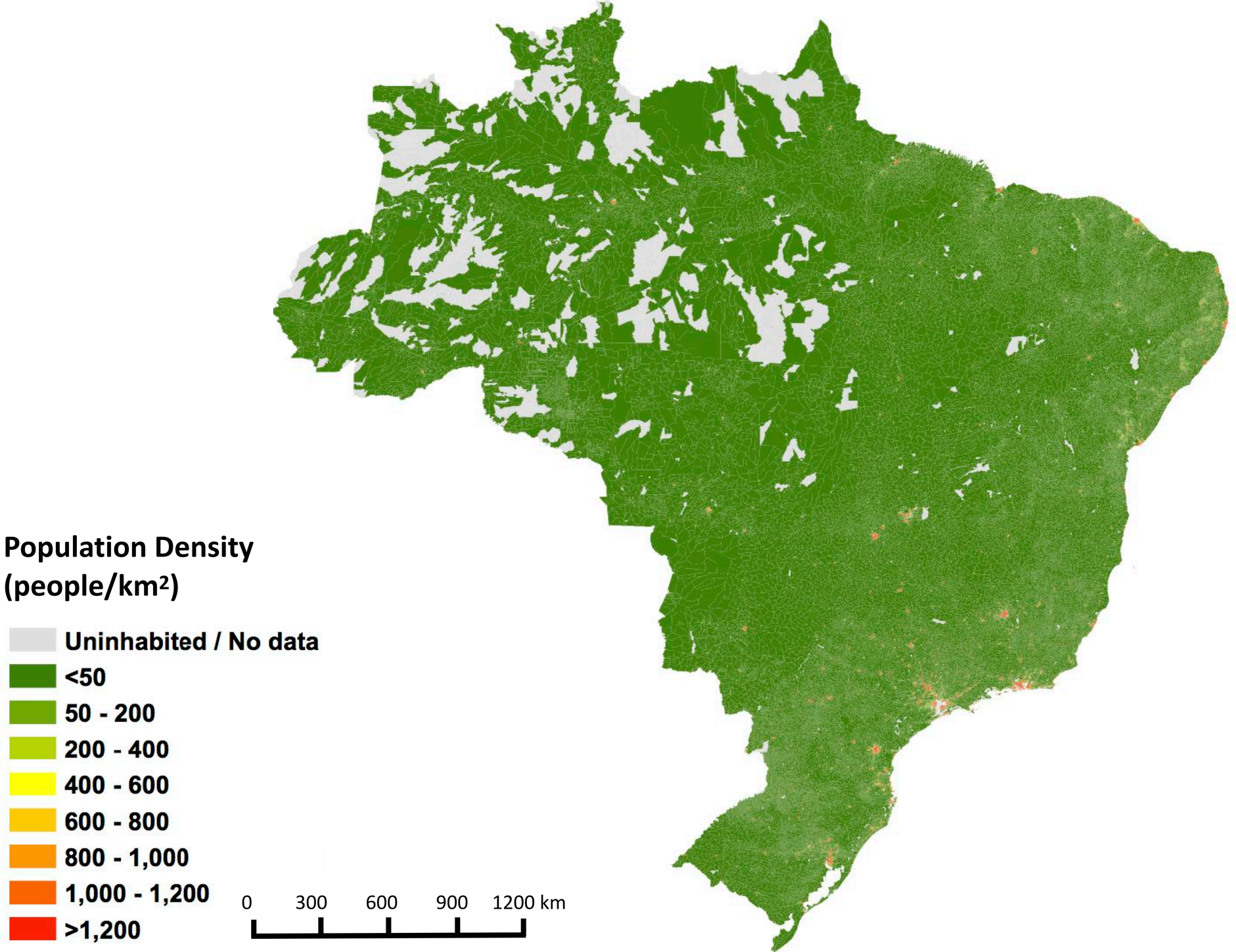
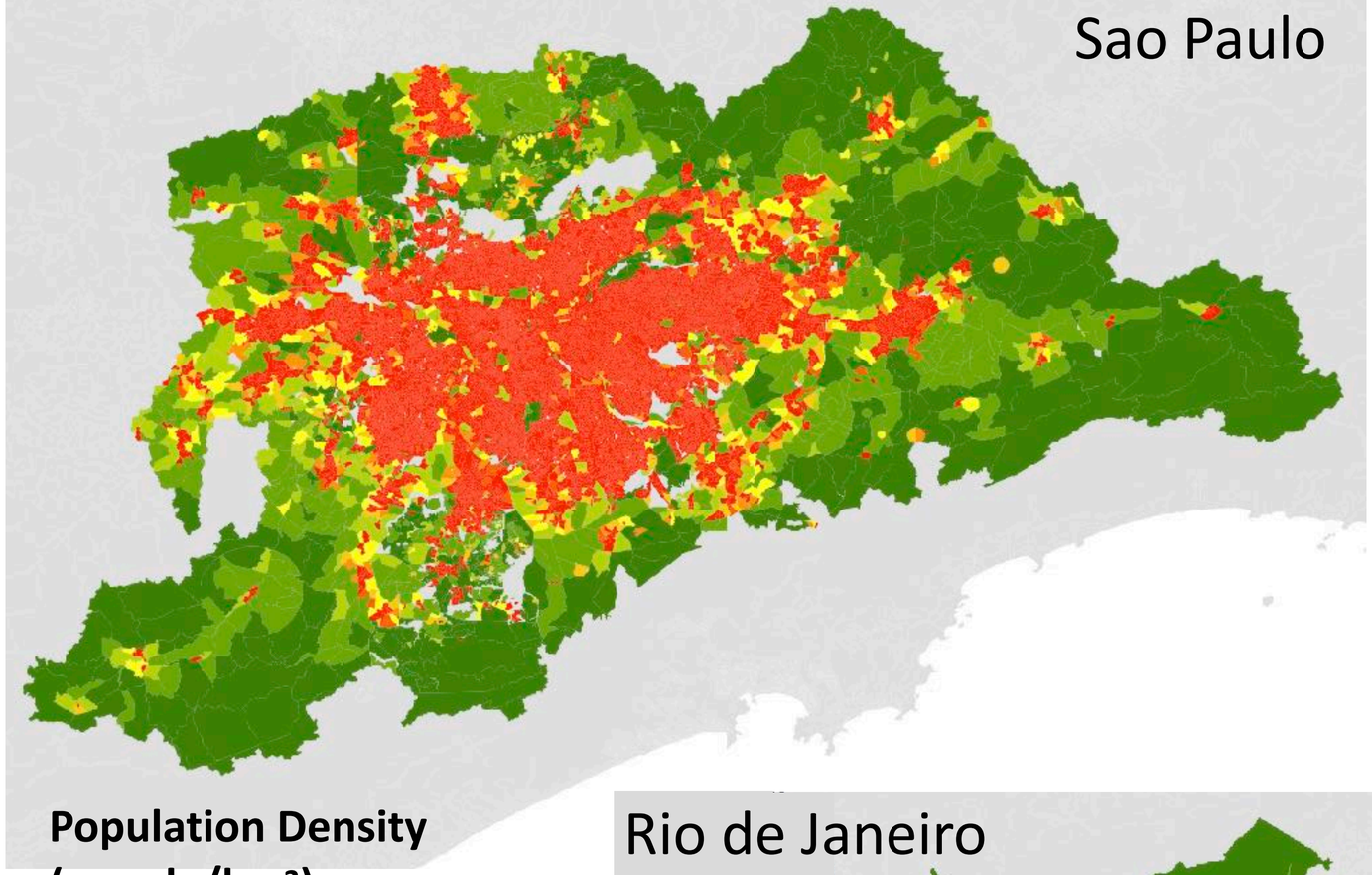
Lecture 12

