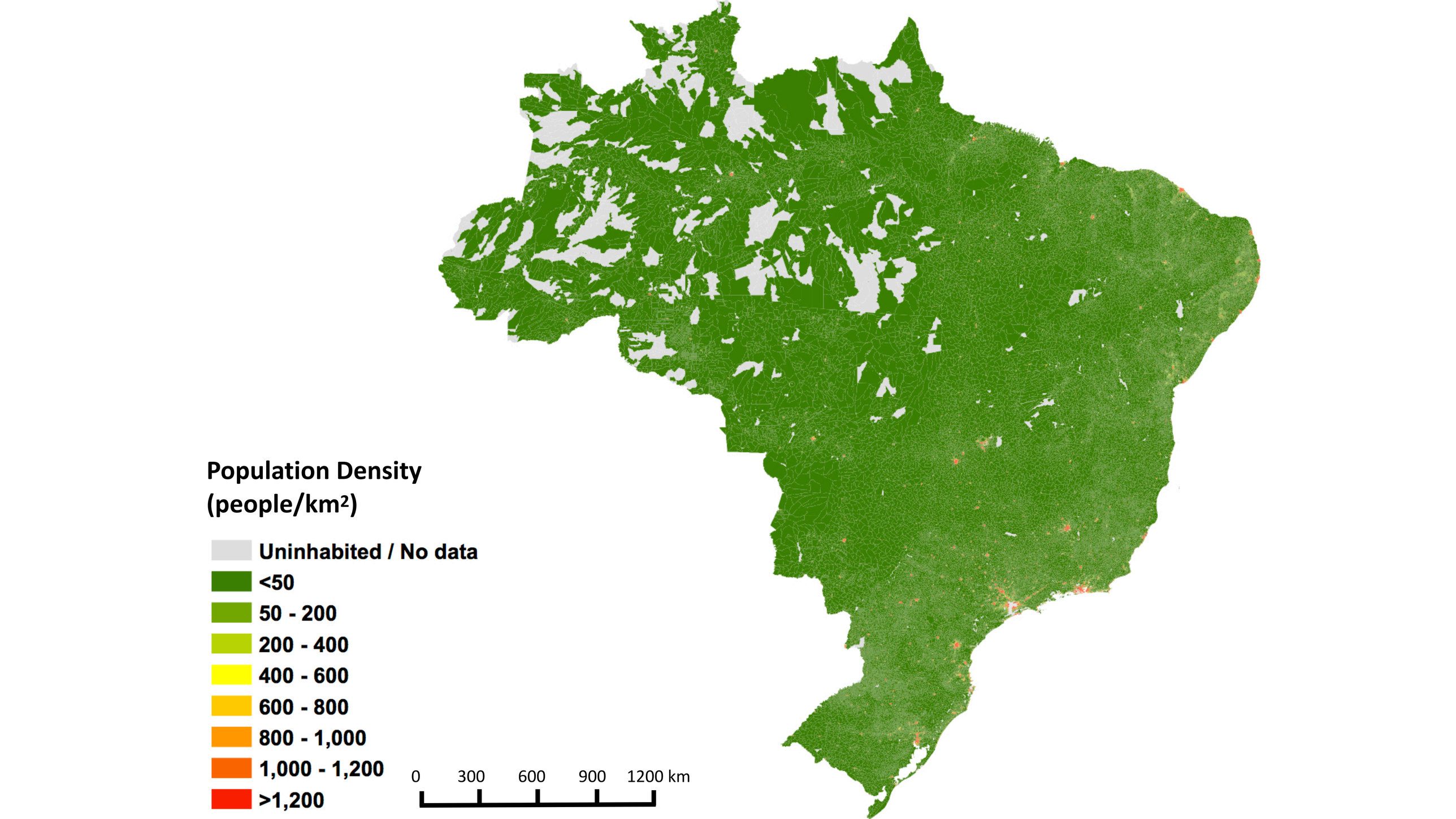
Lecture 12

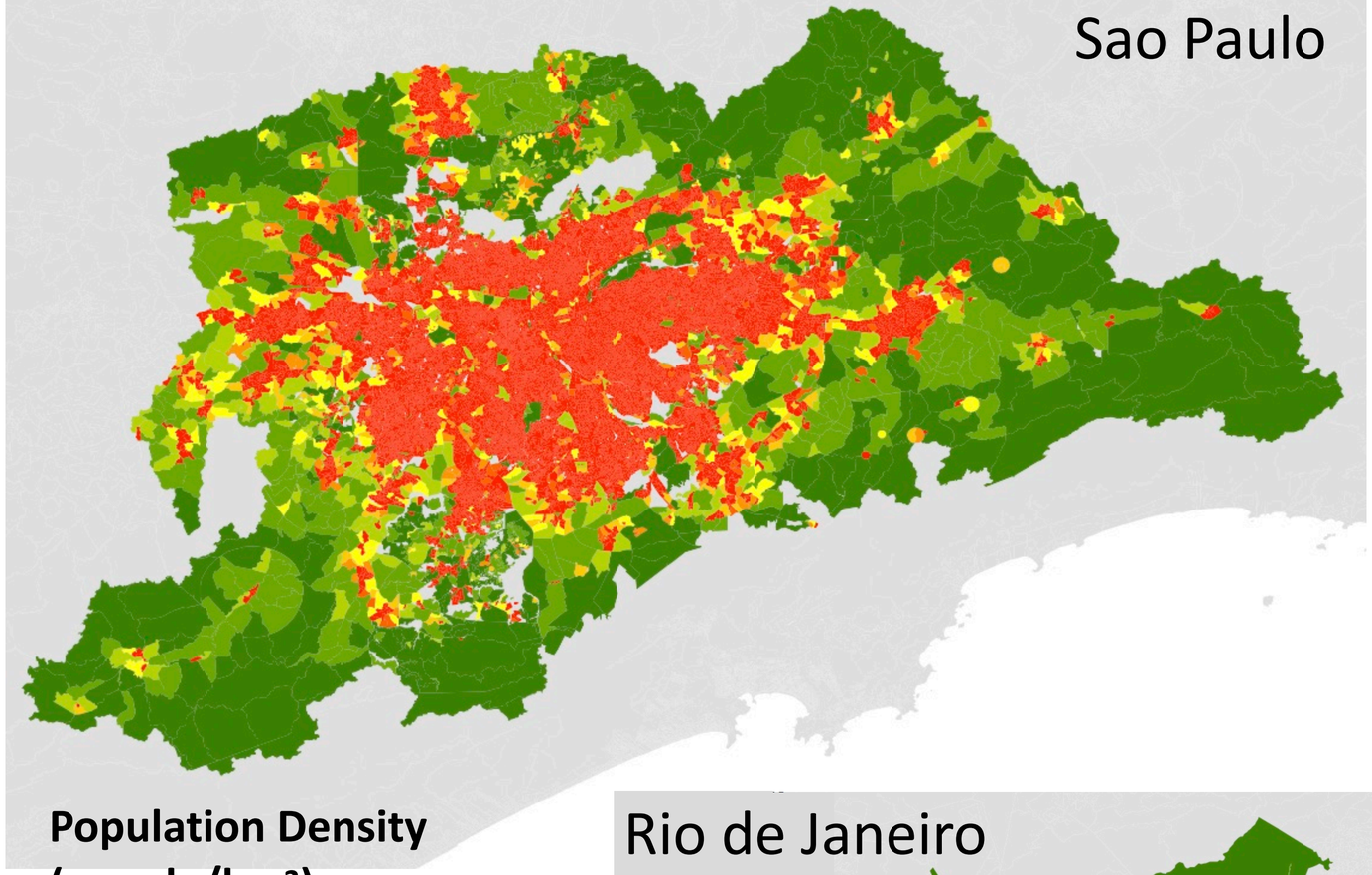
Neighborhoods and Human Development: The international situation

12.3 Heterogeneity and Change in Developing Cities, Human Development

IUS 6.2.2

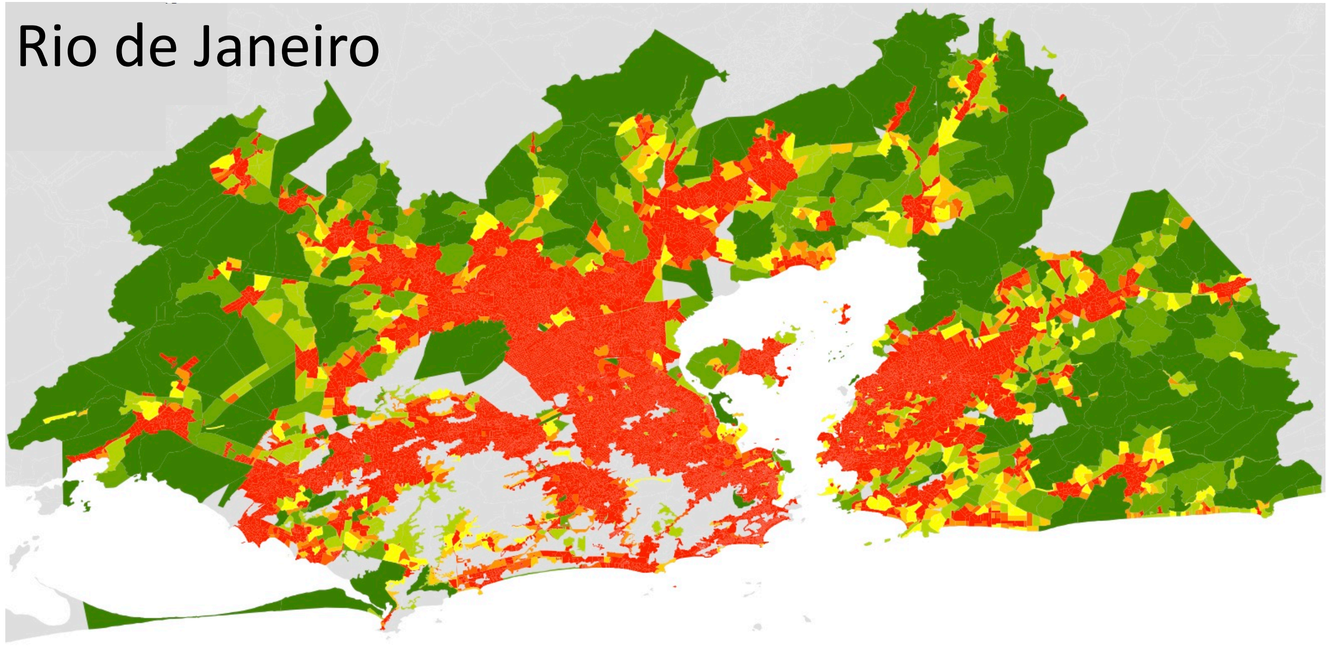
Heterogeneity and Change
in cities and neighborhoods

