Homeless Shelter Occupancy in Toronto

York University

ENVS 4520: Applications in GIS

Project Part Three

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Introduction

Homeless shelters in the Greater Toronto Area have been facing a variety of problems in relation to their occupancy levels. In particular, there has been a significant increase in occupancy rates with the average shelter receiving an estimated 30,000 people per night (Gaetz et al., 2012). While the city caps off occupancy rate at 90% the numbers on the ground do not reflect this policy. The Ontario Coalition Against Poverty (OCAP) has been advocating for an increase in the occupancy rate due to growing demand from the homeless population. Respectively, Toronto is experiencing a 24% increase of people sleeping on the streets as concluded by a 2009 survey released by the City of Toronto (Peat, 2013).

This particular research project has focused on the Toronto region to study shelter occupancy levels. It takes into account all the shelters within this area such as men's, women's, co-ed and family shelters. The variables used to analyze these shelters are as follows: proximity to hospitals, relevant TTC routes, drop-in centre and supportive housing locations, food banks and health care clinics in proximity to shelters. In support of this project, information was collected on the services that these shelters provide (including access to the internet, laundry, new clothes, special needs services). These variable are useful to consider because they provide support in rationalizing the homeless population's deciding factors to a specific shelter type. For example, a co-ed shelter may provide a larger number of beds, health services etc, whereas an all-women's shelter may not. Thus, a female looking for a shelter to reside in for the night may be more likely to stay in a co-ed shelter offering these amenities than any other.

Underlying problems that were detected are the status of women in regards to homeless shelters. To explain, the current ratio between men and women occupying homeless shelters is considerably disproportionate. Women account for approximately 30% of the homeless population in Toronto shelters according to the Canadian Council of Social Development (Cassavant, 1999). The reason for this uneven distribution is not necessarily that there are less homeless women in Toronto, but rather that homeless shelters do not provide women with the services they require (Street Health, 2007). This is an issue which has been addressed

accordingly within this report, particularly the metadata, in order to determine what resources need to be developed in Toronto in order to appropriately accommodate women.

The objective of this project has been to use GIS software and analytical skills to illustrate and assess the factors which contribute to the homeless shelter occupancy problem in Toronto. This will assist relevant organizations in their efforts to mitigate the issue. Using spatial analytical techniques, it was possible to determine the current status of homeless shelters in relation to the aforementioned factors. Additional GIS techniques that were used to assess the issue include network analysis, neighbourhood analysis and vector overlay; tools such as geoprocessing, union, intersect, clip, dissolve, etc.

Map Analysis

The collection of data acquired and examined covers a number of key variables. For starters, by dividing the city into four major regions, there was more ease in separating and focusing on the specific shelters. With this it was concluded that the least amount of shelters are located in Etobicoke (2 shelters). Whereas, the highest number of shelters are located in Old Toronto (38 shelters).

Next, was the division of the shelters by their types: families, single men, single women, and mixed adults/co-ed *(refer to Map B)*. Through investigation, it can be concluded that shelters for single men have the highest capacity, following that are family shelters, then women's shelters, and finally mixed adult shelters. These observations were in accordance with the Daily Shelter Census (2014). But, the occupancy rate does not appear to follow the previously mentioned pattern; the occupancy rate is highest for mixed adult shelters (98%), then women's shelters (96%), then family shelters (94%), and finally men's shelters at 91% (City of Toronto, 2014). Furthermore, the overall occupancy rate is 91%. This is consistent with the municipal statistics of occupancy rates reaching above 90%. From 2011 to 2014, the general trajectory of nightly occupancy in the Toronto shelter system has increased. The greatest occupancy levels are seen during the months of October to December. It is evident that there is a

great need to increase occupancy rates to serve the growing homeless population. As seen on Map B, shelters are not distributed evenly across the regions of the city. If a single woman is in need of a shelter on a given night, it is of no use to her if she is located in an area dominated by single men's shelters.

Map C depicts all TTC routes that intersect with the shelters in the city. This was created to illustrate the connections among shelters. If a particular shelter obtains its maximum occupancy level for that night, the surrounding TTC routes can be used by the individual to locate another shelter. Looking at Map C, all shelters are located on accessible TTC routes. This allows for possible deterrence of individuals from shelters at their maximum occupancy rates.

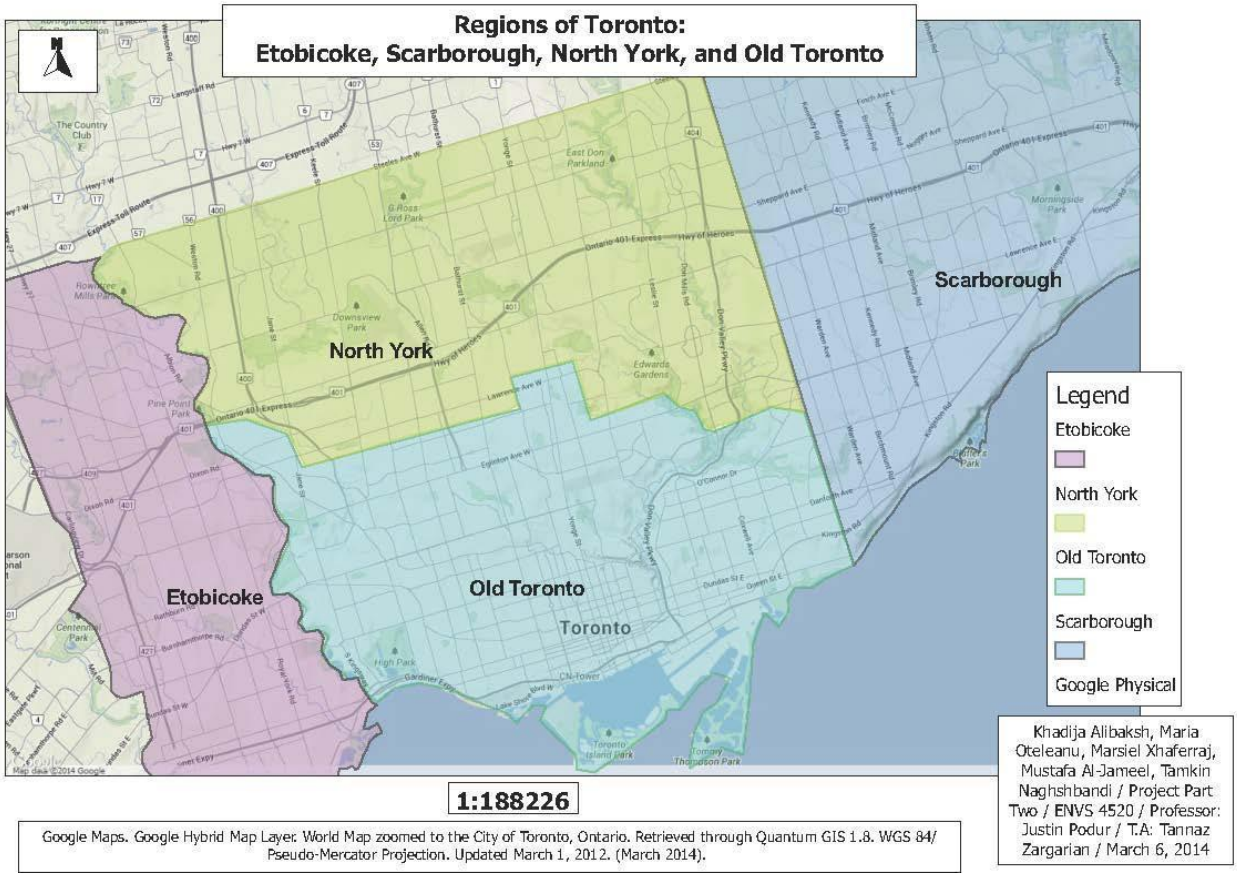
Map D displays drop-in centres relative to shelters. This map illustrates the proximity between the two types of centres. In Old Toronto the drop-in centres and shelters are located close to one another. Although, in Scarborough and North York there are fewer drop-in centres than there are shelters. This means that there are fewer resources that individuals can access if they are located outside the downtown core. The problematic aspect facing these individuals is that the homeless population is more likely to seek shelters in Old Toronto where there are more services available. Thus, increasing the chance of these shelters in Old Toronto reaching maximum capacity faster than those shelters located further away from drop-in centres.

