

# My title\*

My subtitle if needed

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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 (`rohan?`).

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

## 2 Data

### 2.1 Raw data

The data used in here is downloaded from `opendattoronto` (Gelfand 2022). Specifically, we used the Shelter System Flow Data released by Toronto government (City of Toronto 2024). The data loading, cleaning and analysis process is done by R (R Core Team 2023), together with packages include `tidyverse` (Wickham et al. 2019)... This data measures number of people requiring for shelter inside city of Toronto from Jan-2018 till Jun-2024 by each month (`actively_homeless`). Also, this dataset provides division of age group, refugee status, gender, as well as chronic status to provide further detailed study into the change of composition of homeless people over time. While there are several other dataset including daily shelter occupancy in `opendatatoronto`, they do not have the subdivision information such as age or refugee status as this one.

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\*Code and data are available at: [LINK](#).

## 2.2 Cleaned Data

We dropped the only missing row corresponding to July-2024. We selected our columns of interest, namely, gender: ('male', 'female', 'transgender\_non\_binary\_or\_two\_spirit'), total number of homeless people every month ('actively\_homeless'), as well as refugee and chronic status in population column. In addition, we grouped age group by whether they are suitable for work (age under 24 for early career stage, age 25-44 for working age and age above 45 for pre-retirement and retirement age). Finally, we replace the month data by averaged quartered data for better analysis and visualization of a prolonged time period. The cleaned data could be seen in Table 1.

Table 1: cleaned dataset

Time (Quarters)	Subdivision	Total people	Female	Male	Other Gender	Early Career Stage	Working Age	Pre-retire and Retire
2018Q1	All Pop- ulation	8232	3001	5148	83	2413	3029	2791
2018Q1	Chronic	2562	874	1660	29	579	717	1267
2018Q1	Refugees	2575	1261	1300	14	1248	1005	322
2018Q2	All Pop- ulation	9457	3553	5809	95	2959	3557	2941
2018Q2	Chronic	2692	927	1730	35	629	767	1295

## 3 Results

### 3.1 Overall trend

First, we plot the bar graph of overall trend of homeless people over the passage of time. In Figure 1, we observe a slight increase of total number of homeless people from first quarter 2018 to second quarter of 2024. There is a decrease of homeless population in late 2020-early 2021, but increased quickly after that.

### 3.2 Gender trend

Next, we investigate the trend of gender proportion. We plot the proportion of male, female, and Other genders against time in Figure 2. Even though there are some fluctuations of the proportion of these three gender types, the overall trend is quite stable. The male proportion is around 60% while female proportion around 40% and others around 1%.

