

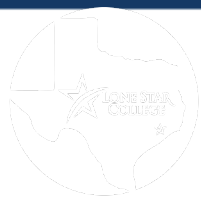


# **Analytics and Institutional Research**

## **Using Spatial Analysis to Build a Profile of Students**

TAIR | February 28, 2023

Presented by: Tiffany Enriquez and Trudi White



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Research

# Introduction

# Background

## LSC Campus Enrollment Analysis Reports

- Disseminated each term to Campus Presidents

### **Enrollment Data**

- Headcount
- **Typical Student [Age, Gender, Race]**
- Completion and Success rates
- Year over Year Comparisons
- Top courses taken



## Purpose

Provide  
comprehensive  
data about the  
**“Typical Student”**  
attending the LSC  
Campus

# Spatial Analysis



# Spatial Analysis

- Can reveal socioeconomic information about students living in a region
- Expose the quality of life



*Class is more than just income... What doesn't change is your education level, your occupation or the neighborhood you live in.” --Rakesh Kochhar, senior researcher at the Pew Research Center.*

<https://money.usnews.com/money/personal-finance/family-finance/articles/where-do-i-fall-in-the-american-economic-class-system>



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## Objectives

Learn the basics of representing students' home address spatially using ArcGIS

Extrapolate insights from student geocoded addresses with census selected socioeconomic data





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# Method



# Data Used

## Campus Data

- Location Addresses

## Student Data

- Student Addresses
- Student Program Campus
- Student Program Plan
- Student Demographics [Age, Race, Gender]

## Socioeconomic Data (US Census Bureau)

- Educational Attainment
- Income [Median Household Income, Area Median Income, Low-income Tracts,
- Housing Type

## Geographic Data

- County Boundaries
- Census Tracts



# Tools

## GIS Software

- ArcGIS Pro

## **\*\*Free\*\*** Geocoding Tool

- Census Geocoding Tool



# Sources

## GIS Software

- ESRI

## **\*\*Free\*\*** Geocoding Tool

- Census Bureau

## Socioeconomic Data

- American Community Survey
- National Historical Geographic Information System

## Geographic Data

- National Historical Geographic Information System
- Census Bureau Shapefiles



# Process

## Geocode Addresses

- Clean up
  - Approximately 11% of addresses had no geocode match and were removed
  - Geocoding is proximal to a direct address and not exact
  - Removed student identification numbers

## Joined Geographic and Attribute Census Data Tables

- Census Tracts Joined with Educational Attainment, Area Median Income, Housing Data and Occupational Data and Population
- Make sure data is correct time range and boundaries
- Geographic joins completed in ArcGIS Pro

Source.Name	LONGITUDE	LATITUDE	Age	Race	Gender	Program College	AcademicPlan	Academic Plan Dual Cred Prior DC?	High School
GeocodeResultsKin	-95.22040425	30.07556205	55	White	M	LSC-Kingwood	AAS_CNCI	Comp Ntwrk Sp (blank)	(blank) New Caney High Sch
GeocodeResultsNo	-95.17730785	30.01217613	69	White	F	LSC-North Harris	ND_CSUL	Non-Degree Se (blank)	(blank) Brazoswood High Sch
GeocodeResultsHo	-95.1601157	30.18756106	53	White	F	LSC-Kingwood	AA_LIBA	Associate of Ar (blank)	(blank) New Caney High Sch
GeocodeResultsKin	-95.2116151	30.12593172	56	White	M	LSC-Kingwood	AAS_FSCST	Fire Science Te (blank)	(blank) GED Texas

GISJOIN, YEAR, STUSAB, REGIONA, DIVISIONA, STATE, STATEA, COUNTY, COUNTYA, COUSUBA, PLA	
TRACTA, BLKGRPA, CONCITA, AIANHHA, RES_ONLYA, TRUSTA, AIHHTLI, AITSCEA, ANRCA, CBSAA, C	
METDIVA, NECTAA, CNECTAA, NECTADIVA, UAA, CDCURRA, SLDUA, SLDLA, ZCTA5A, SUBMCDA, SDELM	
SECA, SDUNIA, PCI, PUMAA, GEOID, BTTRA, BTBGA, NAME_E, AMR8E001, NAME_M, AMR8M001	
G0100010020100, 2016-2020, AL, , , Alabama, 1, Autauga	
County, 1, , , 20100, , , , , , , , , , 14000US01001020100, , , "Census Tract	
Autauga County, Alabama", 60388, "Census Tract 201, Autauga County, Alabama", 96	
G0100010020200, 2016-2020, AL, , , Alabama, 1, Autauga	
County, 1, , , 20200, , , , , , , , , , 14000US01001020200, , , "Census Tract	
Autauga County, Alabama", 49144, "Census Tract 202, Autauga County, Alabama", 34	
G0100010020300, 2016-2020, AL, , , Alabama, 1, Autauga	
County, 1, , , 20300, , , , , , , , , , 14000US01001020300, , , "Census Tract	
Autauga County, Alabama", 62423, "Census Tract 203, Autauga County, Alabama", 98	
G0100010020400, 2016-2020, AL, , , Alabama, 1, Autauga	
County, 1, , , 20400, , , , , , , , , , 14000US01001020400, , , "Census Tract	
Autauga County, Alabama", 41807, "Census Tract 204, Autauga County, Alabama", 98	
G0100010020501, 2016-2020, AL, , , Alabama, 1, Autauga	
County, 1, , , 20501, , , , , , , , , , 14000US01001020501, , , "Census Tract	
Autauga County, Alabama", 41807, "Census Tract 205, Autauga County, Alabama", 98	
G0100010020502, 2016-2020, AL, , , Alabama, 1, Autauga	
County, 1, , , 20502, , , , , , , , , , 14000US01001020502, , , "Census Tract	
Autauga County, Alabama", 41807, "Census Tract 205, Autauga County, Alabama", 98	
G0100010020503, 2016-2020, AL, , , Alabama, 1, Autauga	
County, 1, , , 20503, , , , , , , , , , 14000US01001020503, , , "Census Tract	
Autauga County, Alabama", 41807, "Census Tract 205, Autauga County, Alabama", 98	