Neighborhoods and Human Development: The international situation

12.3 Heterogeneity and Change in Developing Cities, Human Development

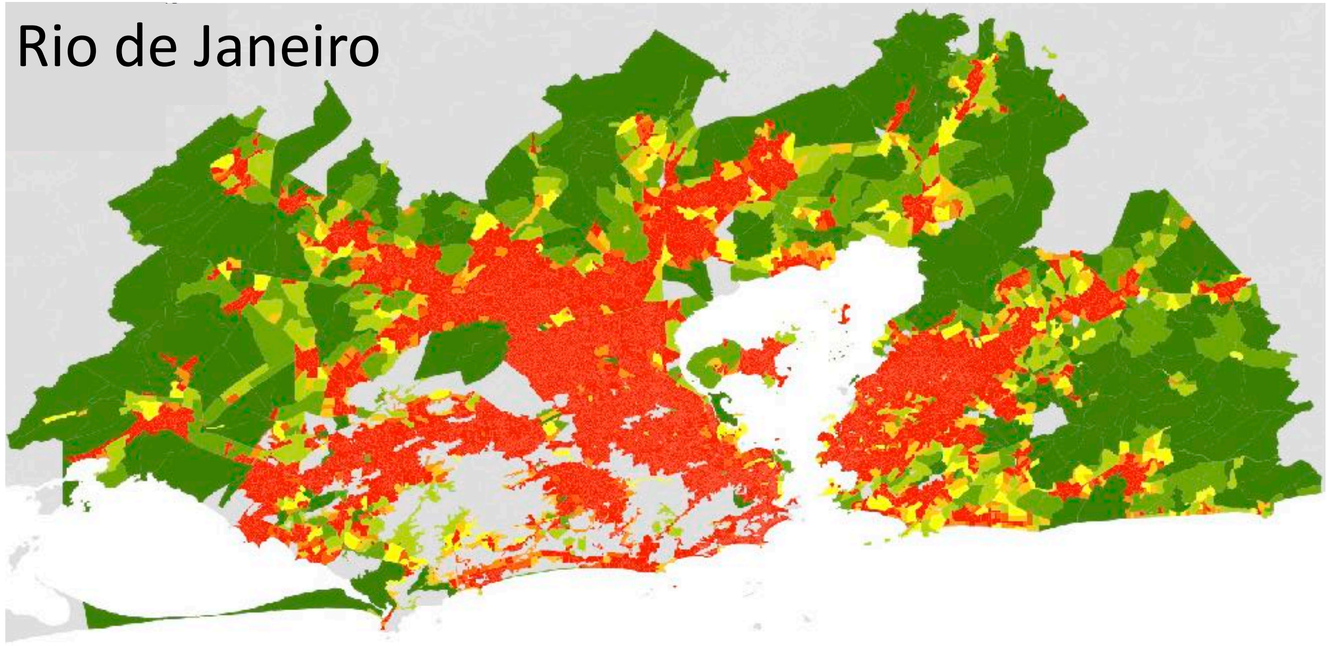
IUS 6.2.2

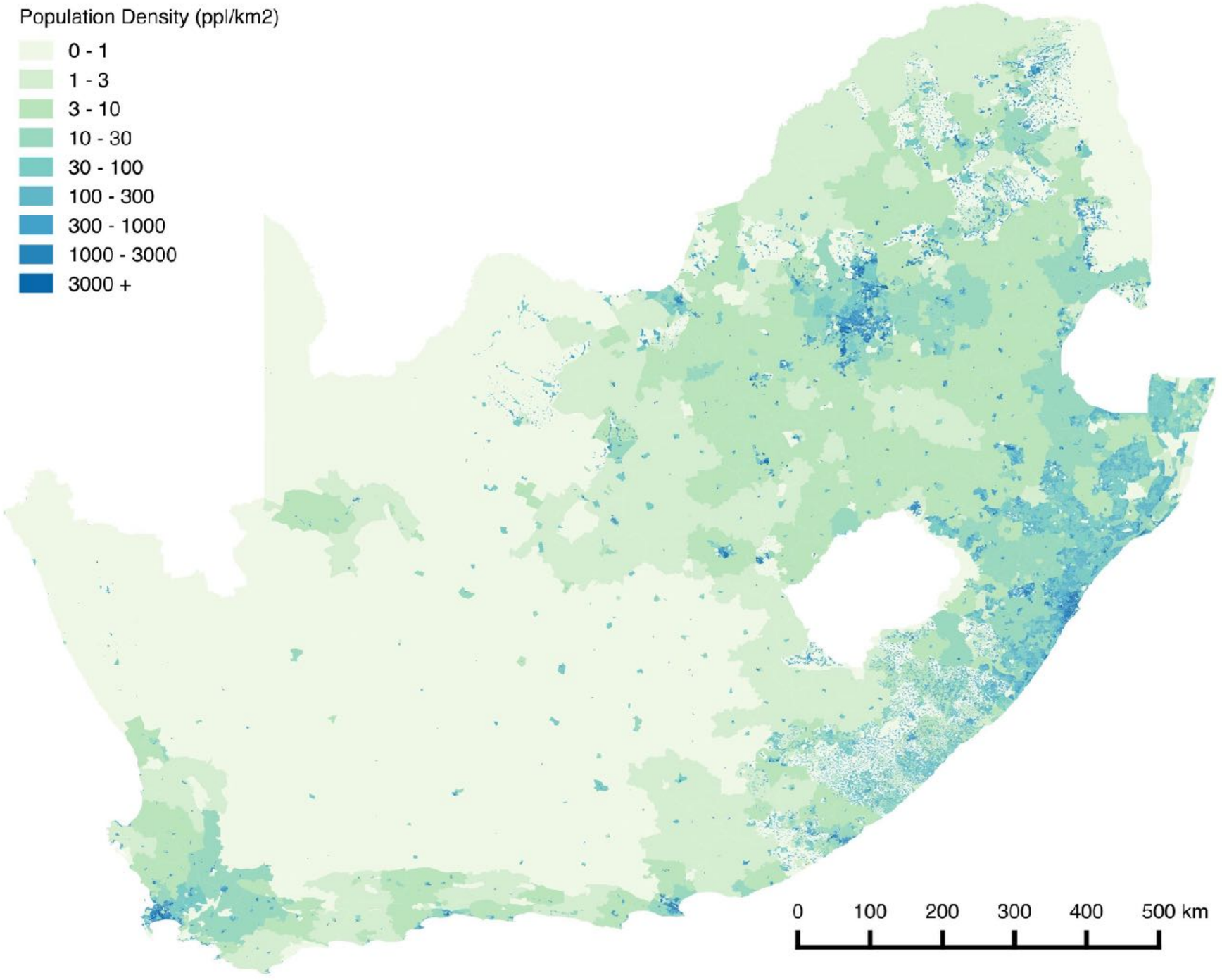

Population Density
(people/km²)
Uninhabited / No data
<50
50 - 200
200 - 400
