

Exploring Colleges and Their Local Economics

By: Adil Baksh, Griselda Rodriguez, Michael Sanchez

Introduction

- There are various institutions in the state of Texas
- The three different types are public, private non-profit, and private profit
 - Public are institutions that are funded by the government
 - Private non-profit are institutions that reinvest their profits back into the institution
 - Private profit are institutions that distribute their profits the institution's owners, investors, and shareholders
- We wanted to see if there is a connection between the economic status of an area to an institutions location.

Research Questions To Explore

1. What is the association between the poverty rates and tuition rates of private and public universities?
2. Does the type of school (Public/Private) depend on the median income of the school's location?

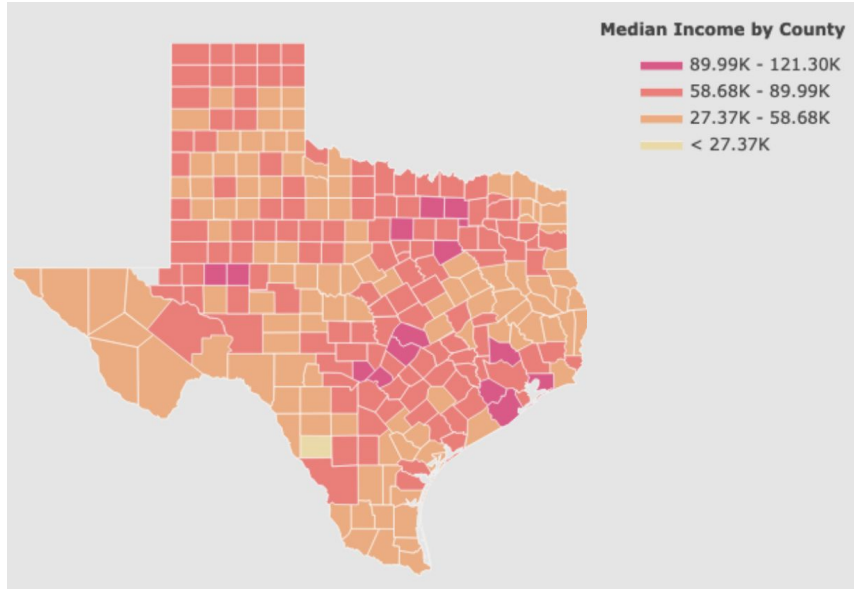
What Sources of Data Are We Using?

- US Census data from the American Community Survey Data API from 2022
- College Scorecard from the United States Department of Education
 - Includes information from years 1997 to 2022.

