Housing Market: A closer look at Oakville

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Introduction

Goal : Understanding the changes of the 2016 and 2021 housing market, to explain the growth of the city of Oakville.

Questions :

1. What unique variables have set Oakville apart from the other cities nearby if at all?
2. What sort of factors increase or decrease the value of housing within the GTA?
3. Which city displays the greatest growth (population, infrastructure, economy) ?
4. Which cities offer the greatest housing opportunities?
5. Which city/cities is/are the most appealing for families?
6. What are the different economic states of each city based on household income, unemployment rate and housing cost ?

Data Overview

City	Year	Population	Household Income ($)	Average Rent ($)	Median Rent ($)	Estimated House Value ($)	Unemployment Rate (%)	Property Tax Rate (%)	Rented Houses	Owned Houses	New Built	Average Sale Price ($)	Median Sale Price ($)
Burlington	**2016**	183314.0	123402.0	2710.0	2400.0	632556.0	5.6	0.871013	16835.0	54540.0	542.0	663675.0	609000.0
	2021	186948.0	140200.0	2862.0	2800.0	1024000.0	10.7	0.779583	18220.0	54955.0	1494.0	1081961.0	975500.0
Oakville	**2016**	193832.0	113666.0	3154.0	2588.0	883853.0	6.9	0.830000	12135.0	54130.0	1791.0	1063117.0	920000.0
	2021	213759.0	128000.0	3363.0	3000.0	1388000.0	11.7	0.720000	16530.0	57025.0	1824.0	1579928.0	1387500.0
Vaughan	**2016**	306233.0	90615.0	2492.0	2300.0	893065.0	5.8	0.815855	9765.0	84490.0	2270.0	656698.0	600000.0
	2021	323103.0	124000.0	2841.0	2550.0	1282000.0	12.5	0.669976	14620.0	89290.0	5564.0	1299913.0	1200000.0
Milton	**2016**	110128.0	120157.0	2821.0	2150.0	622911.0	5.6	0.006820	4840.0	29415.0	891.0	657525.0	621000.0
	2021	132979.0	142600.0	2785.0	2650.0	1022000.0	11.4	0.007449	6950.0	33085.0	1073.0	1104704.0	990000.0
Oshawa	**2016**	159458.0	70211.0	1070.0	1015.0	397934.0	9.8	1.561085	19720.0	42875.0	834.0	443635.0	420000.0
	2021	175383.0	86000.0	1400.0	1300.0	705000.0	15.2	1.304741	23880.0	42750.0	1416.0	798221.0	765000.0

Part 1 : Study of the Population

Population Comparison

Geographical Representation of the Selected Cities

Population Comparison (2016 and 2021) of the Selected Cities

Household Income vs Population

- Rent prices increased between 2016 and 2021
- Household income increases between 2016 and 2021
- Oshawa has the lowest averages of both categories
- Oakville has the highest rent and yet not the highest household income

Part 2 : Economic Stats

House Values vs Sale Values

City	Year	Estimated House Value ($)	Average Sale Price ($)
Burlington	2016	632556.0	663675.0
	2021	1024000.0	1081961.0
Oakville	2016	883853.0	1063117.0
	2021	1388000.0	1579928.0
Vaughan	2016	893065.0	656698.0
	2021	1282000.0	1299913.0
Milton	2016	622911.0	657525.0
	2021	1022000.0	1104704.0
Oshawa	2016	397934.0	443635.0
	2021	705000.0	798221.0

House Values vs Sale Values (#2)

House Values vs Sale Values (#3)

- Houses sell at higher prices than what they are estimated to be
- Oakville has the highest Estimates House Value and Average Sale price
- Oakville has the greatest difference between Estimates House Value and Average Sale price

Unemployment rate

City	Year	Unemployment Rate (%)
Burlington	2016	5.6
	2021	10.7
Oakville	2016	6.9
	2021	11.7
Vaughan	2016	5.8
	2021	12.5
Milton	2016	5.6
	2021	11.4
Oshawa	2016	9.8
	2021	15.2