400 - 600
600 - 800
800 - 1,000
1,000 - 1,200
>1,200
0
300
600
900
1200 km

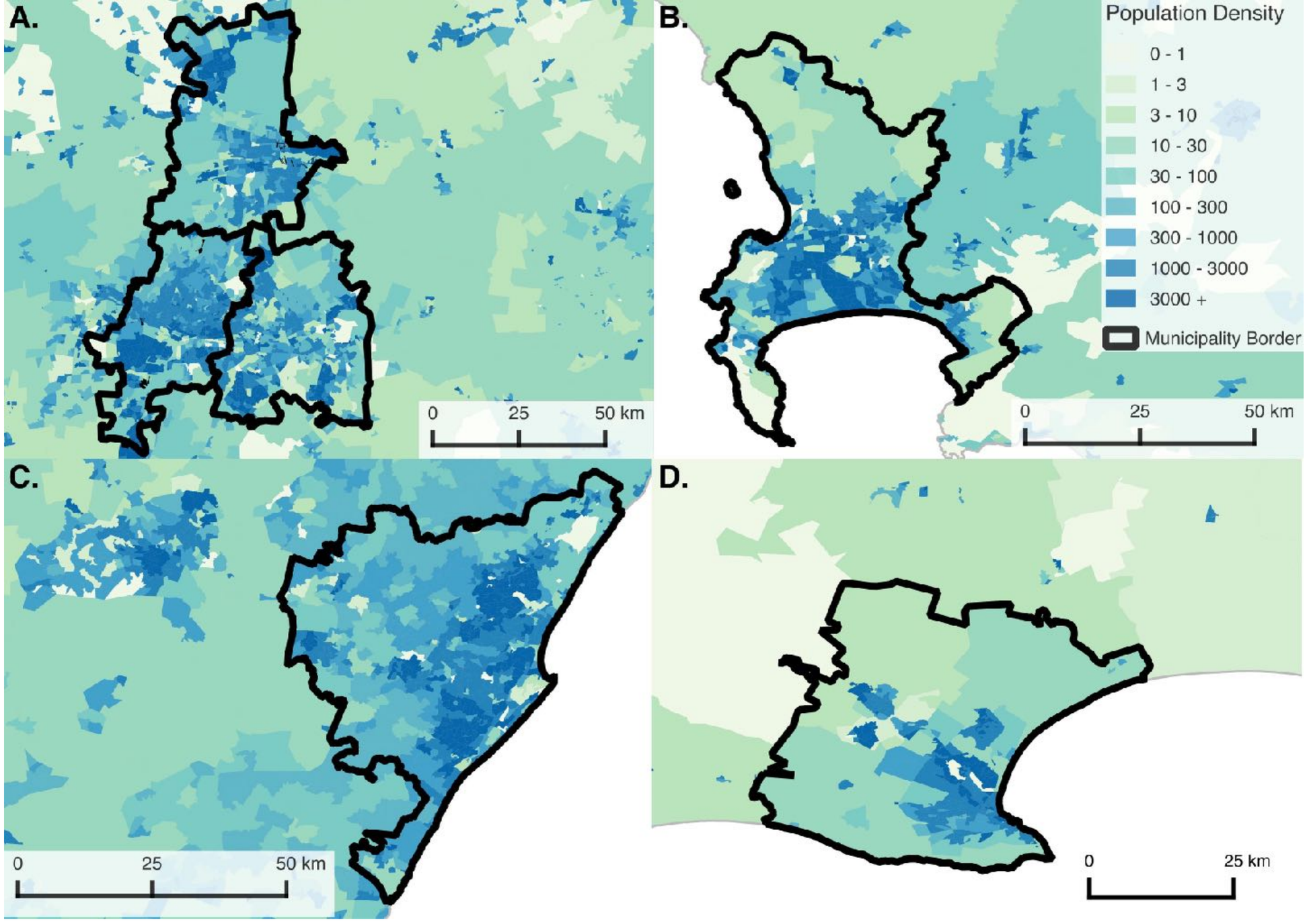


Population Density (people/km²)

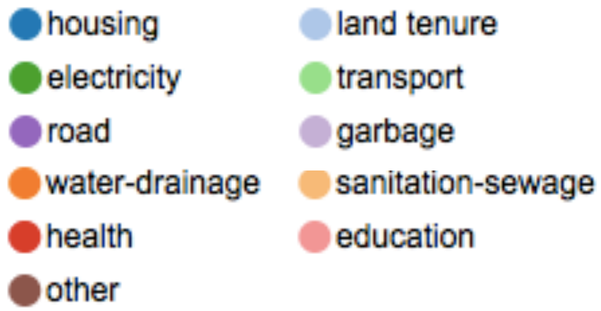
- Uninhabited / No data
- <50
- 50 - 200
- 200 - 400
- 400 - 600
- 600 - 800
- 800 - 1,000
- 1,000 - 1,200
- >1,200

