

# Contrasting Demographics Between the Southern and Northern Regions of the United States

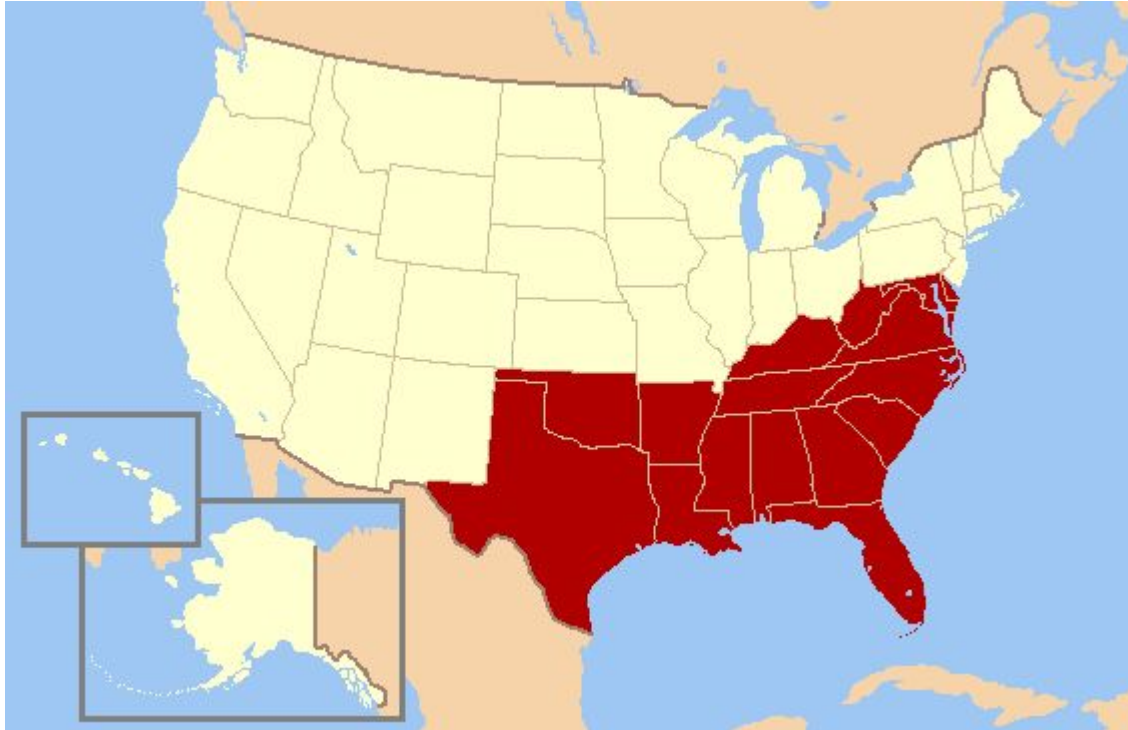
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# Outline

- Regions of Interest
- The Data
- Statistical Methods
- Assumptions
- Differences in educational outcome
- A look at unemployment status
- Rent burden
- Connections between demographic benchmarks
- Policy Recommendations

# Regions of Interest



- The southern United States as defined by the US Census Bureau
- The rest of the country (minus Hawaii, Alaska, and The District of Columbia)

# The Data

- The American Community Survey (2018)
  - Publicly available
  - More than 31,000 variables describing social, economic, demographic, and housing data

<a href="#">DP03_0001E</a>	Estimate!!EMPLOYMENT STATUS!!Population 16 years and over	SELECTED ECONOMIC CHARACTERISTICS
<a href="#">DP03_0001PE</a>	Percent Estimate!!EMPLOYMENT STATUS!!Population 16 years and over	SELECTED ECONOMIC CHARACTERISTICS
<a href="#">DP03_0002E</a>	Estimate!!EMPLOYMENT STATUS!!Population 16 years and over!!In labor force	SELECTED ECONOMIC CHARACTERISTICS
<a href="#">DP03_0002PE</a>	Percent Estimate!!EMPLOYMENT STATUS!!Population 16 years and over!!In labor force	SELECTED ECONOMIC CHARACTERISTICS
<a href="#">DP03_0003E</a>	Estimate!!EMPLOYMENT STATUS!!Population 16 years and over!!In labor force!!Civilian labor force	SELECTED ECONOMIC CHARACTERISTICS

# Statistical Methods

- Hypothesis testing
  - A rigorous framework for determining if results are statistically “significant”
- **Example:** You and your friend go bowling. He claims his all-time average score is 150. You play 10 games together and his average is an abysmal 60 points. What are the odds that his all-time average is really 150?

