



# DESCRIPTIVE ANALYSIS OF HOUSING AFFORDABILITY IN LOS ANGELES COUNTY



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## **I. Introduction**

In the United States, real estate and housing is treated as an asset, not a right. For some it is a luxury, while others face it as an unattainable need. Safety, location, weather, size, and style, all influence the price of a home, making one unequal to its neighbor. Its scarcity influences its price. Short, fixed supplies with high demands increase market prices, making many metropolitan areas unaffordable for the populace which works in their urban centers. The mismatch between market prices and need, create a situation where housing becomes out of reach for many citizens.

In an effort to understand the lived experiences of many in the County of Los Angeles, this project aims to describe the affordability of housing. By looking at the housing, demographic, and financial data, I hope to answer if housing in the County is becoming more unattainable or unaffordable and if the changes in the housing prices are contributing to displacement.

## **II. Data and Methodology**

The project uses both spatial and demographic data to investigate housing affordability. The geographic data used throughout the analysis are TIGER/Line shapefiles from US Census Bureau consisting of the physical geometry and census tract identification. Initially, both 2017 and 2013 shapefiles were used to make a comparison as the geometries corresponded with the data for selected American Community survey information; however, as there were inconsequential changes in the spatial datasets and attribute tables between the years, the latest 2017 shapefile was favored in the analysis.

After being added to ArcMap, the census block groups spatial data was cleaned to exclude extraneous data. The County of Los Angeles were selected by attribute and exported as a separate file so as to remove the block groups from the rest of the state. The blocks that represent the ocean were deleted. A layer showing the County of Los Angeles physical boundary was created by merging a census tract shapefile attained from the County's open data portal. The boundary was then used to trim the blocks around the

shoreline to show the actual landmass. The blocks representing the Catalina Islands were excluded as the housing market behaviors on the controlled island system do not necessarily reflect the market behaviors in a more open system throughout the rest of the County. Individual actors may be limited in their freedom build, develop, sell, or buy property on the island.

Housing, demographic, and financial information was collated from six principal census datasets, three from each of 2013 American Community Survey and the 2017 American Community Surveys. Both main datasets used the five-year estimates as opposed to the one-year estimates in order to calculate the aggregated data. Census block group data was chosen as the spatial unit of analysis due to the relatively small geographical size in relation to the density of the region, and because housing prices can be highly localized, and larger geographies may not accurately convey patterns at the neighborhood scale. While some clarity is sacrificed in the unpopulated rural blocks in the Santa Monica Mountains and San Gabriel Mountains, more information is present in the dense, urban blocks. The 2017 American Community Surveys was chosen as those represented the latest data with the selected geographies, and the 2013 Community Survey was selected as the earliest data with corresponding geographies, demographic affiliations, definitions, and topics.

Initially, all demographic, housing, and financial data was cleaned in Excel. Headings were changed to allow ease of import into ArcMap. As opposed to editing the attribute table directly and calculating fields, calculations were completed in Excel to minimize import errors. This included finding the percent change of population, income, and home values between the years of the survey as well as matching the data to the appropriate census block identification number.

One measure of affordability was also attained by comparing the median incomes, monthly mortgage payments, and median home values in the region. Mortgage payments dictate the ease of entry for new buyers, including those who are moving and first-time homeowners. Due to the other associated costs with homeownership like insurance, taxes, and maintenance, many financial advisors suggest that the monthly mortgage payment be no more than 25% to 28% of an individual's income, where a "total debt-to-income ratio can't exceed 35%," (Trulia, 2017).

Fixed-rate mortgage payments or amortization schedules, are calculated by the following formula:

$$x = P \left( i + \frac{1 - (1 + i)^N}{1 - (1 + i)^N} \right)$$

where:

- x** is the monthly payment;
- P** is the principal value;
- i** is the periodic interest rate, or annual interest rate divided by the number of payments per year; and
- N** is the number of payments, (Goldbeck, 2000).