Map E depicts the locations for supportive housing (ie. social housing), but is not as extensive as predicted. There are only a handful of supportive housing in Toronto, where they are evenly distributed in Scarborough, Old Toronto and Etobicoke. North York has the least amount of shelters in Toronto. In conclusion, supportive housing is distributed evenly across the city and there is no issue with their spatial locations.

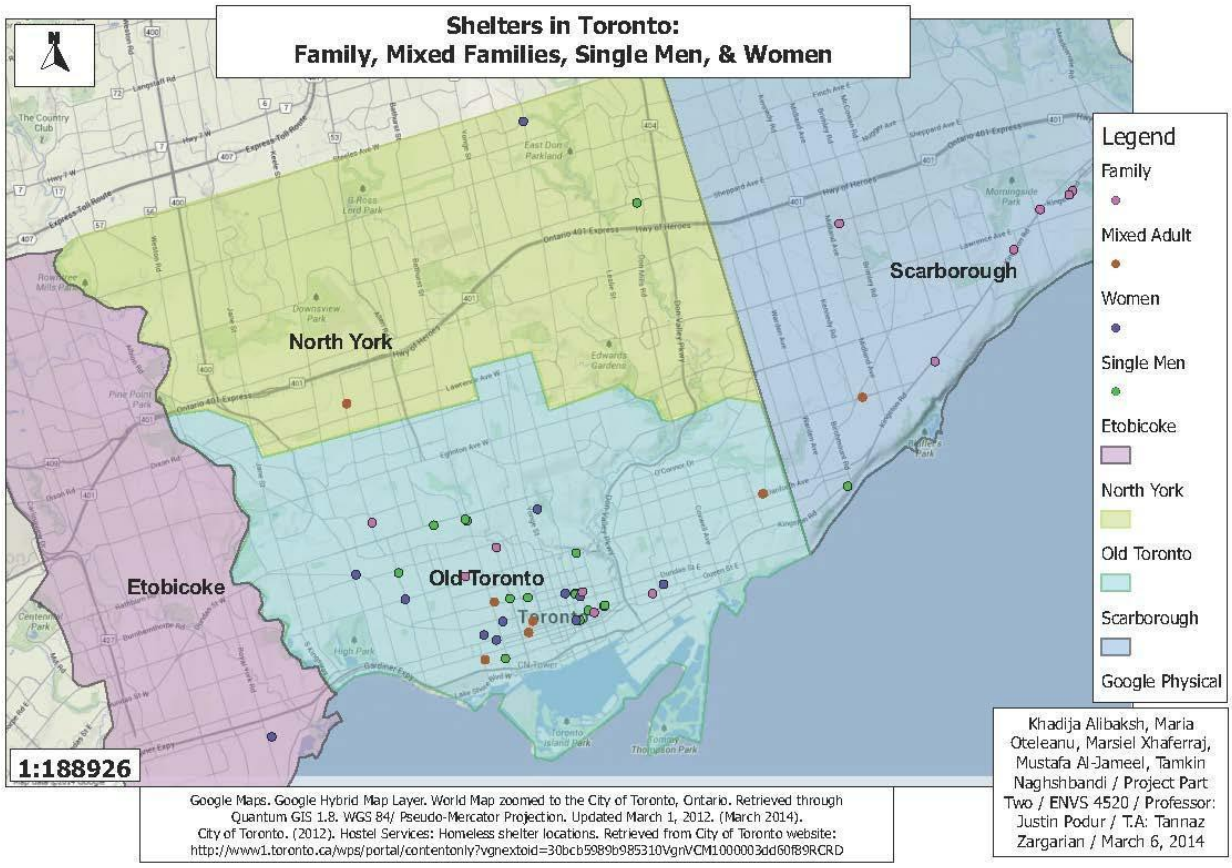
Second Harvest food banks were spatially mapped in Map F. This food bank has most of its locations in the Old Toronto region. Other Second Harvest offices are distributed more-or-less evenly across the rest of the city. The locations of Second Harvest offices appears more extensive than the shelter network. Second

Harvest can potentially reach out to a larger population across a greater surface area.

The same conclusions as the one above can be drawn from Map G; locations of health care clinics. The greatest concentration of health care clinics are in the Old Toronto region with increasingly fewer clinics located outside of this boundary. Overall, the least amount of clinics are located within Etobicoke and Scarborough.



