TEXAS
Department of
State Health Services

Geocoding and Linking HIV Data

Sonia Arbona, PhD, Jennifer Chase, MSPH, Miranda Fanning, MPH
Praveen Pannala, MD, MPH, Sharon Melville, MD, MPH

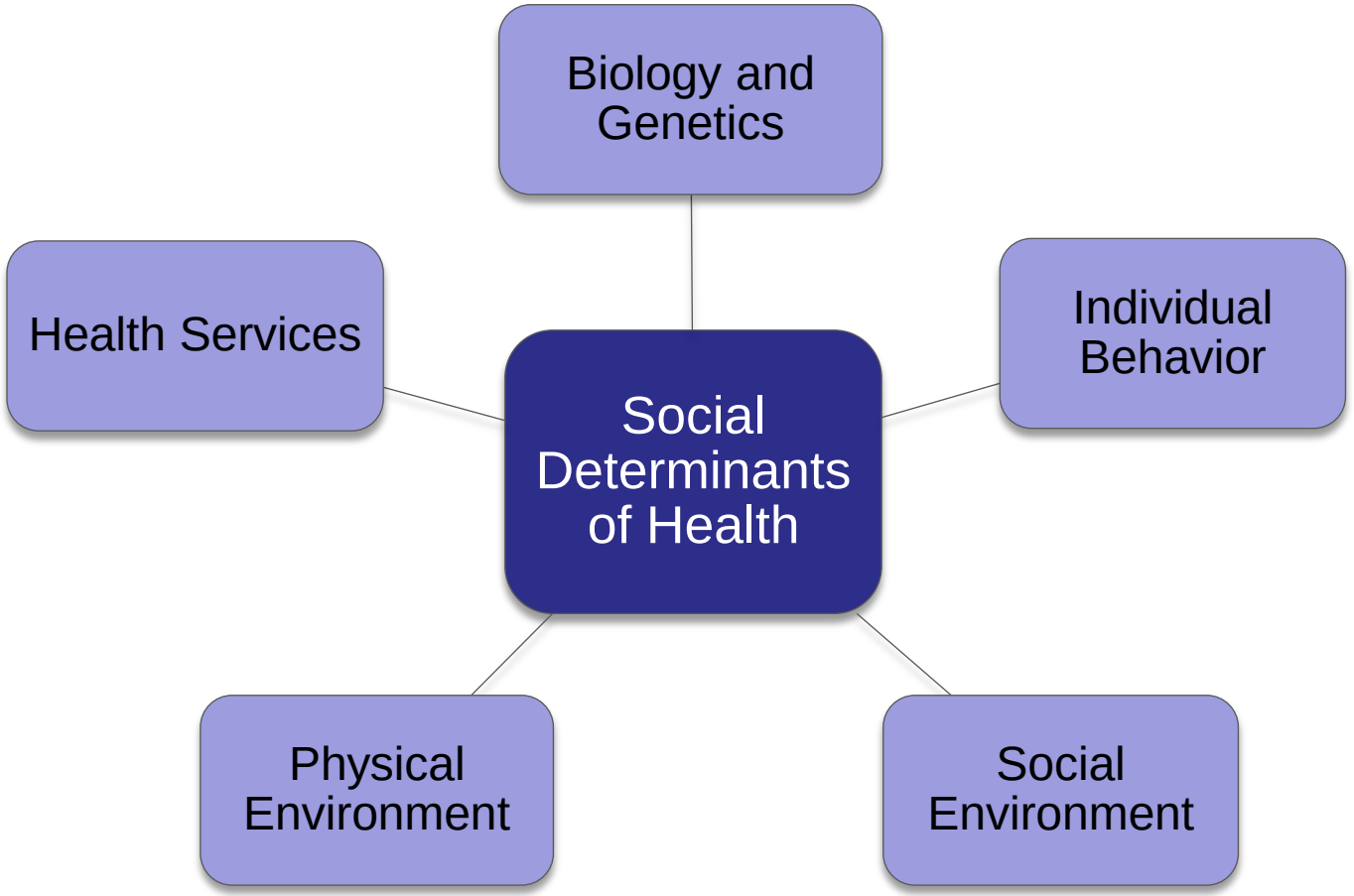
TB/HIV/STD Epidemiology & Surveillance Branch
Texas Department of State Health Services
October, 2012

