

DESCRIBING AND COMPARING DATA DISTRIBUTIONS

Activity Items

The following items are part of this activity and appear at the end of this student version.

- Item 1: Population, Land Area, and Other Data for the 50 U.S. States and the District of Columbia
- Item 2: Income, Employment, and Other Demographic Data for the 50 U.S. States and the District of Columbia

Student Learning Objectives

- I will be able to compare and contrast data distributions in terms of shape, center, and spread.
- I will be able to describe key features of a histogram or box plot.

Government entities in the United States exist in many forms and sizes. From the smallest town council to the U.S. Congress, these entities pass laws, oversee infrastructure, and provide for public education, among other things. In this activity, you will analyze state and county data and compare distributions by examining their shape, center, and spread.

NAME: _____ DATE: _____

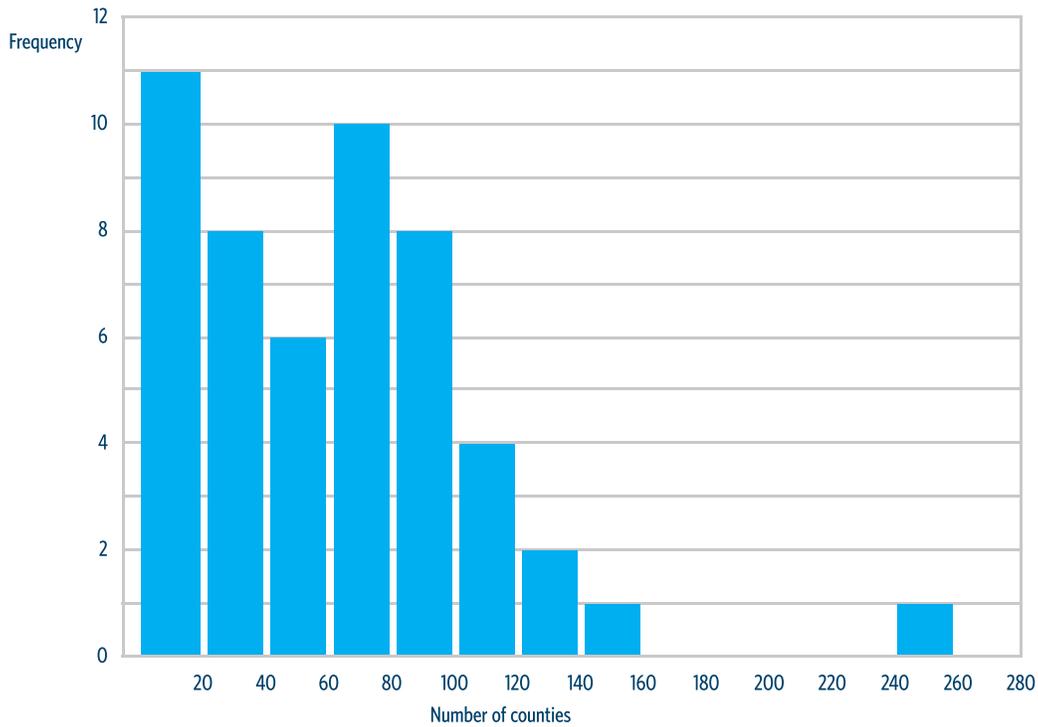
1. Look at **Item 1: Population, Land Area, and Other Data for the 50 U.S. States and the District of Columbia** and **Item 2: Income, Employment, and Other Demographic Data for the 50 U.S. States and the District of Columbia**.
 - a. What is one thing about the data that catches your attention?

 - b. What is one question you have about the data that you can investigate?

2. Share your responses to question 1 with your group. Are they similar or different? How so?

- Recall that a data distribution’s shape can be described as symmetric, skewed left, skewed right, uniform, or bimodal. Looking at the histogram below that shows the distribution of the number of counties in each state and the District of Columbia, how would you describe its shape?