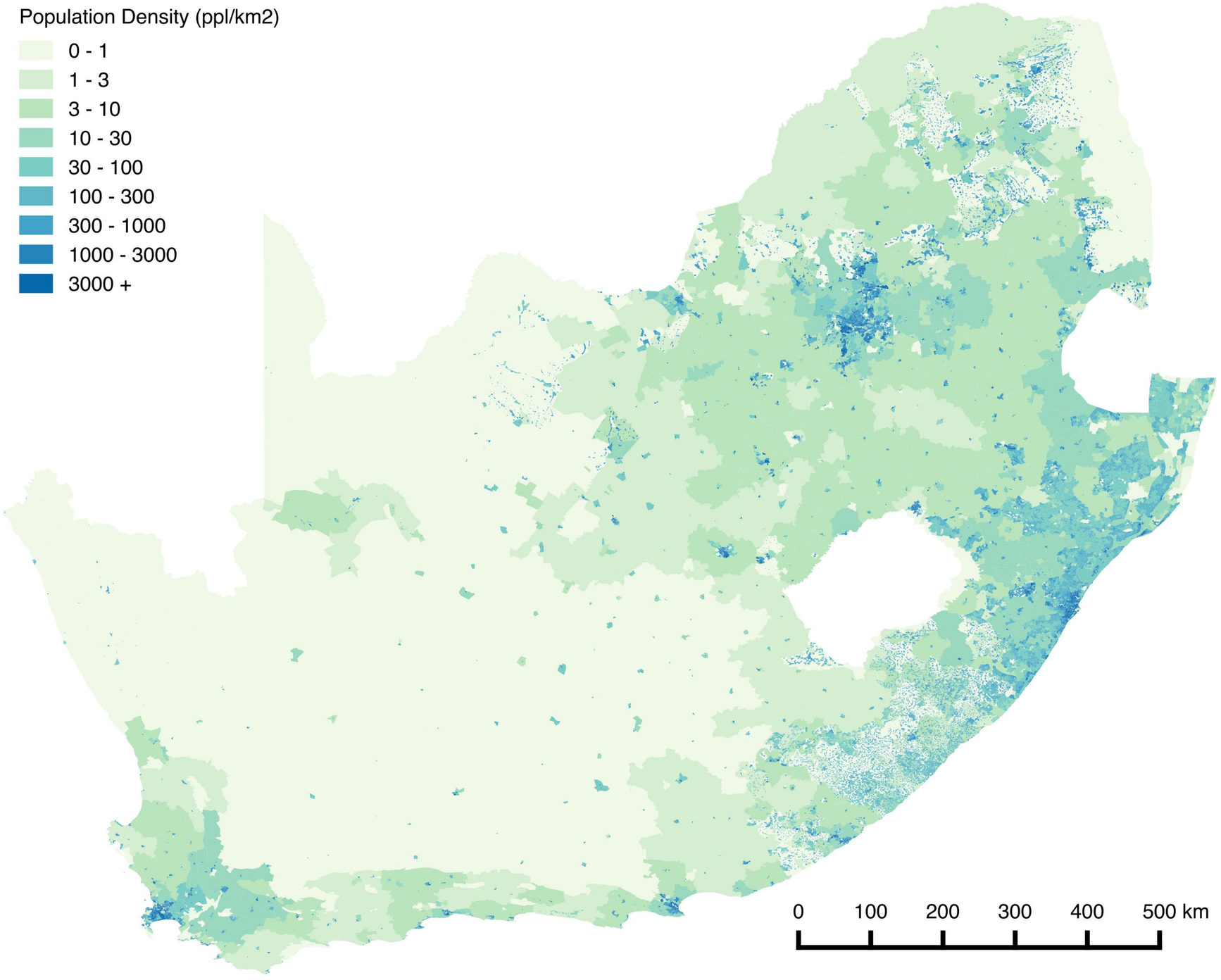

Population Density
(people/km²)
Uninhabited / No data
<50
50 - 200
200 - 400
400 - 600
600 - 800
800 - 1,000
1,000 - 1,200
>1,200
0
300
600
900
1200 km

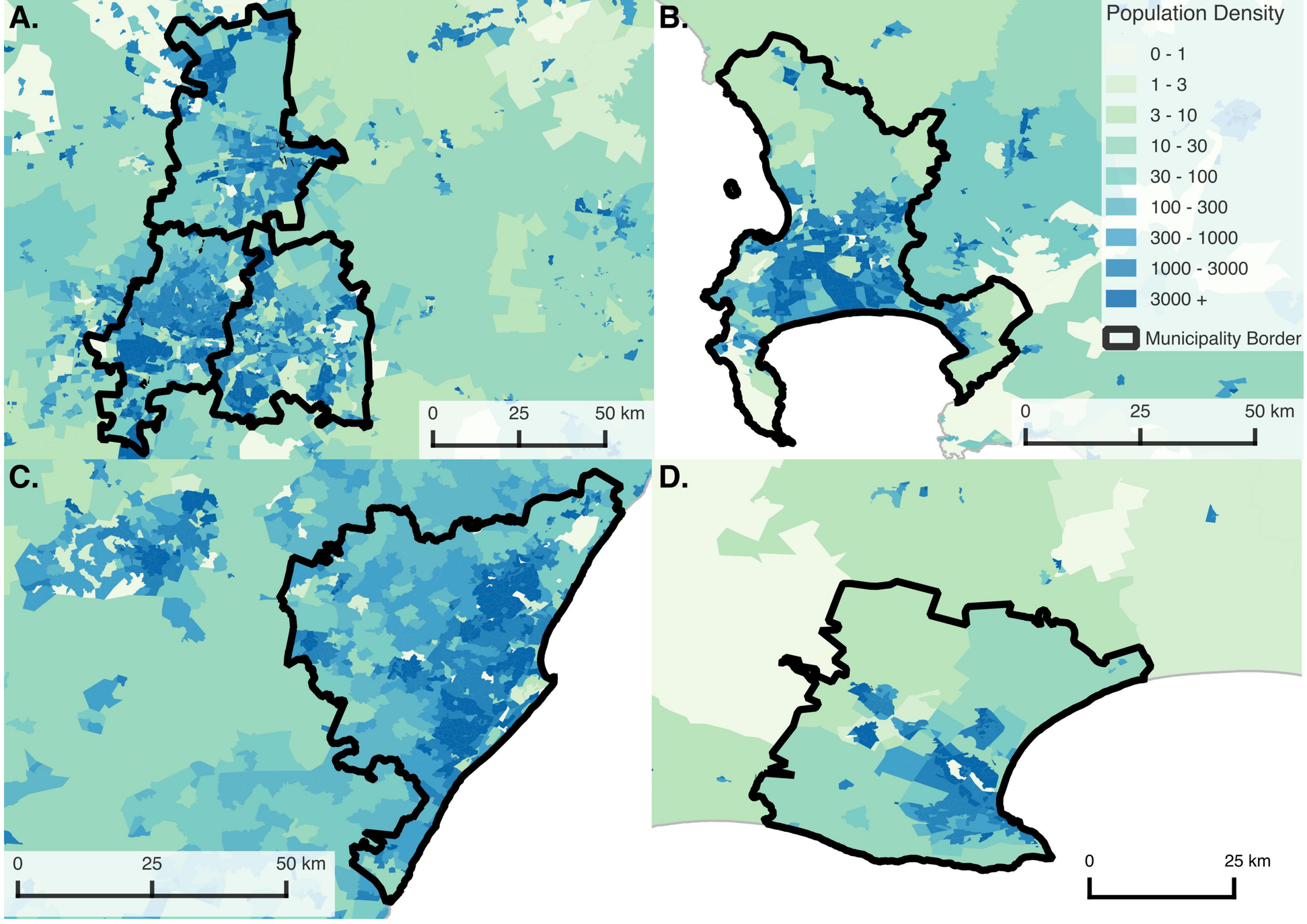


Population Density (people/km²)

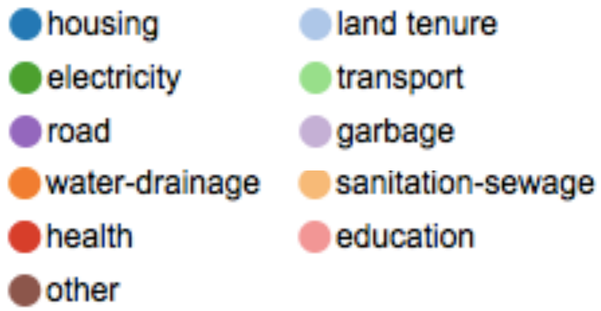
- Uninhabited / No data
- <50
- 50 - 200
- 200 - 400
- 400 - 600
- 600 - 800
- 800 - 1,000
- 1,000 - 1,200
- >1,200

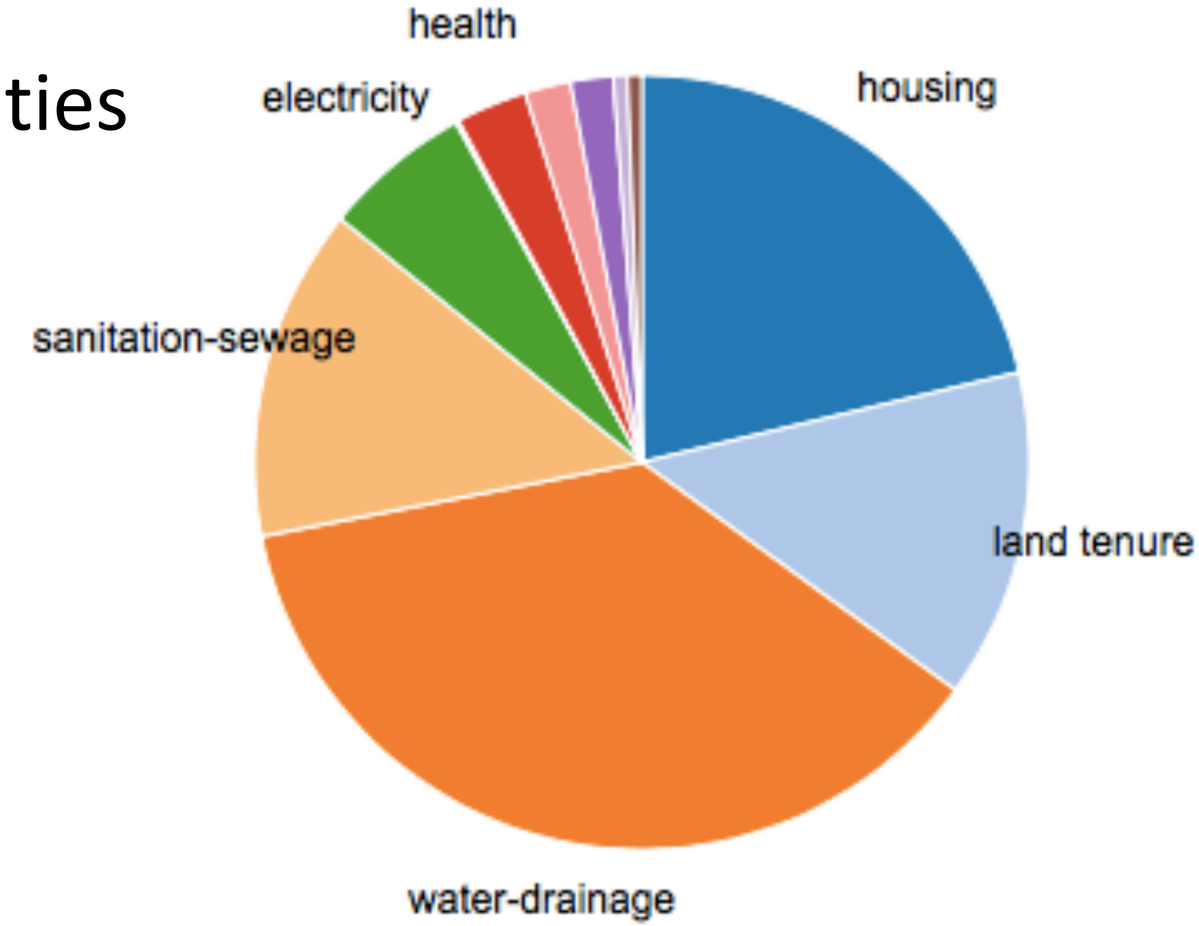



Population Density (ppl/km2)
0 - 1
1 - 3
3 - 10
10 - 30
30 - 100
100 - 300
300 - 1000
1000 - 3000
3000 +
0
100
200
300
400
500 km

