

# Exploring the Correlation Between Environmental & Demographic Indicators across the US

By Emily Yarvis





# Roadmap

01

## Introduction:

Environmental Justice? Whats that?

02

## Discovery:

Initial findings and Data

03

## Exploration

Who is truly most effected and why?

04

## Conclusion:

Why do we care?



# Introduction

Explaining Environmental Justice

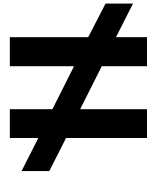
# Climate Change

In 2019 **60 million** individuals died due to particulate matter in the air around the world



# Environmental Discrimination

In 2019 **60 million** individuals died due to particulate matter  
in the air around the world

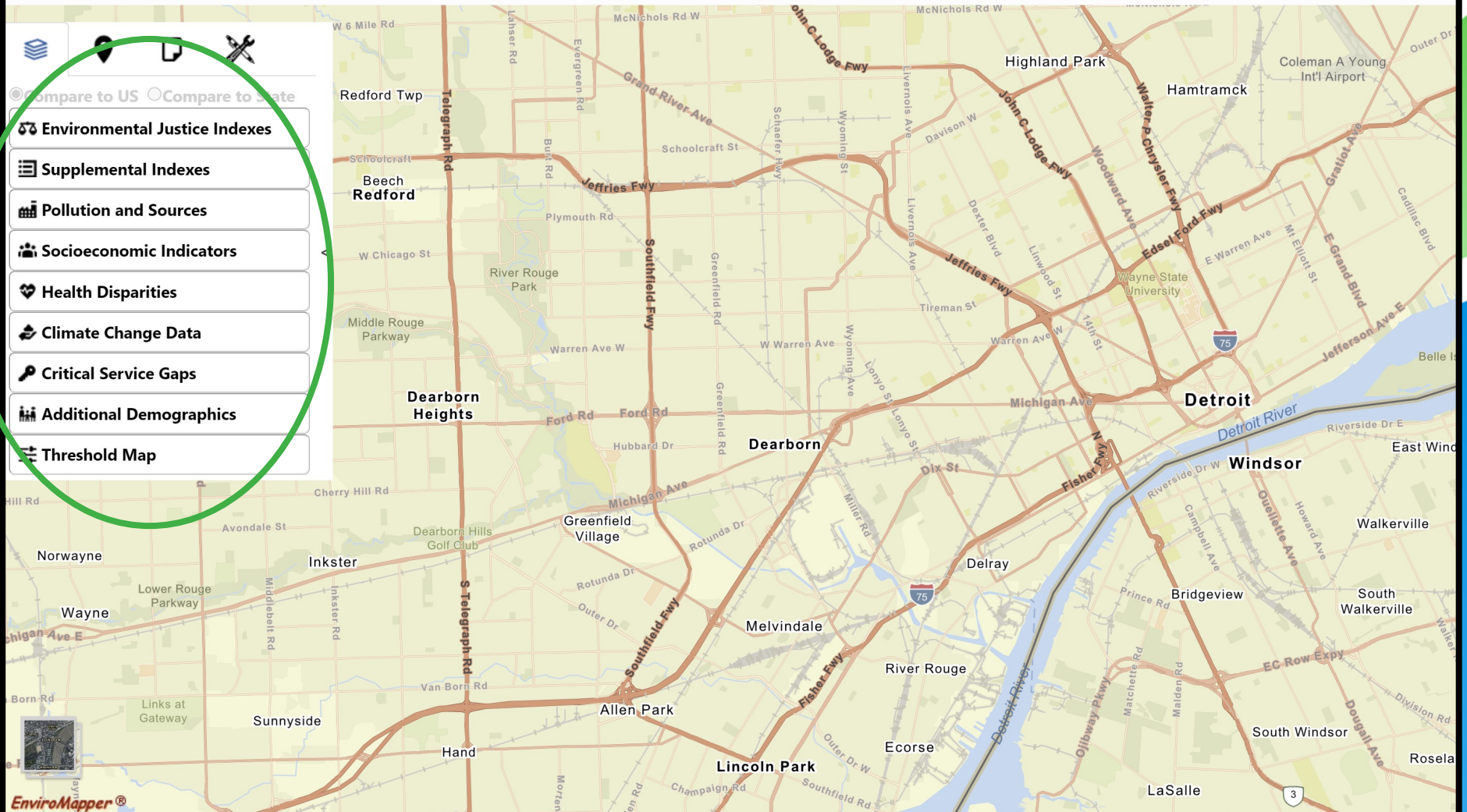


# Research Question:

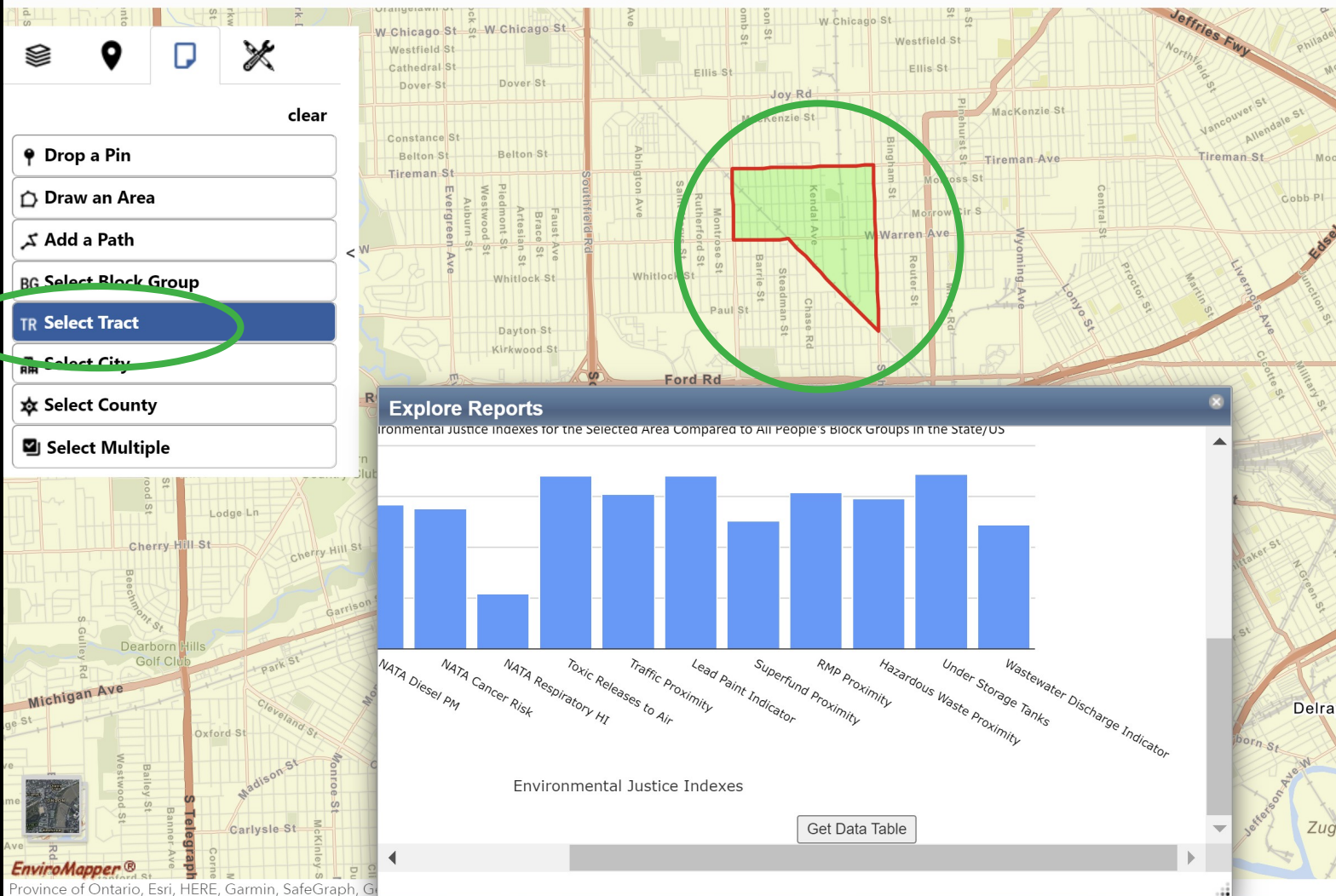
What is the correlation between environmental and demographic indicators across the US?

# What is EJ Screen

EJ Screen is a web tool created by the [Environmental Protection Agency \(EPA\)](#) to give users access to environmental and demographic information for locations across the United States.