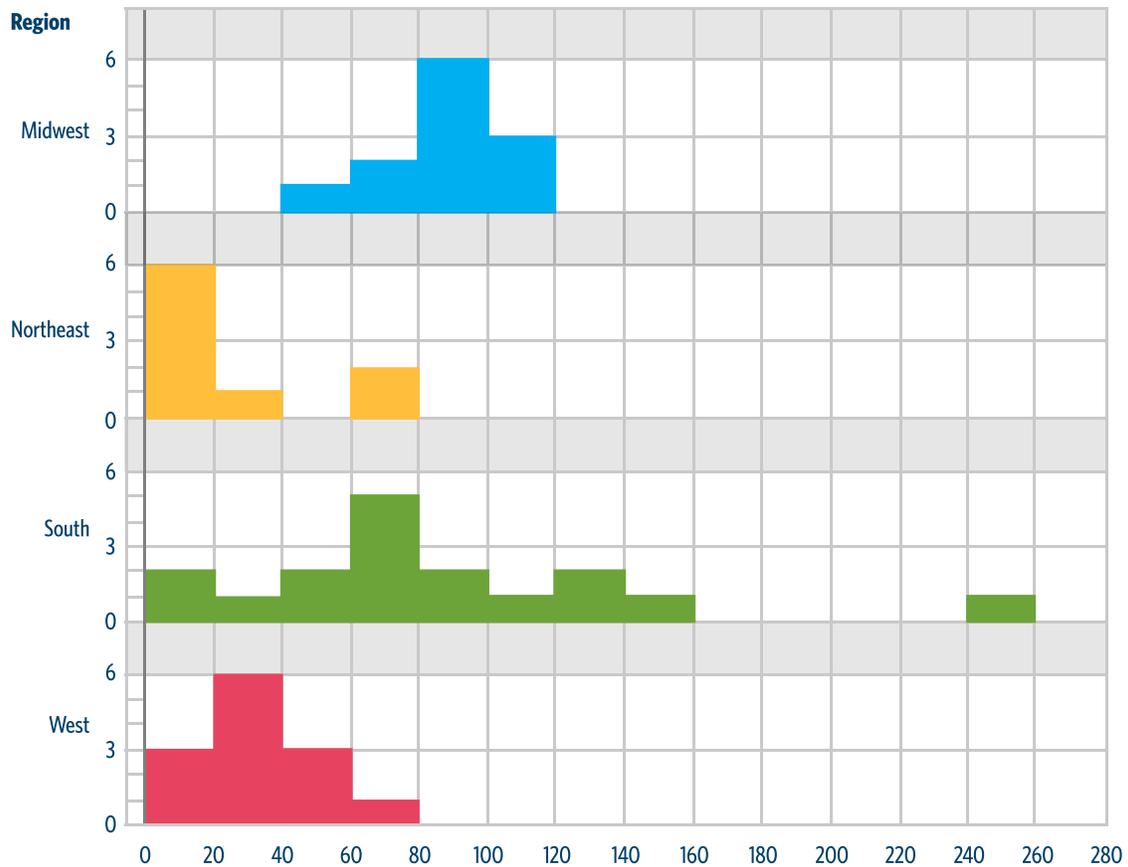
Number of Counties in Each U.S. State and the District of Columbia



- Does the mean or the median better represent the center of this type of data distribution? Why?
- The range of this distribution’s data set is 253, the standard deviation is 46.8, and the interquartile range (IQR) is 65. Which value best represents the spread for this type of data distribution, and why?

6. The U.S. Census Bureau partitions the United States into four regions: Midwest, Northeast, South, and West. The histograms below show the number of counties in each state and the District of Columbia for each region. How do the distributions compare in terms of shape?

Number of Counties in Each U.S. State and the District of Columbia by Census Bureau Region



7. Use the appropriate summary statistics from the table below to describe the distribution for each region in terms of its shape, center, and spread.

