Intro

Toronto has faced increasing challenges with its homeless population in recent years, prompting a closer look at shelter usage trends. Homelessness is a complex issue, deeply intertwined with social and economic factors. Understanding how shelters are utilized is crucial for tailoring support services effectively. This analysis delves into a dataset tracking daily occupancy and capacity in Toronto's shelters throughout 2021, aiming to uncover insights vital for informed decision-making.

Initial Research Questions:

After a review of the dataset, these questions came to mind and became my research questions:

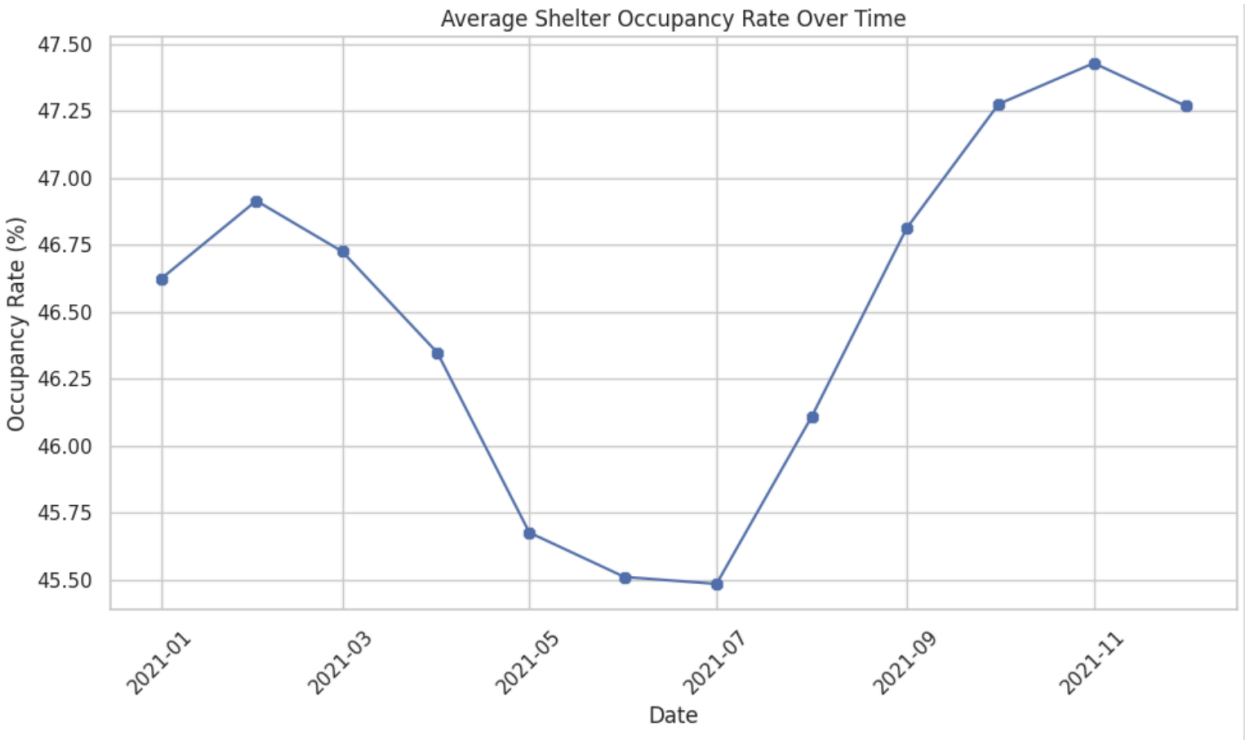
1. How do shelter occupancy rates vary over time, and what seasonal trends can be identified?
2. What are the disparities in occupancy rates among different shelter program types, and how effective are these programs in meeting the needs of shelter users?
3. What is the performance of individual shelter organizations in managing capacity, and what factors contribute to variations in utilization levels?
4. Are there significant differences in shelter occupancy rates across different categories of shelter capacity types?

