Real Estate Prices and Socioeconomic Factors Across Different Canadian Regions

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Proposal

Objective:

- The project aims to analyse the factors that affect real estate prices in different regions, identify key patterns, and explore correlations between property features (e.g., number of beds and baths) and socioeconomic factors.

Main Questions:

- How do socioeconomic factors such as population size, median family income, age, education and geographical location influence real estate prices across various cities and provinces?

Hypothesis

- Population: Higher population size areas have more expensive homes
- Income: The higher the median family income, the more expensive the homes
- Age and Education: The higher the age and education levels, the higher the rate of home ownership
- Geographical Locations: Coastals cities or cities with moderate climates attract higher housing prices, while more inland, colder regions may have lower prices
    - Urban areas have higher house prices due to greater demand and limited space than rural areas
    - Rural areas have larger homes (more bedrooms)

Structure of Our Project

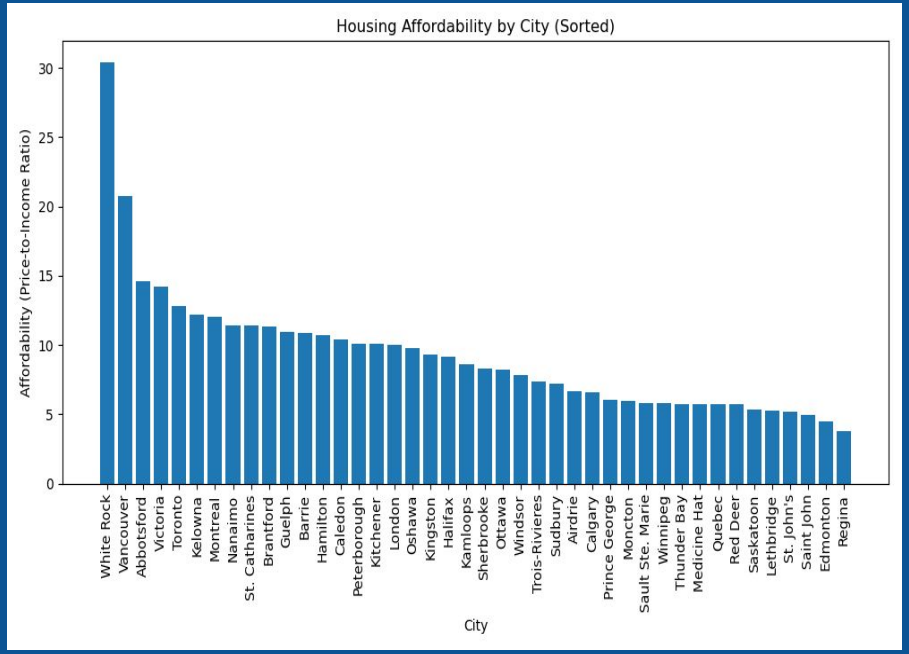
Data Cleaning and Exploration

- Removed duplicates
- Merged two datasets together
- Checked for impact of possible outliers - hypothesis testing using describe

	city	province	abbrev	area_type	pop	pop_density_sq_km	total_dwellings	land_area_sq_km	median_income	lat	lon	address	price	beds	baths
0	St. John's	Newfoundland and Labrador	NL	large urban	185565	1042.5	86189	178.0	85000	47.4817	-52.7971	33 queens road	275000	4	1
1	St. John's	Newfoundland and Labrador	NL	large urban	185565	1042.5	86189	178.0	85000	47.4817	-52.7971	70 julieann place	767500	4	4
2	St. John's	Newfoundland and Labrador	NL	large urban	185565	1042.5	86189	178.0	85000	47.4817	-52.7971	5 ruth avenue	159900	3	1
3	St. John's	Newfoundland and Labrador	NL	large urban	185565	1042.5	86189	178.0	85000	47.4817	-52.7971	11 parliament street	350000	4	3
4	St. John's	Newfoundland and Labrador	NL	large urban	185565	1042.5	86189	178.0	85000	47.4817	-52.7971	84 gil eannes drive	424900	4	3

