

Final Presentation

Evaluation of Vision Zero

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Quantitative Evaluation

1 Cycling Trends in NYC

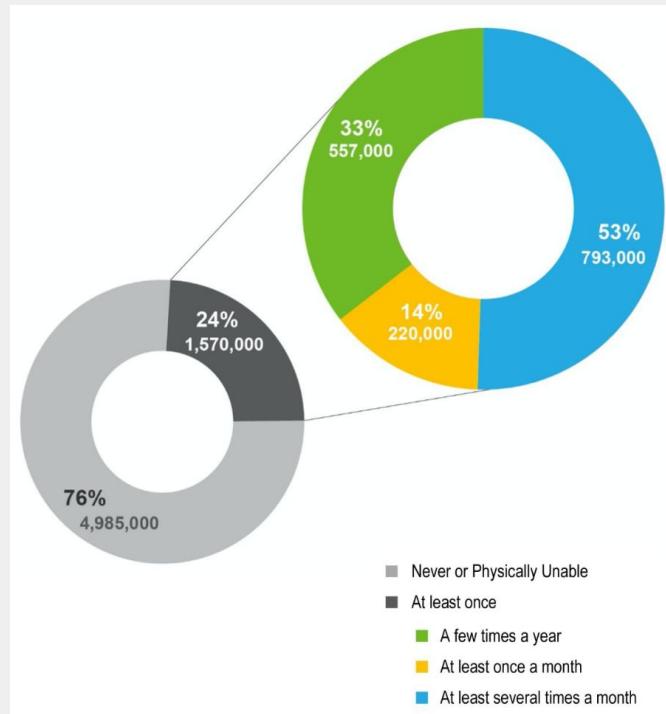
“

On a typical day, there are about
490,000 cycling trips
made in New York City.

”

Source: U.S. Census Bureau's American Community Survey Journey to Work 2017

Percent of Adult New Yorkers Who Ride a Bike



1 Cycling Trends in NYC

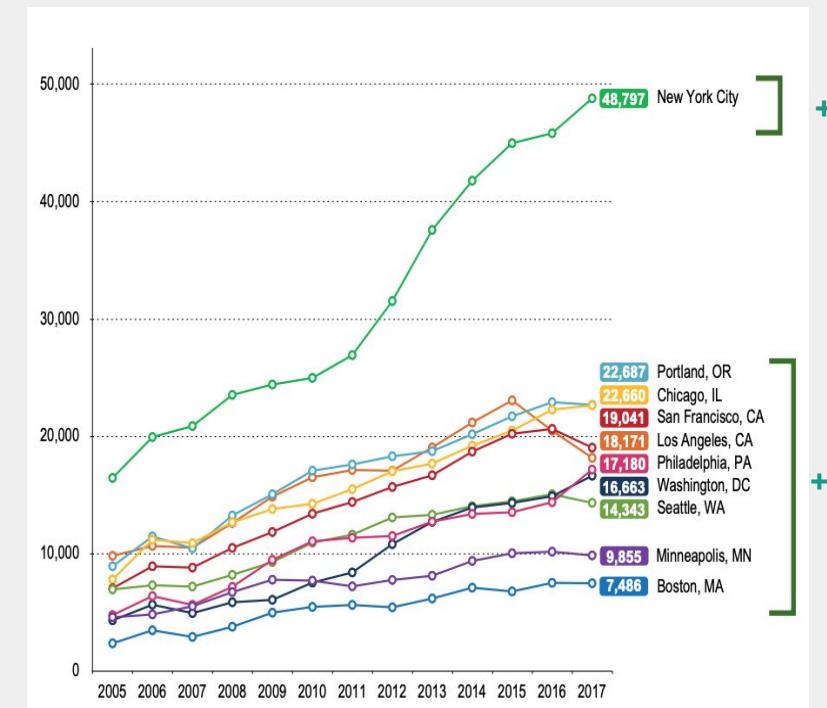


Cycling to work in NYC has grown
2X faster
as other major cities.

2012 - 2017



Commute to Work by Bicycle



Source: U.S. Census Bureau's American Community Survey Journey to Work 2017



Background

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1 Overview of Vision Zero



Eliminate
Fatalities and
Serious Injuries
In New York City
by 2024



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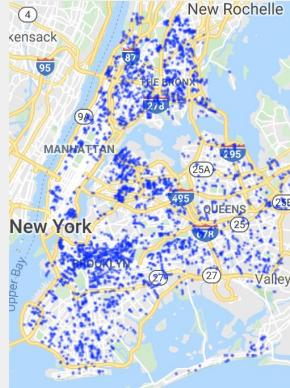
1 Overview of Vision Zero



Highlighted Initiatives:

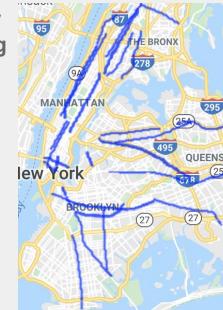
1. Speed Humps

- a raised area of a roadway designed to **reduce vehicle speeds**



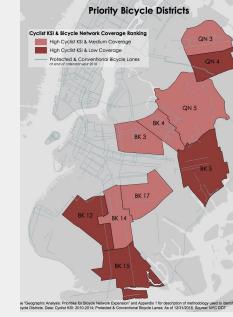
2. Arterial Slow Zones

- a combination of a **lower speed limit, signal timing changes, distinctive signs and increased enforcement**



3. Bike Priority Areas

- neighborhoods with **high numbers of cyclist KSI (Killed or Seriously Injured) and few dedicated bicycle facilities.**



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1 Overview of Vision Zero



Highlighted Initiatives:

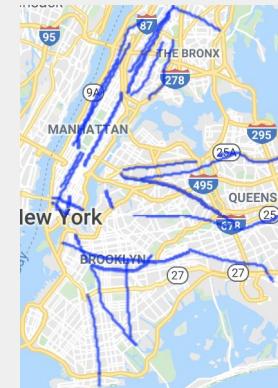
1. Speed Humps

- a raised area of a roadway designed to reduce vehicle speeds



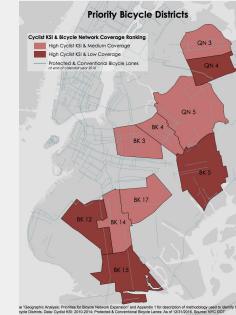
2. Arterial Slow Zones

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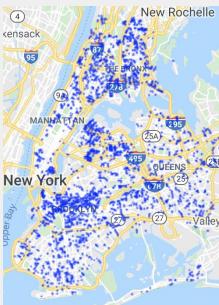
1 Overview of Vision Zero



Highlighted Initiatives:

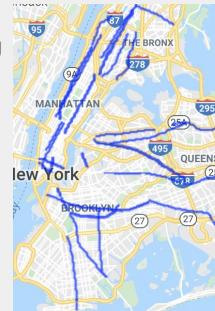
1. Speed Humps

- a raised area of a roadway designed to reduce vehicle speeds



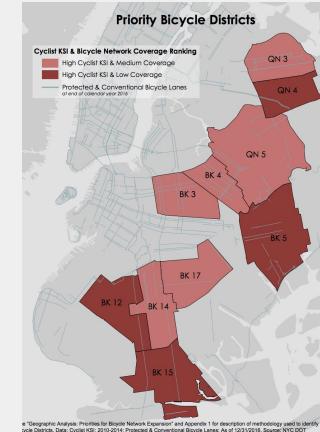
2. Arterial Slow Zones

- a combination of a lower speed limit, signal timing changes, distinctive signs and increased enforcement



3. Bike Priority Areas

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Research Question 1

Do the current **10 priority bicycle districts** best represent the areas that need ridership safety attention?



Research Question 2

What is the impact of **Speed Hump Policy** on bicycle fatalities and injuries?



Research Question 3

~~Do fatality and injury rate differ on 3 classes of bike lanes?~~ *Revised due to lack of related data*

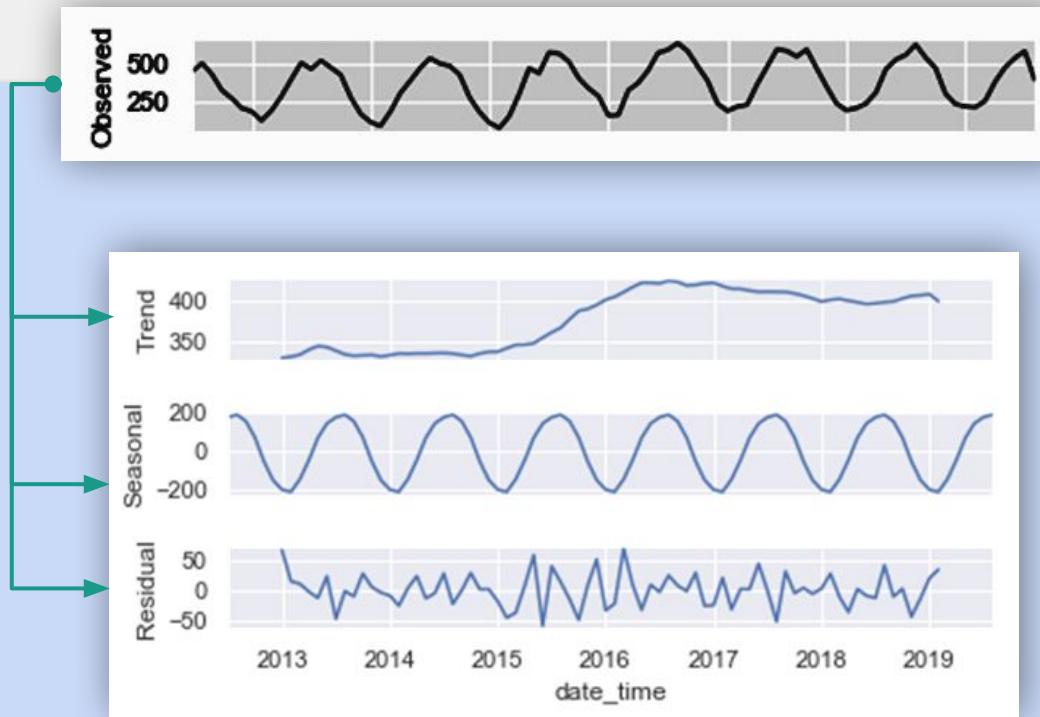
What is the probability that a cyclist gets killed or injured with different initiatives implemented?