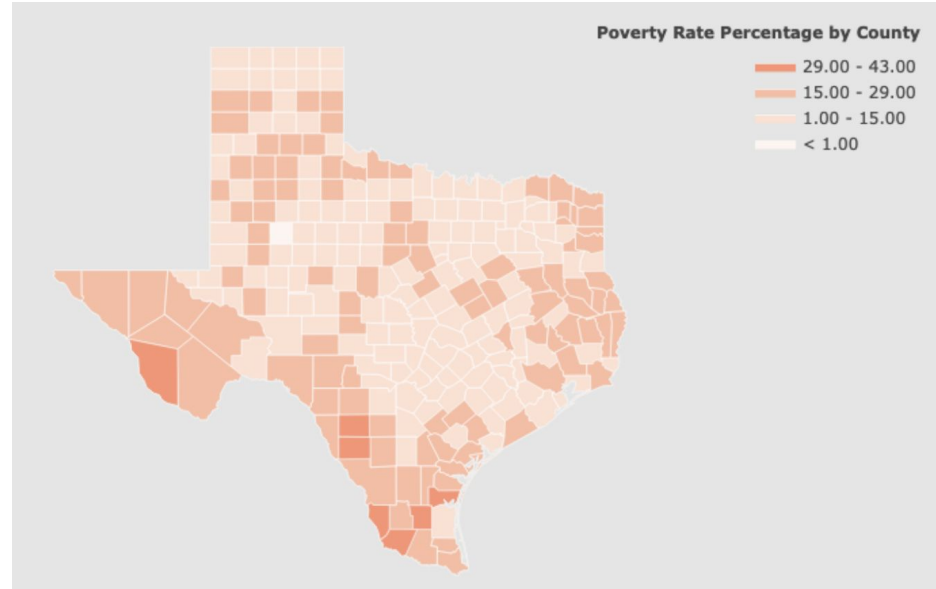


Exploring Demographics and Reported Colleges

Median Income by County in Texas

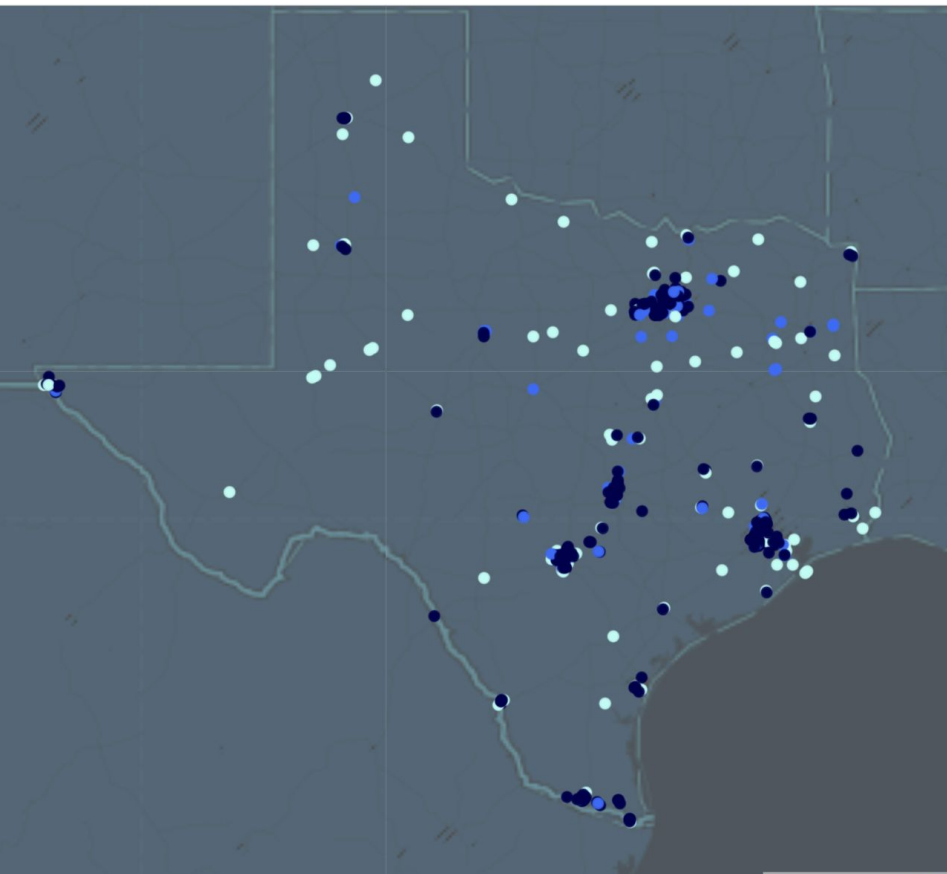


Poverty Rate Percentage by County in Texas



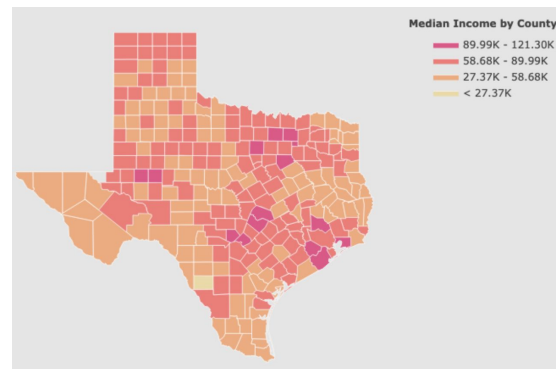
- The Dallas Area, Houston Area, Midland Area, Austin Area, and San Antonio Area have high median incomes while Dimmit County has the lowest median income.
- On the other hand, counties with lower median incomes have higher poverty rates.
- The poverty rate in Texas is below 50%.
- Loving County is not colored on the first map due to showing a negative value in the data.

