# How education helps reduce poverty in rural East Asia: the impact on income mobility

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## Introduction

My research focused on answering the question: How does education help reduce poverty in rural East Asia, particularly through its impact on income mobility? I wanted to understand the role of education as a pathway out of poverty, especially in countries where rural populations often face limited access to resources and opportunities. Using enrollment data across primary, secondary, and tertiary education levels, combined with income and population statistics from five East Asian countries (China, Japan, South Korea, Taiwan, and Mongolia), my goal was to investigate whether higher access to education correlates with improved income outcomes over time. I paid special attention to rural-urban gaps, gender disparities, and the connection between education level and economic mobility in under-resourced areas.

## Literature review

Education has long been regarded as a cornerstone of economic development and a critical pathway out of poverty across East Asia. Research consistently underscores its dual role in improving material conditions and transforming social attitudes, though persistent inequalities continue to limit its benefits for many.

One of the most striking examples of education's transformative potential comes from rural China. Zhang and Hannum (2023) demonstrated that higher educational attainment among youth in Gansu Province not only enabled them to secure formal employment in urban areas but also helped them navigate institutional barriers like the hukou registration system. These opportunities provided stable incomes, social security, and better living conditions major advances over the precarious livelihoods traditionally available to rural families. Importantly, education also catalyzed shifts in cultural norms, promoting greater gender equality and challenging traditional preferences for sons.

Such positive outcomes reflect broader regional trends. Hannum et al. (2021) chronicled how postwar East Asia experienced massive educational expansion, rapidly achieving near-universal access to primary and secondary schooling. This growth contributed to significant economic development and improved social mobility. However, their work also highlighted that educational expansion did not guarantee equitable outcomes. Inequalities persisted along class, urban-rural, and gender lines, with children from more privileged backgrounds better able to leverage educational opportunities for upward mobility.

China's higher education boom since the late 1990s illustrates these mixed effects. Zhang and Fan (2024) found that while expanded access to universities promoted intergenerational income mobility, individuals from urban and higher-income families disproportionately benefited. Barriers such as weaker primary and secondary schooling, limited financial resources, and less familiarity with the higher education system constrained the capacity of rural and low-income students to take advantage of new opportunities. As a result, rather than reducing inequality, higher education expansion risked entrenching existing divides.

This pattern of uneven gains is mirrored in Japan, where economic prosperity has not fully eradicated educational disadvantage. Kimura (2019) reported that nearly 14% of Japanese children still lived in poverty as of 2015. For these families, the high costs of college tuition and limited financial aid created formidable obstacles to higher education. Without stronger public policy support, such as expanded scholarships and institutional reforms, intergenerational poverty remains a persistent risk.

Beyond structural barriers, cultural expectations and family dynamics also shape how education influences mobility. Zhao et al. (2023) examined how intergenerational mobility itself affects parental investments in education. Their study found that in regions with higher mobility, wealthier families tended to reduce spending on private tutoring and extracurricular learning, suggesting that rising mobility can ease competitive pressures. In contrast, lower-income families maintained high levels of investment, underscoring education's role as their primary route to better livelihoods.

Comparative research across East Asia reinforces the importance of national context. Takenoshita (2020) found that while Korea exhibited relatively high social fluidity and lower rates of class inheritance, Japan maintained more rigid occupational structures. China presented a distinctive pattern of widespread upward and downward mobility across occupational categories, reflecting its unique transition from a socialist to a market economy. These findings show that institutional factors, labor markets, and historical legacies all shape how education affects social mobility.

Mongolia's experience over the past decade similarly reveals both progress and persistent divides. Banzragch et al. (2021) documented that many Mongolians especially urban youth and women surpassed their parents in educational attainment, signaling expanding opportunities. However, young people in rural areas increasingly lagged behind in schooling outcomes. While nearly half of the population moved into higher wealth brackets, a majority either stayed in place or fell behind, highlighting the enduring impact of regional inequality. The authors concluded that targeted policies for rural education, job training, and economic development were crucial to making mobility more inclusive.

