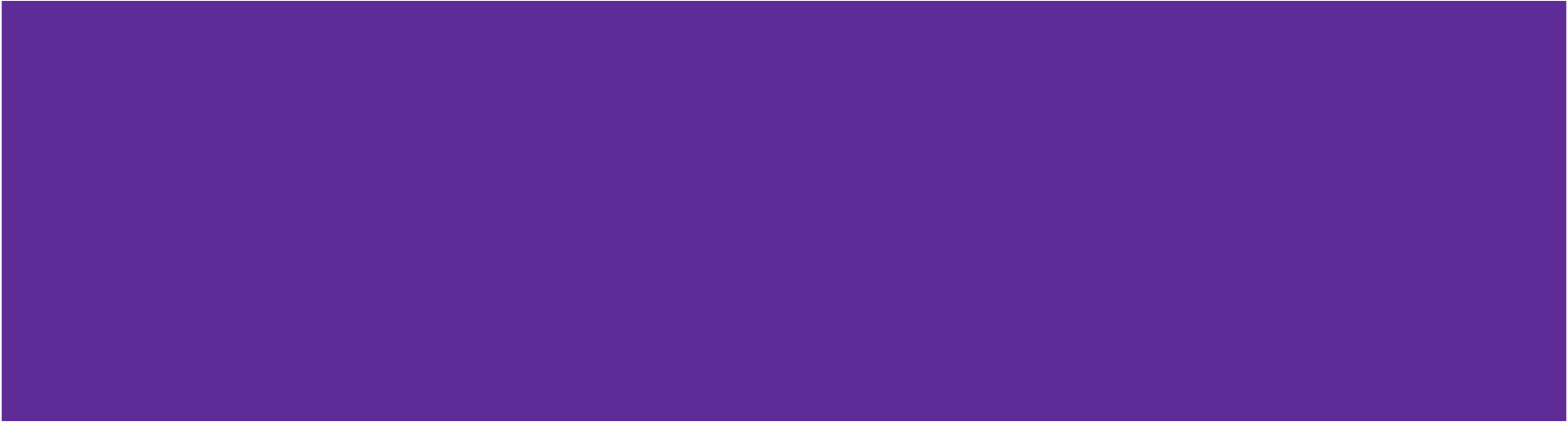


An analysis of residential home values after the Flint water crisis

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Fall 2019



Introduction

Background:

The Flint water crisis began in 2014. Due to insufficient water treatment, lead leached from water pipes into the drinking water, exposing over 100,000 residents to elevated lead levels.

Research questions:

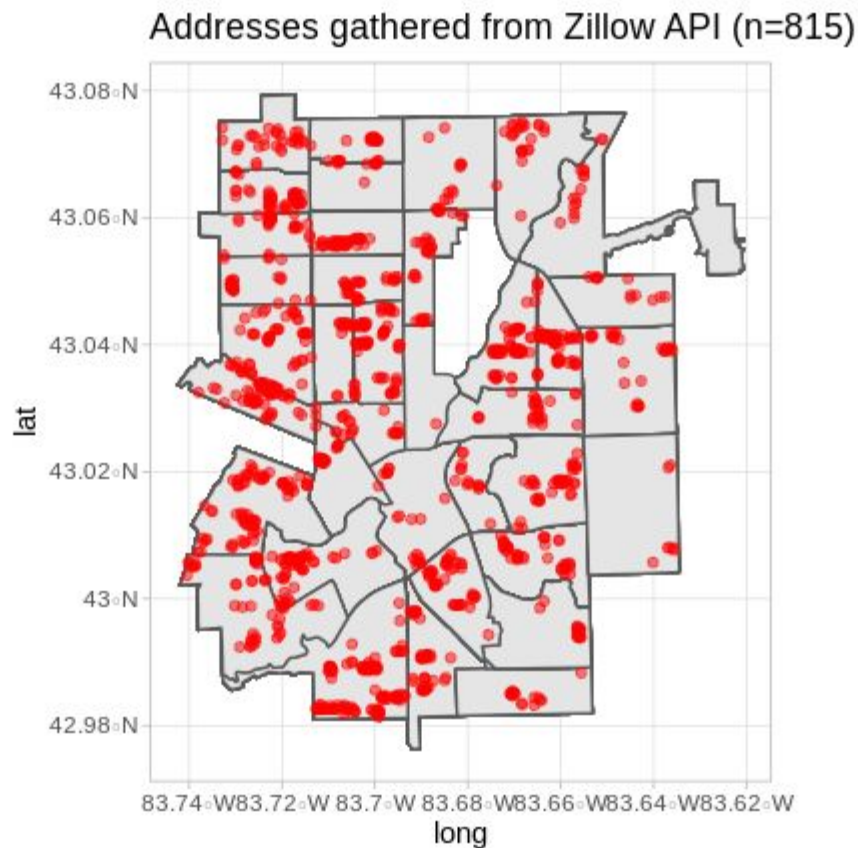
1. How did home values change in Flint, MI between 2010 and 2017?
2. Do self-report and Zillow estimates of home values agree?
3. Was the change in home values higher in areas with lead pipes?