Types of Institutions in Texas



Color	Institution Type
Light Blue	Public
Medium Blue	Private Non-Profit
Dark Blue	Private Profit

Median Income by County in Texas

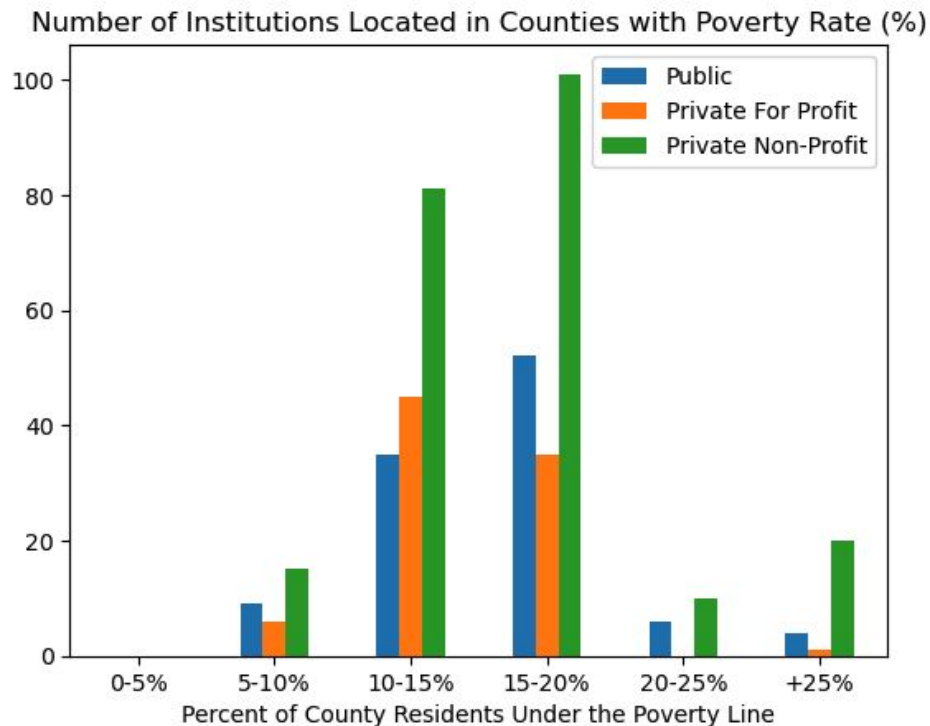


- As seen on the “Types of Institutions in Texas” map, public schools are spread out across the state while private schools are concentrated in major cities.
- The majority of private schools seem to be located where there is a higher median income.

What is the association between the poverty rates and tuition rates of private and public universities?

Analysis of the Number of Institutions vs Poverty Rate

- There are no reporting institutions that are located in a county where less than 5% of the population are below the poverty line.
- Private Non-Profit institutions are the most numerous in all different categories of poverty level.
- Very little Private for Profit institutions have been reported in counties with poverty rates above 20% relative to their counterparts.



Chi-Squared Analysis on Poverty Rate and Institution Type

Ho: There is no association between the type of institution and county poverty rate which it is located.

Ha: There is an association between the type of institution and the county poverty rate which it is located.

Assumptions:

- 1) Since all schools do not report in the School Report Card we will assume our sample is a representation of the population.
- 2) There are no more than 20% of the expected counts below 5%
- 3) Each school selected have results that are independent from each other.