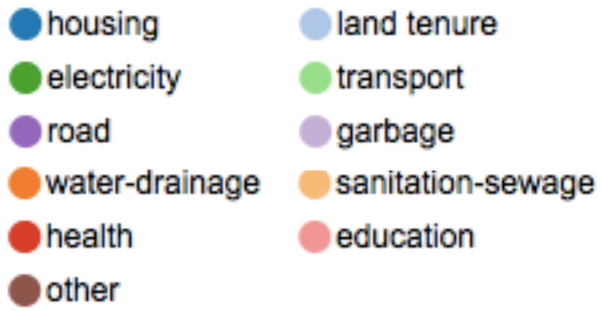

A.
B.
C.
D.
Population Density
0 - 1
1 - 3
3 - 10
10 - 30
30 - 100
100 - 300
300 - 1000
1000 - 3000
3000 +
Municipality Border
0
25
50 km
0
25
50 km
0
25
50 km
0
25 km

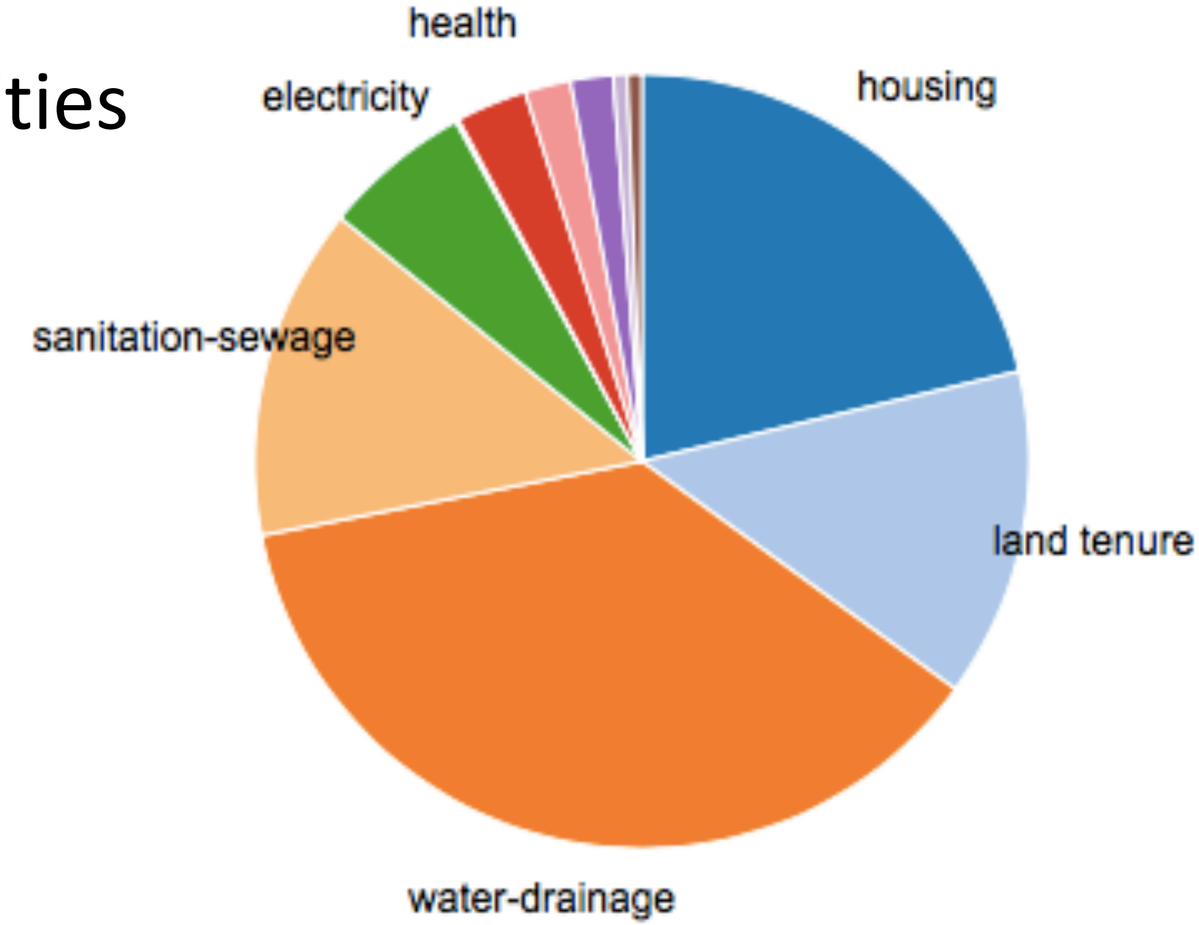
Self Identified Development Priorities



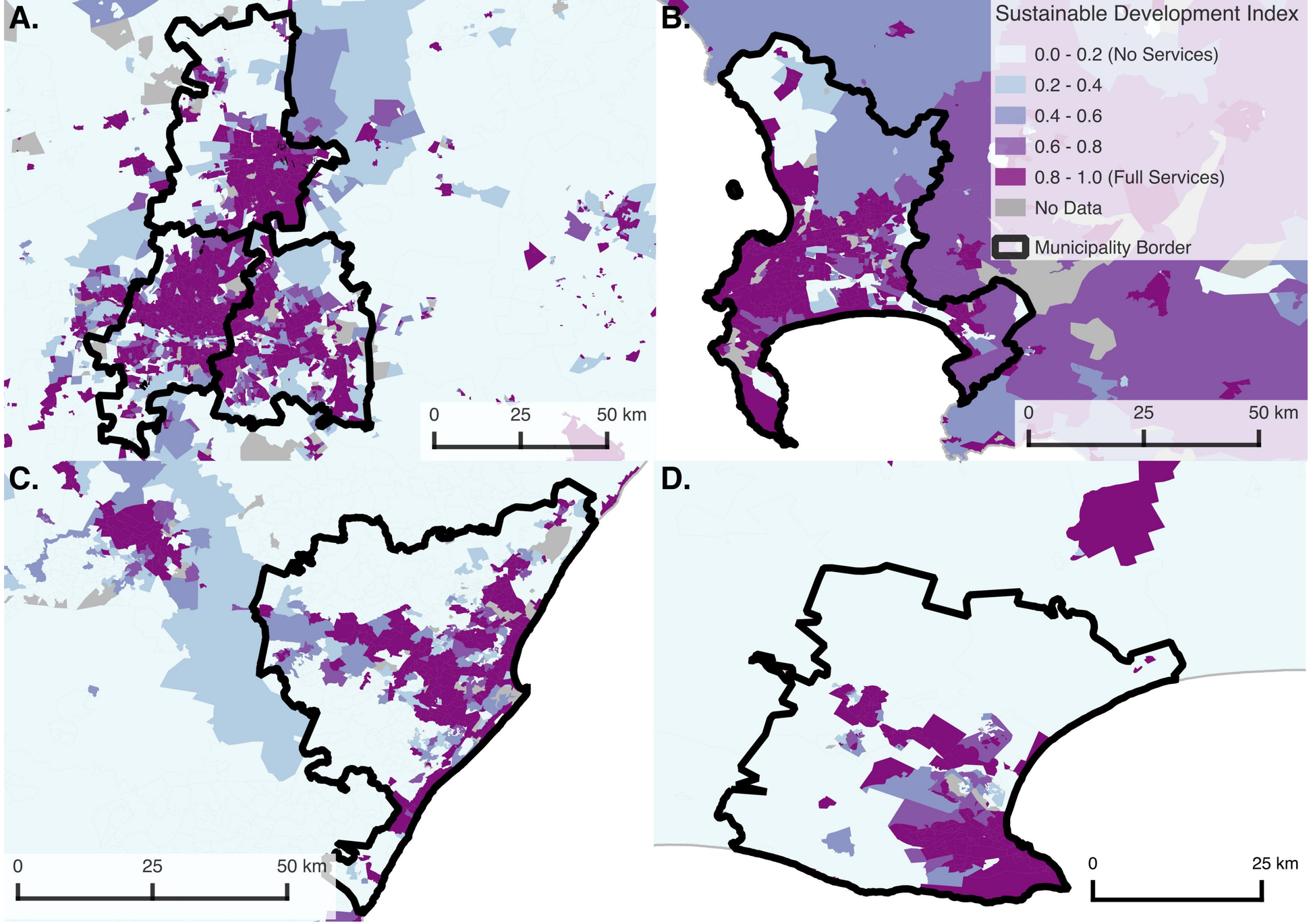


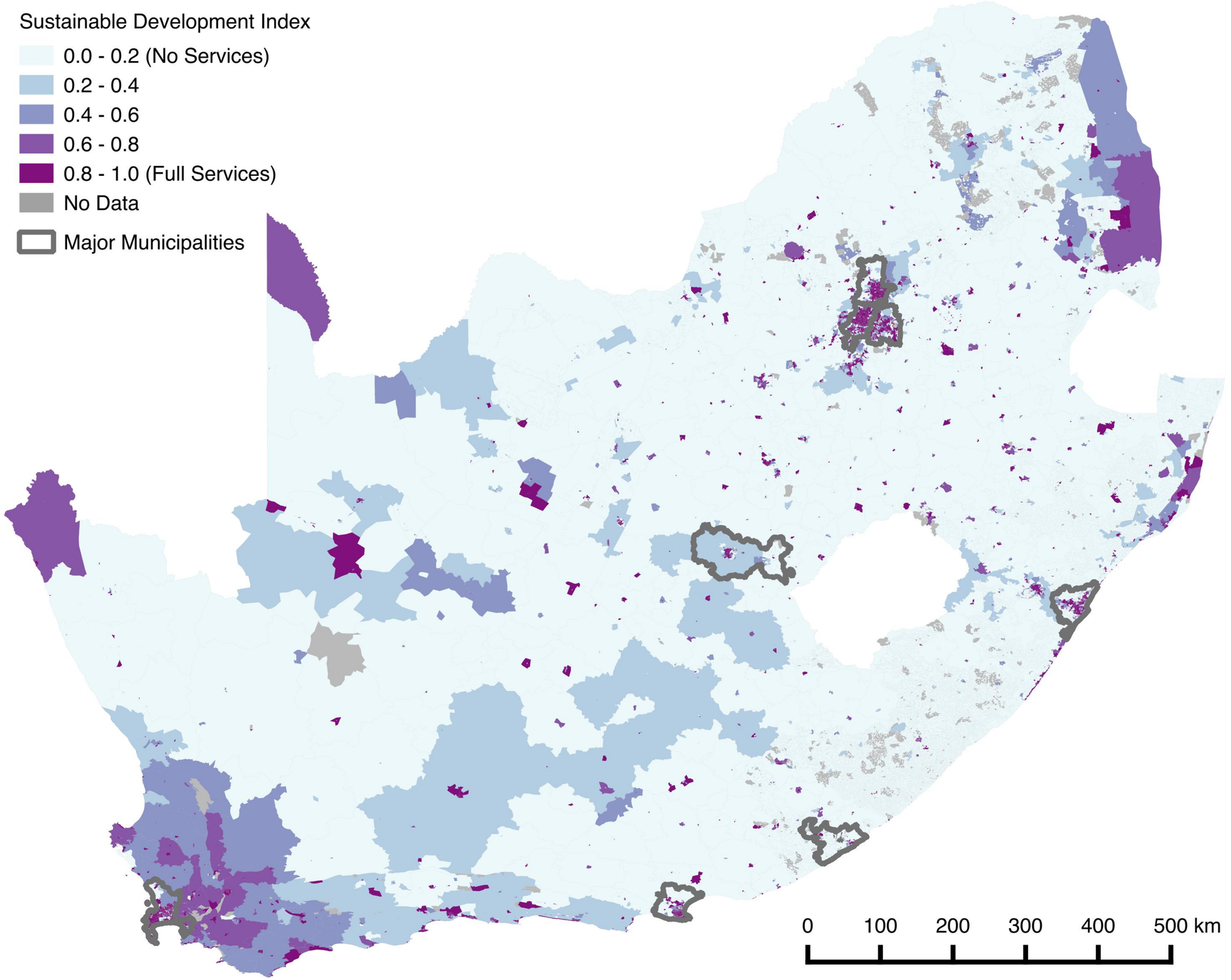
Self Identified Development Priorities





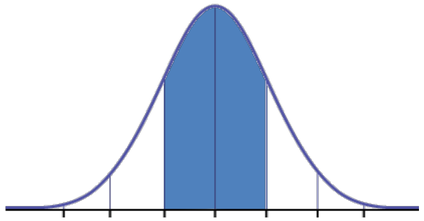
$$X_i = X_i^{housing} \times X_i^{water} \times X_i^{sanitation} \times X_i^{electricity}$$


A.
B.
C.
D.
Sustainable Development Index
0.0 - 0.2 (No Services)
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8
0.8 - 1.0 (Full Services)
No Data
Municipality Border
0
25
50 km
0
25
50 km
0
25
50 km
0
25 km


Sustainable Development Index
0.0 - 0.2 (No Services)
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8
0.8 - 1.0 (Full Services)
No Data
Major Municipalities
0
100
200
300
400
500 km

