Is Residential Racial Segregation a Driver of HIV/AIDS Disparities in Baltimore City, MD?

Introduction

- Human Immunodeficiency Virus/ Acquired Immunodeficiency Virus (HIV/ AIDS) is sexually transmitted infection that causes the immune system's function to diminish over time until infections that are normally non-fatal, such as the flu, become fatal (AIDSinfo, 2016). The infection is referred to as HIV, and the stage at which it becomes fatal is called AIDS. HIV/AIDS is most commonly transmitted though unprotected vaginal and anal sex, and sharing of dirty needles (Centers for Disease Control and Prevention, 2016).

- African Americans comprised 63% of Baltimore City (Tobin, Cutchin, Latkin, & Takahashi,2013) but 83% of HIV/AIDS cases in 2013 (Center for HIV Surveillance, Epidemiology and Evaluation, 2014). This is despite evidence that among Baltimore City men who have sex with men (MSM), who make up 48% of HIV/AIDS cases (Center for HIV Surveillance, Epidemiology and Evaluation, 2014), blacks exhibit less risk behavior than whites (Tobin, Cutchin, Latkin, & Takahashi,2013). These data suggest that there are more macro-level factors shaping HIV/ AIDS patterns.

- Residential racial segregation may be one of them. Poundstone, Strathdee, and Celentano (2004) theorize that residential racial segregation may keep HIV high among segregated minorities and low among whites through increased "isolation" and "concentration" of both diseases and people, a relationship that has been found with Tuberculosis (p.26). However, there is no empirical research with HIV/AIDS supporting this theory.

- To fill this gap, my research asks: does HIV/AIDS in Baltimore City cluster where black neighborhoods cluster? The scope of this project is limited to non-hispanic blacks and whites.
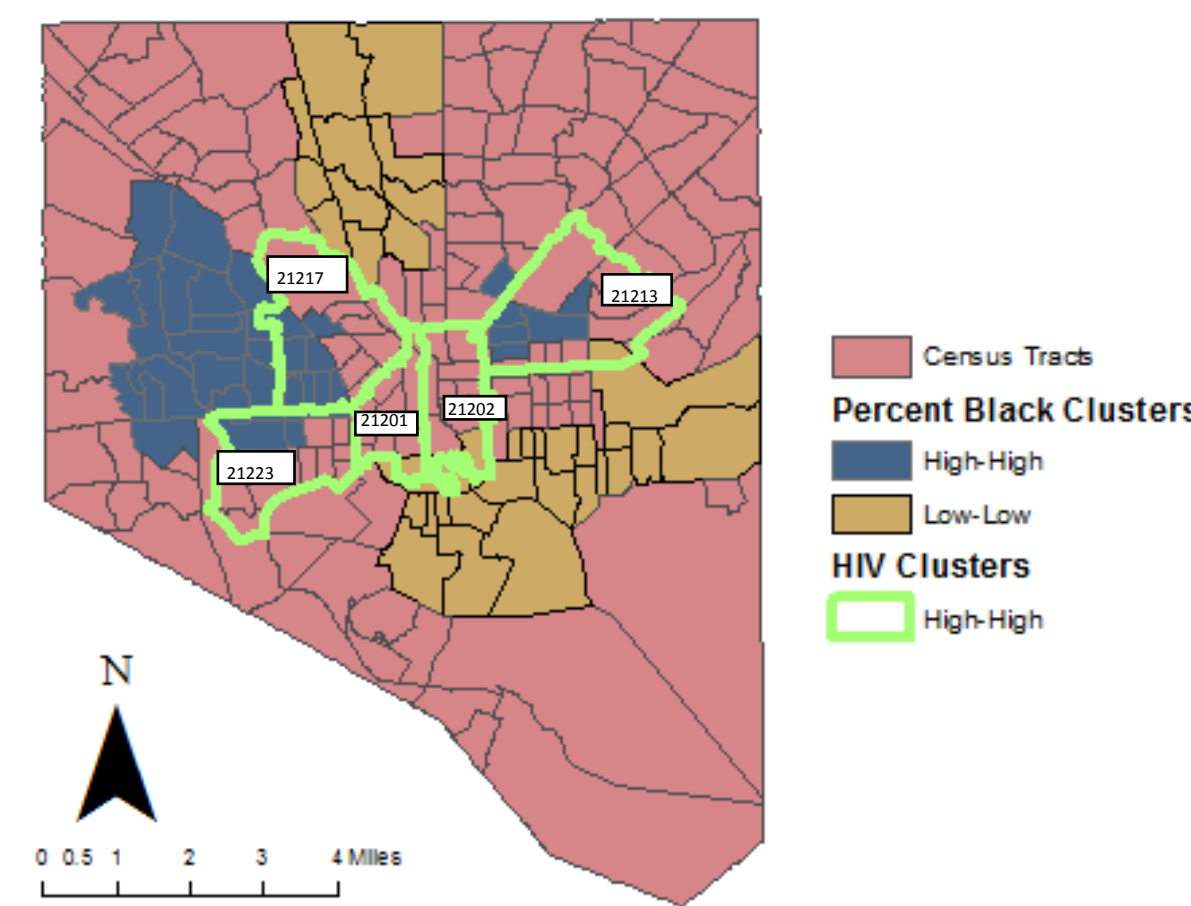
Data Sources and Methods

