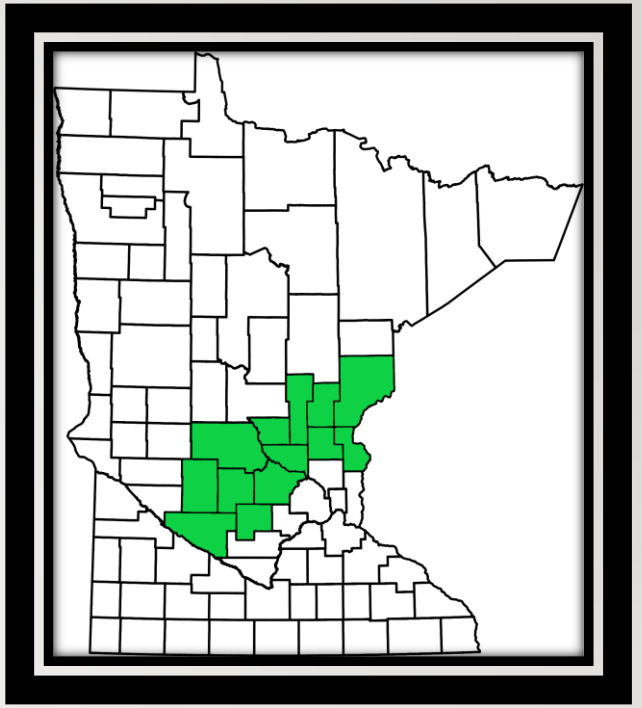
Poverty and **Educational Attainment**

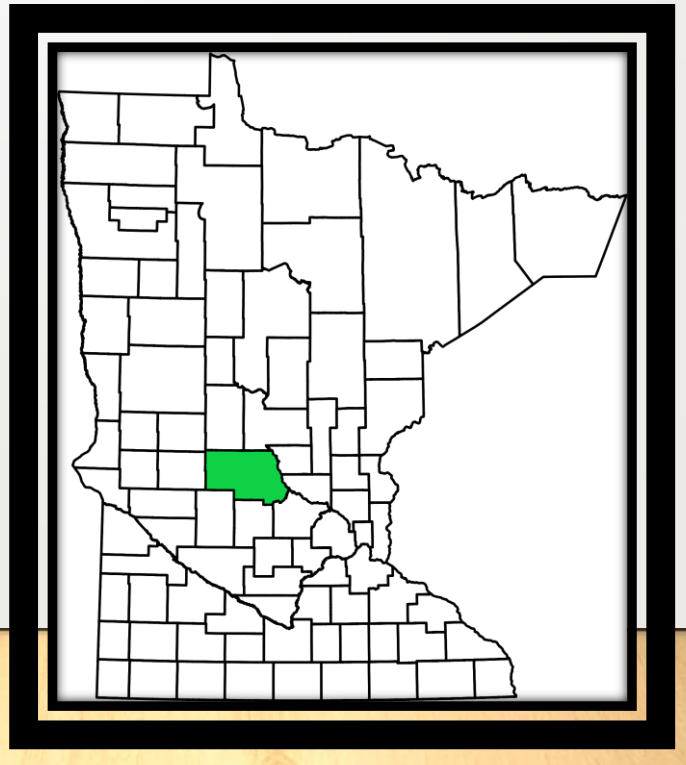
in *St. Cloud & Central Minnesota*



Author:

Hamza Junaid

Claude Haneum Lee



Snapshots of
St. Cloud area and
Central Minnesota

Econometrics 485 Class Project
Advisor: Prof. Mónica García-Pérez

Data & Selection

- American Community Survey 2013-2017 5-Year Sample

  From IPUMS (Integrated Public Use Microdata Series)

- Age: Working Age (24 to 65)
- Sample Region [N (sample size count), Population Estimates (weighted counts)]