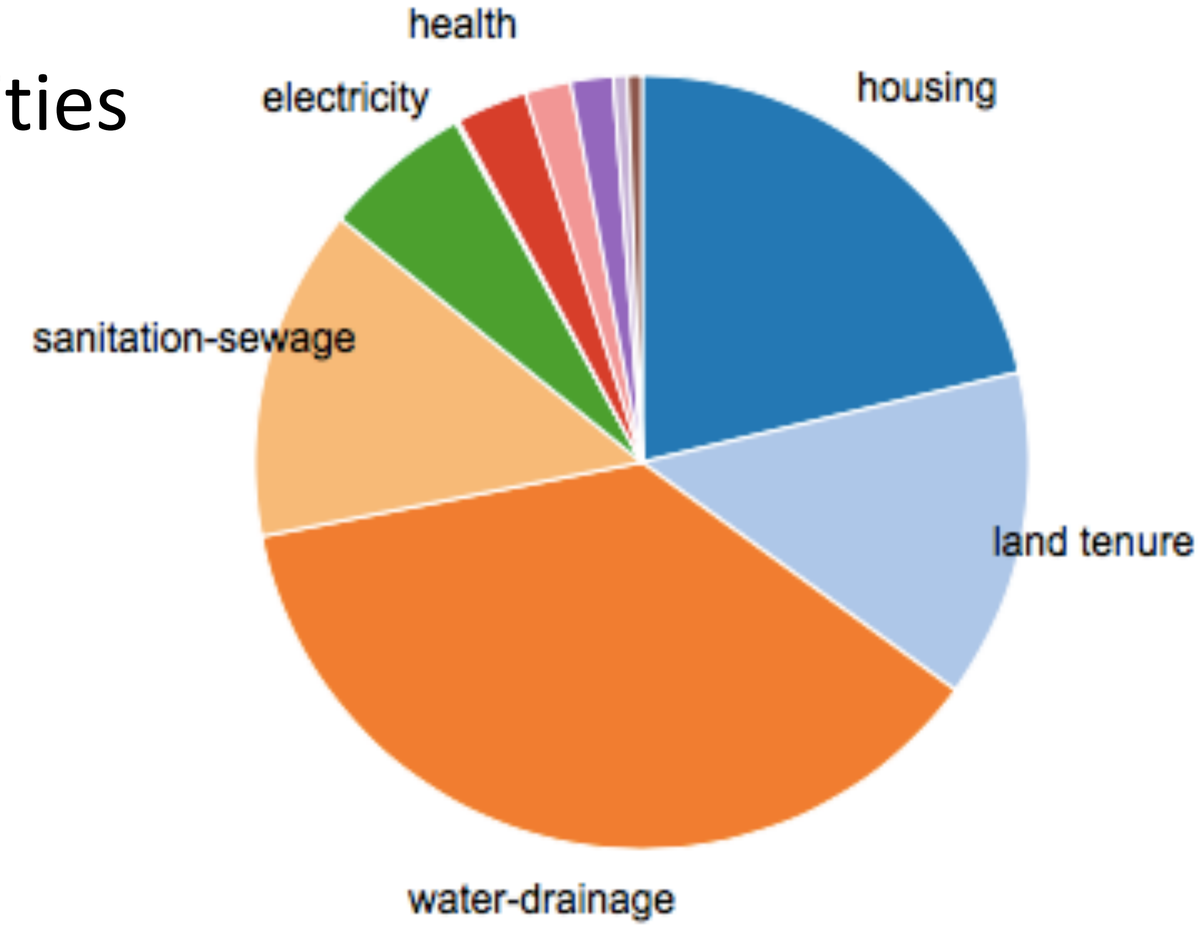



Population Density (ppl/km2)
0 - 1
1 - 3
3 - 10
10 - 30
30 - 100
100 - 300
300 - 1000
1000 - 3000
3000 +
0
100
200
300
400
500 km

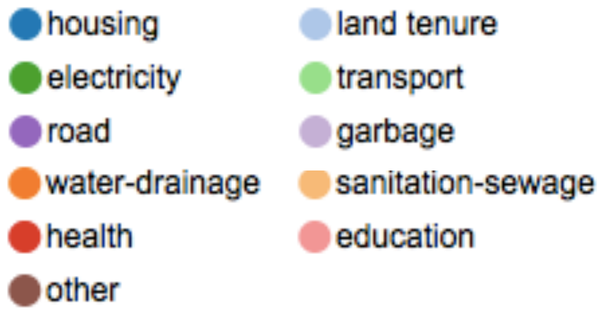

A.
B.
C.
D.
Population Density
0 - 1
1 - 3
3 - 10
10 - 30
30 - 100
100 - 300
300 - 1000
1000 - 3000
3000 +
Municipality Border
0
25
50 km
0
25
50 km
0
25
50 km
0
25 km