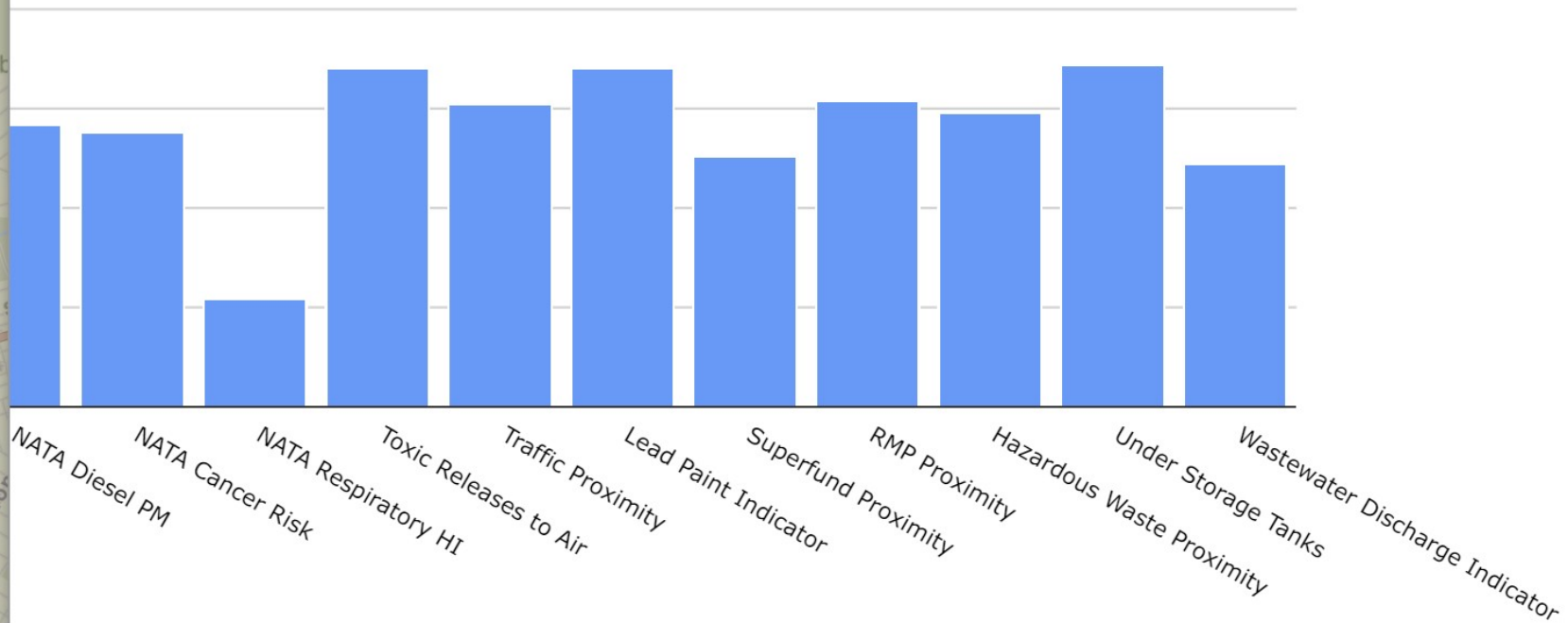






## Explore Reports

Environmental Justice Indexes for the Selected Area Compared to All People's Block Groups in the State/US



Environmental Justice Indexes

[Get Data Table](#)

# Environmental Indicators

Factor #	Factor
1	Particulate Matter
2	Ozone
3	Diesel
4	Air Toxics Cancer Risk
5	Air Toxics Respiratory Hazard Index

Factor #	Factor
6	Toxic Releases to Air
7	Traffic Proximity and Volume
8	Lead paint indicator
9	Superfund proximity
10	RMP Proximity

Factor #	Factor
11	Hazardous Waste Proximity
12	Underground Storage Tank Indicator
13	Wastewater Discharge Indicator

# Demographic Indicators

Factor #	Factor
1	Demographic Index
2	Supplemental Demographic Index
3	People of Color Pop.
4	Low Income Pop.
5	Unemployed Pop.
6	Limited English Speaking Households Pop.
7	Less Than High School Education Pop.

## Demographic Index: Factor 13

$$\frac{\% \text{ Low Income Pop.} + \% \text{ BIPOC Pop.}}{2}$$



# Environmental Indicators:

01

## Particulate Matter (pm 2.5)

Annual average PM2.5 levels in air

02

## Ozone

Annual Average of the top ten daily ozone concentrations in air  
(Measured in a span of 8 hours)

03

## Diesel

Diesel particulate matter level in air

04

## Air Toxics Cancer Risk

Lifetime cancer risk from inhalation of air toxics

05

## Air Toxics Resp. Hazard Index

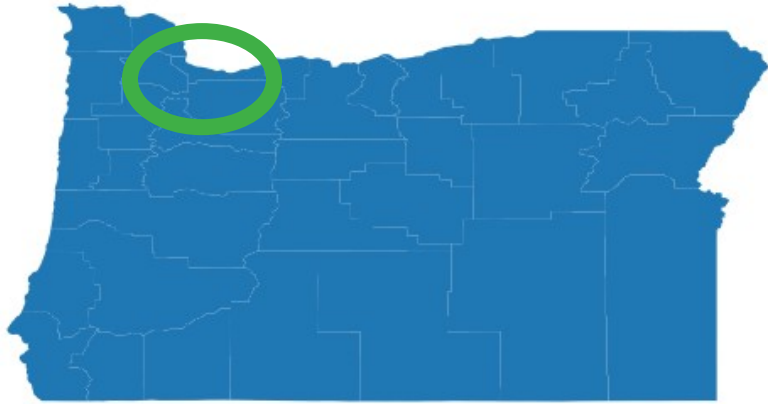
Ratio of exposure concentration to health-based reference concentration