The average annual 30-year fixed mortgage rate between 2013 and 2017 was 3.93 percent, (FreddieMac, 2018). In 2017, the average annual 30-year fixed mortgage rate was 3.99 percent, (FreddieMac, 2018). For ease of calculation, a 4.00 percent 30-year fixed mortgage rate was used. For the purposes of the analysis, the principal value is the median home price, the period is monthly, and there are 360 payments.

Using the monthly mortgage payment for the median home value as a floor, I compared the value to the median income of the same year. For this comparison, the dollar values did not need to be normalized for the inflation rate, as the mortgage payment to income ratio would remain the same.

Lastly the housing, demographic, and financial data was added to ArcMap and joined to the spatial data to be analyzed as a whole. From the complete attribute table, subset layers were generated by selecting by attribute and exporting to new layers. Zero values were excluded as they indicated either no change or incomplete data. The symbology was changed to show graduated colors between quantiles, with limits chosen reflecting the data's distribution around the mean, or difference from the zero. An underlying basemap of the entire County of Los Angeles was included as the bottom layer in gray, generated from the boundary map. As a data layer, the basemap represents zero values, areas where no data was included in the census information, or places where data was excluded; however, it also serves to orient the viewer to the physical space for the remaining information.

### III. Results

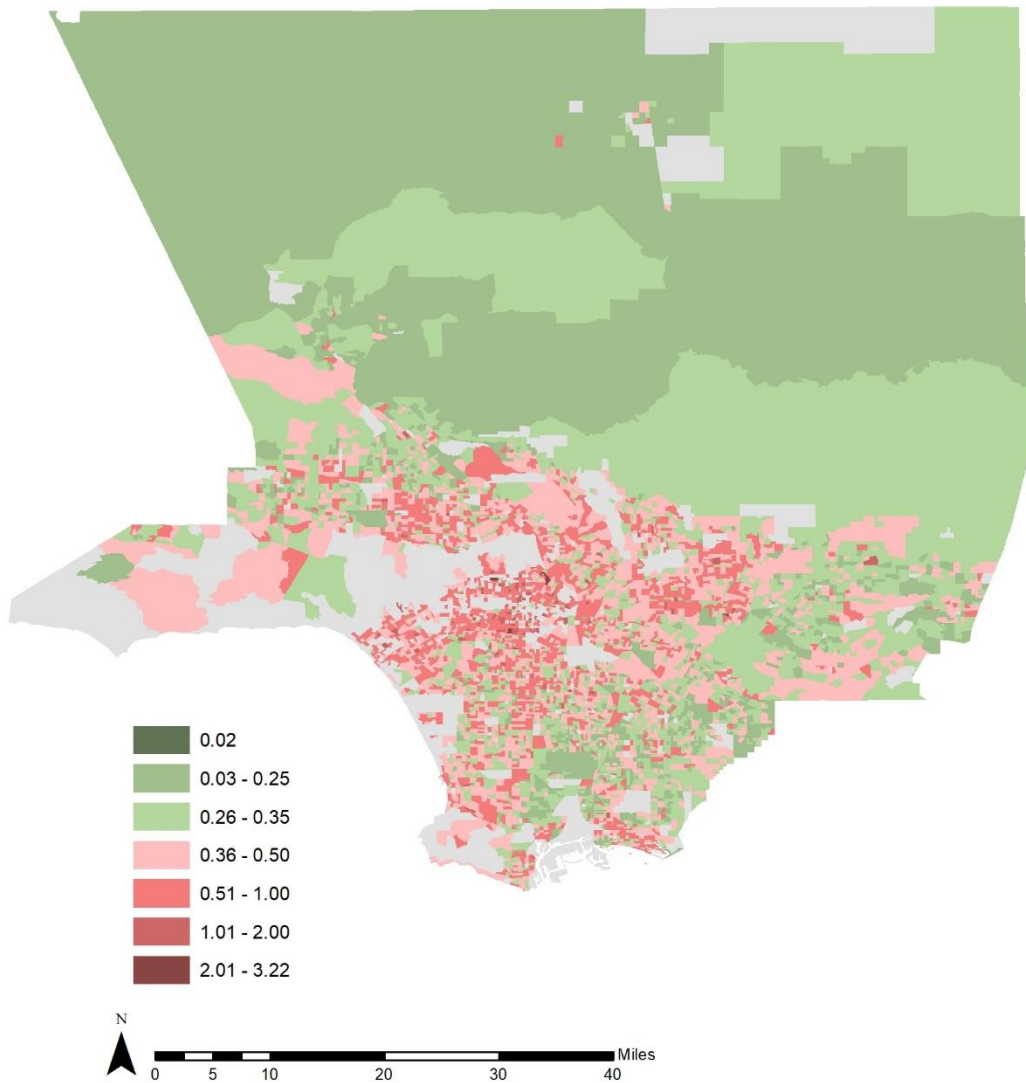
**Figure 1** and **Figure 2** show the measure of affordability in 2013 and 2017. The percent of the monthly mortgage payment of a median value home to the median household income in 2013 was significantly less than that in 2017. In other words, less of the household income would be required to purchase a home in 2013 than it was in 2017.

