



Presented by **Citadel** and **Citadel Securities**
In Partnership with **CorrelationOne**

Restaurants vs Grocery Stores

Can “Home Cooking” improve your health?

Team 15

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Background Information

- The New York State Dept of Health identified 'Prevent Chronic Disease' as one of its five priority areas for the Prevention Agenda 2013-2018 [1].
- Within this priority area, the reduction of obesity among children & adult is a primary focus [1].
- The percentage of New York State adults who are overweight or obese increased from 42% in 1997 to 60.8% in 2016 [2].
- Total obesity-related costs in New York State are estimated at more than \$11.8 billion annually [3].
- The increased prevalence of childhood obesity can be expected to add billions of dollars more to the health care costs in the years ahead, as overweight children and teens become adults [3].

What the research suggests

- US adults have decreased consumption of foods from the home supply and reduced time spent cooking since 1965, but levelled off in 2007-2008, where foods from the home supply accounted for 65 to 72% of total daily energy, with 54 to 57% reporting cooking activities. [4]
- 88% of shoppers believe eating at home is healthier than eating at a restaurant. [5]
- A survey by the NYC Health Department in 2010, found that 57 percent of meals at chain restaurants exceeded the 1,500-milligram per day sodium recommendation of the American Heart Association [6]
- In 2013, The Center for Science in the Public Interest found that 97 percent of kids' meals at top chain restaurants failed to meet basic nutrition standards. [7].

Our Investigation

Impact of Food Source on Health

- Can we create a heuristic for the prevalence of eating at home?
- Does this heuristic fit with validated research?



Poor Health

- Geographical distribution
- Income distribution



Concentration of Food Sources

- Restaurant:Grocery store ratio
- Number of Food sources per capita

Datasets Utilised

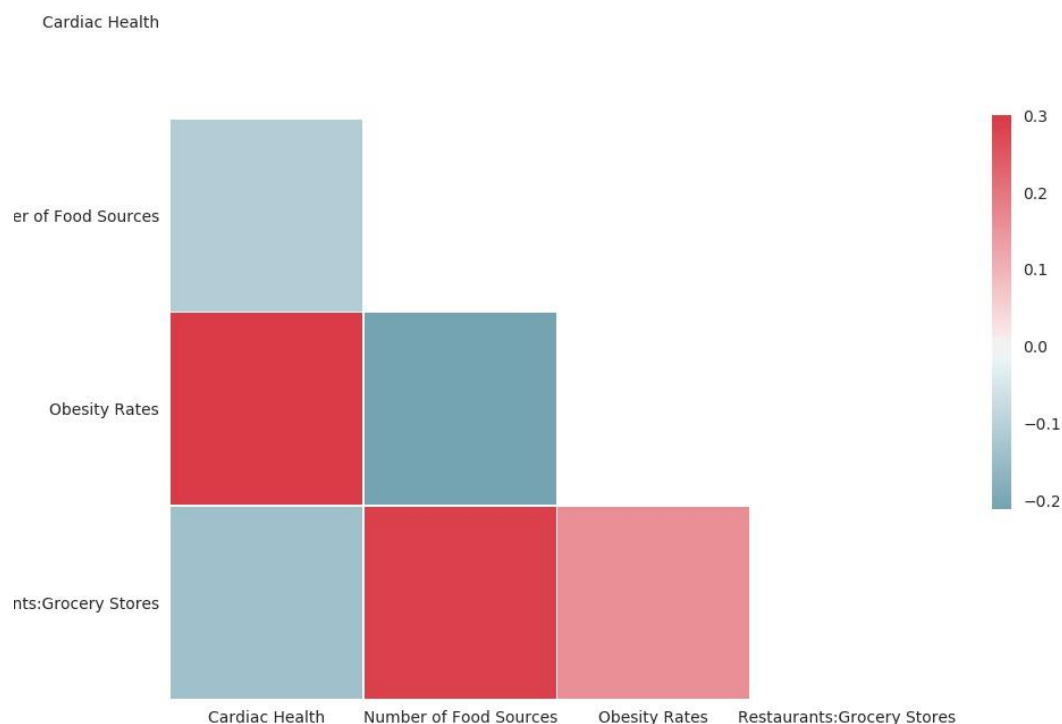
- Community_health: Values of various health indicators for every county throughout 2008 - 2015
 - Creating health heuristics
- Demographics_state: New York State counties demographic data
 - Determining county populations
- Food_venues: Info about restaurants and grocery stores across the US
 - Used for determining home cooking heuristics and restaurant densities

Impacts of Food Source on Health

Main Findings

- Our chosen heuristic to represent home cooking, the ratio of grocery stores to restaurants, did NOT provide a statistically significant relationship with obesity or cardiovascular disorders.
- This demonstrates that environmental food sources do NOT provide a good basis for determining peoples home eating habits.
- The Action Plan outlined the importance to improve the Context to Make Individuals' Decisions Healthy. However, we found there was no correlation between the number of healthy food choices and the health of a particular area.