Summary Statistics for Each Census Bureau Region:
Number of Counties in Each U.S. State and the District of Columbia

	Mean	Median	Standard Deviation	IQR	Range
Midwest	87.9	90	17.5	23.0	62
Northeast	24.1	14	23.4	32.5	62
South	83.7	75	60.8	59.5	253
West	34.5	33	17.7	30.0	59

- Midwest:

- Northeast:

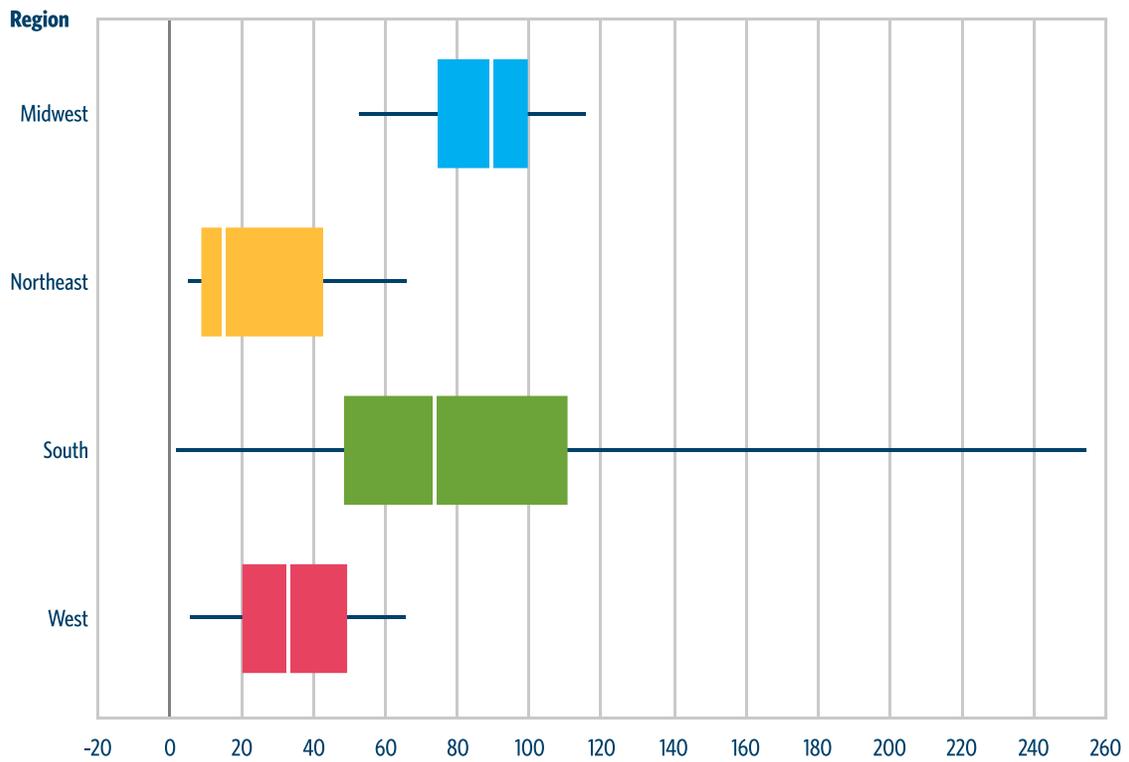
- South:

- West:

8. In what ways are these distributions similar, and in what ways are they different?

9. The following box plots, constructed from the summary statistics mentioned earlier, can give you a different view of the same data.

**Number of Counties in Each U.S. State and the the District of Columbia by
Census Bureau Region**



- a. What kind of information is easier to see in the box plots than in the histograms?

- b. What kind of information is easier to see in the histograms than in the box plots?

- c. How does examining the box plots change your responses to question 8?

- d. If the only graphs you saw of the data were box plots, how would that influence your interpretations?

10. Select your own data set from **Item 1** or **Item 2** by choosing one variable to investigate.

a. Create a histogram of the data.

b. Calculate the summary statistics and record them in the table below.

Variable	Mean	Median	Standard Deviation	IQR	Range

- c. Describe the distribution in terms of shape, center, and spread.