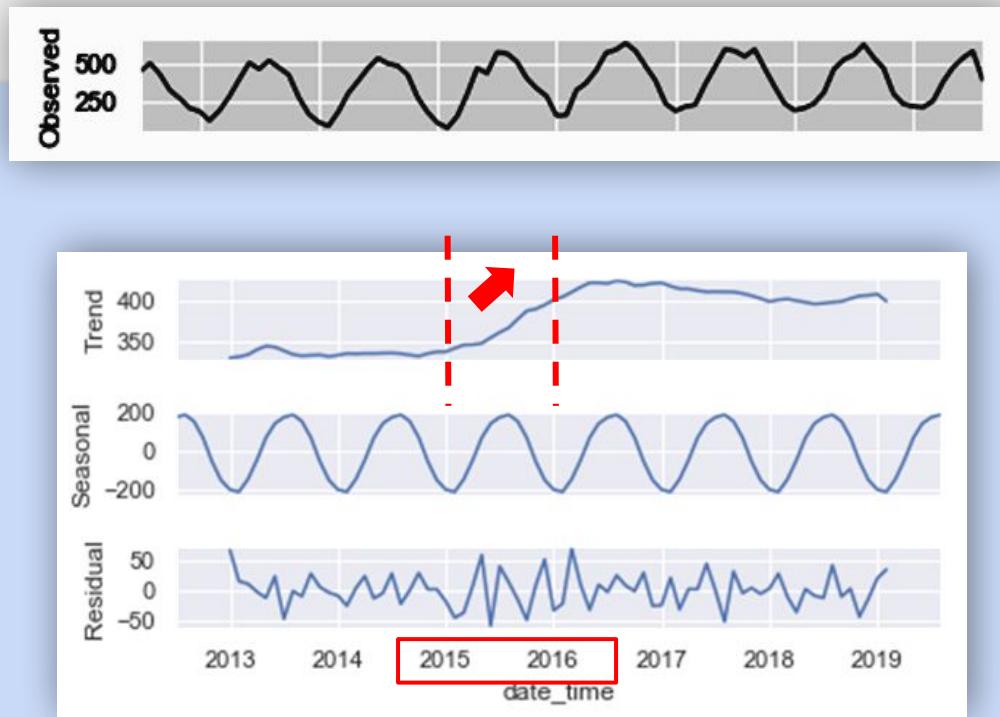
2 Time Series Analysis

Observation =

Trend + Seasonal + Residual



2 Time Series Analysis



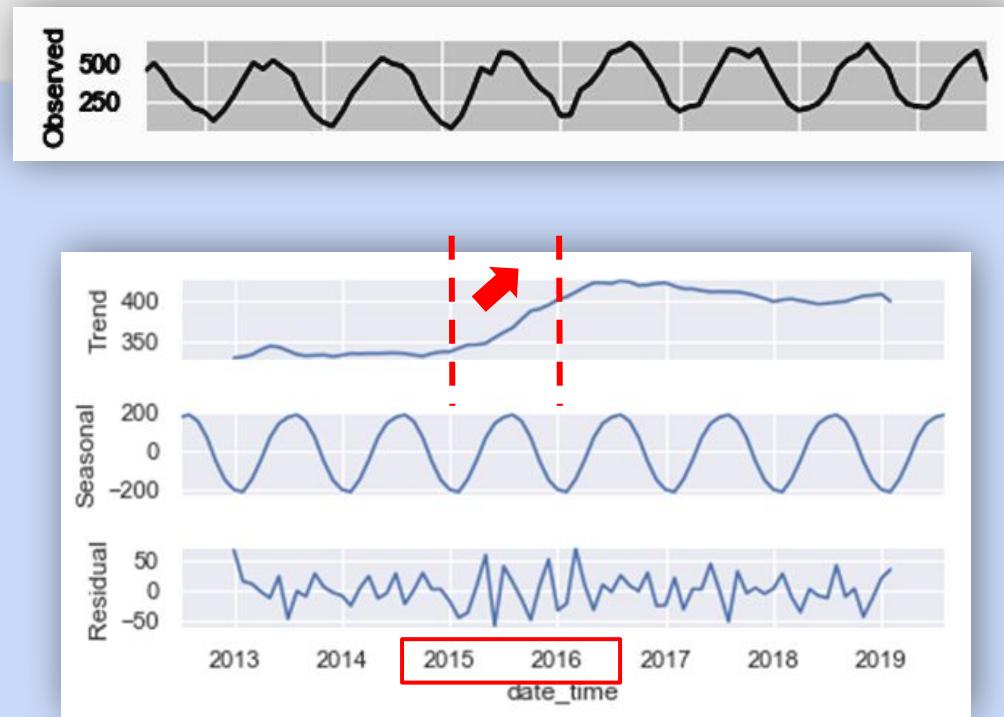
2 Time Series Analysis

A spike from 2015 to 2016

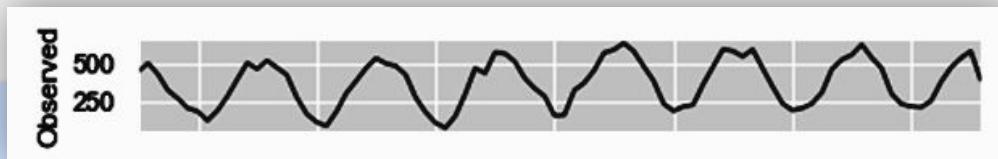


Evaluation:

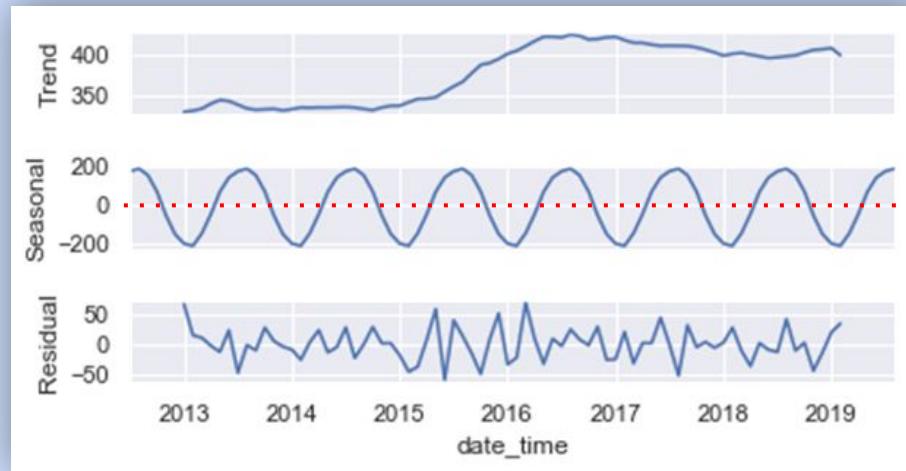
2013 VS 2014
&
2017 VS 2018



2 Time Series Analysis



The **majority** of cyclist injuries and fatalities
occurred from March to September of each year



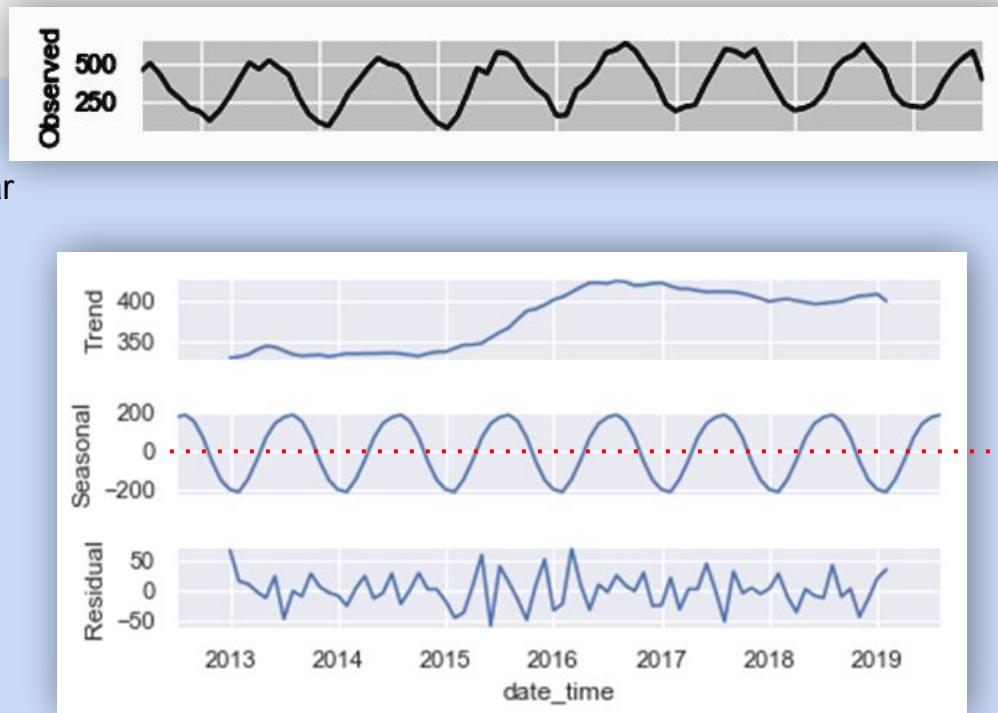
2 Time Series Analysis

The **majority** of cyclist injuries and fatalities occurred from March to September of each year