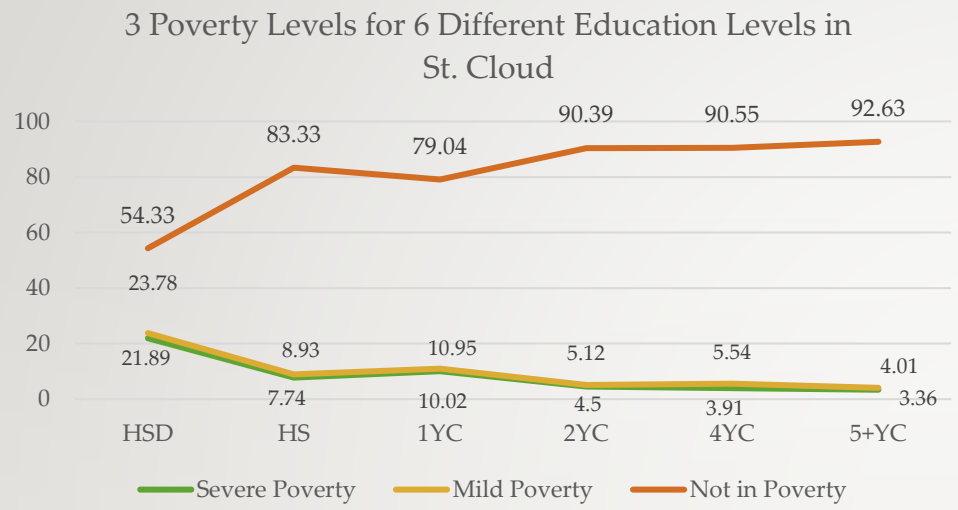
  St. Cloud (Stearns county as an approx., ICP): **4359, 78551**

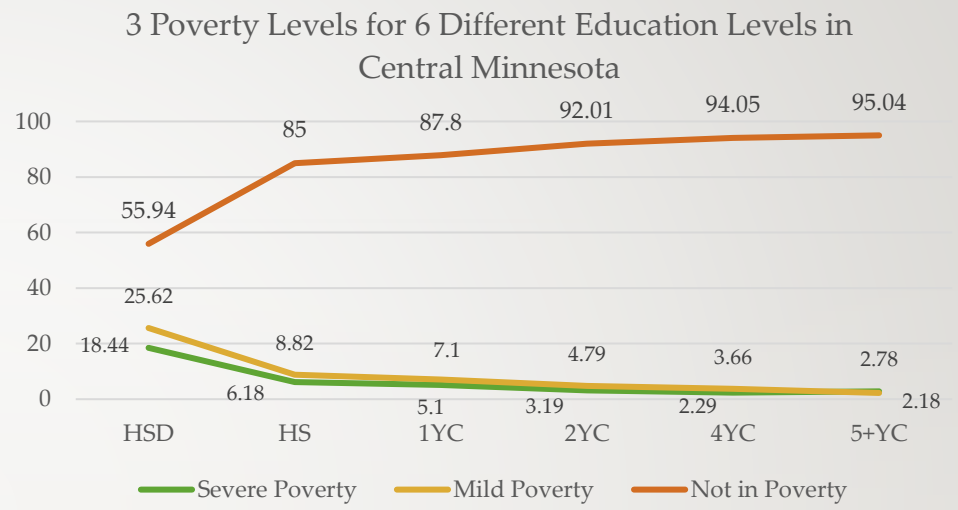
  Central Minnesota (PUMA): **22735, 379158**

Topic Background & Literature Review

- Effect of Educational Attainment on Poverty Level in St. Cloud area and Central MN
- Literature Review:
  - More education leads to lower poverty level *(Weber et al., 2007)*
  - Gender and racial discrimination lead to higher poverty level, and their effects are independent from each other *(Reeves et al., 2016, Lu et al., 2002)*
  - There is no gender gap in education level, but there still is a gender gap in poverty level *(Chaudhuri, 2018)*
  - Minor cultural groups in Minnesota have lower education attainment level and higher poverty level *(Creamer et al., 2018)*
  - Additionally, healthcare coverage, employment status, number of children in household, and age affect poverty level *(Reeves et al., 2016, Orbeta Jr., 2006, Semega et al., 2018)*
- **Hypothesis: The lower the education an individual gets, the more severe poverty level they would have**

Categorizing Key Variables





- Small difference between ***Severe Poverty*** and ***Mild Poverty***
- Similar pattern for any college education (except 1YC in St. Cloud, but ignore for simplicity)