- d. Compare and contrast the distribution of your variable with the distribution of the number of counties by state and the District of Columbia.

Item 1: Population, Land Area, and Other Data for the 50 U.S. States and the District of Columbia

State	Number of Counties	County Subdivisions	Population	Land Area in Square Miles	Population Density per Square Mile	Number of Unified School Districts	Region
Alabama	67	390	4,779,736	50,645.33	94.4	134	South
Alaska	29	37	710,231	570,640.95	1.2	53	West
Arizona	15	80	6,392,017	113,594.08	56.3	99	West
Arkansas	75	1,271	2,915,918	52,035.48	56.0	251	South
California	58	397	37,253,956	155,779.22	239.1	335	West
Colorado	64	209	5,029,196	103,641.89	48.5	178	West
Connecticut	8	173	3,574,097	4,842.36	738.1	115	Northeast
Delaware	3	27	897,934	1,948.54	460.8	16	South
District of Columbia	1	0	601,723	61.05	9,856.5	1	South
Florida	67	316	18,801,310	53,624.76	350.6	67	South
Georgia	159	586	9,687,653	57,513.49	168.4	182	South
Hawaii	5	44	1,360,301	6,422.63	211.8	1	West
Idaho	44	170	1,567,582	82,643.12	19.0	115	West
Illinois	102	1,710	12,830,632	55,518.93	231.1	389	Midwest
Indiana	92	1,011	6,483,802	35,826.11	181.0	294	Midwest
Iowa	99	1,661	3,046,355	55,857.13	54.5	364	Midwest
Kansas	105	1,530	2,853,118	81,758.72	34.9	293	Midwest
Kentucky	120	493	4,339,367	39,486.34	109.9	174	South
Louisiana	64	579	4,533,372	43,203.90	104.9	69	South
Maine	16	533	1,328,361	30,842.92	43.1	240	Northeast
Maryland	24	290	5,773,552	9,707.24	594.8	24	South
Massachusetts	14	357	6,547,629	7,800.06	839.4	210	Northeast
Michigan	83	1,573	9,883,640	56,538.90	174.8	524	Midwest
Minnesota	87	2,760	5,303,925	79,626.74	66.6	339	Midwest
Mississippi	82	410	2,967,297	46,923.27	63.2	149	South
Missouri	115	1,395	5,988,927	68,741.52	87.1	449	Midwest
Montana	56	194	989,415	145,545.80	6.8	52	West
Nebraska	93	1,198	1,826,341	76,824.17	23.8	254	Midwest
Nevada	17	71	2,700,551	109,781.18	24.6	17	West
New Hampshire	10	260	1,316,470	8,952.65	147.0	82	Northeast
New Jersey	21	571	8,791,894	7,354.22	1,195.5	233	Northeast
New Mexico	33	130	2,059,179	121,298.15	17.0	89	West

Item 1: Population, Land Area, and Other Data for the 50 U.S. States and the District of Columbia (Continued)

State	Number of Counties	County Subdivisions	Population	Land Area in Square Miles	Population Density per Square Mile	Number of Unified School Districts	Region
New York	62	1,023	19,378,102	47,126.40	411.2	669	Northeast
North Carolina	100	1,041	9,535,483	48,617.91	196.1	118	South
North Dakota	53	1,765	672,591	69,000.80	9.7	155	Midwest
Ohio	88	1,604	11,536,504	40,860.69	282.3	616	Midwest
Oklahoma	77	305	3,751,351	68,594.92	54.7	426	South
Oregon	36	212	3,831,074	95,988.01	39.9	188	West
Pennsylvania	67	2,575	12,702,379	44,742.70	283.9	501	Northeast
Rhode Island	5	40	1,052,567	1,033.81	1,018.1	30	Northeast
South Carolina	46	299	4,625,364	30,060.70	153.9	86	South
South Dakota	66	1,339	814,180	75,811.00	10.7	156	Midwest
Tennessee	95	844	6,346,105	41,234.90	153.9	120	South
Texas	254	862	25,145,561	261,231.71	96.3	1,022	South
Utah	29	93	2,763,885	82,169.62	33.6	41	West
Vermont	14	255	625,741	9,216.66	67.9	64	Northeast
Virginia	134	550	8,001,024	39,490.09	202.6	137	South
Washington	39	242	6,724,540	66,455.52	101.2	295	West
West Virginia	55	235	1,852,994	24,038.21	77.1	55	South
Wisconsin	72	1,921	5,686,986	54,157.80	105.0	371	Midwest
Wyoming	23	71	563,626	97,093.14	5.8	49	West