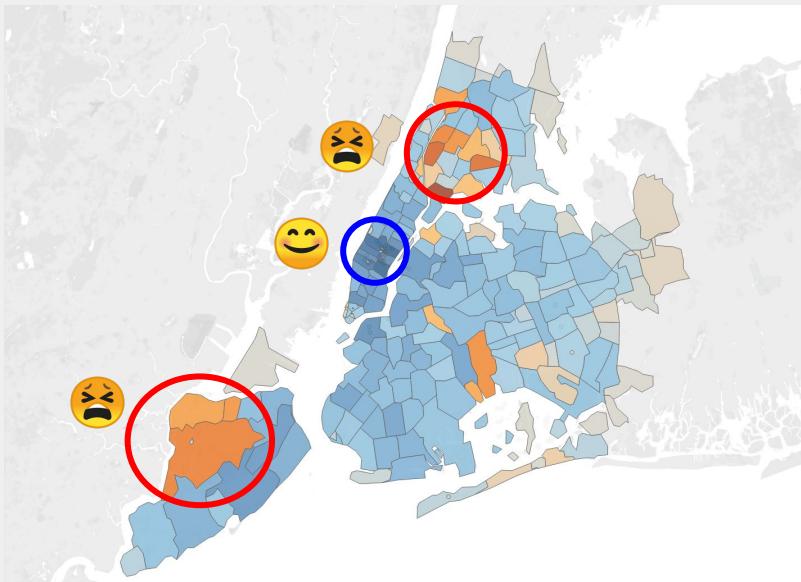
Recommendations:

- Install facilities **before March**
- Increase the number of educational programs **from March to September**



2 Spatial Analysis

Number of killed and injured cyclists  



- Most places have seen a **decrease** in the number of killed and injured cyclists
- Bronx & Staten Island 😢
- Midtown Manhattan 😊

2 Spatial Analysis - Case Study

| | Bronx | Midtown Manhattan |
|---------------------------|-------|-------------------|
| Speed Hump | 6370 | 1700 |
| Arterial Slow Zone | 4078 | 7427 |
| Signal Timing | 9818 | 33067 |
| Left Turn Traffic Calming | 227 | 8094 |

Hypothesis:

Speed humps are ineffective



Regression Result

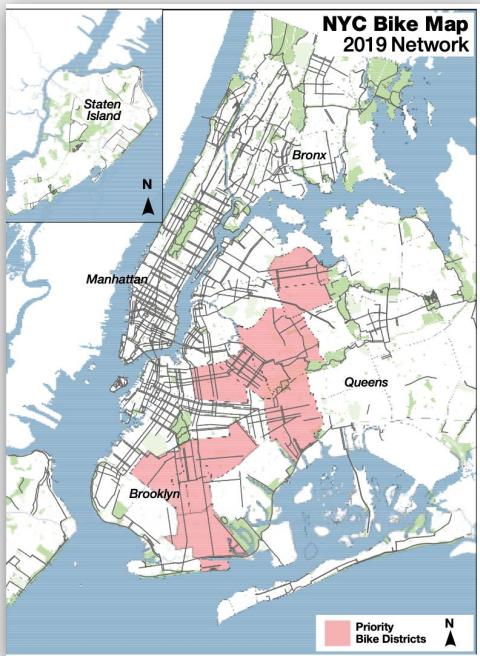
| Initiatives | Negative Changes | Positive Changes | Insignificant |
|---------------------------|------------------|------------------|---------------|
| Arterial Slow Zones | ✓ | | |
| Neighborhood Slow Zones | | ✓ | |
| Signal Timing | | ✓ | |
| Speed Humps | | | ✓ |
| Enhanced Crossings | | | ✓ |
| Left Turn Traffic Calming | | | ✓ |

The implementation of the **Arterial Slow Zones** initiative helps to reduce the number of cyclists injured or killed in the event of a collision.



Evaluation of Bike Priority Districts

Bike Priority Districts



Number of cyclists injured or killed

2017 ⇨ 2018

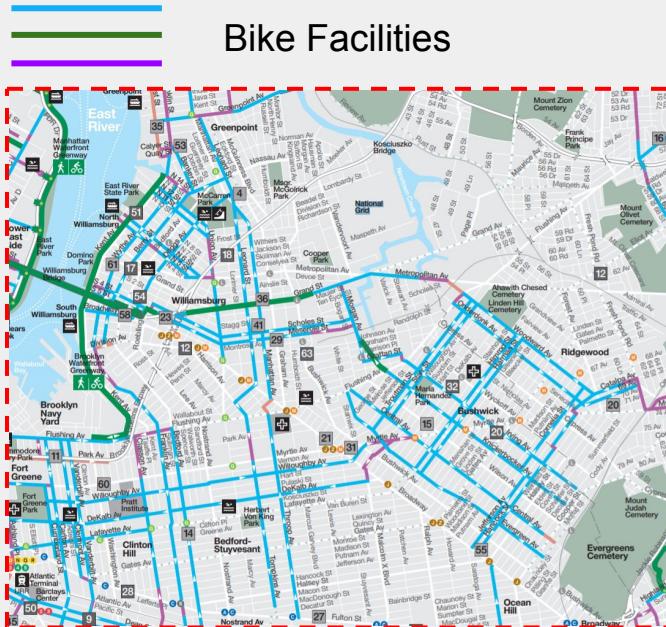
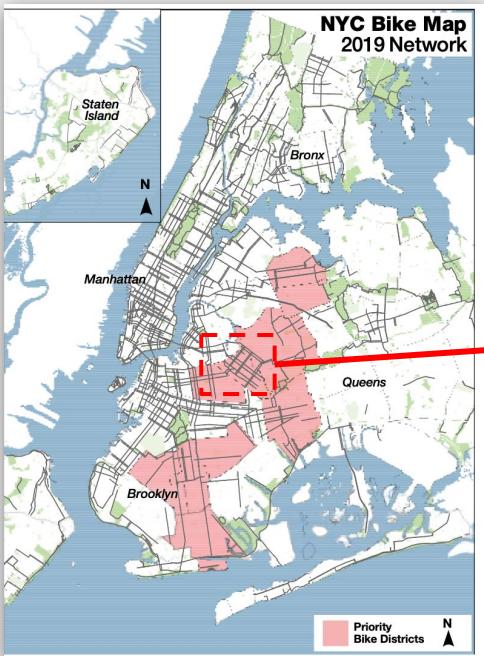
↙ 4.61%

Other: ↓ 3.43%

Source: <https://www1.nyc.gov/html/dot/downloads/pdf/bike-safety-plan.pdf>

Facilities Coverage in Prioritized Bike Districts

Bike Priority Districts

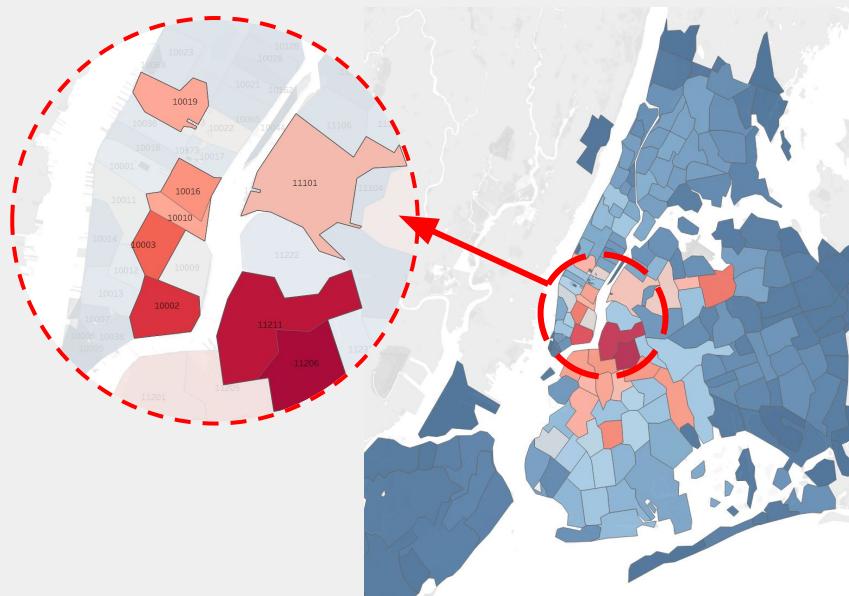


Bike Facilities

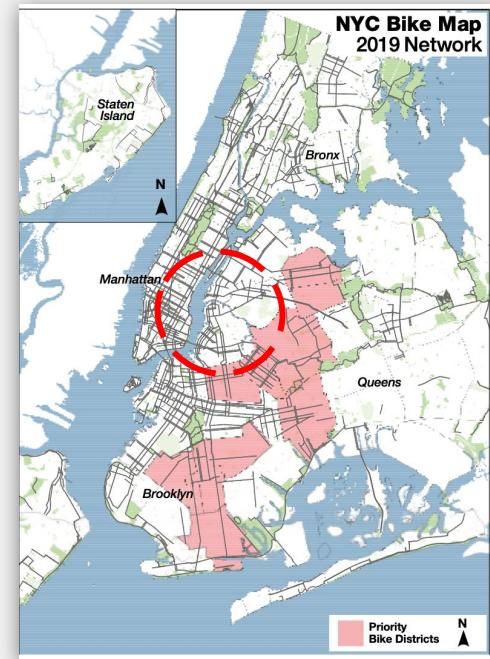
Source: <https://www1.nyc.gov/html/dot/downloads/pdf/bikemap-2019.pdf>

Cyclist Safety Map vs Bike Priority Districts

Cyclist Safety Map



Bike Priority Districts



3 Summary of Evaluation

Seasonality trend in cyclist
injuries and fatalities



3 Summary of Evaluation

Seasonality trend in cyclist
injuries and fatalities



The **Speed Hump Policy** is
ineffective in decreasing cyclists'
fatality and injury rate



3 Summary of Evaluation

Seasonality trend in cyclist injuries and fatalities

1



2



3



The **Speed Hump Policy** is ineffective in decreasing cyclists' fatality and injury rate

The **Arterial Slow Zones** initiative is effective in decreasing cyclists' fatality and injury rate