CDC GLAHD

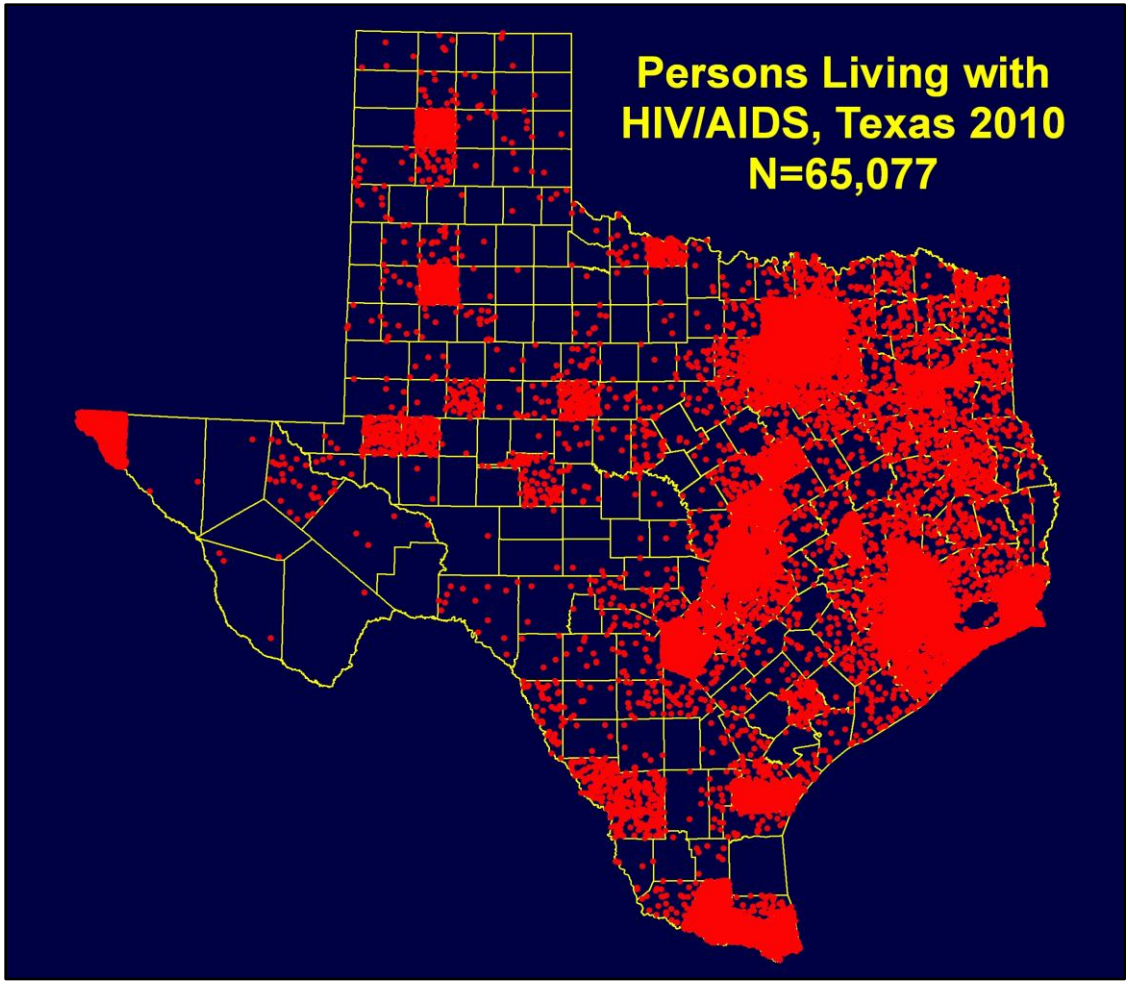
Geocoding and Linking Activities with HIV Data (GLAHD)

- Capture, store, analyze, and spatially display data
- Link geocoded HIV data to other data
- Enhance understanding of social determinants of health (SDH) affecting communities impacted by HIV

Social Determinants of Health



Distribution of PLWH in 2010

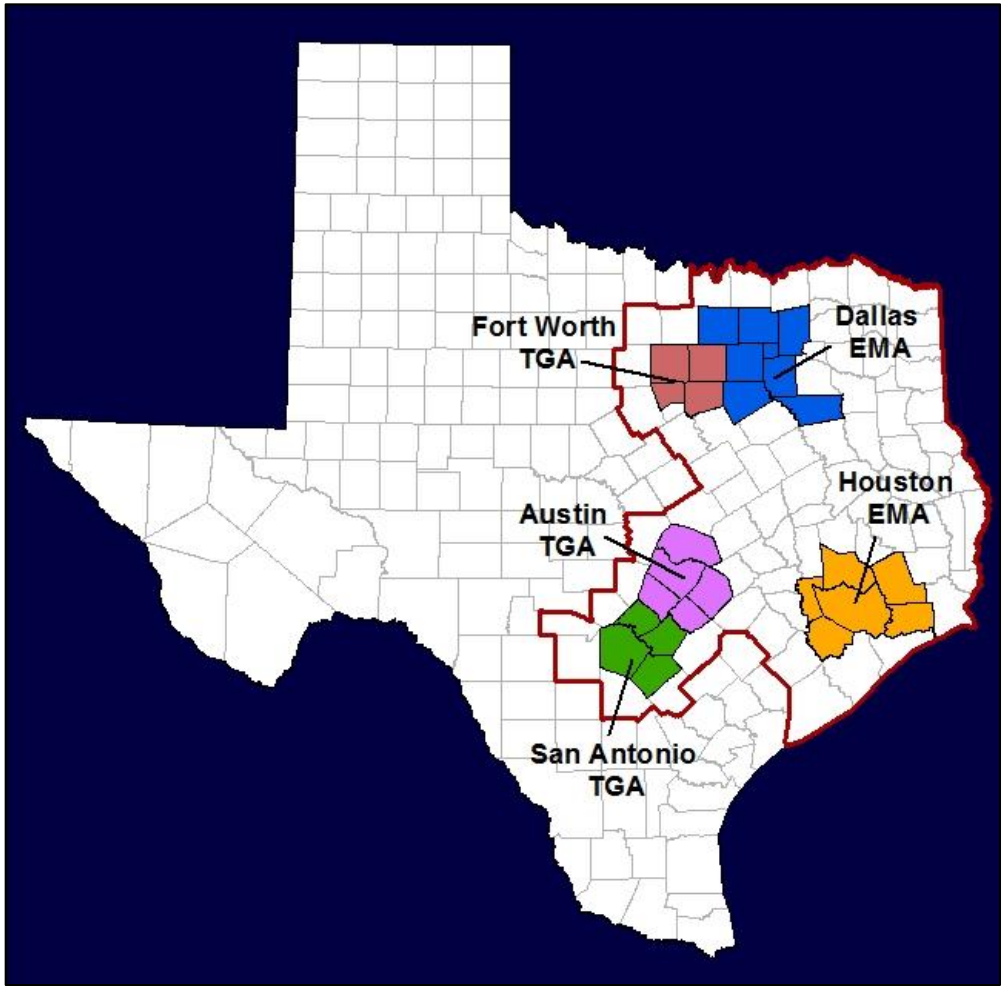


TEXAS
Department of
State Health Services

What do we want to do?