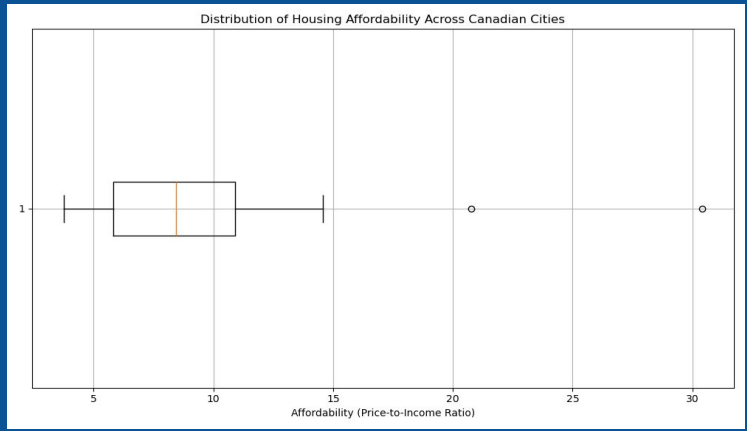
Housing Affordability Across Canadian Cities

How does housing affordability vary across different Canadian cities?



Conclusion:

Bar chart illustrates that cities like White Rock, Vancouver, and Toronto have significantly higher price-to-income ratios, indicating lower housing affordability, while cities like Regina, Edmonton, and Saint John demonstrate more affordable housing. And the box plot provides a broader overview of the distribution of affordability across Canadian cities, highlighting that most cities fall within a moderate affordability range, but a few outliers (such as Vancouver and White Rock) have notably high price-to-income ratios.

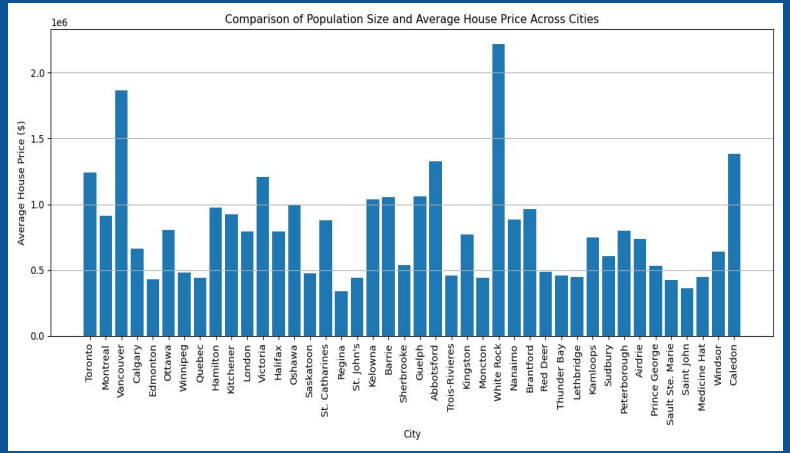


Population Size vs. Average House Price

Is there a correlation between city population size and average house price?

Conclusion

The scatter plot and bar chart show a weak positive correlation between city population size and average house prices. While larger cities generally tend to have higher house prices, the relationship is not very strong, as some smaller cities also exhibit high house prices due to other influencing factors like local demand and housing supply.