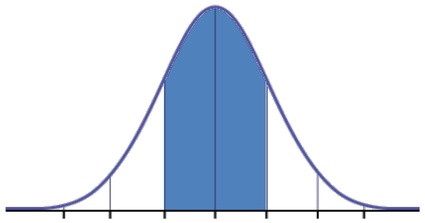
Measures of Heterogeneity

- Standard deviation $\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2}$

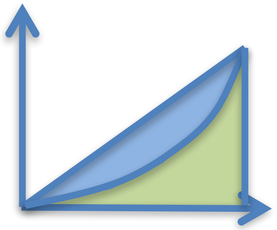


Measures of Heterogeneity

- Standard deviation $\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2}$



- Gini Coefficient $G = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}|x_i - x_j|}{2n\sum_{i=1}^{n}x_i}$



Measures of Heterogeneity

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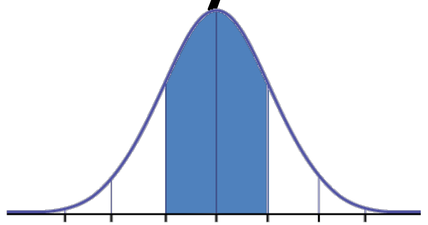
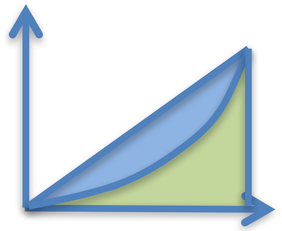
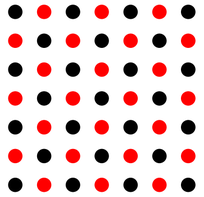
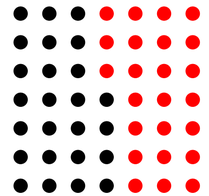


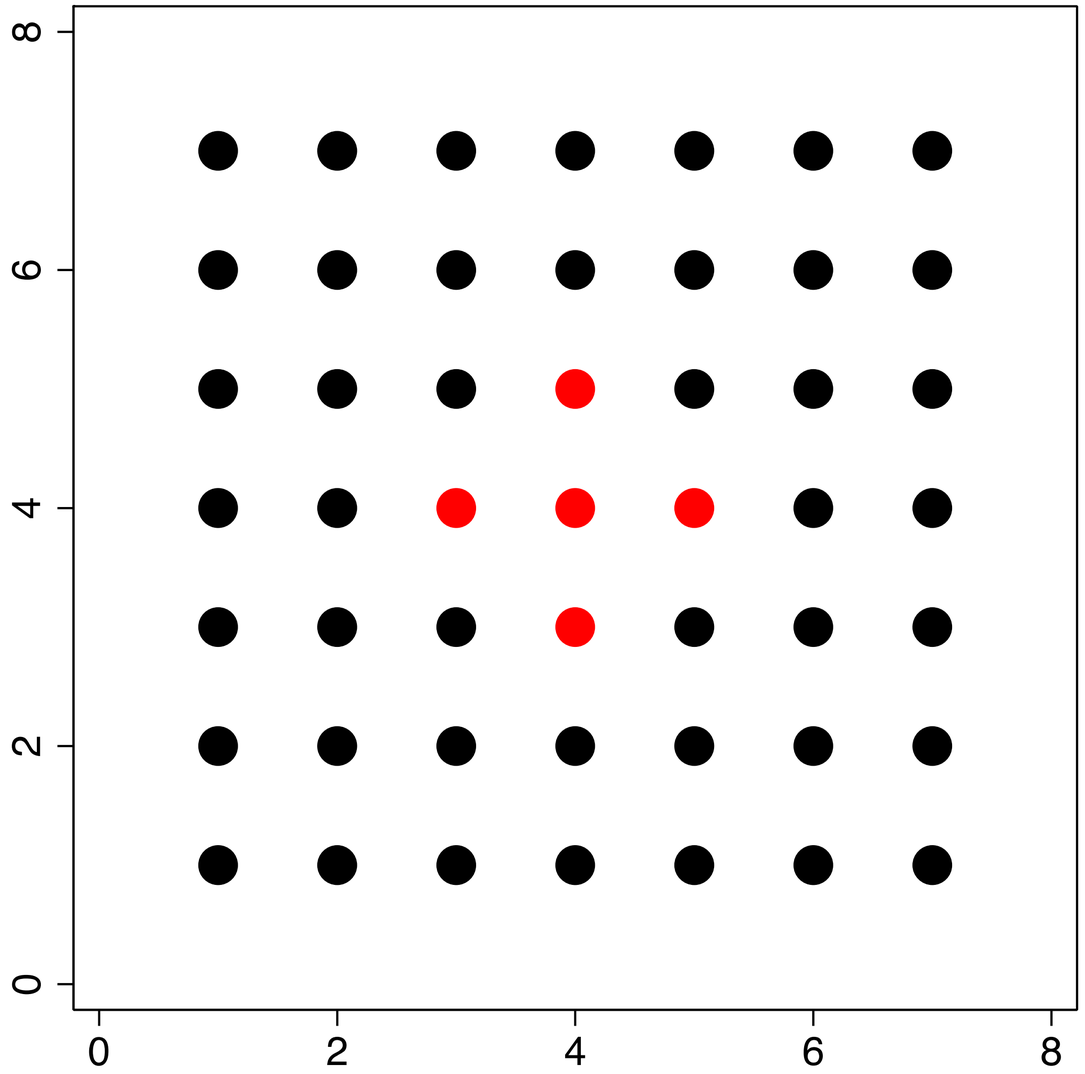
- Gini Coefficient $G = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}|x_i - x_j|}{2n\sum_{i=1}^{n}x_i}$



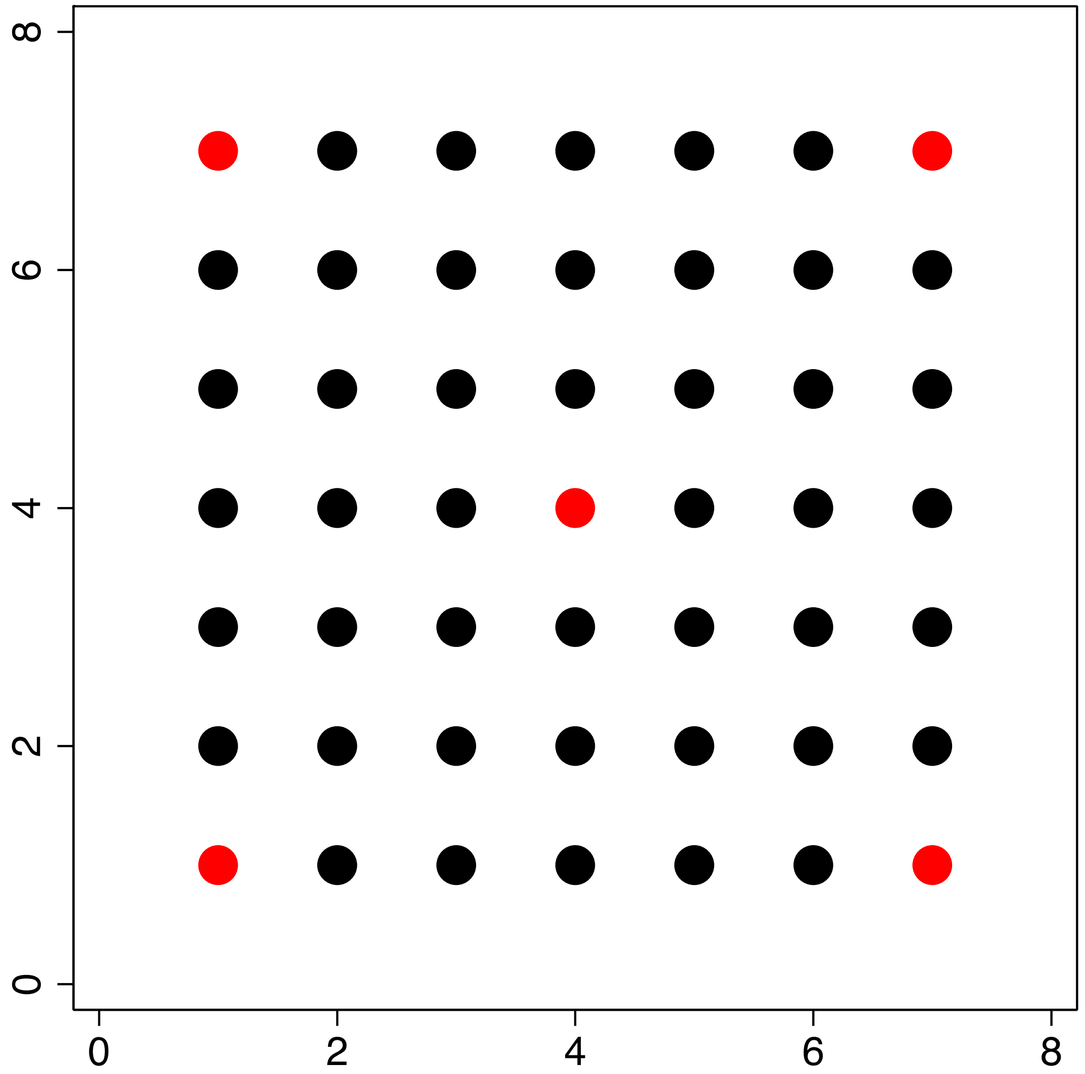
- Moran's I $I = \frac{N\sum_{i,j=1}^{N} w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{W\sum_{i=1}^{N}(x_i - \bar{x})^2}$



