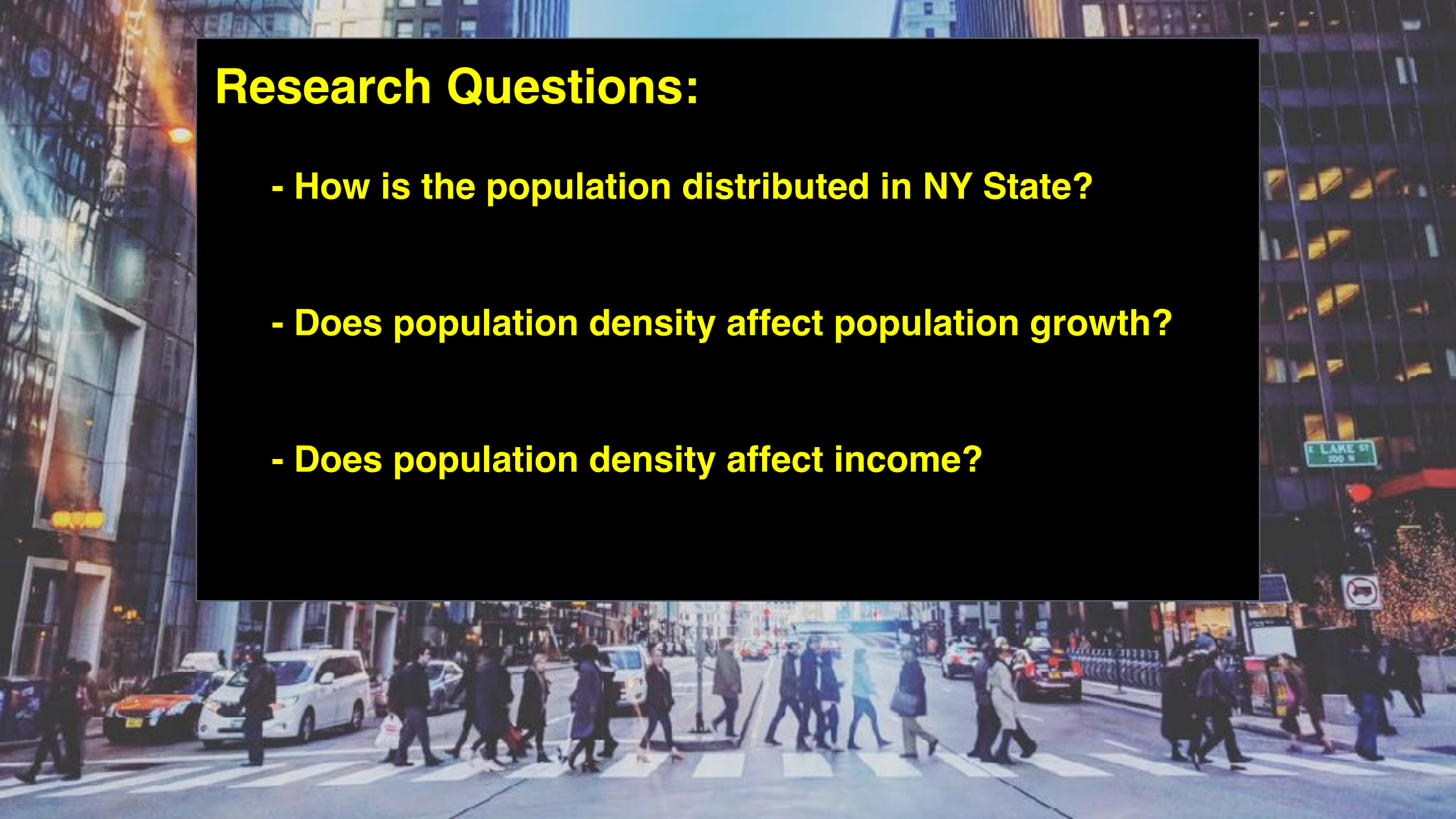


Exploring the Impact of Population Density on County Population Growth Rates and Per Capita Income in New York State.



Research Questions:

- How is the population distributed in NY State?
- Does population density affect population growth?
- Does population density affect income?



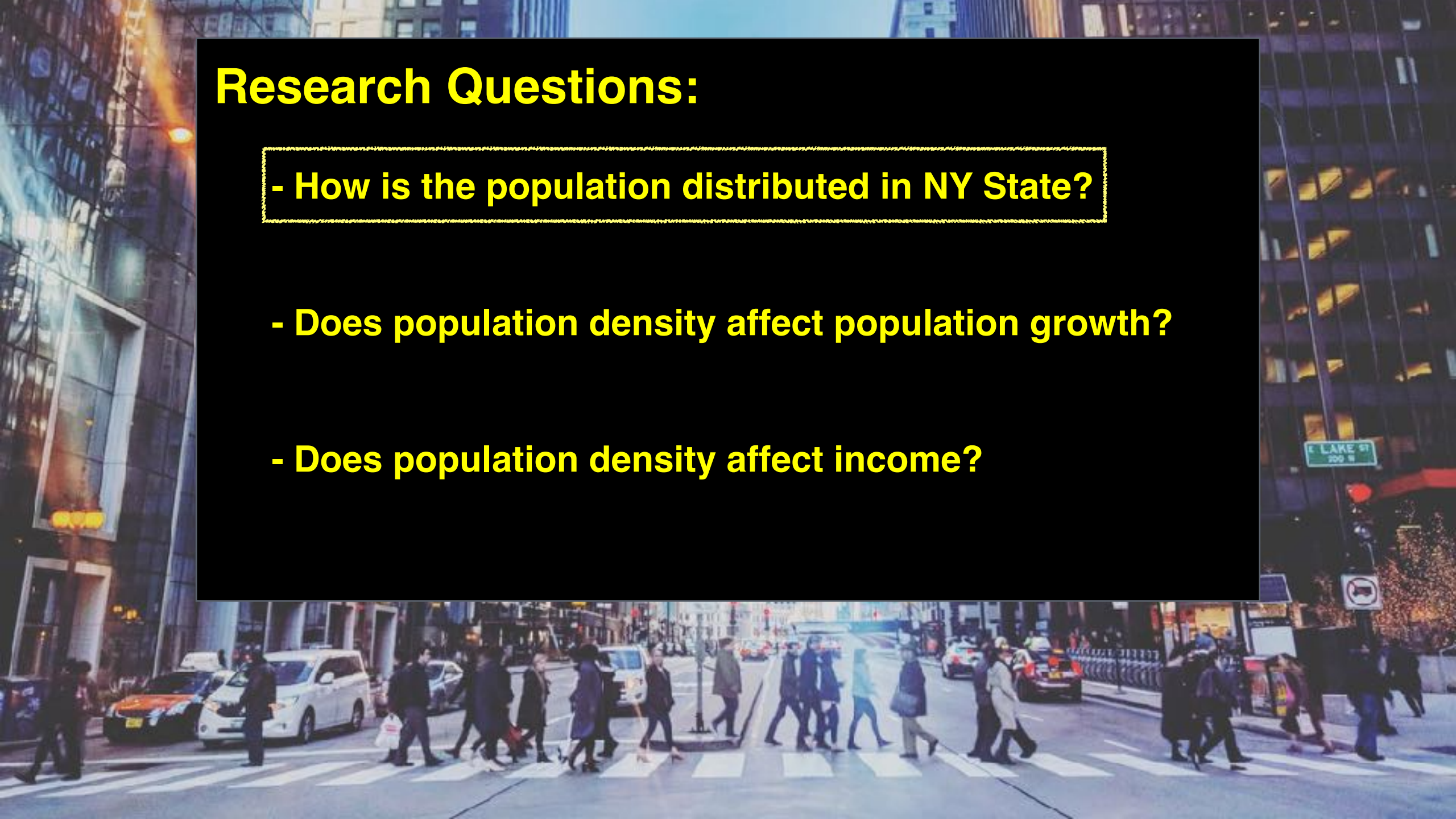
Sources:

Population/Census Data :

- <https://api.census.gov/data/2020/dec/pes/variables.html>
- <https://www.census.gov/data/developers/data-sets/decennial-census.2000.html#list-tab-YIGY5LAGROA1WMY05H>
- **Population by county 1970-2021** : https://data.ny.gov/Government-Finance/Annual-Population-Estimates-for-New-York-State-and/krt9-ym2k/explore/query/SELECT%20%60fips_code%60%2C%20%60geography%60%2C%20%60year%60%2C%20%60program_type%60%2C%20%60population%60/page/filter
- <http://www.usa.com/rank/new-york-state--population-density--county-rank.htm?hl=&hlst=&wist=&yr=&dis=&sb=DESC&plow=&phigh=&ps=>
- **Annual population estimates, land area by county** : <http://www.usa.com/rank/new-york-state--population-density--county-rank.htm?hl=&hlst=&wist=&yr=&dis=&sb=DESC&plow=&phigh=&ps=>
- **Annual Per Capita Income (county level per year)**-<https://fred.stlouisfed.org/release/tables?rid=175&eid=267974&od=2000-01-01#>

Research Questions:

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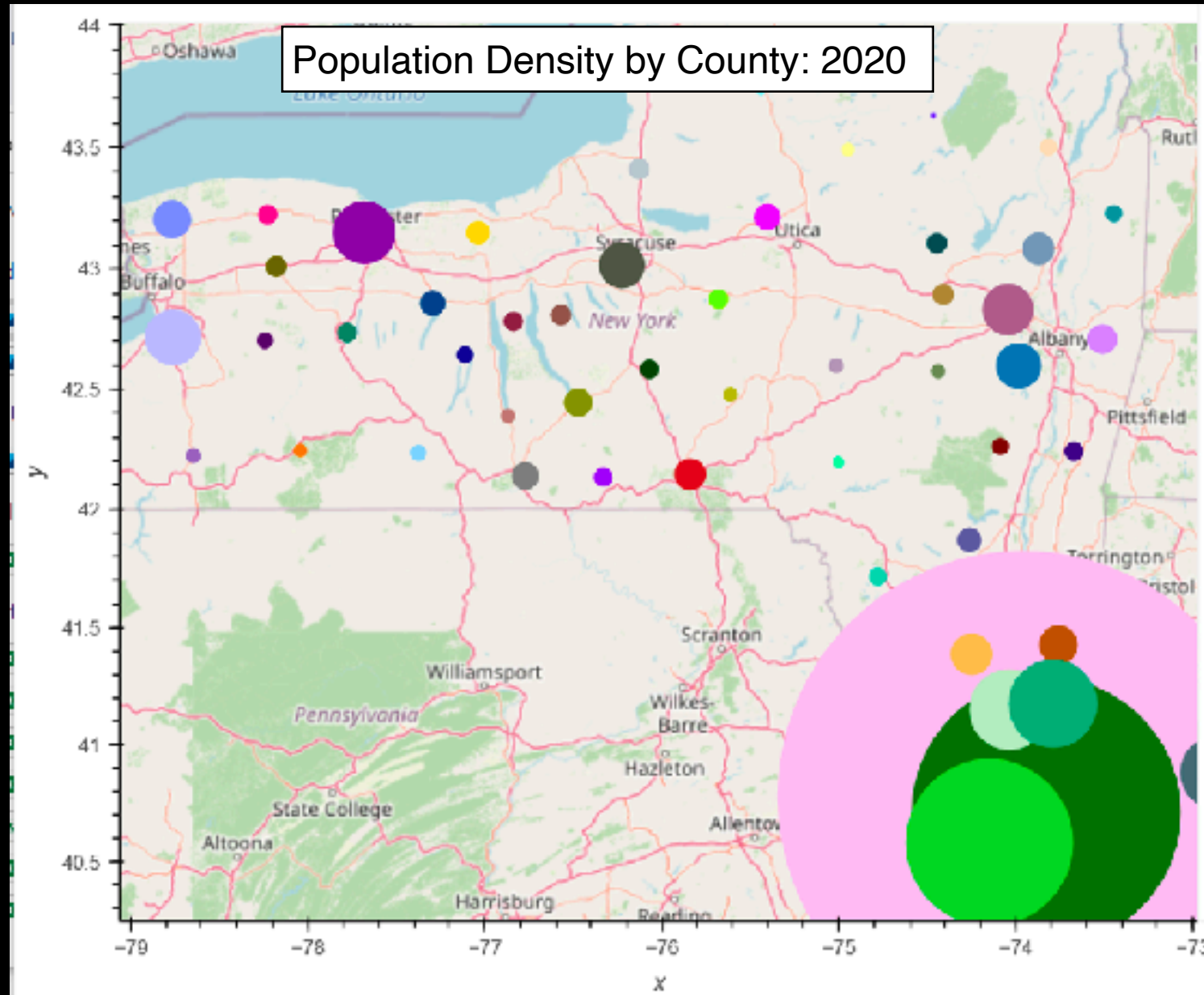


How is the population distributed in NY State?

Population Density by County: 2020

County	Land Area (sq ml.)	Population Density (pop/sq.ml.)	County	Land Area (sq ml.)	Population Density (pop/sq.ml.)	County	Land Area (sq ml.)	Population Density (pop/sq.ml.)
Hamilton	1717.37	2.97	Jefferson	1268.59	92.01	Broome	705.77	281.51
Essex	1794.23	20.83	Tioga	518.60	93.43	Saratoga	809.98	290.76
Lewis	1274.68	20.85	Cortland	498.76	93.85	Dutchess	795.63	371.92
Franklin	1629.12	29.19	Columbia	634.70	97.01	Niagara	522.36	407.13
Delaware	1442.44	30.72	Livingston	631.76	97.88	Putnam	230.31	424.07
St. Lawrence	2680.38	40.48	Orleans	391.26	103.11	New York State	47126.39	428.66
Herkimer	1411.47	42.61	Madison	654.84	103.87	Orange	811.69	494.41
Allegany	1029.31	45.13	Seneca	323.71	104.46	Albany	522.80	602.23
Schoharie	621.82	47.79	Fulton	495.47	107.62	Onondaga	778.39	612.18
Chenango	893.55	52.85	Cayuga	691.58	110.25	Schenectady	204.52	772.84
Schuyler	328.33	54.51	Genesee	492.94	118.45	Erie	1042.69	915.17
Otsego	1001.70	58.42	Chautauqua	1060.23	120.41	Monroe	657.20	1155.57
Cattaraugus	1308.35	58.88	Montgomery	403.04	122.90	Suffolk	912.05	1673.07
Steuben	1390.56	67.30	Oswego	951.65	123.50	Rockland	173.55	1949.46
Wyoming	592.75	68.38	Wayne	603.83	151.17	Westchester	430.50	2333.23
Yates	338.14	73.27	Ulster	1124.23	161.76	Nassau	284.72	4902.27
Washington	831.18	73.75	Ontario	644.06	174.61	Richmond	58.37	8493.18
Greene	647.16	74.06	Oneida	1212.43	191.45	Queens	108.53	22164.05
Warren	866.95	75.83	Chemung	407.35	206.57	Bronx	42.10	34979.90
Clinton	1037.85	76.93	Tompkins	474.65	222.77	Kings	70.82	38634.20
Sullivan	968.13	81.21	Rensselaer	652.43	246.97	New York	22.83	74211.61

How is the population distributed in NY State?