(Reeves et al., 2016)

Federal Poverty Level (FPL)

$$= 100 * \frac{household\ income}{threshold\ income}\%$$

Poverty Status (POVERTY)

Poverty Level	Poverty Status *(POVERTY)*		Abbr.
FPL ≤ 75%	In Severe Poverty	In Poverty	IP
75% ≤ FPL < 150%	In Mild Poverty		
FPL ≥ 150%	Not in poverty		NP

Years in Education (EDUC)

Highest Educational Attainment		Abbr.	
High School Dropouts		HSD	
High School Graduates		HS	
1 Year in College	Some College	1YC	SC
2 Years in College		2YC	
3 Years in College		3YC	
4 Years in College		4YC	
5+ Years in College		5+YC	

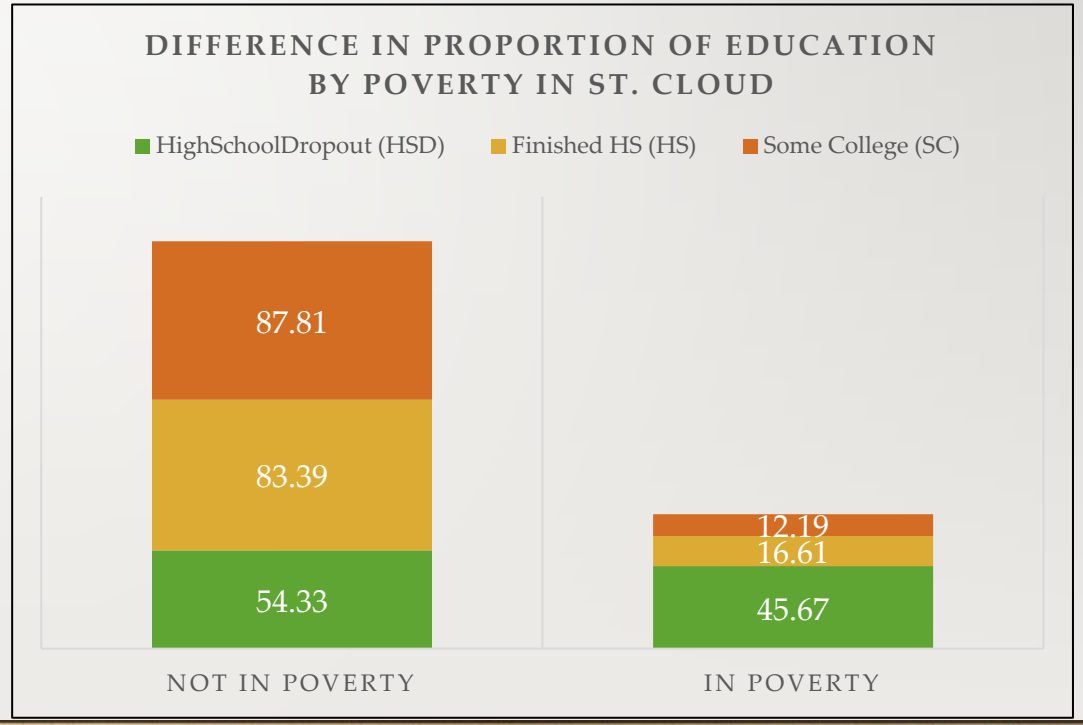
Summary Statistics for St. Cloud area

Subgroup	St. Cloud area				
	In Poverty		Not In Poverty		Chi-Square Test
	Prop.	WC**	Prop.	WC**	p-value
HighSchoolDropout (HSD)	45.67	1878	54.33	2234	< 0.0001 ***
Finished HS (HS)	16.61	4238	83.39	21273	
Some College (SC)	12.19	5963	87.81	42965	
Male	12.99	5114	87.01	34244	< 0.0001 ***
Female (FEMALE)	17.77	6965	82.23	32228	
White	13.29	9614	86.71	62718	< 0.0001 ***
Non-White (NWHITE)	39.64	2465	60.36	3754	
Age (average, t-test)	40	12079	45	66472	< 0.0001 ***
No Children	15.02	6264	84.98	35451	0.0006 ***
Have Children (YCHILD)	15.79	5815	84.21	31021	
Employed	10.99	7275	89.01	58949	< 0.0001 ***
Not Employed (NEMP)	38.97	4804	61.03	7523	
Healthcare Covered	13.47	9953	86.53	63945	< 0.0001 ***
NC Not Covered (NHCOV)	45.69	2126	54.31	2527	
Total Proportion	15.38	12079	84.62	66472	