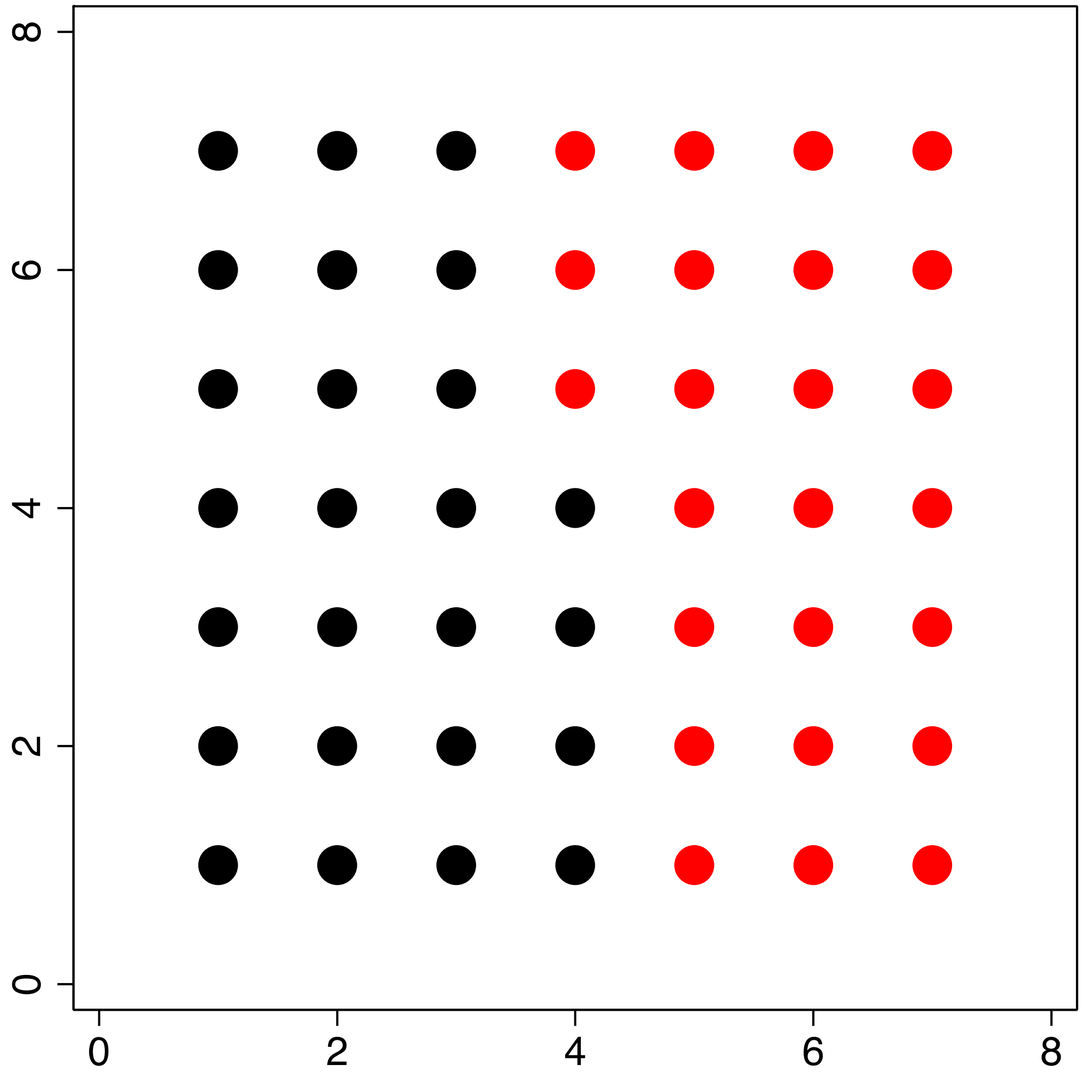




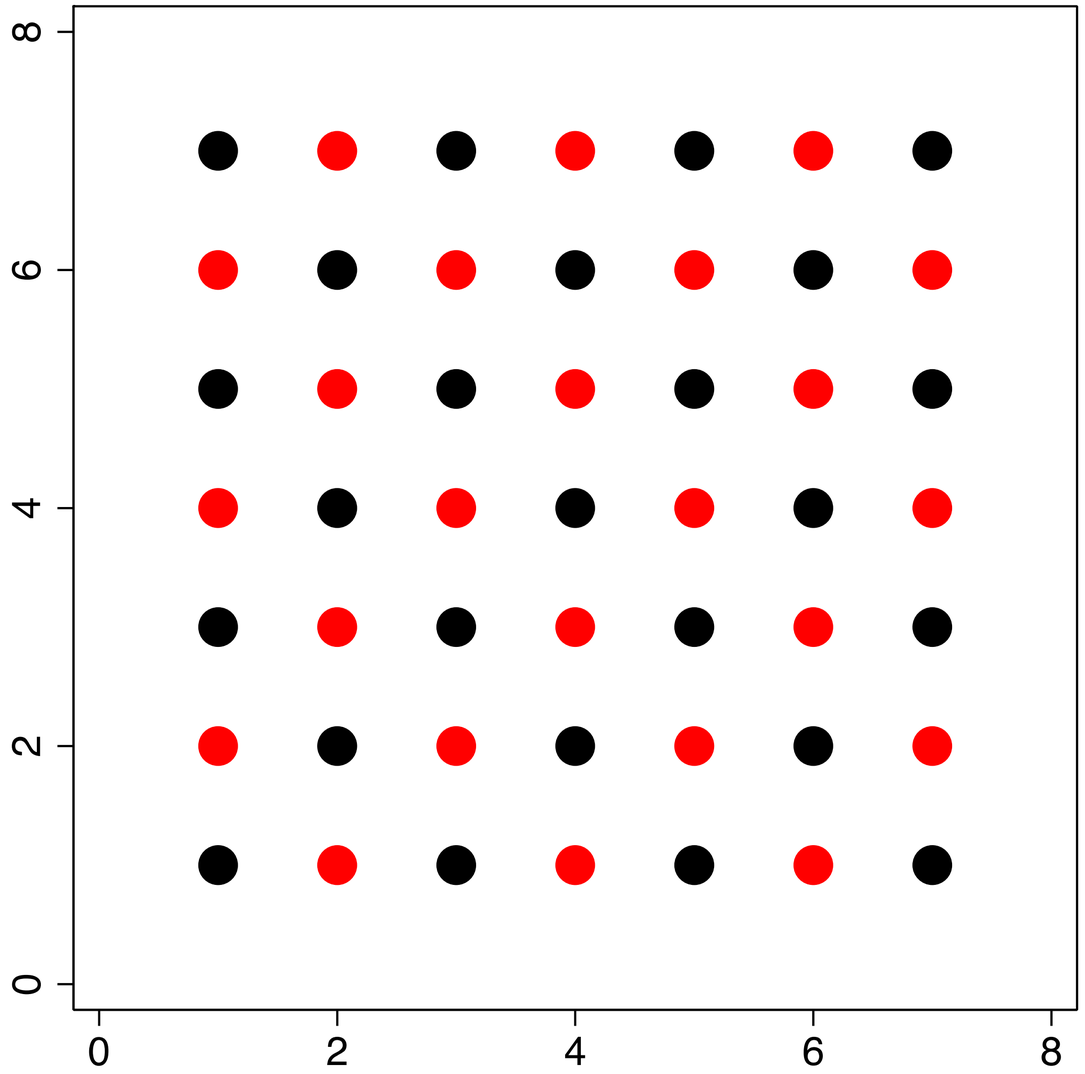
σ = 0.306; Gini = 0.083; Moran’s I = 0.045



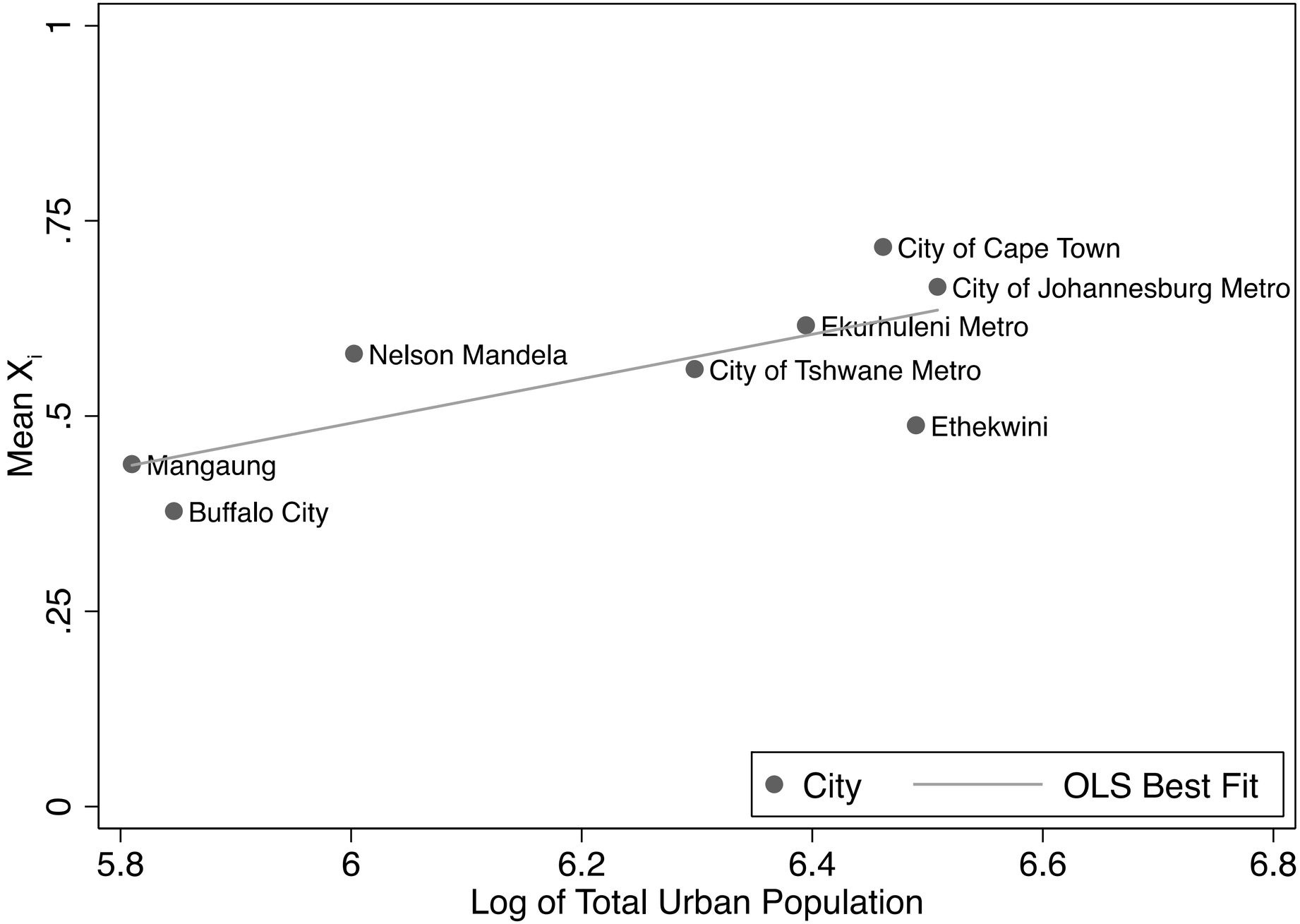
σ = 0.306; Gini = 0.083; Moran’s I = -0.030