Codebook for NHGIS data file 'nhgis0002\_ts\_nominal\_tract'

Contents

- Data Summary
- Data Dictionary
- Geographic Integration Methods
- Source Data
- Citation and Use

Detailed notes on time series design and comparability are available at:  
[https://www.nhgis.org/sites/www.nhgis.org/files/nhgis\\_time\\_series\\_tables.pdf](https://www.nhgis.org/sites/www.nhgis.org/files/nhgis_time_series_tables.pdf)

Data Summary

Time series layout: Time varies by column  
 Geographic level: Census Tract (by State--County)  
 Geographic integration: Nominal  
 Measurement times: 1970, 1980, 1990, 2000, 2008-2012, 2015-2019

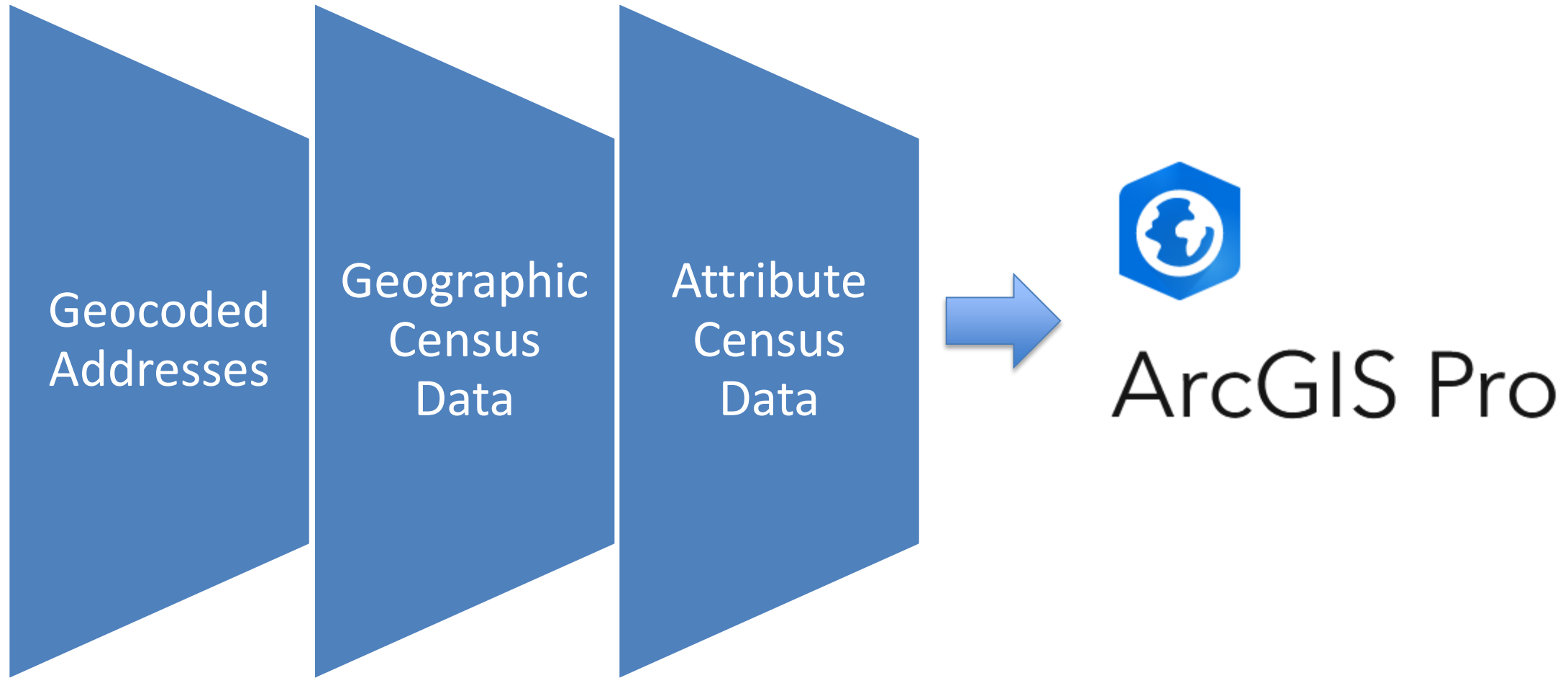
!WARNING! In a "time varies by column" layout, each row provides statistics from multiple censuses for areas that had a matching code across time. For the Census Tract geographic level, matching codes may refer to distinctly different areas in different censuses. We strongly recommend checking GIS files to determine the geographic consistency of your areas of interest for your period of interest.