[Map A]


Shelters in Toronto:
Family, Mixed Families, Single Men, & Women
Legend
Family
Mixed Adult
Women
Single Men
Etobicoke
North York
Old Toronto
Scarborough
Google Physical
North York
Scarborough
Etobicoke
Old Toronto
Toronto
1:188926
Google Maps. Google Hybrid Map Layer. World Map zoomed to the City of Toronto, Ontario. Retrieved through Quantum GIS 1.8. WGS 84/ Pseudo-Mercator Projection. Updated March 1, 2012. (March 2014).
City of Toronto. (2012). Hostel Services: Homeless shelter locations. Retrieved from City of Toronto website: http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=30bcb5989b985310VgnVCM1000003dd60f89RCRD
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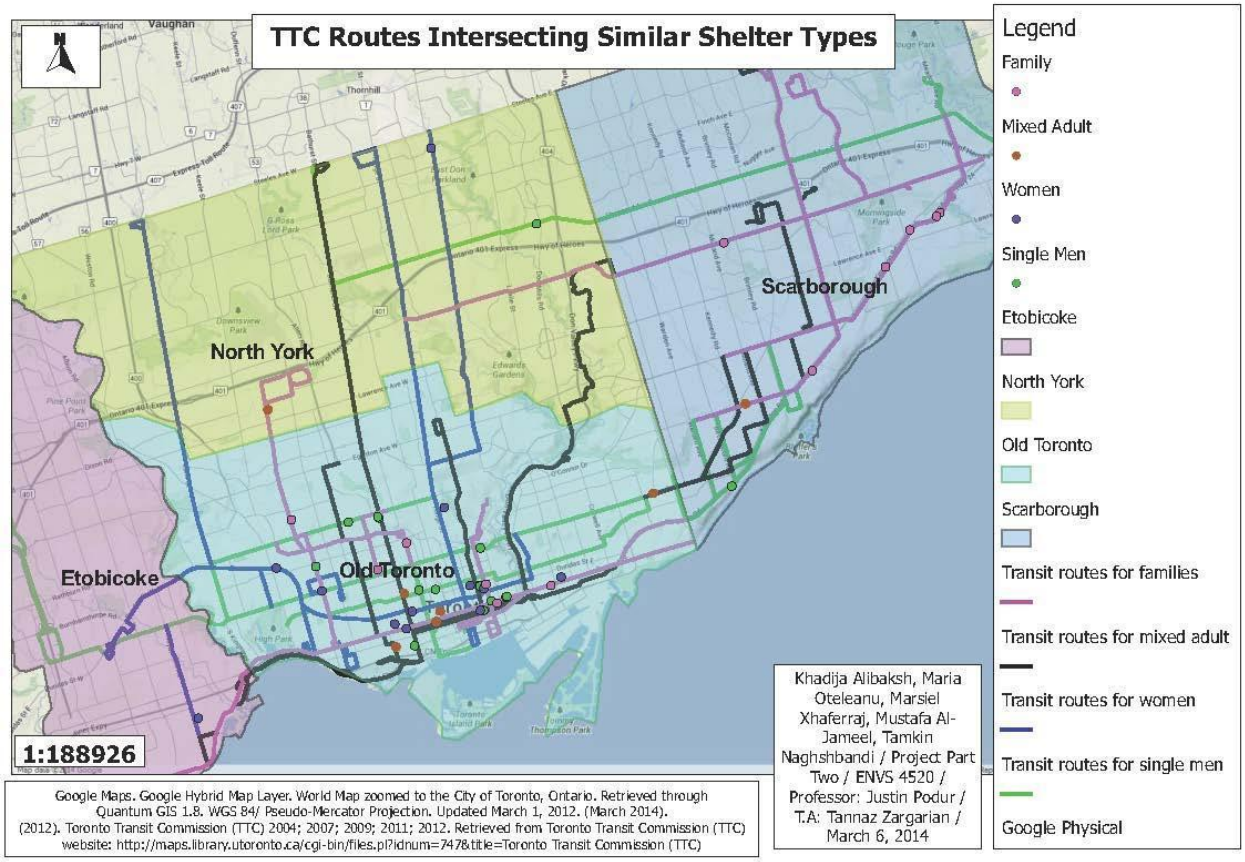
[Map B]


TTC Routes Intersecting Similar Shelter Types
Vaughan
Thornhill
North York
Scarborough
Etobicoke
Old Toronto
1:188926
Legend
Family
Mixed Adult
Women
Single Men
Etobicoke
North York
Old Toronto
Scarborough
Transit routes for families
Transit routes for mixed adult
Transit routes for women
Transit routes for single men
Google Physical
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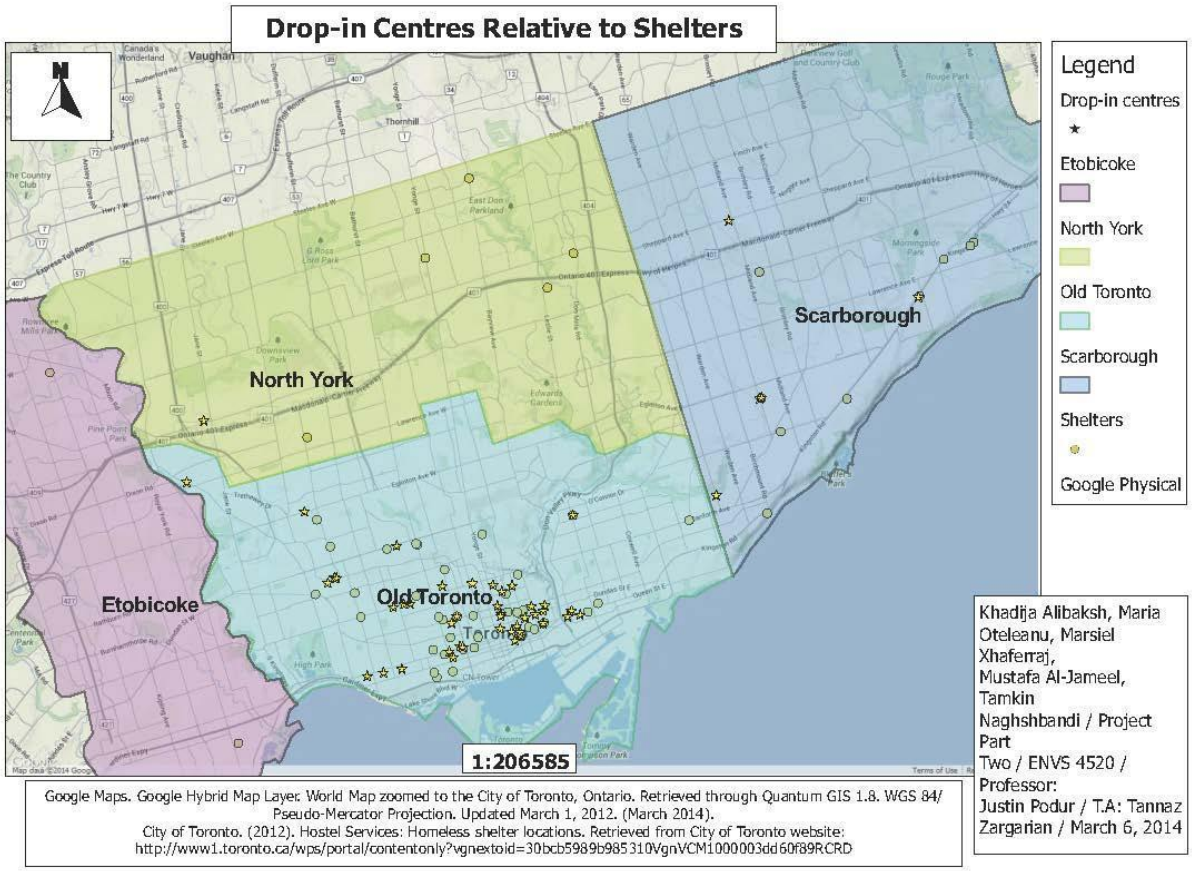
Google Maps. Google Hybrid Map Layer. World Map zoomed to the City of Toronto, Ontario. Retrieved through Quantum GIS 1.8. WGS 84/ Pseudo-Mercator Projection. Updated March 1, 2012. (March 2014).
(2012). Toronto Transit Commission (TTC) 2004; 2007; 2009; 2011; 2012. Retrieved from Toronto Transit Commission (TTC) website: http://maps.library.utoronto.ca/cgi-bin/files.pl?idnum=747&title=Toronto Transit Commission (TTC)