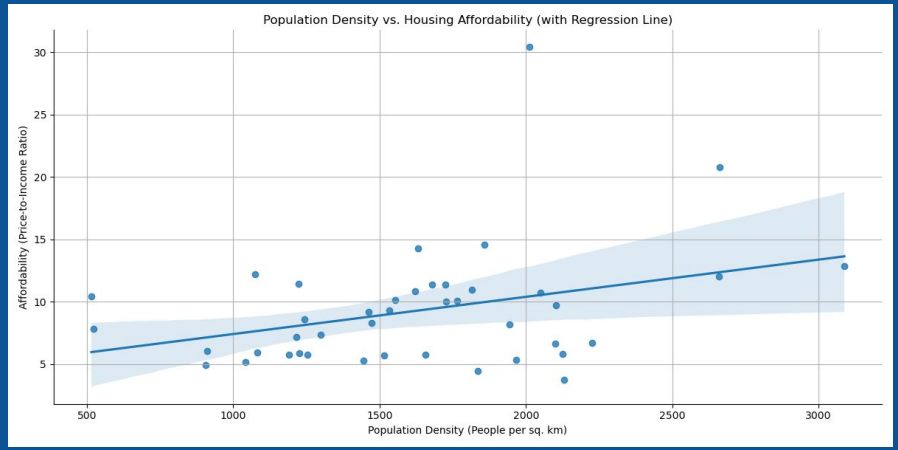


Population Density vs. Housing Affordability

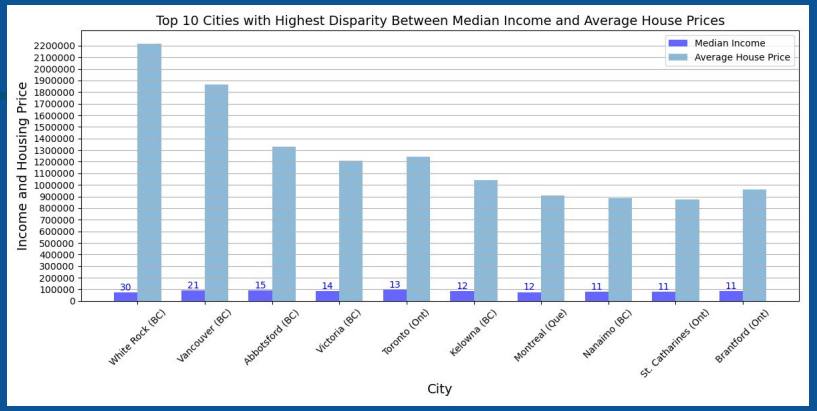
How does population density influence housing prices and affordability across Canadian cities?

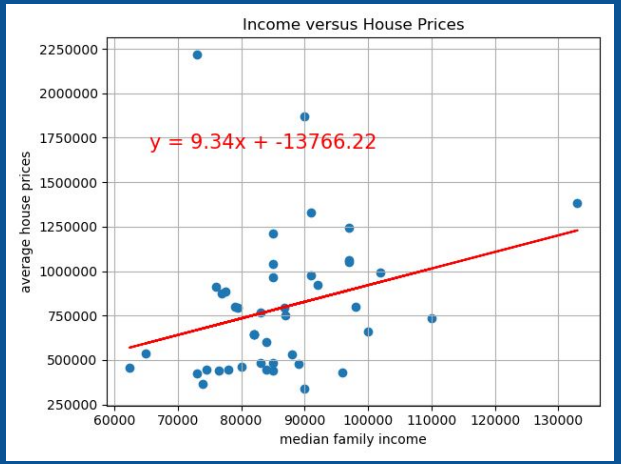
Conclusion:

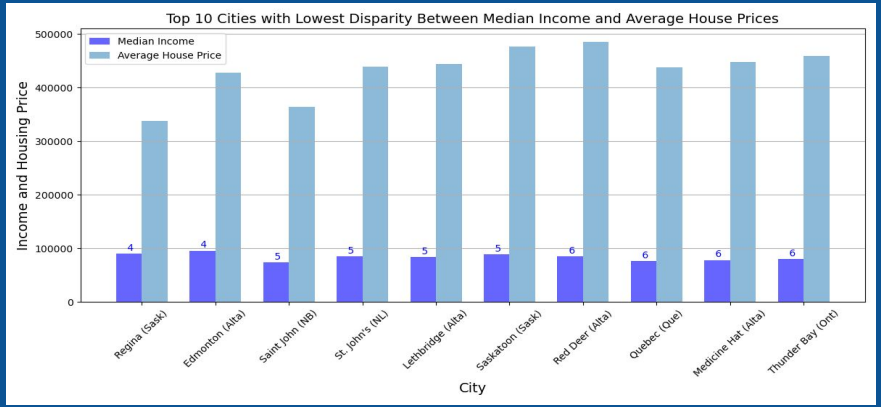
The scatter plot demonstrates a moderate positive correlation, where cities with higher population densities tend to have higher housing affordability ratios, meaning housing is less affordable in densely populated cities.The regression line in the second plot further confirms this trend, highlighting that denser cities tend to have more expensive housing relative to income.



How does median family income relate to housing prices and affordability disparities across Canadian cities?