Any area that is red in both figures signifies a community where the median household income would not even be able to qualify for a mortgage to buy the median valued home. The darker the red, the greater the amount of money that would be needed just to satisfy the monthly mortgage payments for the median valued home.

Any area in green would still be attainable for the median income households that live there. Most would be able to move within the region and maintain a quality of life comparable to the rest living in those neighborhoods.

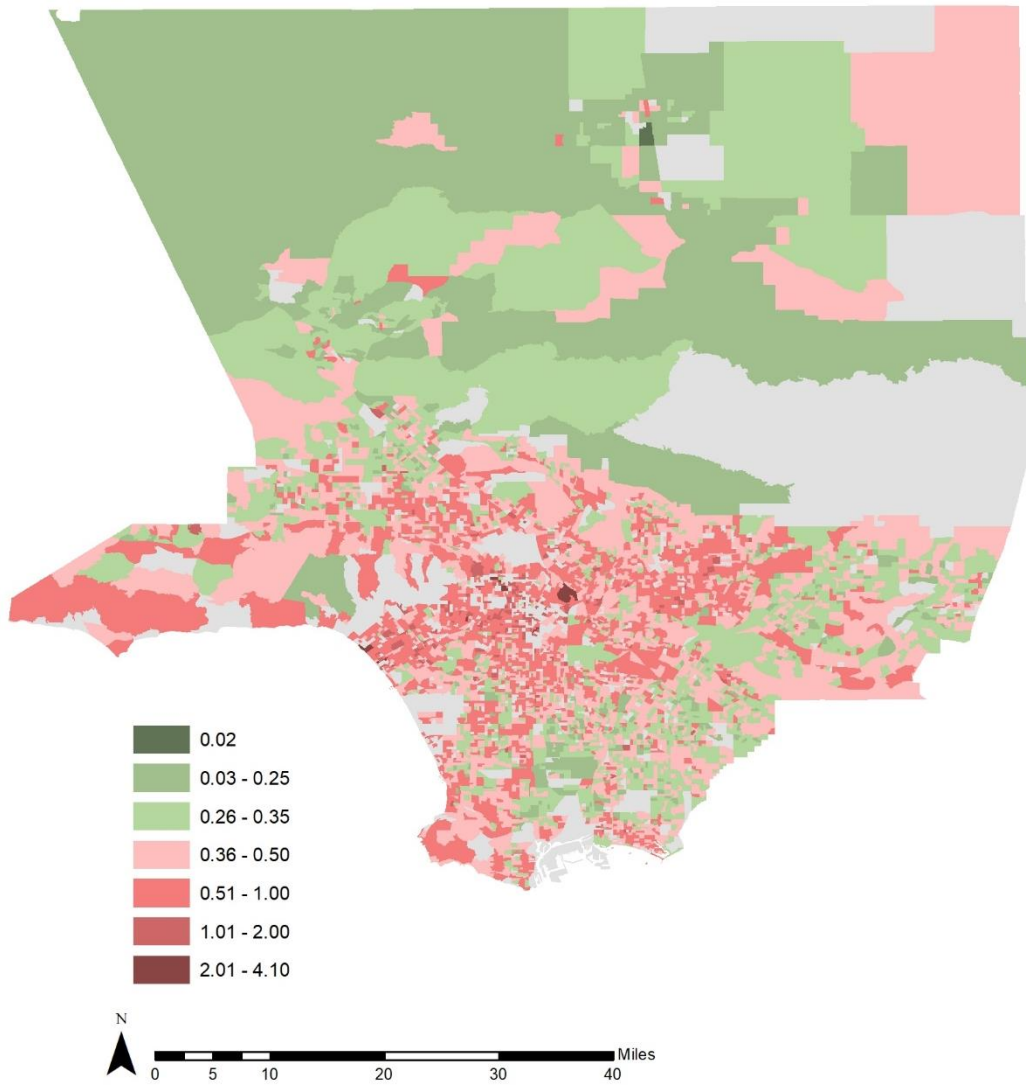
Some areas including downtown Los Angeles, Hollywood, the West Side, and the communities bordering the Pacific Ocean would be unattainable for the households living there, were they not renting or having bought at an earlier date. These situations remained unchanged or the inequity was greater 2017. Other areas, including the San Fernando Valley, Santa Clarita, Palmdale, and South East Los Angeles which were affordable relative to the household incomes of the area in 2013 were functionally unattainable in 2017. The same incomes of those living in the area would not be able to support buying a new home in their neighborhood should they wish to expand or downsize. The vast majority of the County would be unaffordable for the residents who reside there should they wish to move.

