GGR372 Lab 1 Report

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Question 1

The correlation coefficients between the SES variables of interest and COPD prevalence are as follows:

- University graduate: -0.54738
- Aged 65 and up: 0.177558362
- Aged 19 and under: -0.00981912
- Aged 65 and up and living alone: 0.182305475
- Did not complete high school: 0.480453857
- Median income: -0.43424391
- Minorities: 0.102263759

COPD is the result of decades of exposure to polluted air (American Journal). This includes exposure to smoking and second-hand smoke, industrial pollutants, and fire (American Journal). People who grew up or live in environments that have low exposure to these risks are less likely to develop COPD. People with high income can afford to live in such environments while people with low income may not be able to. This also applies to work environments (there may be more low income earners that work in factories and more high income earners that work in offices). This could explain why we see a negative correlation for university graduates (we assume that they have high income) and middle class residents; and a positive correlation for residents who did not complete high school (we assume they have low income).

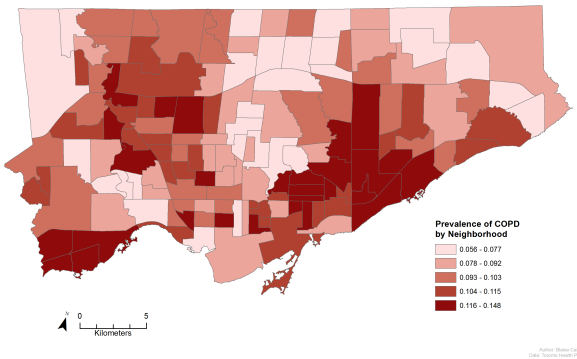
The variable for young people below 20 does not show a correlation because the COPD data we are examining are for people aged 35 and up (although if we had the data for it, we would probably find that COPD cases in young people are rare). We are not accounting for the percentage of people in the neighbourhood between 20 and 35.

There is a low correlation for older adults, which is counterintuitive to what we discussed (i.e. that it takes decades of exposure for the disorder to develop). However, the data for older adults is a combination of all older adults from different socioeconomic backgrounds. That is, there is no distinction between high-income and low-income seniors. The low correlation for minorities might also be explained by this reason.

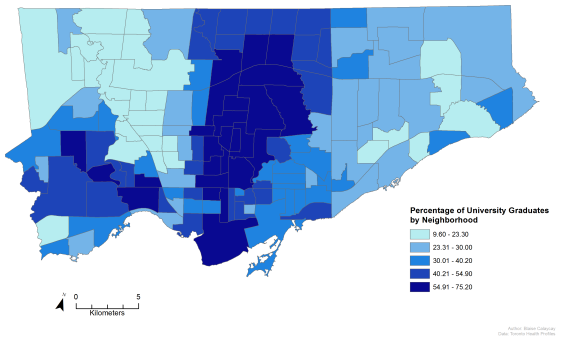
Question 2

The distribution of prevalence of COPD almost exhibits an inverse relationship between the number of university graduates in the corresponding space. By observing the maps below (all the maps from here on out use 5 quantiles for classification), we see that there are higher concentrations of university graduates in the central and southwestern neighborhoods of Toronto, whereas there are higher concentrations of COPD cases in the lower eastern side and central western side of Toronto.

