

# Visualizing Spanish Speaking Limited English Proficiency and Hispanic Populations in Fort Collins, Colorado

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*The views expressed in this article are those of the author and do not represent the official positions or policies of the Office of Policy Development and Research, the U.S. Department of Housing and Urban Development, or the U.S. Government.*

## Introduction

Between 2010 and 2019, the U.S. population grew by 18.9 percent, and the increase in the number of Hispanics or Latinos contributed to 52 percent of this increase (Krogstad, 2020). In 2020, there were 59,361,020 Hispanics or Latinos in the United States, comprising approximately 18 percent of the total population.<sup>1</sup>

Since 2000, English proficiency has increased among the Hispanic and Latino population (Funk and Lopez, 2022). The Pew Research Center reported that the percentage of Hispanics speaking Spanish declined from 78 percent in 2000 to 73 percent in 2013 (Krogstad, Stepler, and Lopez, 2015). The Pew report also indicated that there has been an increase in U.S.-born Latinos who speak English proficiently, from 72 percent in 1980 to 89 percent in 2013, and that part of this trend was due to more U.S.-born Hispanics living in households where only English is spoken.

The U.S. Census Bureau collects information on languages spoken at home for the population ages 5 years and older, and the population with limited English proficiency (LEP) reported speaking English less than “very well.” Besides English, Spanish is the largest language group in the United States. In 2020, there were 40,537,337 people in the United States who reported speaking Spanish, of which 24,587,755, or 61 percent, spoke English “very well,” and 15,949,582, or 39 percent, reported speaking English less than “very well.”<sup>2</sup> We refer to this latter group as the Spanish LEP population.

<sup>1</sup> Authors' tabulations of Census 2020 Table P2: Hispanic or Latino, and Not Hispanic or Latino by Race.

<sup>2</sup> Authors' tabulations of Census American Community Survey 2016-2020 Table C16001: Language Spoken at Home for the Population 5 Years and Over.

Understanding the geographical aspects of these trends can be useful for policymakers and communities in overcoming barriers related to language access and for researchers interested in local demographic change. In this report, the spatial concentration or segregation of Hispanics or Latinos is compared with the Spanish LEP population. To the authors' knowledge, this is the first study to analyze the relationship between a Spanish LEP population and a Hispanic population. This report uses a commonly used segregation measure, the Dissimilarity Index (DI), and employ data visualizations to compare both groups. Data are analyzed for neighborhood patterns in 47 census tracts intersecting the city of Fort Collins, Colorado, as a case study.

## Data Description

Data for Fort Collins are summarized in exhibit 1 below.

### Exhibit 1

Descriptive Statistics					
Variable	Mean	StdDev	Min	Median	Max
<b>Non-LEP population</b>	3,839.745	1,911.727	1,216	3,340	10,753
<b>Spanish speaking LEP population</b>	66.255	102.005	0	32	557
<b>% Spanish speaking LEP population</b>	1.812	3.326	0	0.943	20.830
<b>White non-Hispanic population</b>	3,353.745	1,769.925	882	2,918	9,946
<b>Hispanic population</b>	525.128	368.338	41	435	1,760
<b>% Hispanic population</b>	13.021	10.058	1.440	11.554	65.819

*N = 47. StdDev = standard deviation.*

*Source: Authors' tabulations of Census American Community Survey (ACS) 5-year 2018 Table B03002 and Table C16001*

To measure the concentration of LEP populations vs. non-LEP populations and White/non-Hispanic populations vs. Hispanic populations, DIs are calculated to determine the level of concentration (or clustering) in both cases. For simplification, these pairings are referred to as Spanish LEP concentration and Hispanic concentration, respectively, from this point forward.

The DI formula is in the equation below.

$$DI = .5 * \sum_{i=1}^N abs[\frac{a_i}{A} - \frac{b_i}{B}]$$

In the equation, *i* represents census tract *i*; *N* represents the total number of census tracts in the area for which the DI is being computed; *abs* represents absolute value; *a<sub>i</sub>* represents the population of group A in census tract *i*; *A* represents the total group A population in the area for which the DI is being computed; *b<sub>i</sub>* represents the group B population in census tract *i*; and *B* represents the total group B population in the area for which the DI is being computed.

The range of values for the DI is zero to one. A DI of zero indicates no concentration, and a DI of one indicates maximum concentration. For the city of Fort Collins, the Spanish LEP DI equals 0.467, and the Hispanic DI equals 0.224. Thus, the Spanish LEP concentration is estimated to be roughly twice that of the Hispanic concentration. The next section provides a data visualization

of these spatial patterns and differences between Hispanic concentration and the Spanish LEP concentration.