Correlation Matrix of Top-level Heuristics



	Correlation	P-value
Rest: Groc Ratio & Obesity	0.16	0.2319
Rest: Groc Ratio & Cardiovascular	-0.14	0.3076

- Ratio of restaurants: grocery stores is **not** statistically significant for either health indicator
- This also applies for the overall number of food sources per capita

Concentration of Food Sources

Determining our heuristics

Initial Exploration

Can we use the restaurant to grocery store ratio as a proxy for home cooking?

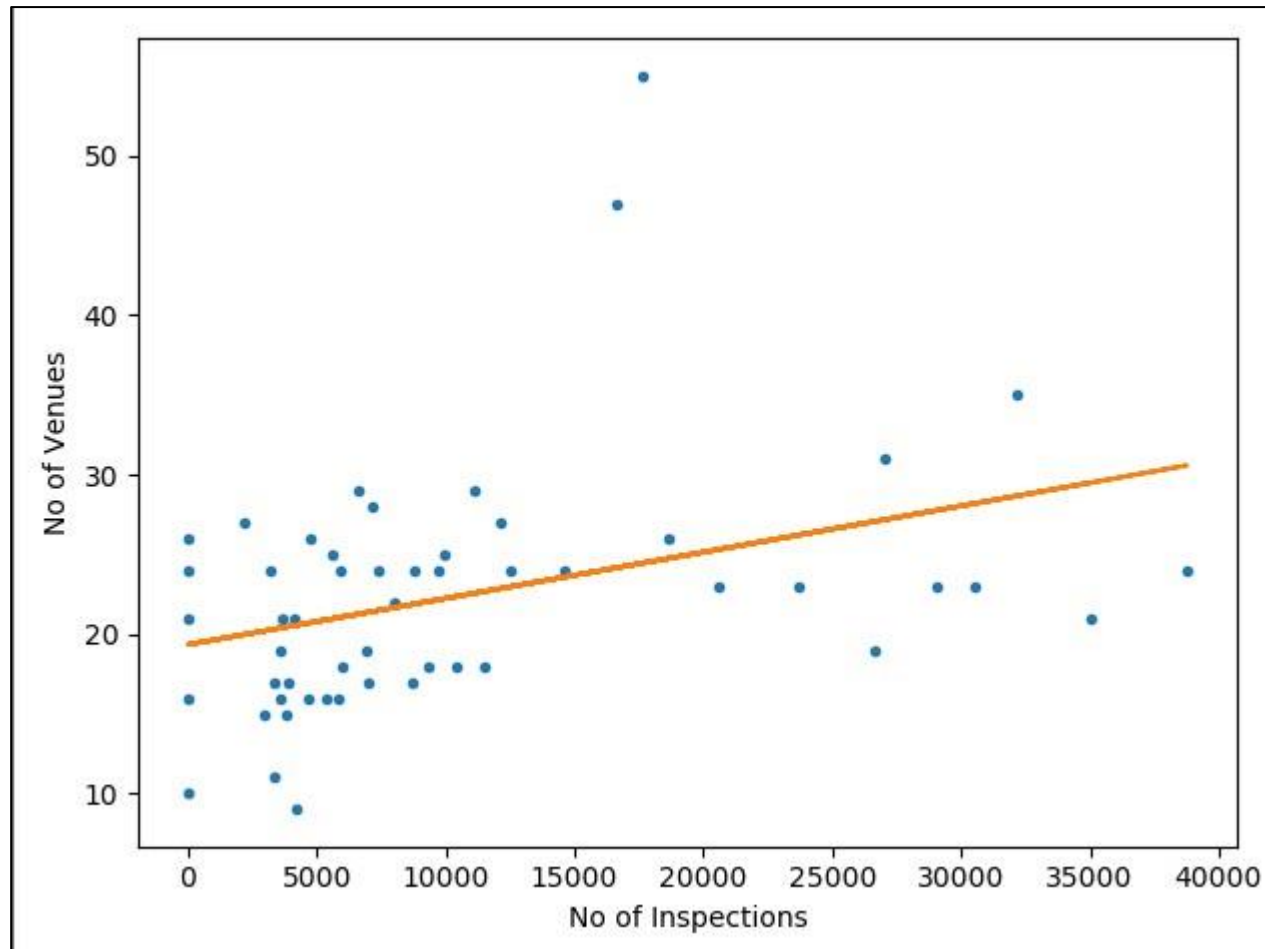
- Geocode restaurants into their relevant county to merge with health data.
 - Querying a public API would violate terms of use, so an offline shape-matching script was used, and uncertain elements were discarded.