- Chi-Square Test (t-test for age)

H_0: Does poverty proportion differ by *Subgroups?*

✓ We have evidence that poverty status differs by subgroups for each categories



**WC: weighted counts

Summary Statistics for Central Minnesota

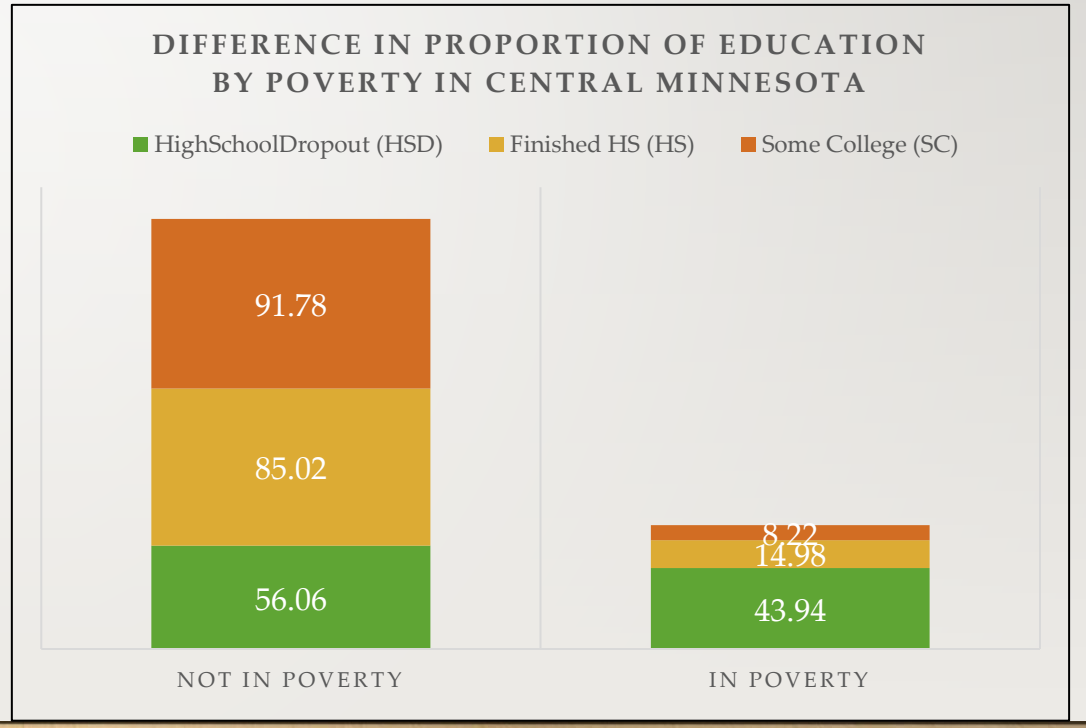
Subgroup	Central Minnesota				
	In Poverty		Not In Poverty		Chi-Square Test
	Prop.	WC**	Prop.	WC**	p-value
HighSchoolDropout (HSD)	43.94	7941	56.06	10132	< 0.0001 ***
Finished HS (HS)	14.98	21435	85.02	121616	
Some College (SC)	8.22	17927	91.78	200107	
Male	10.98	21112	89.02	171191	< 0.0001 ***
Female (FEMALE)	14.02	26191	85.98	160664	
White	11.14	39784	88.86	317259	< 0.0001 ***
Non-White (NWHITE)	34	7519	66	14596	
Age (average, t-test)	42	47303	45	331855	< 0.0001 ***
No Children	12.8	24307	87.2	165649	< 0.0001 ***
Have Children (YCHILD)	12.15	22996	87.85	166206	
Employed	8.21	25675	91.79	287165	< 0.0001 ***
Not Employed (NEMP)	32.61	21628	67.39	44690	
Healthcare Covered	11.46	40756	88.54	314890	< 0.0001 ***
NC Not Covered (NHCOV)	27.85	6547	72.15	16965	
Total Proportion	12.48	47303	87.52	331855	

(same as results from St. Cloud area)

- Chi-Square Test (t-test for age)

H_0: Does poverty proportion differ by *Subgroups?*

✓ We have evidence that poverty status differs by subgroups for each categories.