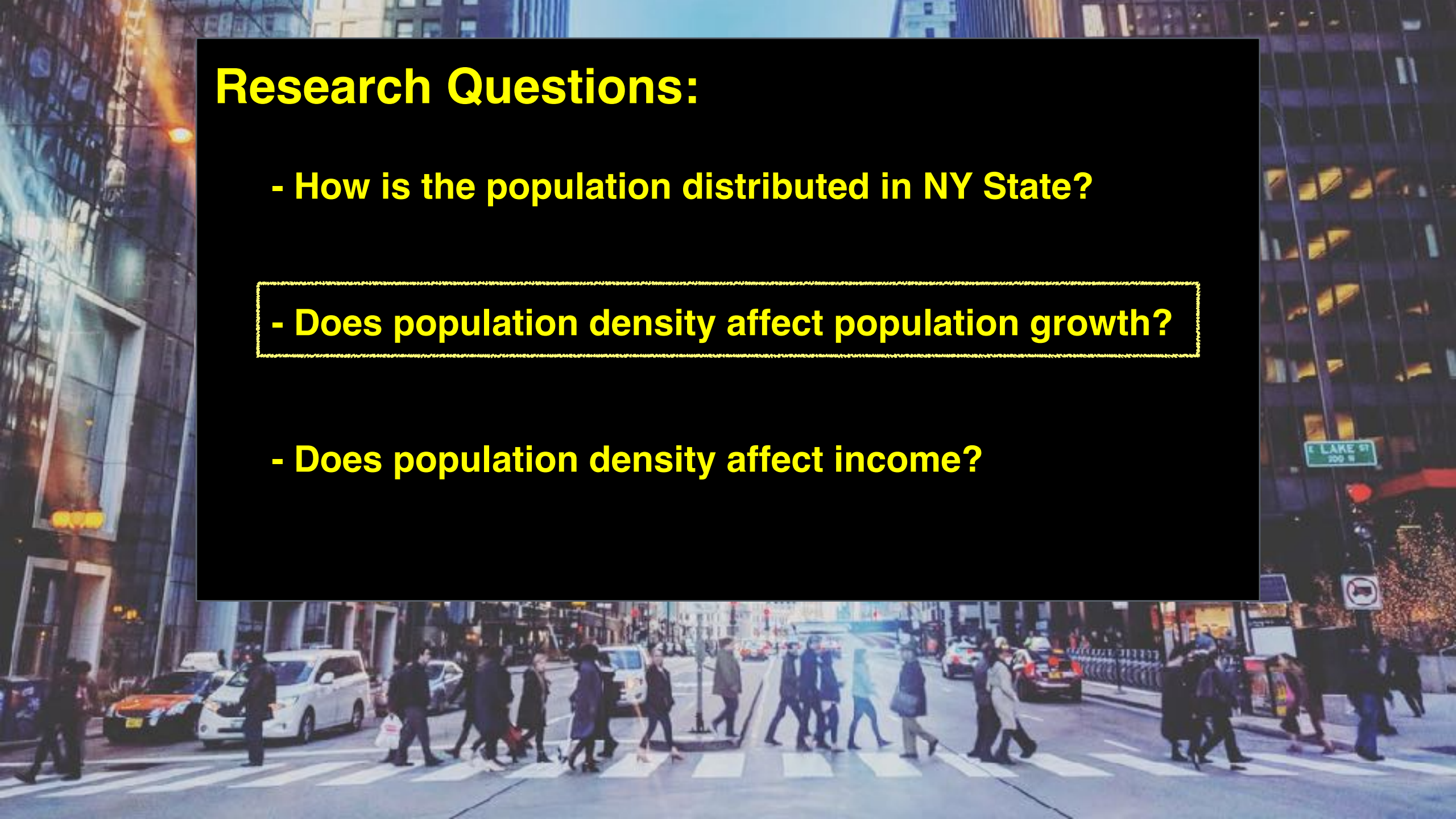


Research Questions:

- How is the population distributed in NY State?

- Does population density affect population growth?

- Does population density affect income?

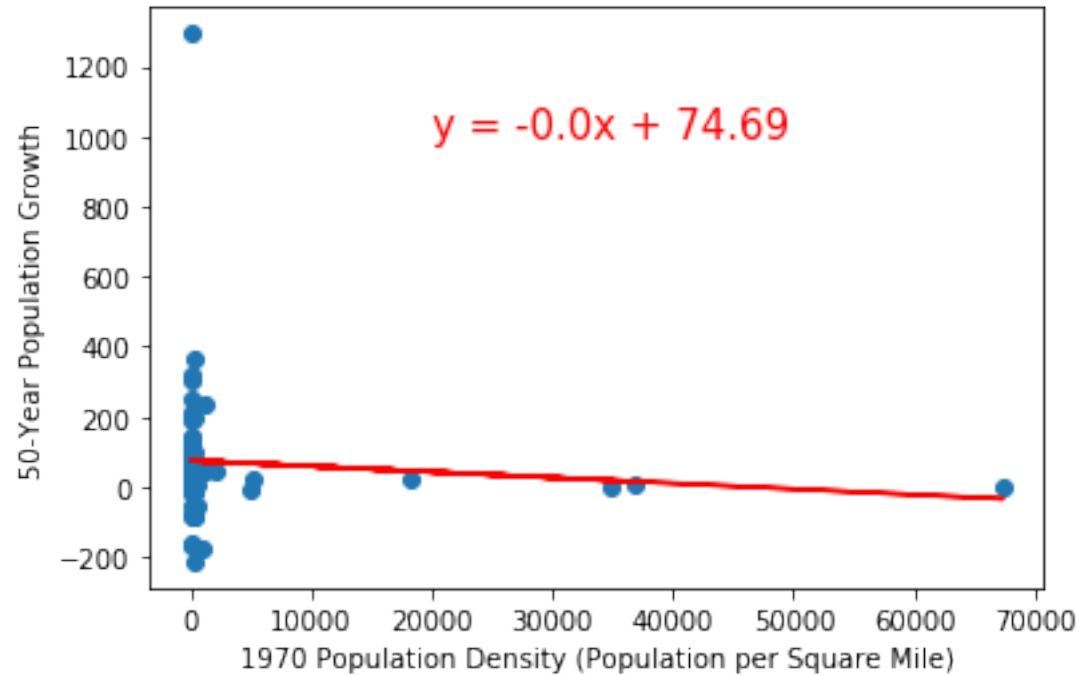


Does population density affect population growth?

Population Density by County: 1970

County	Land Area (sq mi.)	Population Density (pop/sq.mi.)	County	Land Area (sq mi.)	Population Density (pop/sq.mi.)	County	Land Area (sq mi.)	Population Density (pop/sq.mi.)
Hamilton	1717.37	2.74	Steuben	1390.56	71.59	Putnam	230.31	246.17
Lewis	1274.68	18.55	Columbia	634.70	81.17	Chemung	407.35	249.26
Essex	1794.23	19.30	Livingston	631.76	85.54	Orange	811.69	273.08
Franklin	1629.12	26.97	Tioga	518.60	89.69	Dutchess	795.63	279.39
Delaware	1442.44	31.00	Cortland	498.76	92.02	Broome	705.77	314.29
Schoharie	621.82	39.80	Orleans	391.26	95.35	New York State	47126.39	387.07
St. Lawrence	2680.38	41.90	Madison	654.84	96.00	Niagara	522.36	451.26
Allegheny	1029.31	45.14	Oswego	951.65	106.02	Albany	522.80	548.47
Herkimer	1411.47	47.76	Fulton	495.47	106.24	Onondaga	778.39	607.45
Schuyler	328.33	50.98	Seneca	323.71	108.38	Schenectady	204.52	787.59
Greene	647.16	51.20	Cayuga	691.58	111.97	Erie	1042.69	1067.90
Chenango	893.55	51.89	Genesee	492.94	119.13	Monroe	657.20	1083.26
Sullivan	968.13	54.31	Ontario	644.06	122.42	Suffolk	912.05	1235.71
Otsego	1001.70	56.09	Ulster	1124.23	125.63	Rockland	173.55	1324.71
Warren	866.95	56.98	Wayne	603.83	131.50	Westchester	430.50	2077.60
Yates	338.14	58.65	Montgomery	403.04	138.65	Nassau	284.72	5018.40
Cattaraugus	1308.35	62.42	Chautauqua	1060.23	138.94	Richmond	58.37	5061.56
Washington	831.18	63.43	Saratoga	809.98	150.33	Queens	108.53	18309.91
Wyoming	592.75	63.58	Tompkins	474.65	162.36	Bronx	42.10	34957.27
Jefferson	1268.59	69.77	Oneida	1212.43	225.23	Kings	70.82	36741.20
Clinton	1037.85	70.27	Rensselaer	652.43	233.76	New York	22.83	67421.51

Does population density affect population growth?



