



Beyond the Classroom: Socioeconomic and Community Factors Shaping Educational Attainment

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Abstract

This study assesses the correlation between unemployment rate, poverty rate, median household income, broadband subscription, library visits, and education attainment to gain insight into the relationship between socioeconomic and community-level factors and education outcomes. The main research objective of this study is to see if these factors account for any disparities in education attainment between states between 2014 and 2024. A quantitative correlational research design was employed using state-level secondary data and examining the relationships using scatter plots, correlation analysis, multiple linear regression and diagnostic testing. The findings indicate that there is a positive association between median household income and library visits, and a negative association between poverty rate and educational attainment. Unemployment rate and library visits don't have significant relationships with educational attainment. The results for broadband show a more complex picture: There is a positive simple correlation between broadband and educational attainment, but the regression coefficient is negative once other factors are entered. The outcome illustrates that there are interrelated economic, digital and public-resource influences on educational attainment. This research is a contribution to the existing research by considering correlated variables that are less frequently studied but are important to the study such as library visits and broadband subscription along with the commonly studied variables.

Keywords: *Educational Attainment; Poverty Rate; Median Household Income; Broadband Access; Library Visits; Unemployment Rate; Socioeconomic Factors; Community Factors*

Introduction

The higher the level of education, the fewer the number of unemployed people and the less income inequality. Skills mismatch impacts employment opportunities and income levels (Qin, 2023). Home Internet access is directly related to student achievement, digital skills, and interest in post-secondary education, and socioeconomic conditions such as unemployment and poverty have indirect impacts. That is, inequities in home Internet access are related to wider gaps in student performance

throughout the K-12 educational system, in terms of students' digital proficiency, grades, standardized test scores, and more. More specifically, students living with low or no Internet access at home are at a great disadvantage in doing their homework (Bauer et al., 2020). Regional literacy rates have a negative correlation with poverty incidence, average annual family income and families that subscribe to cable services (Astaño, 2025). The adults who completed high school diplomas and the unemployment rate per state have a strong negative correlation. The impact of adults with Associate's or higher is also evident, but less pronounced, on reducing unemployment rates, especially during the Great Recession in 2009. Generally, there is a lack of relationship between adults with a Bachelor's degree or higher and the unemployment rate (Applegate et al., 2014). The coefficient of the education variable is larger in absolute value than the coefficient of the other variables, suggesting that the impact of education on poverty is negative. The unemployment has a significant positive effect on poverty as an increase in unemployment increases the poverty rate (Solmidawati et al., 2025). The negative and significant relationship between education level and income inequality suggests that the higher the level of education, the less income inequality would be. Unemployment is positively and significantly related to inequality in income, indicating that increasing unemployment leads to an increase in income inequality. The poverty rate is also positively and significantly associated with income inequality, suggesting that a rise in poverty will increase income inequality (Andini et al., 2026). The correlation between Baccalaureate pass rates and unemployment rate is negative, but not statistically significant. A positive association between higher levels of education and lower unemployment rates may exist but these associations are poorly statistically supported. Average income level is also noted as one of the major negative predictors of unemployment (Perta et al., 2025). Residents of West Virginia have the least amount of degree attainment compared to the rest of the country. Poverty has the highest correlation with educational attainment at the state level. In West Virginia, the highest correlation with having a bachelor's degree comes from free or reduced-price lunch (FRPL). Low socio-economic status (SES) high schools are common in high poverty neighborhoods and affect educational outcomes (Arcadipane 2013). Those students who do not have Internet access at home or those who depend on their cell phone for Internet access score below average in digital skills, homework completion and in grades. Higher rate of no broadband correlates to lower rates of interest in post-secondary education among affected students. Lack of digital skills increases inequalities, resulting in poorer standardized test scores and reduced interest in STEM careers. Broadband access has a secondary effect on educational outcomes, mainly on the learning of digital skills, not on the sociodemographic factors (Hampton et al., 2020). High school graduation rates are strongly correlated with economic well-being in Alabama, suggesting that higher levels of education are associated with higher incomes and lower poverty rates. Also, it was discovered that people without high school diplomas earned significantly less than those who obtained their high school degrees, with the median income of high school dropouts being much less than that of high school graduates. High school dropouts lead to higher rates of poverty, malnutrition, crime, and unhealthy lifestyle that adversely affect the state's economic development (Izeogu 2008). The number of research papers that consider library visits as a factor that impacts educational attainment is sparse, while a large number of papers, on the other hand, address the link between educational attainment, unemployment rate and poverty rate. Additionally, many studies rely on data from data restricted to a small geographic location or time period, with many studies relying on data over one year. This is a major limitation as it diminishes the applicability and reliability of the results. This study is a corrective of these omissions, as it examines the relationship between the unemployment rate, the poverty rate, median household income, broadband subscription, education levels and the overall number of visits to a library for the period 2014 to 2024. This study examines how an individual's economic status, access to digital media, and public learning resources influence their educational attainment. The objective of this study is to analyze whether unemployment rate, poverty rate, median household income, broadband subscription, and library visits account for differences in educational attainment across the United States from 2014 to 2024. By combining variables that are often studied separately, this research attempts to explain the connection between socioeconomic factors and education outcomes.