Water samples in Flint
[Credit: FlintWaterStudy.org]

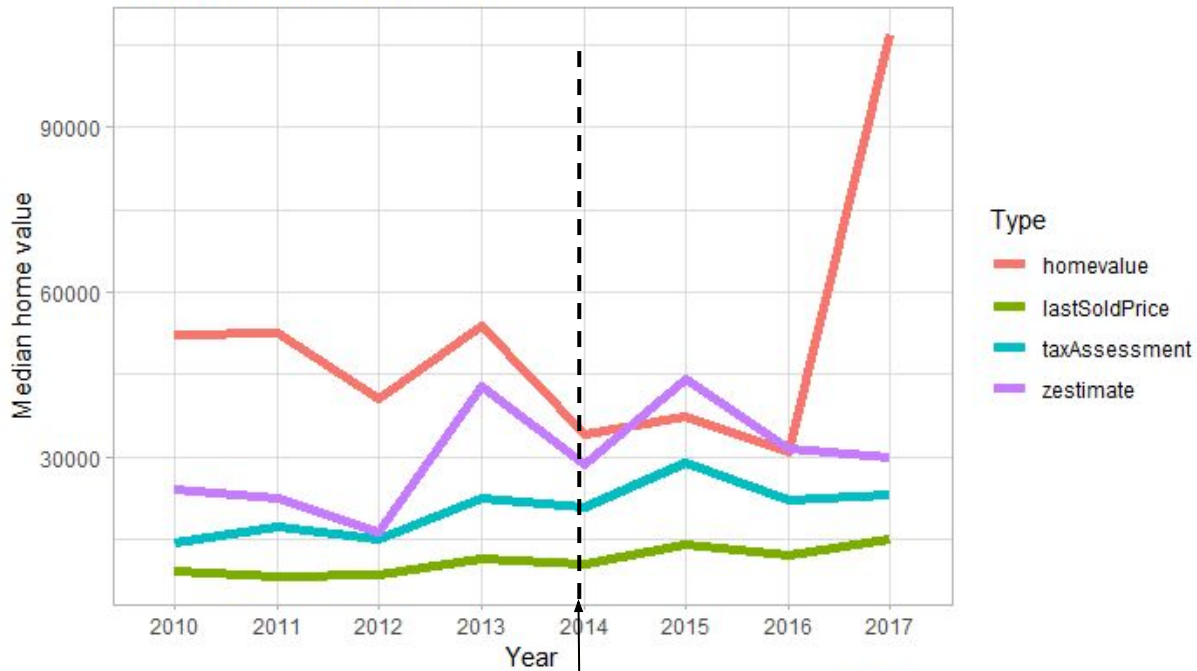
Data gathering through Zillow API

- Potential addresses using census mapping files (street name + address range)
- 3 days with 5 keys
 - 15,000 API requests (1,000 limit per key per day)
 - 9,351 valid records
 - 5,843 unique records
- Records within our years of interest: 2,000 +
- Records geocoded to Flint tracts: 815



RQ1: Change in home values over time

Flint: Home values over time



Source: ACS and Zillow

Start of water crisis

19 About how much do you think this house and lot, apartment, or mobile home (and lot, if owned) would sell for if it were for sale?