**WC: weighted counts

Comparisons and Significance

- Extra education after high school have about the same changes in poverty proportion
  - 3 Levels in Education (HSD, HS, SC) would work better for simplicity
- There isn't much difference in severe poverty and mild poverty
  - Poverty Status (in/not in poverty) would work better for simplicity
- Each factor on poverty, especially ***Education,*** makes difference in poverty status
  - Only comparing each factor by itself (Correlation ≠ Causation)
  - Econometric model: actual effect of a factor in poverty status

Econometric Analysis: *Linear Probability Model*

$$\boldsymbol{POVERTY} = \beta_0 + \beta_1 \boldsymbol{EDUC} + \beta_2 \boldsymbol{FEMALE} + \beta_3 \boldsymbol{NWHITE} + \beta_4 \boldsymbol{Age}$$

$$+ \beta_5 \boldsymbol{YCHILD} + \beta_6 \boldsymbol{NEMP} + \beta_7 \boldsymbol{NHCOV} + \varepsilon$$

POVERTY		EDUC		FEMALE		NWHITE		YCHILD		NEMP		NHCOV	
0	Not in Poverty (NP)	**0**	**HS Dropout**	**0**	**Male**	**0**	**White**	**0**	**No children**	**0**	**Employed**	**0**	**Healthcare Covered**
1	In Poverty (IP)	1	Finished HS	1	Female	1	Non-White	1	Have children	1	Not employed	1	No HC Cov.
		2	Some college										

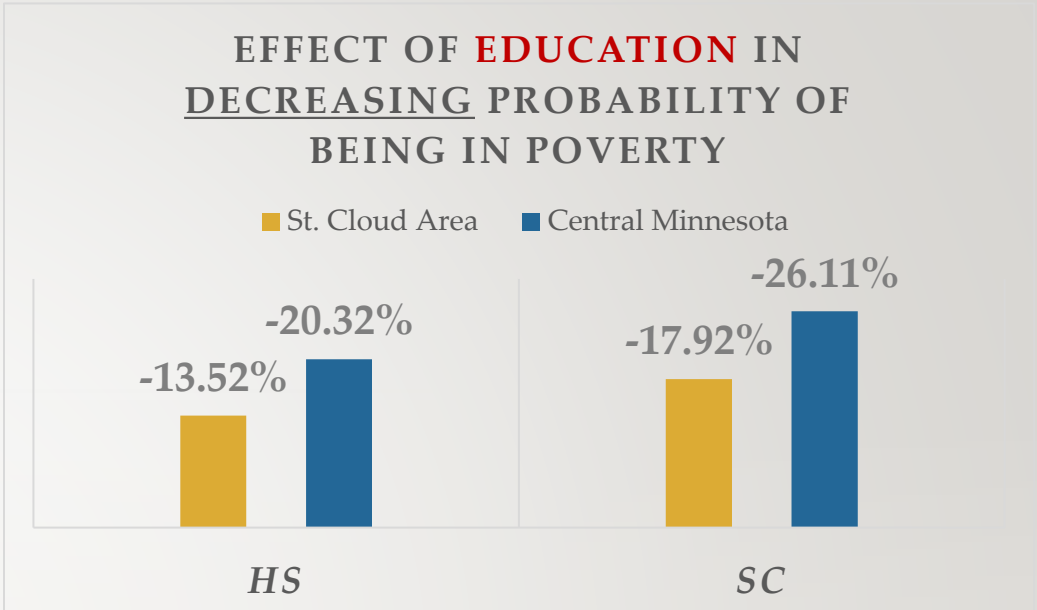
- **Reference Group** (marked as red above)