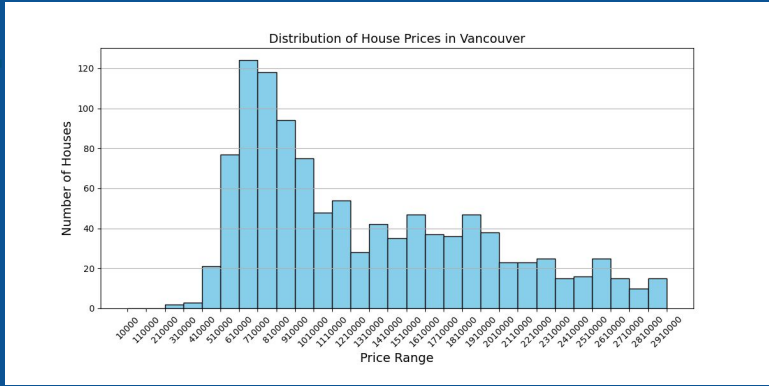


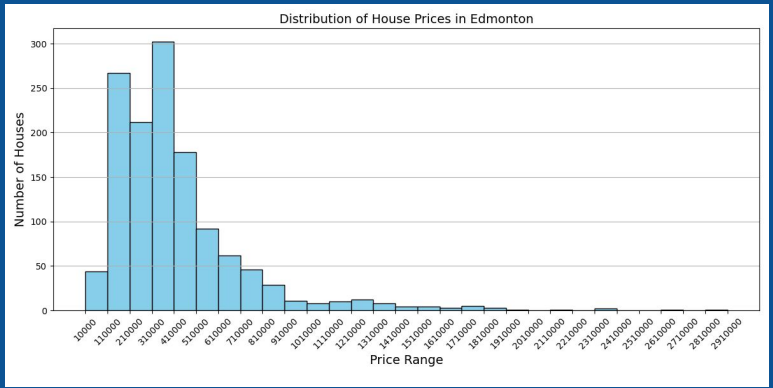


Conclusion

Overall income across all the cities seems to be below 100k but the housing prices vary significantly across cities.

What is the distribution of house prices between the most and the least expensive cities?





Conclusion

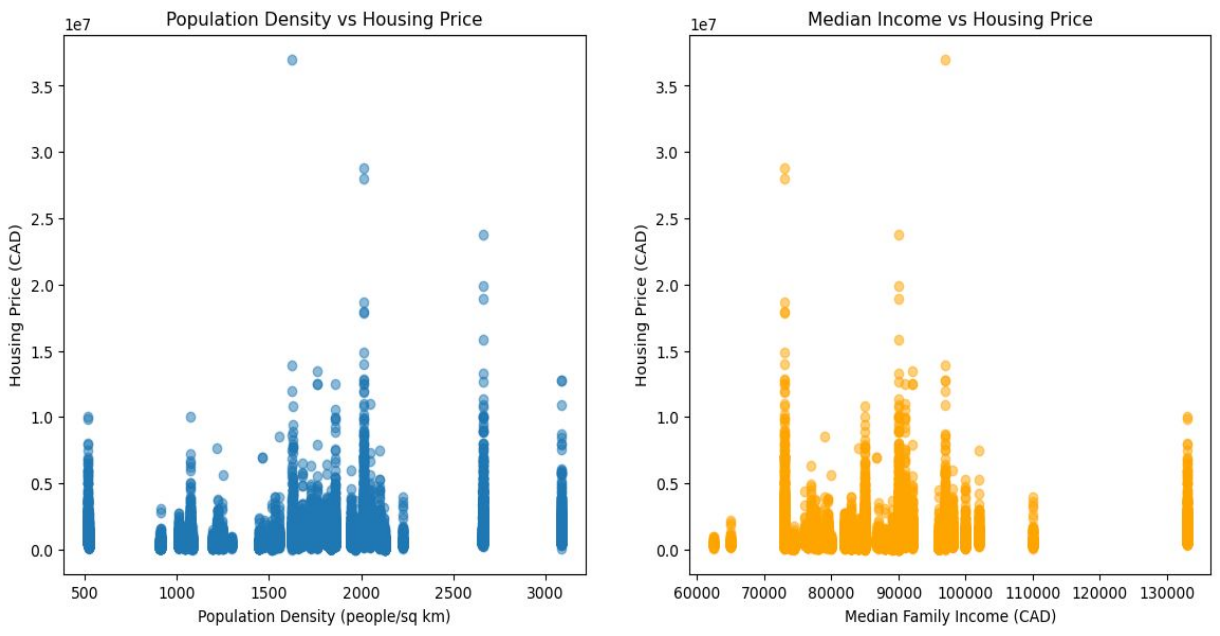
The visualisation clearly shows a lack of affordable housing in Vancouver which may contribute to the high disparity.