- It became obvious that there was a significant lack in grocery store data - sometimes only 5-10 stores per county. This raised questions about whether there might be sampling bias inside the grocery dataset itself, and whether representations per county were still accurate.
- To validate the dataset, the correlation of food venue occurrence was validated against the number of food inspections per county.

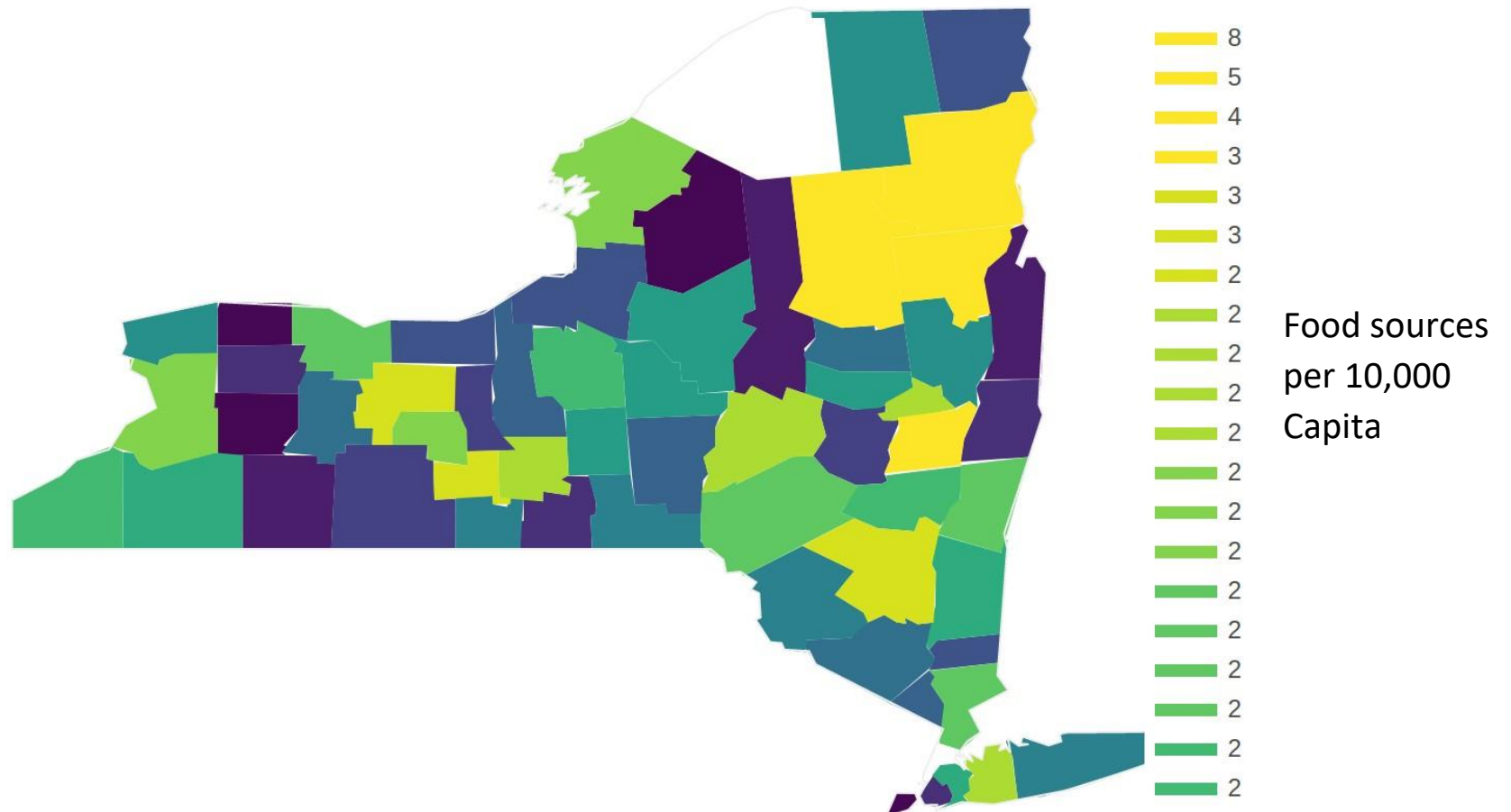
This correlated strongly positive with a P value of 0.007 - reducing the likelihood of bias in the dataset.