To view the source data, go to www2.census.gov/geo/pdfs/reference/guidestloc/All_GSLCG.pdf (for Number of Counties, County Subdivisions, Population, Land Area in Square Miles, Population Density per Square Mile, and Number of Unified School Districts) and www2.census.gov/geo/docs/maps-data/maps/reg_div.txt (for Region).

Item 2: Income, Employment, and Other Demographic Data for the 50 U.S. States and the District of Columbia

State	Median Household Income in Dollars	Percentage With a Bachelor's Degree or Higher	Percentage Who Carpool (Workers 16 Years and Older)	Mean Travel Time to Work in Minutes	Percentage Employed	Percentage of Divorced Adults	Percentage Who Own Homes	Per Pupil Amounts in Dollars for 2013 Spending of Public Elementary-Secondary School Systems	Percentage Younger Than 18 Years	Percentage 65 Years and Older	Percentage Male	Percentage Female	Region
Alabama	42,830	23.5	8.6	24.3	52.5	12.5	67.7	8,755	22.8	15.4	48.5	51.5	South
Alaska	71,583	28.0	12.0	18.3	61.9	11.8	62.5	18,175	25.3	9.5	52.6	47.4	West
Arizona	50,068	27.6	10.4	24.5	54.2	12.3	61.1	7,208	24.1	15.9	49.7	50.3	West
Arkansas	41,262	21.4	10.9	21.7	54.2	12.9	65.8	9,394	23.8	15.7	49.1	50.9	South
California	61,933	31.7	10.5	28.1	57.4	9.6	53.7	9,220	23.6	12.9	49.7	50.3	West
Colorado	61,303	38.3	9.6	25.1	63.7	12.2	63.9	8,647	23.3	12.7	50.2	49.8	West
Connecticut	70,048	38.0	8.1	25.4	61.6	11.1	66.4	16,631	21.6	15.4	48.8	51.2	Northeast
Delaware	59,716	30.6	7.6	24.6	58.5	12.2	70.3	13,833	21.8	16.4	48.4	51.6	South
District of Columbia	71,648	55.0	5.6	29.3	62.3	9.0	40.6	17,953	17.5	11.3	47.4	52.6	South
Florida	47,463	27.3	9.1	26.4	53.6	13.0	64.1	8,433	20.4	19.1	48.9	51.1	South
Georgia	49,321	29.1	10.1	27.6	56.7	11.3	62.2	9,099	24.7	12.4	48.8	51.2	South
Hawaii	69,592	31.0	13.5	27.9	58.1	9.6	56.7	11,823	21.7	16.1	50.6	49.4	West
Idaho	47,861	25.0	9.8	20.3	58.1	11.8	68.0	6,791	26.4	14.4	50.1	49.9	West
Illinois	57,444	32.8	8.0	28.6	60.0	10.0	65.5	12,288	23.2	13.9	49.1	50.9	Midwest
Indiana	49,446	24.7	9.0	23.3	59.5	12.9	68.6	9,566	24.0	14.3	49.3	50.7	Midwest
Iowa	53,712	27.7	8.6	18.8	64.7	10.6	70.9	10,313	23.4	15.8	49.7	50.3	Midwest
Kansas	52,504	31.5	9.5	19.2	61.9	11.6	66.6	9,828	24.9	14.4	49.8	50.2	Midwest
Kentucky	42,958	22.2	10.0	22.9	54.4	13.1	66.1	9,316	22.9	14.8	49.2	50.8	South
Louisiana	44,555	22.9	9.8	25.4	55.2	12.0	64.4	10,490	23.9	13.6	48.9	51.1	South
Maine	49,462	29.4	10.7	23.6	59.3	14.6	71.3	12,147	19.5	18.2	49.0	51.0	Northeast
Maryland	73,971	38.2	9.3	32.3	62.7	10.0	65.9	13,829	22.6	13.8	48.5	51.5	South
Massachusetts	69,160	41.2	7.4	28.8	62.9	9.5	61.6	14,515	20.6	15.1	48.5	51.5	Northeast
Michigan	49,847	27.4	8.9	24.3	55.9	11.8	70.2	10,948	22.4	15.4	49.1	50.9	Midwest
Minnesota	61,481	34.3	8.8	23.4	66.3	10.2	71.7	11,089	23.5	14.3	49.7	50.3	Midwest
Mississippi	39,680	21.1	8.7	24.2	51.7	12.1	67.7	8,130	24.4	14.3	48.6	51.4	South
Missouri	48,363	27.5	8.9	23.1	58.1	12.4	66.9	9,597	23.0	15.4	49.1	50.9	Midwest

