cleaned, it is saved into 3 .csv files, one for 2022 and another for 2023, both of which have 12 observations one for each month. The third .csv file conains both years and has 24 observations. The only columns that remain in any file are Date and Marriages (Figure 2).

3 Results

In order to determine if there is a difference in the amount of marriage licenses issued in Toronto between warm months (April to September) compared to cold months (October to March), we plot the number of marriage licenses for each month separately for 2022, 2023 and both years together.

3.1 2022 Marriage Licenses

(1)

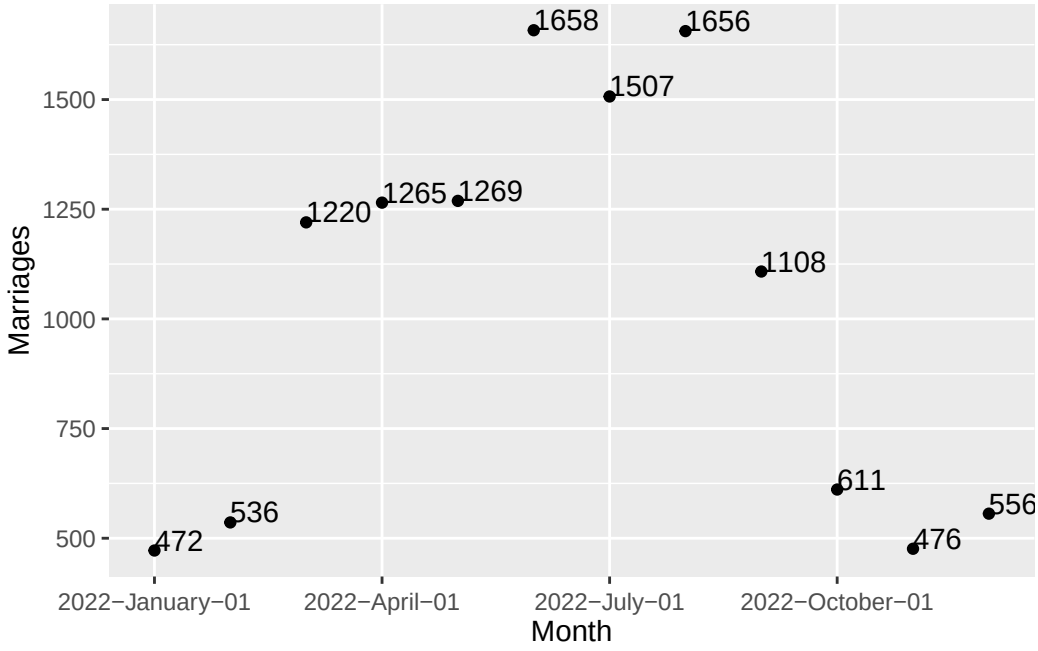

Figure 3: Number of marriage licenses issued in Toronto in 2022

We used ggplot to plot each marriage license observation for each month, then we connected the points so the trend over time is easier to observe. Looking at 1, we can see that January has the lowest amount marriage licenses being issued of 472. A slight increase of 62 licenses occurs in February, followed by an increase in in March of 684, more than doubling the amount in

February. Then there is a slight plateau for 3 months before another increase to 1658 licenses in June, this is also the max in 2022 and a $1658/472 \approx 350\%$increase since January. There is another plateau which ends in September when the number of licenses falls to 1108. This decrease continues to October where the number if licenses plateau once again around 500.