Poverty Types	5%-10%	10%-15%	15%-20%	20%-25%	>25%
School Types					
Private Non-Profit	15	81	101	10	20
Private Profit	6	45	35	0	1
Public	9	35	52	6	3

Proportion Table: Poverty Type						
School Types	5%-10%	10%-15%	15%-20%	20%-25%	>25%	All
Private Non-Profit	3.58	19.33	24.11	2.39	4.77	54.18
Private Profit	1.43	10.74	8.35	0.00	0.24	20.76
Public	2.15	8.35	12.41	1.43	0.72	25.06
All	7.16	38.42	44.87	3.82	5.73	100.00

Expected Counts: Poverty Type					
School Types	5%-10%	10%-15%	15%-20%	20%-25%	>25%
Private Non-Profit	16.252983	87.224344	101.852029	8.66258	13.002387
Private Profit	6.229117	33.429594	39.0358	3.322196	4.983294
Public	7.5179	40.346062	47.112172	4.009547	6.01432

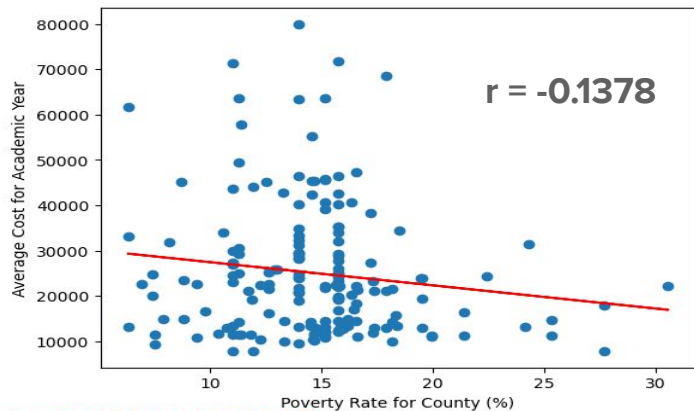
Chi-square Test Results	
Pearson Chi-square (8.0)	19.4615
p-value	0.0126
Cramer's V	0.1524

Conclusions of the Qualitative Analysis

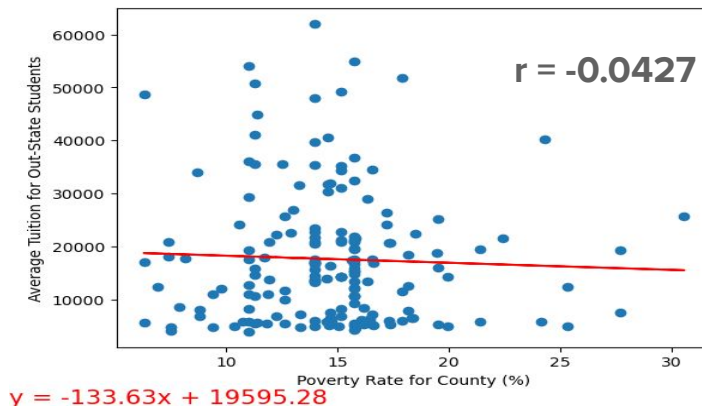
The low p-value ($0.01 < 0.05$) resulting from the Chi-Squared Test for Independence confirms our observations from the bar chart that there is an association between the type of institution and the poverty rate at which the institution was built.

This implies that institutions are built in locations that are within the range of 10-20% of residents being below the poverty line. This also shows that for locations where the poverty rate is higher is where most Non-Profit Private institutions are established.