Item 2: Income, Employment, and Other Demographic Data for the 50 U.S. States and the District of Columbia (Continued)

State	Median Household Income in Dollars	Percentage With a Bachelor's Degree or Higher	Percentage Who Carpool (Workers 16 Years and Older)	Mean Travel Time to Work in Minutes	Percentage Employed	Percentage of Divorced Adults	Percentage Who Own Homes	Per Pupil Amounts in Dollars for 2013 Spending of Public Elementary-Secondary School Systems	Percentage Younger Than 18 Years	Percentage 65 Years and Older	Percentage Male	Percentage Female	Region
Montana	46,328	29.3	10.4	17.9	60.1	12.7	66.4	10,625	22.0	16.6	50.2	49.8	West
Nebraska	52,686	29.5	9.5	18.4	67.1	10.7	65.9	11,579	24.8	14.4	49.8	50.2	Midwest
Nevada	51,450	23.1	10.4	23.8	57.7	14.2	53.6	8,339	23.4	14.1	50.3	49.7	West
New Hampshire	66,532	35.0	7.8	27.0	64.4	12.2	70.2	13,721	20.1	15.8	49.4	50.6	Northeast
New Jersey	71,919	37.4	7.9	31.1	61.0	8.5	63.3	17,572	22.5	14.7	48.8	51.2	Northeast
New Mexico	44,803	26.4	9.5	21.8	53.4	12.3	66.9	9,012	24.1	15.3	49.5	50.5	West
New York	58,878	34.5	6.5	32.6	58.5	8.7	53.0	19,818	21.4	14.7	48.5	51.5	Northeast
North Carolina	46,556	28.7	9.7	23.9	56.3	10.9	64.2	8,390	23.0	14.7	48.7	51.3	South
North Dakota	59,029	27.4	8.3	17.6	66.5	9.4	63.8	11,980	22.8	14.2	51.3	48.7	Midwest
Ohio	49,308	26.6	7.8	23.2	58.7	12.3	65.3	11,197	22.8	15.5	48.9	51.1	Midwest
Oklahoma	47,529	24.2	10.5	21.3	57.3	13.3	65.1	7,672	24.6	14.5	49.5	50.5	South
Oregon	51,075	30.8	10.8	23.1	56.6	13.5	60.7	9,543	21.6	16.0	49.5	50.5	West
Pennsylvania	53,234	29.0	8.5	26.4	58.1	9.6	68.8	13,864	21.1	16.7	48.9	51.1	Northeast
Rhode Island	54,891	30.4	7.4	24	59.7	11.4	58.8	14,415	20.2	15.8	48.5	51.5	Northeast
South Carolina	45,238	26.3	9.3	24.1	54.9	11.1	68.0	9,514	22.4	15.8	48.6	51.4	South
South Dakota	50,979	27.8	9.2	16.7	66.5	10.4	68.2	8,470	24.7	15.2	50.3	49.7	Midwest
Tennessee	44,361	25.3	9.2	24.5	55.7	12.6	66.1	8,208	22.8	15.1	48.7	51.3	South
Texas	53,035	27.8	10.6	25.6	60.2	10.9	61.2	8,299	26.4	11.5	49.6	50.4	South
Utah	60,922	31.1	11.8	21.6	64.0	9.1	69.2	6,555	30.7	10.0	50.3	49.7	West
Vermont	54,166	34.9	8.7	22.1	62.5	12.3	70.0	16,377	19.4	17.0	49.3	50.7	Northeast
Virginia	64,902	36.7	9.3	28.1	60.6	10.1	65.3	10,960	22.4	13.8	49.2	50.8	South
Washington	61,366	33.1	10.1	26.8	59.1	12.0	61.7	9,672	22.7	14.1	50.0	50.0	West
West Virginia	41,059	19.2	9.7	25.7	49.5	13.3	72.2	11,132	20.5	17.8	49.4	50.6	South
Wisconsin	52,622	28.4	8.2	21.9	63.3	11.0	66.6	11,071	22.6	15.2	49.7	50.3	Midwest
Wyoming	57,055	26.6	11.0	18.7	64.8	14.0	66.9	15,700	23.7	13.8	51.0	49.0	West