3 Summary of Evaluation

Seasonality trend in cyclist injuries and fatalities

1



2



3



4



The Speed Hump Policy is ineffective in decreasing cyclists' fatality and injury rate

The **Arterial Slow Zones** initiative is effective in decreasing cyclists' fatality and injury rate



Conclusions

Recommendations

Seasonality trend in cyclist injuries and fatalities

Install facilities before March;
Increase the number of educational programs from March to September

2

1

3

4

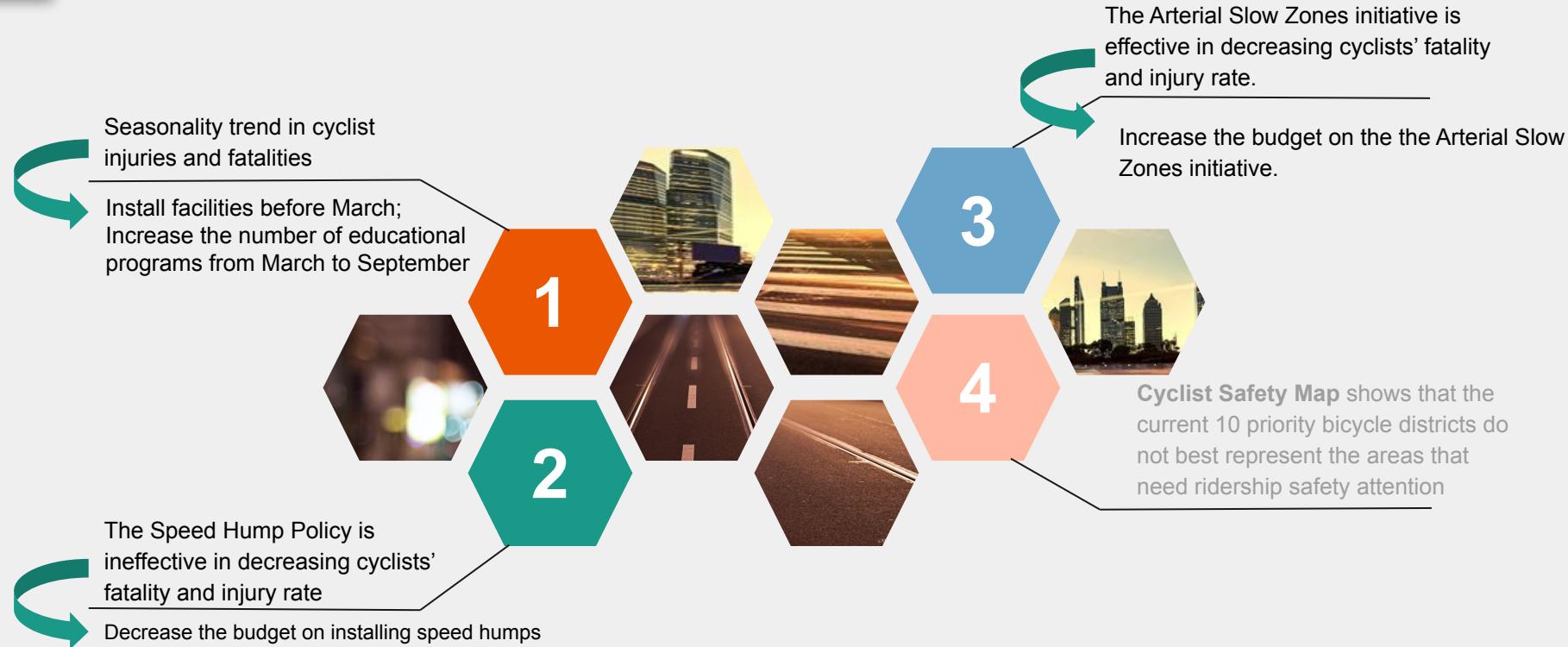
The Speed Hump Policy is ineffective in decreasing cyclists' fatality and injury rate

The Arterial Slow Zones initiative is effective in decreasing cyclists' fatality and injury rate.

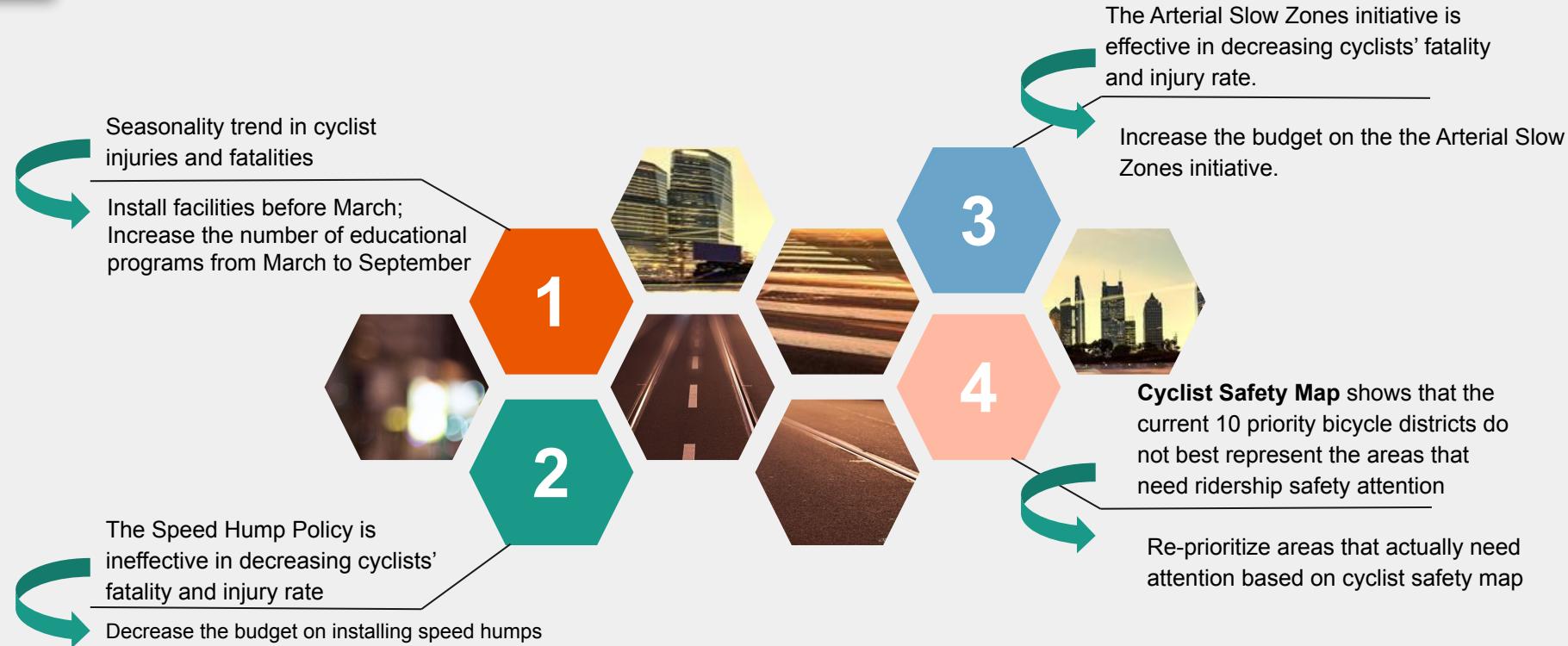


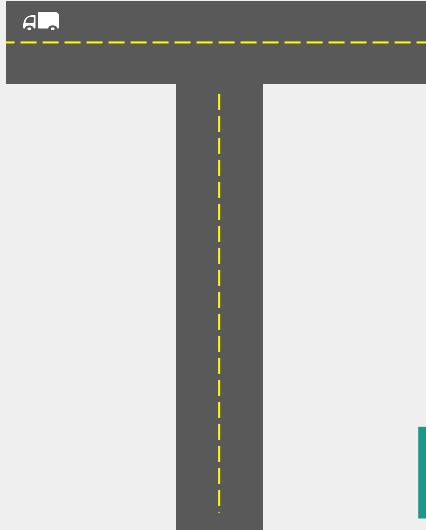
Conclusions

Recommendations



Recommendations

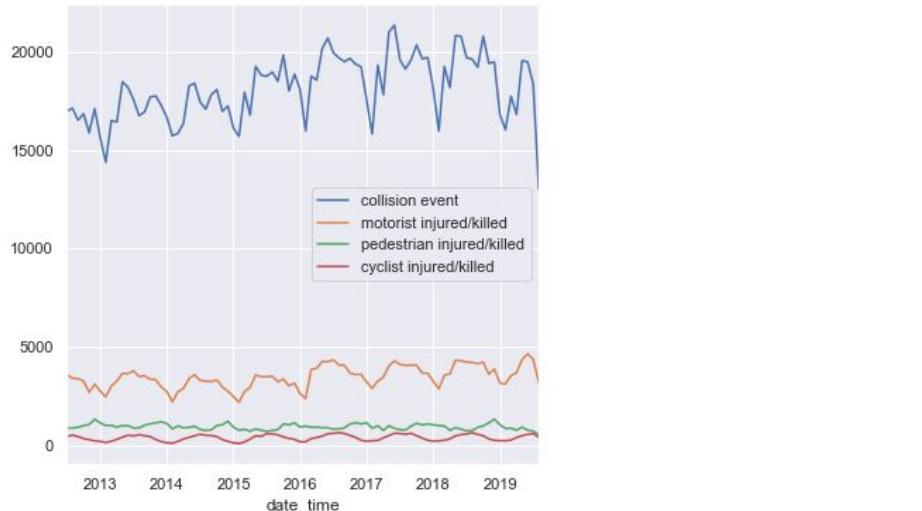




hank You
Evaluation of Vision Zero

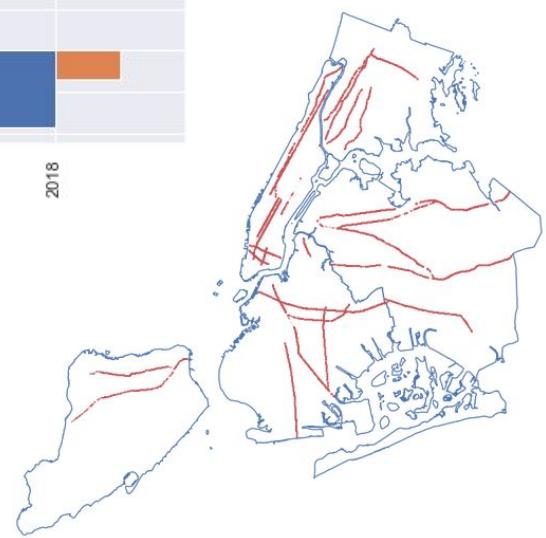
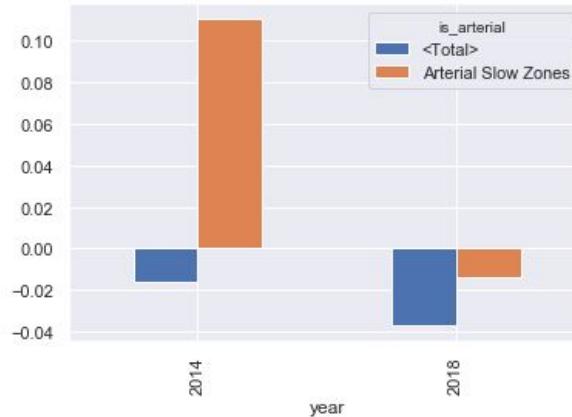
Correlation Matrix

