

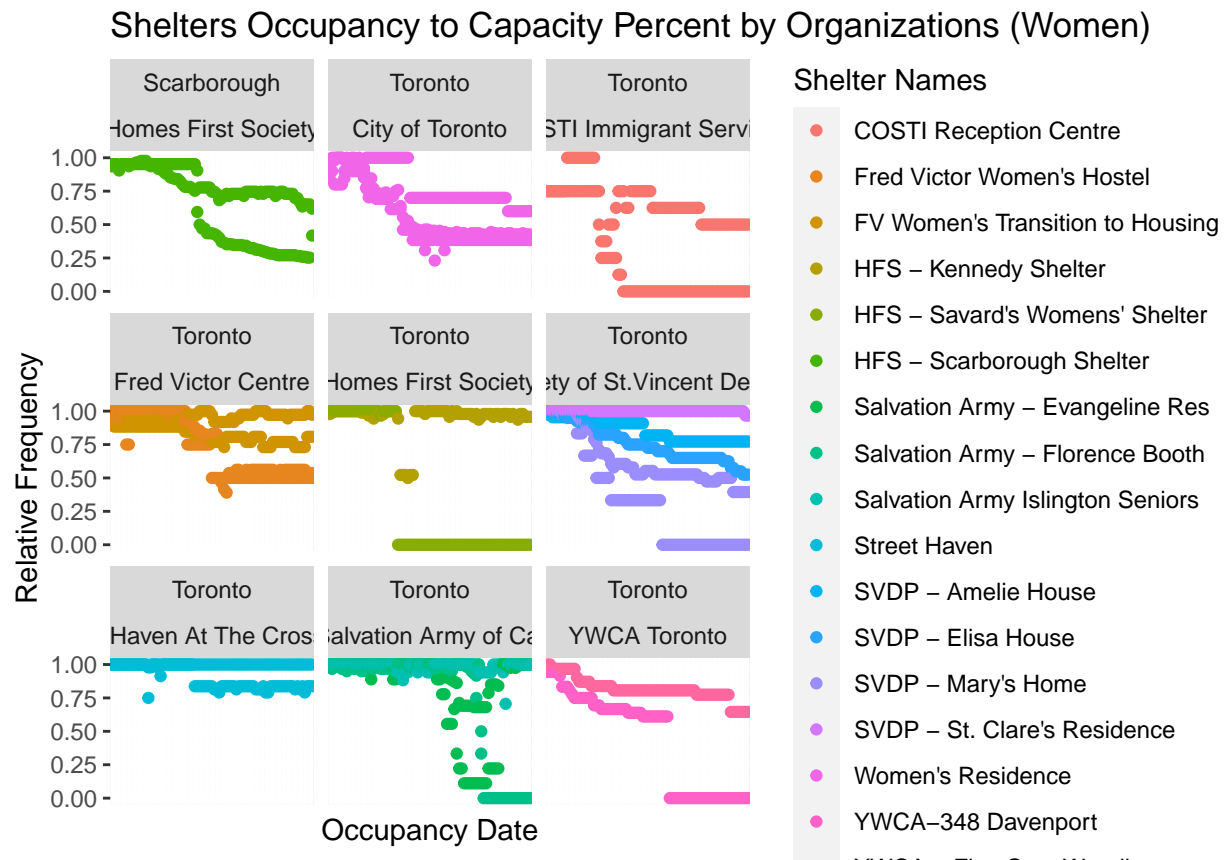
DataFest 2020 - How Will COVID-19 Affect the Occupancy in Temporary Shelters?