Literature Review

Sparse research exists on the connection between library visits and education levels. Research identified that 72% of the variation in poverty level was caused by education and unemployment (Solmidawati et al., 2025). There is a weak correlation at the state level between secondary and postsecondary attainment, as measured by the index of 0.47, suggesting different outcomes of education (Arcadipane 2013). An earlier study included 3,258 students across 15 school districts in Michigan that were largely rural, and included 70.6% of students ages 13 and older in grades 8-11 (Bauer 2020). The study, which finds that the gap in unemployment rates between different levels of educational attainment is closing, says that the global model it derives suggests that the unemployment rate is the equation: $\text{Unemployment Rate} = 13.2290 - 0.0002682 \text{ Date} - 2.8195 \text{ High School} - 3.8568 \text{ Some College} - 5.9025 \text{ Bachelor and Higher}$. A greater level of education is correlated with a lower rate of unemployment, as suggested by the coefficients. The regression model used in the analysis sets "less than high school diploma" as the intercept, and offers an understanding of the trends in the U.S. unemployment rates over 20 years (Jiang 2024). The study also found that income is a significant negative predictor of unemployment in the multiple regression model, suggesting that a higher income might be associated with lower unemployment rates, and the spatial econometric model regression analysis revealed the significant spatial autocorrelation in unemployment rates (Perta 2025). Aurellia study results in 2025 revealed that unemployment and poverty factors have significant effects on the dropouts, with the effects of unemployment contributing 23.8% and the poverty contributing 20.0% towards dropouts in Sumbang District (Aurellia et al., 2025). A study in 2025 showed that education has a significant effect on the levels of poverty in Indonesia, with lower education levels associated with higher poverty rates, which was conducted using multiple linear regression analysis, was used to evaluate the relationship between education, unemployment and poverty (Purwanti et al., 2025). According to a study in 2023, using multiple linear regression on time series data over 10 years, the results indicate that population growth, unemployment and education have significant impacts on poverty in the Province of South Kalimantan during 2011 to 2020. In particular, it pointed out that education alone was found to have a significant impact on poverty levels. The growth of population was found not to be significant in influencing poverty levels (Paridah et al., 2023). For another study in 2023, Pratiwi applied multiple linear regression analysis to determine the relationship of the variables of educational attainment, unemployment rates and poverty rates. The study was conducted in Tanah Laut Districts in 2023 using secondary data with multiple linear regression techniques with t-test, f-test, and R-squared (R²) analysis, and concluded that the Gross Regional Domestic Product (GRDP) variable significantly affects poverty levels, while the Education variable had no significant effect on poverty levels (Pratiwi et al., 2023). A Multiple Linear Analysis is used as the method for analysing the data in a study by Saraswati which concluded that education plays a positive role, while income also plays a positive role in the poor households in Gianyar Regency; this finding is consistent with the Culture of Poverty Theory which states that there is an interconnection between socio-economic factors such as education and a family's income, and their influence on poverty (Saraswati & Setiawina, 2023). The secondary cross-sectional study by Wulandari in 2025, conducted using secondary data, indicates that education level (measured by the proportion of people who have completed secondary school or higher) is positively and non-statistically significantly associated with poverty in Jambi City in 2024 (Wulandari et al., 2025). Using secondary data from 2011–2020, Putri Natasya's study (2022) used multiple linear regression to determine the effect of education on the number of poor people in Aceh Province, and it showed that education had a negative and significant impact, meaning that the higher the education level, the lower the poverty rate (Putri et al., 2022). The common effect model (CEM) was used in a 2022 study, which found that education negatively and significantly affects the poverty rate in North Sulawesi's four cities (Roring et al., 2022). The study of Liswanda 2024 investigates the impact of education, demography and employment on poverty with digital literacy as a mediator, and it concludes that education has a negative impact on poverty (Liswanda et al., 2024). A study that took place in 2023, using a random impacts model, analyzed data from 14 regencies/cities for six years (2017-2022), and a regression equation was obtained and suggested that the level of education