The r-value is: -0.08874409130425427

The r-squared is: 0.007875513741417818

R-value = 0.0887

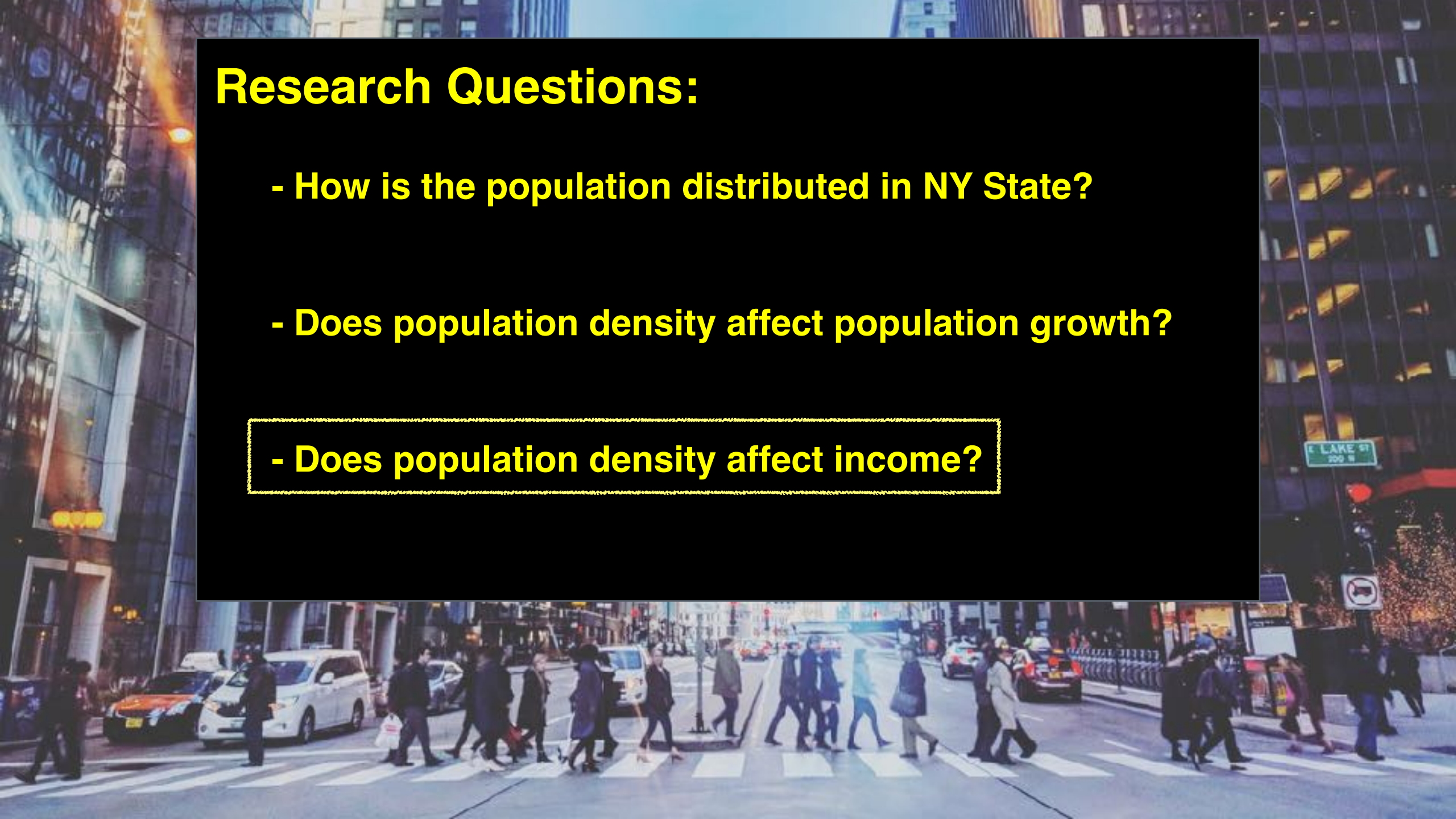
This suggests that there is a weak negative correlation between
50-Year Population Growth Rate
and
1970 Population Density

r-squared = 0.0079

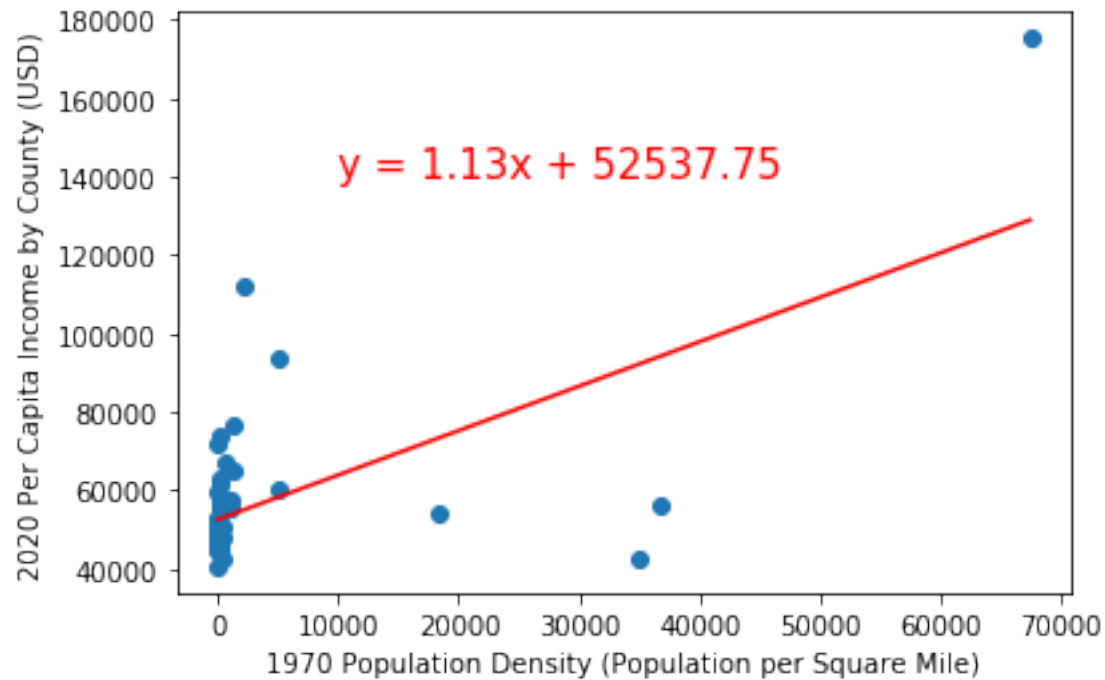
This suggests that 0.79% of the
50-Year Population Growth Rate
can be predicted by the
1970 Population Density

Research Questions:

- How is the population distributed in NY State?
- Does population density affect population growth?
- Does population density affect income?



Does population density affect income?