# Discovery

Initial Research and Findings

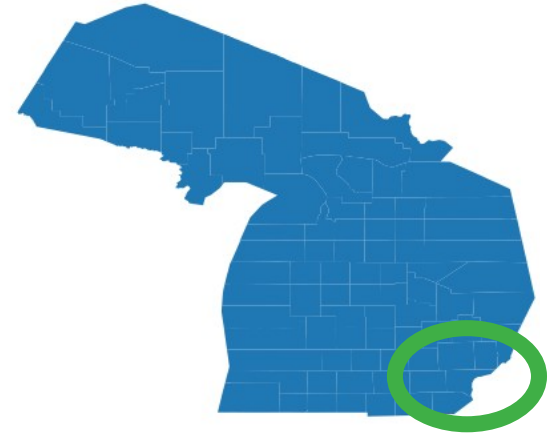
# Initial Chosen Cities



**Portland,  
Oregon**



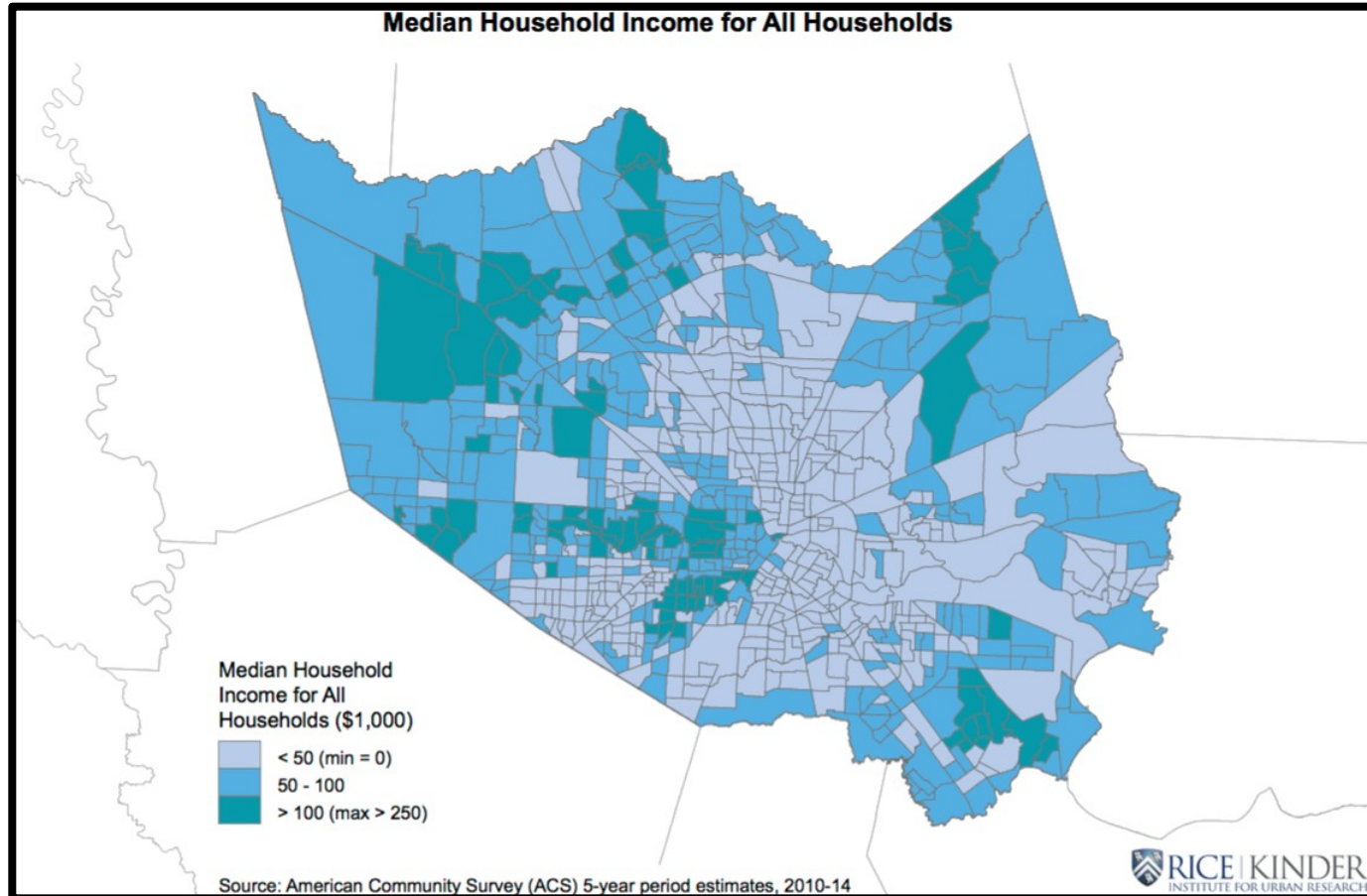
**Houston,  
Texas**



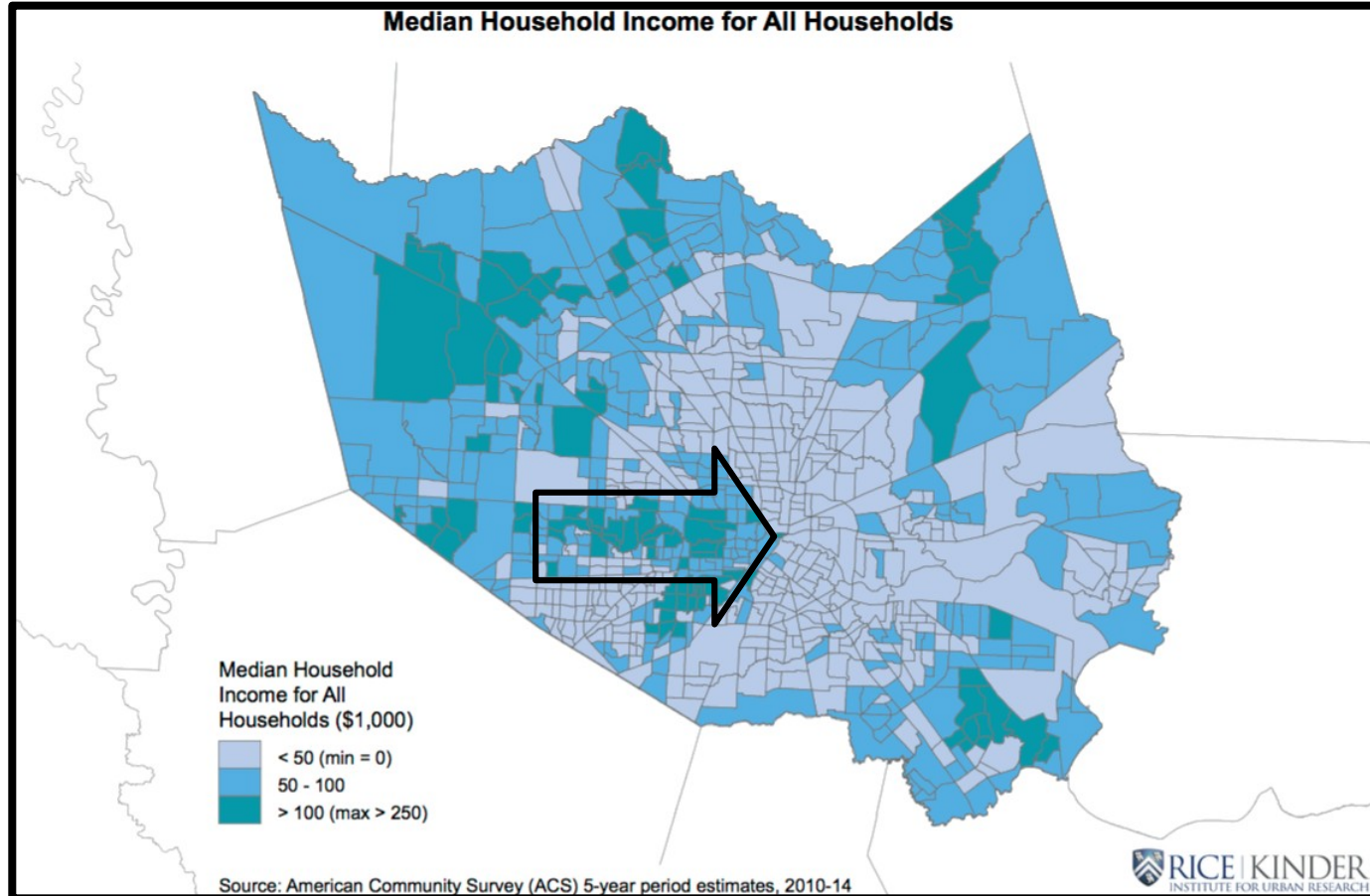
**Detroit,  
Michigan**



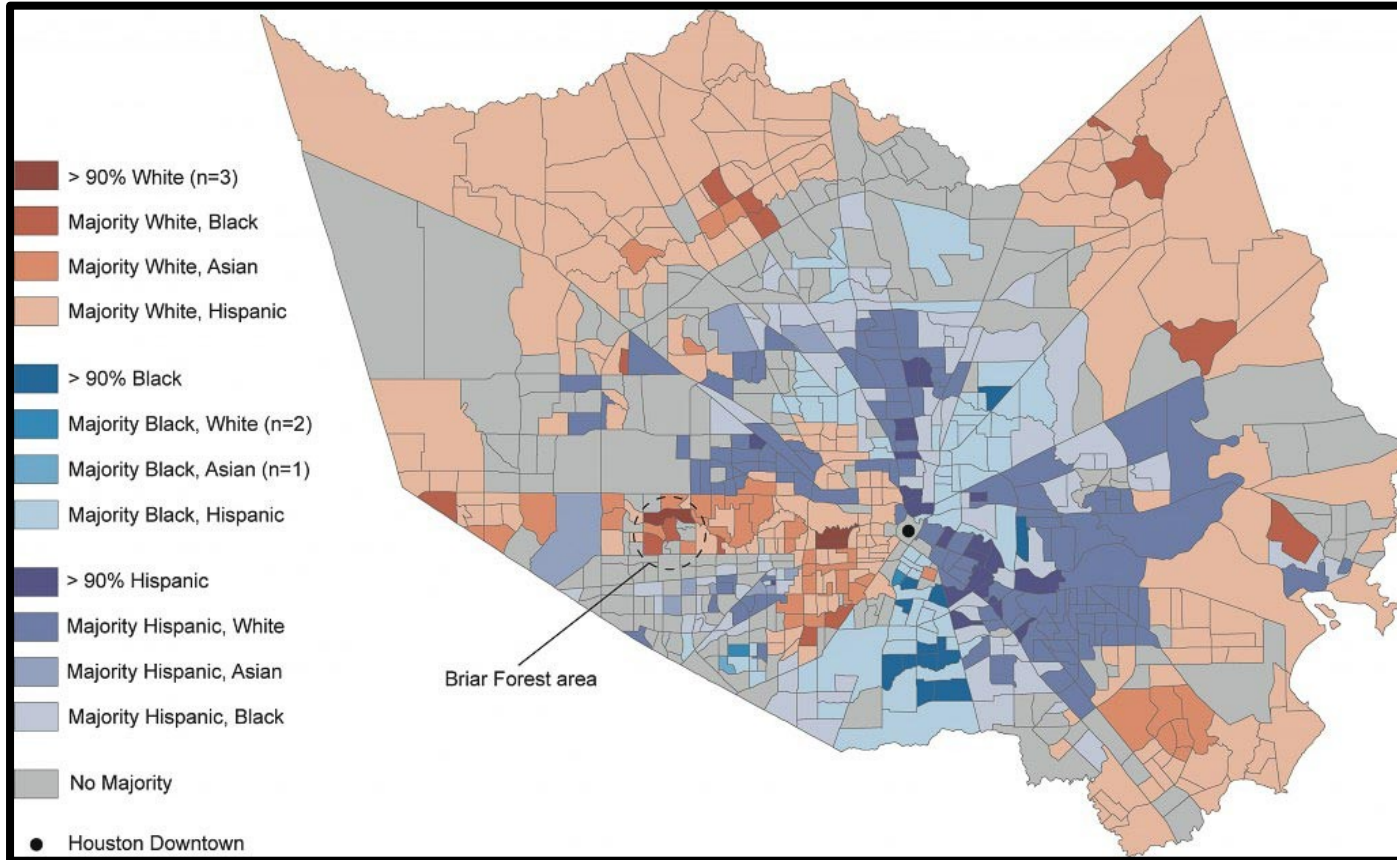