## Ratio of Monthly Mortgage Payments of Median Value Homes to Median Incomes, 2013



*Figure 1: Measure of affordability in 2013*

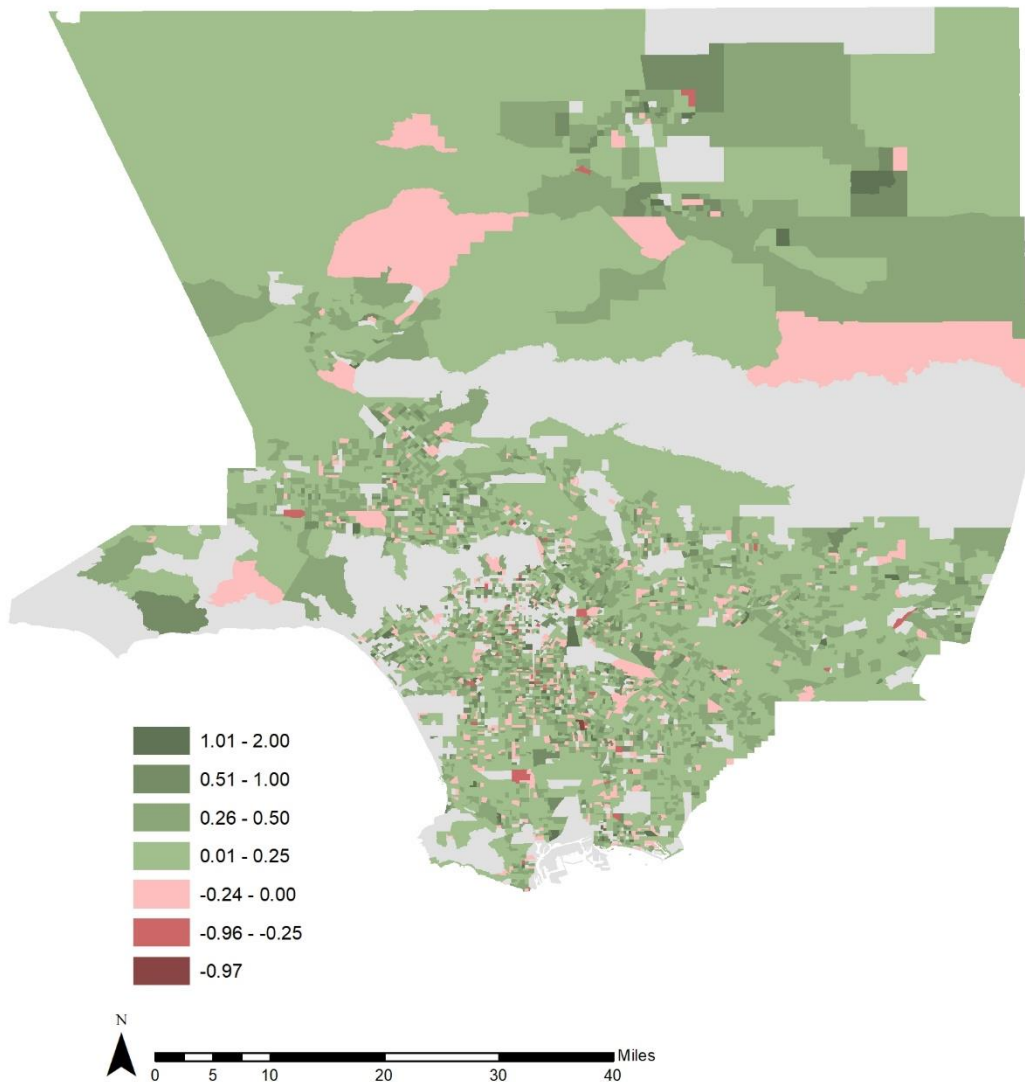
## Ratio of Monthly Mortgage Payments of Median Value Homes to Median Incomes, 2017