The r-value is: 0.6232249355753017

The r-squared is: 0.3884093203228389

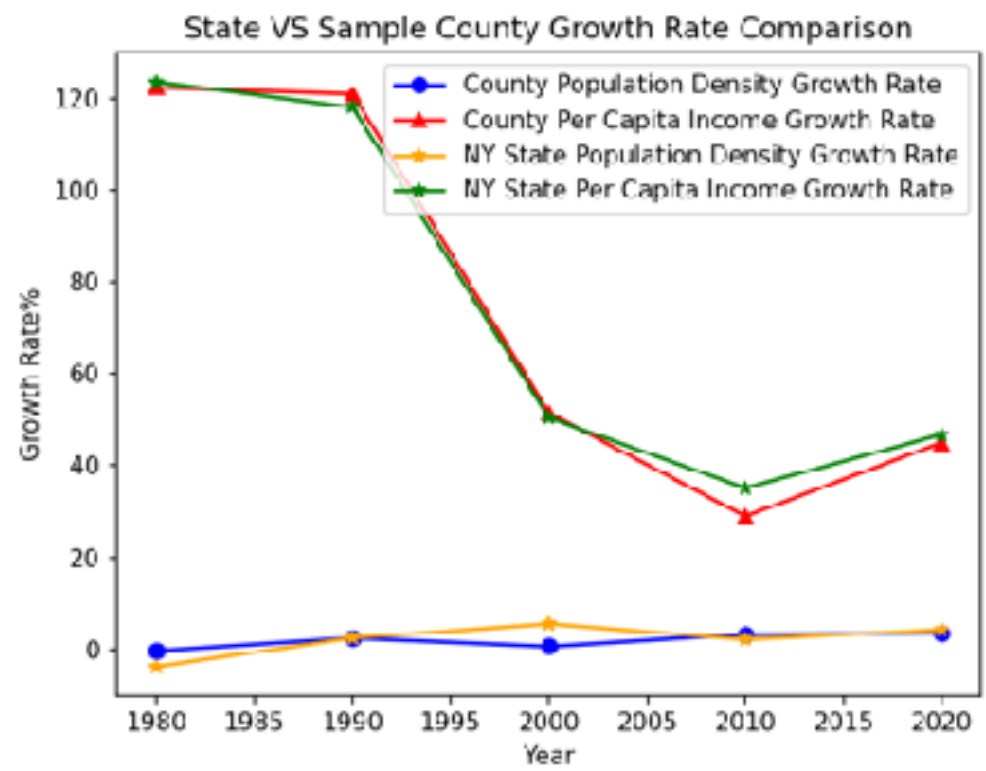
R-value = 0.6232

This suggests that there is a moderately strong positive correlation between **Per Capita Income** and **1970 Population Density**

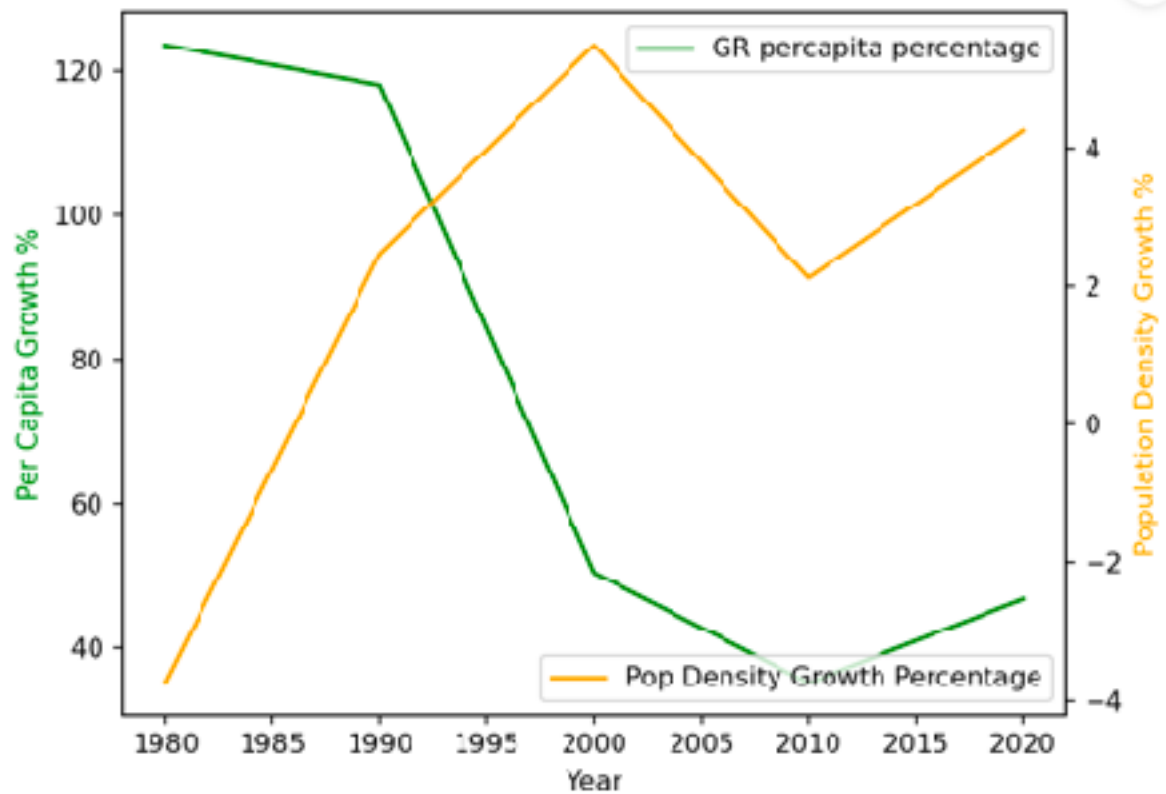
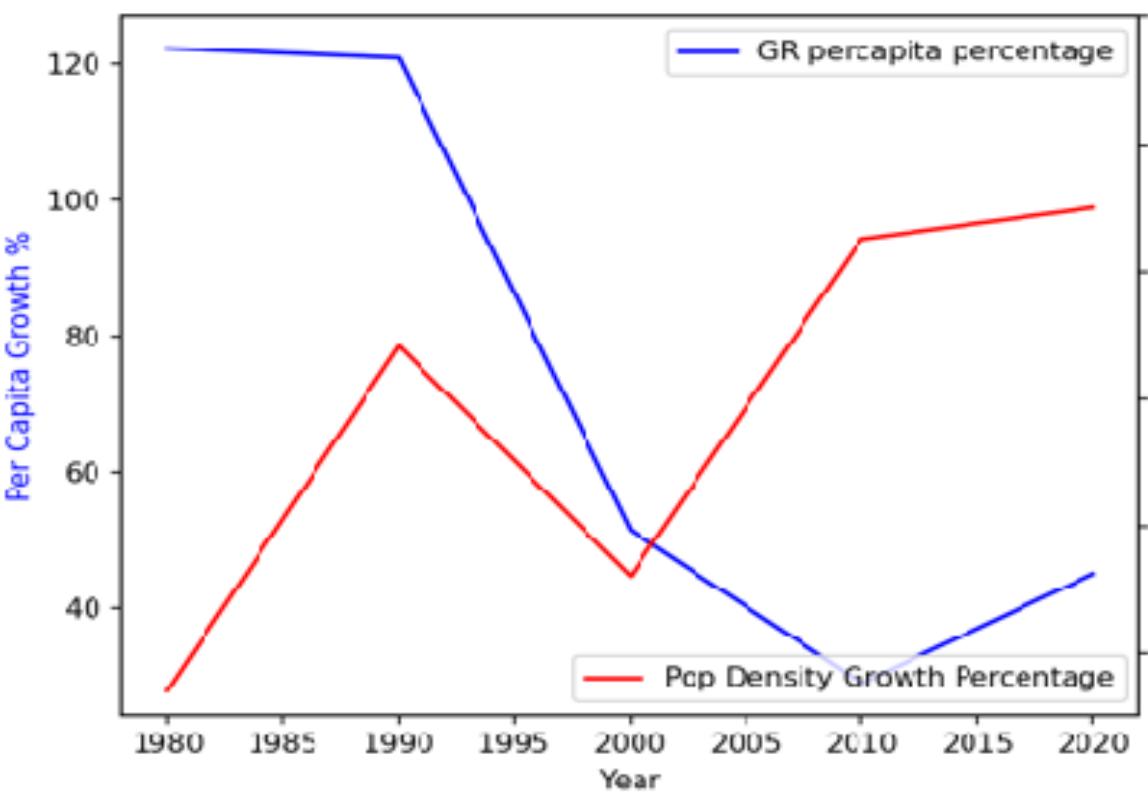
r-squared = 0.3884

This suggests that 39% of the **Per Capita Income** can be predicted by the **1970 Population Density**

How does population Density Growth affect Per Capita Growth?