Tables:

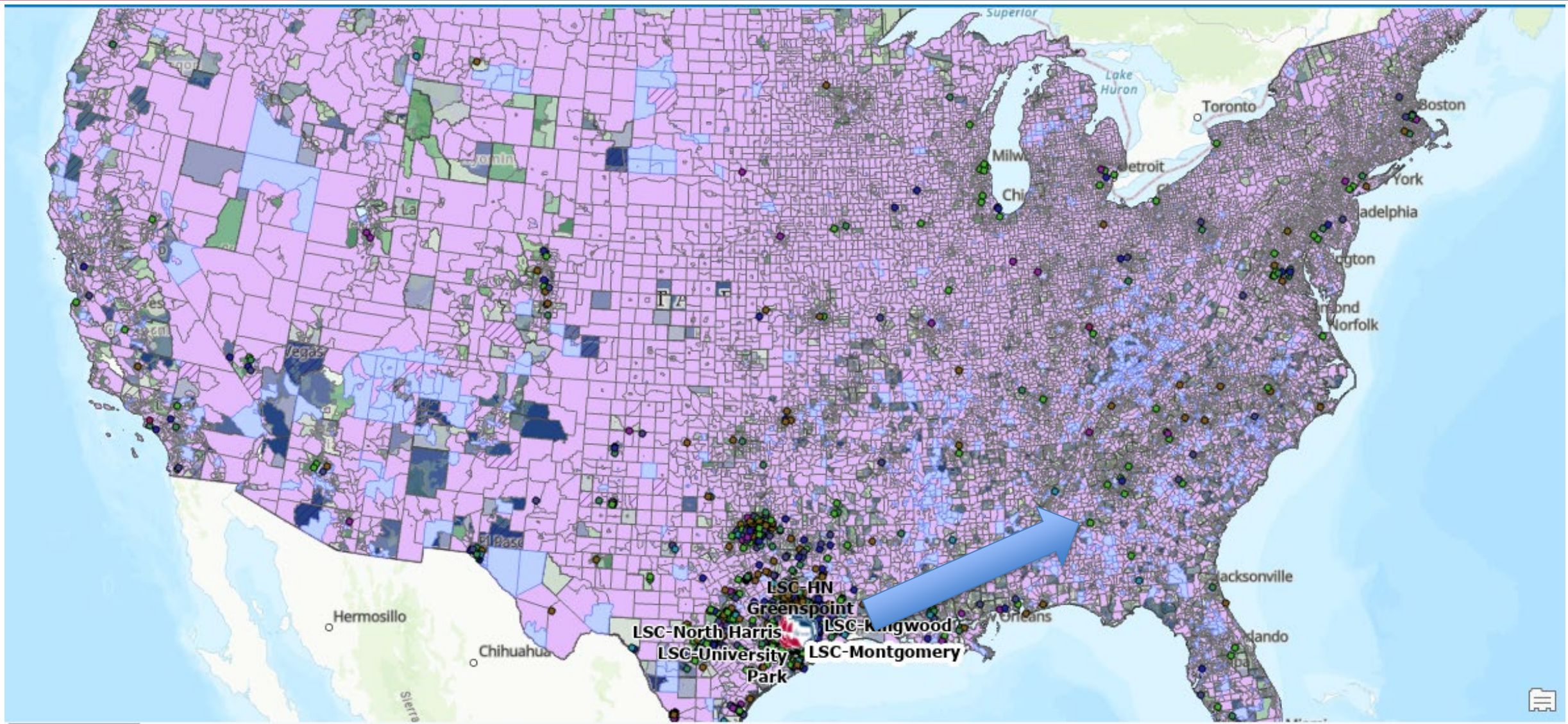
1. Persons 25 Years and Over by Educational Attainment [3]  
 Years: 1970, 1980, 1990, 2000, 2008-2012, 2015-2019  
 Code: B69