| | collision event | motorist injured/killed | pedestrian injured/killed | cyclist injured/killed |
|---------------------------|-----------------|-------------------------|---------------------------|------------------------|
| collision event | 1.000000 | 0.789236 | 0.045756 | 0.577815 |
| motorist injured/killed | 0.789236 | 1.000000 | -0.206573 | 0.792971 |
| pedestrian injured/killed | 0.045756 | -0.206573 | 1.000000 | -0.451605 |
| cyclist injured/killed | 0.577815 | 0.792971 | -0.451605 | 1.000000 |



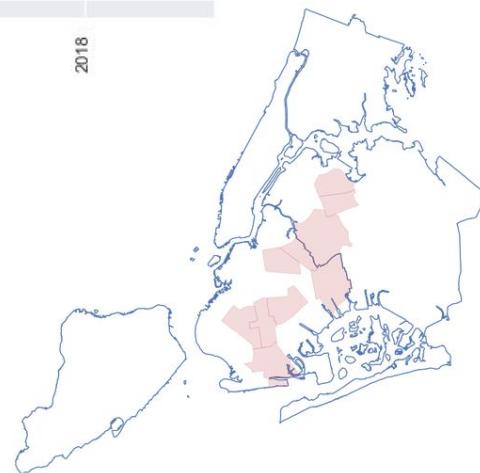
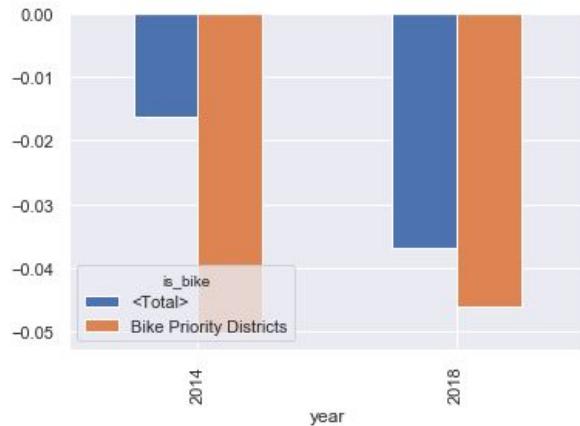
Change rate -- Arterial Slow Zones

| | is_arterial | year | number of cyclist injured/killed | pct_change |
|----|---------------------|------|----------------------------------|------------|
| 0 | <Total> | 2012 | 2215 | NaN |
| 1 | <Total> | 2013 | 4086 | 0.844695 |
| 2 | <Total> | 2014 | 4020 | -0.016153 |
| 3 | <Total> | 2015 | 4296 | 0.068657 |
| 4 | <Total> | 2016 | 5025 | 0.169693 |
| 5 | <Total> | 2017 | 4916 | -0.021692 |
| 6 | <Total> | 2018 | 4735 | -0.036819 |
| 7 | <Total> | 2019 | 3094 | -0.346568 |
| 8 | Arterial Slow Zones | 2012 | 301 | NaN |
| 9 | Arterial Slow Zones | 2013 | 479 | 0.591362 |
| 10 | Arterial Slow Zones | 2014 | 532 | 0.110647 |
| 11 | Arterial Slow Zones | 2015 | 538 | 0.011278 |
| 12 | Arterial Slow Zones | 2016 | 532 | -0.011152 |
| 13 | Arterial Slow Zones | 2017 | 590 | 0.109023 |
| 14 | Arterial Slow Zones | 2018 | 582 | -0.013559 |
| 15 | Arterial Slow Zones | 2019 | 380 | -0.347079 |



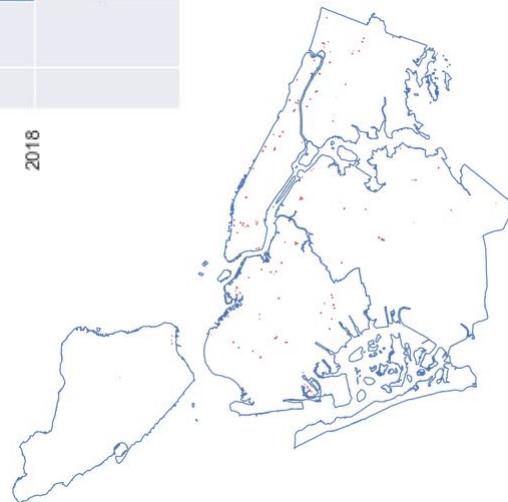
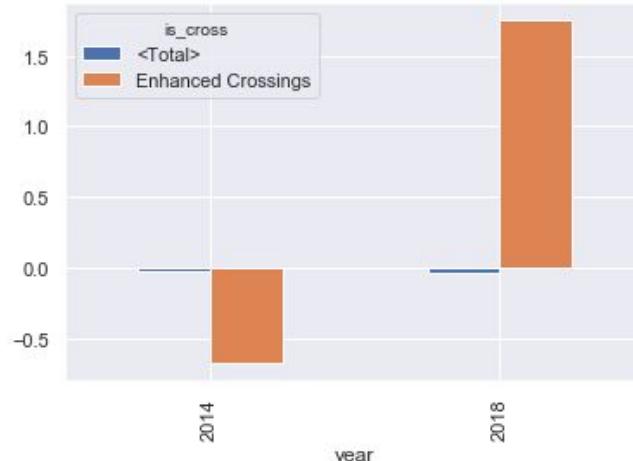
Change rate -- Bike Priority Districts

| | is_bike | year | number of cyclist injured/killed | pct_change |
|----|-------------------------|------|----------------------------------|------------|
| 0 | <Total> | 2012 | 2215 | NaN |
| 1 | <Total> | 2013 | 4086 | 0.844695 |
| 2 | <Total> | 2014 | 4020 | -0.016153 |
| 3 | <Total> | 2015 | 4296 | 0.068657 |
| 4 | <Total> | 2016 | 5025 | 0.169693 |
| 5 | <Total> | 2017 | 4916 | -0.021692 |
| 6 | <Total> | 2018 | 4735 | -0.036819 |
| 7 | <Total> | 2019 | 3094 | -0.346568 |
| 8 | Bike Priority Districts | 2012 | 513 | NaN |
| 9 | Bike Priority Districts | 2013 | 814 | 0.586745 |
| 10 | Bike Priority Districts | 2014 | 773 | -0.050369 |
| 11 | Bike Priority Districts | 2015 | 921 | 0.191462 |
| 12 | Bike Priority Districts | 2016 | 944 | 0.024973 |
| 13 | Bike Priority Districts | 2017 | 1064 | 0.127119 |
| 14 | Bike Priority Districts | 2018 | 1015 | -0.046053 |
| 15 | Bike Priority Districts | 2019 | 616 | -0.393103 |



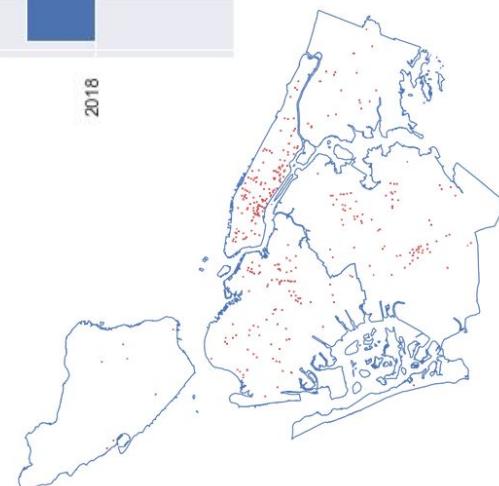
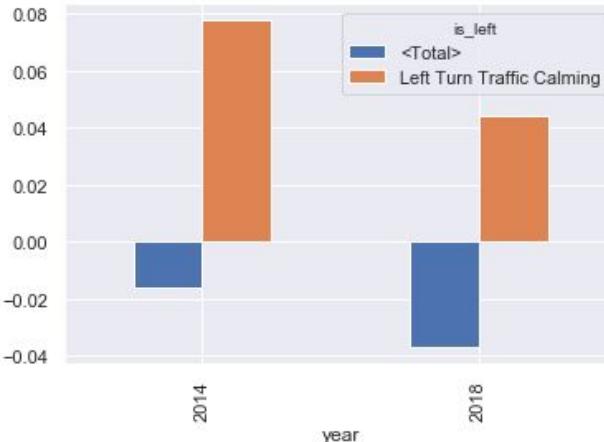
Change rate -- Enhanced Crossings

| | is_cross | year | number of cyclist injured/killed | pct_change |
|----|--------------------|------|----------------------------------|------------|
| 0 | <Total> | 2012 | 2215 | NaN |
| 1 | <Total> | 2013 | 4086 | 0.844695 |
| 2 | <Total> | 2014 | 4020 | -0.016153 |
| 3 | <Total> | 2015 | 4296 | 0.068657 |
| 4 | <Total> | 2016 | 5025 | 0.169693 |
| 5 | <Total> | 2017 | 4916 | -0.021692 |
| 6 | <Total> | 2018 | 4735 | -0.036819 |
| 7 | <Total> | 2019 | 3094 | -0.346568 |
| 8 | Enhanced Crossings | 2012 | 5 | NaN |
| 9 | Enhanced Crossings | 2013 | 9 | 0.800000 |
| 10 | Enhanced Crossings | 2014 | 3 | -0.666667 |
| 11 | Enhanced Crossings | 2015 | 4 | 0.333333 |
| 12 | Enhanced Crossings | 2016 | 13 | 2.250000 |
| 13 | Enhanced Crossings | 2017 | 4 | -0.692308 |
| 14 | Enhanced Crossings | 2018 | 11 | 1.750000 |
| 15 | Enhanced Crossings | 2019 | 8 | -0.272727 |