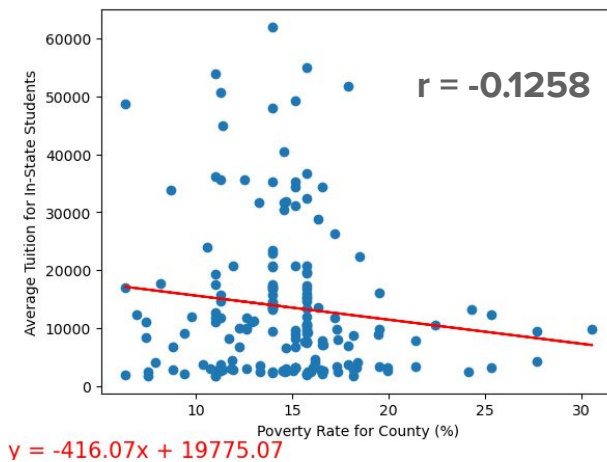
Poverty Rate vs Average Cost Per Year



Poverty Rate vs Tuition for Out-of-State Students

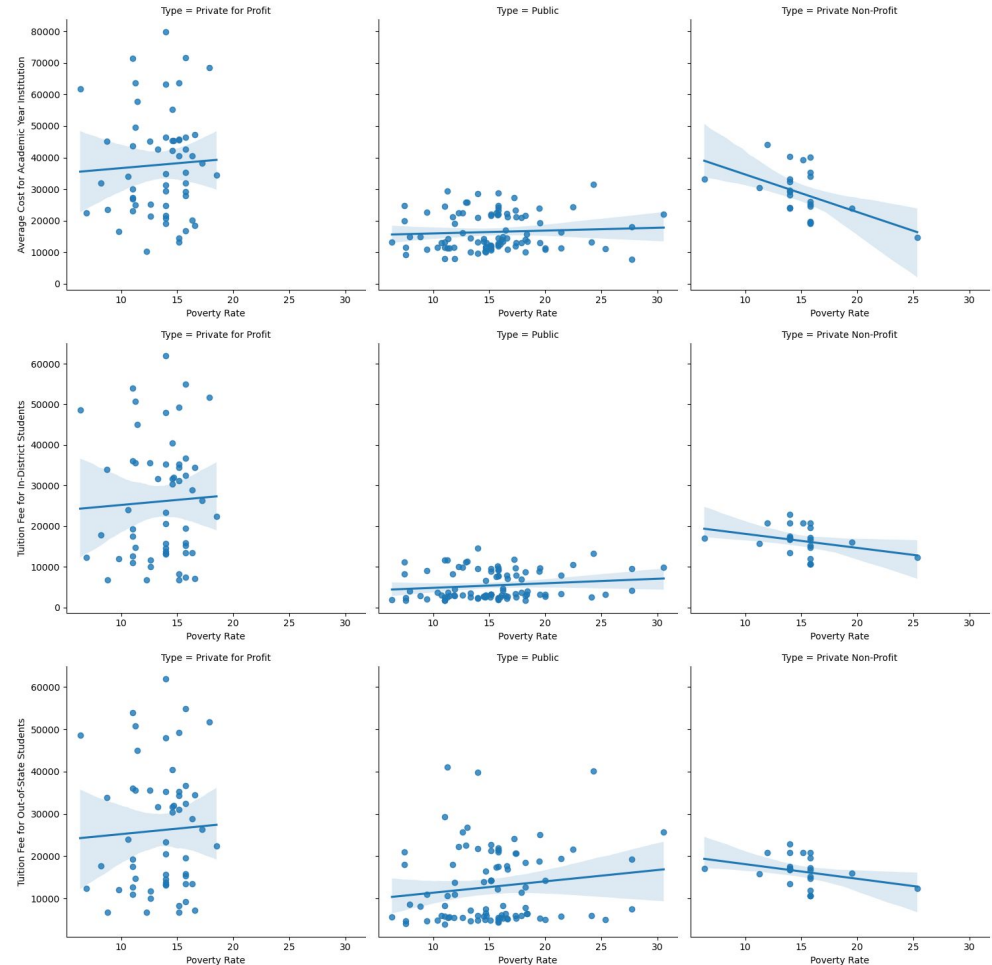


Poverty Rate vs Tuition for In-State Students



Overall Comparison of Poverty Rate vs Costs and Institution Type

- No apparent association between poverty rate and Private for Profit Institutions' Average Yearly Cost
- Slightly positive association between poverty rate and Public Institutions' Tuition and Fees for In-State Students
- Negative association between poverty rate and Private Non-Profit Institutions' Tuition for Out-State Students