The disparity is not caused by income but the lack of supply of affordable housing.

Summary Statistics by Province

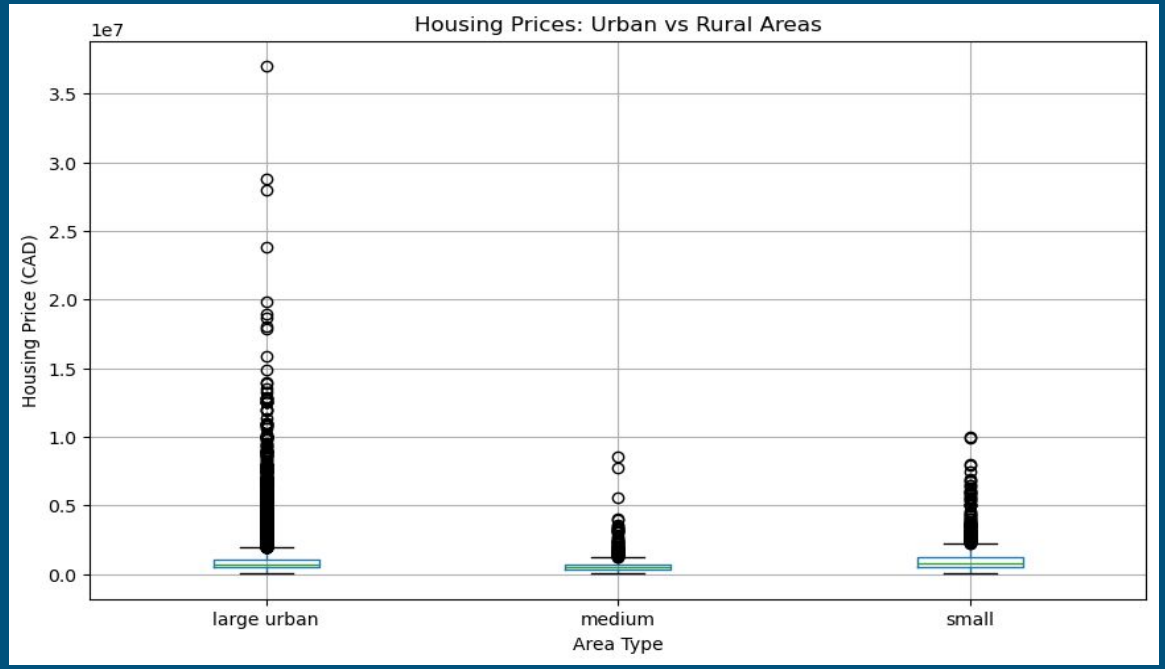
	province	avg_price	avg_pop_density	avg_median_income	total_population
0	Alberta	533,165.78	1,836.33	94,756.75	3,307,561,393
1	British Columbia	1,394,327.86	1,717.44	84,218.23	4,131,631,297
2	Manitoba	480,567.84	2,124.70	83,000.00	360,294,625
3	New Brunswick	427,289.77	1,046.53	74,399.80	55,224,089
4	Newfoundland and Labrador	438,912.85	1,042.50	85,000.00	120,060,555
5	Nova Scotia	794,771.09	1,463.10	86,753.00	31,725,694
6	Ontario	928,689.87	1,677.89	92,538.00	11,577,342,385
7	Quebec	602,906.80	1,856.30	71,741.68	792,714,151
8	Saskatchewan	403,197.64	2,050.89	89,517.55	458,946,867

Pop Density and Income Affects on Price



-Weak positive correlation showing areas with higher population have slightly higher prices
-Median income is not a good indicator of housing price