Prevalence of COPD in Toronto

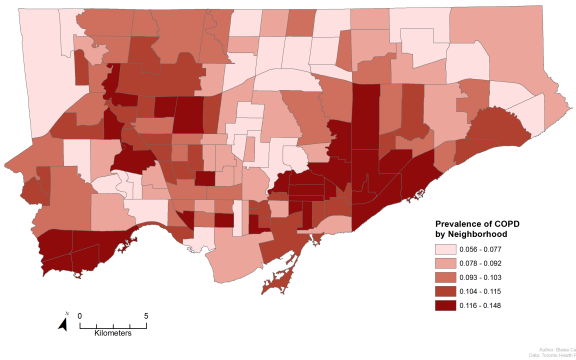


Percentage of University Graduates in Toronto

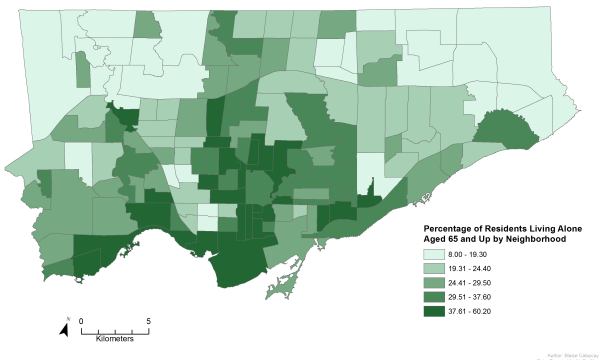


We intuitively expect a direct relationship between older adults living alone and COPD cases. However, this relationship is not obvious when looking at the two maps side by side. In fact, after exploring the maps, one could argue that there is almost an inverse relationship or no relationship at all between the two sets of data. Although COPD is prevalent in older adults

Prevalence of COPD in Toronto



Percentage of Toronto Residents Living Alone Aged 65 and Up

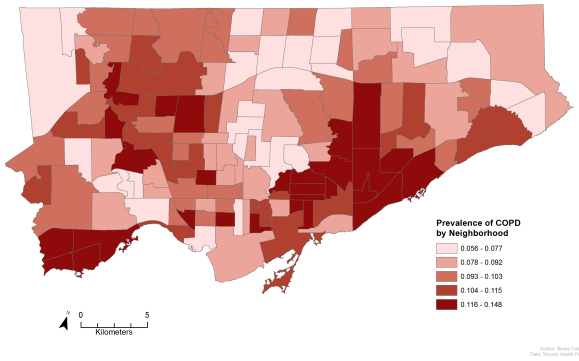


(American Journal), age is not the cause but rather the decades of exposure to risk factors (American Journal).

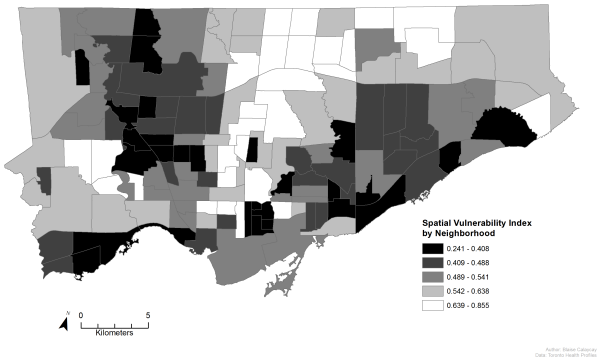
Question 3

Despite not seeing a very good relationship between old age and COPD in our maps, using this variable as one of two equally weighted variables for our vulnerability index map (university graduates is the other one) shows an expected visual relationship with the COPD prevalence map (see below). The colors of each neighbourhood on both maps are generally the same shade or one shade apart (with some exceptions of course).

Prevalence of COPD in Toronto

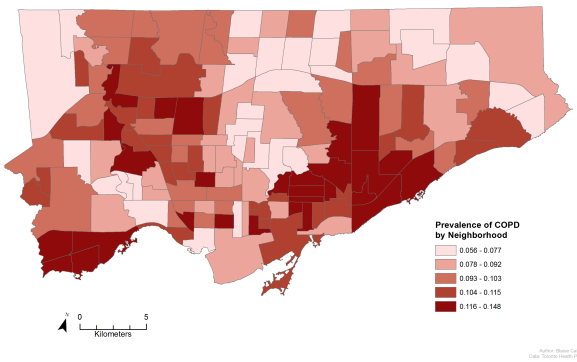


Spatial Vulnerability Index of Toronto

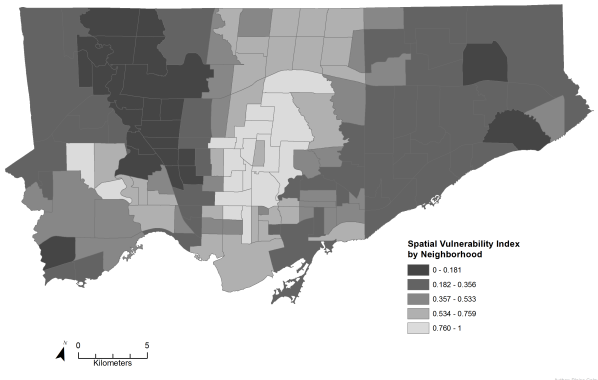


Using university graduates as a single variable for the index seemed like a good idea based on our previous observations. However, comparing that map with the COPD prevalence map proves otherwise (see below). Hence, although there is a relatively low correlation between old