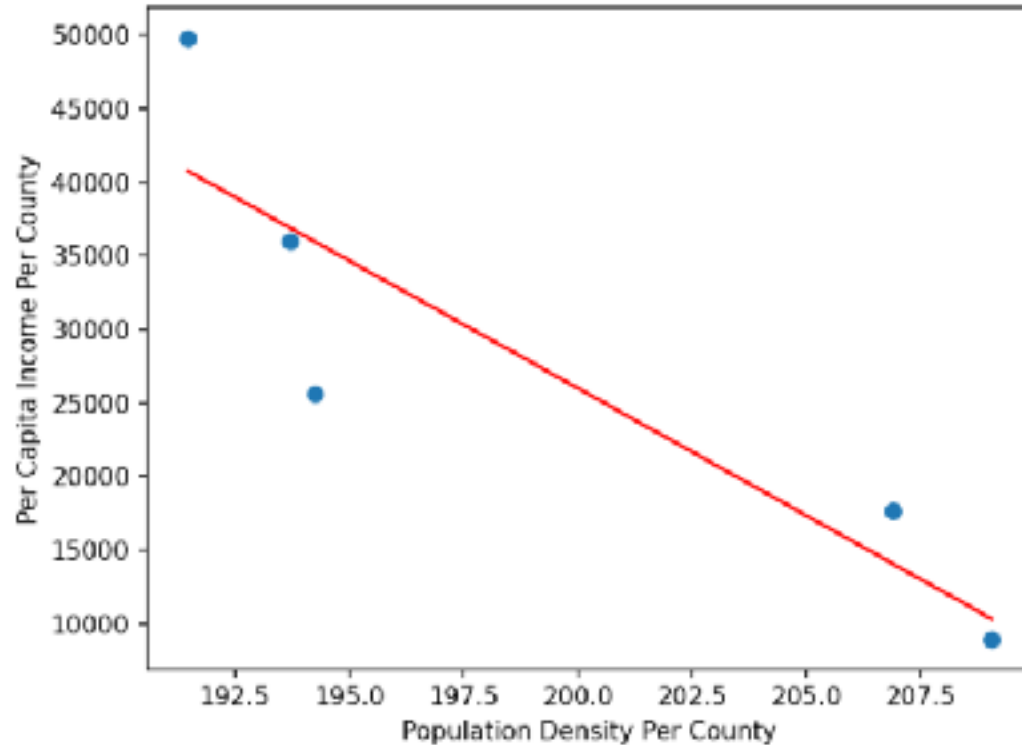


How does population Density Growth affect Per Capita Growth?



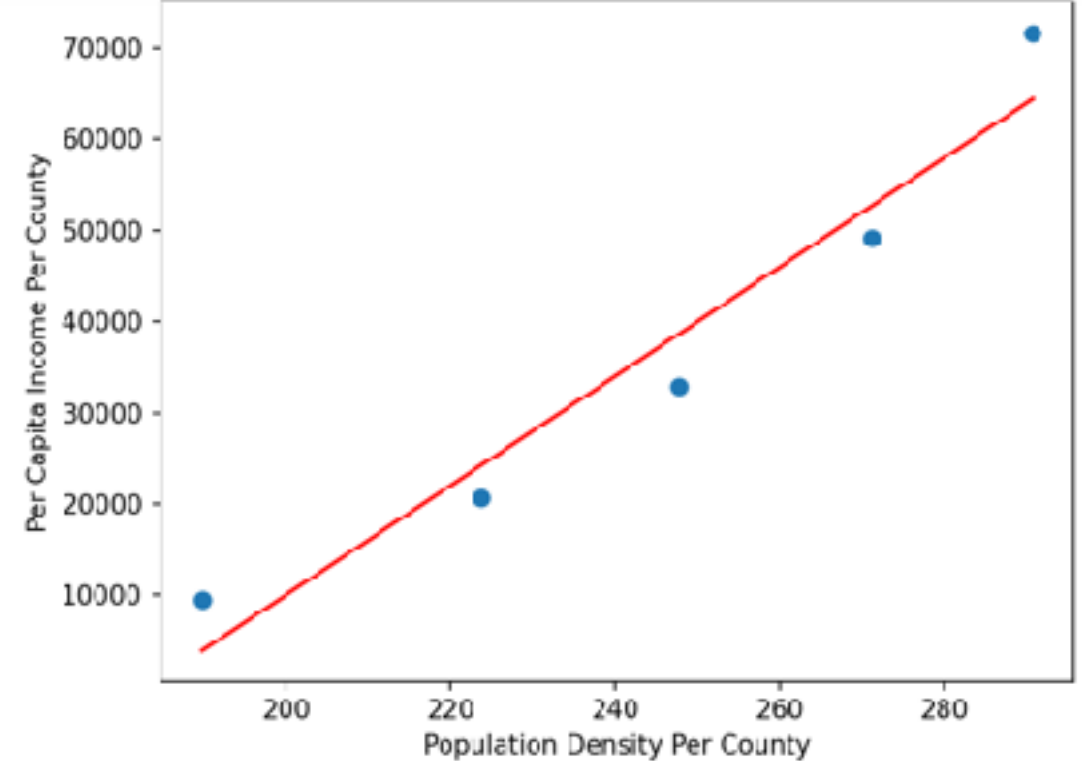
Does population density affect income?

Lowest Population Growth Rate:
Oneida County



The r-squared is: 0.7996663223703514 r-value: -0.8942486400798117

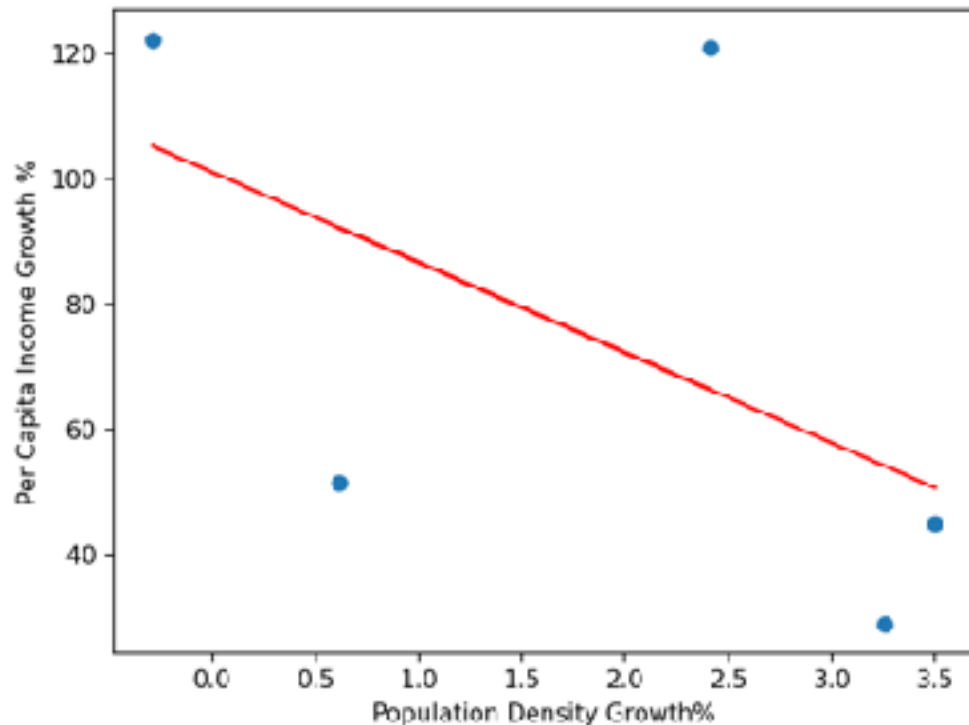
Highest Population Growth Rate:
Saratoga County