[Map C]


Drop-in Centres Relative to Shelters
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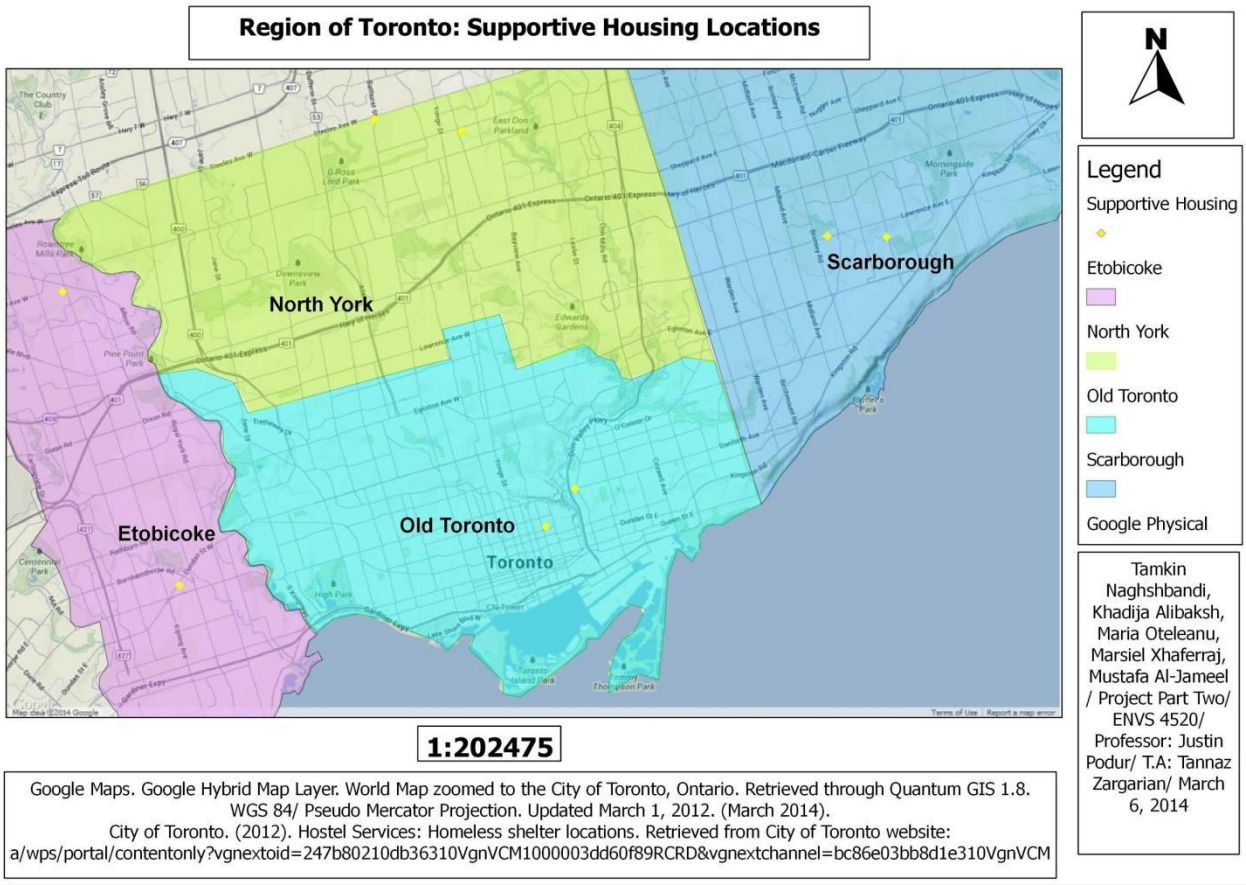
Thornhill
North York
Scarborough
Etobicoke
Old Toronto
Toronto
1:206585
Legend
Drop-in centres
Etobicoke
North York
Old Toronto
Scarborough
Shelters
Google Physical
Khadija Alibaksh, Maria Oteleanu, Marsiel Xhaferraj, Mustafa Al-Jameel, Tamkin Naghshbandi / Project Part Two / ENVS 4520 / Professor: Justin Podur / T.A: Tannaz Zargarian / March 6, 2014
Google Maps. Google Hybrid Map Layer. World Map zoomed to the City of Toronto, Ontario. Retrieved through Quantum GIS 1.8. WGS 84/ Pseudo-Mercator Projection. Updated March 1, 2012. (March 2014).
City of Toronto. (2012). Hostel Services: Homeless shelter locations. Retrieved from City of Toronto website: http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=30bcb5989b985310VgnVCM1000003dd60f89RCRD

[Map D]