Together, these studies show that while education remains the most powerful mechanism for promoting social mobility and reducing poverty, simply expanding access is not enough. Equitable outcomes require comprehensive policy interventions that address disparities in resources, family background, and institutional constraints. Whether in China, Japan, Korea, or Mongolia, education's promise depends not only on what is taught in classrooms but also on the broader social and economic systems that determine who benefits most.

## Analysis

For my research, I collected data from 2010 to 2023 on student enrollment at the primary, upper secondary, and tertiary education levels refers respectively to grades 1-6 (ages 6-11), grades 10-12 (ages 15-18), and college and university for students aged 18

and above, disaggregated by gender. This data was sourced from the UNESCO Institute for Statistics (UIS), which provides internationally comparable education statistics. It plays a key role in analyzing trends in gender equality in education over time and across different countries.

In addition to enrollment figures, I also gathered income data from the official websites of each country. This was essential for exploring the relationship between education levels and income, helping to understand how access to and attainment in education may influence economic status and opportunities.

To accurately calculate enrollment rates, I used population data from the World Bank Open Data platform. By comparing the number of enrolled students to the total population, I was able to determine the percentage of individuals studying at each level of education, making the data more meaningful and comparable across regions.

Furthermore, I included information on the distribution of students in urban and rural areas, which I also found through each country's government or education statistics websites. This provided valuable insights into geographic disparities in educational access and participation, adding another layer to the analysis of educational equality and socioeconomic factors.

By combining these datasets on gender, income, population, and geographic location, I was able to conduct a more in-depth and comprehensive study on the connections between education, gender, income levels, and urban-rural differences.

Table 1: Average Annual Enrollment by Education Level, Gender, and Country (2010–2023):

| Primary School | Both | Male | Female |
|---|---|---|---|
| Taiwan | 1,256,227 | 654,981 | 601,246 |
| China | 101,746,556 | 54,489,910 | 47,256,646 |
| Japan | 6,601,600 | 3,249,166 | 3,352,434 |
| Mongolia | 298,726 | 152,647 | 146,079 |
| South Korea | 2,796,698 | 1,449,396 | 1,347,302 |
| | | | |
| High school | Both | Male | Female |
| Taiwan | 352,773 | 177,428 | 175,345 |
| China | 42,434,734 | 22,343,627 | 20,091,108 |
| Japan | 3,480,842 | 1,785,045 | 1,721,746 |

| | | | |
|---|---|---|---|
| Mongolia | 122,188 | 60,859 | 61,329 |
| South Korea | 1,635,488 | 857,050 | 820,102 |
| | | | |
| College | Both | Male | Female |
| Taiwan | 92,169 | 24,721 | 67,449 |
| China | 22,192,283 | 10,545,141 | 11,647,142 |
| Japan | 2,722,908 | 1,490,978 | 1,231,930 |
| Mongolia | 118,337 | 53,090 | 65,247 |
| South Korea | 2,087,859 | 1,252,847 | 835,011 |

Table 2: Average Household Income by Country (USD, 2010–2023):

| Income | Average |
|---|---|
| Taiwan | $21,998.13 |
| China | $59,970.31 |
| Japan | $48,962.85 |
| Mongolia | $4,256.13 |
| South Korea | $37,652.37 |

## Result

To explore how education relates to income mobility across rural East Asia, I performed a series of correlation and regression analyses. These statistical methods were chosen because they offer clear ways to assess whether increases in student enrollment are associated with improvements in average household income over time and across countries. Correlation analysis, in particular, measures the strength and direction of a linear relationship between two variables, providing an essential first step in understanding whether educational access and economic outcomes move together.

First, descriptive statistics showed substantial variation in mean household income across countries and years. A positive correlation was observed between total student enrollment and mean income at the country-year level ($r = 0.68$, $p < 0.000000001$). This relationship remained positive, though weaker, when aggregating across all degrees ($r = 0.57$ with mean income, $r = 0.41$ with log-transformed income).