The r-squared is: 0.9408134487526897 r-value: 0.9699553849289514

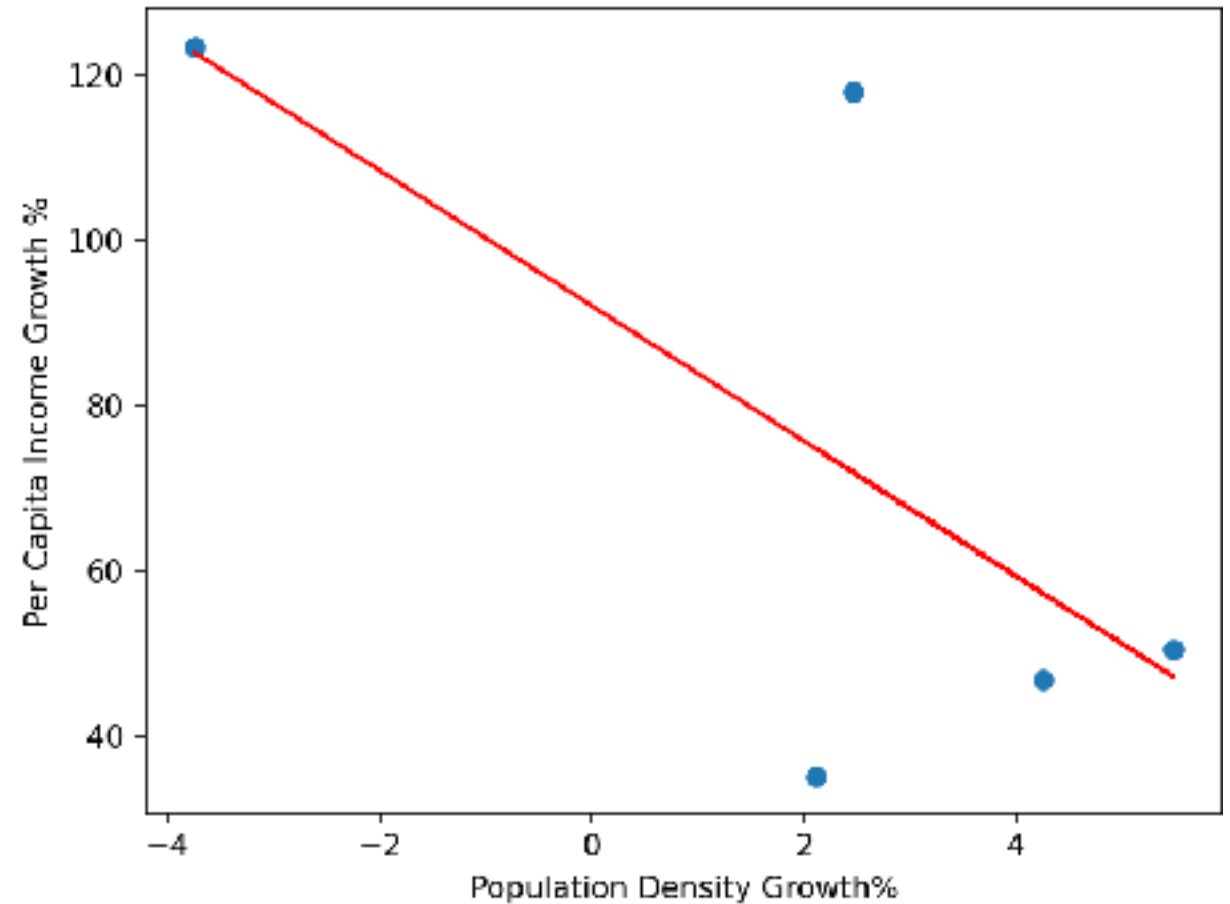
what's the correlation between
population density growth & per
capita income growth ?

Albany County



The r-squared is: 0.29153801721211685 r-value: -0.5395889647120476

New York State



ie r-squared is: 0.46922087649192085 r-value: -0.6849969901334756

Limitations :

Census survey
is performed per
decade.

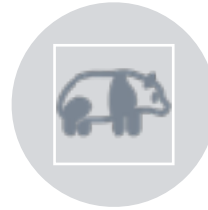
Not able to pull
data through API

Data Analysis is
only for New-
York State
Counties

Modules Employed :