When we examine our graph separated into warm months (April, May, June, July, August, September) and cold months (October, November, December, January, February, March), we can see that there is a $(8463 - 3871)/3871 \approx 117\%$ increase between the number of marriage licenses in cold and warm months

$$\textit{Total Marriages Warm Months } 2022$$
$$1265 + 1269 + 1658 + 1507 + 1656 + 1108 = 8463$$
$$\textit{Average} = 1410.5$$
$$\textit{Total Marriages Cold Months } 2022$$
$$611 + 476 + 556 + 472 + 536 + 1220 = 3871$$
$$\textit{Average} = 645.2$$

3.2 2023

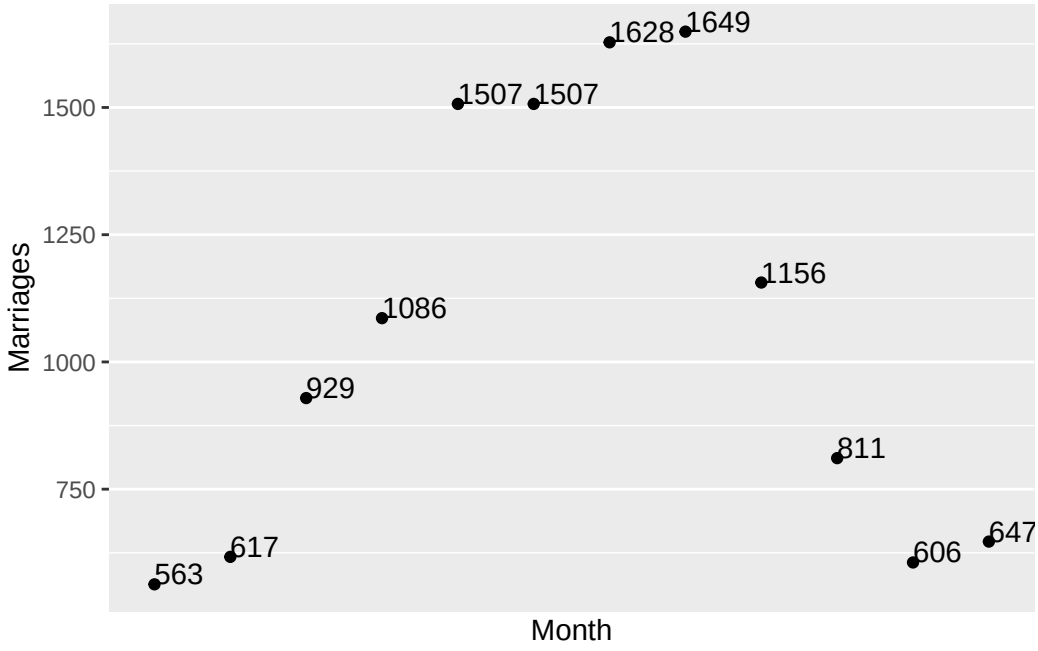

Figure 4: Number of marriage licenses issued in Toronto in 2023

2023 is similar to 2022 in terms of the general pattern of increases and decreases in the number of marriage licenses obtained (Figure 4). Once again January is the min and a large increase

from 517 to 929 takes place between February and March. This increase continues until it hits 1507 licenses in May where it levels off. August is the max with 1649 licenses. The decrease like 2022, starts in September and continues until November.

In 2023 there is a $(7026 - 4146)/4146 \approx 68\%$ increase between warm and cold months.

$$\begin{aligned} &\textit{Total Marriages Warm Months } 2023 \\ &1086 + 1507 + 1507 + 1628 + 1649 + 1156 = 7026 \\ &\textit{Average} = 1171 \\ &\textit{Total Marriages Cold Months } 2023 \\ &811 + 606 + 647 + 563 + 617 + 929 = 4146 \\ &\textit{Average} = 691 \end{aligned}$$

The results indicate that our hypothesis is correct. There are more marriage licenses issued in warm months (April to September) than cold months (October to March).