*Figure 2: Measure of Affordability in 2017*

**Figure 3** shows the percent change in median home values. The percent change was measured in 2017 dollars, with the 2013 median home values being converted due to inflation. The darker the green in color, the higher the change in median home value from 2013 to 2017. The median value for homes in almost all census blocks in the County increased.

### Percent Change in Home Values from 2013 to 2017



**Figure 3:** Percent Change in Median Incomes



**Figure 4** shows the percent change in median household incomes. Like the data in **Figure 3**, the percent change was measured in 2017 dollars, with the 2013 median income values being converted due to inflation. The darker the green in color, the higher the change in median incomes from 2013 to 2017. While many areas saw income growth, more saw stagnation. The rural areas in Santa Clarita, the suburbs in the San Gabriel Valley, and many places in south central Los Angeles saw negative growth in household incomes, meaning households lost income during this period. A notable exception is the dark green area in the center of the figure which include the wealthy foothill ranch communities below I-14 that border the San Gabriel National Forest like Placerita Canyon and Sand Canyon, which saw significant positive income growth.

**Figure 5** shows the percent change in the number of households in each census block from 2013 to 2017. For any area in red, the number of households in 2017 decreased relative to the number of households in 2013. In most areas where there was a decrease in households, the home values experienced the greatest growth, as shown in **Figure 3**, or incomes were decreasing as seen in **Figure 4**. The displacement can be thought of as a manifestation of simple demand economics: families or households are lost through gentrification, renters lose homes as prices increase and landowners sell investments, individuals move closer to work, or others sprawl outside the geographic boundaries for this project.

#### **IV. Limitations**

The project was limited in scope and conclusions by the availability and types of data. Most real estate data is kept private. While some like the assessor data is publicly available, the price for the data is prohibitive. Some data on first time home and rental values is made available through the multiple listing services; however, the geographies rarely coincide with census data, or are too large to be able to draw definitive conclusions. The analysis would have benefited from additional sources of financial and economic data, particularly to show more causation for the reduction of households as seen in **Figure 4** and justify the cost of housing increasing. In these instances, while some information, including “cost of housing” metrics, was available from the Census Bureau, not all was available in the required geographies. Other information might have been gleaned through additional data enrichment; however, the scope of work to thoroughly investigate these areas would be outside the boundaries for this type of analysis.