- Explore how varying magnitudes of socioeconomic conditions are related spatially to varying rates of PLWH
- Emphasis on local spatial correlation

EMAs and TGAs Study Area



TEXAS
Department of
State Health Services

What are the steps?

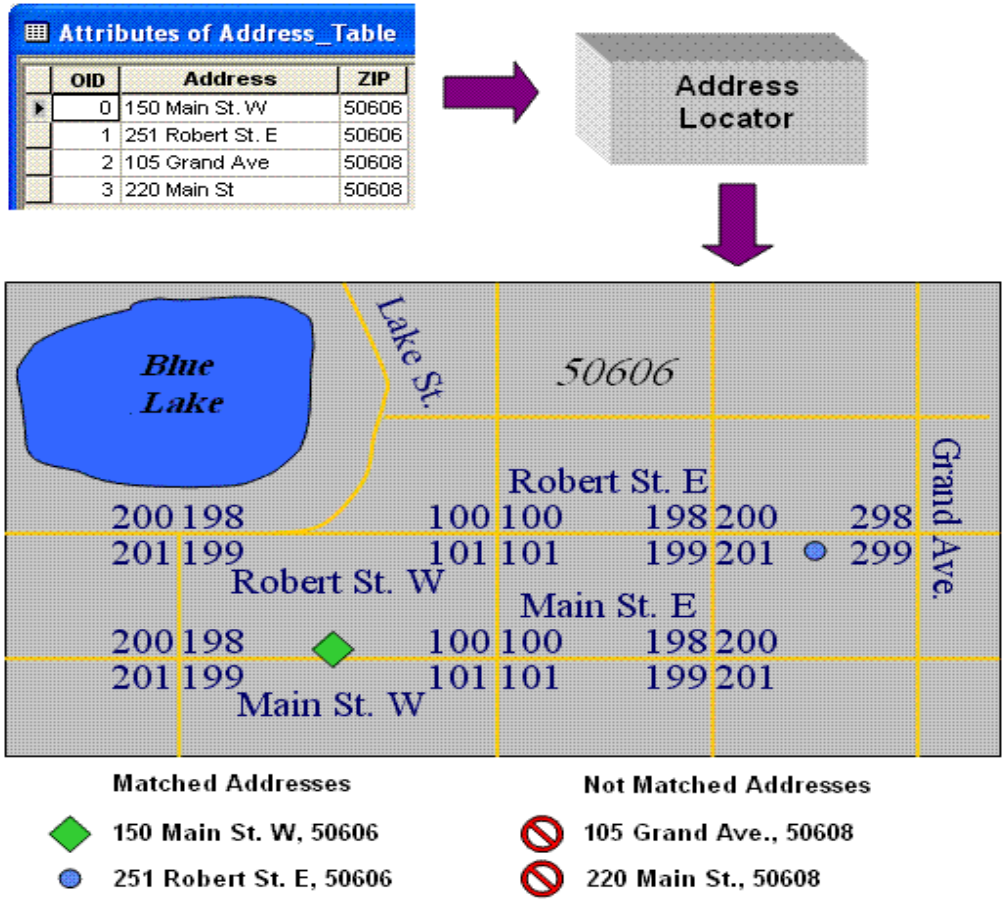
Geocode current address of PLWH in ArcGIS and Centrus

Aggregate addresses of PLWH by census tract

Select SDH variables by census tract

Conduct local spatial correlation in GeoDa

Geocoding



Source: http://resources.esri.com/help/9.3/arcgisdesktop/com/gp_toolref/geocoding_tools/geocode_addresses_geocoding_.htm

Geocoding

Geocoded addresses have coordinates (latitude and longitude) assigned to them

Original address:

Street	ZIP
1100 W 49th St	78756

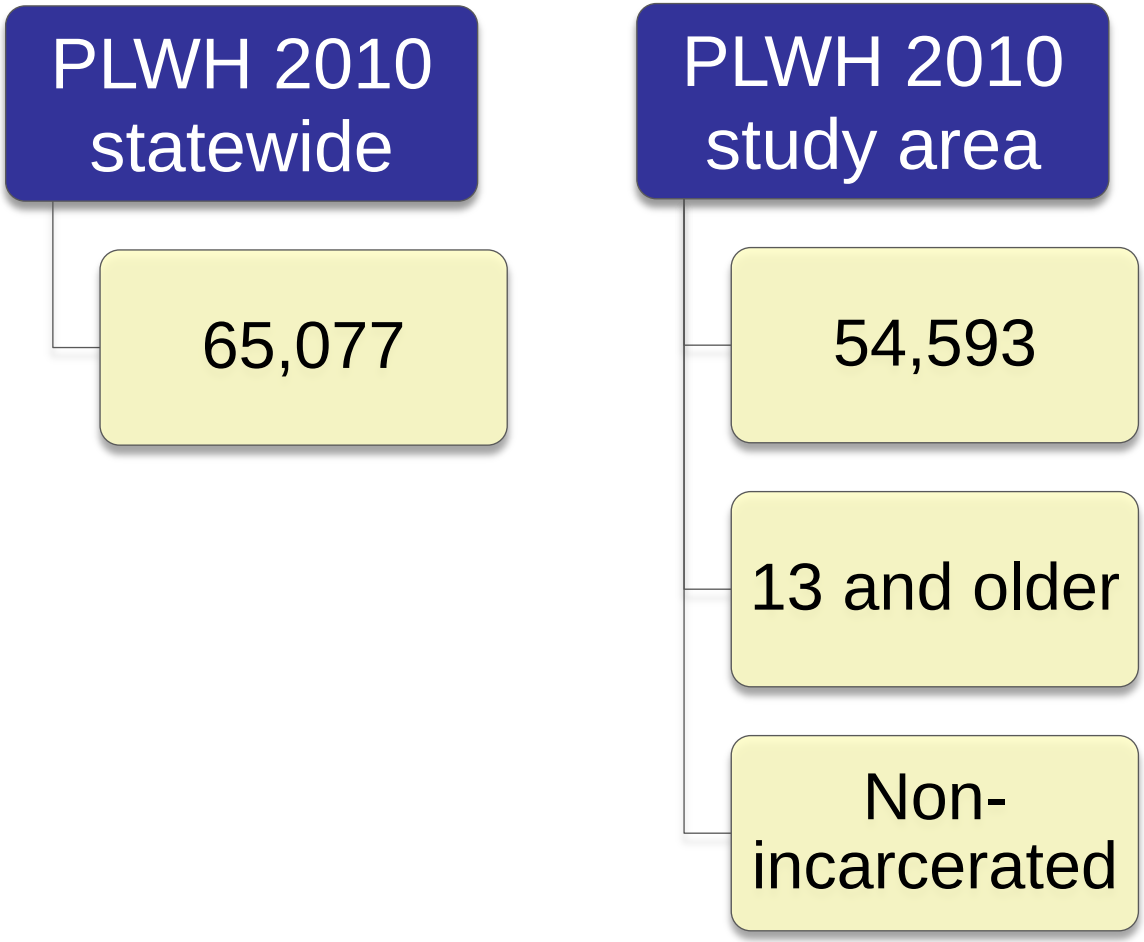
Geocoded address:

Street	ZIP	Latitude	Longitude
1100 W 49th St	78756	30.8215	-97.735514

SDH variables

- 18+ with less than 9th grade schooling
- 16+ in workforce and unemployed
- 25+ living below national poverty level

PLWH in 2010


PLWH 2010 statewide
65,077
PLWH 2010 study area
54,593
13 and older
Non-incarcerated

Moran's *I* Statistic (Global)

Univariate analysis (autocorrelation)

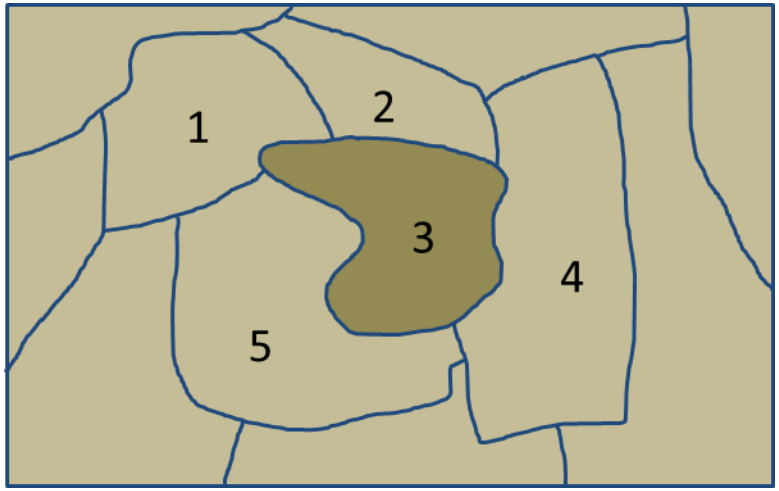
- the degree to which values of a variable are similar among locations in close proximity

Bivariate analysis

- the degree to which values of one variable are similar to values of another variable among locations in close proximity

Weight matrix

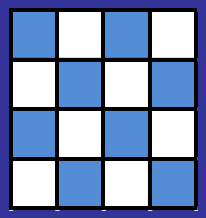
- Structure of the neighbors of each location
- Can be specified in several ways
  - ✓ Example: First-order contiguity or immediate neighbors



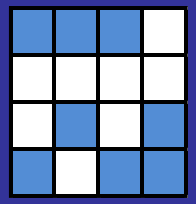
Census Tract	Variable (e.g. rate)	Weighted rate
1	184	198
2	341	173
3	168	201
4	149	162
5	129	170

201 = (184 + 341 + 149 + 129) / 4

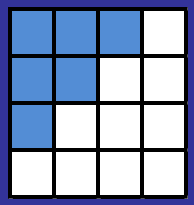
Moran's *I* values



-1
dispersion



0
random pattern



1
correlation

Variable	Moran's *I*
PLWH rate	0.55
% below poverty level	0.30
% school < 9th grade	0.60
% unemployment	0.30