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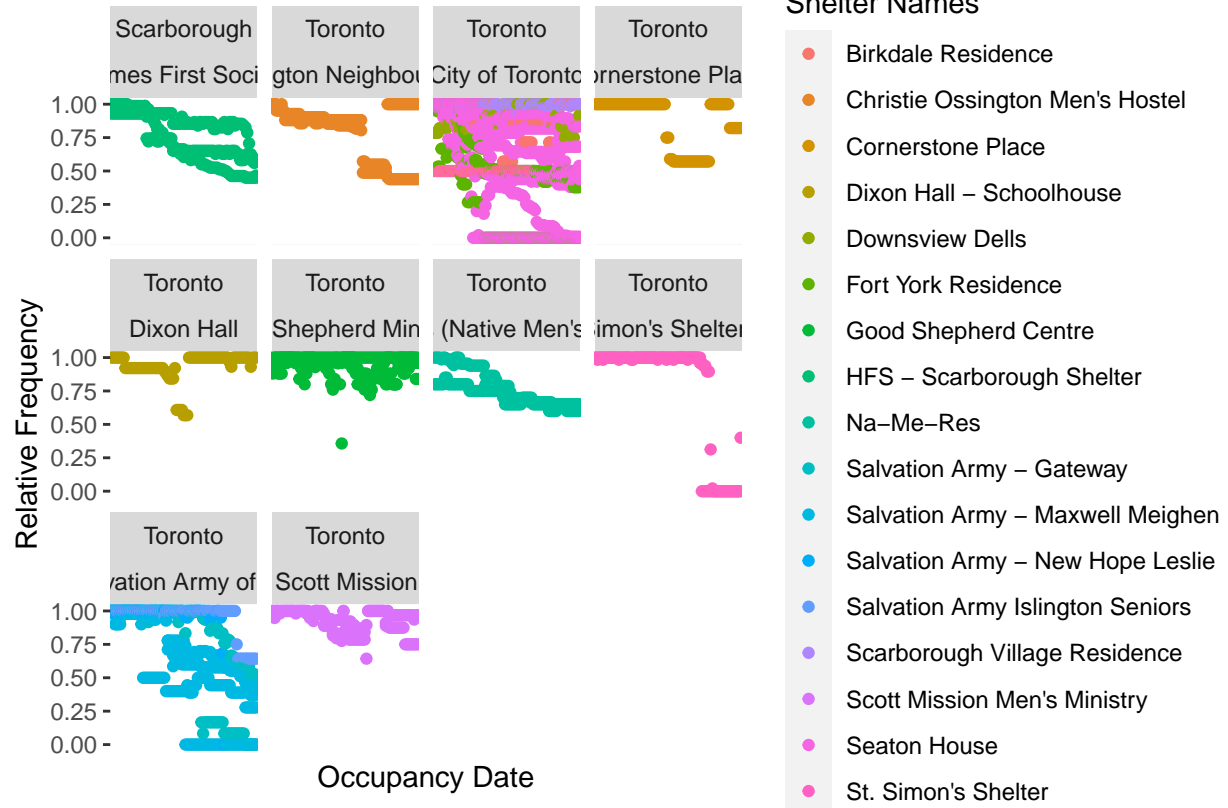
Qs: The effects of covid19 on the occupancy count(percent) of temporary shelters around GTA

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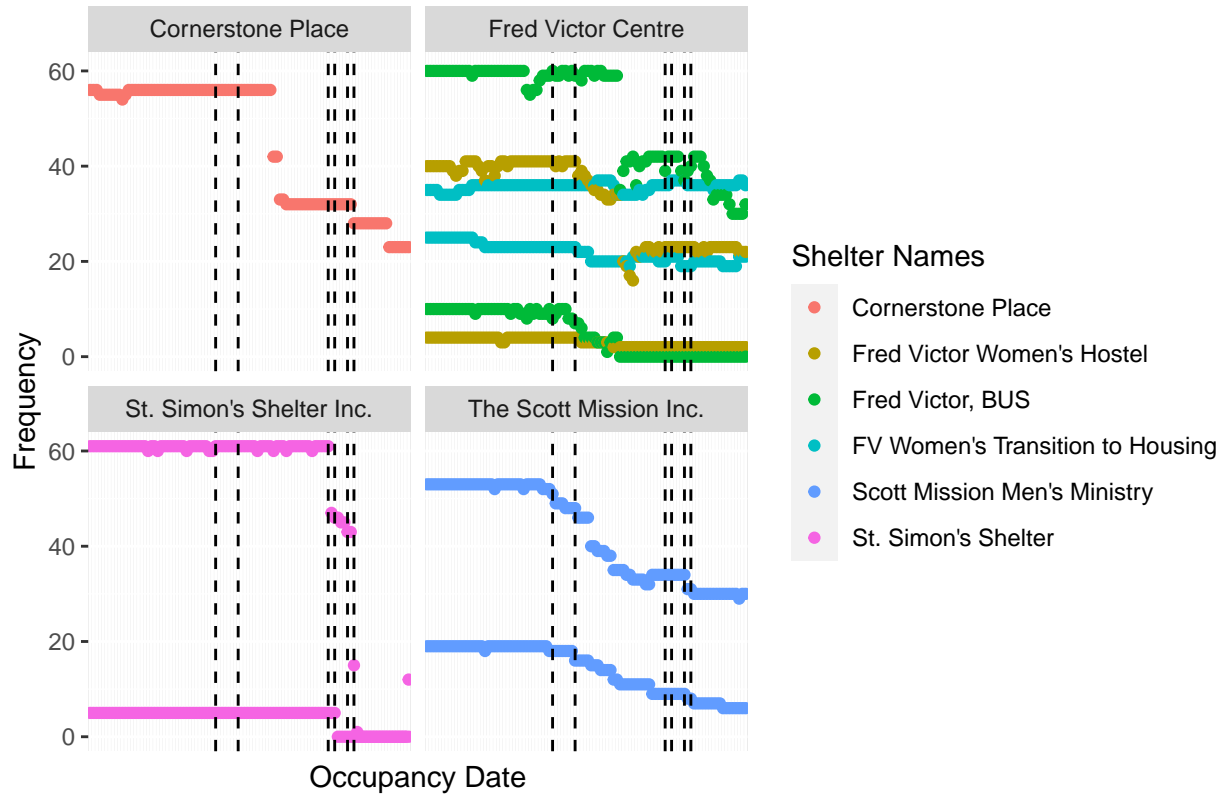