# The Arrow



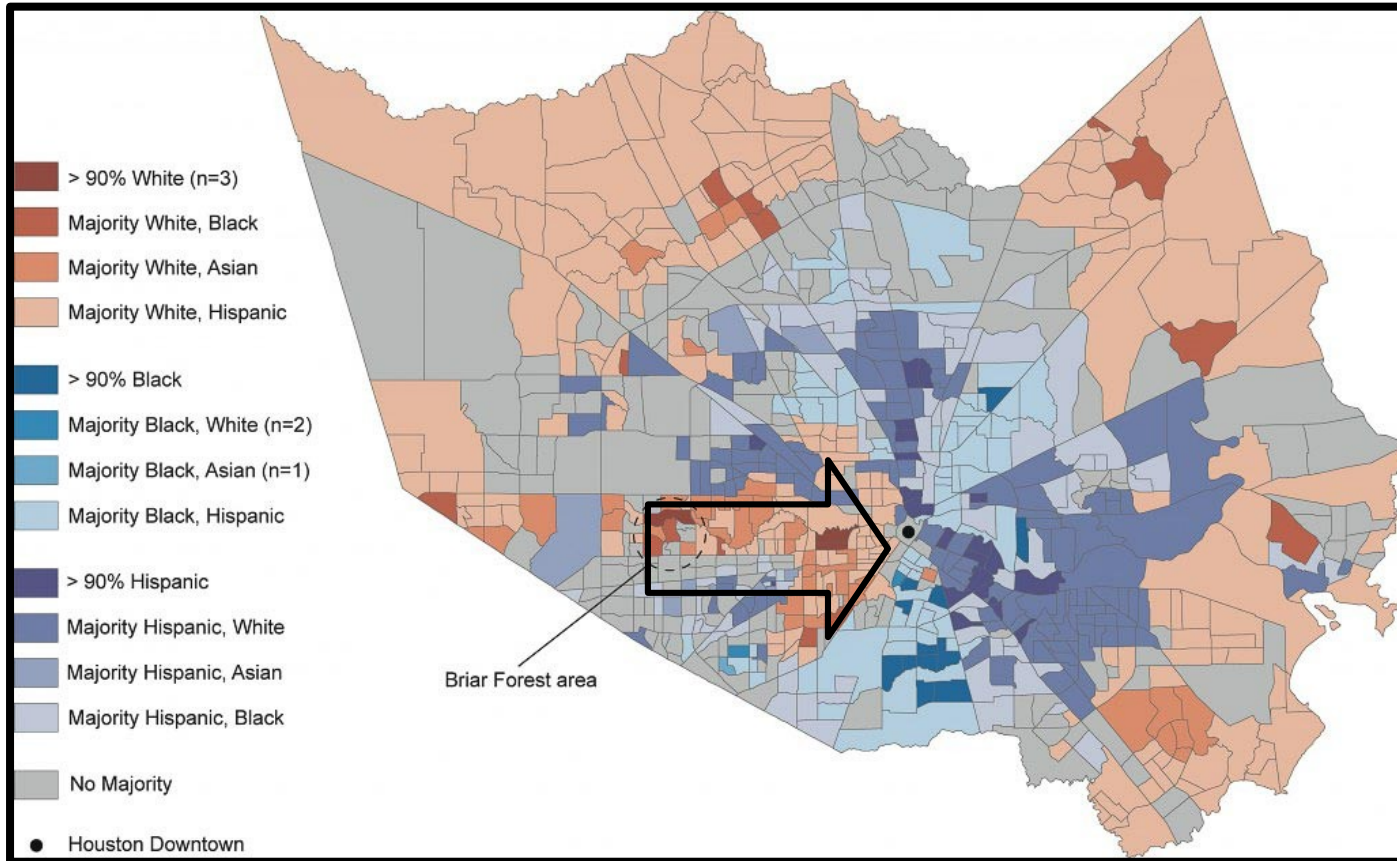
# The Arrow



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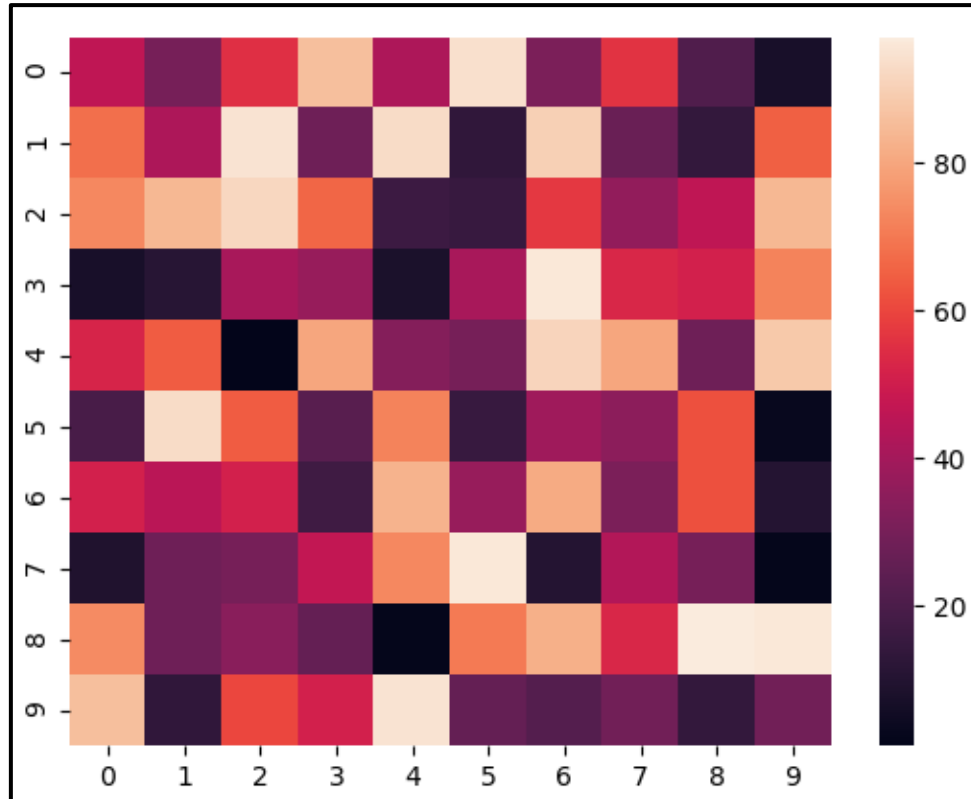


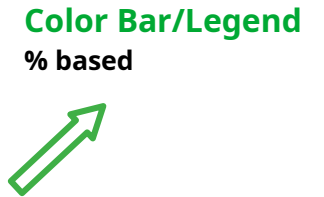


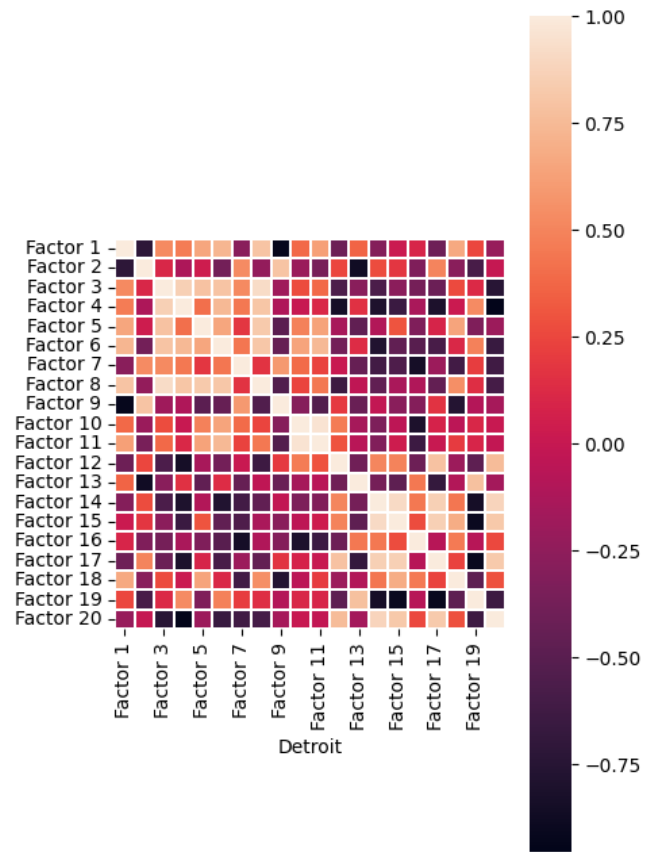
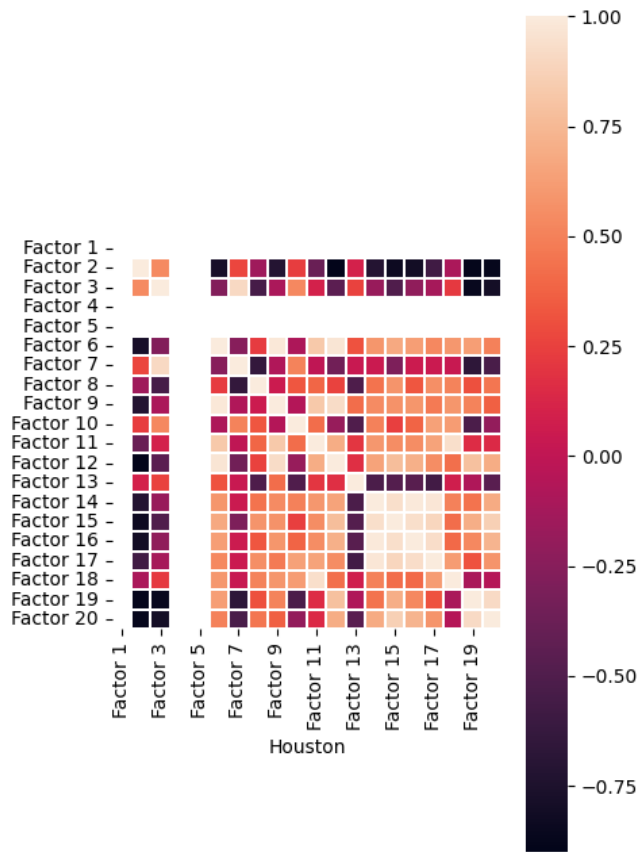
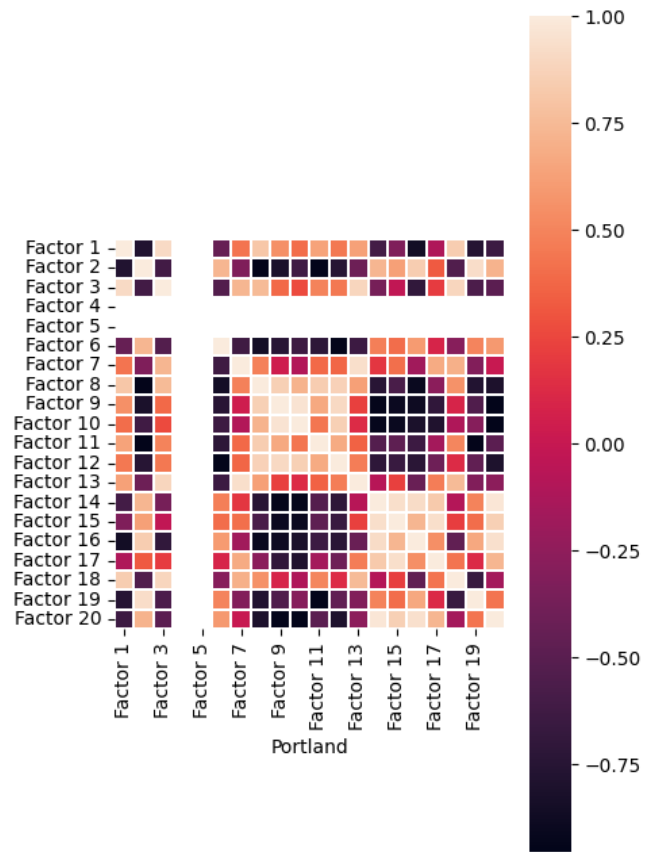