had a negative and significant influence on the poverty rate in West Kalimantan (Putri et al., 2023). A regression equation was found by Zulfalinda that shows that increase in Human Development Index (HDI) will be estimated at 0.009528 for every one per cent increase in economic growth with both poverty and open unemployment having a significant negative impact on the Human Development Index (HDI) (Zulfalinda et al., 2025). According to Suriandhi (2025), this study is based on secondary quantitative time series data, the Banten Province Central Statistics Agency (BPCSA), and the Ministry of Education and Culture (MEC) in 2019-2023 and F-tests. The results of the study indicate that the level education has a significant effect on the poverty in Banten Province with the t-count value of 3.134, which is greater than the t-table value at 271.2 (Suriandhi & Wonatta, 2025). Based on the data of the East Lampung district in the period 2012-2022, it was found that the education level has a significant negative effect on poverty, meaning that the higher the education level, the lower the poverty rate (Nugraha et al., 2024). A study by Sugandha in 2022 suggests that that education, measured by Mean Years School, significantly affects poverty levels from 2016-2020 in Banyumas Regency, finding that, the coefficient of determination from the linear regression analysis is 97.9%, indicating a strong effect of the Mean Years School on poverty. To find the correlation between the level of education, unemployment and poverty, multiple linear regression, F statistical tests, and t statistical tests were used by Sugandha and the other researchers (Sugandha & Rioke, 2022). The study in 2026 by Pradana, using time-series data collected from official publications from 2014-2024, found that the number of years spent in school has a significant negative impact on poverty levels in the Brebes Regency, suggesting that education plays a positive role in reducing poverty levels (Pradana et al., 2026). Education has a negative and significant effect on poverty; in 2008-2022 there was a decrease in poverty levels in the District Brebes with higher education levels. In addition, the study results showed that the influence of education on poverty was very large, with the results of the t test obtained -8.082, which is less than the t table -2.178 (Firdaus et al., 2024). In 2021, Charity carried out a study on qualitative data, gathering data through a questionnaire, that found a positive education household income relationship ($p < 0.01$). The study found that either the education level of the household head or the education level of the highest educated household member could be used to estimate the impact of education on the household income (Charity et al., 2021).

Methodology

Research Design

This study utilized a quantitative correlational research design to examine the relationship between educational attainment, the dependent variable, and the predictors or independent variables of unemployment rate, poverty rate, median household income, broadband subscription, and library visits.

Research Data

The study relies on secondary state-level data over the years between 2014 and 2024, inclusive, with nearly 550 observations included in the regression model. Median household income and library visits are transformed into logarithmic form to limit the influence of extreme values on the study results.

Research Approach

The analysis begins with scatter plots to visually examine the relationships between the variables, followed by a correlation analysis to measure the strength of these relationships. A multiple linear regression model is employed to estimate the association between educational attainment and individual independent variables when other variables are controlled.

Data Analysis Technique

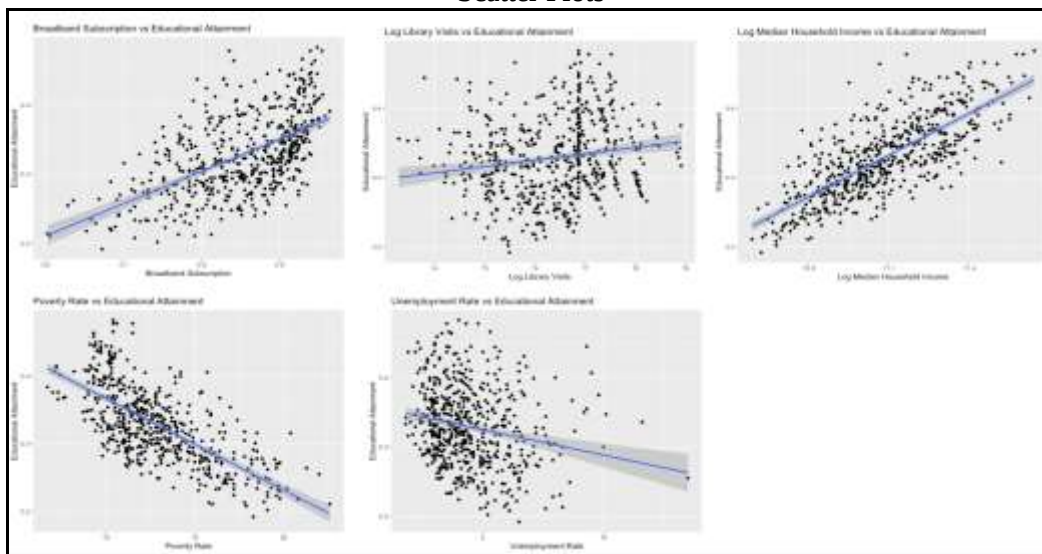
To evaluate the model, the study uses VIF testing for multicollinearity, the Breusch-Pagan test to check for heteroskedasticity, the Ramsey RESET test for model specification, the Durbin-Watson test for autocorrelation, and visual diagnostic tools such as the Q-Q plot and residual plot.