`from bs4 import
BeautifulSoup`



`import
hvplot.pandas`



`import
plotly.graph_objs
as go`



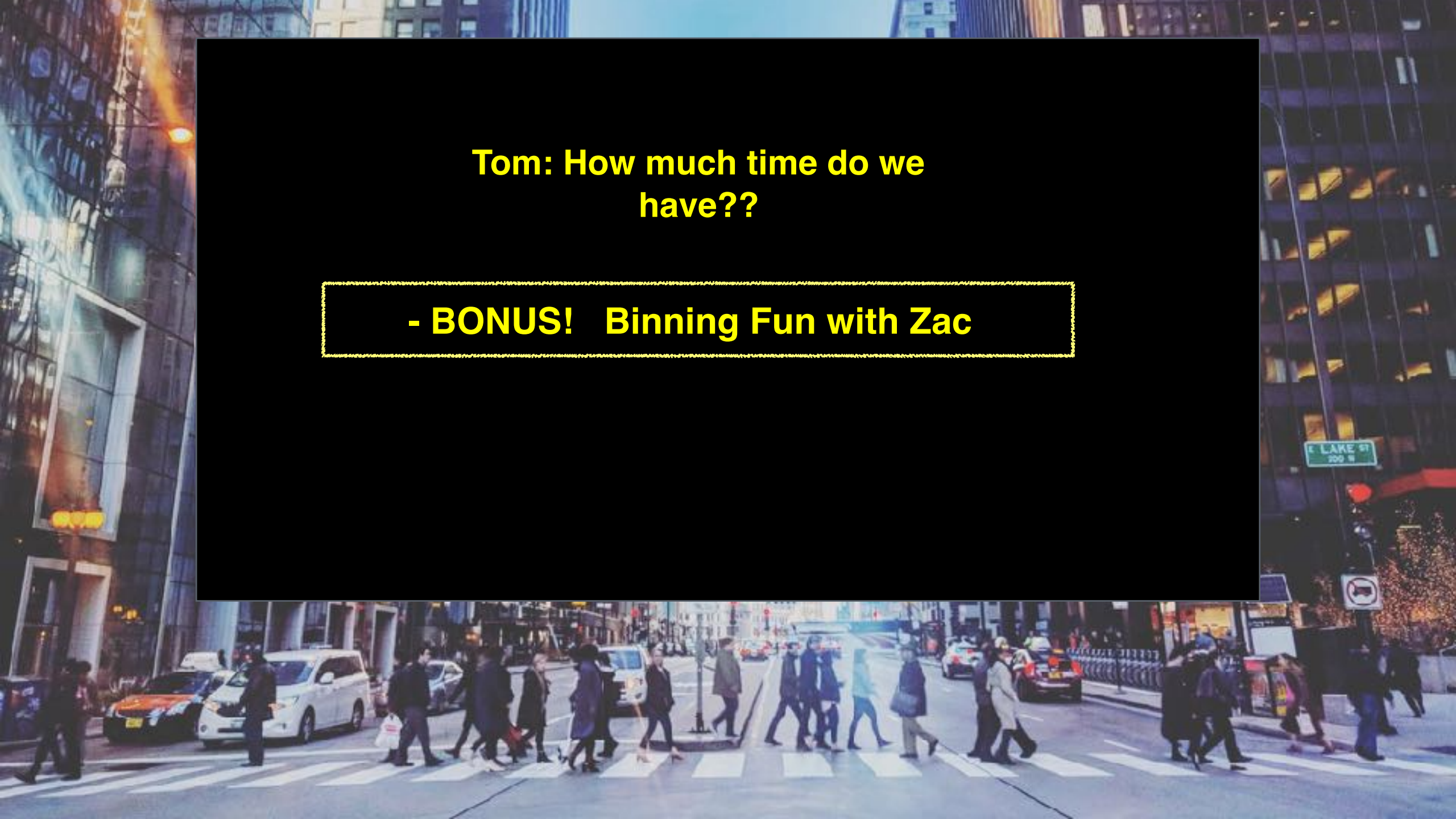
`import ipywidgets
as widgets`



`import
plotly.express as
px`

**Tom: How much time do we
have??**

- BONUS! Binning Fun with Zac



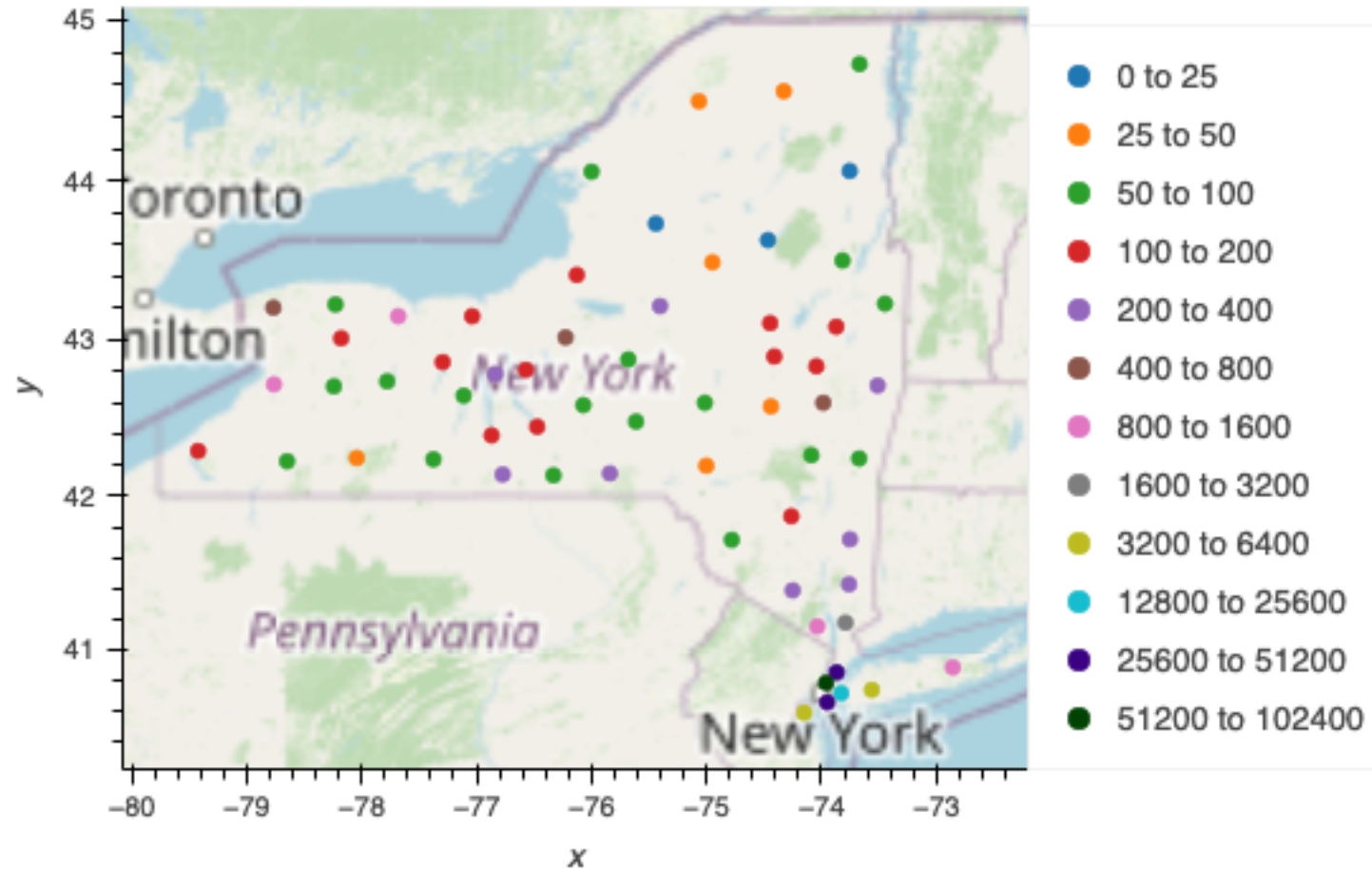
Does population density affect income?

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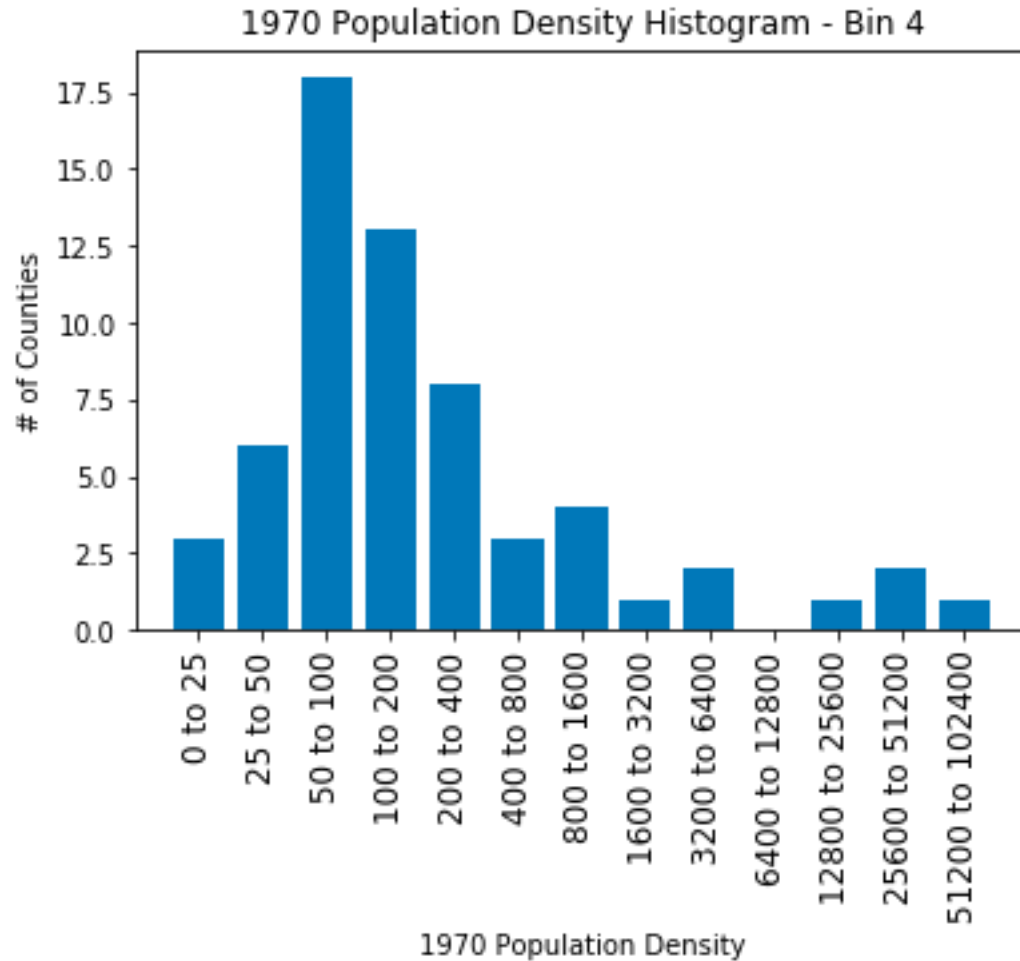


Does population density affect income?

Population Density by County: 1970

- 13 Logarithmic scale bins

Why Logarithmic scale??



Questions ?