## Data

- **Population mean**  $\mu = 150$
- **Sample mean**  $\bar{x} = 60$

## Hypotheses

- **Null hypothesis**  $H_0: \mu = 150$
- **Alternative Hypothesis**  $H_a: \mu < 150$
- **Significance level**  $\alpha = 0.05$
- **Critical t-value**  $t_{crit} = -1.83$

## Test Results

- **p-value**  $p \sim 0$
- **t-statistic**  $t = -17.32$

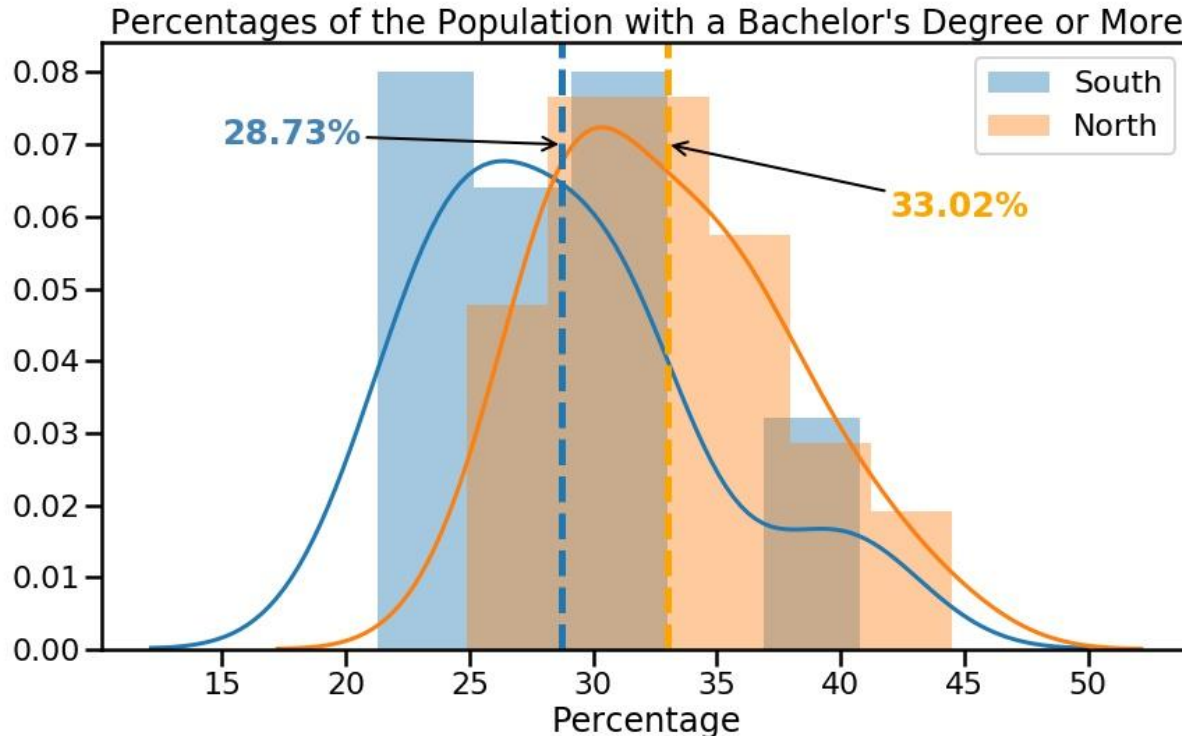
## Conclusion

- We reject the null hypothesis with 95% confidence

# Assumptions

- US census surveys have no hidden biases
  - Survey outcomes are representative of the general population within each state
- Samples from northern and southern states come from different populations
  - Impacts the outcomes of statistical tests

# Differences in Educational Outcome



## Hypothesis Testing

$H_0$ : Northern education status equal Southern education status.