Reliability and Validity

The study is reliable because it utilizes data compiled from government websites over a span of 10 years.

Analysis

Figure 1
Scatter Plots



The scatter plots highlight that broadband subscription and median household income have a positive relationship, while poverty rate has a strong negative relationship, with educational attainment. Library visits show a weak positive relationship, suggesting that the amount of library visits is related to educational attainment, but not as strongly as income or poverty. Unemployment rate also has a negative relationship with educational attainment, although the pattern is less consistent than that between poverty rate and educational attainment.

Table 1
Correlation

Variable	Correlation
Log Median Household Income	0.759
Log Library Visits	0.168
Unemployment Rate	-0.203
Poverty Rate	-0.692
Broadband Subscription	0.573

Supporting the scatter plots, the logarithmic value of median household income, being nearly 0.759, has the strongest positive correlation with educational attainment, while poverty rate has the strongest negative correlation at -0.692. Therefore, a high household income corresponds with more educational opportunities; in contrast, a high poverty rate signifies lower chances of education. Broadband subscription has a moderate positive correlation of 0.573 with educational attainment,

indicating that a high digital access is associated with greater education. The logarithmic values of amount of library visits and unemployment rate have a weak positive and negative correlation, respectively, with educational attainment. So, when taken individually, higher library visits and low unemployment rates should lead to greater educational attainment.

Table 2
Regression

<i>Dependent variable:</i>	
Educational Attainment	
log_income	0.196*** (0.016)
log_library_visits	0.009*** (0.002)
Unemployment Rate	-0.0003 (0.001)
Poverty Rate	-0.006*** (0.001)
Broadband Subscription	-0.211*** (0.040)
Constant	-1.734*** (0.158)
Observations	550
R ²	0.659
Adjusted R ²	0.655
Residual Std. Error	0.033 (df = 544)
F Statistic	209.828*** (df = 5; 544)
Note:	*p<0.1; **p<0.05; ***p<0.01

These regression results highlight the relationship between educational attainment and the independent variables with the other variables held constant. The model, having an $R^2=0.659$, accounts for a significant amount of the variance in educational attainment, meaning that approximately 65.9% of the variance in the educational attainment variable can be explained by the variables used in the study. There is a positive and statistically significant relationship between median household income and educational attainment, meaning that higher income areas have better levels of education. The relationship between poverty and education is negative and significant, so a higher poverty rate corresponds to a lower level of education. Visits to the library are also positively and significantly related which indicates that education outcomes could benefit from public learning resources, but less than income and poverty. The unemployment rate is not statistically significant and, therefore, does not seem to consistently stand out from the other factors when examining the relationship between education and unemployment. Broadband subscription, having a positive simple correlation with education but a negative regression coefficient, is statistically significant. Although this does not mean that having broadband lowers educational attainment, it indicates two possibilities. These include there being an overlap in broadband, income, and poverty, while it also being plausible that broadband subscription does not reflect the quality, affordability, or educational use of Internet access. Overall, the regression indicates that educational attainment is generally more consistently related to socioeconomic circumstances than to digital access and community resources.

Table 3
VIF Table

	Variable	VIF
log_income	log_income	5.781
log_library_visits	log_library_visits	1.082
`Unemployment Rate`	`Unemployment Rate`	1.117
`Poverty Rate`	`Poverty Rate`	2.619
`Broadband Subscription`	`Broadband Subscription`	4.130

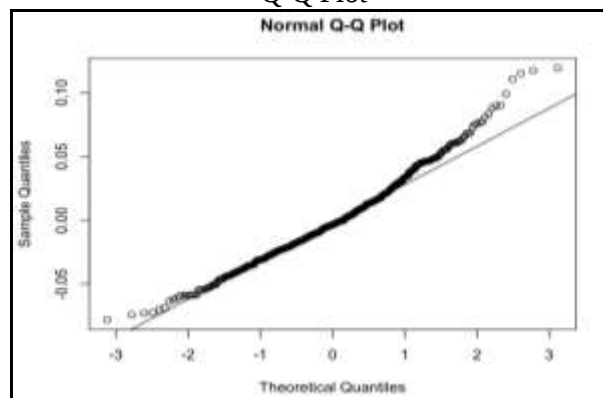
The VIF table shows that multicollinearity is present but is not a significant amount. Log median household income has the highest VIF at 5.781, followed by broadband subscription at 4.130 and poverty rate at 2.619. These values indicate that there is a slight overlap between these variables, which is expected as they are all related to socioeconomic conditions. However, since the VIF values are below 10, multicollinearity does not appear strong enough to invalidate the model.