# Method:

## Pearson Correlation Coefficient

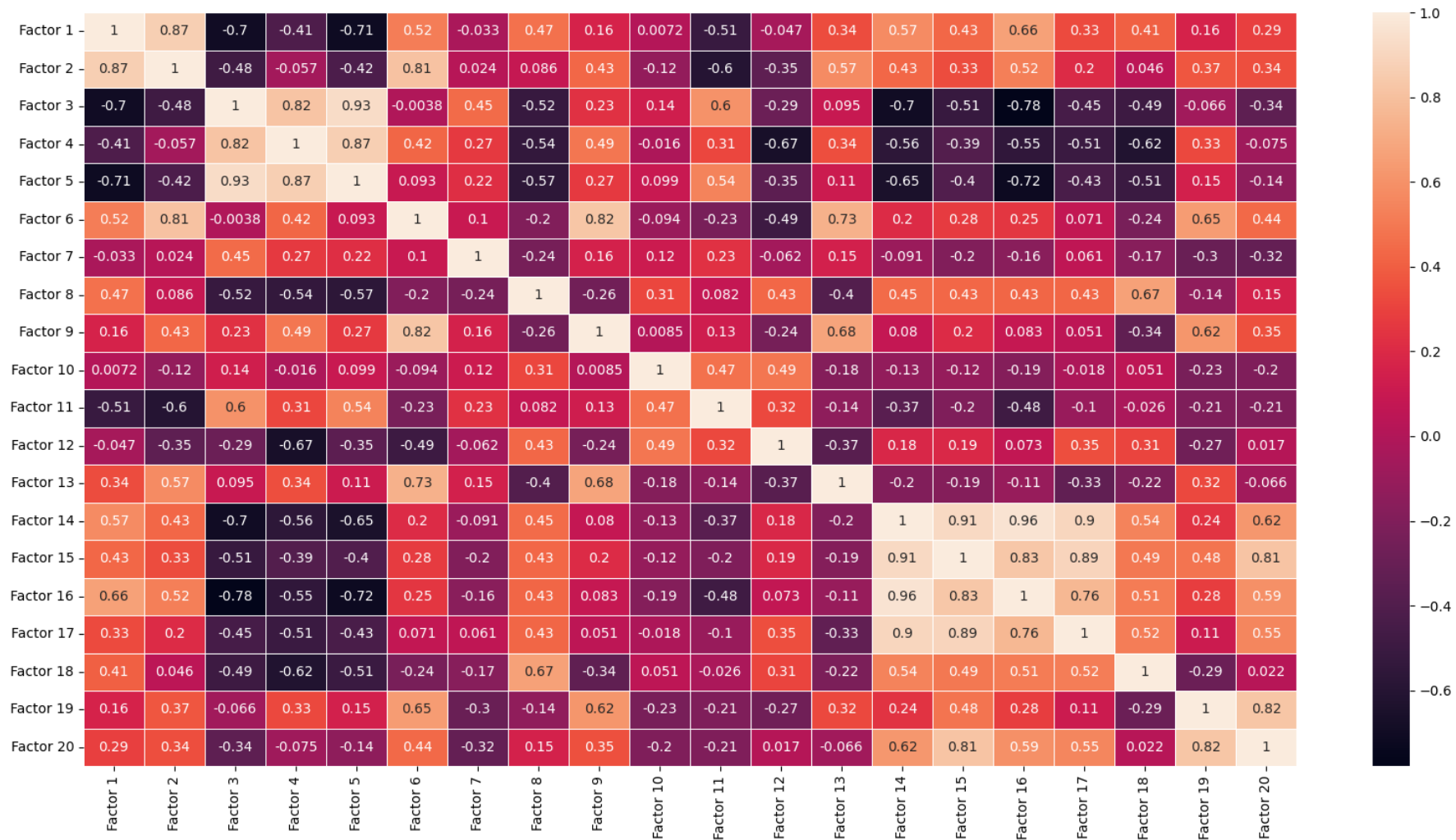












# Environmental Indicators vs Environmental Indicators

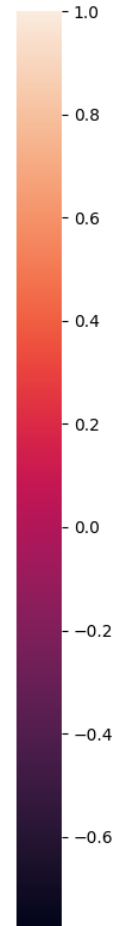
Factor 1  
Factor 2  
Factor 3  
Factor 4  
Factor 5  
Factor 6  
Factor 7  
Factor 8  
Factor 9  
Factor 10  
Factor 11  
Factor 12  
Factor 13

Factor 14	0.57	0.43	-0.7	-0.56	-0.65	0.2	-0.091	0.45	0.08	-0.13	-0.37	0.18	-0.2
Factor 15	0.43	0.33	-0.51	-0.39	-0.4	0.28	-0.2	0.43	0.2	-0.12	-0.2	0.19	-0.19
Factor 16	0.66	0.52	-0.78	-0.55	-0.72	0.25	-0.16	0.43	0.083	-0.19	-0.48	0.073	-0.11
Factor 17	0.33	0.2	-0.45	-0.51	-0.43	0.071	0.061	0.43	0.051	-0.018	-0.1	0.35	-0.33
Factor 18	0.41	0.046	-0.49	-0.62	-0.51	-0.24	-0.17	0.67	-0.34	0.051	-0.026	0.31	-0.22
Factor 19	0.16	0.37	-0.066	0.33	0.15	0.65	-0.3	-0.14	0.62	-0.23	-0.21	-0.27	0.32
Factor 20	0.29	0.34	-0.34	-0.075	-0.14	0.44	-0.32	0.15	0.35	-0.2	-0.21	0.017	-0.066
Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10	Factor 11	Factor 12	Factor 13	

# Demographic Indicators vs Demographic Indicators

0.57	0.43	0.66	0.33	0.41	0.16	0.29
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Factor 14	Factor 15	Factor 16	Factor 17	Factor 18	Factor 19	Factor 20
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Factor 1

Factor 2

Factor 3

Factor 4

Factor 5

Factor 6

Factor 7

Factor 8

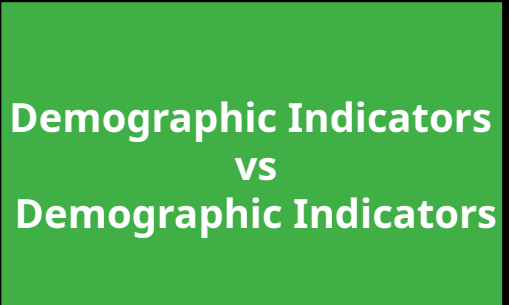
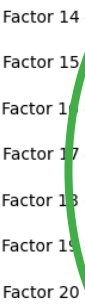
Factor 9