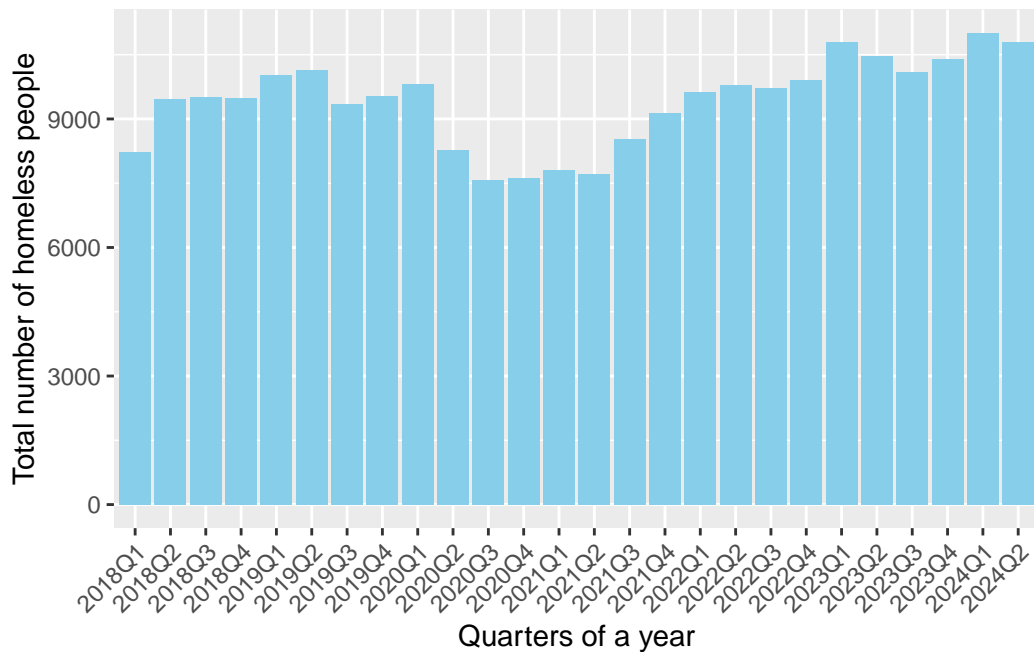


Figure 1: Homeless Population Over Quarters

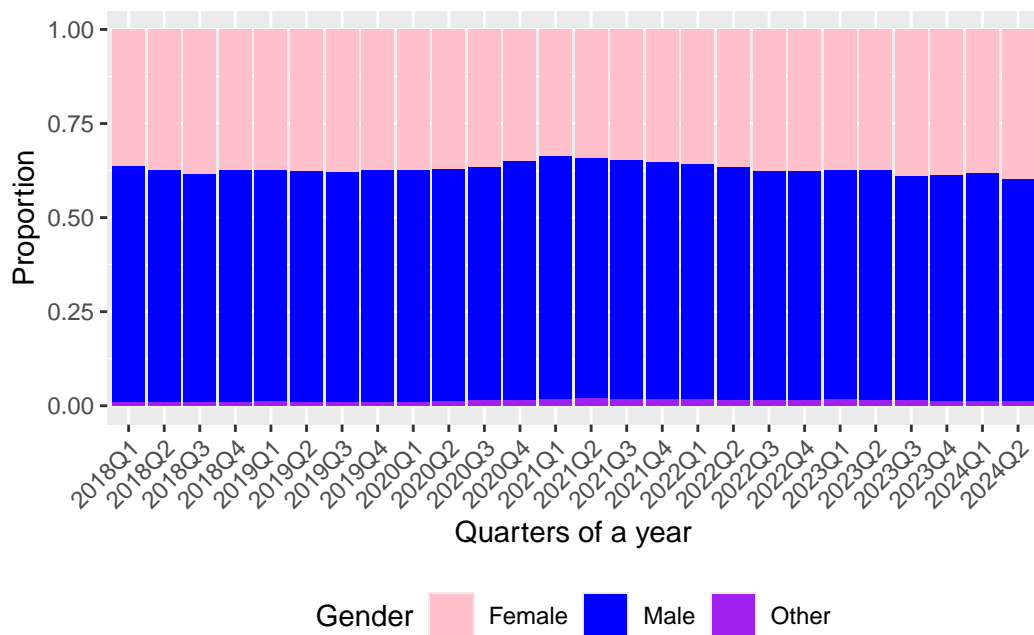


Figure 2: Proportion of Active Homeless Population by Gender Over Quarters

### 3.3 Chronic trend

Figure 3 shows the trend of the proportion of chronic population among all of homeless people over the quarters of a year. Here, according to Echenberg and Munn-Rivard (2020), chronic homeless refers to, “People who meet one of the two following criteria, as per the federal definition of chronic homelessness. The person has recorded a minimum of 180 overnight stay in the past year (365 days); or the person has recurrent overnight stays over the past three years with a cumulative duration of at least 546 nights.” We can see from the graph that the proportion in chronic homeless increased a lot, from less than 35% in first quarter of 2018 to more than 65% in the second quarter of 2024.