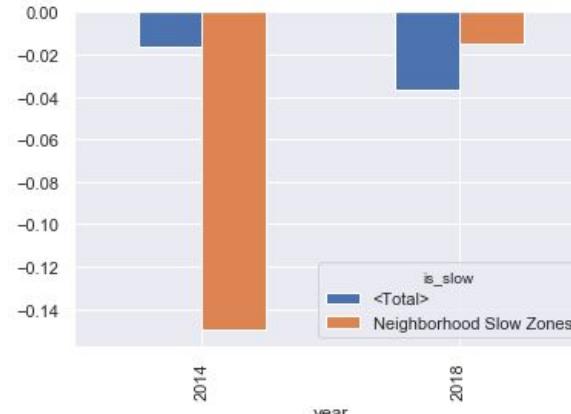
Change rate -- Left Turn Traffic Calming

| | is_left | year | number of cyclist injured/killed | pct_change |
|----|---------------------------|------|----------------------------------|------------|
| 0 | <Total> | 2012 | 2215 | NaN |
| 1 | <Total> | 2013 | 4086 | 0.844695 |
| 2 | <Total> | 2014 | 4020 | -0.016153 |
| 3 | <Total> | 2015 | 4296 | 0.068657 |
| 4 | <Total> | 2016 | 5025 | 0.169693 |
| 5 | <Total> | 2017 | 4916 | -0.021692 |
| 6 | <Total> | 2018 | 4735 | -0.036819 |
| 7 | <Total> | 2019 | 3094 | -0.346568 |
| 8 | Left Turn Traffic Calming | 2012 | 95 | NaN |
| 9 | Left Turn Traffic Calming | 2013 | 193 | 1.031579 |
| 10 | Left Turn Traffic Calming | 2014 | 208 | 0.077720 |
| 11 | Left Turn Traffic Calming | 2015 | 222 | 0.067308 |
| 12 | Left Turn Traffic Calming | 2016 | 164 | -0.261261 |
| 13 | Left Turn Traffic Calming | 2017 | 159 | -0.030488 |
| 14 | Left Turn Traffic Calming | 2018 | 166 | 0.044025 |
| 15 | Left Turn Traffic Calming | 2019 | 113 | -0.319277 |



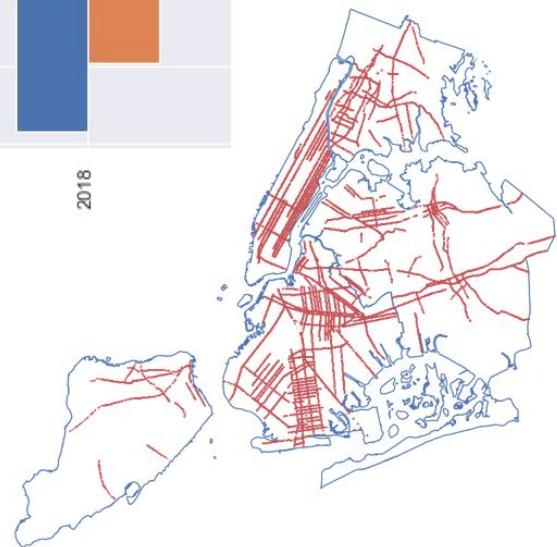
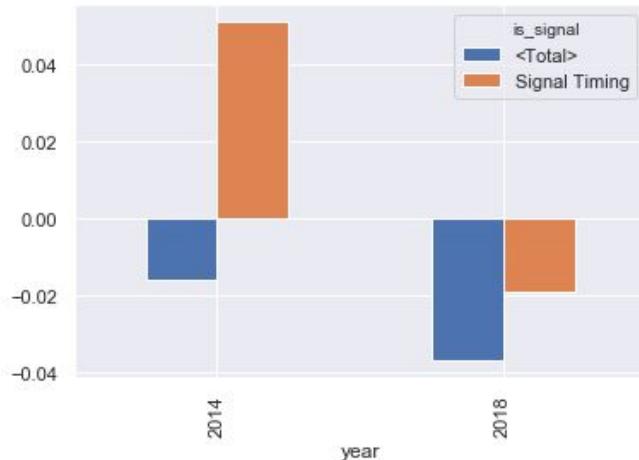
Change rate -- Neighborhood Slow Zones

| | is_slow | year | number of cyclist injured/killed | pct_change |
|----|-------------------------|------|----------------------------------|------------|
| 0 | <Total> | 2012 | 2215 | NaN |
| 1 | <Total> | 2013 | 4086 | 0.844695 |
| 2 | <Total> | 2014 | 4020 | -0.016153 |
| 3 | <Total> | 2015 | 4296 | 0.068657 |
| 4 | <Total> | 2016 | 5025 | 0.169693 |
| 5 | <Total> | 2017 | 4916 | -0.021692 |
| 6 | <Total> | 2018 | 4735 | -0.036819 |
| 7 | <Total> | 2019 | 3094 | -0.346568 |
| 8 | Neighborhood Slow Zones | 2012 | 106 | NaN |
| 9 | Neighborhood Slow Zones | 2013 | 227 | 1.141509 |
| 10 | Neighborhood Slow Zones | 2014 | 193 | -0.149780 |
| 11 | Neighborhood Slow Zones | 2015 | 166 | -0.139896 |
| 12 | Neighborhood Slow Zones | 2016 | 231 | 0.391566 |
| 13 | Neighborhood Slow Zones | 2017 | 202 | -0.125541 |
| 14 | Neighborhood Slow Zones | 2018 | 199 | -0.014851 |
| 15 | Neighborhood Slow Zones | 2019 | 152 | -0.236181 |



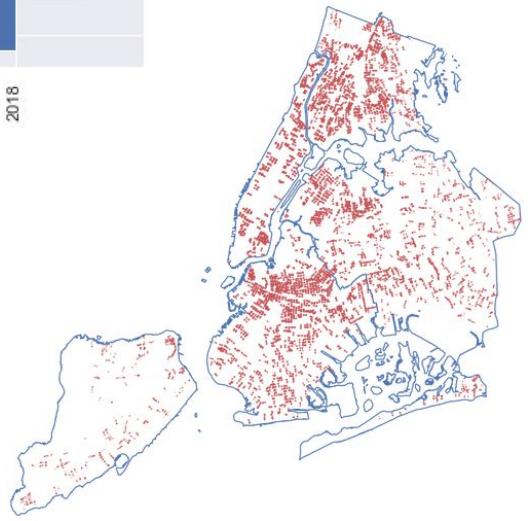
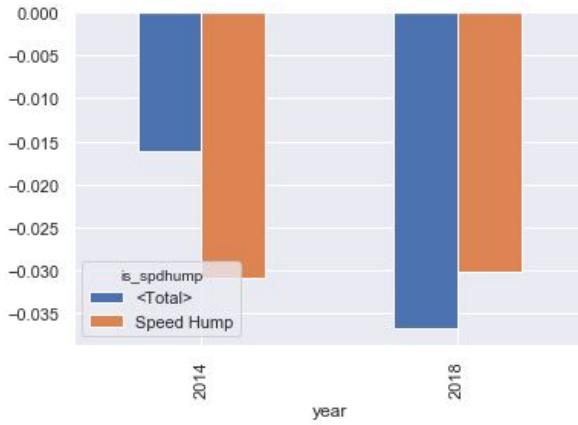
Change rate -- Signal Timing

| | is_signal | year | number of cyclist injured/killed | pct_change |
|----|---------------|------|----------------------------------|------------|
| 0 | <Total> | 2012 | 2215 | NaN |
| 1 | <Total> | 2013 | 4086 | 0.844695 |
| 2 | <Total> | 2014 | 4020 | -0.016153 |
| 3 | <Total> | 2015 | 4296 | 0.068657 |
| 4 | <Total> | 2016 | 5025 | 0.169693 |
| 5 | <Total> | 2017 | 4916 | -0.021692 |
| 6 | <Total> | 2018 | 4735 | -0.036819 |
| 7 | <Total> | 2019 | 3094 | -0.346568 |
| 8 | Signal Timing | 2012 | 885 | NaN |
| 9 | Signal Timing | 2013 | 1567 | 0.770621 |
| 10 | Signal Timing | 2014 | 1647 | 0.051053 |
| 11 | Signal Timing | 2015 | 1723 | 0.046145 |
| 12 | Signal Timing | 2016 | 1730 | 0.004063 |
| 13 | Signal Timing | 2017 | 1891 | 0.093064 |
| 14 | Signal Timing | 2018 | 1855 | -0.019038 |
| 15 | Signal Timing | 2019 | 1225 | -0.339623 |



