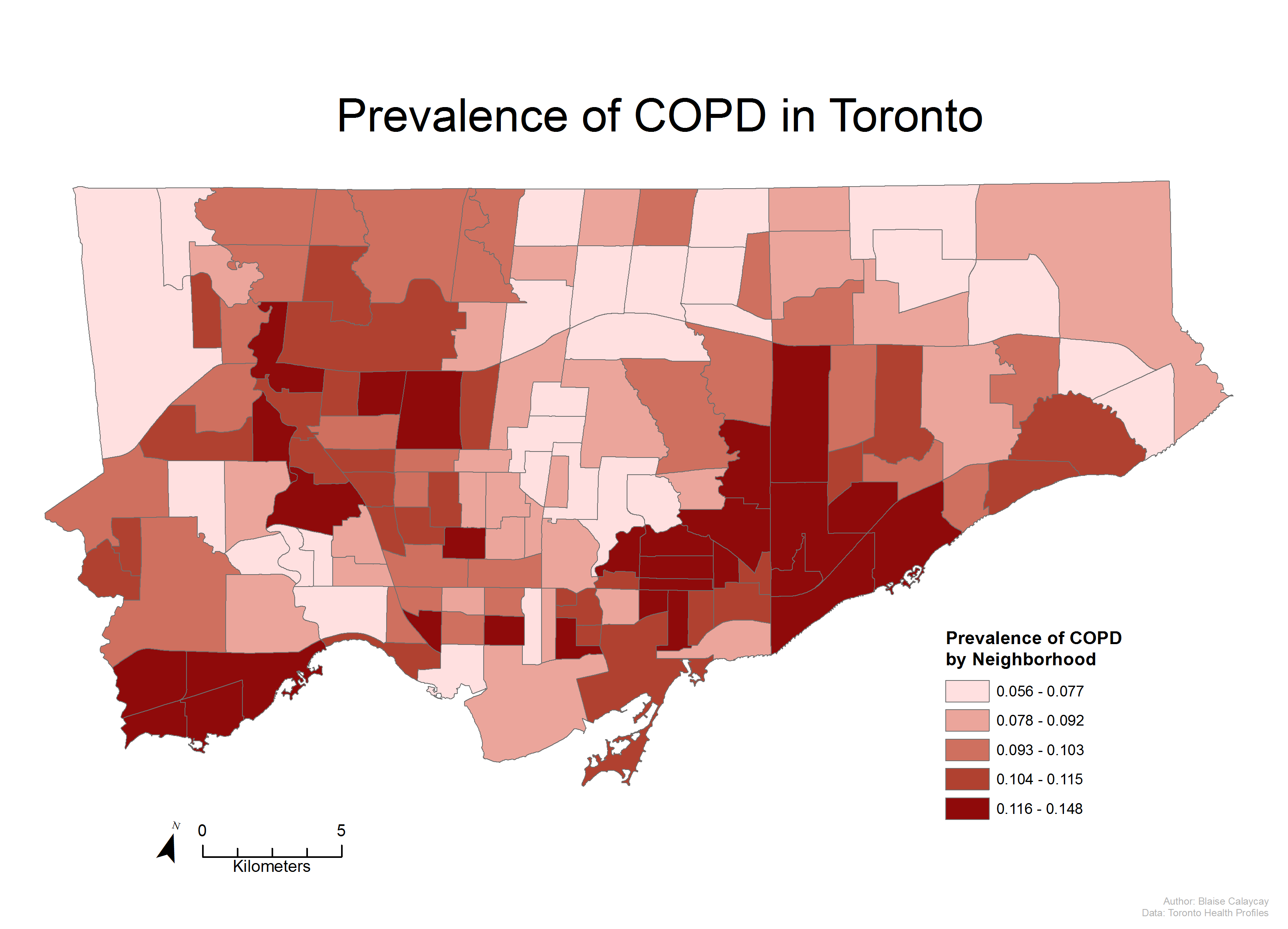
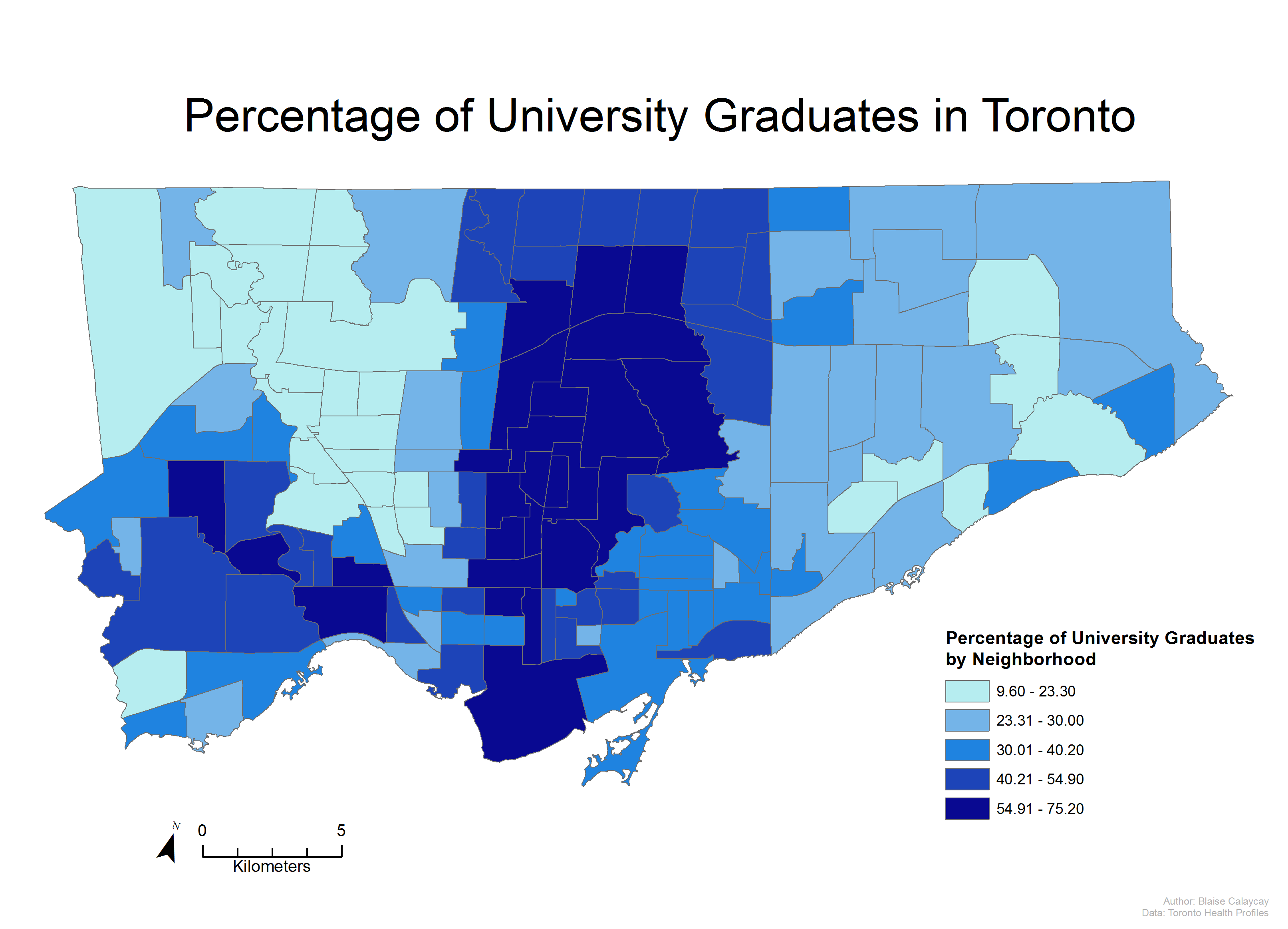
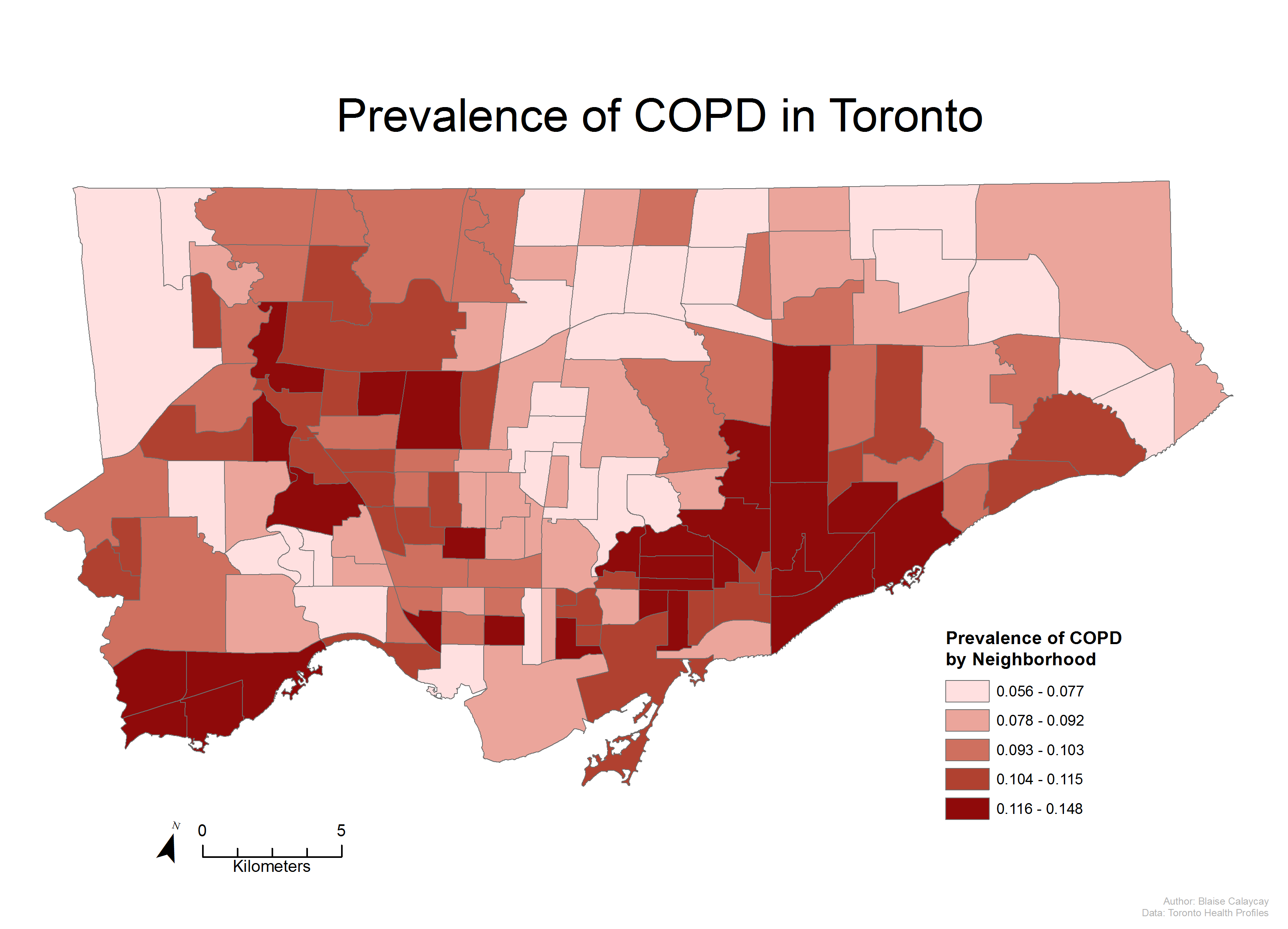