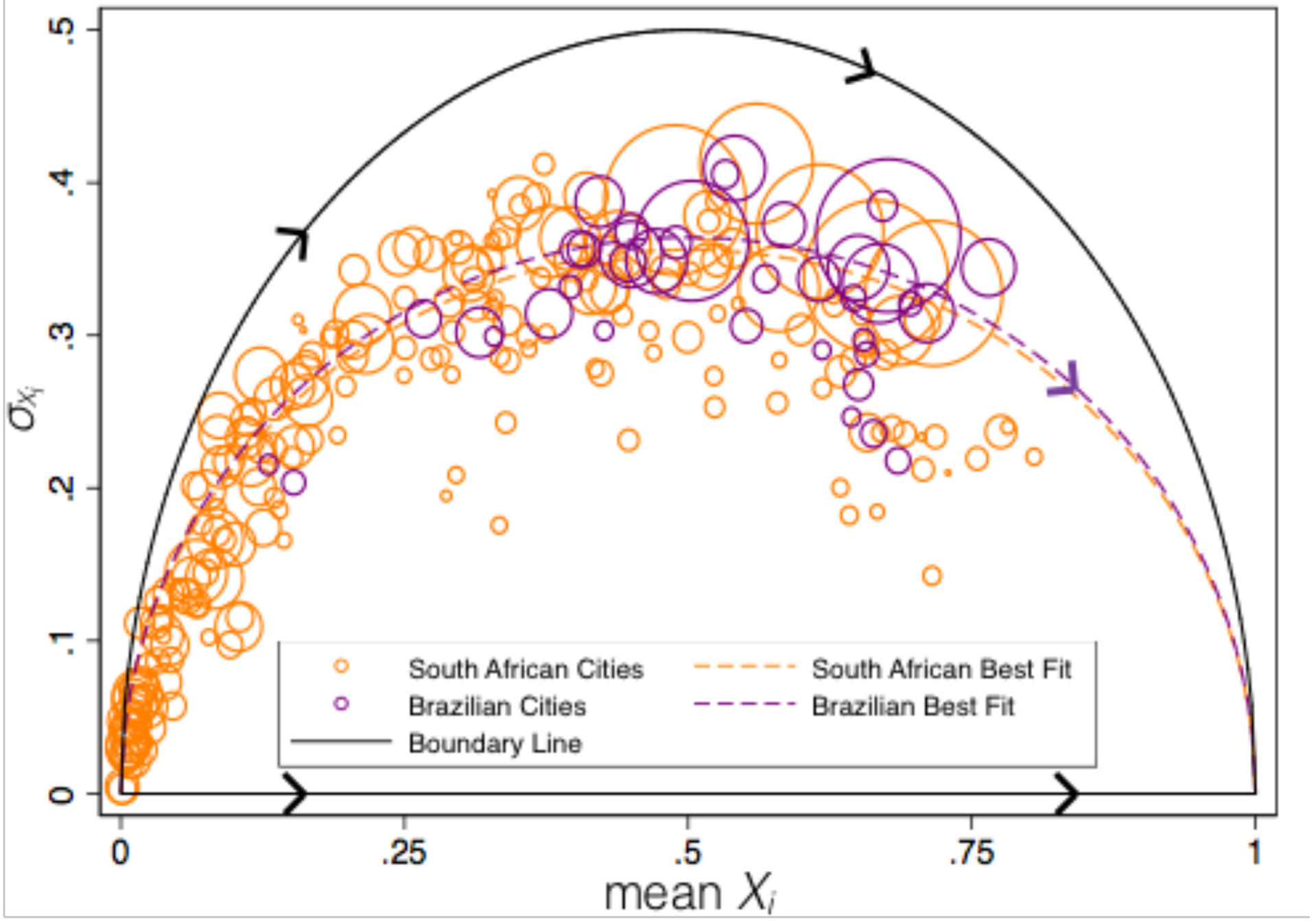


σ = 0.505; Gini = 0.168; Moran’s I = 0.247

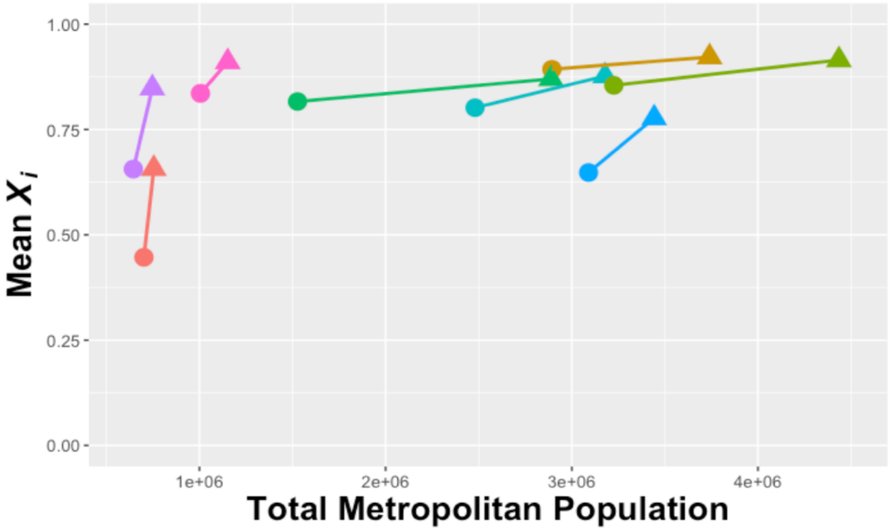


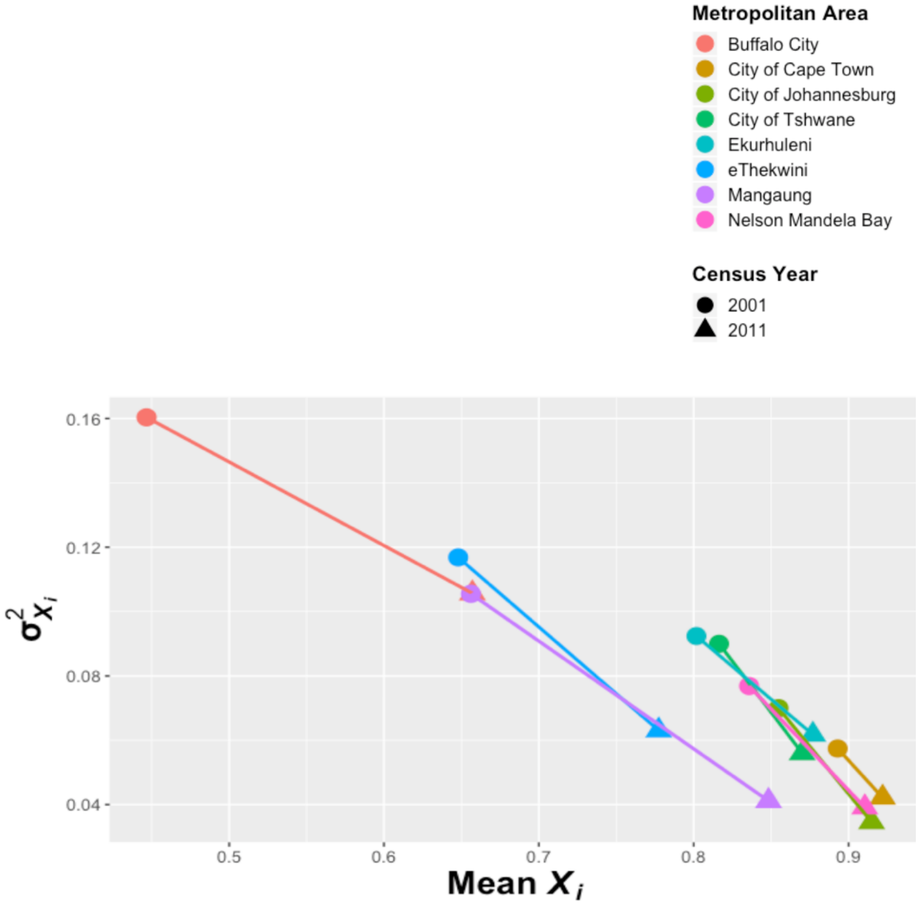
σ = 0.505; Gini = 0.168; Moran’s I = -0.090


Mean X_i
0
.25
.5
.75
1
5.8
6
6.2
6.4
6.6
6.8
Log of Total Urban Population
City of Cape Town
City of Johannesburg Metro
Ekurhuleni Metro
Nelson Mandela
City of Tshwane Metro
Ethekwini
Mangaung
Buffalo City
City
OLS Best Fit


0
.1
.2
.3
.4
.5
σ_{X_i}
0
.25
.5
.75
1
mean X_i
South African Cities
Brazilian Cities
Boundary Line
South African Best Fit
Brazilian Best Fit

Temporal Changes in X_i





Figures by Mollie Gaines (ORNL SULI student)

Basis: **Human-Environment Interactions**

Physical, Social, Economic, Cultural

Neighborhood Effects

Central Concept: Human Ecology

Home Turf: Sociology

Metrics: Behavioral outcomes, poverty, race, inequality

Bill Wilson

Capabilities Approach

Central Concept: Well being means that people have the capacity to reason and act in their own contexts

Home Turf: International Development Economics and Ethics

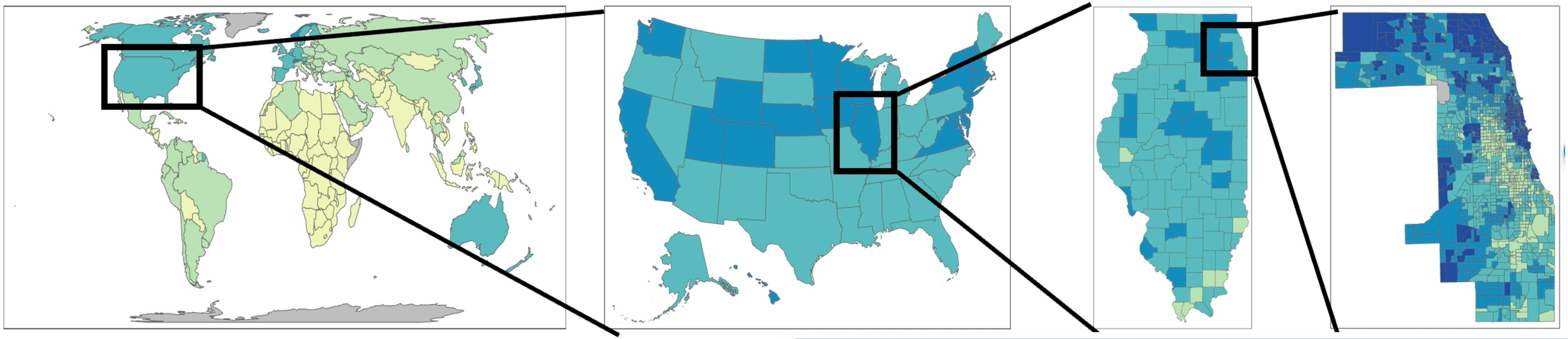
Metrics: Human Development index

Amartya Sen

Martha Nussbaum

Human Development Index

"measures the ability of human populations to lead, long , healthy and fulfilled lives"



credit: Neil Sheth (UChicago)