Therefore - we can test the ratio of restaurants to grocery stores as a home cooking heuristic, with less concern about underlying bias

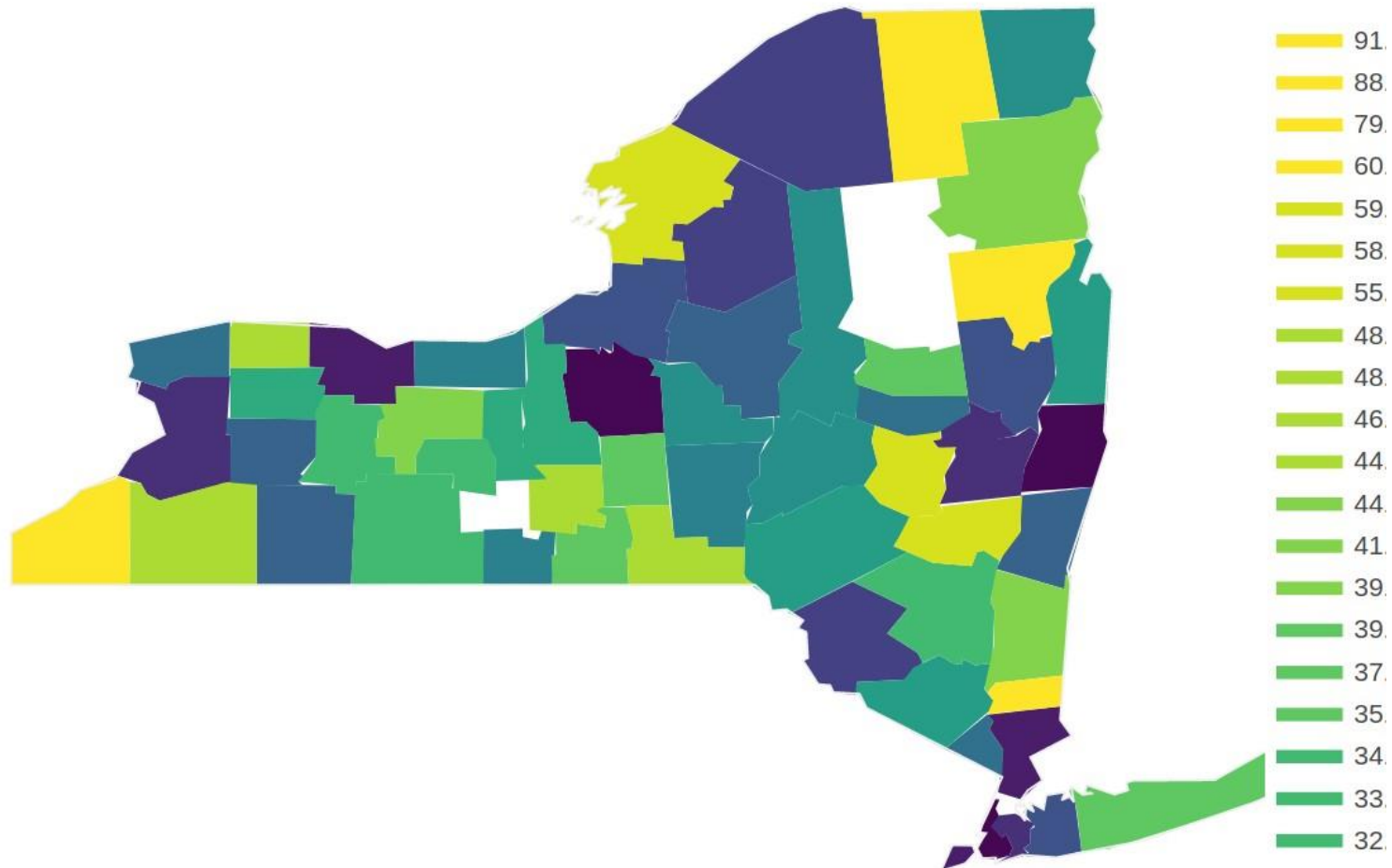
Relationship between Inspections & Venue Counts