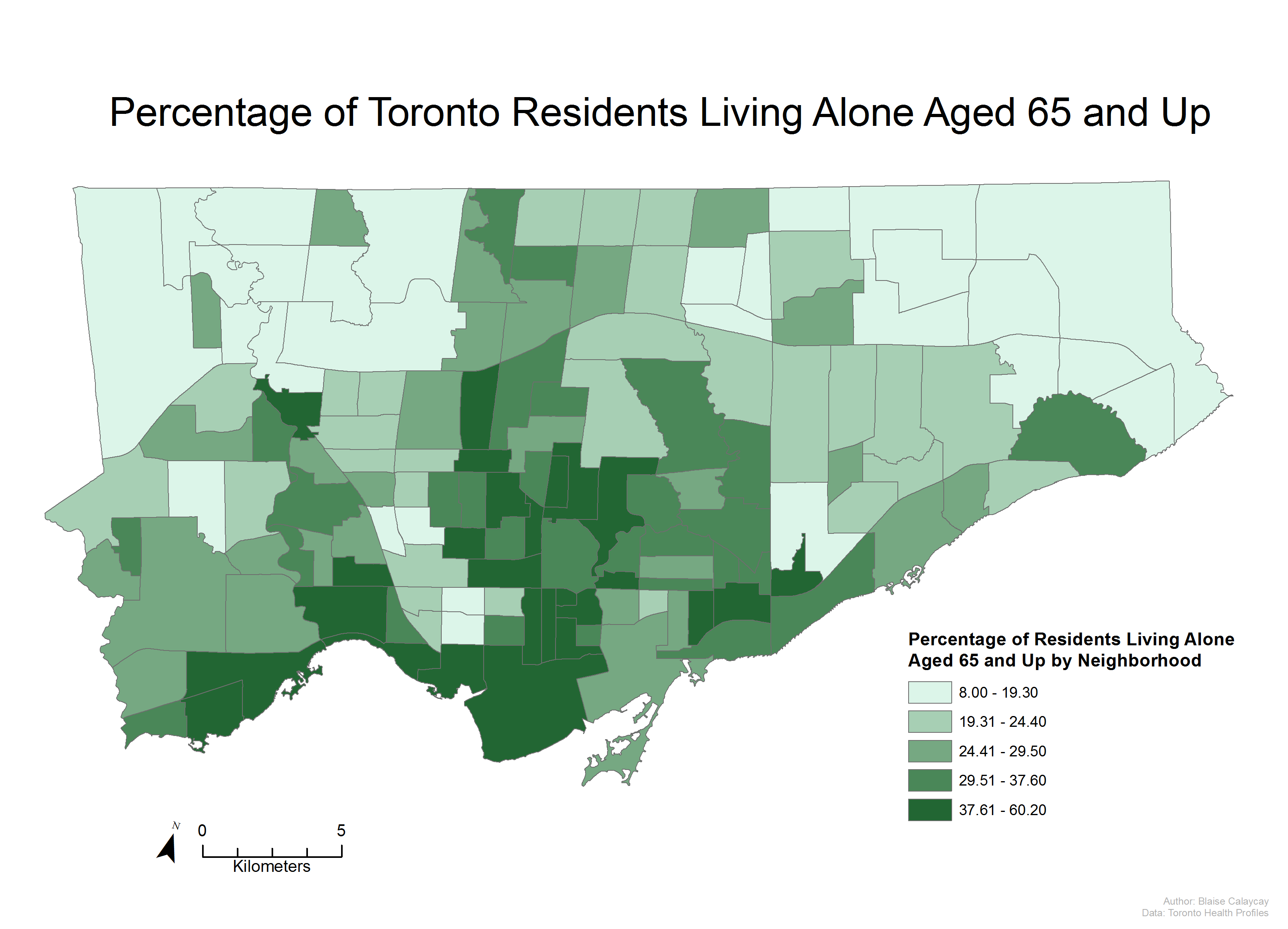
**Question 1**

**Question 2**

The spatial distribution of prevalence of COPD almost exhibits an inverse relationship between the number of university graduates in the space. By observing the maps below, 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.