2015 HDI Values

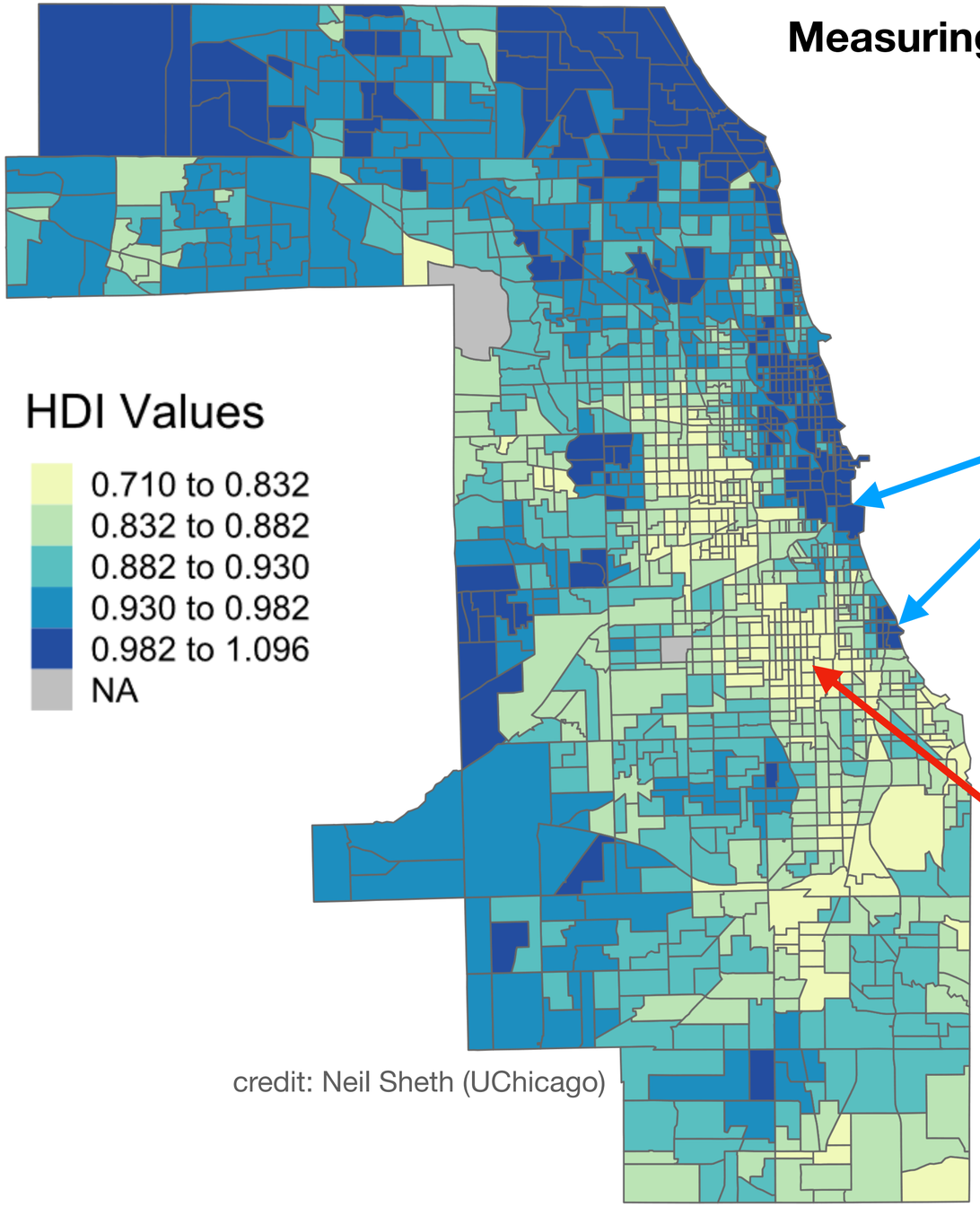
- 0.372 to 0.737
- 0.737 to 0.893
- 0.893 to 0.943
- 0.943 to 0.995
- 0.995 to 1.155
- Missing

$$\mathrm{HDI}_i = \left(\mathrm{education}_i \,.\, \mathrm{life\ expectancy}_i \,.\, \mathrm{real\ income}_i\right)^{1/3}$$

Rank		Country or Territory	HDI	
2019 data (2020 report)[14]	Change over 5 years (2014)[15]		2019 data (2020 report)[14]	Average annual HDI growth (2010-2019)[15]
1	–	Norway	0.957	▲ 0.20%
2	▲ (7)	Ireland	0.955	▲ 0.65%
2	–	Switzerland	0.955	▲ 0.16%
4	▲ (7)	Hong Kong	0.949	▲ 0.54%
4	▲ (4)	Iceland	0.949	▲ 0.62%
6	▼ (3)	Germany	0.947	▲ 0.24%
7	▼ (3)	Sweden	0.945	▲ 0.41%
8	▼ (2)	Australia	0.944	▲ 0.17%
8	▼ (1)	Netherlands	0.944	▲ 0.32%
10	▼ (6)	Denmark	0.940	▲ 0.28%
11	▼ (2)	Finland	0.938	▲ 0.26%

The US is now # 17

Measuring the Human Development of Chicago neighborhoods

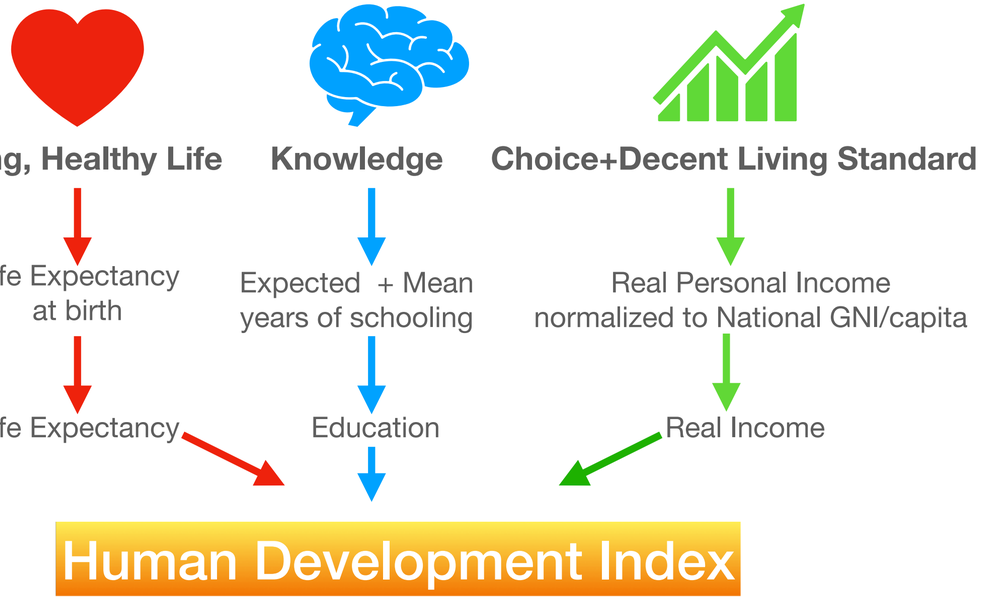


better than Norway

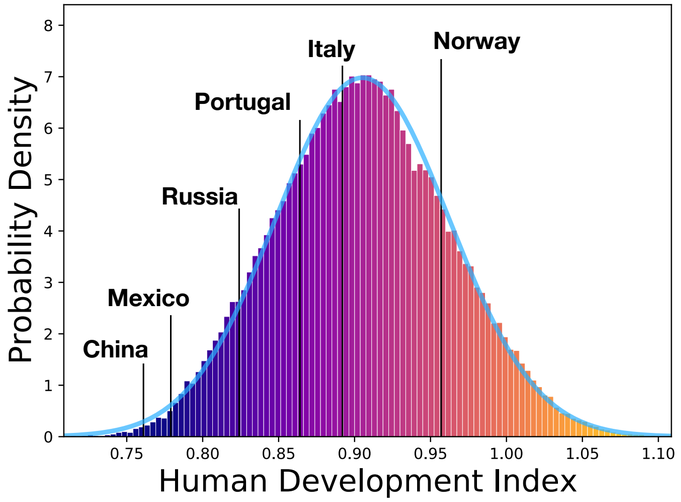
worse than China or Mexico

credit: Neil Sheth (UChicago)

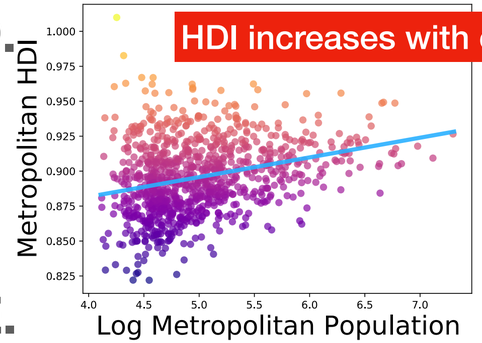
A.



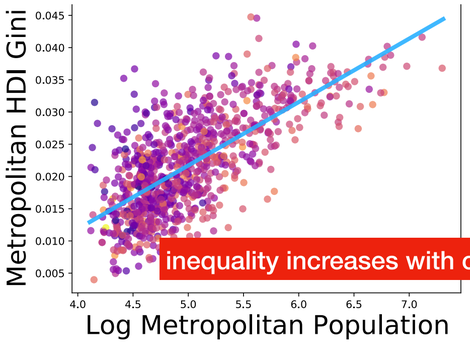
C.



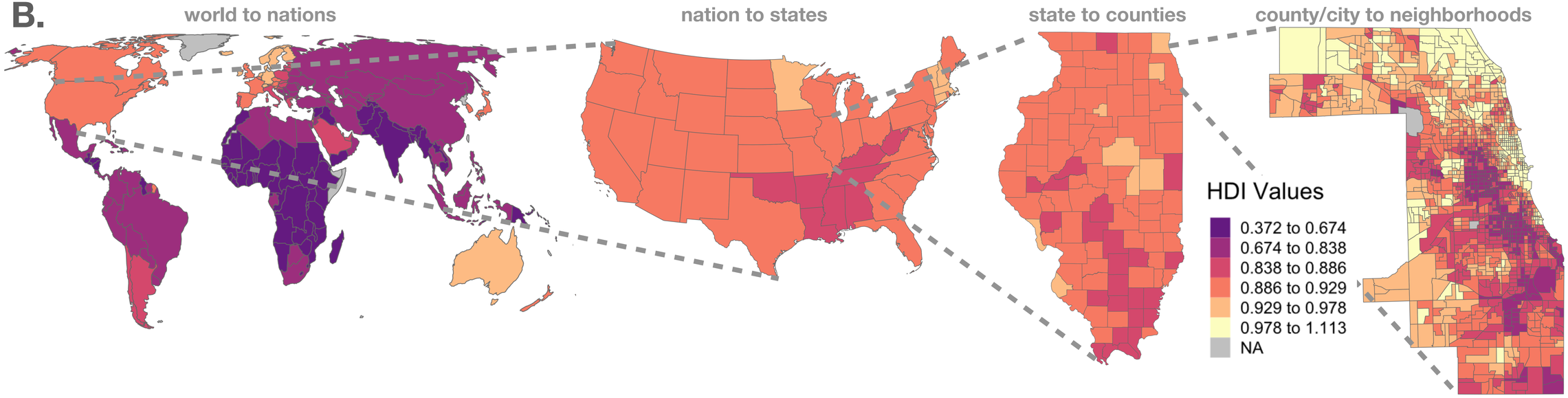
D.