3.3 Both Years

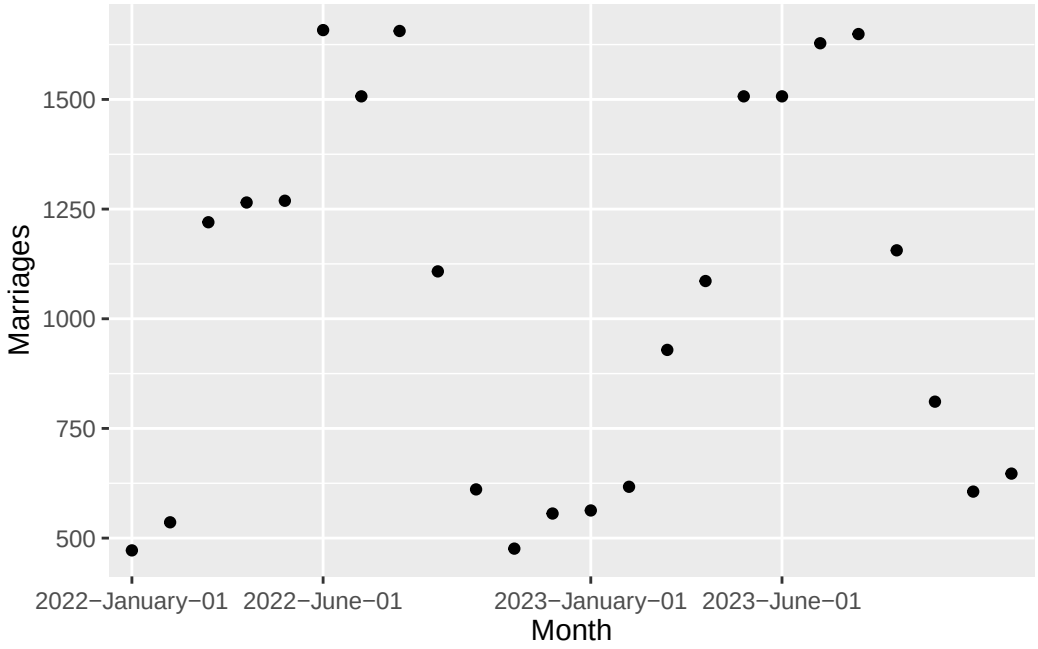

Figure 5: Number of marriage licenses issued in Toronto in 2022 and 2023

Finally, I plotted both 2022 and 2023 together so the trend over time is easier to see. This cyclical nature of more marriage licenses obtained in warm months is evident (Figure 5).

4 Discussion

4.1 Findings

In both 2022 and 2023, there was more marriage licenses issued in warm months than cold ones, 117% more in 2022 and 68% more in 2023. This confirms our hypothesis of more marriages taking place from April to September.

Compared with the 2022 data, the total number of marriage licenses in 2023 only changed by $(12334 - 12706)/12706 = -0.0292 \approx -2.92\%$. This small amount of change indicates that approximately the same number of couples get married in Toronto each year, so any increases in the number of marriages for any given month is unlikely to be attributable to a total increase in marriages.

With these findings we can conclude that April to September is the busy season for marriage license applications and October to March is the less busy season. Since applying for a marriage license comes before the actual wedding ceremony, we can infer that more licenses equate to more weddings. This means that there is more demand for venues, photographers, and catering for weddings from April to September making these services harder to book and potentially more expensive.

Prospective couples should consider the trend of higher volume marriage license applications in the warm months when applying for their marriage license because although many Torontonians prefer getting married in the warm month, the higher volume of marriage license application could cause delays. The higher demand for wedding ceremonies should also be a part of budgeting for their weddings.

4.2 Weaknesses and Next Steps

A weakness in our analysis is the small quantity of data that was used to come to our conclusion. While the pattern of increased marriage licenses was present in both 2022 and 2023, this might not have been the case in prior years. Performing the same analysis on years 2011 to 2021 will confirm our results.

Both years have not only warm monhs where the number of marriage licenses is high and cold months where it is low, but also in between seasons when the number is increasing or decreasing. The analysis could be more nuanced if it had divided the year into 4 instead of 2 by including spring and autumn.

We assumed that obtaining a marriage license comes before conducting the wedding ceremony, but this is not necessarily the case. Some couples can choose to get a license without a ceremony, therefore a higher volume in marriage licenses during warm months does not automatically equate to higher demand for wedding ceremonies. Further analysis of the number of marriage

licenses obtained compared with the number of wedding ceremonies that take place should be conducted to confirm this link.

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