# Process







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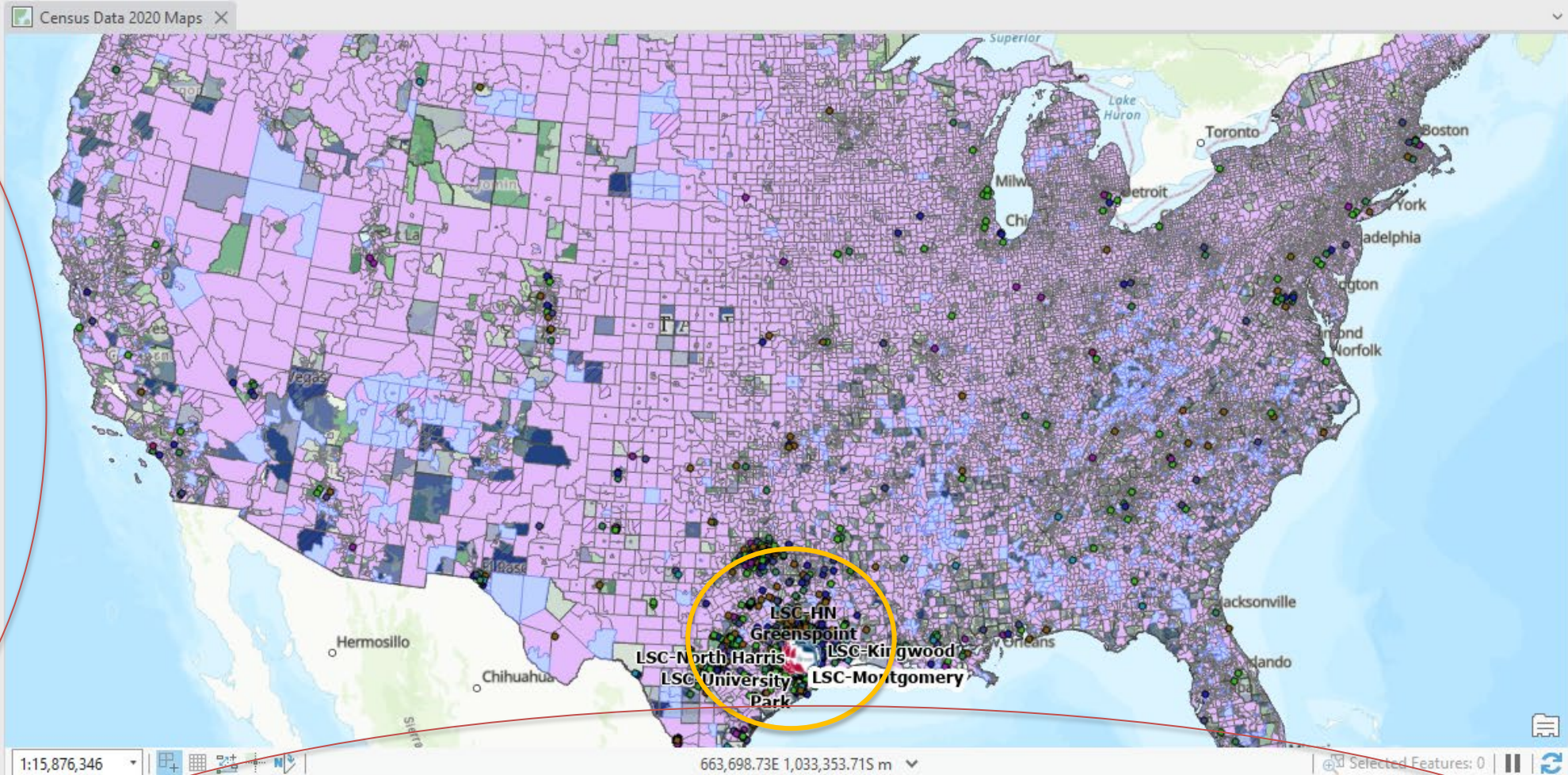
Contents

Search 



### Drawing Order

- ☒ Census Data 2020 Maps
  - ☒ Campuses
  - ☒ Students
  - ☒ Sheet1\_XYTableToPoint
  - ☒ US\_tract\_2020\_LayerQCT
  - ☒ QUALIFIED\_CENSUS\_TRACTS 2022
  - ☒ Educational Attainment 9th grade - Associate Degree
  - ☒ US\_tract\_2020
  - ☒ cb\_2020\_us\_county\_500k
  - ☒ World Topographic Map
  - ☐ World Hillshade
  - ☒ US\_tract\_2020\_MHI
- ☒ Standalone Tables

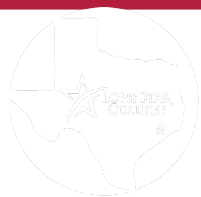


	FID	Shape	GISJOIN	STATEFP	COUNTYFP	TRACTCE	GEOID	NAME	NAMELSAD	MTFCC	FUNCSTAT	ALAND	AWATER	INTPTLAT	INTPTLON	S
1	0	Polygon	G0100010020100	01	001	020100	01001020100	201	Census Tract 201	G5020	S	9825304	28435	+32.4819731	-086.4915648	
2	1	Polygon	G0100010020200	01	001	020200	01001020200	202	Census Tract 202	G5020	S	3320818	5669	+32.4757580	-086.4724678	
3	2	Polygon	G0100010020300	01	001	020300	01001020300	203	Census Tract 203	G5020	S	5349271	9054	+32.4740243	-086.4597033	
4	3	Polygon	G0100010020400	01	001	020400	01001020400	204	Census Tract 204	G5020	S	6384282	8408	+32.4710304	-086.4448353	









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# Analysis

## Purpose Reiterated

Provide  
comprehensive  
data about the  
**“Typical Student”**  
attending the LSC  
Campus

# Spatial Analysis



# Investigative Questions

Where are our  
Students?

What do some of the  
socioeconomic  
factors look like in  
their neighborhood?

Does Census Data  
line up with the data  
LSC has?