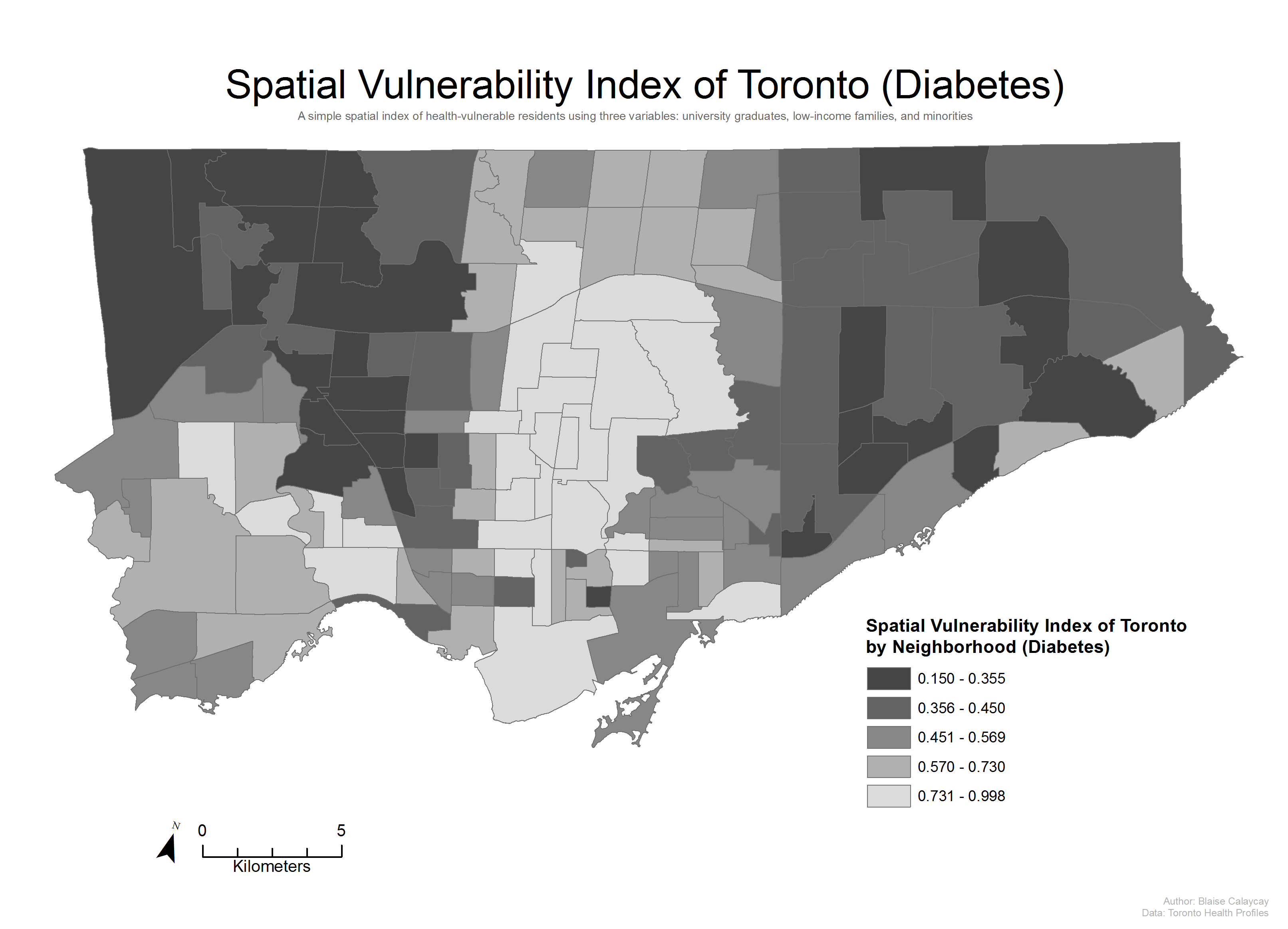
We expect a direct relationship between older adults living alone and COPD cases. However, this relationship is not obvious when looking at the two maps side by side. In fact, one could argue that there is almost an inverse relationship between the two sets of data by exploring the maps.

**Question 3**

**Independent Work: Diabetes Prevalence and Spatial Vulenrability Index**

Plenty of 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 (American Diabetes Association [ADA]). For unclear reasons, minorities in North America are at a significantly higher risk of diabetes (around 50-100%) than their non-Aboriginal White counterparts (ADA; Canadian Diabetes Association [CDA]). Other factors that increase a person’s risk of diabetes include health history, having low income, and being overweight.

Since the data that we used in this lab does not include health data for Toronto residents under 20 (exploring the correlation between youth and diabetes is useless), 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 immigrants, and are university graduates (with the same reasoning as in Question 1, where we assume that university graduates have a relatively high income). The coefficients are as follows: **minorities**: 0.584685086; **low income**: 0.320382965; **immigrants**: 0.552084469; **university graduates**: -0.400070322. In fact, minorities have the highest correlation between diabetes prevalence out of all the SES factors. 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 (r2) of the three variables (r2minorities ≈ 0.34, r2income ≈ 0.10, r2graduate ≈ 0.16).

Comparing our three-factor vulnerability index map (with weights as stated above) between a map of the prevalence of diabetes in Toronto (using 5 quantiles for both categories) show that they are visually similar.