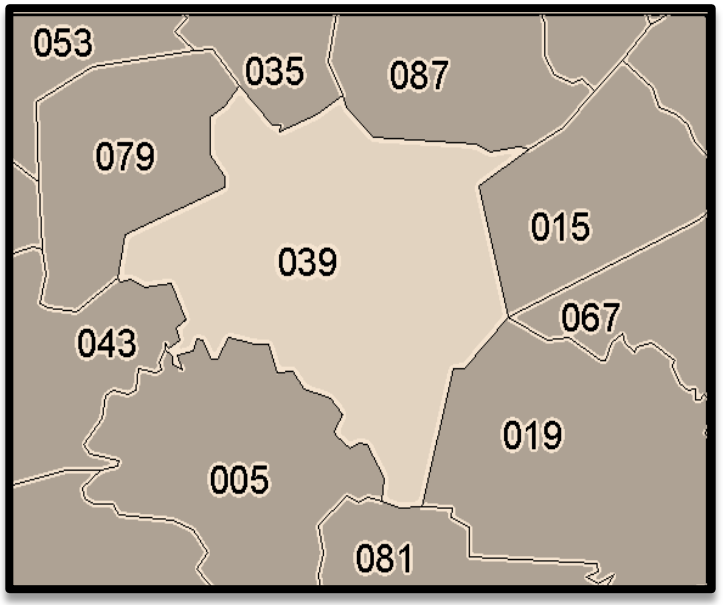
TEXAS Department of State Health Services

Local Indicator of Spatial Association (LISA)

Calculation of local Moran's I for each spatial unit

Unit of analysis

- **neighborhood of census tracts**



TEXAS Department of State Health Services

Bivariate LISA

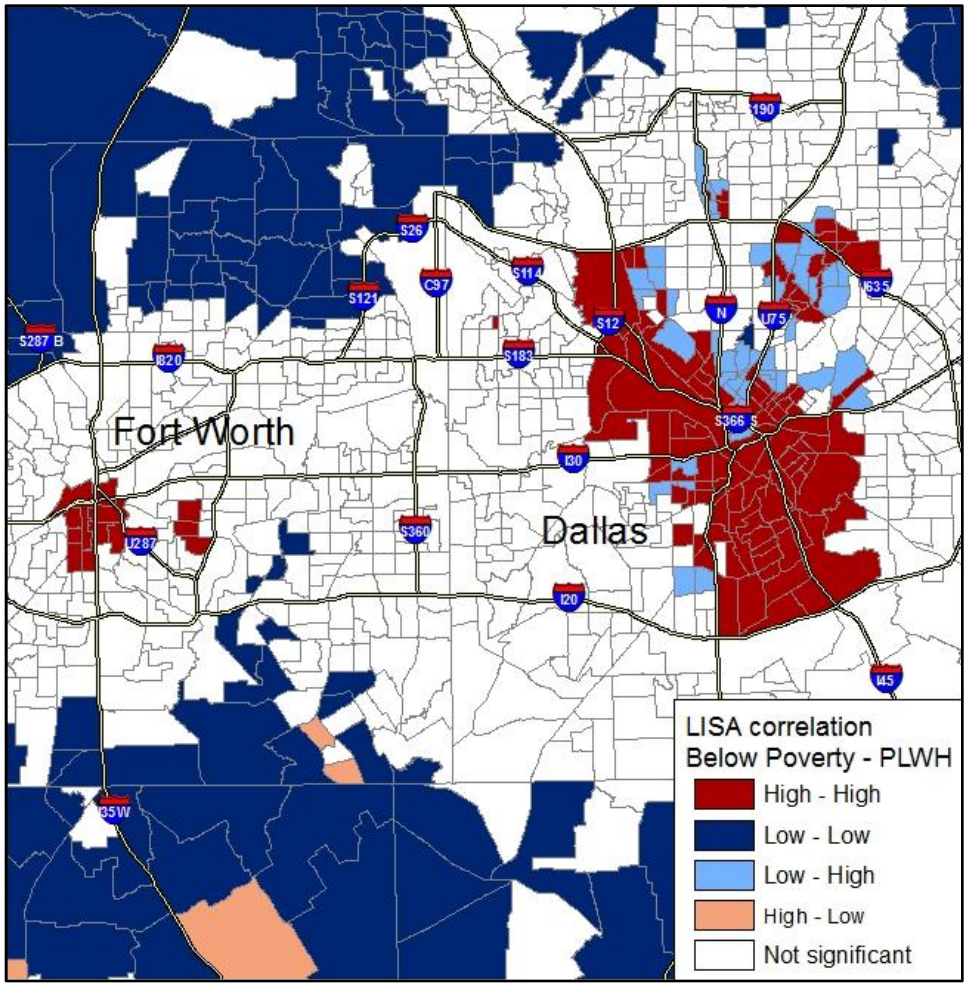
- Association between a pair of variables
- LISA value for each feature (census tract)
- Permutation value = 9999
- Statistically significance $p<0.05$

LISA Maps

Bivariate LISA maps for each pair of variables, the Rate of PLWH and one SDH:

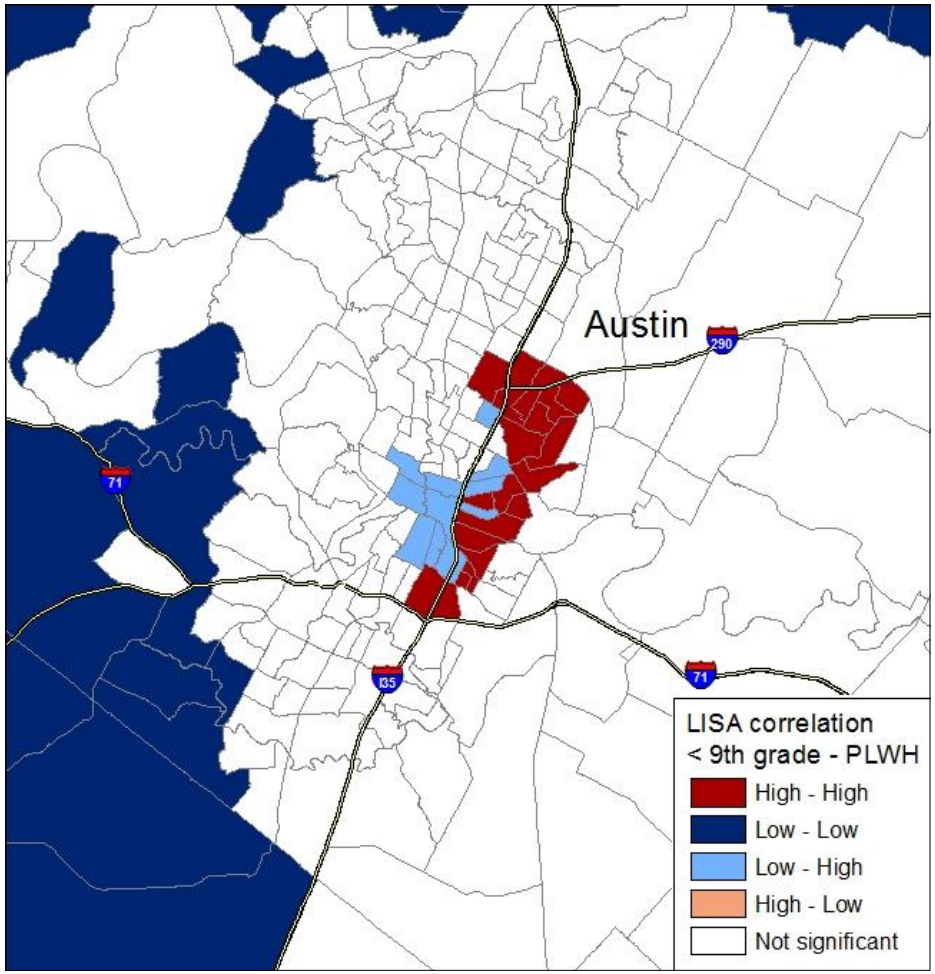
- Percent Less than 9th grade schooling
- Percent Below Poverty Level
- Percent Unemployment

Percent Below Poverty Level and Rate PLWH in Dallas and Ft Worth, TX



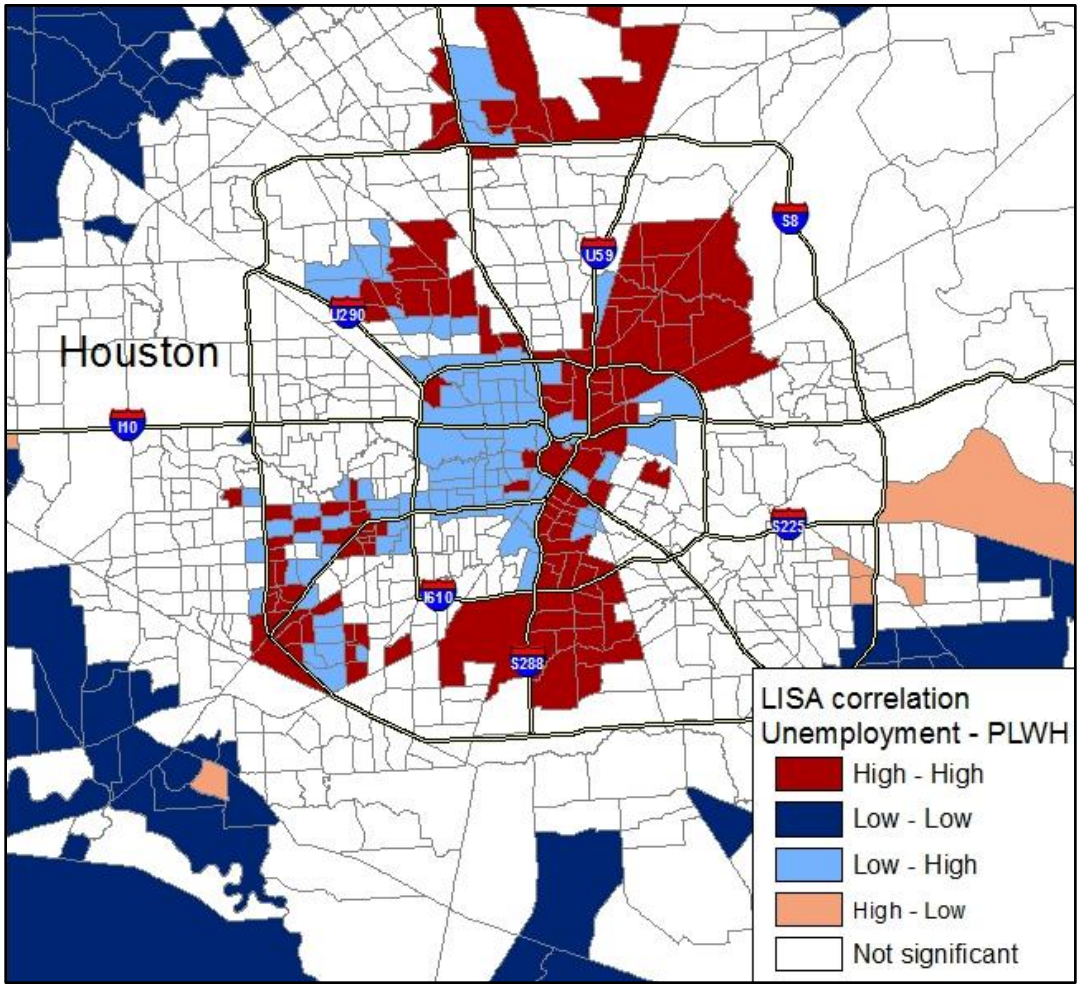
TEXAS Department of State Health Services