Factor 10

Factor 11

Factor 12

Factor 13

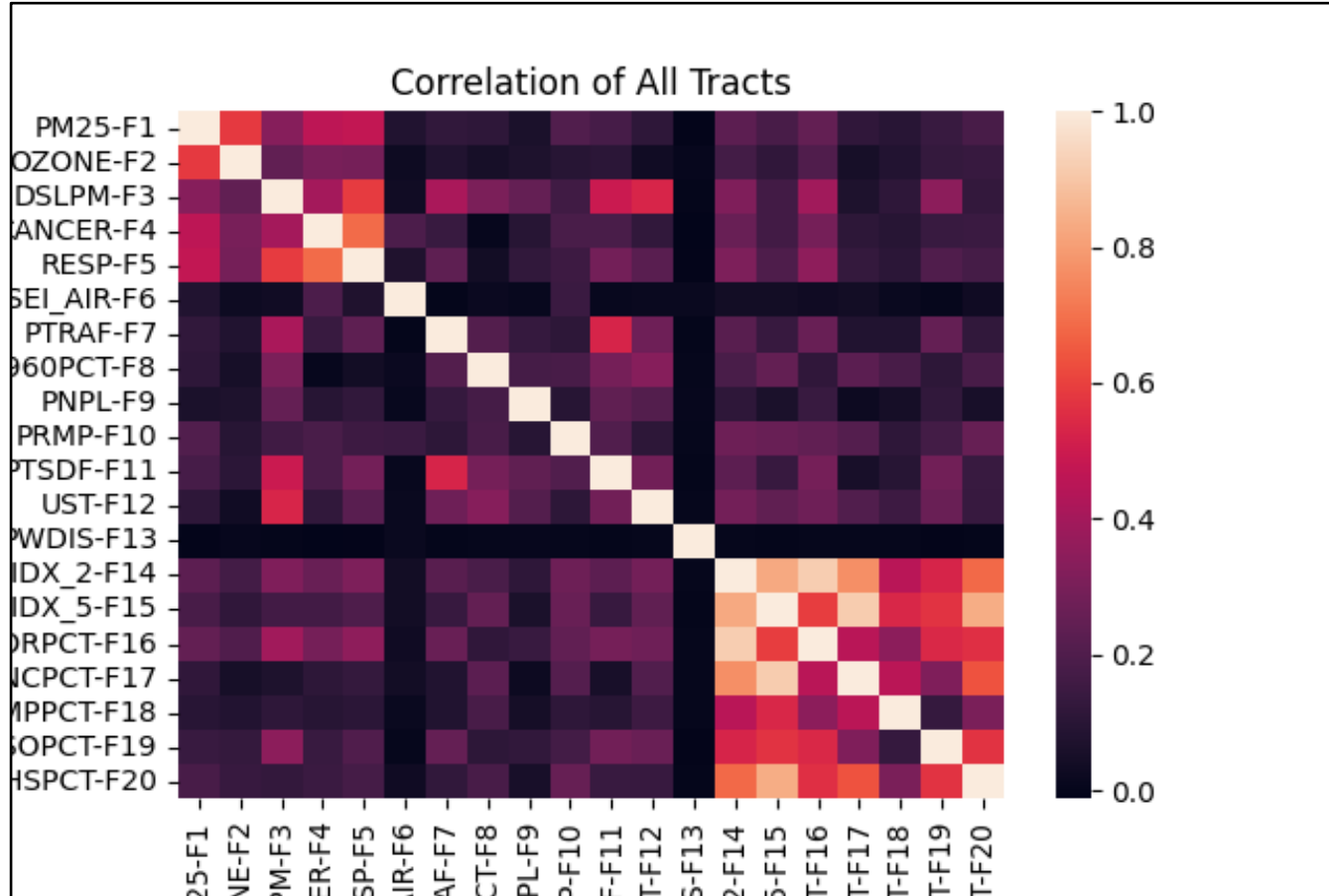




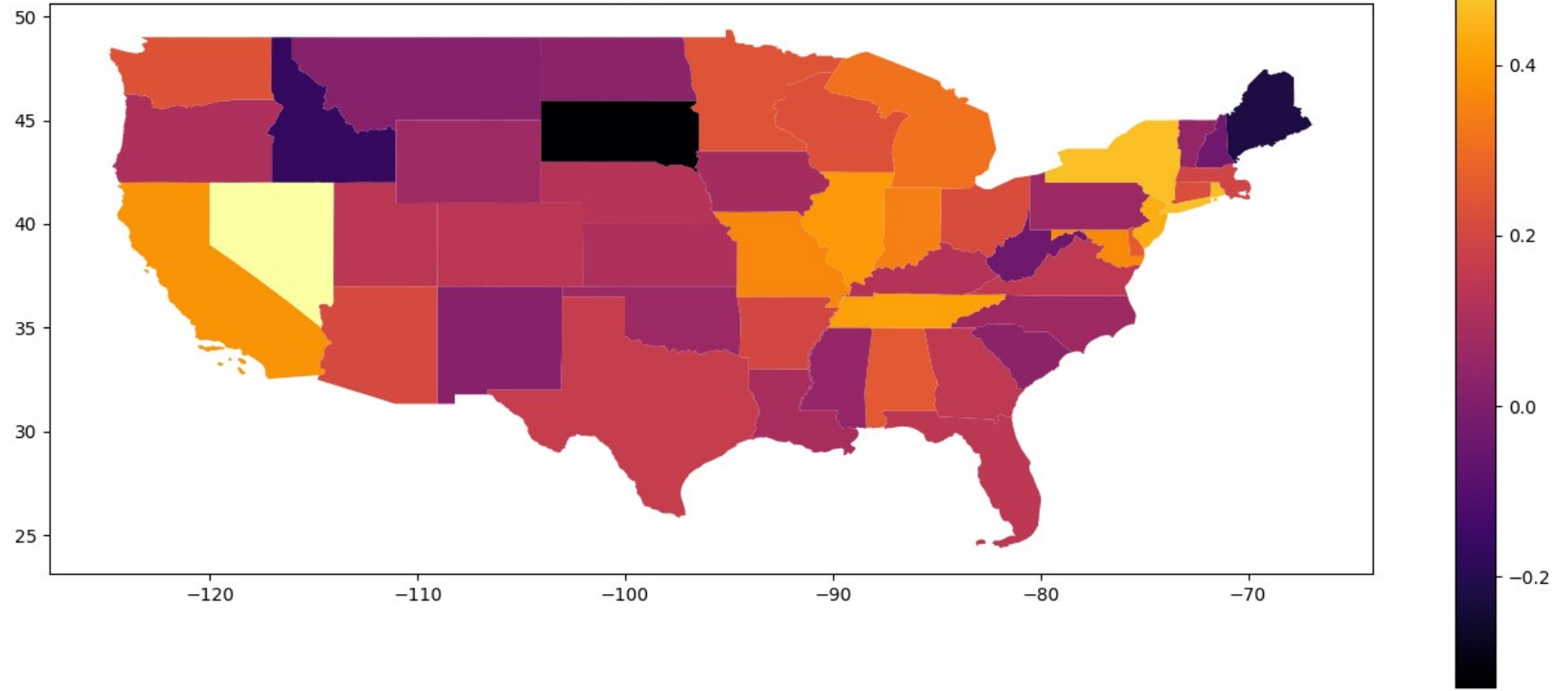
# Exploration

Further Findings

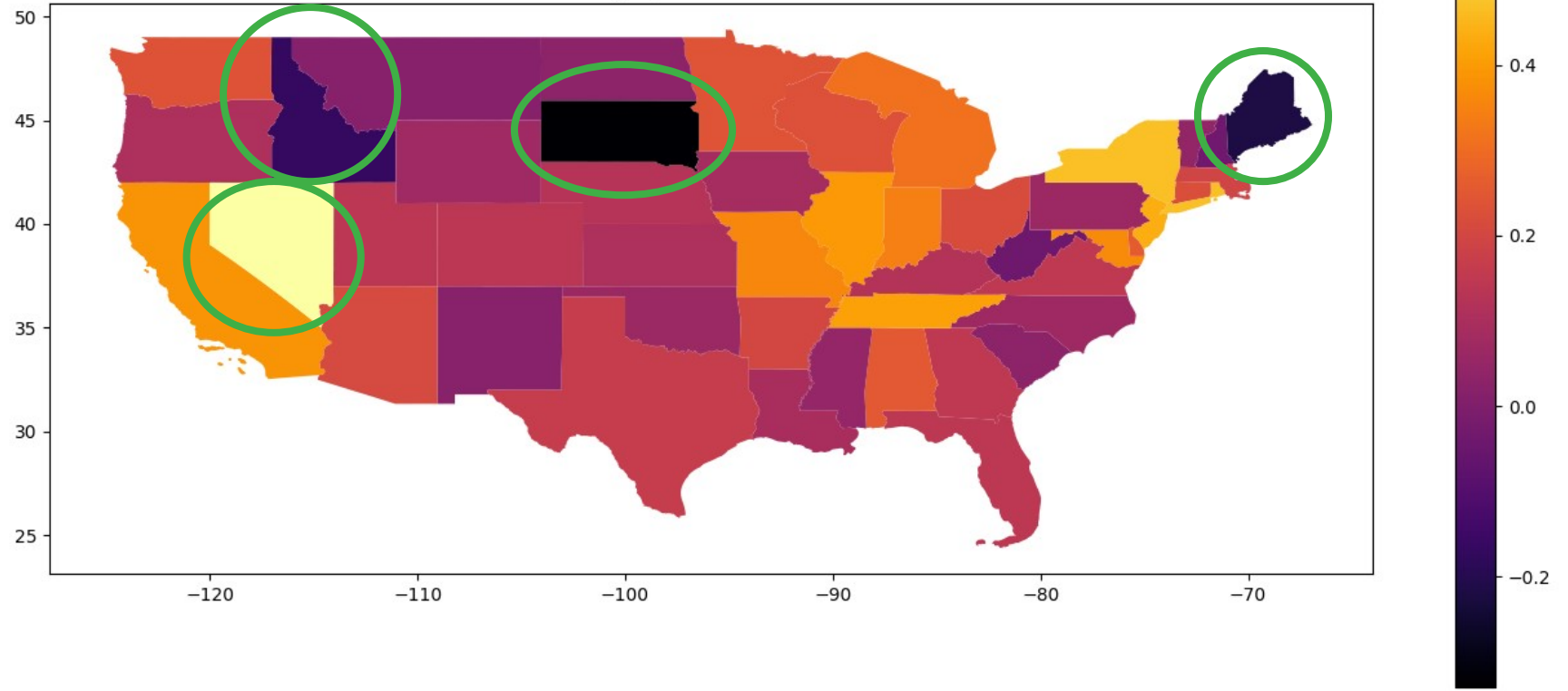
# Total Tracts

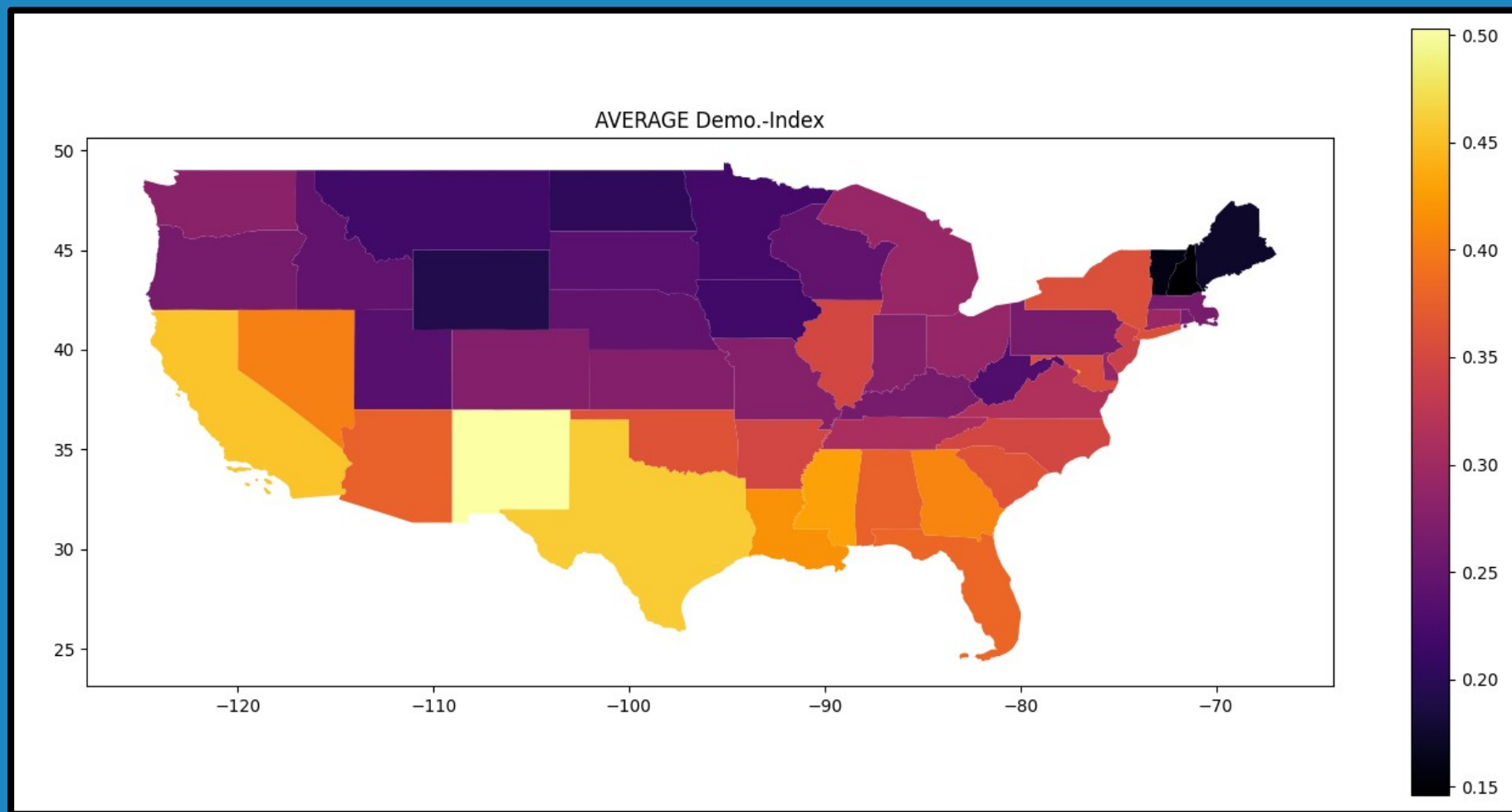


Demographic Index vs PM 2.5

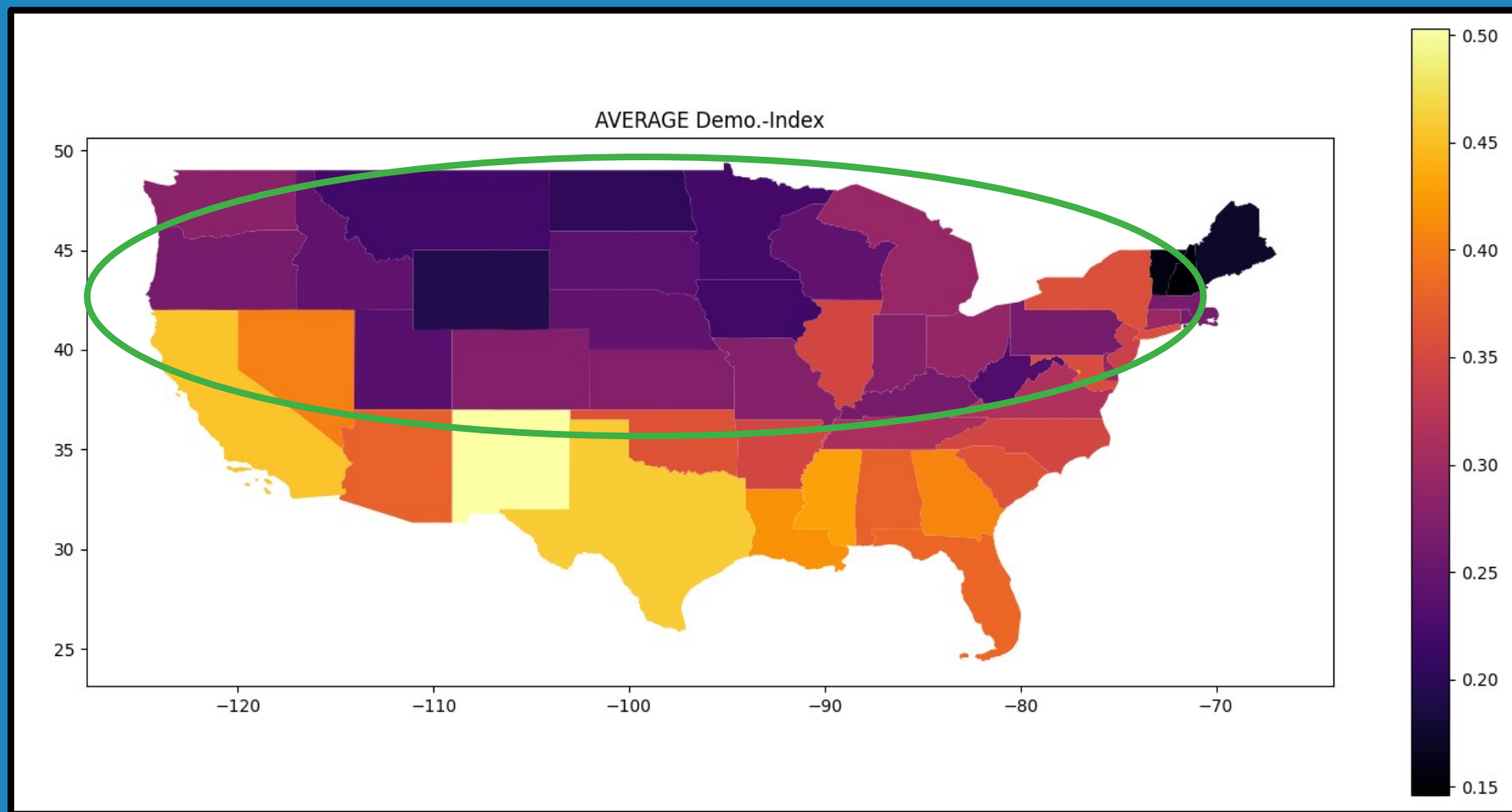