## Data Visualizations

In this section, patterns of Spanish LEP concentration and Hispanic concentration are visualized with a conditioned choropleth map and scatterplots. A conditioned choropleth map charts a continuous variable (in this case, Spanish LEP) conditioned on multiple categories of a discrete variable (percent Hispanic in this analysis). Exhibit 2 provides a table indicating the four categories or levels of percent Hispanic or Latino. Each category has 12 tracts, and Categories 2 and 3 overlap due to the odd number of tracts. These four categories are labeled as Low, Low-Moderate, High-Moderate, and High. For example, the 12 tracts in the High Category have Hispanic population shares ranging from 14.43 percent to 65.82 percent.

### Exhibit 2

Categories of Percent Hispanic

Category	Tracts	Min	Max
<b>1 Low</b>	12	1.438	8.022
<b>2 Low-Moderate</b>	12	8.513	11.552
<b>3 High-Moderate</b>	12	11.552	14.224
<b>4 High</b>	12	14.432	65.821

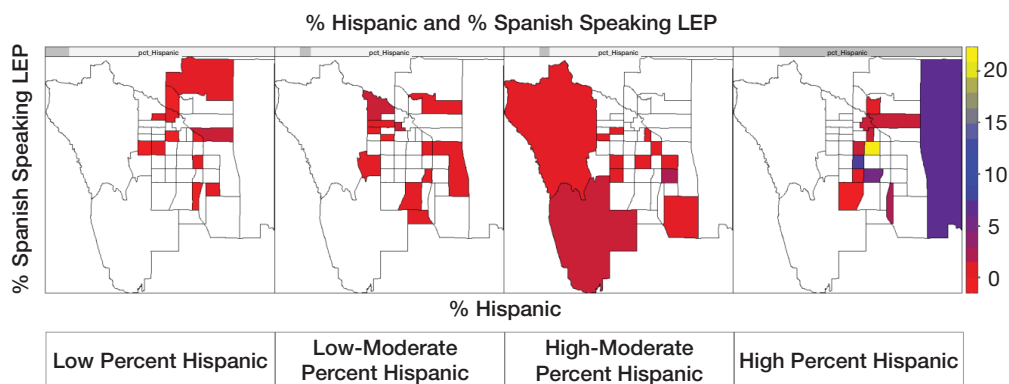
*N* = 47.

Source: Authors' tabulations of Census American Community Survey (ACS) 5-year 2018 Table B03002

Exhibit 3 displays the percent of the population that are Spanish speaking LEP, conditioned on four categories of percent that are Hispanic reported in exhibit 2. This exhibit illustrates how the Spanish LEP population, expressed as a continuous variable, intersects with the four levels of the percent that are Hispanic.

### Exhibit 3

Percent Spanish Speaking LEP Conditioned on Percent Hispanic



*N* = 47.

Source: Authors' tabulations of Census American Community Survey (ACS) 5-year 2018 Table B03002 and Table C16001

The maps in the first three columns of exhibit 3 show that levels of the percent who are Hispanic are similar to the levels of the percent who are Spanish LEP. Most tracts with a low percentage of Hispanics also have low percentages of those who are Spanish LEP. Most tracts with low to moderate percent Hispanic populations also have low to moderate percentages of Spanish LEP populations, and tracts with medium to high percentages of Hispanic populations generally also have medium to high percentages of Spanish LEP populations. However, the map in the fourth column of exhibit 3 has a few notable outliers, demonstrating that tracts with high percentages of Hispanic populations have a fairly wide range of percentages that are Spanish LEP. Some tracts had low percentages of Spanish LEP populations, despite having higher percentages of Hispanics. These data may suggest that there are areas where there are more Hispanics proficient in English than Hispanics who are Spanish LEP.