Percent < 9th grade and Rate PLWH in Austin, TX



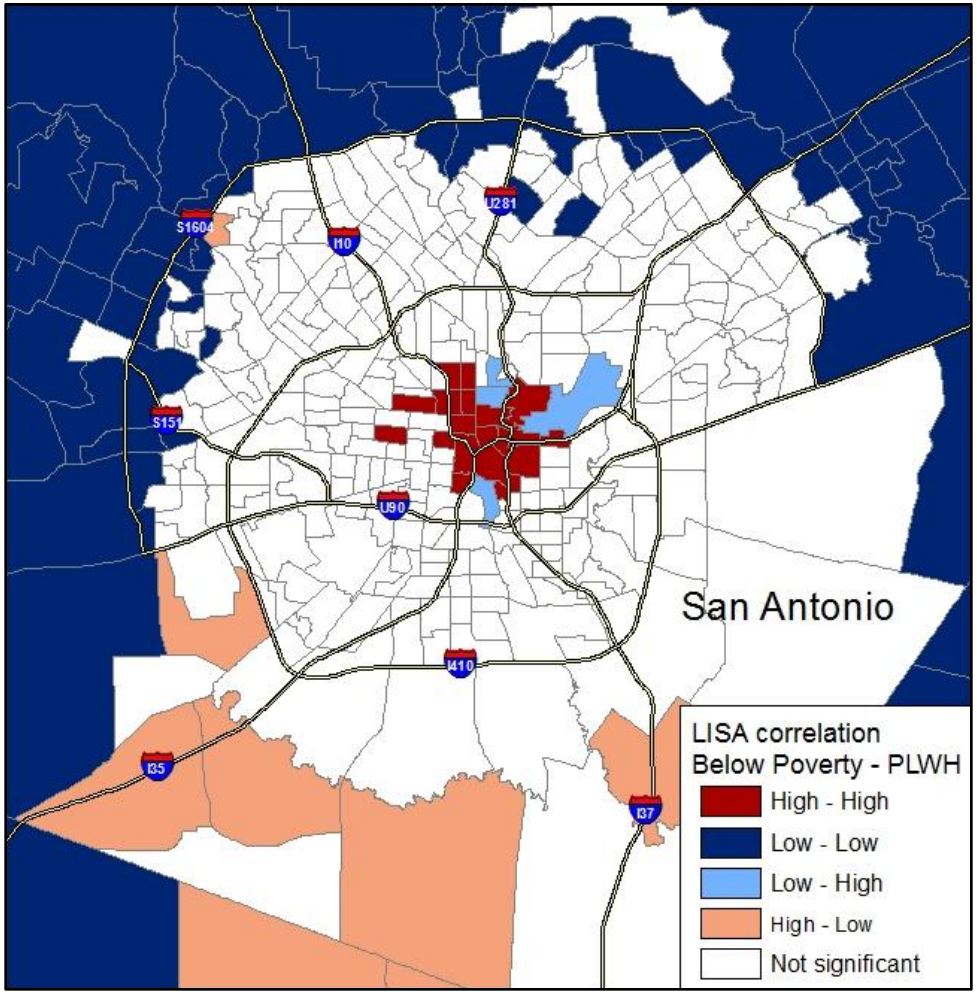
TEXAS Department of State Health Services

Percent Unemployment and Rate PLWH in Houston, TX



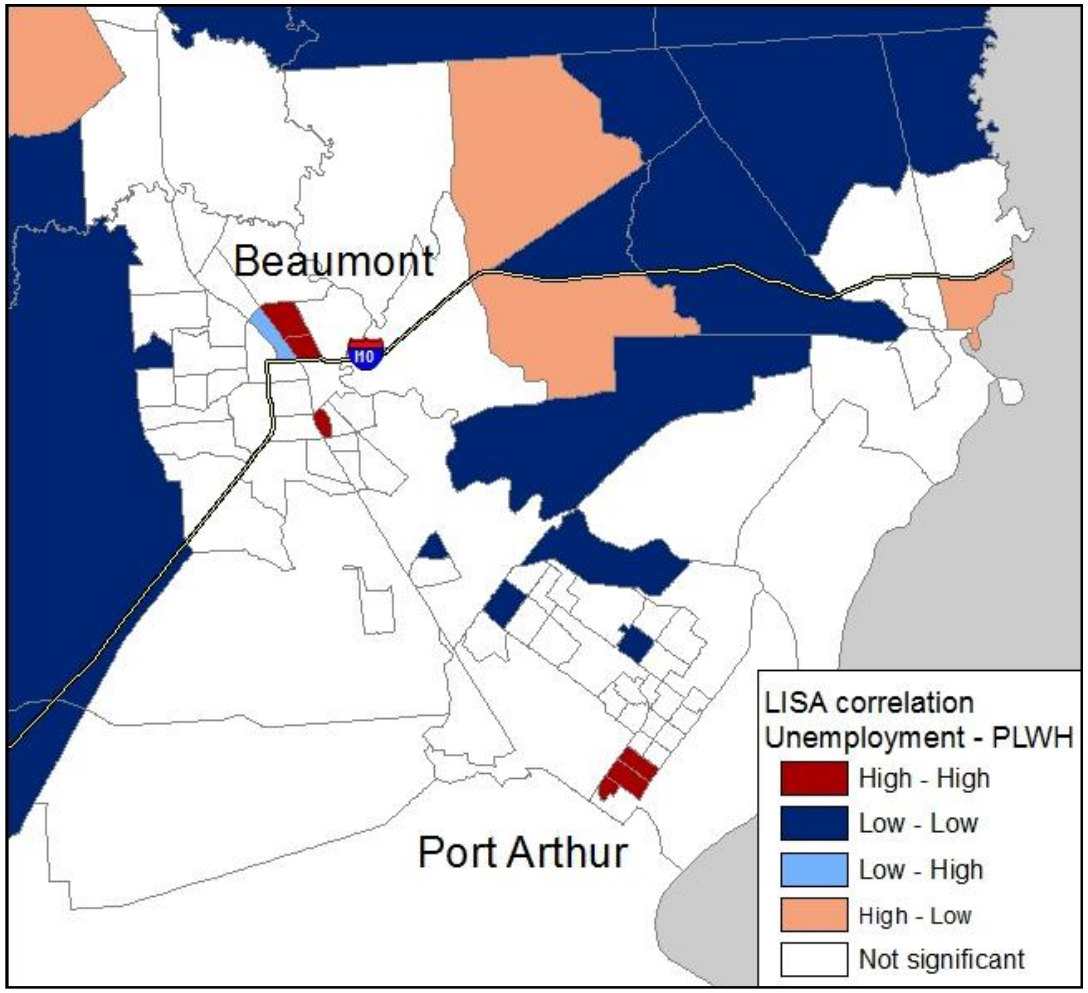
TEXAS Department of State Health Services