$H_a$ : Northern education status not equal Southern education status.

**Alpha-value** : 0.005

Difference in Education Outcome

**T-test Value** : -2.633

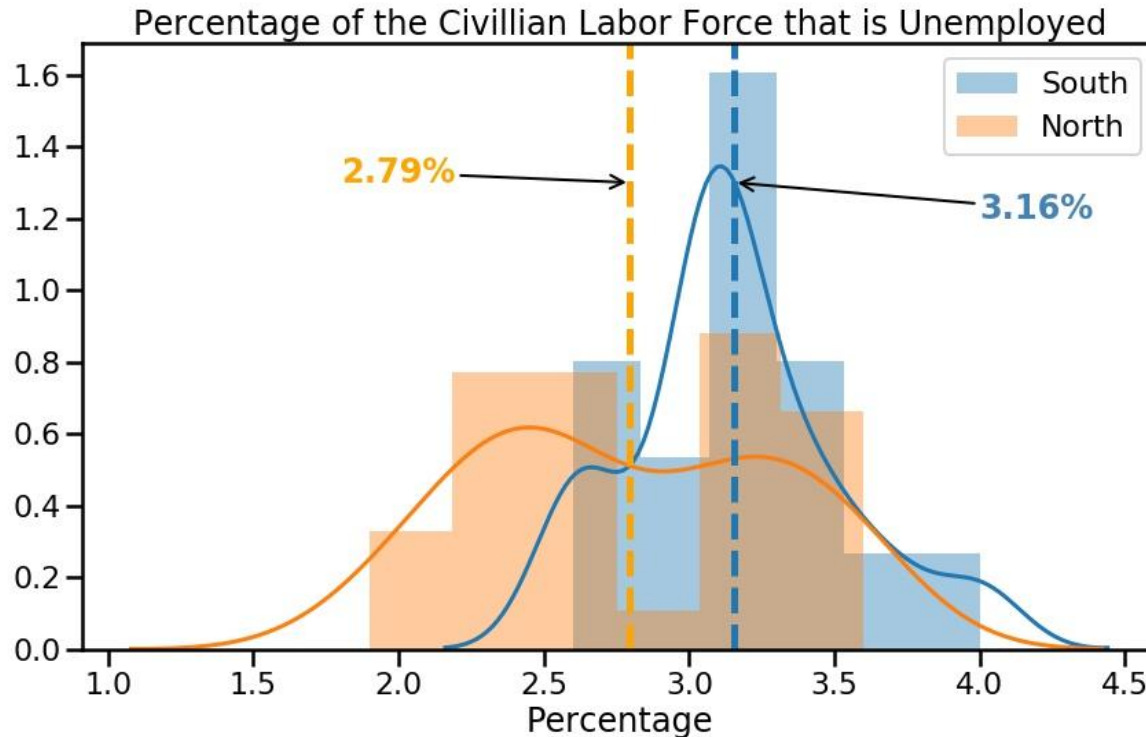
**P-value** : 0.006

**Decision:** Reject Null Hypothesis

**Reason** : p-value < alpha-value

**Conclusion:** There is sufficient evidence to conclude northern education Status not equal southern education status.

# A Look at Unemployment Status



Hypothesis Testing

$H_0$ : Northern unemployment status equal Southern unemployment status.

$H_a$ : Northern unemployment status not equal Southern unemployment status.