- I obtained 2013 HIV/ AIDS prevalence statistics for Baltimore City from AIDSVu, Baltimore City ZIP code polygons from Baltimore City Open GIS Data, Baltimore City census tract polygons with 2010 census demographic data from OpenBaltimore, and latitude and longitude data for all bars and night clubs in Baltimore City (see below for why) from Reference USA using 2012 NAICS code "722410"

1) Visualized distribution of HIV/AIDS prevalence and checked for significant clusters and outliers.

2) Visualized racial distribution (percentages) and checked for significant clusters and outliers.

3) Looked for overlap between HIV clusters and racial clusters.

4) Noticed little overlap; investigated other explanations on Google Maps ; found many nightclubs.

5) Pursued secondary research: geocoded bars and nightclubs (BNC), and looked for significant clusters and outliers.

6) Analyzed summary statistics for all data.

Clusters for "Percent Black" by Census Tract and HIV by ZIP Code in Baltimore City

HIV High-High Clusters			
ZIP Code	Overlaps with "Percent Black" High-High Cluster?	Percent Black	HIV/AIDS per 100, 000 in 2013
21213	Yes	84%	3614
21223	Yes	78%	3890
21217	Yes	74%	4867
21202	No	57%	4089
21201	No	46%	3679

Racial Distribution by Census Tract and HIV Clusters by ZIP Code for Baltimore City

Clusters for "Percent Black" by Census Tract and HIV by ZIP Code in Baltimore City