Data Overview:

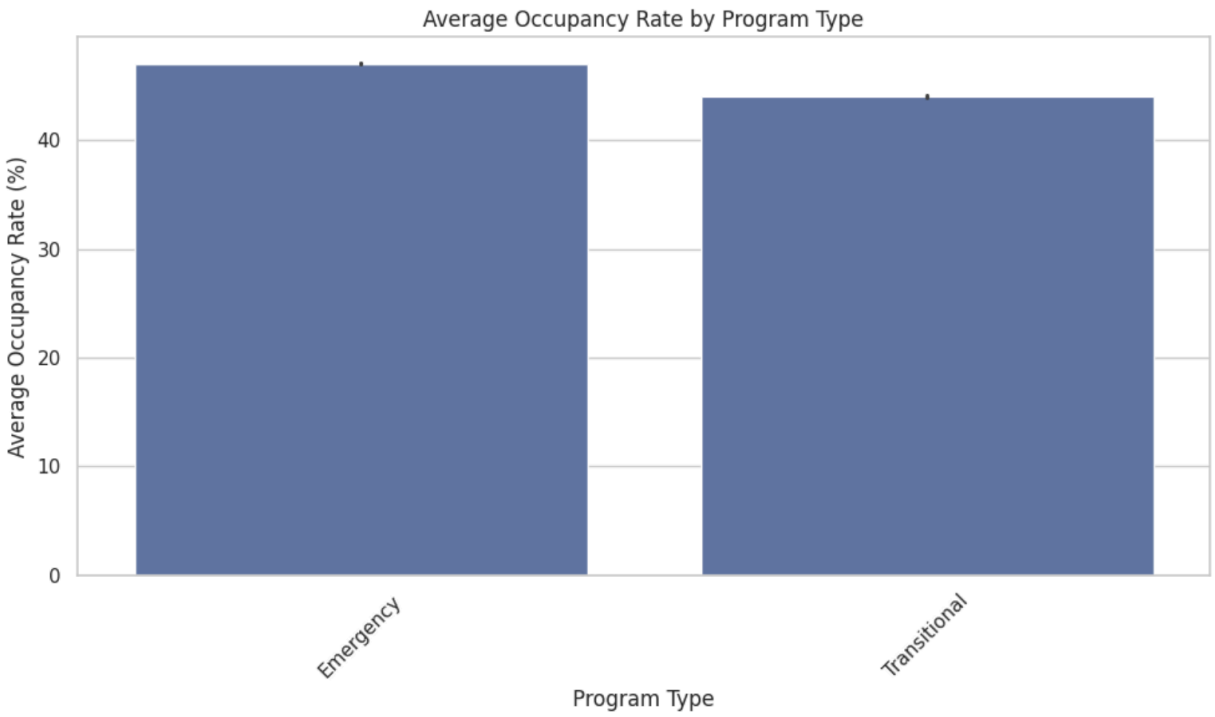
The dataset under investigation provides a comprehensive view of shelter occupancy and capacity across various organizations and programs in Toronto. It includes information on program types, service user counts, actual bed and room capacities, and daily occupancy rates.

Data Exploration:

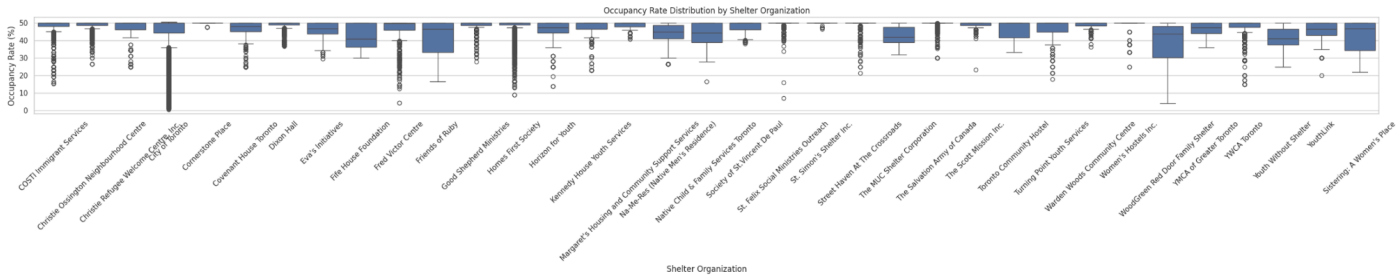
Before delving into analysis, I conducted preliminary data cleaning tasks to ensure data integrity. This involved handling missing values, removing irrelevant columns, and standardizing data formats. Subsequently, we proceeded with exploratory data analysis (EDA) to uncover insights from the dataset.