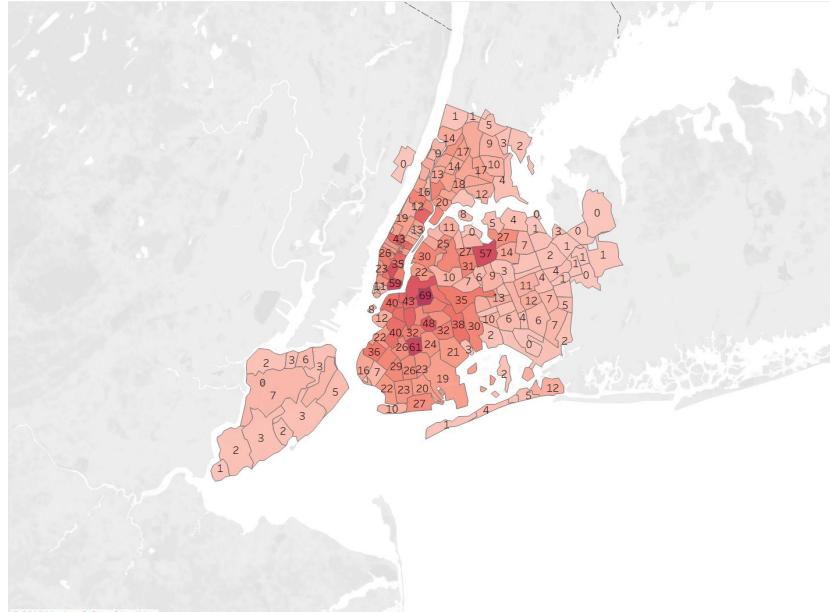
Change rate -- Speed Humps

| | is_spdhump | year | number of cyclist injured/killed | pct_change |
|----|------------|------|----------------------------------|------------|
| 0 | <Total> | 2012 | 2215 | NaN |
| 1 | <Total> | 2013 | 4086 | 0.844695 |
| 2 | <Total> | 2014 | 4020 | -0.016153 |
| 3 | <Total> | 2015 | 4296 | 0.068657 |
| 4 | <Total> | 2016 | 5025 | 0.169693 |
| 5 | <Total> | 2017 | 4916 | -0.021692 |
| 6 | <Total> | 2018 | 4735 | -0.036819 |
| 7 | <Total> | 2019 | 3094 | -0.346568 |
| 8 | Speed Hump | 2012 | 385 | NaN |
| 9 | Speed Hump | 2013 | 648 | 0.683117 |
| 10 | Speed Hump | 2014 | 628 | -0.030864 |
| 11 | Speed Hump | 2015 | 579 | -0.078025 |
| 12 | Speed Hump | 2016 | 523 | -0.096718 |
| 13 | Speed Hump | 2017 | 598 | 0.143403 |
| 14 | Speed Hump | 2018 | 580 | -0.030100 |
| 15 | Speed Hump | 2019 | 398 | -0.313793 |

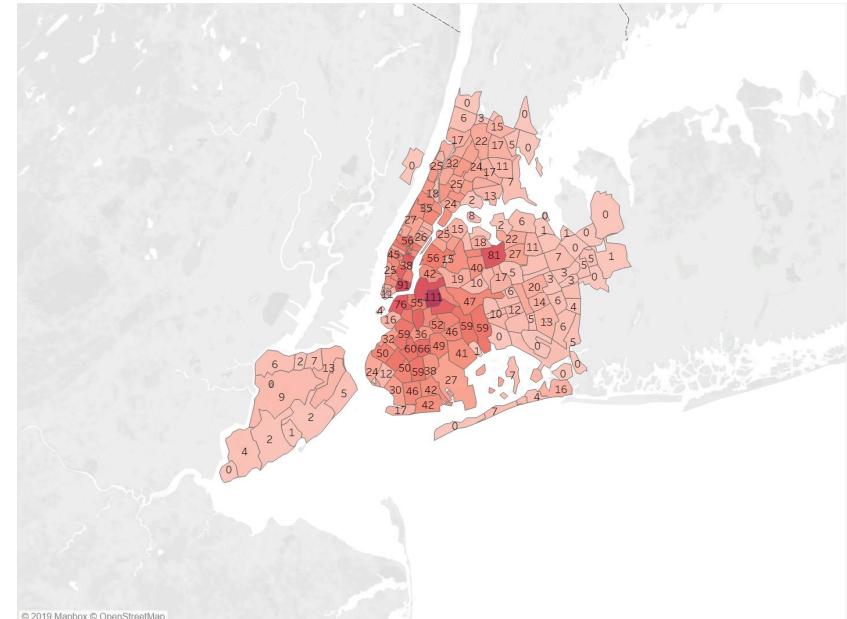


Cycling Risk Score Heatmap (1)

Heatmap - 2019

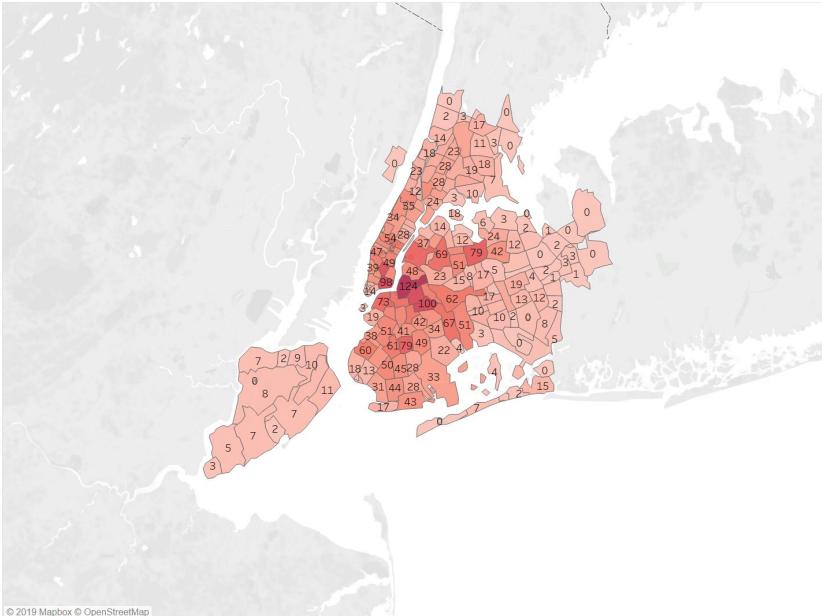


Heatmap - 2018



Cycling Risk Score Heatmap (2)

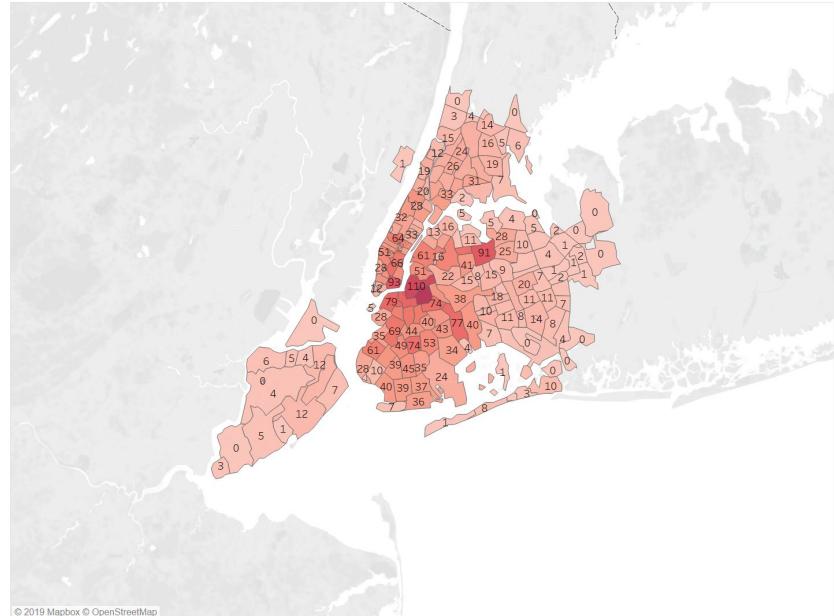
Heatmap - 2017



Number Of Inc..

0 124

Heatmap - 2016

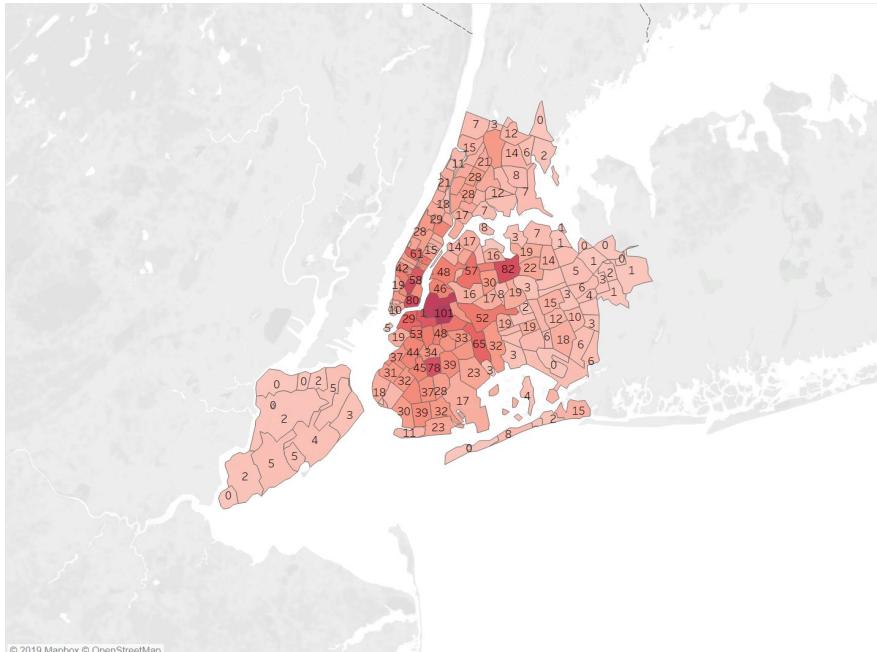


Number Of Inc..