ZIP Code HIV/AIDS Prevalence in Baltimore City, MD in 2013

2013 HIV/AIDS Prevalence for Baltimore City by ZIP Code

Bars and Night Clubs (BNC) in Baltimore City

HIV and Bars & Night Club (BNC) Clusters by ZIP Code in Baltimore City

HIV Clusters by ZIP Code and BNC Clusters by Census Tract for Baltimore City
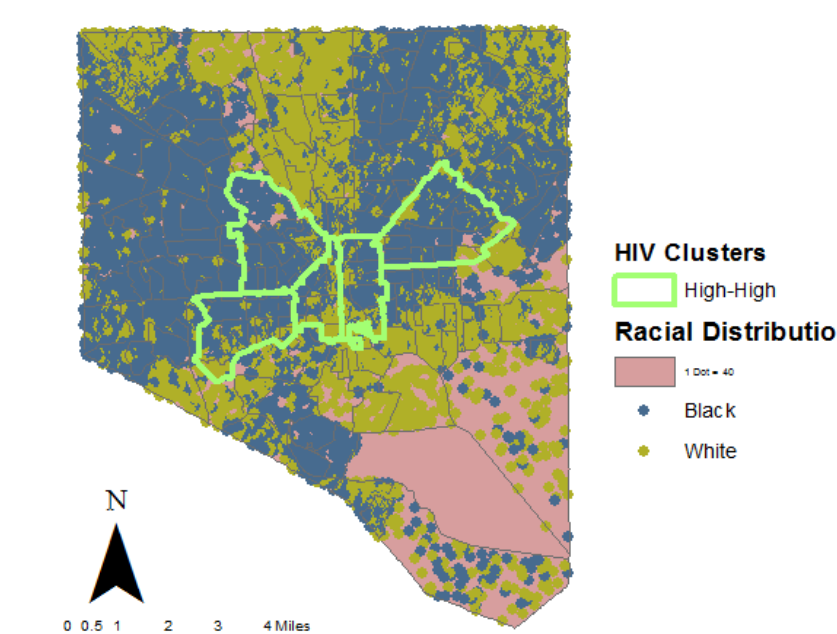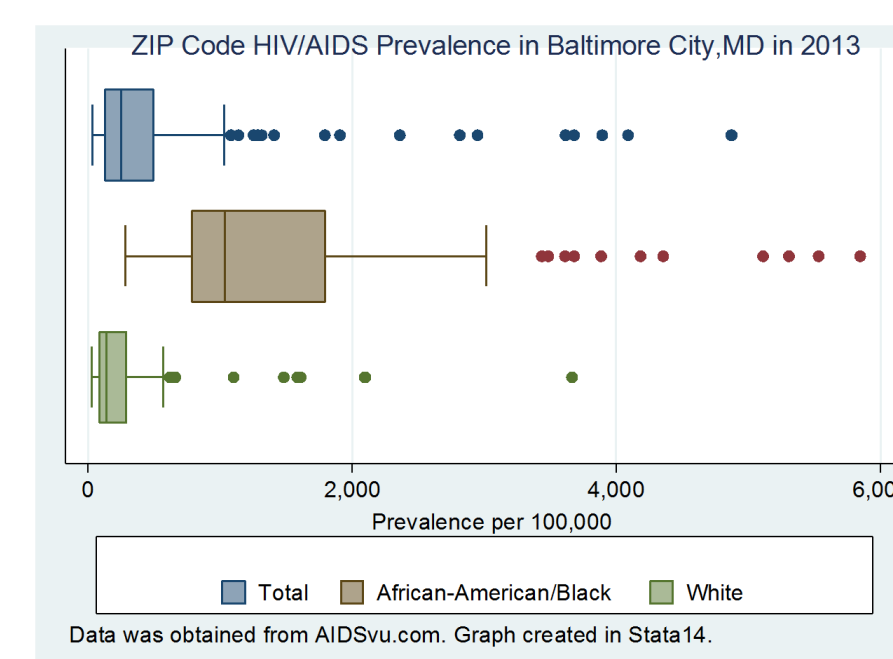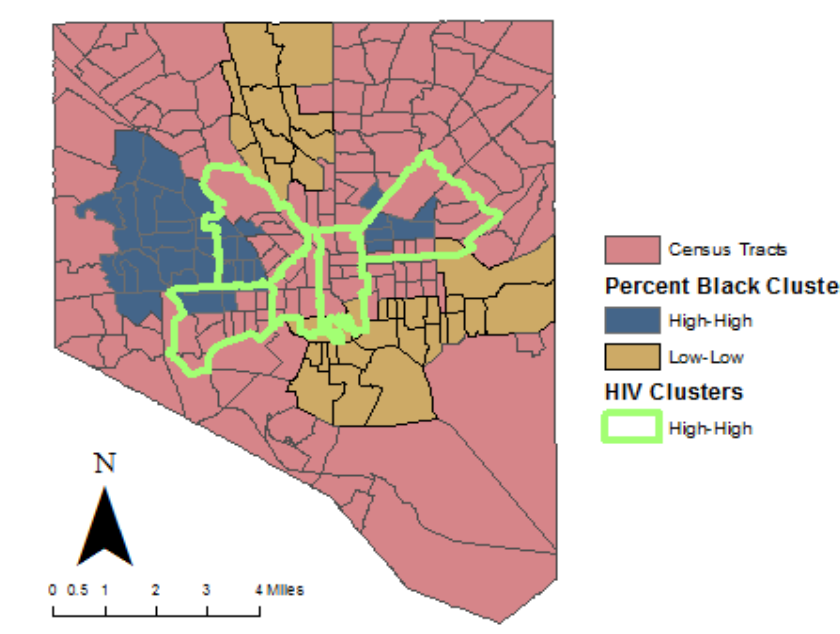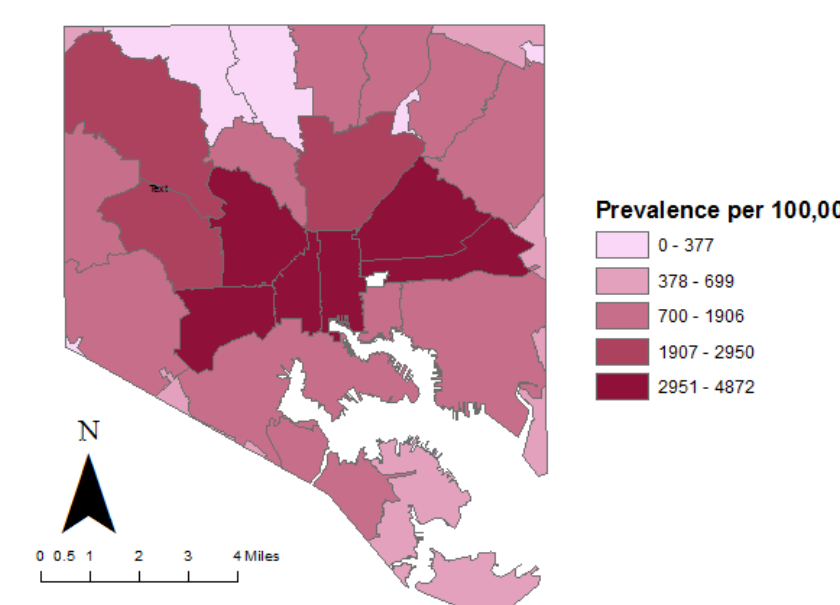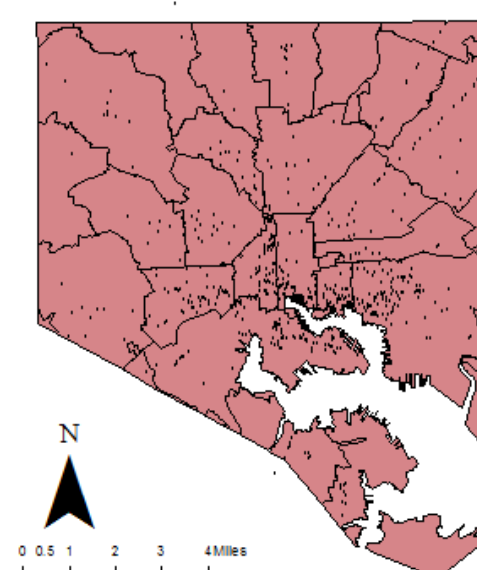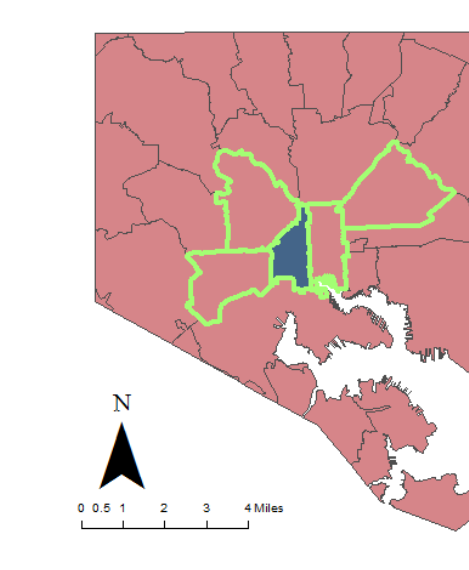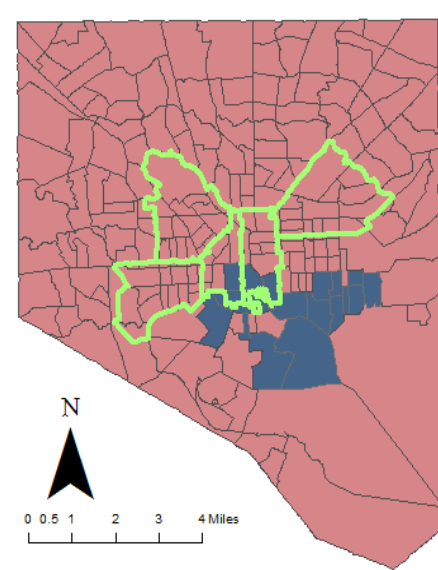
Conclusions