A simple linear regression model predicting mean household income (the dependent variable) from the percentage of college students enrolled (the independent variable) showed a statistically significant negative association ($\beta = -213.02$, $p = 0.025$). Specifically, each 1-percentage-point increase in college enrollment was associated with an estimated decrease of approximately $213 in average income. However, this bivariate relationship did not persist after adjusting for other variables.

In a multiple regression model that included controls for the percentage of the population living in urban areas, used as a proxy for the degree of urbanization, as well as fixed effects for country and year, college enrollment percentage was not significantly associated with income ($\beta = +59.13$, $p = 0.751$). These fixed effects control for unobserved, time-invariant differences between countries (such as economic development level, education policy, or cultural factors) and for any year-specific shocks. Including them helps isolate the association between college enrollment and income from these potential confounding influences. The model explained a large proportion of variance (Adjusted $R^2 = 0.953$), suggesting that most of the differences were due to country and year factors rather than enrollment rates alone.

Similarly, in the model predicting log-transformed income, college enrollment remained non-significant ($\beta = +0.011$, $p = 0.120$), while several later years showed positive and significant associations (e.g., Year 2021 $\beta = +0.348$, $p = 0.010$), indicating income increases over time.

Lagged income models and first-difference models did not yield further explanatory power. In the differenced regression, the outcome variable had no remaining variability, resulting in undefined estimates.

While these analyses provided insight into general patterns, one limitation was that it was not possible to fully identify how income varied by education level within each country due to constraints in the dataset structure. Additionally, throughout the project, I relied extensively on the use history of my previous chats to review, clean, and analyze the data effectively.

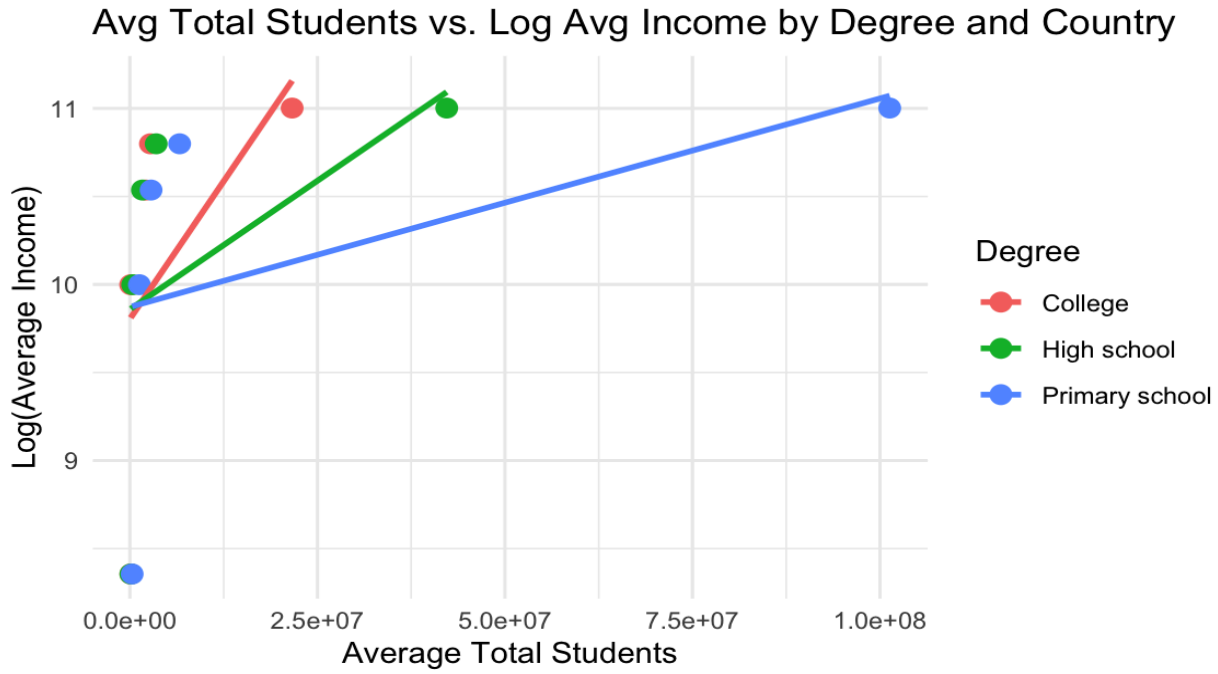
Taken together, the results suggest that although higher overall enrollment correlates with higher income across countries and years, the percentage of college students alone does not consistently predict household income when controlling for contextual factors.