Food sources by County per Capita



Restaurants per Grocery Store



Poor Health

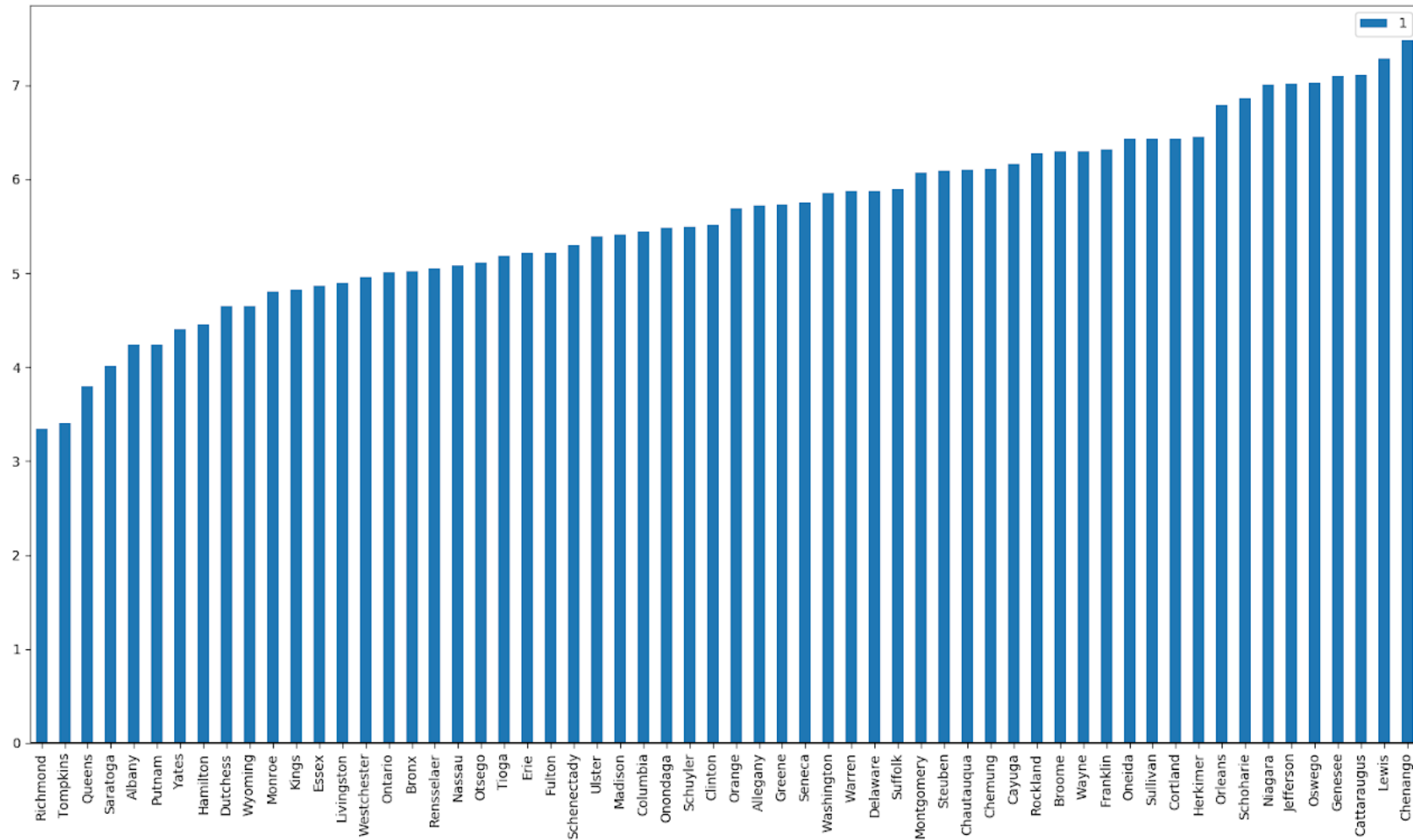