Housing Prices in Rural vs Urban Areas



-Greatest variance in large urban areas with the highest prices

-small areas have higher prices than medium

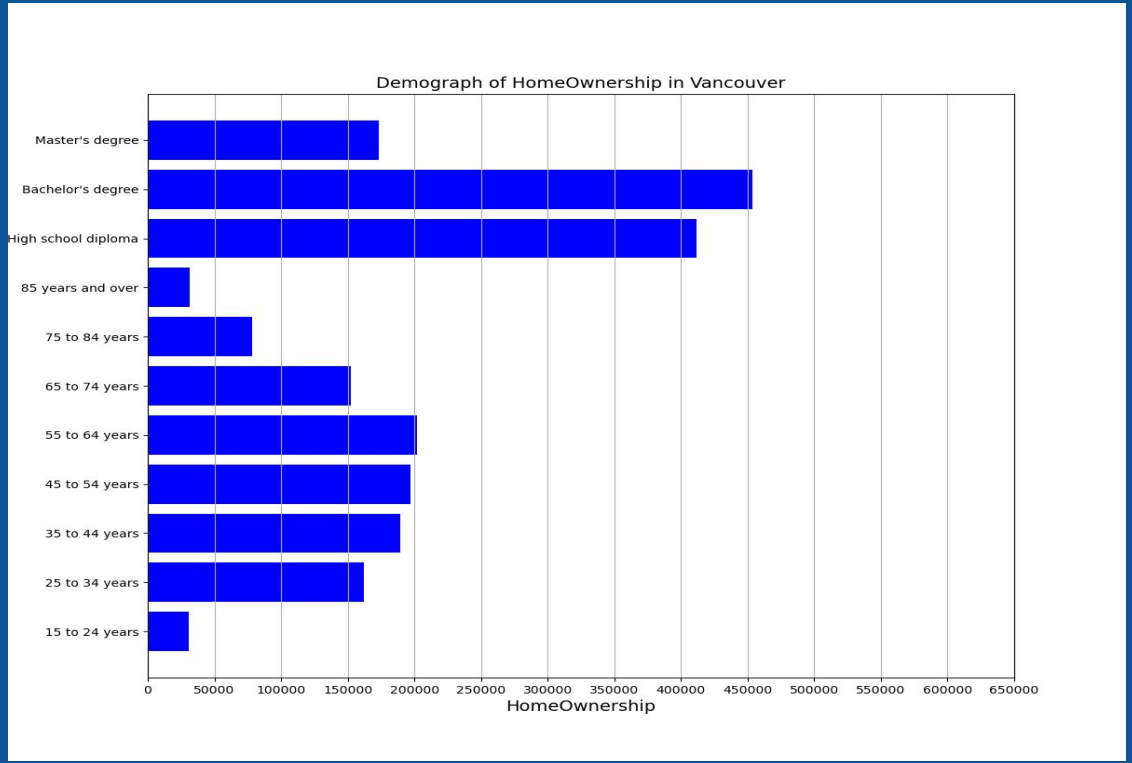
-medium area pricing very low variability