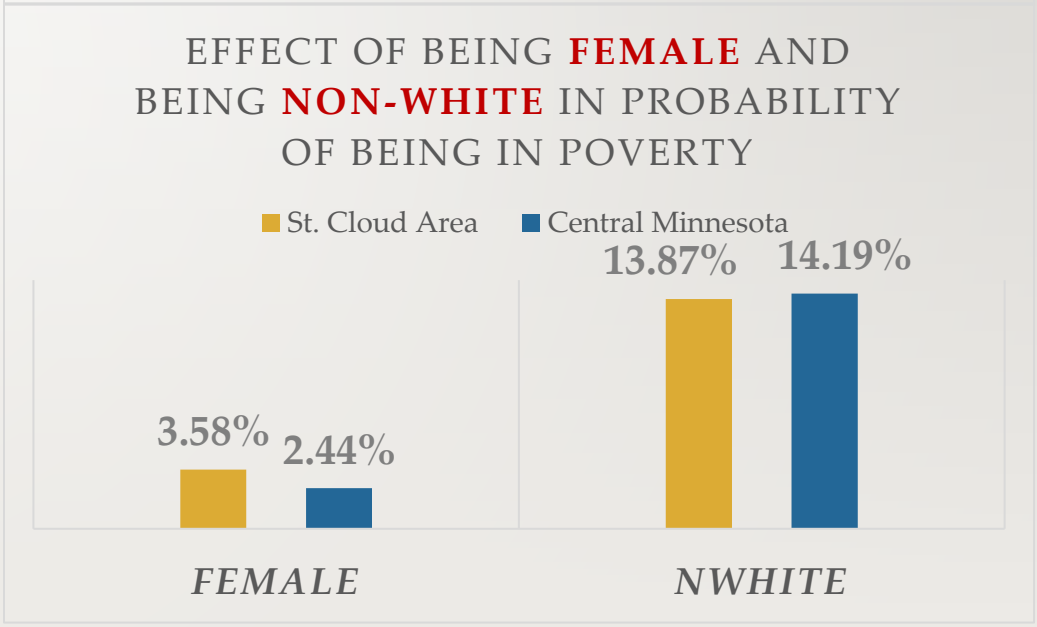
High School Dropout White Males without children, employed with health insurance.

First Step: Estimates and Result Interpretation

Estimated Effects of Each Group on Probability of Being in Poverty						
Parameter %point unit	St. Cloud Area			Central Minnesota		
	Estimate	Std Error	p-value	Estimate	Std Error	p-value
Intercept	43.26%	3.20%	< 0.0001	43.96%	1.32%	< 0.0001
EDUC - HS	**-13.52%**	2.47%	< 0.0001	**-20.32%**	1.01%	< 0.0001
EDUC - SC	**-17.92%**	2.41%	< 0.0001	**-26.11%**	1.00%	< 0.0001
FEMALE	**3.58%**	1.01%	0.0004	**2.44%**	0.41%	< 0.0001
NWHITE	**13.87%**	1.96%	< 0.0001	**14.19%**	0.89%	< 0.0001
AGE	-0.47%	0.04%	< 0.0001	-0.34%	0.02%	< 0.0001
YCHILD	**0.21%**	1.02%	0.8377	**-0.45%**	0.42%	0.2798
NEMP	26.00%	1.42%	< 0.0001	22.67%	0.55%	< 0.0001
NHCOV	23.51%	2.16%	< 0.0001	8.96%	0.85%	< 0.0001

- Extra education decreases the probability of being in poverty.
- Being female and being non-white increases the probability of being in poverty.





Concluding Remarks: Limitation & Future Steps

- Selection Bias (Omitted Variable Bias)
  - Why do these people stay in St. Cloud Area/Central Minnesota after years of education?

- Reverse Causality
  - Being poverty also affects one's educational attainment level ("Five Evils: Multidimensional Poverty and Race in America", *Reeves et al., 2016*).

Model Validation/Improvement

- Residual (error) diagnostics for MLR Assumptions verification
- Other model comparisons (Logistic Model, interaction terms, etc.)
- Re-selection of variables (ex. Insignificance of YCHILD indicator)
- Expand White/Non-White into multiple races