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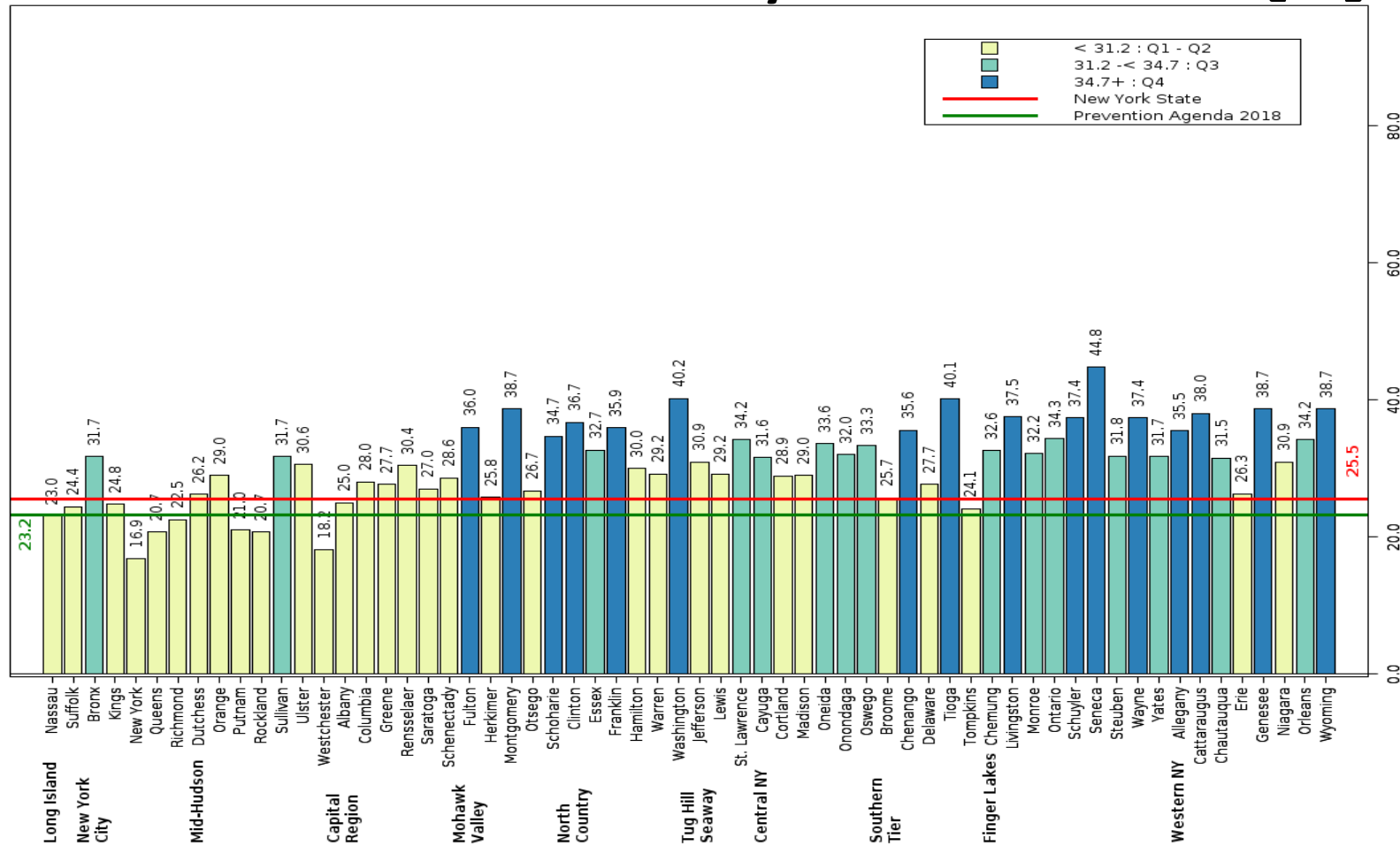
Main Findings