Key Finding 1: Temporal Dynamics and Seasonal Trends
This plot visualized how the shelter occupancy rate changes throughout the year, providing insights into seasonal trends and peak demand periods. By observing fluctuations in occupancy rates over time, we can identify patterns such as higher demand during colder months or specific events that may affect shelter usage. This information can be applied for policymakers and service providers to anticipate and address the needs of the homeless population effectively.



Key Finding 2: Programmatic Disparities and Service Effectiveness:
This bar plot compared the average occupancy rates of different shelter program types, allowing us to understand utilization patterns across program models. By examining variations in occupancy rates among program types, I aimed to identify which types of programs experience higher demand and assess the effectiveness of different service models in meeting the needs of shelter users. This analysis can inform decision-making regarding resource allocation and program development to optimize service delivery.



Key Finding 3: Organizational Performance and Capacity Management
By evaluating organizational performance in managing shelter capacity, I aimed to identify strengths and weaknesses. These insights facilitate continuous improvement and enhance service quality across the sector.

The box plot displays the distribution of occupancy rates for each shelter organization, represented by boxes that show the interquartile range (IQR) and median occupancy rate. The whiskers extended to 1.5 times the IQR, with outliers shown as individual data points beyond the whiskers. By examining the spread of occupancy rates across organizations, I identified variability in shelter utilization levels. Organizations with wider box plots and more outliers may experience greater fluctuations in occupancy, suggesting challenges in managing shelter capacity effectively. Conversely, organizations with narrower box plots and fewer outliers may demonstrate more consistent utilization patterns. The box plot visualized the distribution of occupancy rates among different shelter organizations, highlighting variability in utilization levels. By examining the spread and central tendency of occupancy rates across organizations, we can identify potential disparities in shelter usage and assess organizational performance in managing shelter capacity. This analysis provided insights into the effectiveness of individual organizations in meeting the demand for shelter services and may guide collaborative efforts to address capacity challenges collectively.

T-test

After conducting visual exploration to identify key trends and patterns in shelter occupancy, I employed t-tests to rigorously test hypotheses derived from the observed trends. These statistical tests provided quantitative validation of the insights gleaned from visual analysis, offering evidence to support the findings.

Temporal Dynamics and Seasonal Trends:
The t-test revealed a significant difference in occupancy rates between winter and summer months, confirming the presence of distinct seasonal trends in shelter occupancy. This finding validates the visual observation of seasonal fluctuations in shelter utilization and underscores the importance of accounting for seasonal variations in planning shelter services.

Programmatic Disparities and Service Effectiveness:
Significant differences in occupancy rates between different program types were observed, highlighting disparities in shelter utilization across program models. This finding provides quantitative evidence to support programmatic decision-making and underscores the need for tailored interventions to address the diverse needs of shelter users.

Organizational Performance and Capacity Management:
Statistically significant differences in occupancy rates between different shelter organizations were identified, indicating variability in organizational performance and capacity management practices. This finding emphasizes the importance of assessing organizational efficiency and resource utilization to ensure equitable access to shelter services.

Conclusion:

Through comprehensive analysis, valuable insights into shelter usage trends in Toronto were obtained, addressing the initial research questions. The findings highlight the dynamic nature of shelter demand, influenced by factors such as seasonality, program characteristics, and service availability. Understanding these dynamics is essential for policymakers, service providers, and advocacy groups working to address homelessness and improve shelter services.

Next Steps:

While this analysis provides a foundational understanding of shelter utilization patterns, several avenues for further exploration exist. Future research could delve deeper into specific demographic trends, geographic variations, and the impact of external factors such as economic conditions or policy changes on shelter demand. Additionally, ongoing data collection and analysis are crucial for monitoring trends over time and informing targeted interventions to address evolving needs.