**Alpha-value** : 0.05

Unemployment Status

**T-test Value** : 2.079

**P-value** : 0.024

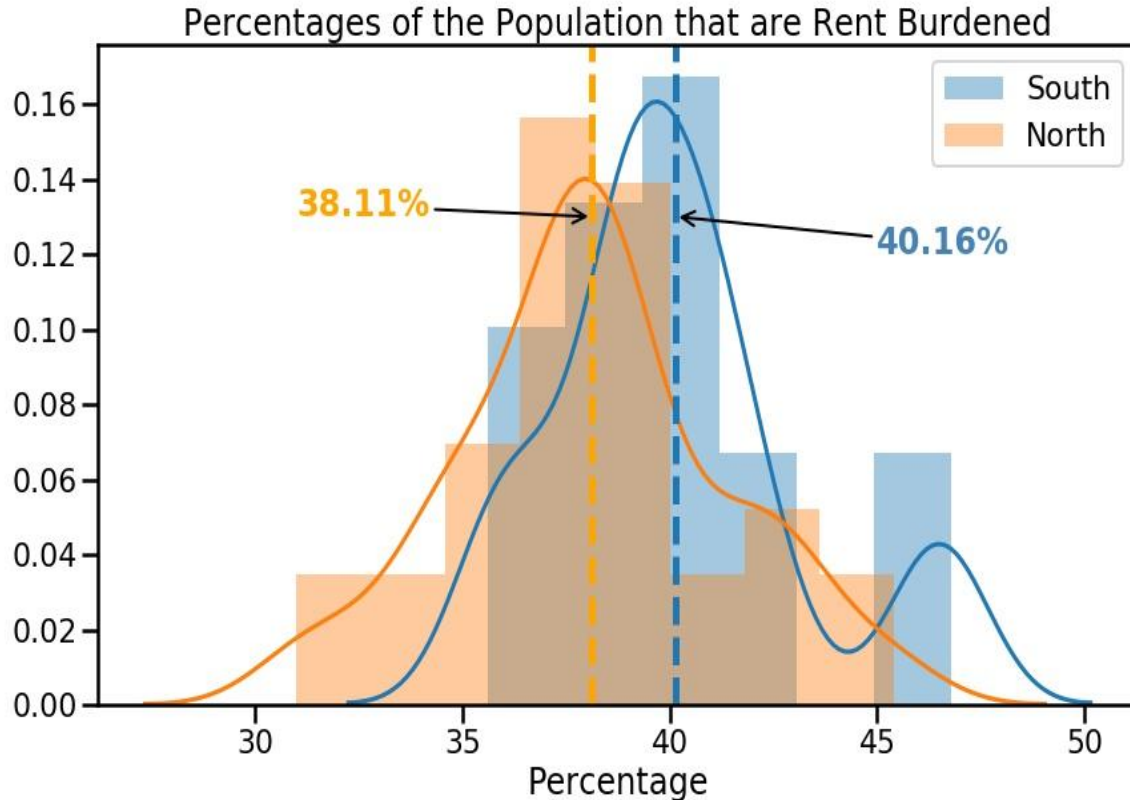
**Decision:** Reject Null Hypothesis

**Reason** : p-value < alpha-value

**Conclusion:** There is sufficient evidence to conclude northern unemployment status not equal southern unemployment status.



# Rent Burden



## Hypothesis Testing

$H_0$ : Northern rent burden status equal Southern rent burden status.

$H_a$ : Northern rent burden status not equal Southern rent burden status.

**Alpha-value** : 0.05

Rent Burden Status

**T-test Value** : 2.122

**P-value** : 0.020

**Decision**: Reject Null Hypothesis

**Reason** : p-value < alpha-value

**Conclusion**: There is sufficient evidence to conclude northern rent burden status not equal southern burden status

# Connections Between Demographic Insights

- Is there a relationship between unemployment status and educational attainment?

Percentage of the Civilian Labor Force that is Unemployed by Education Level in the Southern United States

Education Status	Less Than High School	High School Degree	Some College	Bachelor's Degree or More
Employment Status				
Employed	8.35	23.94	29.25	34.34
Unemployed	0.64	1.36	1.3	0.82

## Hypothesis Testing for chi-square of independence

$H_0$ : There is no association between employment status and education.

$H_a$ : There is association between employment status and education.

**Alpha-value** : 0.05

**T-test Value** : 18055.855      **P-value** : 0.0

**Decision**: Reject Null Hypothesis      **Reason** : p-value < alpha-value

**Conclusion**: There is sufficient evidence to conclude there is association between employment status and education

# Policy Recommendations

- Programs that will increase access to higher education
- Public works programs to alleviate unemployment
- Plans to increase access to affordable, public housing
- Policies for education and employment opportunities  
should reflect one another