Overall Conclusion of Poverty Rate and the Types of Institutions

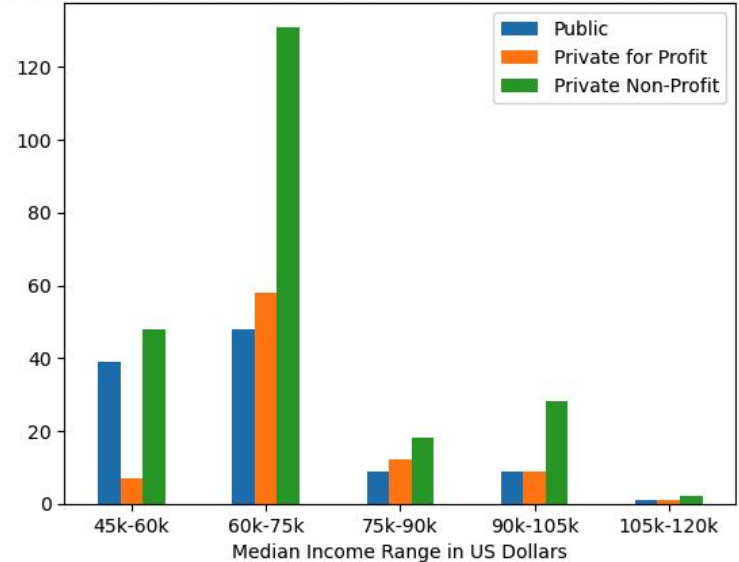
Through the qualitative analysis we are able to identify that there is an association between the rate of poverty in a particular county and the institution that are established within it. Overall, there are less institutions built in areas that are of higher poverty. The regression analysis of the poverty rate and the average yearly cost, in-state tuition, and out-of-state tuition provides some evidence that there is no overall linear relationship with the exception of Private Non-Profit Institutions implying a negative relationship between poverty rate and average yearly cost. Private Non-Profit institutions are more likely to align lower costs to areas with higher rates of poverty.

Does the type of school depend on the median income of the school's location?

Visual Analysis of Median Income and Institution Type

- Most observations can be seen within the median income range of \$45,000 and \$90,000.
- Fewer institutions are established in counties with large median incomes.
- Private Non-Profit institutions are more numerous in the median income ranges compared to the other types of institutions.

Number of Institutions Located in Counties with Median Income Range (\$)



Chi-Squared Analysis of Median Income and Institution Type

Ho: There is no association between the type of institution and county median income which it is located.

Ha: There is an association between the type of institution and the county median income which it is located.

Assumptions:

- 1) Since all institutions do not report in the School Report Card we will assume our sample is a representation of the population.
- 2) There are no more than 20% of the expected counts below 5%
- 3) Each institution selected have results that are independent from each other.

Income Range	45k-60k	60k-75k	75k-90k	90k-105k	105k-120k
School Types					
Private Non-Profit	48	131	18	28	2
Private Profit	7	58	12	9	1
Public	39	48	9	9	1

Proportion Table: Income Range						
School Types	45k-60k	60k-75k	75k-90k	90k-105k	105k-120k	All
Private Non-Profit	11.43	31.19	4.29	6.67	0.48	54.85
Private Profit	1.67	13.81	2.86	2.14	0.24	20.71
Public	9.29	11.43	2.14	2.14	0.24	25.24
All	22.38	56.43	9.29	10.95	0.95	100.00

Expected Counts: Income Range					
School Types	45k-60k	60k-75k	75k-90k	90k-105k	105k-120k
Private Non-Profit	50.804762	128.092857	21.078571	24.861905	2.161905
Private Profit	19.471429	49.092857	8.078571	9.528571	0.828571
Public	23.72381	59.814286	9.842857	11.609524	1.009524