Region of Toronto: Supportive Housing Locations
N
Legend
Supportive Housing
Etobicoke
North York
Old Toronto
Scarborough
Google Physical
North York
Scarborough
Etobicoke
Old Toronto
Toronto
1:202475
Google Maps. Google Hybrid Map Layer. World Map zoomed to the City of Toronto, Ontario. Retrieved through Quantum GIS 1.8. WGS 84/ Pseudo Mercator Projection. Updated March 1, 2012. (March 2014).
City of Toronto. (2012). Hostel Services: Homeless shelter locations. Retrieved from City of Toronto website: a/wps/portal/contentonly?vgnextoid=247b80210db36310VgnVCM1000003dd60f89RCRD&vgnextchannel=bc86e03bb8d1e310VgnVCM
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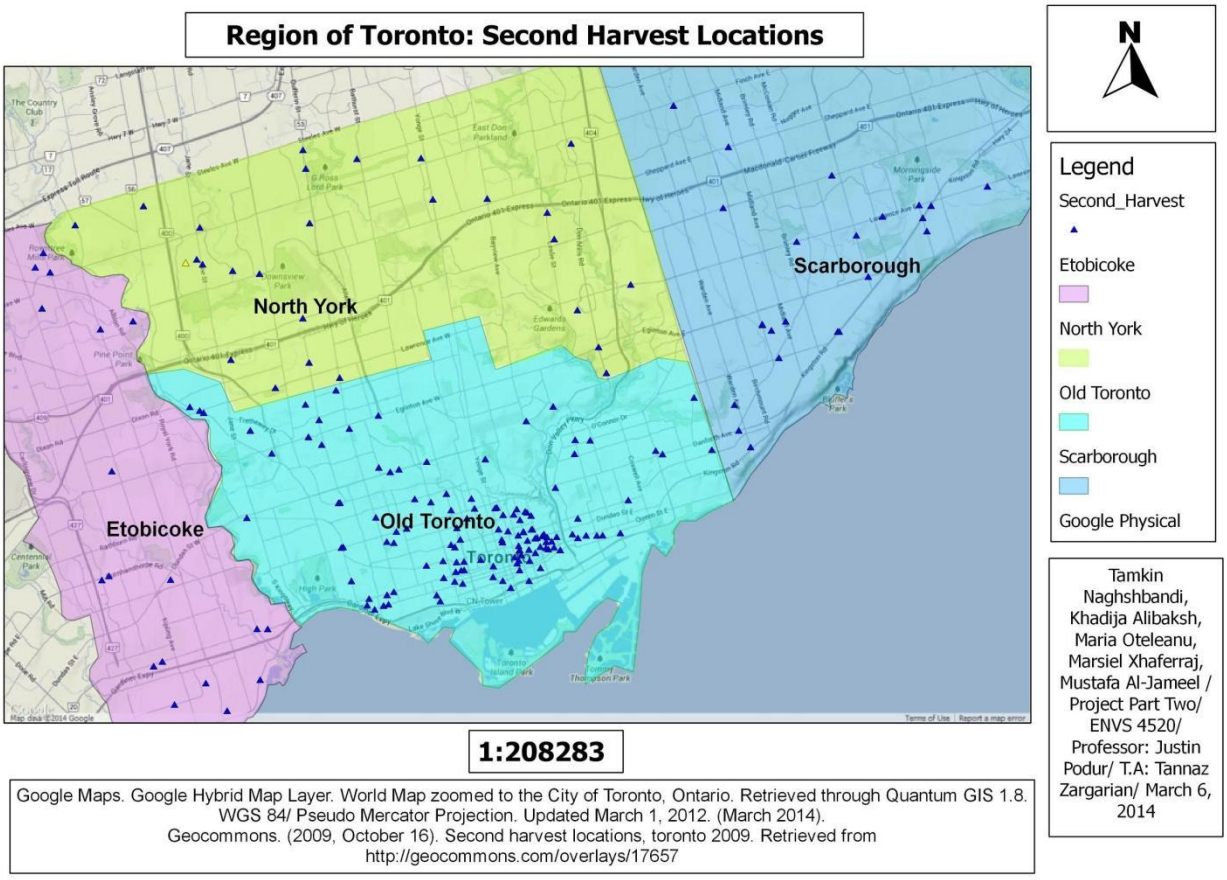
[Map E]


Region of Toronto: Second Harvest Locations
N
Legend
Second_Harvest
Etobicoke
North York
Old Toronto
Scarborough
Google Physical
North York
Scarborough
Etobicoke
Old Toronto
Toronto
1:208283
Tamkin Naghshbandi, Khadija Alibaksh, Maria Oteleanu, Marsiel Xhaferraj, Mustafa Al-Jameel / Project Part Two/ ENVS 4520/ Professor: Justin Podur/ T.A: Tannaz Zargarian/ March 6, 2014
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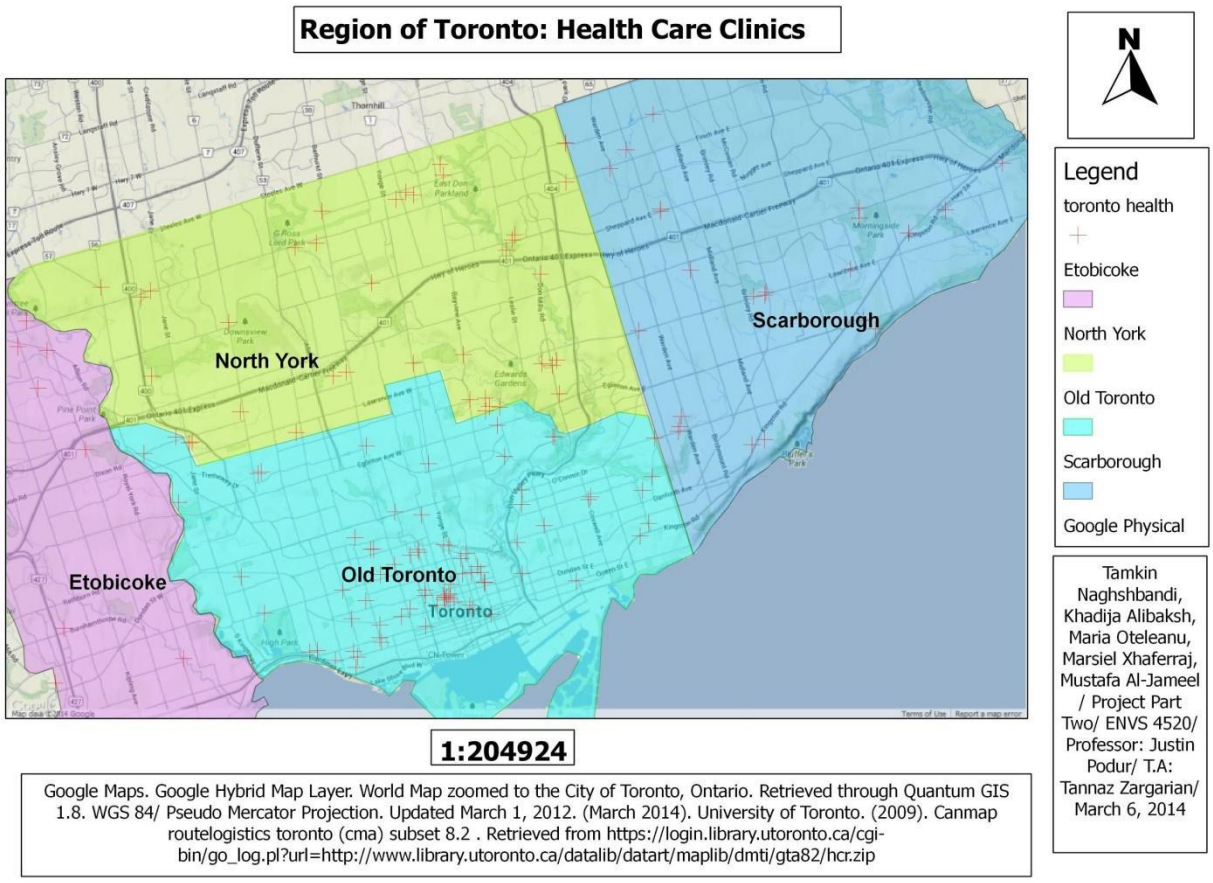
[Map F]