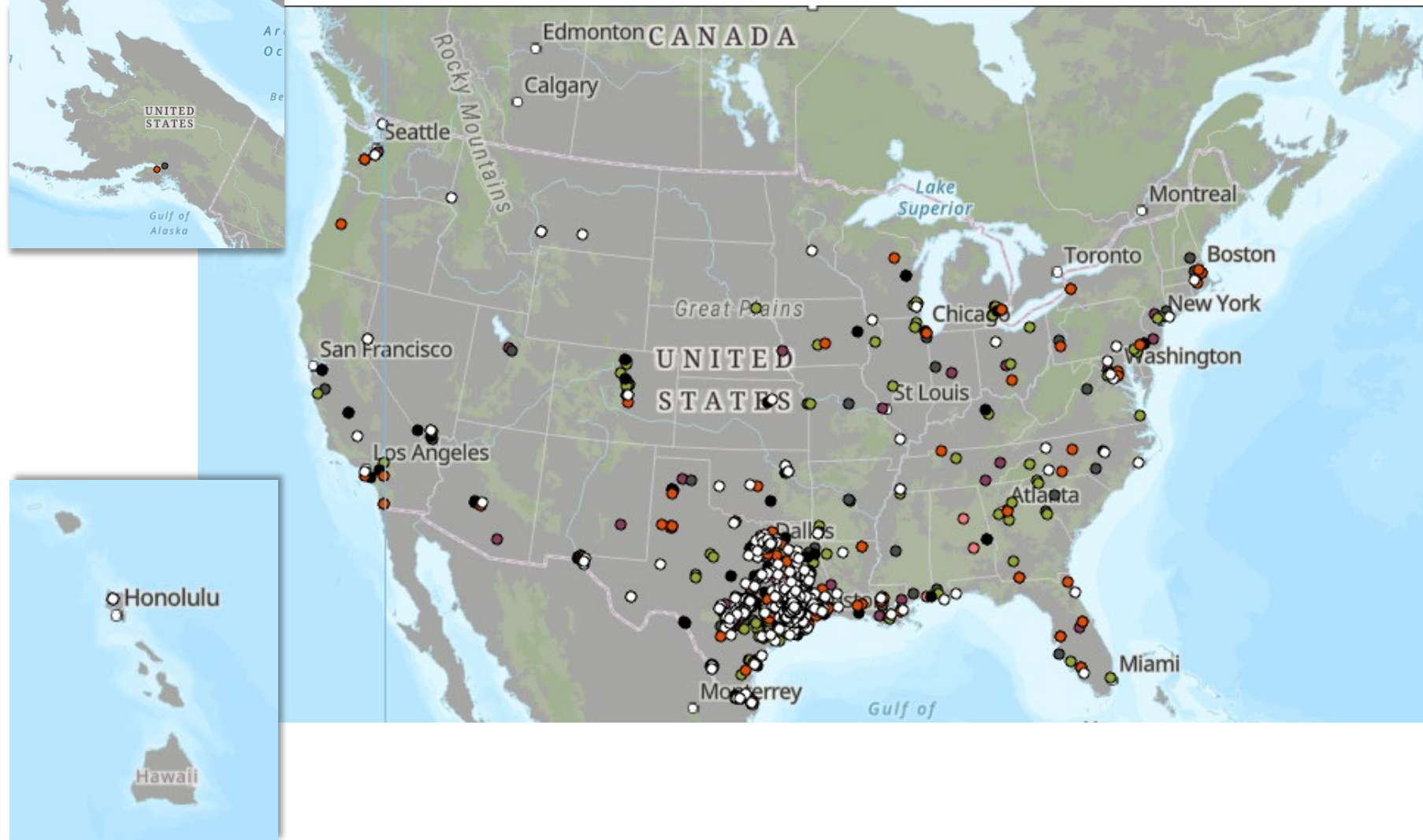


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# Where are our Students?