Amount – Dollars

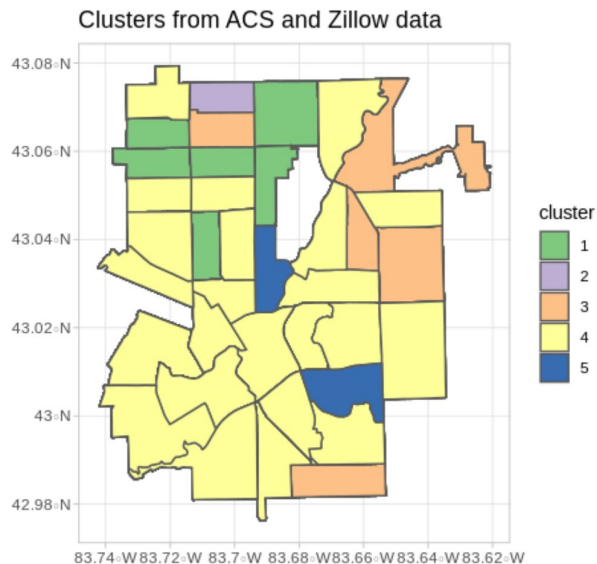
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ACS home value question

RQ2: Do ACS and Zillow prices match?

Insufficient records per tract -> hierarchical clustering to group households

Number of bedrooms	Number of bathrooms	Size of the finished property in square footage
Rentzestimate	Latitude	Longitude
Proportion of African American population	Proportion of White population	Number of family households



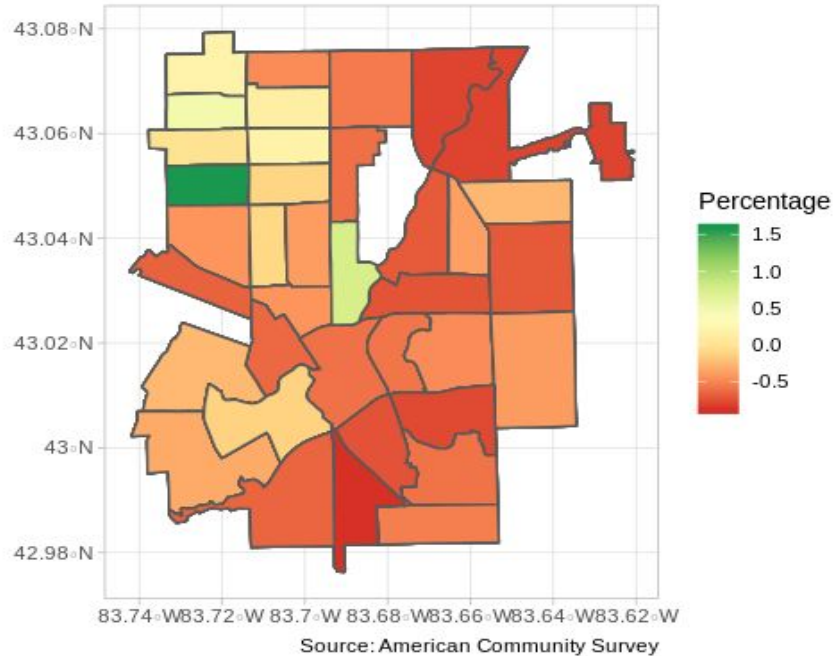
RQ2: Do ACS and Zillow prices match?

- Created buckets of categories for home values, grouped by ten thousand (10ks)
- Are cluster average between ACS, tax assessment, last home sale price within the same “bucket”? (eg. 0-10k, 11k-20k, 21k-30k, etc.)

Cluster	Matches by Tax (%)	Matches by Sale Price (%)	Number of tax records	Number of sale records	Average difference – Tax	Average difference – Sales
1	2%	0.66%	307	152	\$27,085	\$32,333
2	0%	6.67%	29	180	\$17,375	\$27,835
3	31%	7.69%	134	195	\$27,321	\$27,795
4	0%	4.52%	127	155	\$29,140	\$32,340