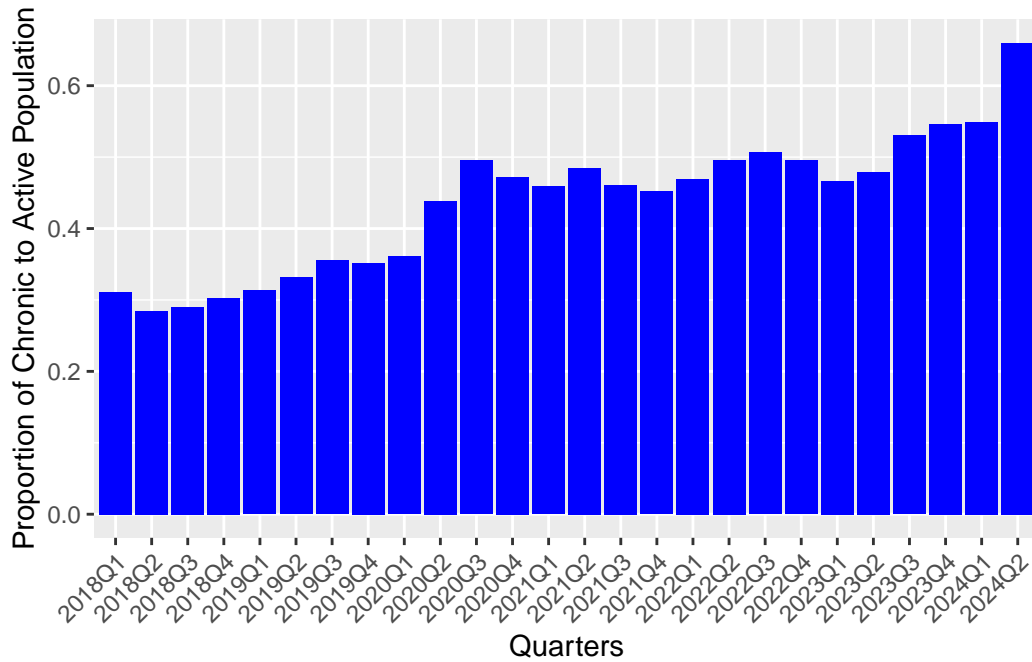


Figure 3: Proportion of Chronic population to Active Population by Quarter

### 3.4 Age trend

Figure 4 shows the trend of the proportion of different working age statuses among the actively homeless population over the quarters of a year. Here, the working age statuses are categorized into three groups: Early Career Stage, Working Age, and Pre-Retirement and Retirement Age. Even though the trend is not huge, we can see from the graph that the proportion of the Early Career Stage population as well as pre-retire and retire have decreased (from 29% and 33% separately in first quarter of 2018 to 25% and 28% in second quarter in 2024). On the other hand, working age proportion increased to 47% in 2024Q2 from 37% in 2018Q1.

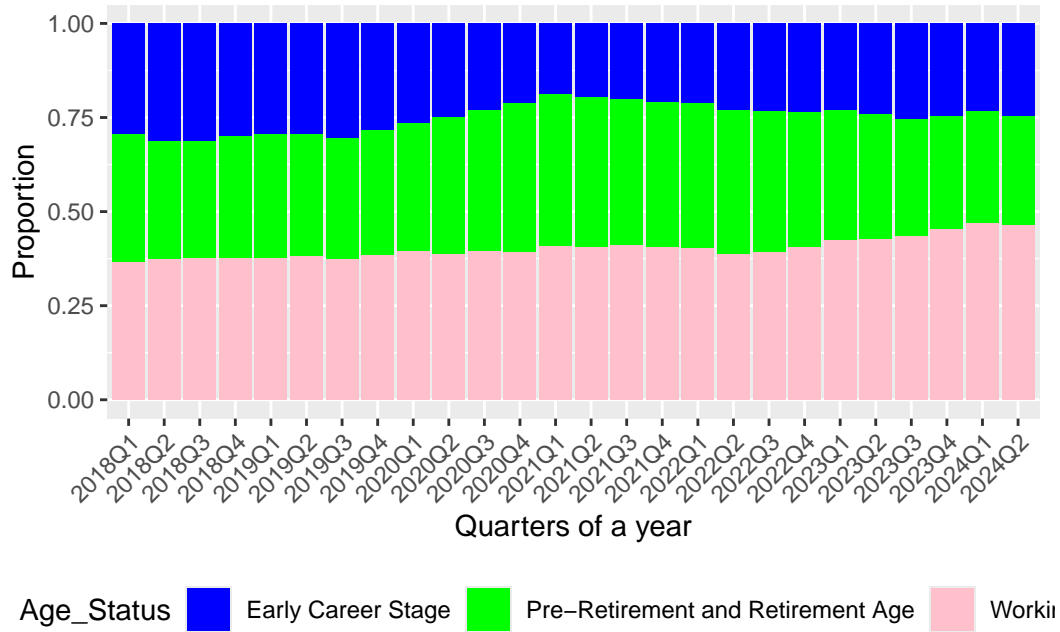


Figure 4: Proportion of working age population to Active Population by Quarter

### 3.5 Refugee trend

Figure 5 shows the trend of the proportion of refugees among the actively homeless population over the quarters of a year. We observe a significant decrease of the trend accompanied by even more significant increase.

## 4 Discussion

Based on the analysis in the results section, we observe that although the overall population of homeless individuals in Toronto has not changed significantly over the past six years, its demographics have shifted considerably. Specifically, the proportions of refugees, chronically homeless individuals, and working-aged people have increased. In the past, the City of Toronto focused its efforts on reducing homelessness, primarily through projects aimed at building affordable housing (torontosol?). However, our study indicates that with these demographic changes, the city government must also adopt additional strategies to address homelessness effectively.