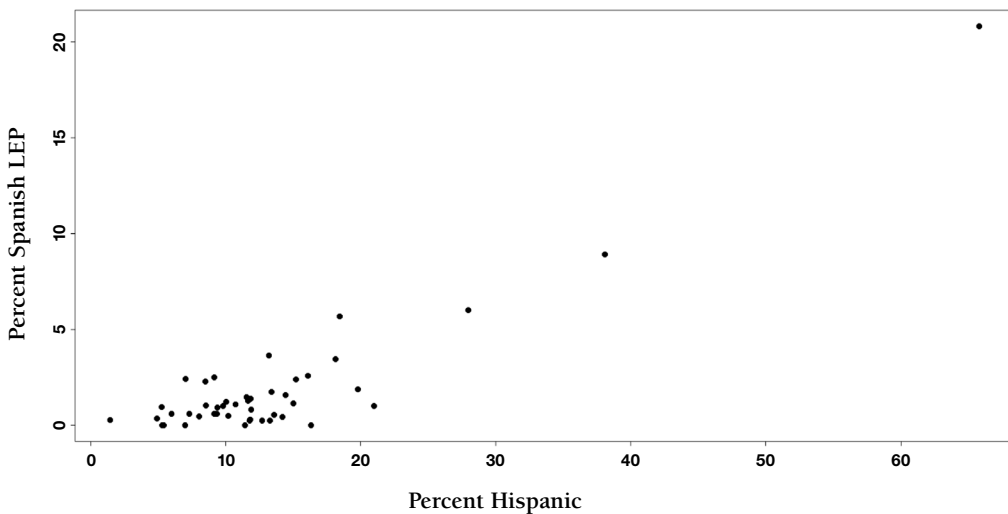
To accompany the maps, a Pearson correlation coefficient was computed between the percent of Hispanics and the percent who are Spanish LEP across the tracts, which was 0.918. However, this correlation is driven by three tracts with the percent of Hispanics greater than 25 percent, as demonstrated in the scatterplot in exhibit 4. The scatterplot in exhibit 5 has the three tracts with percentage of Hispanics greater than 25 percent removed; the Pearson correlation coefficient for the data in this plot is 0.480.

#### Exhibit 4

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Scatterplot 1

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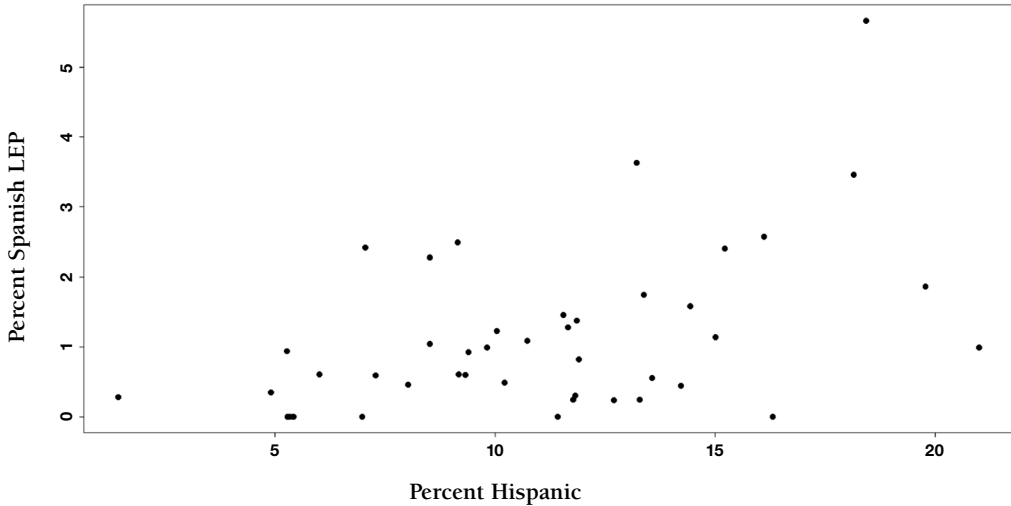


*N* = 47.

Source: Authors' tabulations of Census American Community Survey (ACS) 5-year 2018 Table B03002 and Table C16001

## Exhibit 5

### Scatterplot 2



*N* = 44.

Source: Authors' tabulations of Census American Community Survey (ACS) 5-year 2018 Table B03002 and Table C16001

## Conclusion

In this report, the relationship between the Spanish LEP population and Hispanic population is explored in Fort Collins, Colorado. As measured by the DI, the Spanish LEP concentration is about twice the concentration of the Hispanic population.

The data are visualized with a conditioned choropleth map and scatterplots. The conditioned choropleth map indicates that tracts with low, low to moderate, and moderate to high percentages of Hispanics also tend to have similar percentages of those who are Spanish LEP. However, tracts with high Hispanic population percentages have wide ranging percentages of Spanish LEP populations.

When the percent who are Hispanic is compared with the percent who are Spanish LEP across tracts, the correlation between them is calculated to be very high, which at first seems contrary to what one might expect, given that the city-wide concentration of the two groups was not equivalent, as measured by the DI. However, the correlation of the tract level data is driven by only three tracts with high percentages of Hispanics. When these three tracts are eliminated from the data analysis, the correlation is quite moderate.

## Authors

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## References

Funk, Cary, and Hugo Lopez. 2022. "A Brief Statistical Portrait of U.S. Hispanics." Pew Research Center. <https://www.pewresearch.org/science/2022/06/14/a-brief-statistical-portrait-of-u-s-hispanics/>.

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