Region of Toronto: Health Care Clinics
N
Legend
toronto health
Etobicoke
North York
Old Toronto
Scarborough
Google Physical
North York
Scarborough
Etobicoke
Old Toronto
Toronto
1:204924
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[Map G]

Chart Analysis

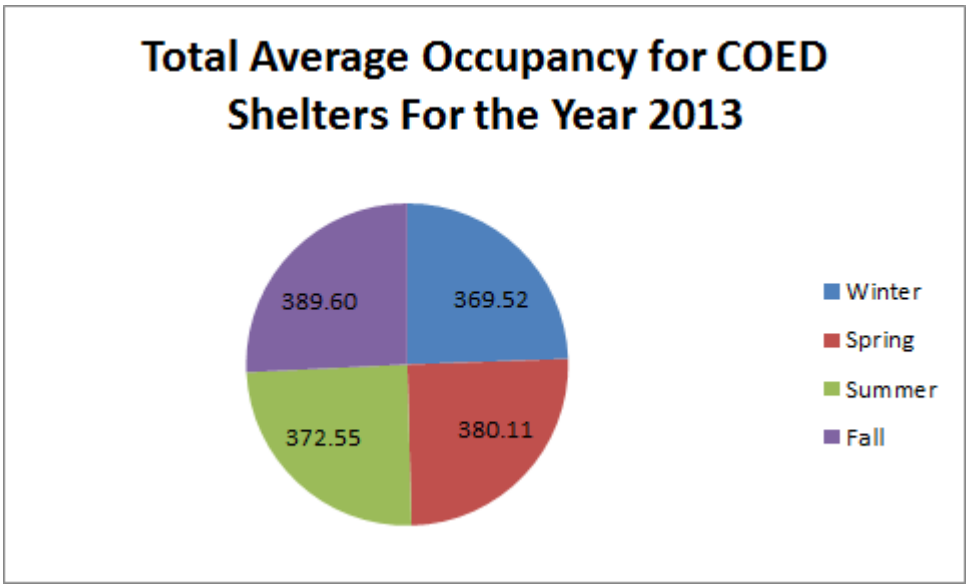
The pie charts below illustrate the total average occupancy of each shelter type for the year 2013. The data consists of daily census numbers from January 1, 2013 to December 31, 2013. The shelter types include coed (men and women), single men, single women, and families. These charts were created to illustrate the occupancy rates per shelter type per season.

To begin the analysis of the data, the data was divided by seasons from December 21st up to March 20th [Winter], March 21st to june 20th [Spring], June 21st up to september 20th [Summer] and September 21st up to the 20th of December [Fall]. Each type of shelter census data was averaged and the admittance figures were produced. To explain, in chart 1, the co-ed shelter census for the winter consisted of an average of 370 people, 380 during the spring, 273 in summer season and 390 people during the autumn season. These numbers could potentially be different in the year 2014 due to seasonal variation in temperature and climate intensity patterns. Even though we did not analyze youth shelters in our maps, we created a pie chart illustrating youth homeless average occupancy. Looking at chart 1 and chart 2 a pattern is visible;mainly that co-ed shelters and youth shelters have similar occupancy rates during each season.

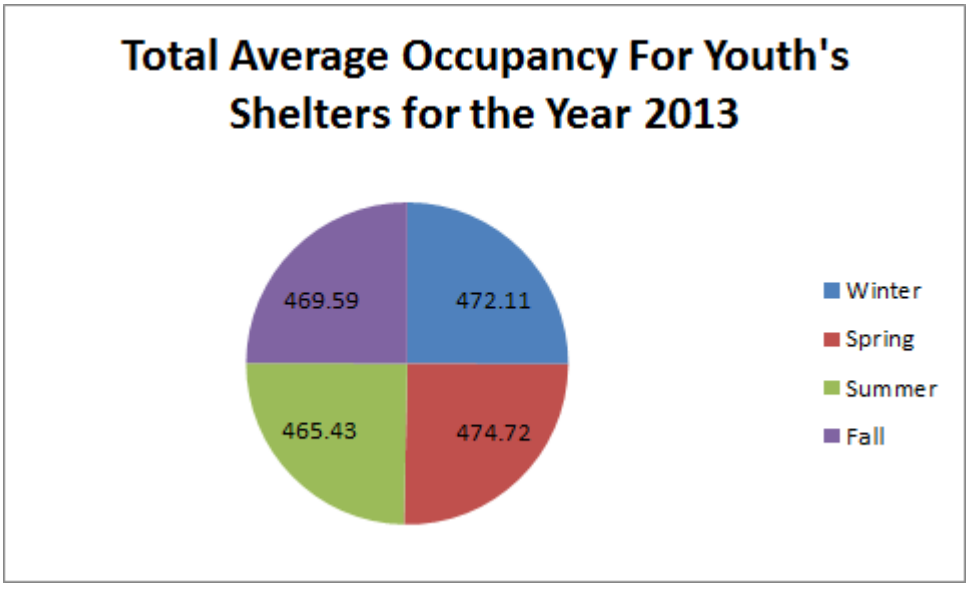
Chart 3, chart 4 and chart 5 depict the average occupancy by season for women, families and men, respectively. Men's shelters appear to have the highest occupancy rates of all types. As seen in chart 5, the fall season has 1,603 men using shelters. The winter appears to be the season with lowest occupancy in all shelter types with the exception of youth shelters. The highest occupancy rates is during the fall season (again with the exception of youth shelters, which have highest occupancy rates during the spring). Overall, the occupancy rates of charts 1 through 5 for the four season seem to occupy about 25% of the pie in each chart. Therefore, it is significant to study each season in terms of occupancy rates.