Top 5 Cities with Highest Avg Per Bed Price

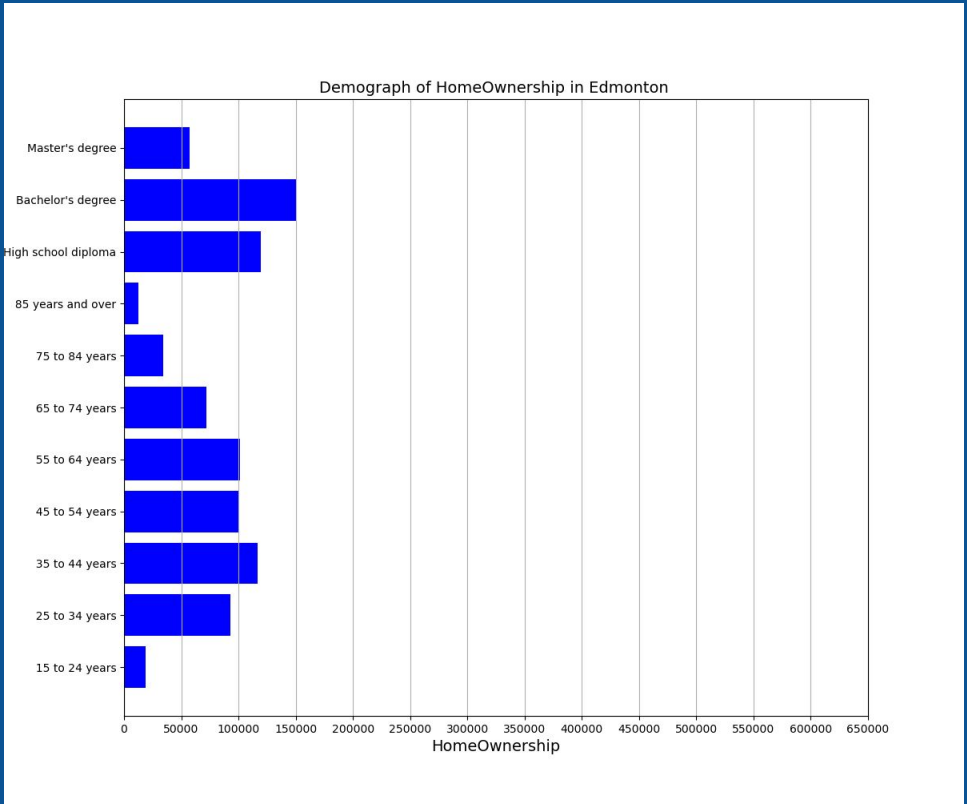
city	area_type	avg_price_per_bedroom	avg_bedrooms	avg_bathrooms	avg_price
White Rock	large urban	650,070.47	3.72	3.35	2,219,142.15
Vancouver	large urban	547,200.90	2.81	2.50	1,867,976.82
Caledon	small	405,021.31	4.02	3.29	1,382,619.11
Abbotsford	large urban	388,723.83	3.85	2.87	1,326,984.47
Toronto	large urban	364,297.03	2.73	2.13	1,243,598.83

White Rock has been identified as the city with the highest average per bedroom price.
Toronto is #5.

How do age and education level impact homeownership rates in the most expensive city and the least expensive city in Canada?



How do age and education level impact homeownership rates in the most expensive city and the least expensive city in Canada?



Conclusions:

1. In Edmonton, homeownership is highest among 35 to 44 year olds. This may indicate that Vancouver has homeowners who are older while Edmonton has homeowners that are younger. In general, 3 age groups between 35 to 64 seem to have the highest rate of homeownership.For both cities, home ownership seems to be highest among people who have a Bachelor's degree.

2. The gap between home ownership between Bachelor's degree and High School Diploma for Edmonton and Vancouver is less than 50000. Edmonton has smaller gap in Education level compared to Vancouver

Final Conclusions

- Overall the factors of population, income, and geographical location have a weak correlation and therefore not statistically significant in predicting house prices in this data set. There may be other factors such as interest rates, government policies, or local economic conditions that could provide more insight. Even though there is a weak correlation, we did find some interesting conclusions
- Population densities tend to have higher housing affordability ratios, meaning housing is less affordable in densely populated cities. Population density has a greater influence on housing costs than population size.
- Overall income across all the cities seems to be below 100k but the housing prices vary between cities, a possible reason for the variability might be the lack of affordable housing options.
- Urban areas, especially cities like Vancouver and Toronto, exhibit more expensive and volatile housing markets than rural regions.
- The more affordable cities tend to have younger homeowners and education only slightly increases homeownership regardless of city. Overall, the higher the age and education, the higher the likelihood of home ownership.

For complete details and resources, visit our GitHub:

https://github.com/anjgh/real_estate_socioeconomic_analysis

Dataset resources:

https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=9810000801&geocode=A000011124

https://www.kaggle.com/datasets/etsc9287/2020-general-election-polls

https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=Edmonton&DGUIDlist=2021A00053520005,2021A00054806016,2021A00053506008,2021S0503933,2021S0503835&GENDERlist=1&STATISTIClist=1&HEADERlist=37,36,20

Thank you for your interest in our work.