

CAPSTON PROJECT

THE BATTEL OF NEIGHBORHOODS MEDICAL SERVICE LOCATIONS IN TORONTO

PROBLEM

Population of City of Toronto is rising every year, which brings more requirements on the city services, as well as the medical services. However, within Toronto, the medical service sites are not located evenly based on the population, some boroughs have more sites than the others.

TARGET AUDIENCE

This report target audience are City of Toronto, and the medical service provides, who want to open a new medical service site in Toronto.

With this report, they will have a clear view to help them to decide the new medical service site location.

Volunteer Experience or Leadership

DATA SET

This report uses 4 data sets, including Toronto postal codes, GPS location, 2011 population, and Medical Centers locations from Foursquare.

Get Toronto neighbourhoods Postal Codes from [Wikipedia](#), and get the neighbourhood longitude & latitude data from geocoder. Combine these two dataframe to get the neighbourhood location dataframe.

Then, get Toronto neighbourhoods population (2011 census) from [City of Toronto](#)

At last, get venue info from Foursquare for the neighborhoods North York and Downtown Toronto

METHODOLOGY

From Wikipedia, get the postal codes table which contains all Toronto neighborhoods. However, some of the postal codes do not have a borough or neighborhoods assigned, need to drop off the rows which does not have borough assigned.

	Postal Code	Borough	Neighbourhood
0	M1B	Scarborough	Malvern, Rouge
1	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek
2	M1E	Scarborough	Guildwood, Morningside, West Hill
3	M1G	Scarborough	Woburn
4	M1H	Scarborough	Cedarbrae

Get Toronto neighborhoods' latitude and longitude data from geocoder. Merge this data set to the Toronto neighborhoods postal codes table by the same postal codes.

	Postal Code	Latitude	Longitude
0	M1B	43.806686	-79.194353
1	M1C	43.784535	-79.160497
2	M1E	43.763573	-79.188711
3	M1G	43.770992	-79.216917
4	M1H	43.773136	-79.239476

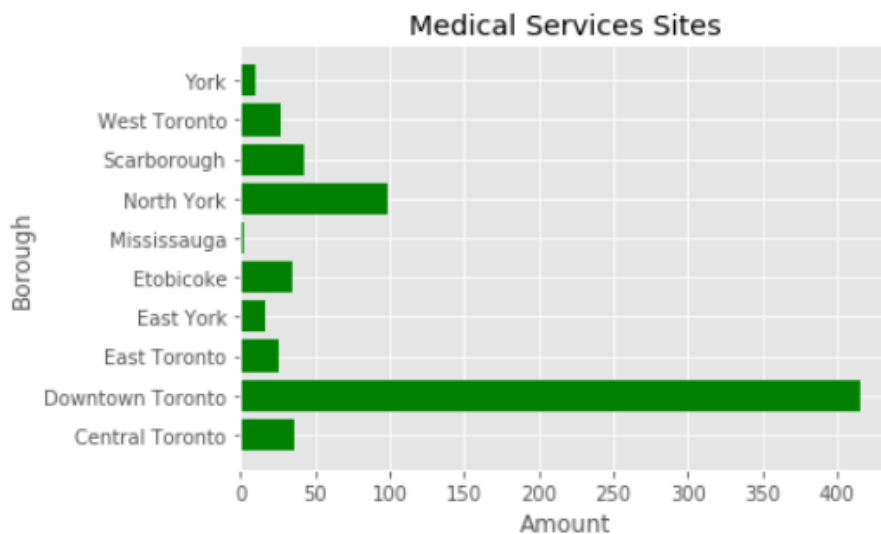
	Postal Code	Borough	Neighbourhood	Latitude	Longitude
0	M1B	Scarborough	Malvern, Rouge	43.806686	-79.194353
1	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek	43.784535	-79.160497
2	M1E	Scarborough	Guildwood, Morningside, West Hill	43.763573	-79.188711
3	M1G	Scarborough	Woburn	43.770992	-79.216917
4	M1H	Scarborough	Cedarbrae	43.773136	-79.239476
5	M1J	Scarborough	Scarborough Village	43.744734	-79.239476
6	M1K	Scarborough	Kennedy Park, Ionview, East Birchmount Park	43.727929	-79.262029
7	M1L	Scarborough	Golden Mile, Clairlea, Oakridge	43.711112	-79.284577
8	M1M	Scarborough	Cliffside, Cliffcrest, Scarborough Village West	43.716316	-79.239476
9	M1N	Scarborough	Birch Cliff, Cliffside West	43.692657	-79.264848

Connect to Foursquare, get all medical center locations by the Foursquare category id: 4bf58dd8d48988d104941735. Then merge the results to the neighborhood GPS table get from the above process.