Finally, chart 6 portrays the monthly occupancy rates of each shelter type. Figure 1 illustrates the data in chart 6 in a table format. Chart 6 combines all shelter types into one visual. This data shows that there is a significantly higher occupancy rate for men. Following this is the

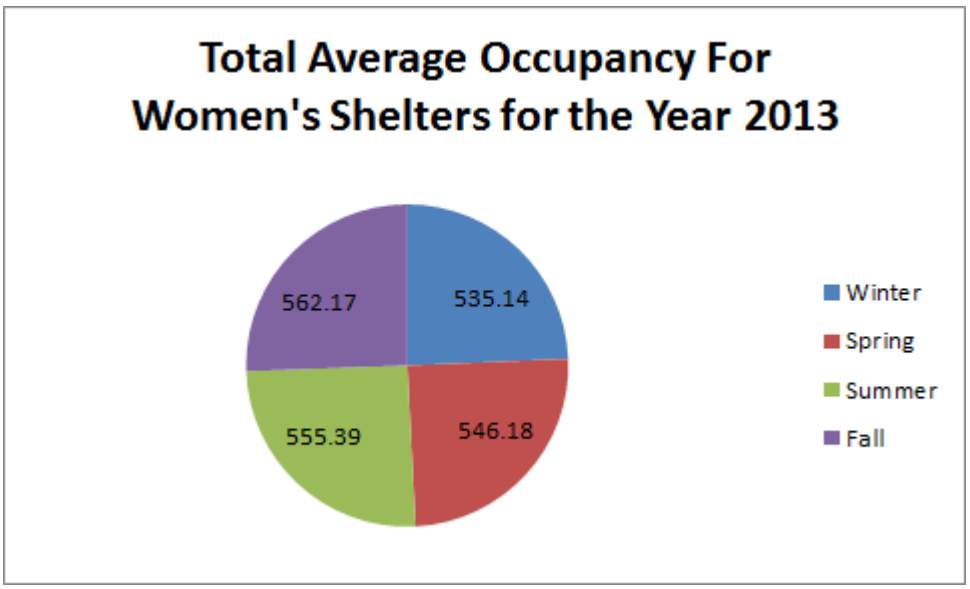
family category, then women's, youth and then co-ed. This time series chart is important in considering which month is more susceptible to higher demand of beds in shelters.



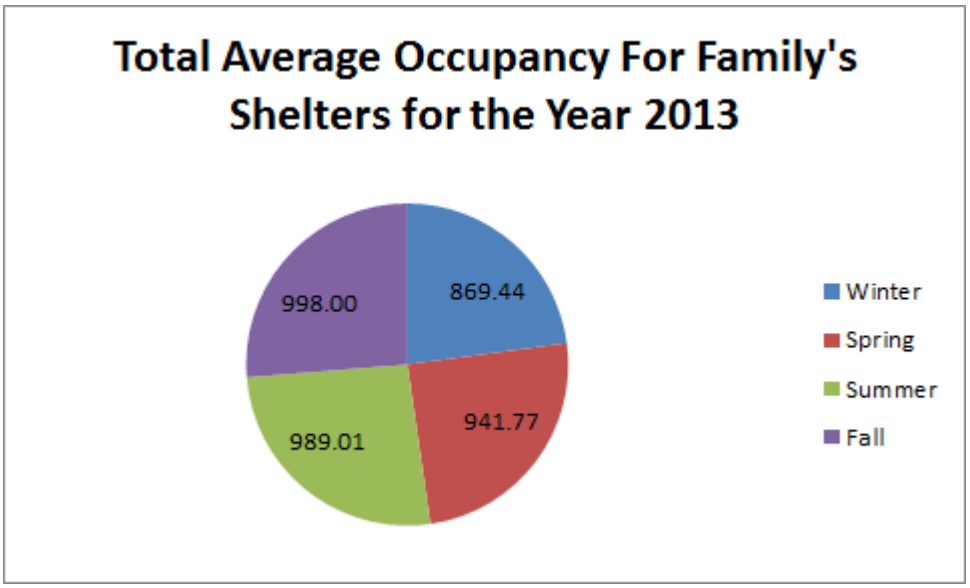
[Chart 1]



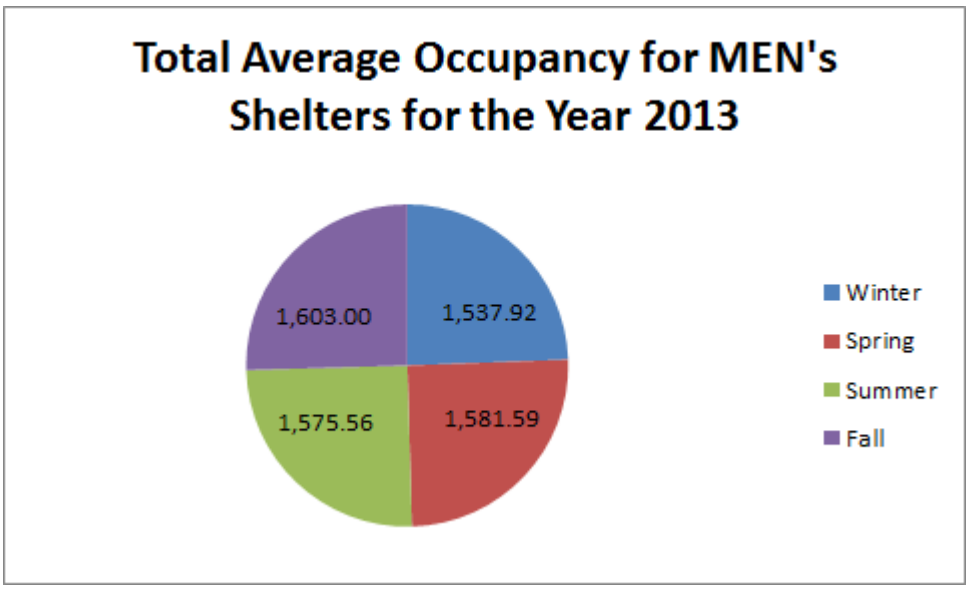
[Chart 2]