Table 4
Diagnostics Table

	Test	Statistic	P_Value
BP	Breusch-Pagan	21.253	0.001
RESET	Ramsey RESET	1.795	0.167
DW	Durbin-Watson	0.777	0.000

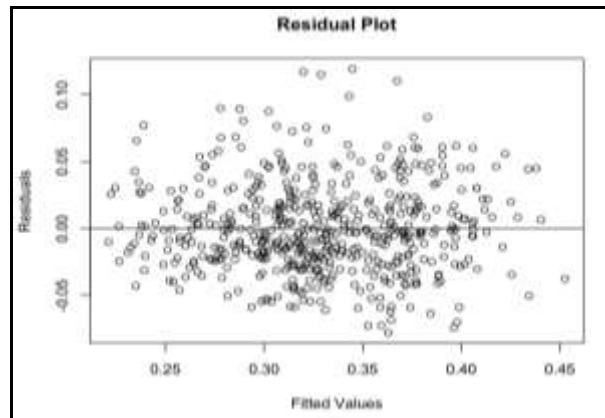
The Breusch-Pagan test is statistically significant with a p-value of 0.001. This diagnostic suggests the presence of heteroskedasticity in the study, meaning that the model's errors may not have constance variance. To reduce the chance of this, robust standard errors should be employed in future analysis. The Ramsey RESET test is not statistically significant, with a p-value of 0.167, suggesting that there is not a strong evidence of major model misspecification. The Durbin-Watson test, with a p-value of 0, is statistically significant, implying that autocorrelation could be present, likely because the dataset follows states over a period of 10 years.

Figure 2
Q-Q Plot



The Q-Q plot shows that the residuals mostly follow the normal line in the middle of the distribution, with some noticeable deviations in the tails. This suggests that the residuals are mostly normal, with a few outliers or extreme values still present. Since the sample size is large, these deviations are not necessarily harmful to the analysis, but they should be acknowledged as a limitation.

Figure 3
Residual Plot



The residual plot shows that most of the residuals are approximately 0, underscoring that the model does not consistently overpredict or underpredict educational attainment. Although the model is useful for identifying relationships, the somewhat uneven spread of residuals suggests that future research should improve the model by using robust standard errors or a panel regression approach, supporting the Breusch-Pagan test result that indicated the presence of heteroskedasticity.

Limitation

The analysis identifies associations rather than proving causation because some variables, especially broadband subscription, may overlap with income and poverty, making it difficult to separate their independent effects on educational attainment. So, the results don't show whether income, poverty, broadband, unemployment or library visits directly cause changes in educational attainment. The model also suffers from heteroskedasticity and autocorrelation, both of which could be mitigated by future analysis through use of robust standard errors or a two-way fixed effects model.

Conclusion

In this study, the relationship between the unemployment rate, poverty rate, median household income, broadband subscription and library visits with educational attainment is explored between the years 2014 and 2024. The results demonstrate that several interconnected social and economic factors influence educational attainment. Educational attainment is positively linked to median household income, while the same shares a negative correlation poverty rate, suggesting that socioeconomic factors have a significant impact on education outcomes. The relationship between library visits and education level is statistically significant and positive. This link is essential, though, as the use of libraries is relatively under-researched in terms of education. The relationship between educational attainment and unemployment rate is negative, but not statistically significant; this means that it could have an indirect effect or be affected by poverty and income measures. The results indicate that there is a positive simple correlation between having broadband and education attainment and a negative regression coefficient between the two variables, controlling for other variables. This implies the relationship between broadband access and income, poverty and other socio-economic conditions. Thus, the study is limited to association and not causation as it is carried out at the state level, so may not reflect local differences, and there are concerns with the study's diagnostics (heteroskedasticity and autocorrelation). To counteract this, further studies should incorporate more specific county or district-level data, include more powerful panel methods, and include powerful measures of broadband quality and library use. The general findings of the study suggest that the learning environment is not the only one that should be promoted to enhance educational attainment; economic and social context of a person's life should be taken into consideration.

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