Percent Below Poverty Level and Rate PLWH in San Antonio, TX



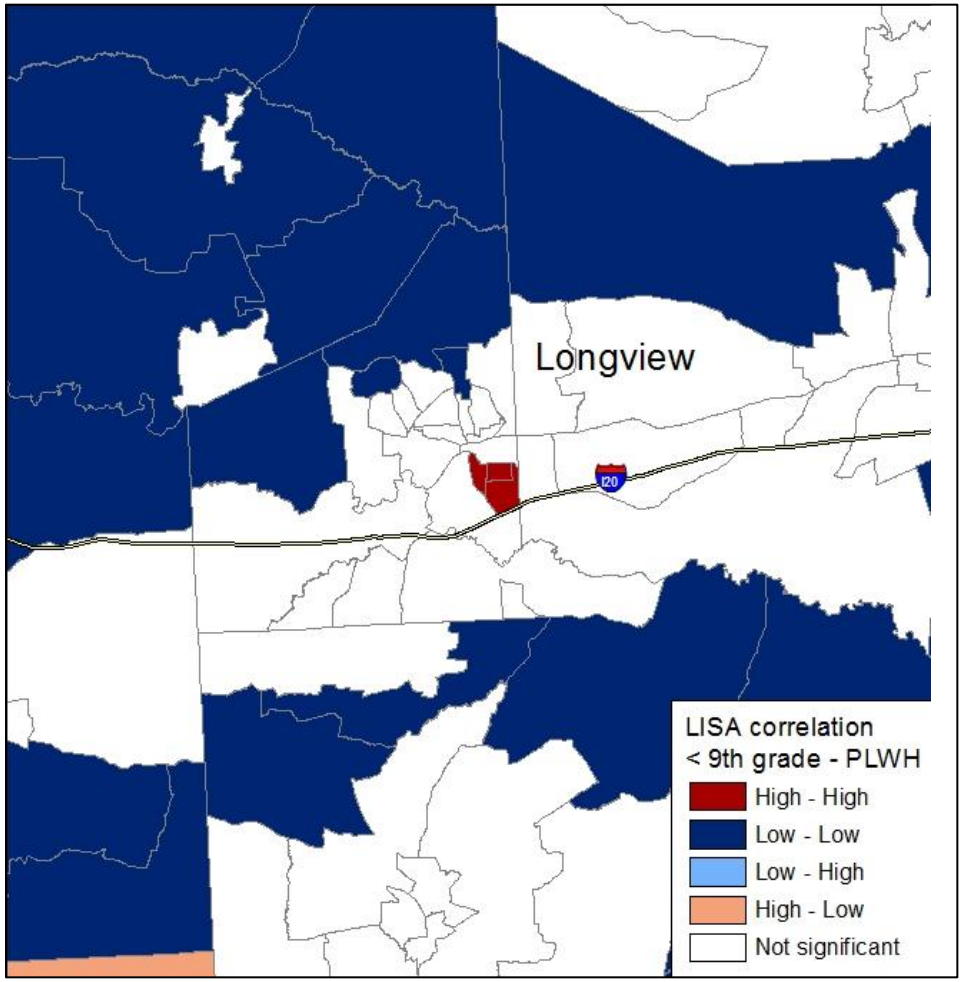
TEXAS Department of State Health Services

Percent Unemployment and Rate PLWH in Beaumont - Port Arthur, TX



TEXAS Department of State Health Services

Percent < 9th grade and Rate PLWH in Longview, TX



TEXAS Department of State Health Services

What did we learn?

LISA maps highlighted areas of increase vulnerability

- Small areas maybe overlooked in larger regional context

Areas with similar measures of SDHs experience different magnitude of PLWH

- There are likely to be other key factors that need to be considered

Limitations

SDH variables are limited to predefined geographies

- Usually not collected at the neighborhood scale

Dependence on the overall mean

- Associations are relative to regional averages

Implications

LISA map distributions suggest spatial structure, do not explain

- More detailed local analyses needed to refine understanding of relationships

Area-level measures do provide a measure of the local context

- Suggest local conditions that contribute to community-level health outcomes