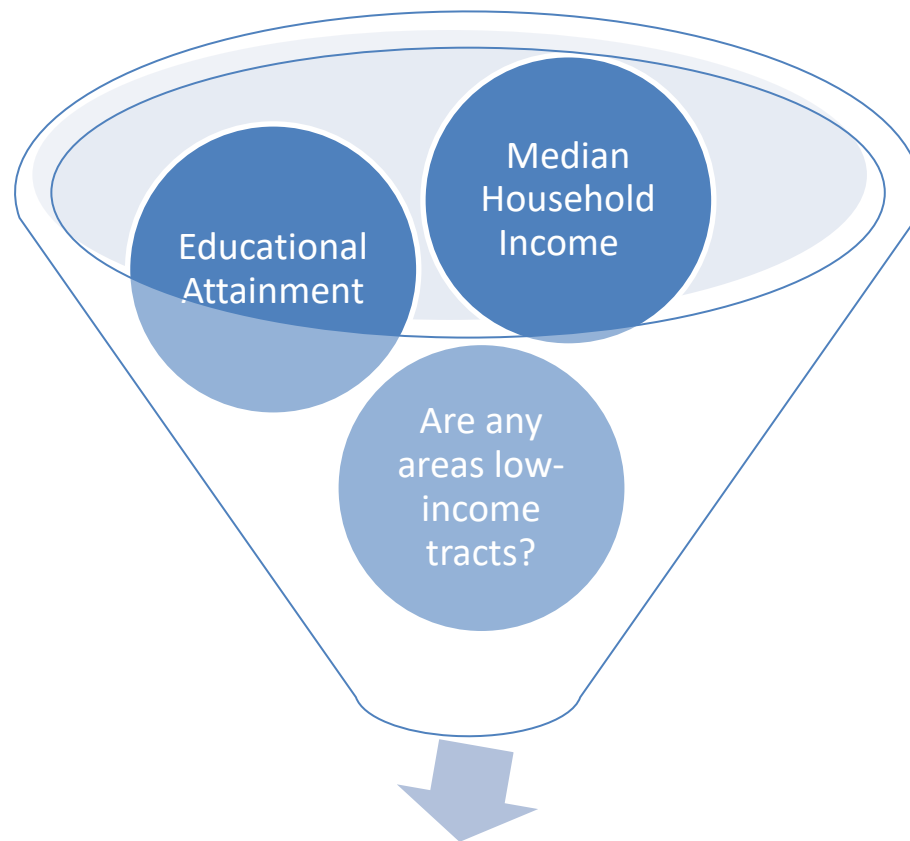


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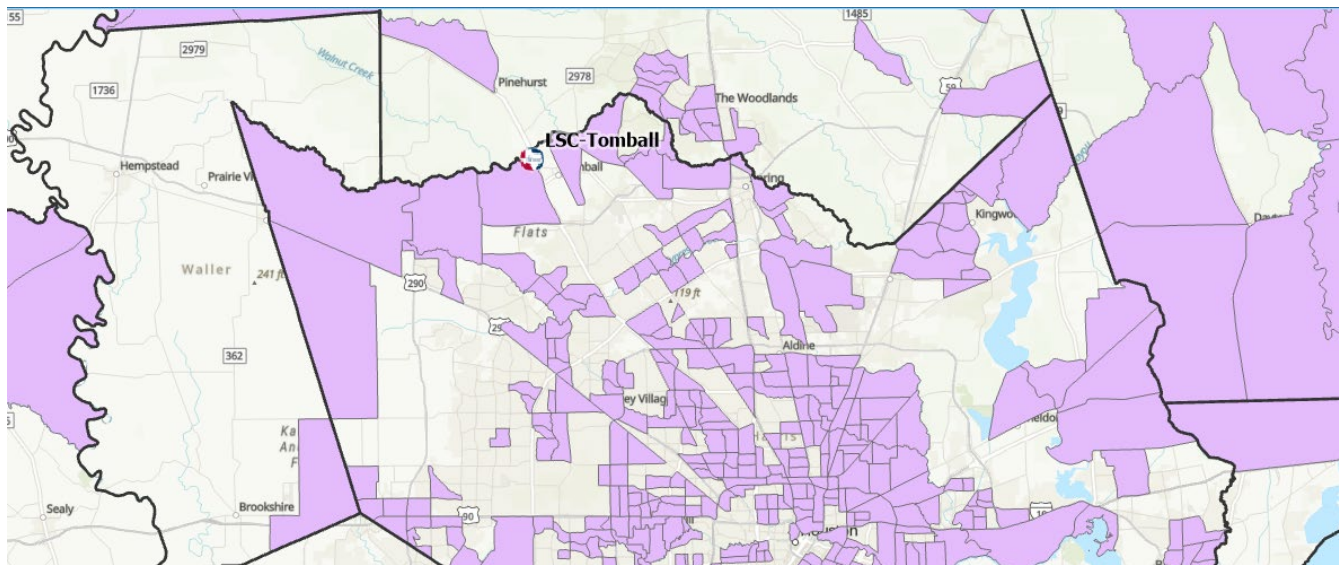
# What do the socioeconomic factors look like in the neighborhood?



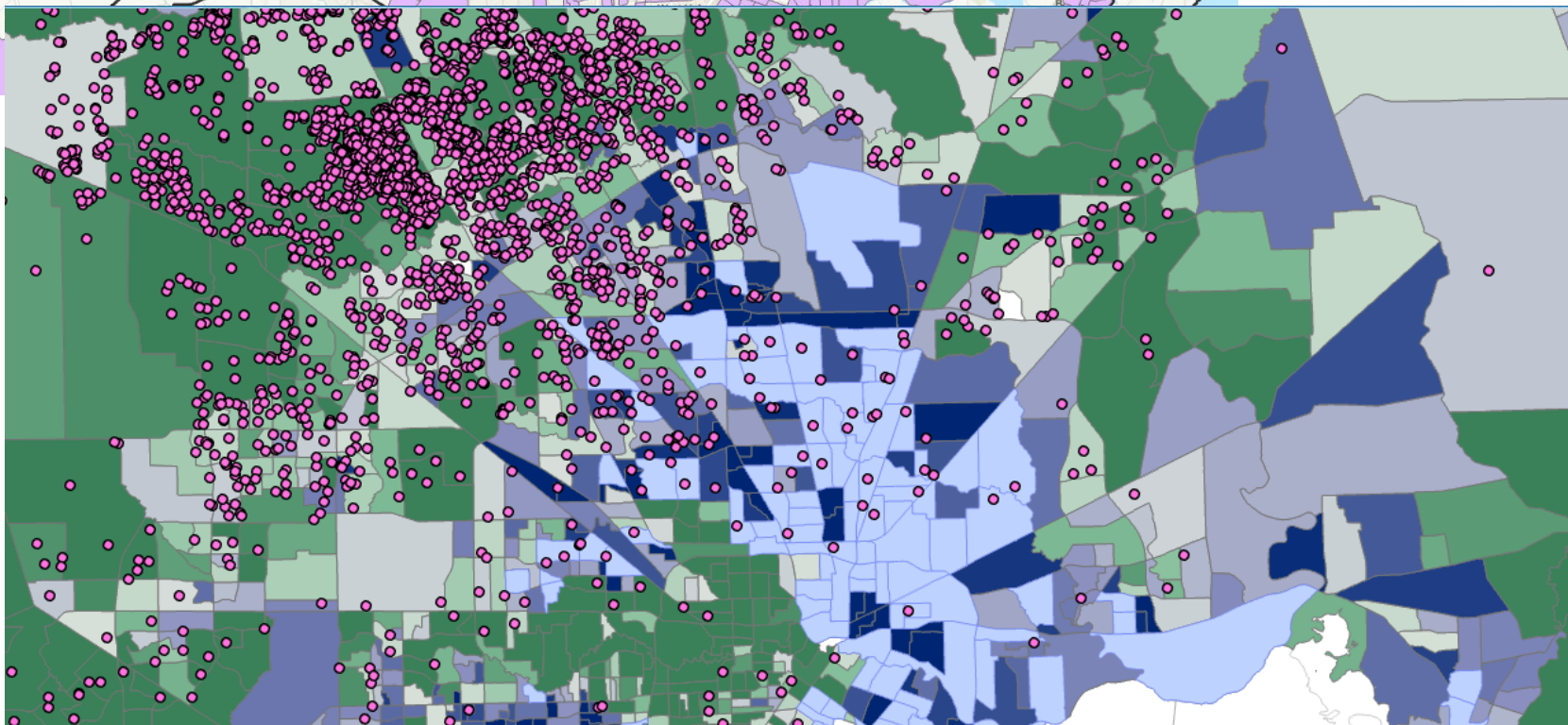
**Student Community**



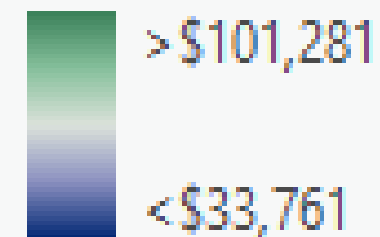
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Educational Attainment