# Percent Change in Median Household Income from 2013 to 2017

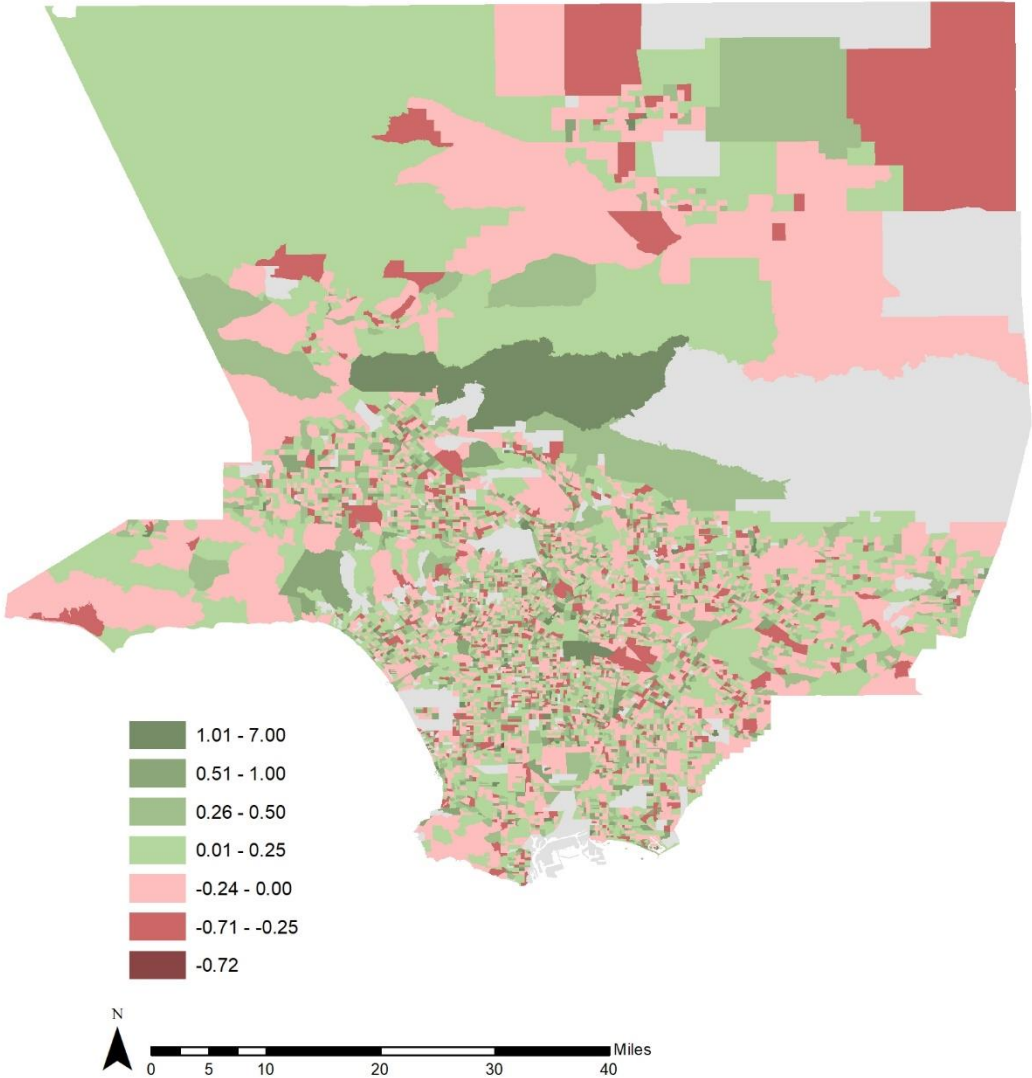
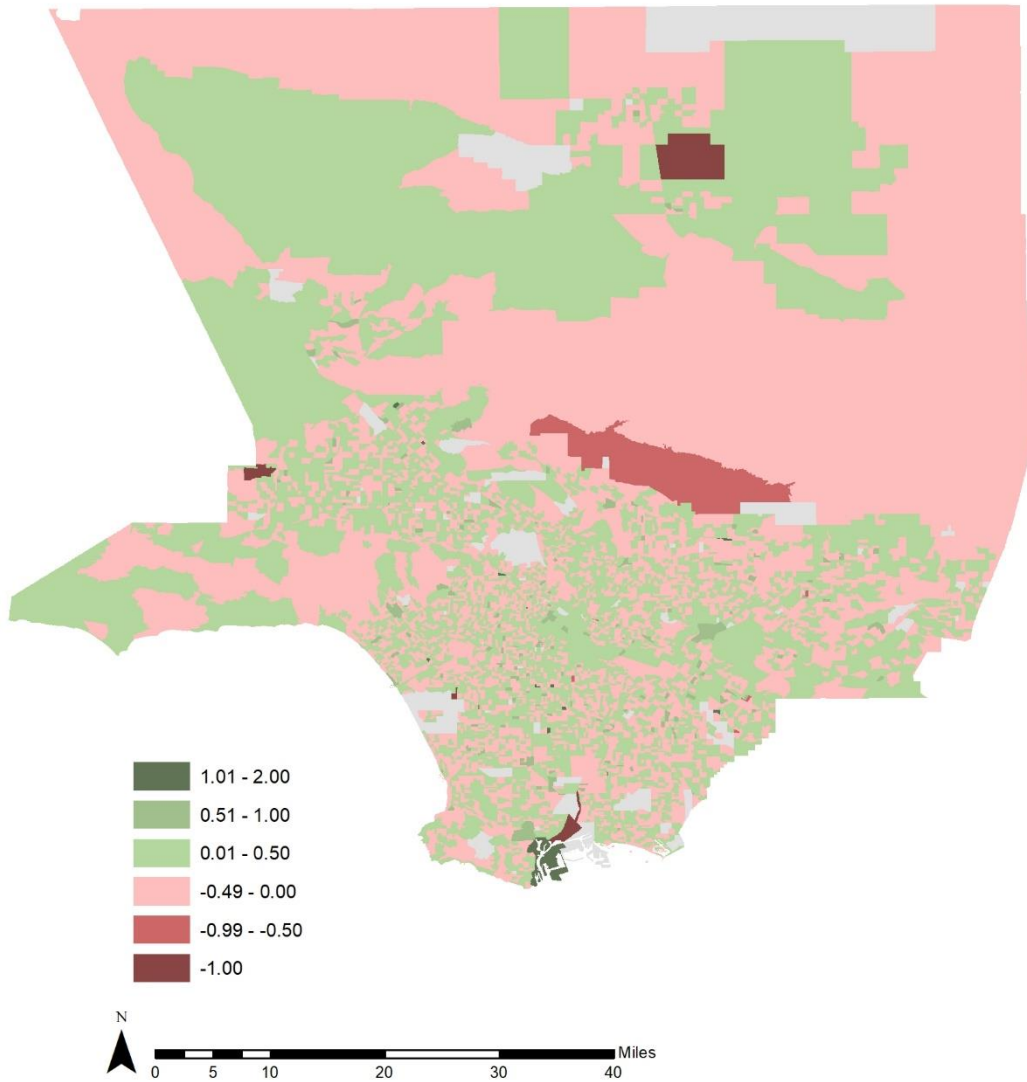


Figure 4: Percent Change in Median Household Incomes

## Percent Change in Number of Households from 2013 to 2017



*Figure 5: Percent Change in Households from 2013 to 2017*

## **V. Discussion and Conclusion**

Housing is becoming increasingly unaffordable to those throughout Los Angeles County. With the median value of homes exceeding the median incomes of the households in communities, individuals are prevented from moving or exploring other opportunities elsewhere by being priced out of the market. This creates a mismatch between where people can live versus where they need to be, ultimately contributing to other negative externalities like traffic. People already living in the County can't afford the communities, and neighborhoods that they call home.

While the population is increasing throughout the Los Angeles Metropolitan area, households are decreasing, creating overcrowding or simply multigenerational or multi-household residences. With incomes not rising with the value of housing, individuals will continue to be priced out of homes, forcing movement and potentially negatively impacting the quality of the labor force. The housing market needs to fundamentally change and increase supply of affordable units at every income level if any of these negative externalities are to be alleviated.

## VI. Data and References

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