	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Postal Code	Borough	Latitude	Longitude
0	Malvern, Rouge	43.806686	-79.194353	Extendicare Rouge Valley	43.803974	-79.189386	Medical Center	M1B	Scarborough	43.806686	-79.194353
1	Guildwood, Morningside, West Hill	43.763573	-79.188711	CML HealthCare	43.762568	-79.191970	Medical Center	M1E	Scarborough	43.763573	-79.188711
2	Guildwood, Morningside, West Hill	43.763573	-79.188711	Woburn Medical Centre	43.766631	-79.192286	Medical Center	M1E	Scarborough	43.763573	-79.188711
3	Guildwood, Morningside, West Hill	43.763573	-79.188711	Life Labs	43.766802	-79.192486	Medical Lab	M1E	Scarborough	43.763573	-79.188711
4	Guildwood, Morningside, West Hill	43.763573	-79.188711	Simply Align Rehabilitation	43.766634	-79.192275	Chiropractor	M1E	Scarborough	43.763573	-79.188711
5	Cedarbrae	43.773136	-79.239476	physiomed	43.774745	-79.240938	Medical Center	M1H	Scarborough	43.773136	-79.239476
6	Cedarbrae	43.773136	-79.239476	Physiomed Scarborough - Ellesmere	43.775003	-79.240841	Medical Center	M1H	Scarborough	43.773136	-79.239476
7	Cedarbrae	43.773136	-79.239476	Maple Clinic	43.774840	-79.240644	Doctor's Office	M1H	Scarborough	43.773136	-79.239476
8	Cedarbrae	43.773136	-79.239476	Dr. Meneses Health Clinic	43.774960	-79.240851	Doctor's Office	M1H	Scarborough	43.773136	-79.239476
9	Cedarbrae	43.773136	-79.239476	ACTIVE CARE CHIROPRACTIC CLINIC	43.775038	-79.240834	Chiropractor	M1H	Scarborough	43.773136	-79.239476

Group the results by Borough, and count the amount of medical center venues in each borough, get the below data set, and Bar chart.

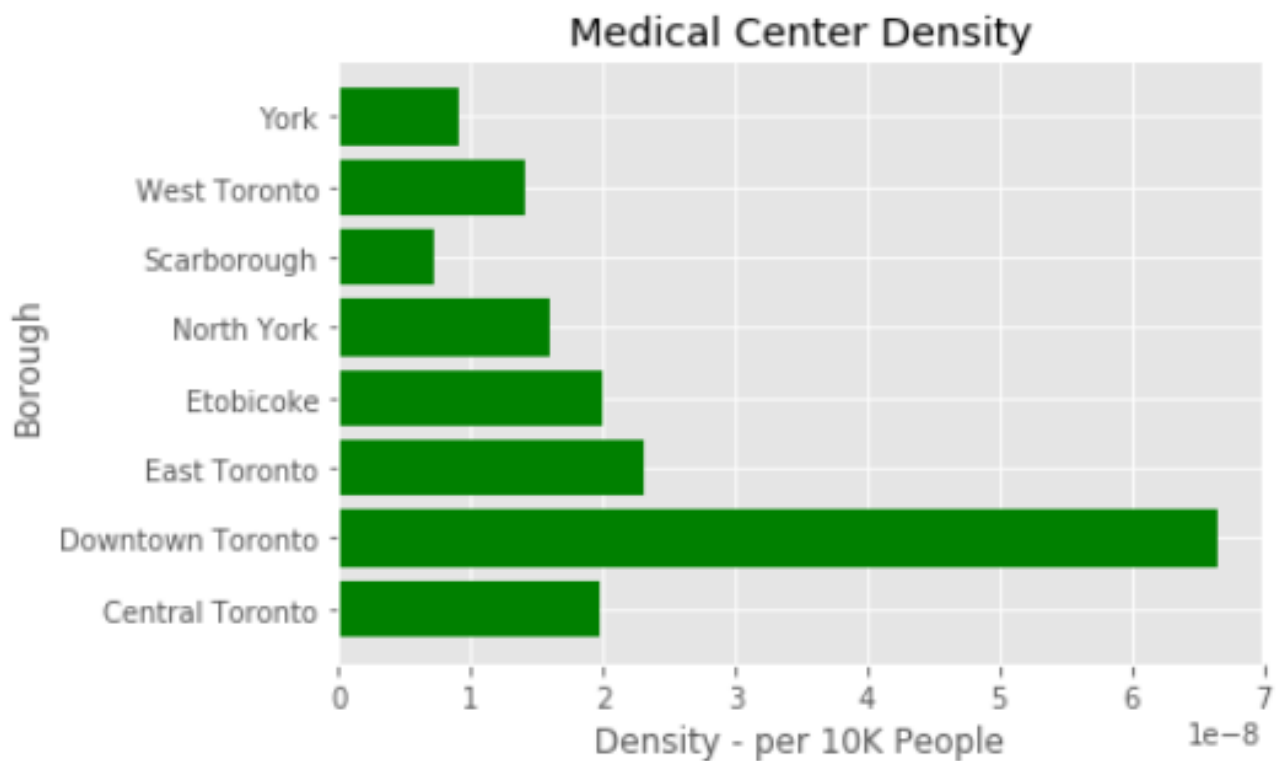
	Borough	Count
0	Central Toronto	36
1	Downtown Toronto	416
2	East Toronto	26
3	East York	17
4	Etobicoke	35
5	Mississauga	2
6	North York	99
7	Scarborough	43
8	West Toronto	27
9	York	10