Part 3 : Factors of Change

Total Number of New Builds per Selected City

City	Year	New Built
Burlington	2016	542.0
	2021	1494.0
Oakville	2016	1791.0
	2021	1824.0
Vaughan	2016	2270.0
	2021	5564.0
Milton	2016	891.0
	2021	1073.0
Oshawa	2016	834.0
	2021	1416.0

Total Number of Schools per Selected City

City	# of Public Schools	# of Catholic Schools	# of Private Schools	Total # of Schools
Burlington	38	17	2	57
Oakville	39	28	32	99
Vaughan	41	46	46	133
Milton	21	14	4	39
Oshawa	32	15	8	55

- Vaughan has the most schools total and for each category
- Oakville has the second most, yet far more than Burlington despite similar populations

Total Number of Leisure Spaces per Selected City

City	# of Leisure Spaces
Burlington	282
Oakville	428
Vaughan	251
Milton	234
Oshawa	356

Part 4 : Housing Tenure

Housing Tenure in 2016 and 2021

City	Year	Owned Houses	Rented Houses
Burlington	2016	54540.0	16835.0
	2021	54955.0	18220.0
Oakville	2016	54130.0	12135.0
	2021	57025.0	16530.0
Vaughan	2016	84490.0	9765.0
	2021	89290.0	14620.0
Milton	2016	29415.0	4840.0
	2021	33085.0	6950.0
Oshawa	2016	42875.0	19720.0
	2021	42750.0	23880.0

Housing Tenure in 2016 and 2021 (#2)

- Oakville remains consistent
- Burlington and Oshawa occupy the greatest portion of rentals
- Vaughan has a huge disparity between having the most owned houses yet second to least rentals

Housing Tenure Preference per Population Size

- Very strong correlation between owned houses and population
- No correlation between number of rentals and population

Answering Questions and Limitations

Questions :

1. What are the different economic states of each city based on household income, unemployment rate and housing cost ?
2. What sort of factors increase or decrease the value of housing within the GTA?
3. Which city displays the greatest growth (population, infrastructure, economic) ?
4. Which cities offer the greatest housing opportunities?
5. Which city/cities is/are more appealing for families?
6. What unique variables have set Oakville apart from the other cities nearby if at all?

Limitations :

1. Size of sample
2. Reliability and availability of the data (Census done every 5 years)

Snippet of Codes

```
leisure_types = []
for feature in leisure_dict['features']:
    leisure_info = feature['properties']['datasource']['raw']['osm_id']
    if 'city' in feature['properties']:
        leisure_cities = feature['properties']['city']
        if leisure_cities == 'Burlington':
            leisure_types.append(leisure_info)
```

Helped using the Geoapify API to display each leisure space in one list

```
merged_map_df['City'] = merged_map_df['City'].astype('category')
min_pop = merged_map_df['Population'].min()
max_pop = merged_map_df['Population'].max()

merged_map_df['Scaled_Population'] = (
    ((merged_map_df['Population'] - min_pop) / (max_pop - min_pop)) * (900 - 300) + 300
)

final_map = merged_map_df.hvplot.points(
    'Lon', 'Lat', geo=True, tiles="OSM",
    size='Scaled_Population',
    color='City',
    alpha=0.7,
    hover_cols=['City', 'Population'],
    legend=False)
final_map
```

Helped sizing the graph by population

Helped facilitating the dataframes' merge

```
housing_dfs = [df_sale_median, df_rent_median, df_sale_average, df_rent_average]
df_housing_merged = reduce(lambda  left,right: pd.merge(left,right,on=['Year'], how='outer'), housing_dfs)
years_to_keep = [2016, 2021]
df_housing_merged_filtered = df_housing_merged[df_housing_merged['Year'].isin(years_to_keep)]
```

Comparison of Graphs

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Merci !

Thank you!