- The percentage of people who presented with Obesity related diseases was lower than we anticipated from our baseline research from the New York State Dept. of Health
- However, it was noted that the amount of people with cardiovascular issues was roughly similar to our anticipated result.
- Reducing the obesity rate in line with the Prevention Agenda would also reduce cardiovascular disease.

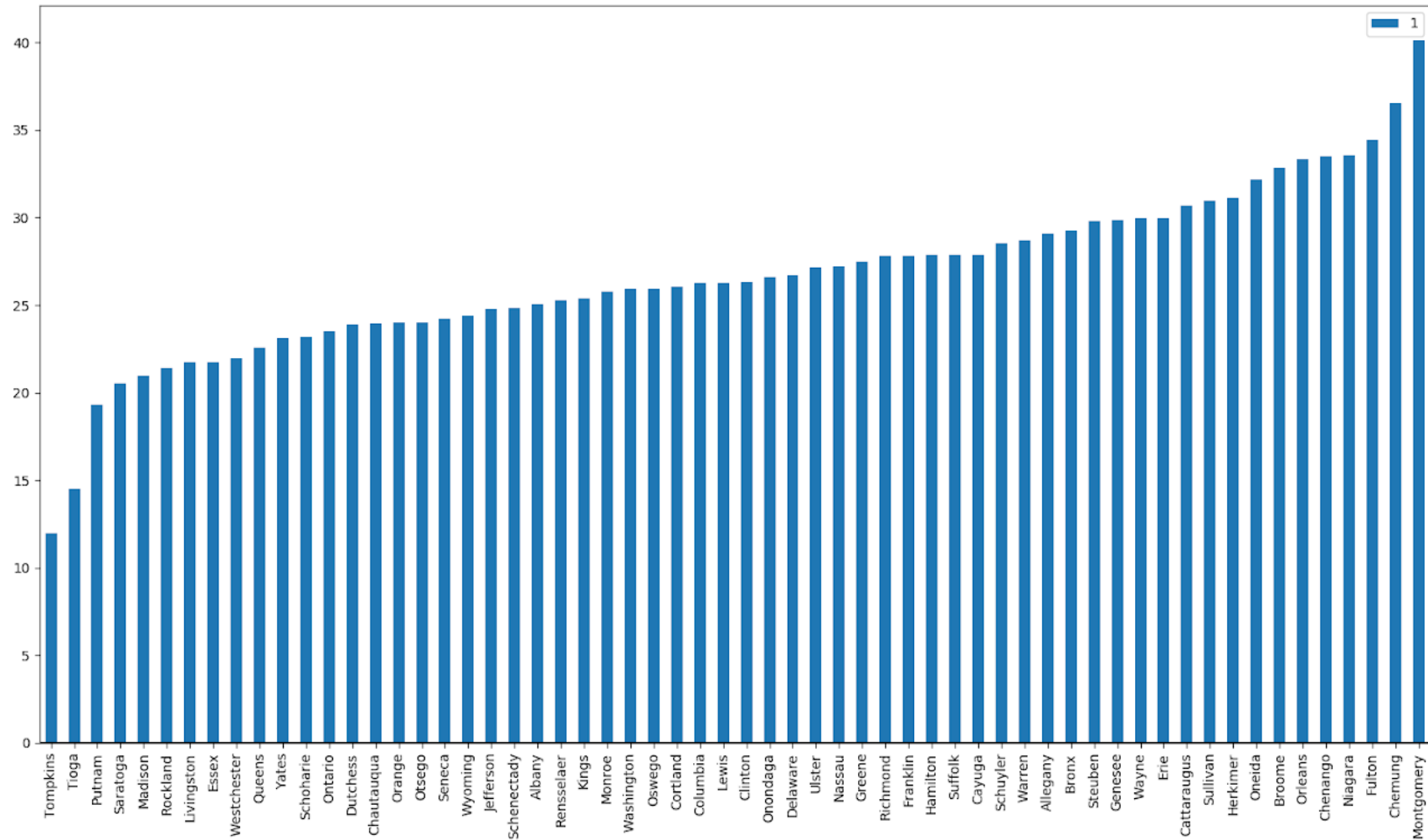
Prevalence of Obesity per County - Surprisingly Low



New York State Percentage of adults who are obese – County Level 2016 [8]



Cardiovascular Complications per County - More in Line with Expectations



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- [7] Centre for Science in the Public Interest, "Kids' Meals II :Obesity and Poor Nutrition on the Menu," Centre for Science in the Public Interest, 2013.
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https://webbi1.health.ny.gov/SASStoredProcess/guest?_program=/EBI/PHIG/apps/dashboard/pa_dashboard&p=ig&ind_id=pa16_0. [Accessed 10 November 2018].

- [⁹ J. G. Biing-Hwan Lin, "Nutritional Quality of Food Prepared at Home and Away From Home, 1977-2008," United States Department of Agriculture, 2012.

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