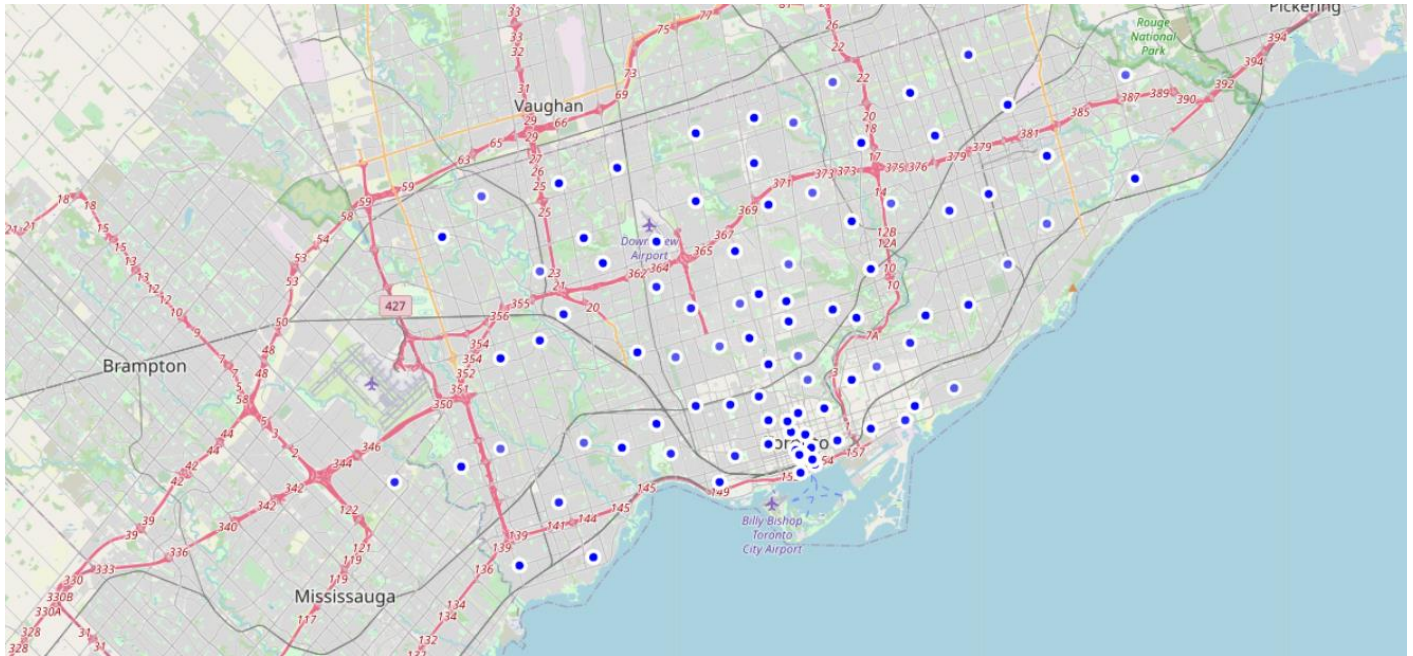
As the medical services should be located evenly for providing better service to residents, need to analyst the density of the medical services based on the population of each borough. Get Toronto population data from City of Toronto for the year 2011.

Merge the population results to the medical centers grouped table above, and get the results and the Bar chart as below.

	index	Borough	Count	Population
0	0	Central Toronto	36	181735
1	1	Downtown Toronto	416	624910
2	2	East Toronto	26	112054
3	4	Etobicoke	35	175647
4	6	North York	99	621068
5	7	Scarborough	43	600715
6	8	West Toronto	27	191735
7	9	York	10	109134



From the location map, it also indicates most of the medical service venues are in downtown Toronto.



RESULTS

According to the above data analyst, Downtown Toronto is the borough which has the most medical service venues in Toronto. Per 10K residents, there's 6.6 medical service venues. While Scarborough is the one has the least medical service venue, there's only 0.7 venue available per 10K residents. The second least is York, which has less than 1 venue per 10K residents.

DECISION & CONCLUSION

For serving the residents better, when the medical service providers or City of Toronto want to open a new medical service site, Scarborough should be the first choice. Or the second choice can be the borough York.