0 130

Cycling Risk Score Heatmap (3)

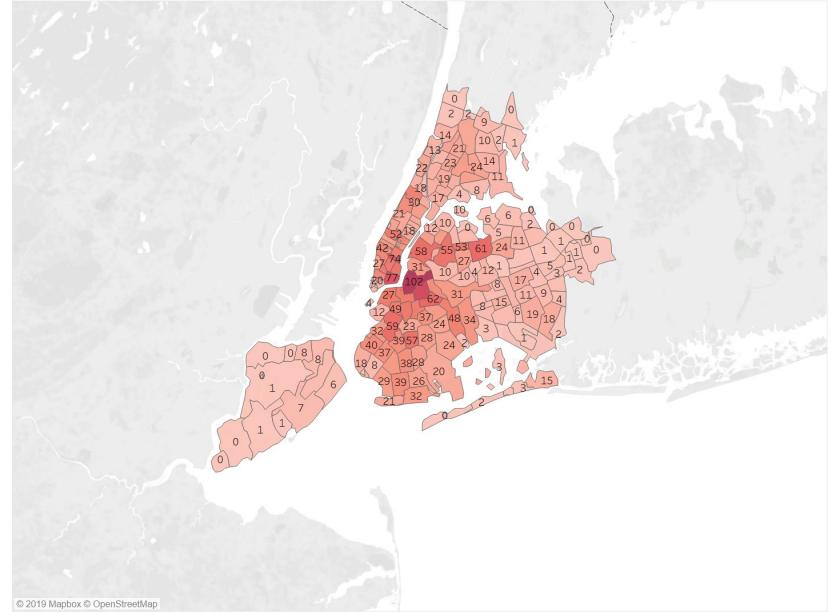
Heatmap - 2015



Map based on Longitude (generated) and Latitude (generated). Color shows sum of Number Of Incidents. The marks are labeled by sum of Number Of Incidents. Details are shown for Zip Code. The data is filtered on Date Year, which keeps 2015.



Heatmap - 2014



Map based on Longitude (generated) and Latitude (generated). Color shows sum of Number Of Incidents. The marks are labeled by sum of Number Of Incidents. Details are shown for Zip Code. The data is filtered on Date Year, which keeps 2014.



Appendix 1. Community District Prioritization

| Borough | Community District | Street Mileage | Bicycle Network Mileage | Percent Bicycle Network Coverage | Bicycle Network Coverage | Cyclist Fatalities | Cyclist Severe Injuries | Cyclist KSI | Cyclist KSI Rank | Community District | Borough |
|---------------|--------------------|----------------|-------------------------|----------------------------------|--------------------------|--------------------|-------------------------|-------------|------------------|--------------------|---------------|
| Bronx | 01 | 67.9 | 12.1 | 18% | High | 1 | 29 | 30 | Medium | 01 | Bronx |
| | 02 | 60.4 | 12.6 | 27% | High | 1 | 20 | 20 | Medium | 02 | |
| | 03 | 44.2 | 12.6 | 28% | High | 1 | 14 | 15 | Low | 03 | |
| | 04 | 72.0 | 10.0 | 14% | Medium | 1 | 16 | 16 | Low | 04 | |
| | 05 | 49.6 | 9.6 | 13% | Medium | 1 | 15 | 17 | Low | 05 | |
| | 06 | 51.2 | 6.5 | 12% | Medium | 1 | 12 | 14 | Medium | 06 | |
| | 07 | 56.1 | 6.5 | 2% | Medium | 1 | 13 | 13 | Low | 07 | |
| | 08 | 87.5 | 1.6 | 2% | Low | 1 | 3 | 3 | Low | 08 | |
| | 09 | 115.1 | 17.5 | 15% | Medium | 1 | 13 | 14 | Low | 09 | |
| | 10 | 183.2 | 11.4 | 5% | Low | 1 | 13 | 13 | Low | 10 | |
| | 11 | 142.3 | 7.8 | 10% | Medium | 1 | 14 | 16 | Low | 11 | |
| | 12 | 142.3 | 7.8 | 6% | Low | 1 | 16 | 16 | Low | 12 | |
| Brooklyn | 01 | 139.5 | 24.1 | 17% | High | 9 | 96 | 105 | High | 01 | Brooklyn |
| | 02 | 100.0 | 22.2 | 26% | High | 9 | 90 | 90 | High | 02 | |
| | 03 | 78.0 | 6.9 | 11% | Medium | 9 | 86 | 89 | High | 03 | |
| | 04 | 58.2 | 8.0 | 14% | Medium | 9 | 48 | 51 | High | 04 | |
| | 05 | 167.6 | 13.9 | 8% | Low | 9 | 37 | 39 | High | 05 | |
| | 06 | 93.7 | 27.4 | 29% | High | 9 | 36 | 36 | Medium | 06 | |
| | 07 | 91.0 | 5.6 | 5% | Medium | 9 | 36 | 36 | Medium | 07 | |
| | 08 | 46.3 | 20.9 | 45% | High | 9 | 36 | 36 | Medium | 08 | |
| | 09 | 48.2 | 12.4 | 26% | High | 9 | 24 | 25 | Medium | 09 | |
| | 10 | 128.0 | 20.1 | 16% | Medium | 9 | 24 | 25 | Medium | 10 | |
| | 11 | 112.4 | 2.6 | 2% | Low | 9 | 30 | 35 | Medium | 11 | |
| | 12 | 105.1 | 6.5 | 5% | Low | 9 | 49 | 51 | High | 12 | |
| | 13 | 74.0 | 10.0 | 13% | Medium | 9 | 32 | 32 | Low | 13 | |
| | 14 | 83.8 | 13.0 | 16% | Medium | 9 | 44 | 45 | High | 14 | |
| | 15 | 162.0 | 11.3 | 7% | Low | 9 | 41 | 42 | High | 15 | |
| | 16 | 59.4 | 5.6 | 9% | Medium | 9 | 33 | 35 | Medium | 16 | |
| | 17 | 101.4 | 10.2 | 10% | Medium | 9 | 39 | 40 | High | 17 | |
| | 18 | 217.5 | 10.8 | 5% | Low | 9 | 34 | 35 | Medium | 18 | |
| Manhattan | 01 | 70.4 | 25.4 | 36% | High | 1 | 22 | 23 | Medium | 01 | Manhattan |
| | 02 | 51.3 | 15.8 | 31% | High | 1 | 66 | 67 | High | 02 | |
| | 03 | 68.7 | 29.9 | 97% | High | 1 | 73 | 77 | High | 03 | |
| | 04 | 60.0 | 12.8 | 27% | High | 1 | 60 | 61 | High | 04 | |
| | 05 | 50.6 | 13.8 | 27% | High | 1 | 103 | 104 | High | 05 | |
| | 06 | 55.2 | 11.5 | 21% | High | 1 | 60 | 62 | High | 06 | |
| | 07 | 57.2 | 16.9 | 30% | High | 1 | 39 | 40 | High | 07 | |
| | 08 | 67.4 | 20.0 | 30% | High | 1 | 72 | 76 | High | 08 | |
| | 09 | 47.0 | 9.1 | 20% | High | 1 | 24 | 24 | Medium | 09 | |
| | 10 | 47.5 | 8.5 | 14% | Medium | 1 | 36 | 26 | Medium | 10 | |
| | 11 | 79.6 | 24.1 | 30% | High | 1 | 43 | 43 | High | 11 | |
| | 12 | 84.3 | 29.1 | 35% | High | 1 | 26 | 26 | Medium | 12 | |
| Queens | 01 | 173.6 | 24.0 | 14% | Medium | 0 | 29 | 29 | Medium | 01 | Queens |
| | 02 | 153.0 | 16.9 | 11% | Medium | 0 | 54 | 57 | Medium | 02 | |
| | 03 | 109.5 | 11.6 | 11% | Medium | 0 | 45 | 47 | High | 03 | |
| | 04 | 82.0 | 2.9 | 3% | Low | 0 | 39 | 39 | High | 04 | |
| | 05 | 156.9 | 18.2 | 10% | Medium | 0 | 44 | 46 | High | 05 | |
| | 06 | 115.0 | 0.2 | 0% | Low | 0 | 21 | 21 | Low | 06 | |
| | 07 | 314.0 | 9.7 | 3% | Low | 0 | 23 | 23 | Medium | 07 | |
| | 08 | 215.6 | 16.7 | 8% | Low | 0 | 15 | 15 | Low | 08 | |
| | 09 | 145.2 | 0.3 | 0% | Low | 0 | 25 | 28 | Medium | 09 | |
| | 10 | 171.0 | 0.7 | 4% | Low | 0 | 10 | 11 | Low | 10 | |
| | 11 | 262.9 | 12.7 | 5% | Low | 0 | 32 | 32 | Low | 11 | |
| | 12 | 286.8 | 1.3 | 0% | Low | 0 | 12 | 12 | Medium | 12 | |
| | 13 | 372.4 | 12.2 | 3% | Low | 0 | 6 | 6 | Low | 13 | |
| | 14 | 186.0 | 23.3 | 13% | Medium | 0 | 10 | 10 | Low | 14 | |
| Staten Island | 01 | 332.0 | 9.4 | 3% | Low | 2 | 19 | 21 | Medium | 01 | Staten Island |
| | 02 | 377.0 | 23.1 | 6% | Low | 2 | 9 | 9 | Low | 02 | |
| | 03 | 457.5 | 15.1 | 3% | Low | 2 | 1 | 1 | Low | 03 | |

Sources: [1] [2] [3] [4] [5]

[6] [7] [8] Cyclist fatalities, severe injuries, and KSI based on last 5 years of available data; 2010 - 2014.

[9] Cyclist KSI Rank is a tercile ranking of column [8]. Cyclist KSI: "Low" KSI range from 1 - 17; "Medium" range from 20 - 37; "High" range from 38 - 105.

[10] Cyclist Network Coverage is a tercile ranking of column [4]. Percent Bicycle Network Coverage: "Low" coverage ranges from 0 - 8.5% coverage;

"Medium" coverage ranges from 9.0 - 16.2%; "High" coverage ranges from 27.2 - 45.1%.