Median Household income

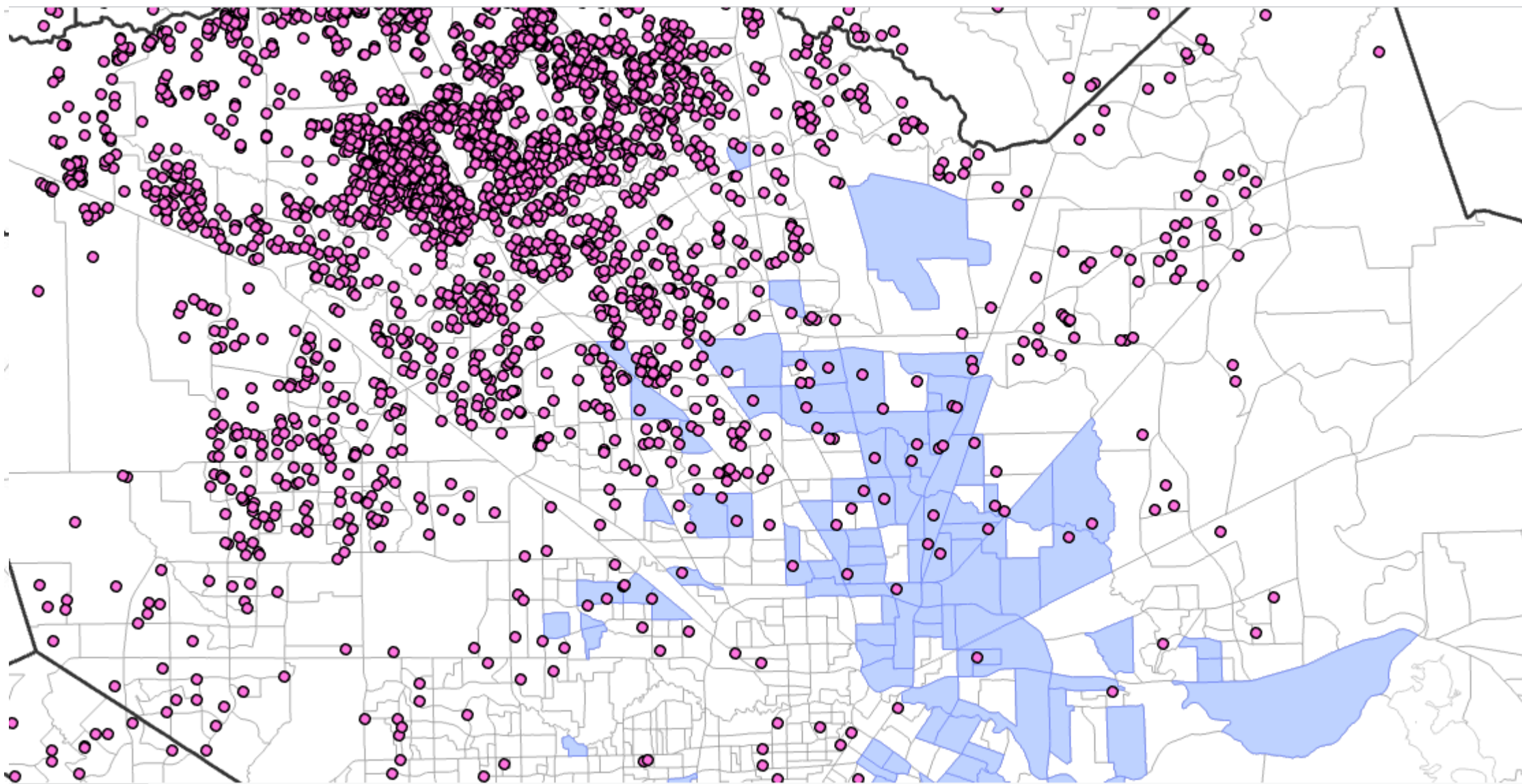






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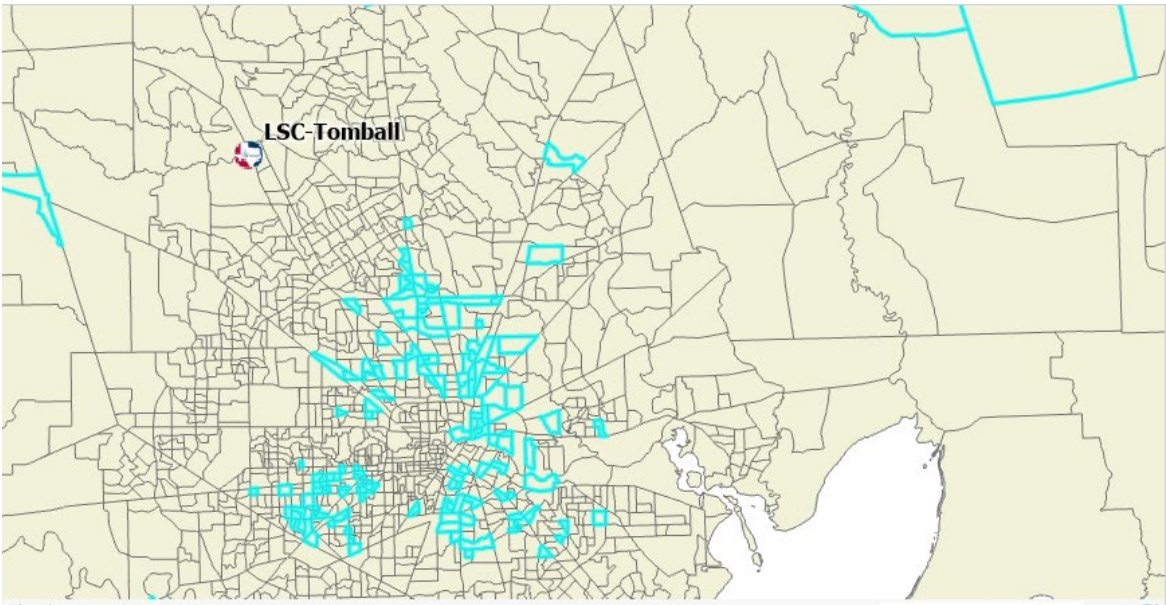
Low-income



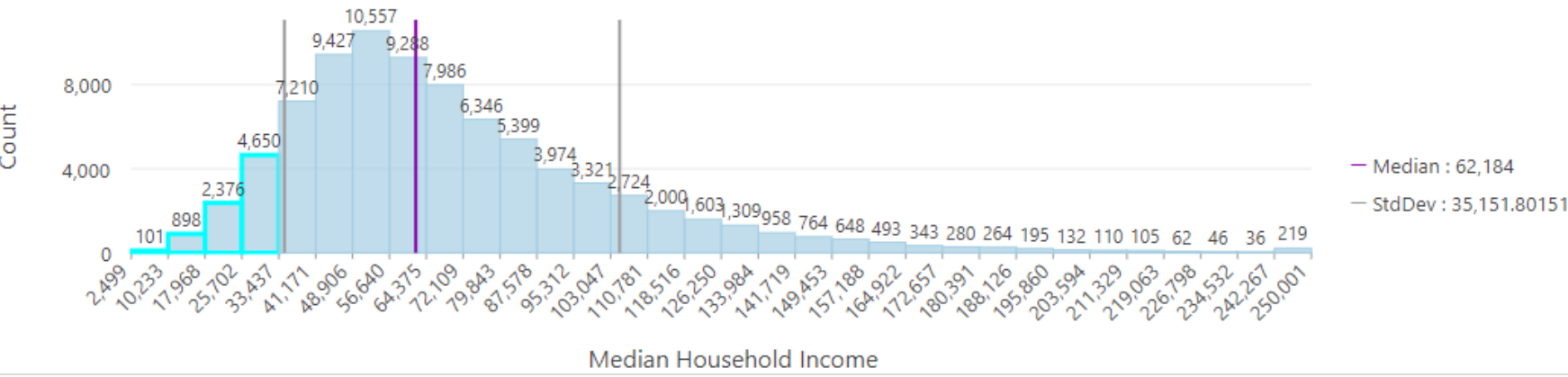
# Summarize Within (Analysis)

## Summary

Overlays a polygon layer with another layer to summarize the number of points, length of the lines, or area of the polygons within each polygon, and calculate attribute field statistics about the features within the polygons.



Distribution of Median Household Income







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# Discussion