First, as highlighted in the results section, the proportion of chronically homeless individuals has nearly doubled in the past six years. While chronic homelessness inherently involves long-lasting periods without stable housing, studies have shown that it is closely associated

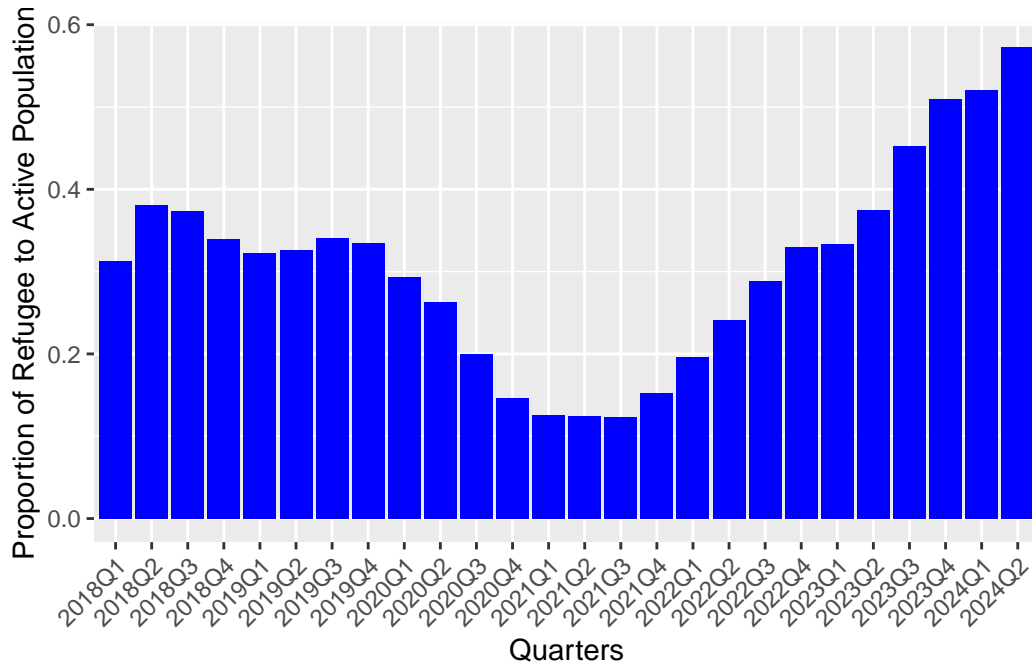


Figure 5: Proportion of Chronic population to Active Population by Quarter

with chronic illness and mental health issues Echenberg and Munn-Rivard (2020). Research further reveals that individuals experiencing mental illness or other disorders tend to have significantly lower incomes than the general population Sareen et al. (2011). Consequently, those already facing mental and physical health challenges find it exceptionally difficult to escape homelessness. Additionally, homeless individuals often encounter more severe health problems due to inadequate nutrition, discrimination, and barriers to healthcare Sleet and Francescutti (2021). These factors create a vicious cycle: illness leads to decreased income, which leads to homelessness, which in turn worsens the illness.

To break this cycle, the city government should strengthen public healthcare systems, particularly for low-income and homeless populations. Building affordable housing alone has, in some cases, led to an increase in the proportion of chronically homeless individuals Auditor General of Canada (2022). Instead, the city should invest in supportive housing, where healthcare, mental health services, and social support are integrated with affordable housing. Given the strong link between chronic homelessness and mental health challenges, the city should also expand access to mental health and addiction services. Mobile outreach teams and community-based mental health clinics can help ensure that homeless individuals receive the care they need. Programs that reduce healthcare barriers—such as mobile health clinics, telehealth services, and partnerships with local hospitals—will improve health outcomes for homeless individuals and prevent them from becoming chronically homeless.

Second, due to increased global conflicts in Eastern Europe and the Middle East, the number

of refugees entering Toronto has risen significantly Balintec (2023). However, the city has been unprepared to support this influx, as the proportion of refugees among the homeless population has surged from less than 20% in the first three quarters of 2021 to nearly 60% by the second quarter of 2024. There is an urgent need for the government to accelerate its efforts in assisting newly arrived refugees, providing them with jobs and secure housing.

Finally, we observe an increase in the proportion of working-aged homeless individuals. This underscores the need for the government to create more job opportunities, particularly for those who rely on employment to make a living, such as individuals experiencing mental health challenges or physical disabilities.

#### **4.1 First discussion point**

If my paper were 10 pages, then should be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

#### **4.2 Second discussion point**

#### **4.3 Third discussion point**

#### **4.4 Weaknesses and next steps**

Weaknesses and next steps should also be included.

## References

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