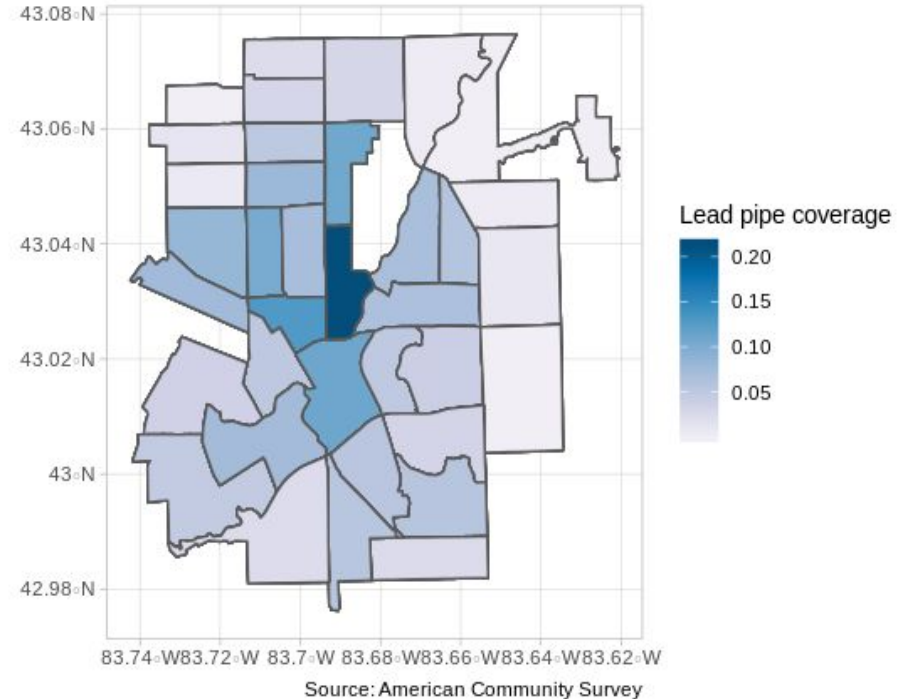
RQ3: Was the change in home values higher in areas with lead pipes?

Flint: Percentage change in home values 2013-2016



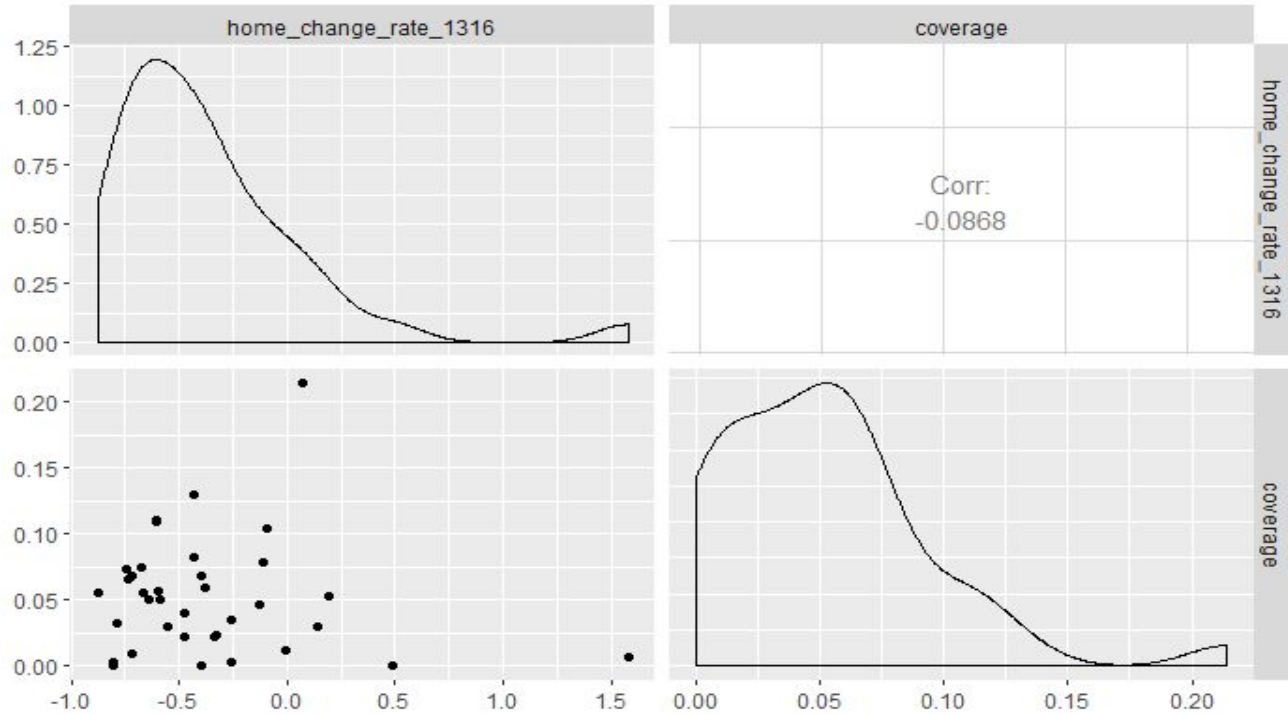
$\% \text{ change} = (2016 - 2013) / 2013$