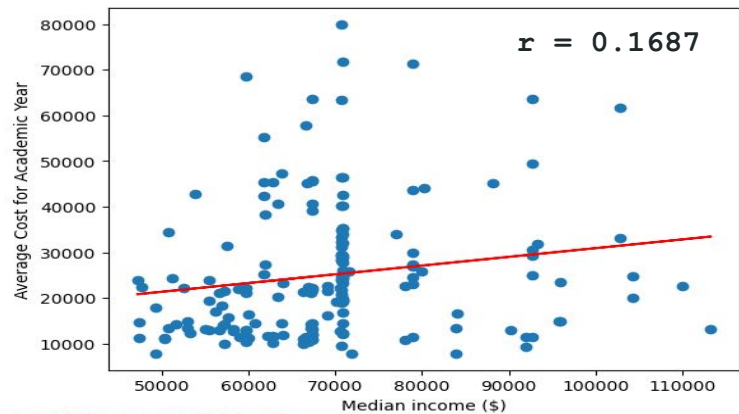
Chi-square Test Results	
Pearson Chi-square (8.0)	25.4799
p-value	0.0013
Cramer's V	0.1742

Conclusions

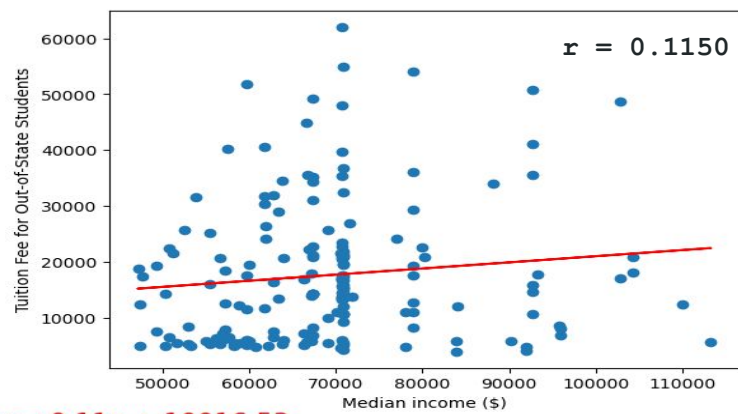
With a small p-value ($0.001 < 0.05$) resulting from the Chi-Squared Test for Independence there is sufficient evidence to believe that there is an association between the type of institution and the median income of residents in the counties they share. This is further backed up by the visual representation in the bar chart which shows more Private Non-Profit institutions being more numerous in each category.

Overall, all institutions are not surprising located within where most of the median incomes are reported by the US Census. These results do align with the poverty rate analysis earlier.