Prevalence of COPD in Toronto



Spatial Vulnerability Index of Toronto (COPD; One variable)



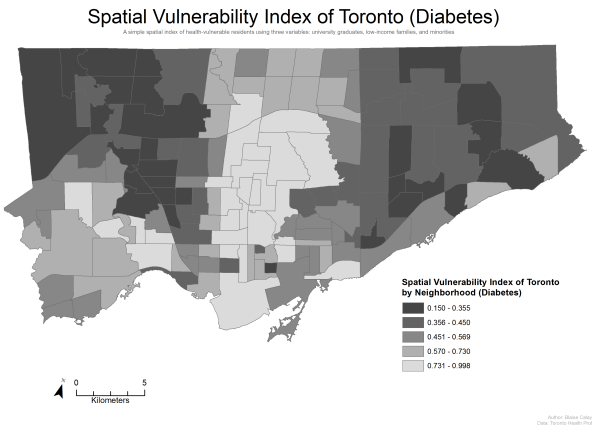
age and COPD prevalence, it is significant enough to include as a variable to determine the index. After all, COPD is most prevalent among older adults (American Journal).

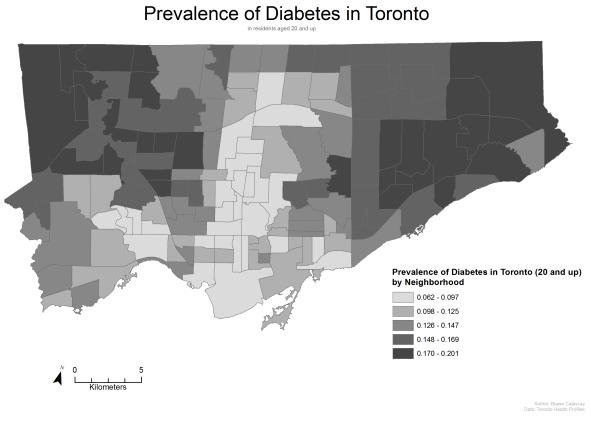
Independent Work: Diabetes Prevalence and Spatial Vulenrability Index

Many health organizations in North America have collected data on the risk factors of diabetes. Based on their findings, it seems that youth below 20 have a very low risk of developing diabetes (ADA). In addition, for reasons unclear, minorities in North America are at a significantly higher risk of diabetes (around 50-100%) than their non-Aboriginal White counterparts (ADA; CDA). Other factors that increase a person's risk of diabetes include health history, having low income, and being overweight.

The four SES variables that I selected for exploring correlation coefficients between diabetes prevalence (20 and up) are the percentage of residents who are minorities, have low income, are below 20, and are university graduates (we are assuming again that graduates have high income). The correlation coefficients are as follows: **minorities**: 0.584685086; **low income**: 0.320382965; **below 20**: 0.244873; **university graduates**: -0.400070322. In fact, minorities have the highest correlation between diabetes prevalence out of all the SES factors. Surprisingly, there is a positive correlation between the percentage of young residents in a neighbourhood and diabetes prevalence (we expected an inverse relationship). In creating the spatial vulnerability index based on diabetes prevalence, I chose minorities, low income, and university graduates as my three risk factors. The weights I used for each factor are as follows: **minorities**: 0.565; **low income**: 0.170; **university graduates**: 0.265. I chose these weights by normalizing the coefficient of determination (r^2) of the three variables ($r^2_{minorities} \approx 0.34$, $r^2_{income} \approx 0.10$, $r^2_{graduate} \approx 0.16$). I chose to base my weights on r^2 because it represents the percentage of variability of each SES variable that relates to the variability of diabetes prevalence.

Comparing our three-factor vulnerability index map (with weights as stated above) between a map of the prevalence of diabetes in Toronto show that they are visually similar.





References

ADA – American Diabetes Association. http://www.diabetes.org/diabetes-basics/statistics/

American Journal of Respiratory and Critical Care Medicine. http://www.atsjournals.org/doi/full/10.1164/rccm.201204-0596PP#.V5Fh3_mANBc

CDA – Canadian Diabetes Association. http://www.diabetes.ca/how-you-can-help/advocate/why-federal-leadership-is-essential/diabetes-statistics-in-canada