Flint: Percent of tract covered by lead pipes 2013-2016



Lead shape file source: University of Michigan - Flint

RQ3: Was the change in home values higher in areas with lead pipes?

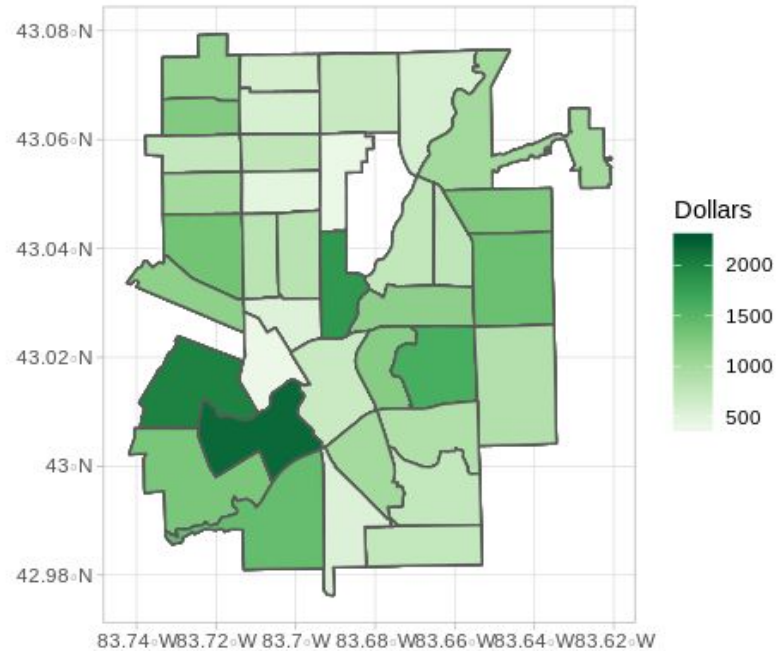


Conclusion

- Limitations of Zillow data
 - We are unable to observe houses that weren't sold or had tax assessment between 2010-17
 - Not all addresses returned Zillow record
- We did not conduct an experiment (unable to calculate exact measurement error associated with ACS home value question)
- Trade-off between precision and data quality:
 - Census tract level: fewer records
 - Address level: hard to get all and might not be representative