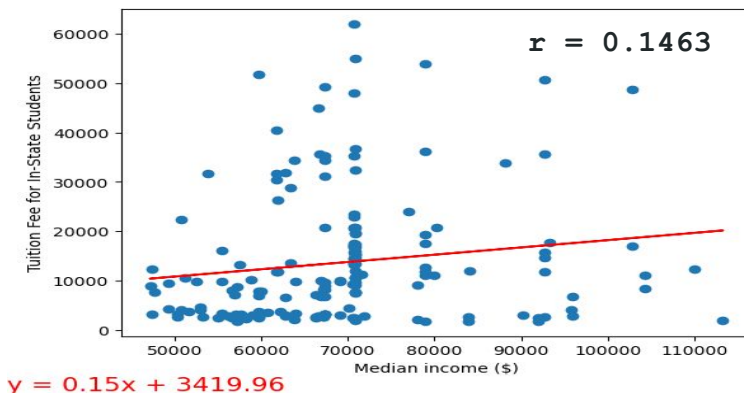
Median Income vs Average Cost Per Year



Median Income vs Tuition for Out-of-State Students

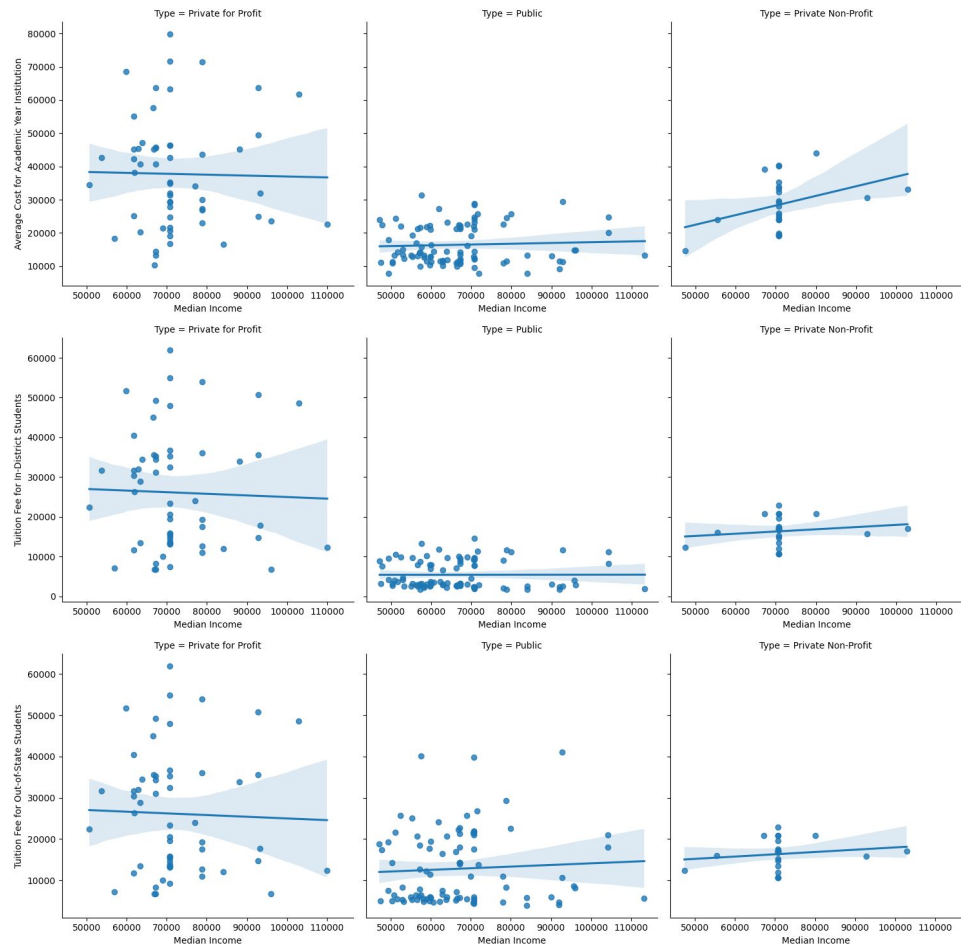


Median Income vs Tuition for In-State Students



Overall Comparison of Median Income vs Costs and Institution Type

- No apparent association between median income and Private for Profit Institutions' Average Yearly Cost
- No apparent association between median income and Public Institutions' Tuition and Fees for In-State Students
- No apparent association between median income and Private Non-Profit Institutions' Tuition for Out-State Students



Conclusions on Median Income and Institutions

The qualitative analysis of median income and institution type provides clear evidence that there is an association between the median income of a county in which an institution is located and its type. The results are similar to that of poverty rate. The regression analysis of median income and average yearly cost, in-state tuition, and out of state tuition show that there is no linear relationship. This implies that regardless of where the school is located, the cost to attending the institutions are not aligned to the area that they cater to based on median income.

Work Cited

Bureau, U. C. (2024, June 18). *American Community Survey Data*. Census.gov.
<https://www.census.gov/programs-surveys/acs/data.html>

Data Home: College Scorecard. Data Home | College Scorecard. (2024). <https://collegescorecard.ed.gov/data/>