Item 2: Income, Employment, and Other Demographic Data for the 50 U.S. States and the District of Columbia (Continued)

Some of the data in the table use 5-year estimates. The values are based on sample data that are pooled and weighted to an average of 5 years of estimates and may exhibit differences from the official estimates of the population produced by the Population Estimates Program (PEP). For more information about PEP, go to www.census.gov/programs-surveys/popest.html.

To view the source data, copy and paste the following links into your browser:

data.census.gov/cedsci/table?q=B19013&hidePreview=true&tid=ACSDT1Y2014.B19013&vintage=2018&g=0100000US.04000.001

(for Median Household Income in Dollars – Socioeconomic Estimates)

data.census.gov/cedsci/table?q=S1501&g=0100000US.04000.001&tid=ACSST1Y2014.S1501&hidePreview=true

(for Percentage With a Bachelor's Degree or Higher)

data.census.gov/cedsci/table?q=S0801&hidePreview=false&tid=ACSST1Y2014.S0801&vintage=2018

(for Percentage Who Carpool (Workers 16 Years and Older) and Mean Travel Time to Work in Minutes)

data.census.gov/cedsci/table?q=DP03&g=0100000US.04000.001&tid=ACSDP1Y2014.DP03&hidePreview=true

(for Percentage Employed)

data.census.gov/cedsci/table?q=S1201&g=0100000US.04000.001&tid=ACSST1Y2014.S1201&hidePreview=true

(for Percentage of Divorced Adults)

data.census.gov/cedsci/table?q=DP04&g=0100000US.04000.001&tid=ACSDP1Y2014.DP04&hidePreview=true

(for Percentage Who Own Homes)

www.census.gov/data/tables/2013/econ/school-finances/secondary-education-finance.html – click on the link to the Microsoft Excel document under “State-level Tables,” and go to tab 8

(for Per Pupil Amounts in Dollars for 2013 Spending of Public Elementary-Secondary School Systems)

www.census.gov/quickfacts/

(For Percentage Younger Than 18 Years, and for Percentage Male and Female, calculated from “Female persons, percent, July 1, 2014, [V2014]”)

data.census.gov/cedsci/table?q=DP05&g=0100000US.04000.001&tid=ACSDP1Y2014.DP05&hidePreview=true

(for Percentage 65 Years and Older)

www2.census.gov/geo/docs/maps-data/maps/reg_div.txt

(for Region)