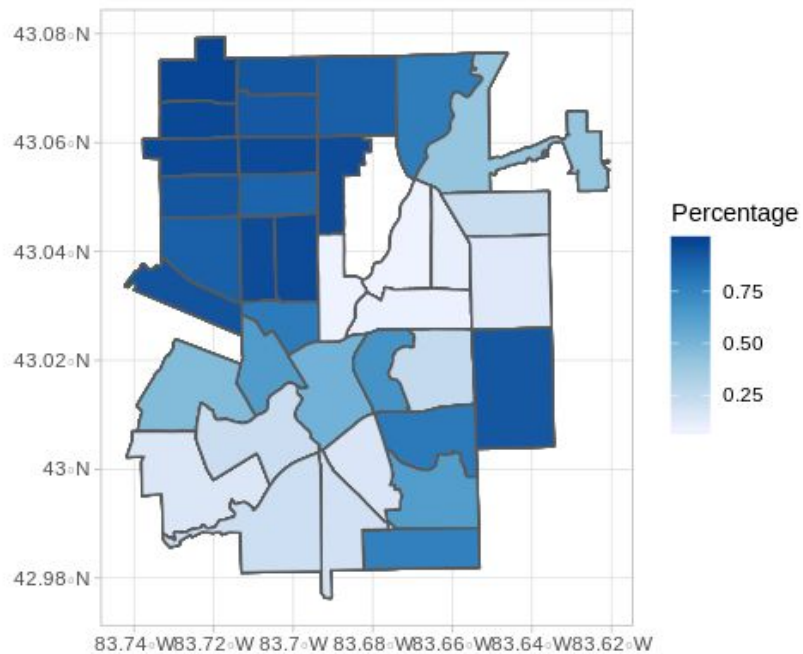
Appendix

Flint: Household Income in 2014



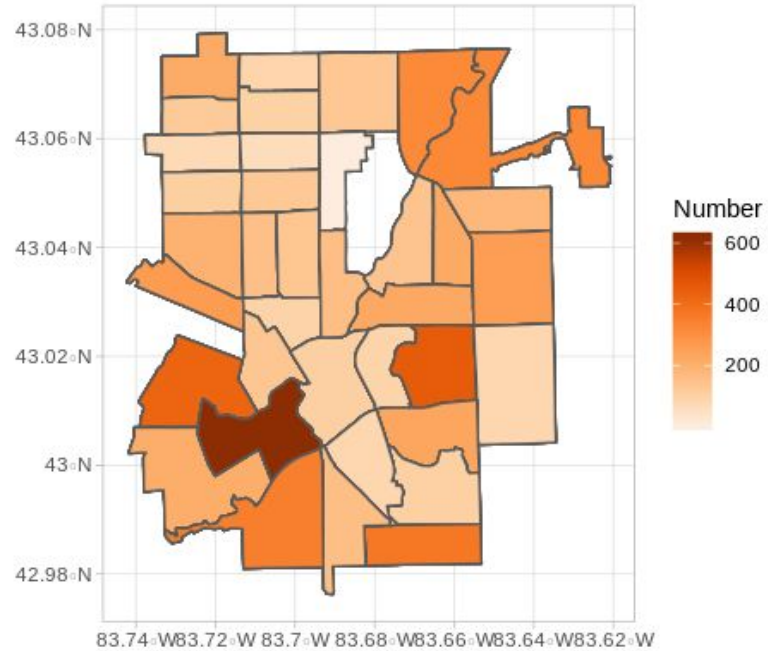
Source: American Community Survey

Flint: Percent Black-Only Households in 2014



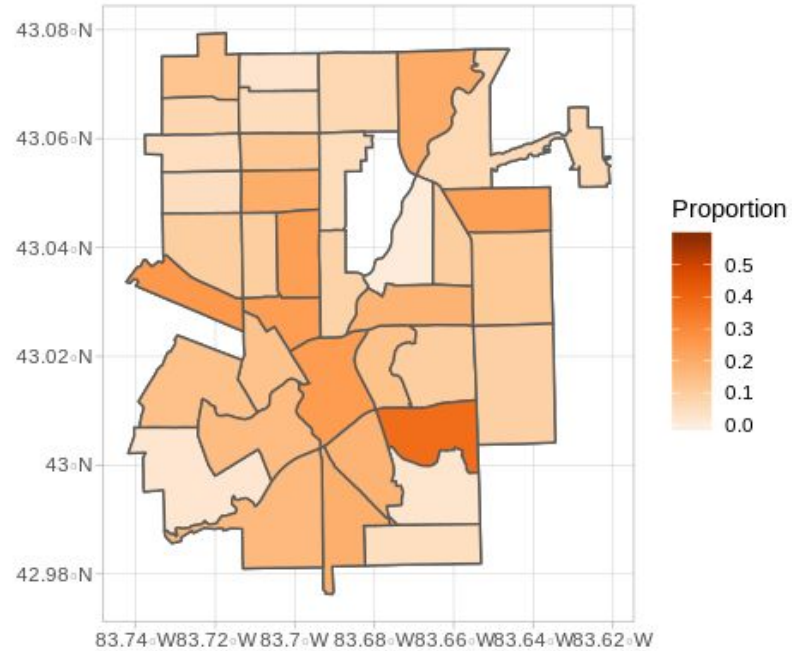
Source: American Community Survey

Flint: Number of children under five in 2014



Source: American Community Survey

Flint: Proportion of houses built between 1940-1959



Source: American Community Survey