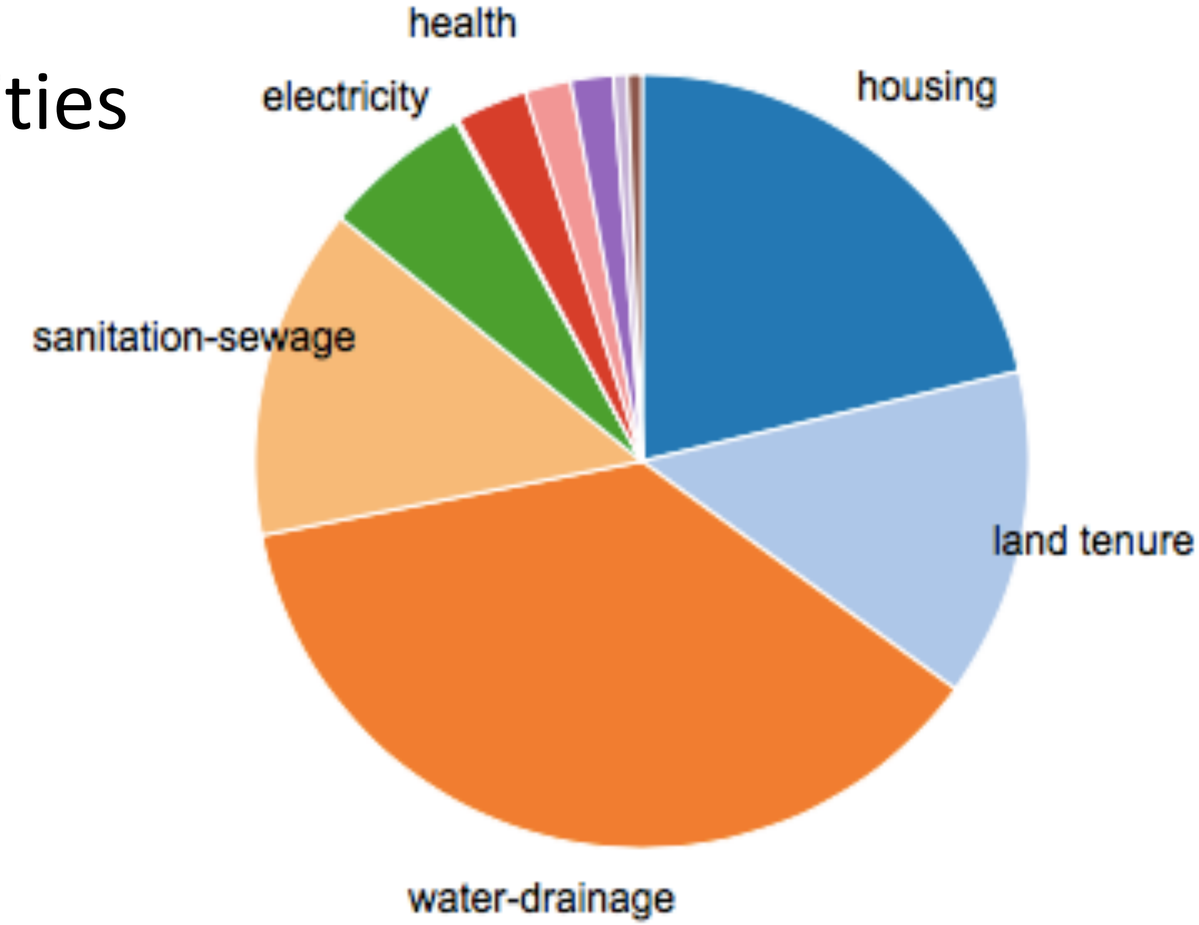
Self Identified Development Priorities



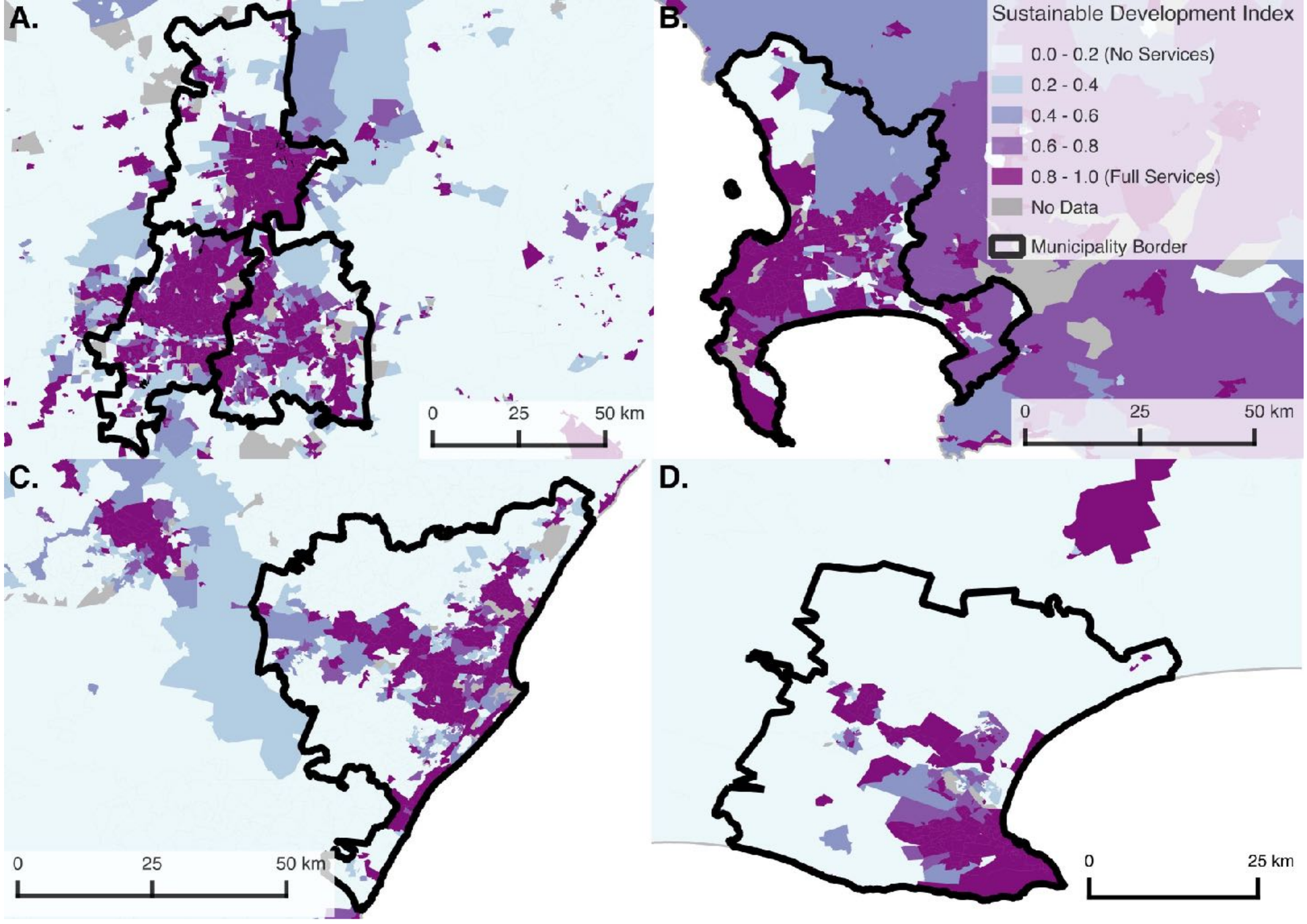


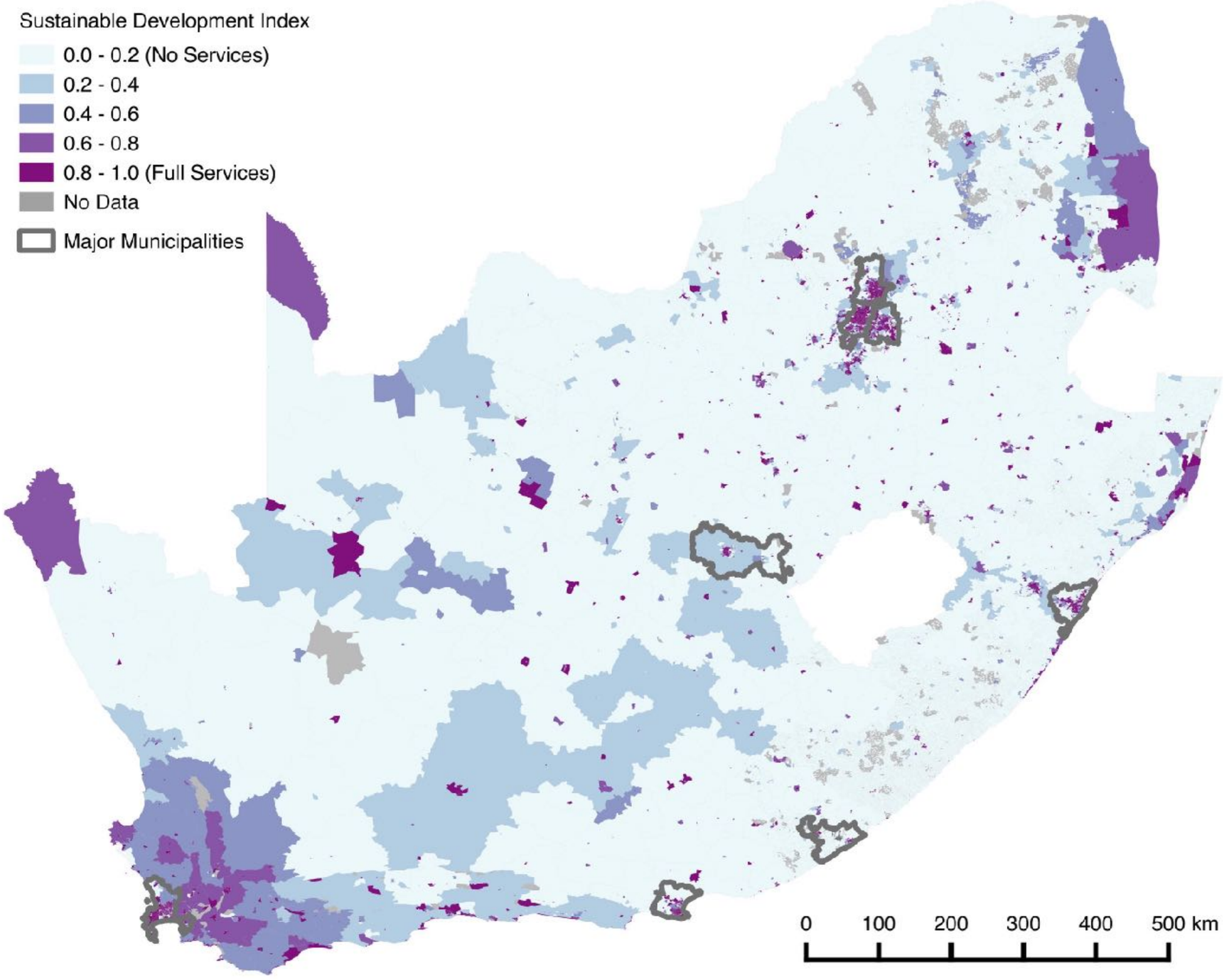
Self Identified Development Priorities





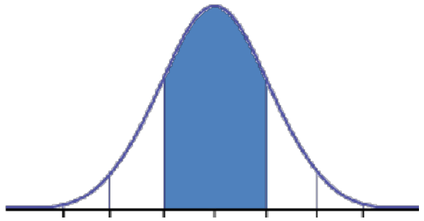
$$X_i = X_i^{housing} \times X_i^{water} \times X_i^{sanitation} \times X_i^{electricity}$$


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