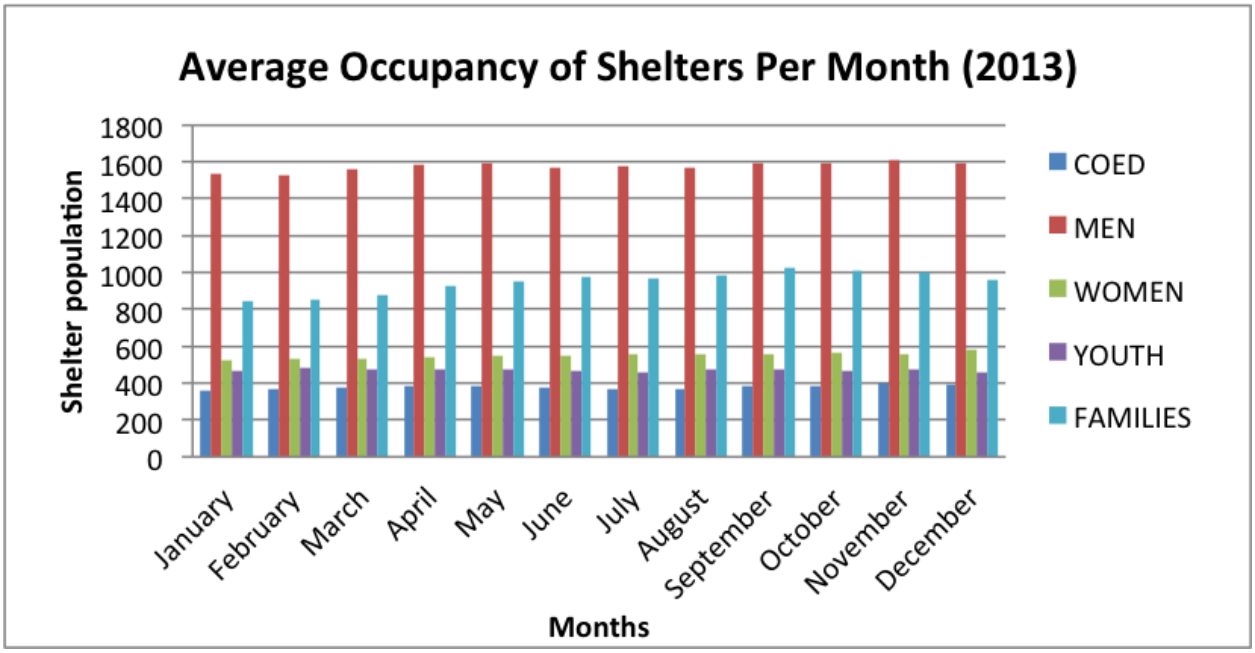
[Chart 3]



[Chart 4]



[Chart 5]



[Chart 6]

Shelter Occupancy by month, 2013 Average

	COED	Men	Women	Youth	Families
January	359	1534	525	463	843
February	370	1528	530	482	855
March	376	1557	530	476	877
April	380	1582	543	474	931
May	381	1596	551	477	951
June	377	1567	550	468	976
July	370	1575	555	459	967
August	371	1570	558	471	983
September	381	1593	556	471	1029
October	383	1596	561	468	1009
November	396	1612	558	476	997
December	389	1596	577	454	960

[Figure 1]

Errors & Limitations

As with any process of acquiring data, creating maps and developing analytical background, there is room for error. With the development of maps, there was some difficulty in acquiring shapefiles and converting data layers to the compatible projections. Nonetheless, all the relevant variables (data for shelters, drop-in centers, supportive housing, second harvest food banks, TTC routes and health care clinics) were reprojected to the same map projection and file size was compressed.

There was also an issue with the extent of data. For example, the TTC shapefiles consisted of a large amount of data. This needed to be reduced, thus the creation of the new layers by selecting the needed features (lines) and overlaying the shelter location point data. Moreover, the health care clinic shapefile included unnecessary information. In addressing this problem, the geoprocessing tool on QGIS was used to clip the health clinics, thus allowing the clinics to portray only within the borders of Toronto versus all of Ontario.

A manually derived problem that may have resulted produced inaccurate data was the averaging of the daily census shelters. Most of the data was collected from Open Data Toronto, a trusted government website. However, data was also gathered directly from each shelter. Data management by each respective shelter could have contained errors as the reports at the shelters are done manually. The daily shelter census may be skewed as can be laborious to gain information from the homeless populations. This is due of their lack of a fixed home making them difficult to count. For example, an individual may be registered to several shelters for the same day. This produces issues for management as an empty space would be accounted for, but in reality it is vacant. The numbers of individuals using shelter beds per night can be exaggerated due to this.

GIS Techniques

This research project has attempted to understand the problem of homeless shelter occupancy in the city of Toronto. Using GIS software we were able to determine a number of spatial patterns, including locations of shelter types and proximity to vital services. To illustrate these patterns, we used Quantum GIS to create maps using the shapefiles we accumulated from open data sources. These maps lead the way to conceptualizing the problem at hand and assisting the process of improving the situation.

Using GIS analysis techniques, such as network and neighbourhood analysis, we were able to determine a range of variables that influence the occupancy rate as well as consider possible solutions. Using geoprocessing tools, it was possible to utilize a clipping feature to remove unnecessary and clustered data as seen for the Toronto health care clinics. With spatial analysis, the use of point-over-polygon and line-over-polygon was conducted for this project. Such that shapefiles were consistently being placed over the predominant region shapefiles (Etobicoke, Scarborough, Old Toronto, and North York). This is particularly useful as it allows for readers to conceptualize the distance either via TTC route to another shelter or drop-in center to shelter type.

Concluding Remarks

The congestion and overcapacity of homeless shelters within the GTA is a growing issue that should be addressed by governmental bodies as well as social groups. This problem should be considered a priority subject for further analysis while also looking at its severity, and can benefit with the help of GIS analysts and tools. The issue could be due to uncertain data because of a number of factors, which ultimately affect the managerial aspect of this study. The spatial factor is another significant issue. For example, the distance in between shelters could be rather larger making it a problem to get to these shelters. This creates a problem for the homeless population because they are constantly being deferred due to the over-capacity rates. The spatial analysis conducted using GIS software could act as representation and as an identification to the

spatial issue. It may even be able to mitigate this issue. With the acquisition of helpful data layers and maps such as transportation routes, food banks, social assistance offices and nearby health facilities the issue can be studied in greater depth. In addition, GIS software could also be used in determining and identifying future prime locations, in which new shelters could be established. These would create spatially accessible matches needed to accommodate the capacity volumes for the increasing homeless population within the city.

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