Demographic Index vs PM 2.5

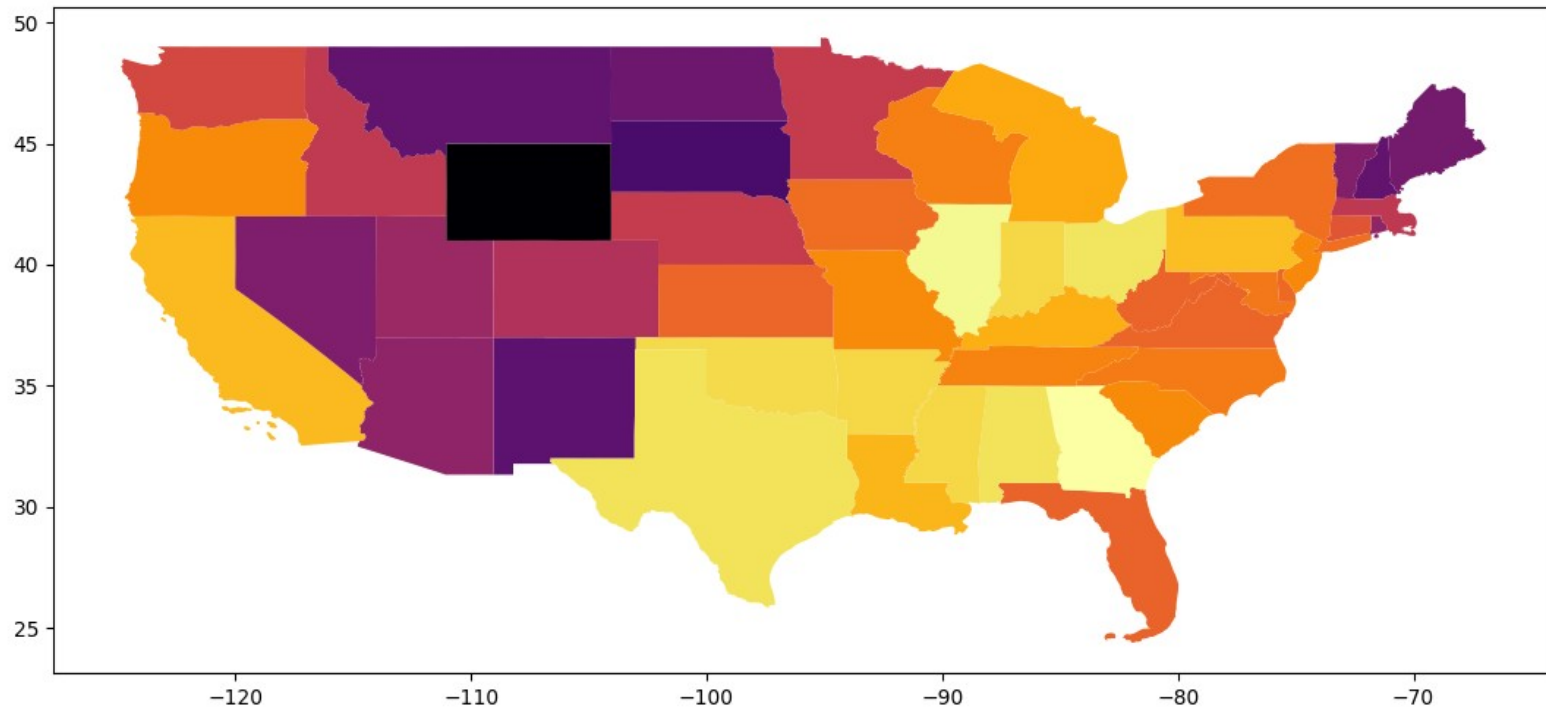


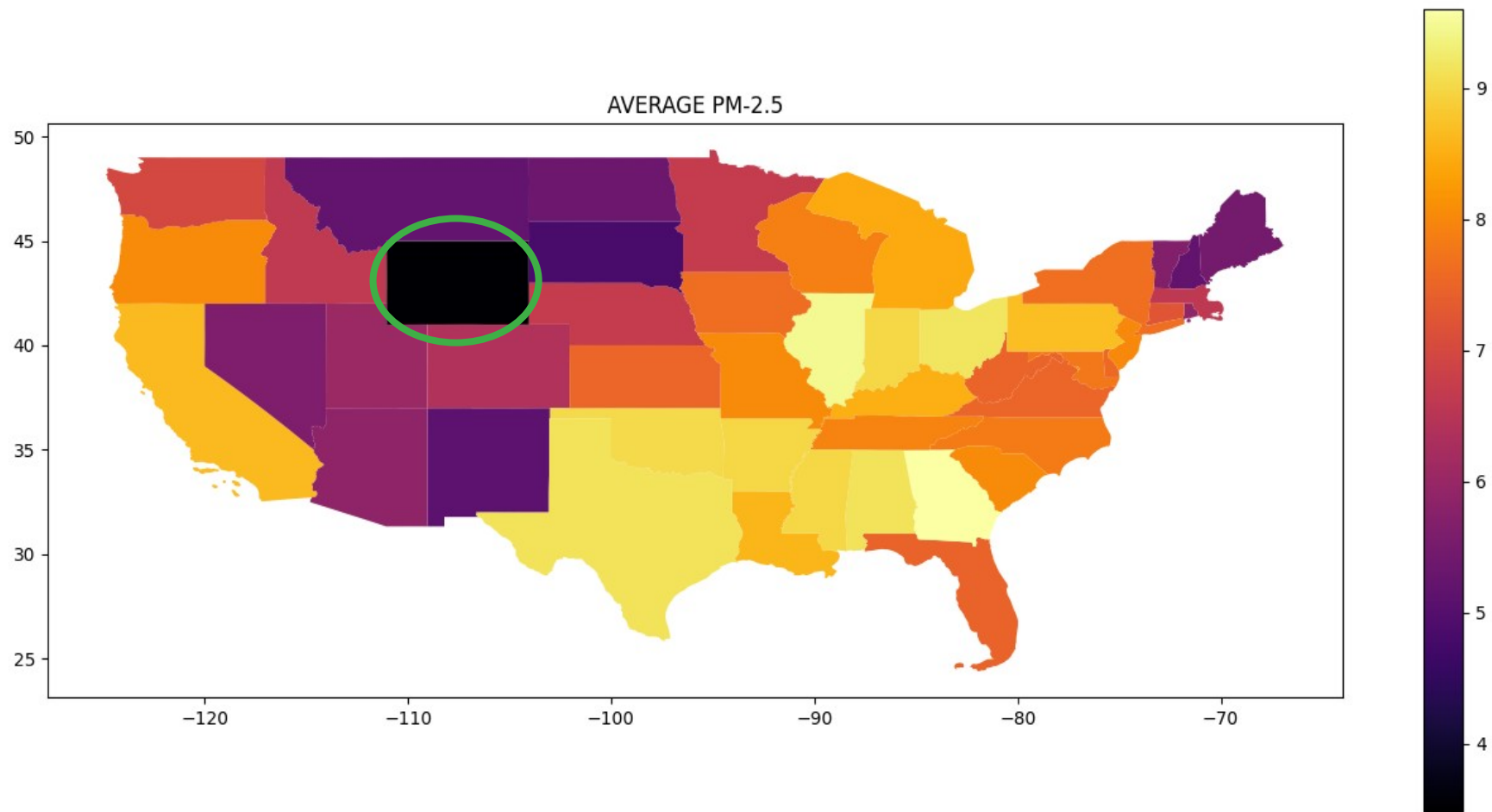






AVERAGE PM-2.5







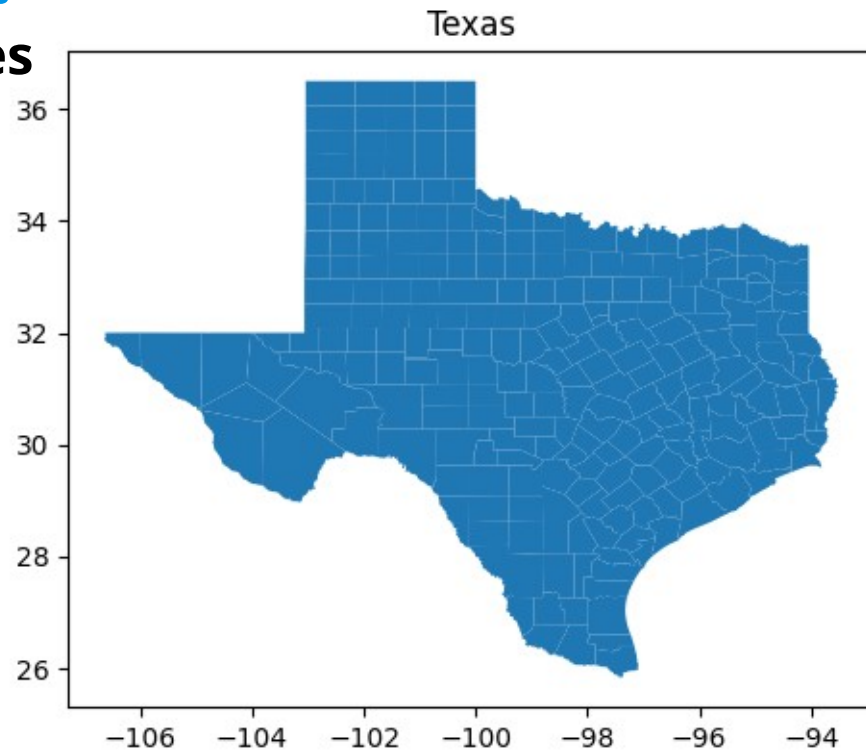


# Conclusion

Next steps and why we should care

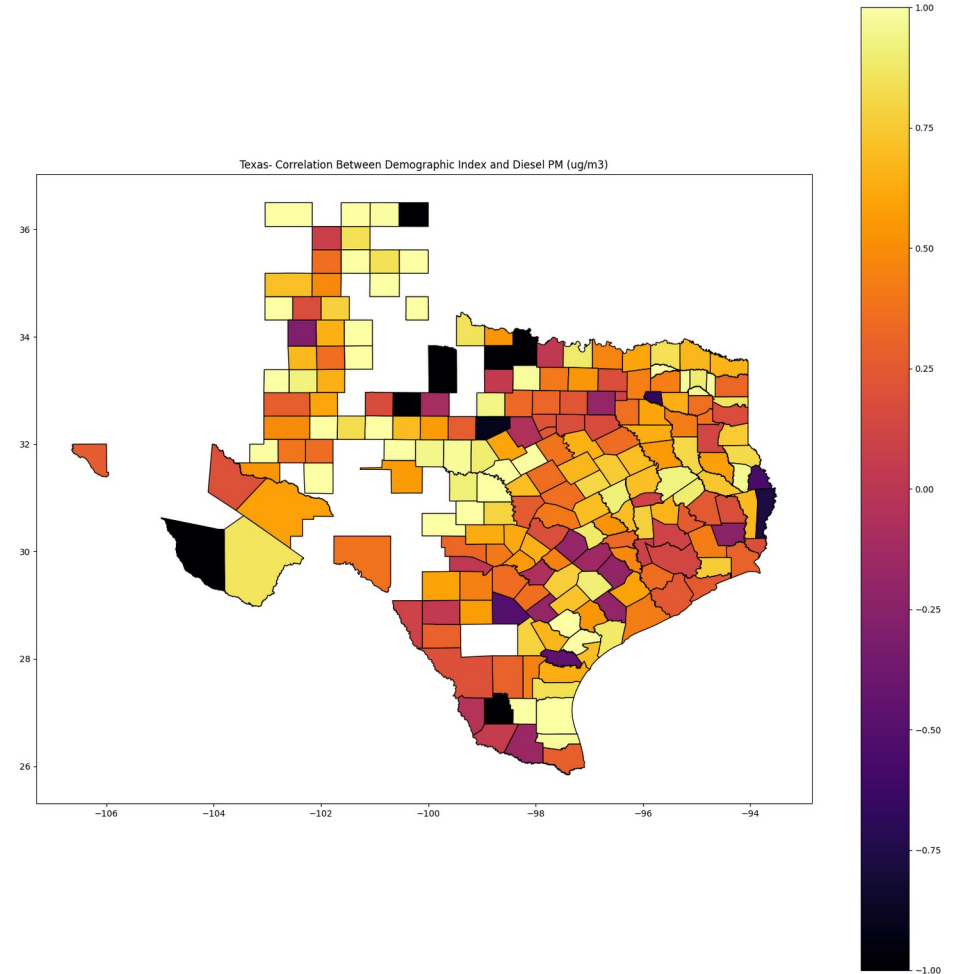


## Next Steps: Examining Counties Within States



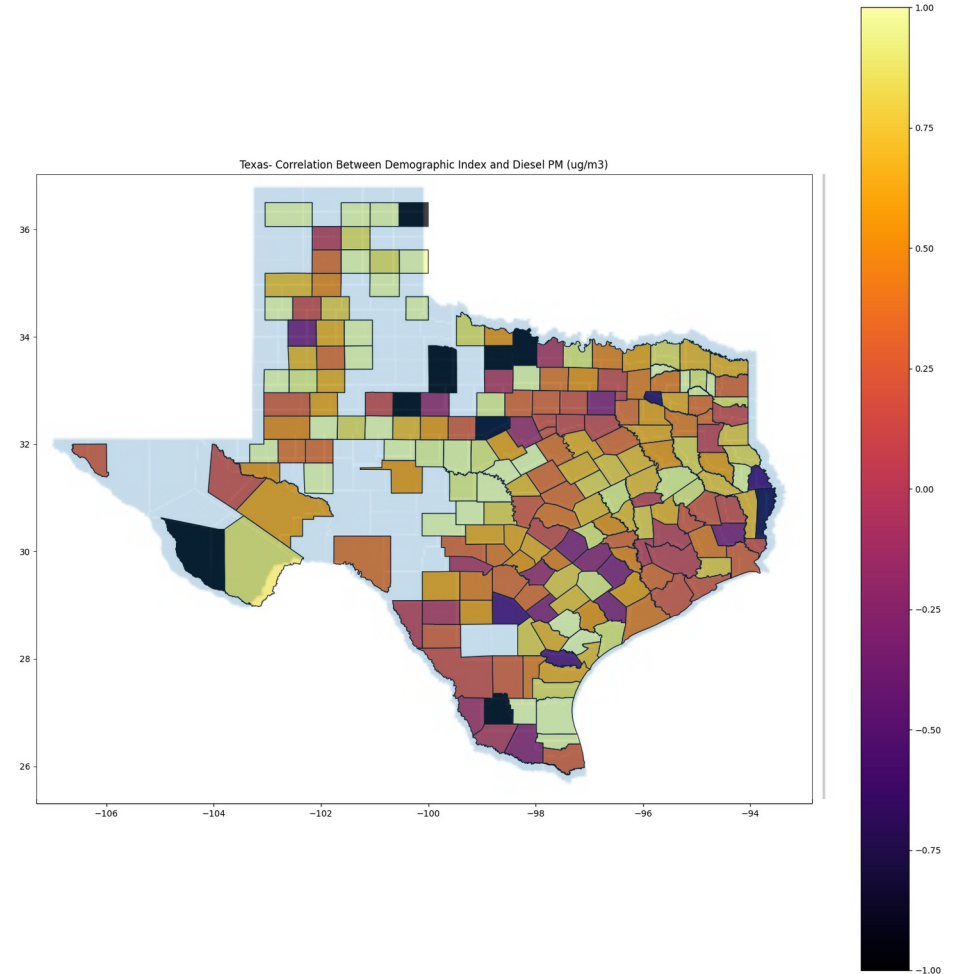


## Next Steps: Examining Counties Within States





# Next Steps: Examining Counties Within States







## Takeaways:

- 01 **Environmental  
Discrimination is real**
- 02 **Must be more conscious  
about our actions**
- 03 **Changing our mindset**



# Thank You For Listening

Questions?