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Shelters Occupancy to Capacity Percent by Organizations (Women)



Shelters Occupancy Count by Organizations



Unlike our initial thoughts, we have discovered that the number of occupancies in shelters have been generally decreasing or stable. However, there has been an interesting correlation between the decline in occupancies and the reported dates of active COVID-19 outbreaks in shelters. The dates of the active cases are indicated by the dashed black lines and as seen from the graph above, it is clear that some of these dates coincide with the sudden drop in occupancies. One possible explanation of this trend can be interpreted as a direct consequence of an outbreak occurring in the said shelter. For example, When there was an outbreak reported at St. Simon's Shelter on May 16th, the immediate drop in occupancies can be seen on the graph (as indicated by the second last line). However, a similar relationship, between occupancy counts and day of an outbreak, could be noticed even in locations that are not directly affected by the outbreak. Such correlation can be explained by many residents leaving the facilities in response to ongoing outbreaks in the surrounding shelters.

Waiting for profiling to be done...

	Estimate	Std. Error	z value	Pr(> z)	est	2.5 %	97.5 %
(Intercept)	3.396	0.003	1143.474	0.000	29.851	29.677	30.025
categoryCo-ed	0.008	0.005	1.600	0.110	1.008	0.998	1.018
categoryFamilies	0.381	0.005	81.741	0.000	1.463	1.450	1.477
categoryWomen	-0.340	0.005	-66.022	0.000	0.712	0.705	0.719
categoryYouth	-0.256	0.007	-37.453	0.000	0.774	0.764	0.784
CAPACITY	0.004	0.000	511.265	0.000	1.004	1.004	1.004
cityEtobicoke	-0.839	0.074	-11.295	0.000	0.432	0.373	0.500
cityNorth York	-2.311	0.062	-37.478	0.000	0.099	0.088	0.112
cityScarborough	0.001	0.013	0.042	0.966	1.001	0.975	1.027
CAPACITY:cityEtobicoke	0.025	0.003	9.489	0.000	1.025	1.020	1.030

	Estimate	Std. Error	z value	Pr(> z)	est	2.5 %	97.5 %
CAPACITY:cityNorth York	0.065	0.002	38.354	0.000	1.067	1.063	1.070
CAPACITY:cityScarborough	0.005	0.000	41.260	0.000	1.005	1.005	1.005

```
## Likelihood ratio test
##
## Model 1: OCCUPANCY ~ SECTOR + CAPACITY + SHELTER_CITY
## Model 2: OCCUPANCY ~ category + CAPACITY * city
##   #Df  LogLik Df Chisq Pr(>Chisq)
## 1    9 -116176
## 2   12 -114016  3  4321  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The generalised linear model follows a Poisson regression with a log link, where the response represents the number of homeless clients in a shelter on that day. The covariates in the model are: SECTOR (categorization of the type of residents from “Men”, “Women”, “Families”, “Co-ed” and “Youth”), SHELTER_CITY (the city of the shelter locations from “Toronto”, “North York”, “Scarborough” and “Etobicoke”), and CAPACITY (the maximum number of beds available for the residents).

The baseline represents the number of male homeless clients who are visiting a Toronto shelter.

From the table above, we can see that there are more male clients in Toronto shelters than Women or Youth but less than families and co-ed clients in Toronto shelters. This is likely because these clients are considered at least pairs in numbers.

Furthermore, considering the capacity estimate is greater than 1, we can deduce that most shelters have not been filled to their full capacity. This coincides with the earlier graph showing a general decrease in occupancy as time progressed and such behavior may be attributed to the increasing cases of COVID-19 in shelters. Such trend is also present when exploring the interactions between capacities and cities which implies that shelters in other cities also have vacant rooms/beds.

Unsurprisingly, the table also illustrates that there are greater number of clients in Toronto areas than its surrounding cities.

As seen from a small p-value, it is evident that model including the interaction between capacity and shelter city explains the data significantly more accurately. This is likely the result of some cities, such as Toronto, containing much larger facilities with higher capacity than other cities such as Scarborough and North York.