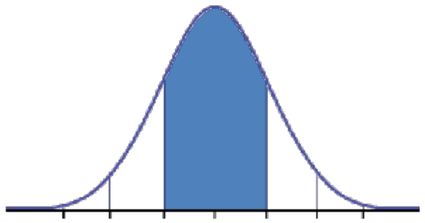
Measures of Heterogeneity

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

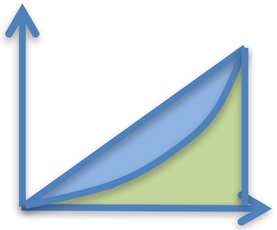


Measures of Heterogeneity

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



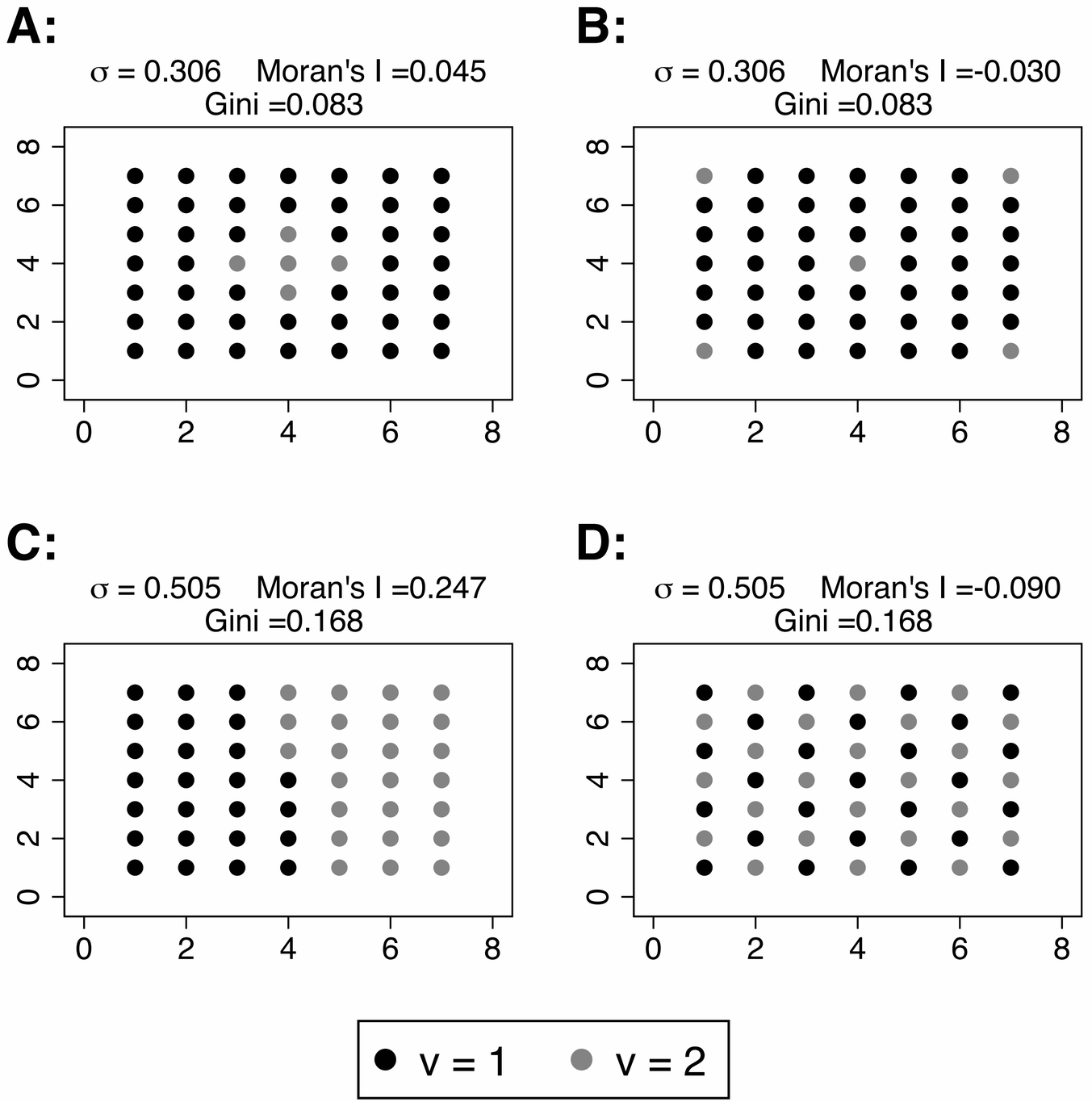
- Gini Coefficient $G = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}|x_i - x_j|}{2n\sum_{i=1}^{n}x_i}$