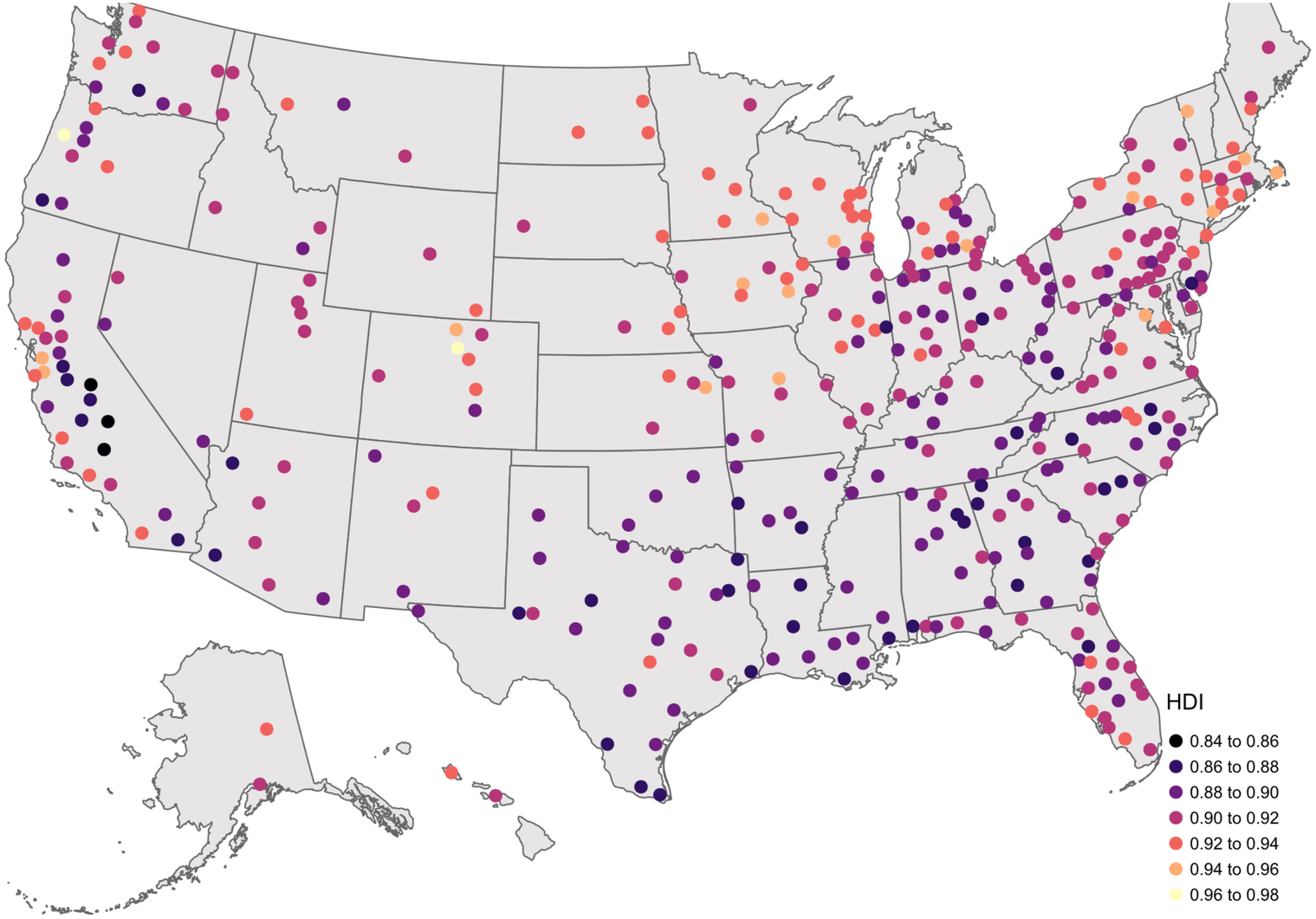
E.



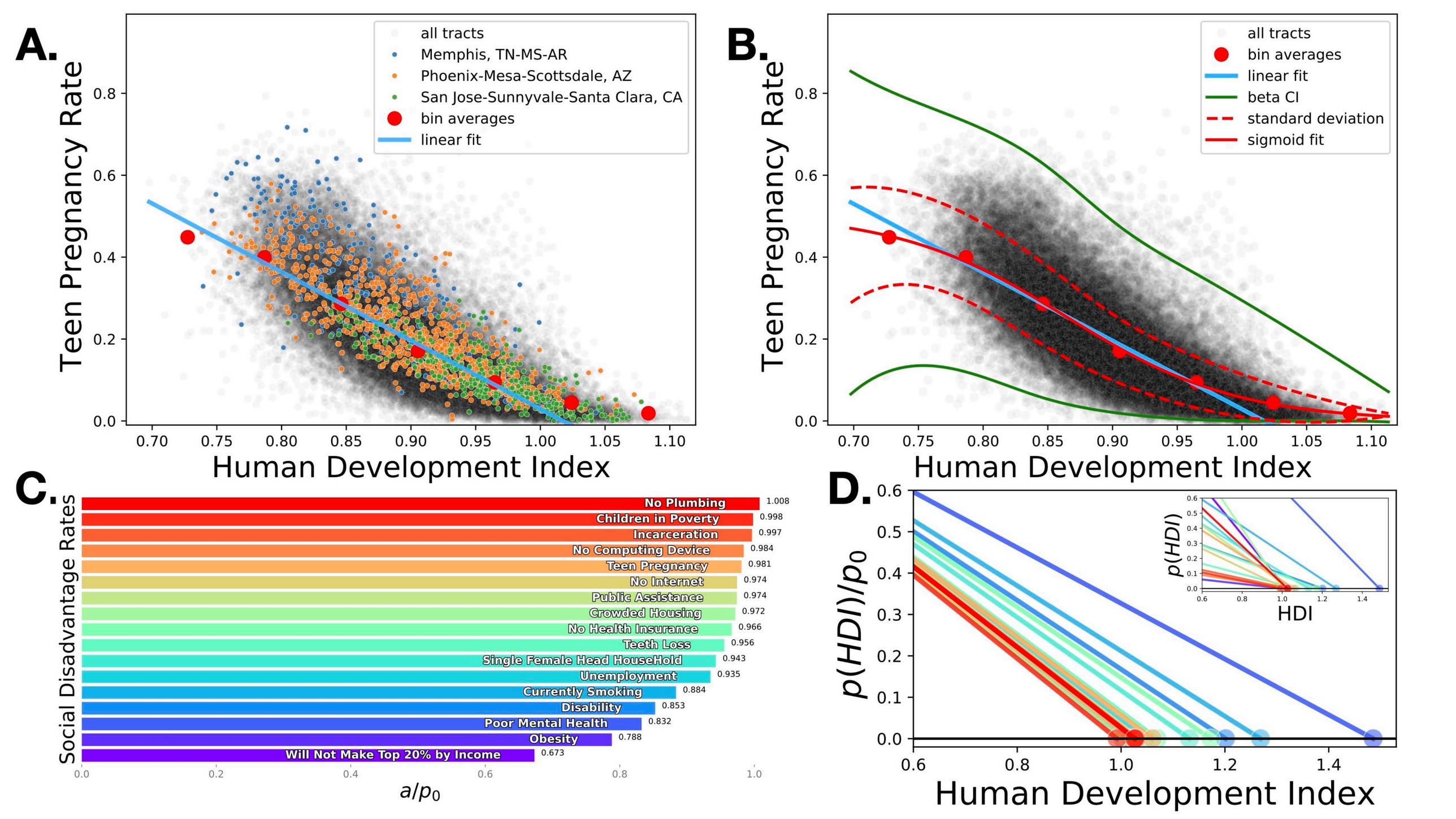
B.



Check out the interactive map at: https://communityhdi.org/



State/Federal District	HDI	Metropolitan Area	HDI
Massachusetts	0.9407	Boulder, CO	0.9624
Connecticut	0.9378	Corvallis, OR	0.9622
Vermont	0.9348	Ann Arbor, MI	0.9570
New Hampshire	0.9345	Iowa City, IA	0.9567
Minnesota	0.9330	San Jose-Sunnyvale-Santa Clara, CA	0.9557
New Jersey	0.9281	Bridgeport-Stamford-Norwalk, CT	0.9553
District of Columbia	0.9273	Ames, IA	0.9532
Maryland	0.9271	Lawrence, KS	0.9496
North Dakota	0.9244	Boston-Cambridge-Newton, MA-NH	0.9491
Colorado	0.9240	San Francisco-Oakland-Hayward, CA	0.9486
Texas	0.8964	Gadsden, AL	0.8647
South Carolina	0.8935	McAllen-Edinburg-Mission, TX	0.8641
Nevada	0.8919	Lake Havasu City-Kingman, AZ	0.8637
Oklahoma	0.8879	Laredo, TX	0.8614
Tennessee	0.8874	Dalton, GA	0.8614
Kentucky	0.8843	Brownsville-Harlingen, TX	0.8605
Alabama	0.8839	Yakima, WA	0.8604
Louisiana	0.8838	Pine Bluff, AR	0.8601
West Virginia	0.8832	Bakersfield, CA	0.8595
Arkansas	0.8798	Visalia-Porterville, CA	0.8579
Mississippi	0.8762	Madera, CA	0.8572


A.
all tracts
Memphis, TN-MS-AR
Phoenix-Mesa-Scottsdale, AZ
San Jose-Sunnyvale-Santa Clara, CA
bin averages
linear fit
Teen Pregnancy Rate
Human Development Index
B.
all tracts
bin averages
linear fit
beta CI
standard deviation
sigmoid fit
Teen Pregnancy Rate
Human Development Index
C.
Social Disadvantage Rates
No Plumbing 1.008
Children in Poverty 0.998
Incarceration 0.997
No Computing Device 0.984
Teen Pregnancy 0.981
No Internet 0.974
Public Assistance 0.974
Crowded Housing 0.972
No Health Insurance 0.966
Teeth Loss 0.956
Single Female Head HouseHold 0.943
Unemployment 0.935
Currently Smoking 0.884
Disability 0.853
Poor Mental Health 0.832
Obesity 0.788
Will Not Make Top 20% by Income 0.673
a/p_0
D.
$p(HDI)/p_0$
$p(HDI)$
HDI
Human Development Index