Multiple Maps for  
analysis not efficient



Learning Curve of new  
software



Initial setup of Data can  
be time consuming



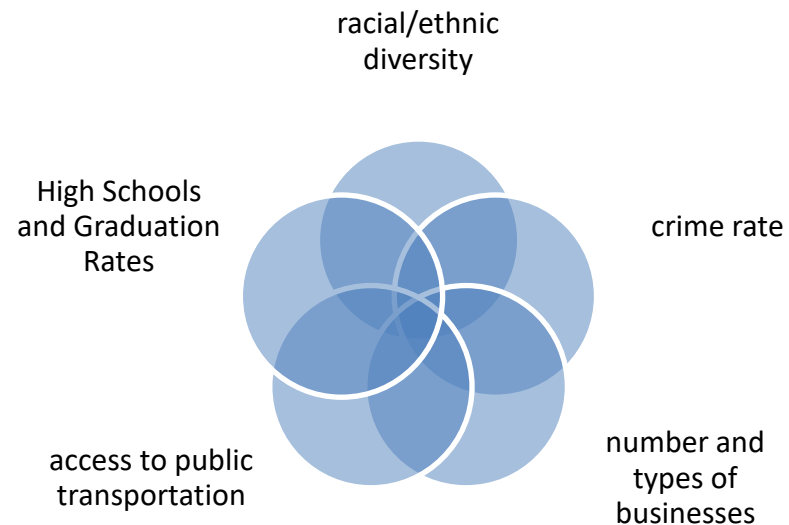
## **Limitations**



# Future Research

Use spatial analysis to Identify High Schools with low graduation rates to assist while also bridging High School to College connections (ex. New opportunities to recruit students for our summer bridge programs at LSC)

Does Housing type – multifamily, correlate with educational attainment





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# Questions