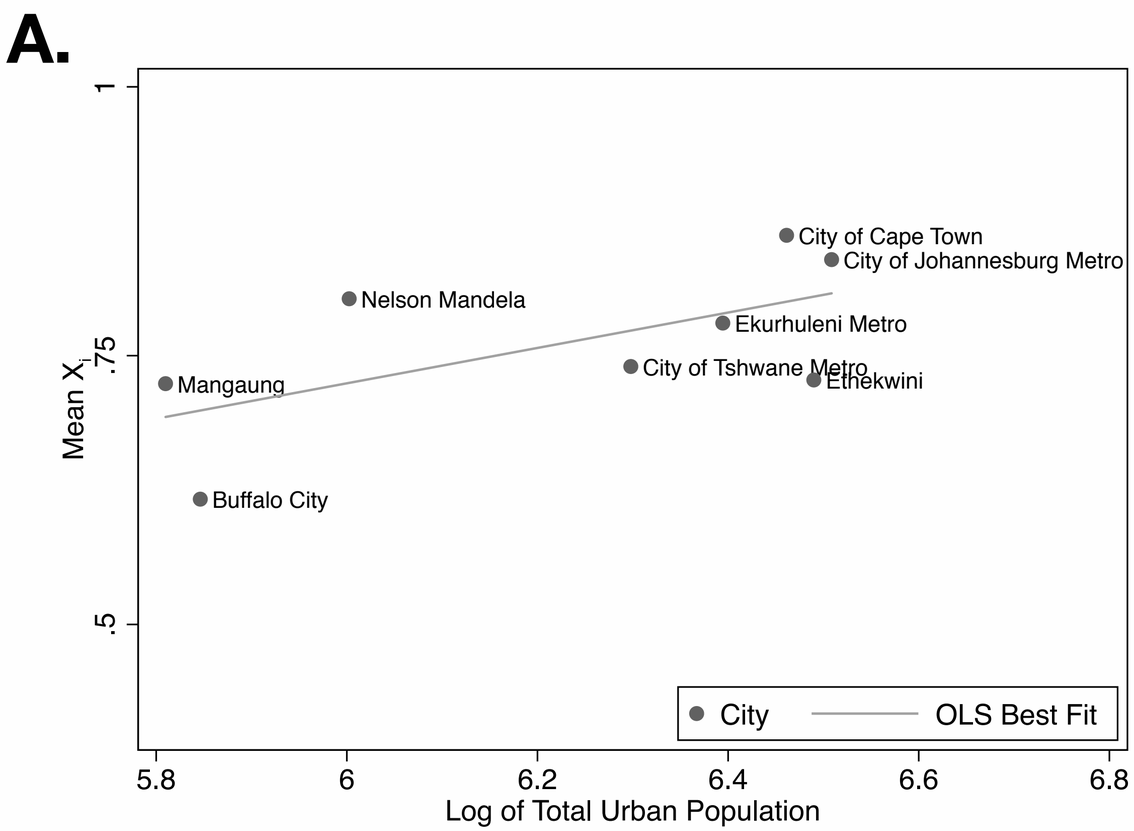
Spatial sorting and inequality

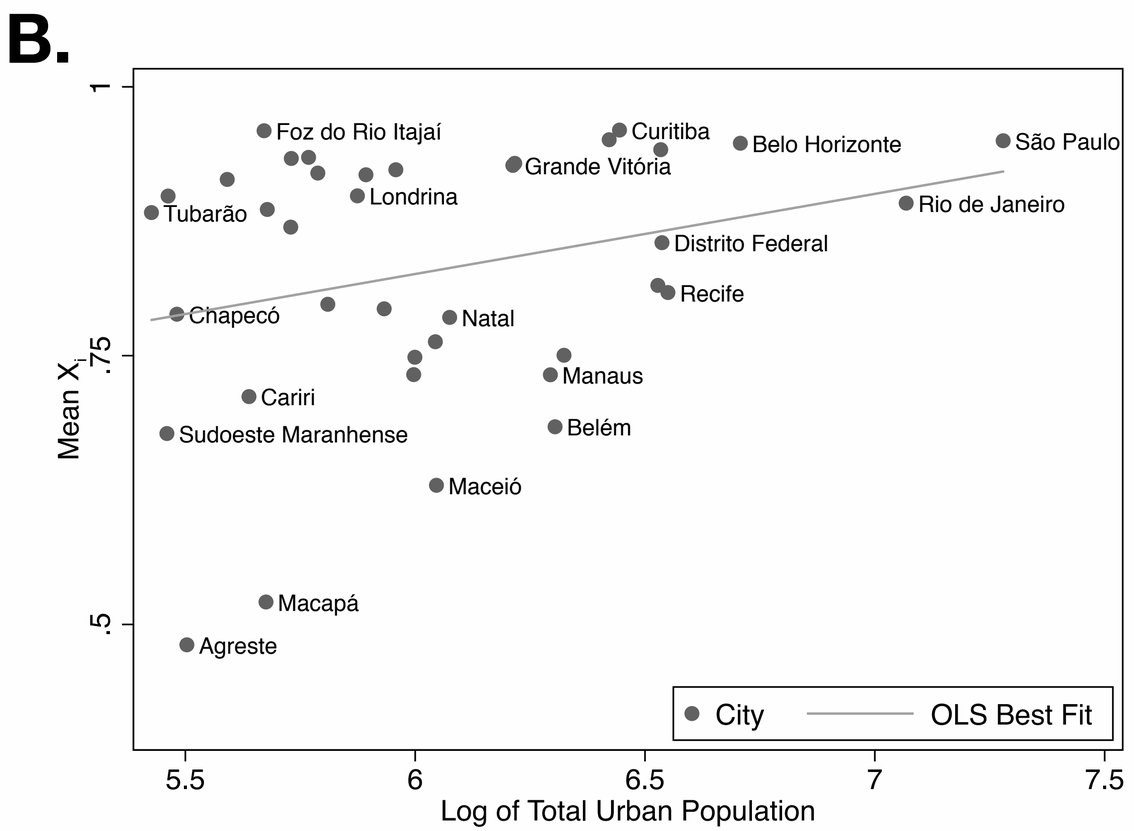
Same inequality

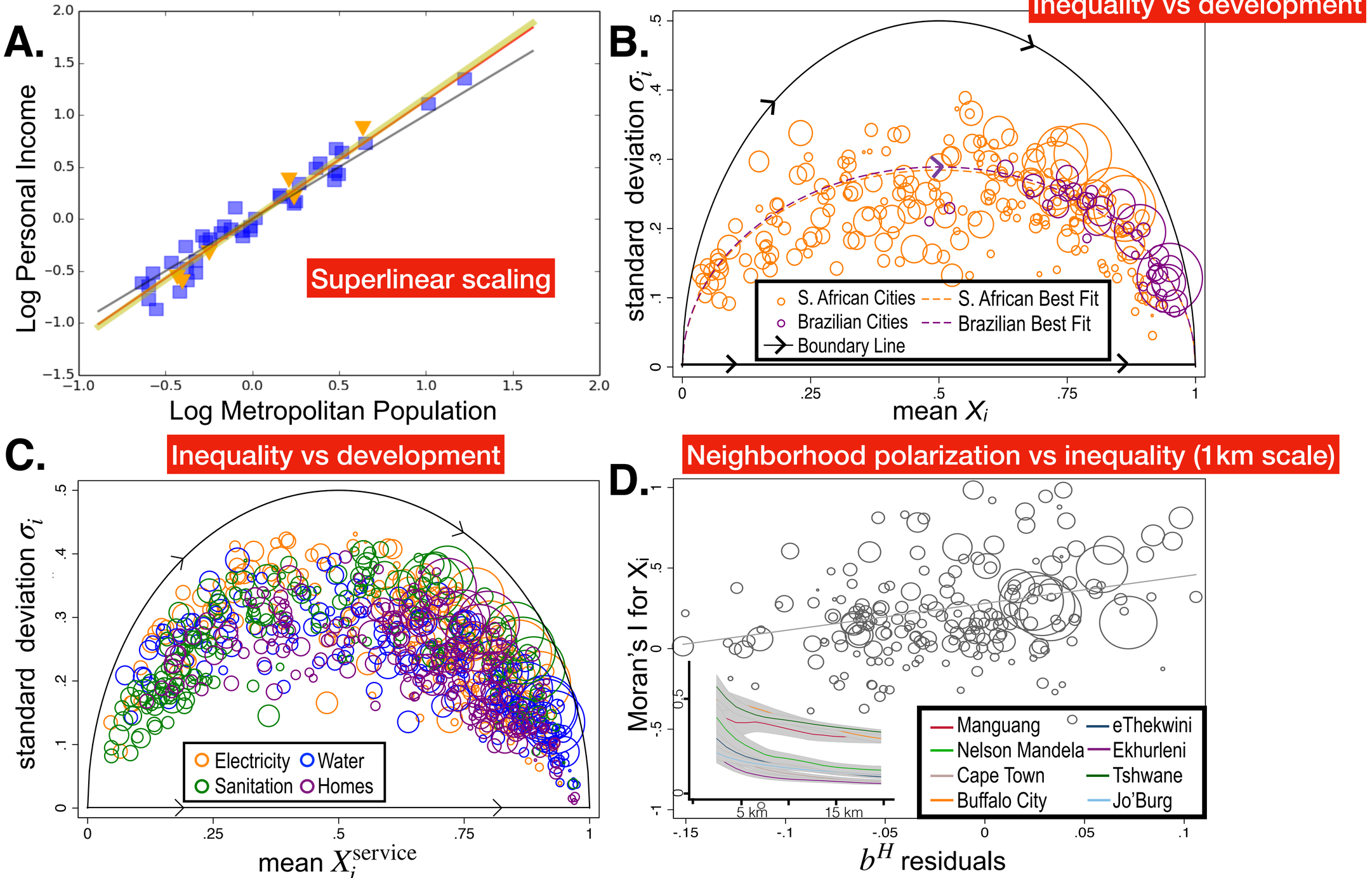
Same inequality



City size effect

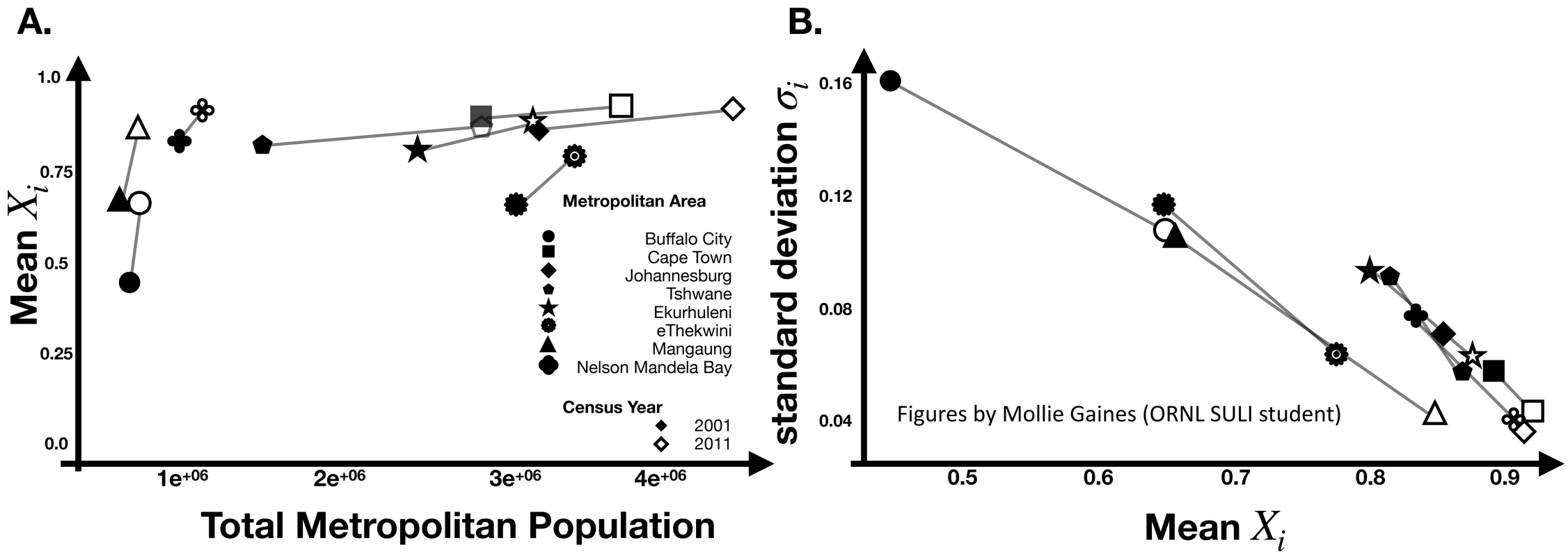





A.
Log Personal Income
Log Metropolitan Population
Superlinear scaling
B.
Inequality vs development
standard deviation σ_i
mean X_i
S. African Cities
Brazilian Cities
Boundary Line
S. African Best Fit
Brazilian Best Fit
C.
Inequality vs development
standard deviation σ_i
mean $X_i^{service}$
Electricity
Water
Sanitation
Homes
D.
Neighborhood polarization vs inequality (1km scale)
Moran's I for X_i
b^H residuals
5 km
15 km
Manguang
Nelson Mandela
Cape Town
Buffalo City
eThekwini
Ekhurleni
Tshwane
Jo'Burg

Development and reduction of inequality

More people gain services down the urban hierarchy over time



Innovations typically travel down the urban hierarchy from larger to smaller cities