- A High-High (HH) cluster indicates that there are more high values near one another than would be expected by chance alone. Similarly, a Low-Low (LL) cluster indicates that there are more low values near each other than would be expected by chance alone.

- HIV/AIDS HH cluster did not occur in West Baltimore, where the largest black HH cluster was located. This suggests that residential racial segregation is not a strong predictor of HIV/AIDS. Perhaps this is because in Baltimore City, African-Americans make up the majority, which may change the impacts of segregation (Tobin, Cutchin, Latkin, & Takahashi,2013). Or perhaps residential segregation contributes to infectious diseases that are easily spread though close contact, such as tuberculosis, but not ones spread through body fluids, such as HIV/AIDS.

- Though beyond the original scope of this project, bars and nightclubs cluster greatly with HIV/AIDS at the zip code level but to a much weaker extent at the census tract level. In their qualitative research, Tobin, Cutchin, Latkin, and Takahashi (2013) note that the center of the city is a hot spot for male prostitution, drug and alcohol use, and multiple sex partners, which are documented HIV/AIDS risk factors. Future research should further explore the relationship between bars and nightclubs and HIV/AIDS in other cities.

- One limitation of this research is that percent was used to approximate segregation. As Oka and Wong (2014) note, percent does not communicate information about the distribution of social groups. Hence, for a census tract that is 50% black, percent cannot tell you if blacks and whites are interspersed or living separately from one another. Future researchers may want to look at same research question but with different measures of segregation, such as local spatial entropy-based diversity index.

- My results show that to reduce HIV/AIDS, interventions should target the center of the city, and that segregation is still very much present in Baltimore.

Cartographer: Sarah Hamad

Class: Introduction to GIS (GIS101)

Date: 12/18/16

Coordinate System: NAD83_Maryland_ftUS—- lambert conformal conic

Tufts

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