A comparison of tick densities in New York

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Abstract. New York State (NYS) has an active tick surveillance program operated by the NYS Department of Health (DOH). The goal of this study is to use NYS-DOH data to compare tick densities across the state.

1. Introduction. The blacklegged tick, also known as the deer tick *Ixodes scapularis*, is one of the most clinically important tick species in the United States (US) and in particular, in New York State (NYS). *I. scapularis* transmits a diversity of pathogens including the genus of bacterium which cause Lyme disease, *Borrelia* (Tokarz et al., 2019, Yuan, 2019). As a result, New York State has an active tick surveillance program operated by their Department of Health (NYS-DOH). The goal of this study is to compare adult blacklegged tick densities across New York using NYS-DOH tick surveillance data.

2. Methods. NYS-DOH surveils ticks across much of NYS. Tick collection is typically done by dragging a 1-m^2 rectangular piece of white cloth along the ground, to which ticks attach themselves. Collection (of adult ticks) takes place across New York State from October to December, which is when adult deer ticks are most commonly seen. This data is made available by the NYS-DOH (Health.data.ny.gov, Deer Tick Surveillance: Adults, 2020).

Statistical analyses were performed using R v. 3.6.3 (R Core Team, 2020).

3. Results. Adult tick densities (ticks per 1,000 m^2) were compared across several counties in NYS using data collected over 2008 – 2019.

3.1. Westchester vs Dutchess Counties

Westchester and Dutchess are counties in New York State.

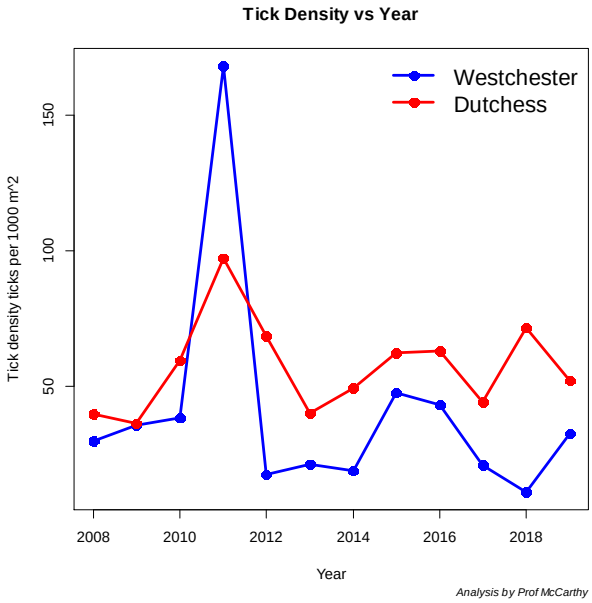

Figure 1. Comparing adult tick densities (ticks per 1,000 m^2) in Westchester and Dutchess counties by year. Note the 2011 spike in tick density.

A Pearson product-moment correlation coefficient was computed to assess the relationship between tick densities in Westchester and Dutchess counties. There was a positive correlation between the two variables, r(10) = .699345, p = .01137. See Figure 1.

A one sample t-test indicated that in Westchester the 2011 tick density spike (168.4 ticks per 1000 m^2) was significantly higher than the 2008 – 2019 average (M = 40.5, SD = 41.79) t(11) = -10.603, p < .0001. A one sample t-test also indicated that in Dutchess County the 2011 tick density spike (97.4 ticks per1000 m^2) was significantly higher than the 2008 – 2019 average (M = 57.1, SD = 17.31) t(11) = -8.0657, p < .0001.

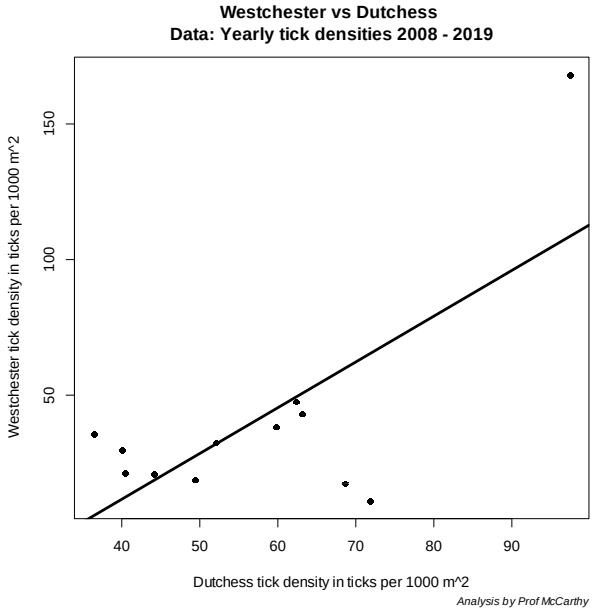

Figure 2. The above scatter plot shows the relationship between tick densities in Dutchess and Westchester counties. The outlier is the datapoint (97.4, 168.4) corresponding to 2011 spike in tick density.

A simple linear regression was calculated to predict Westchester's tick density based on Dutchess County's tick density. A significant regression equation was found (F(1,10) = 9.573, p = .01137) with an R-squared of .4891. Predicted density in Westchester is equal to -55.9171 + 1.6885 (density in Dutchess) when density is measured in ticks per 1000 m^2. See Figure 2.

Discussion. It is not surprising that tick densities in Westchester and Dutchess Counties should be correlated as they are both located in the Hudson Valley on the same side of the Hudson River.

References.

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Section of a Statistical Research Report*

The following survey was given to n = 20 randomly chosen students taking Travel and Tourism courses at BMCC to ascertain whether Travel and Tourism students visit "touristic" sites at higher percentages than other students (the expected percentages).

1. Have you been to Pier 25? Yes. No.
2. Have you been to Central Park? Yes. No.

Question	n	yes	percent yes	expected yes	p-value: $\rho >$ expected	significant
Pier 25	20	17	85%	60%	.01596116	yes
Central Park	20	18	90%	75%	.09126043	no

P-values calculated using the exact binomial test (one sided). The ρ is the Travel and Tourism population percent for each question.

The following survey was given to n = 49 randomly chosen BMCC students. See Figure 1.

1. About how many minutes, on average, does it take you to get to BMCC?

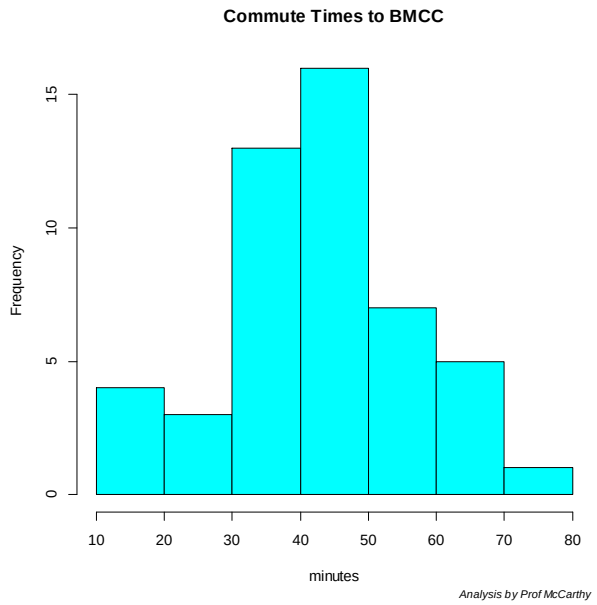

Figure 1. The mean of the 49 students' self-reported commuting times was 42.8 minutes (SD = 15.12, 95% CI = 38.4, 47.1).

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*The data in the "Statistical Research Report" is fictional.

However, the data and content in "A comparison of tick densities in New York" is completely real.