Graph 1: Average Total Students vs. Log Average Income by Degree and Country:

This scatterplot shows the relationship between the average total number of enrolled students (x-axis) and the logarithm of average household income (y-axis), Each color and the line represents a degree category.

The steeper slope for College suggests a stronger positive association between total college enrollment and logged income compared to Primary School. In contrast, the Primary School and High School lines are flatter, indicating a less pronounced

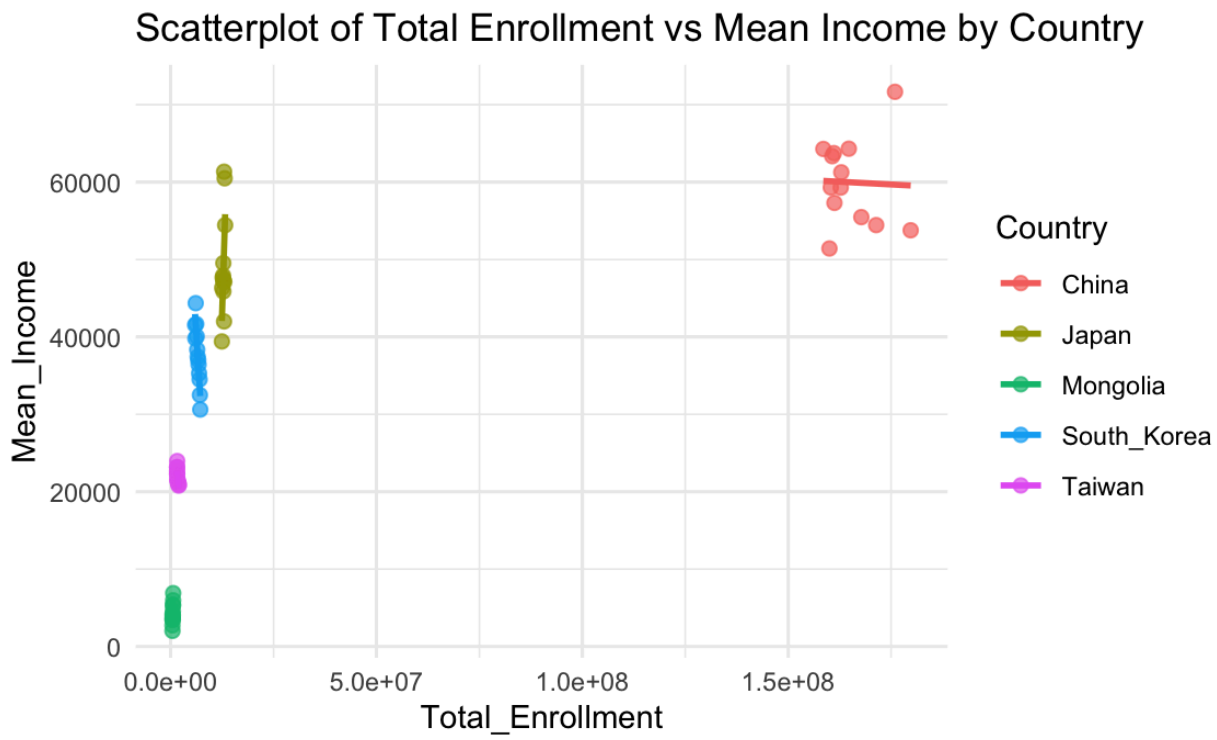
relationship.




Graph 2: Scatterplot of Total Enrollment vs. Mean Income by Country:

This scatterplot displays total enrollment (x-axis) and mean household income (y-axis) for each observation, color-coded by country.

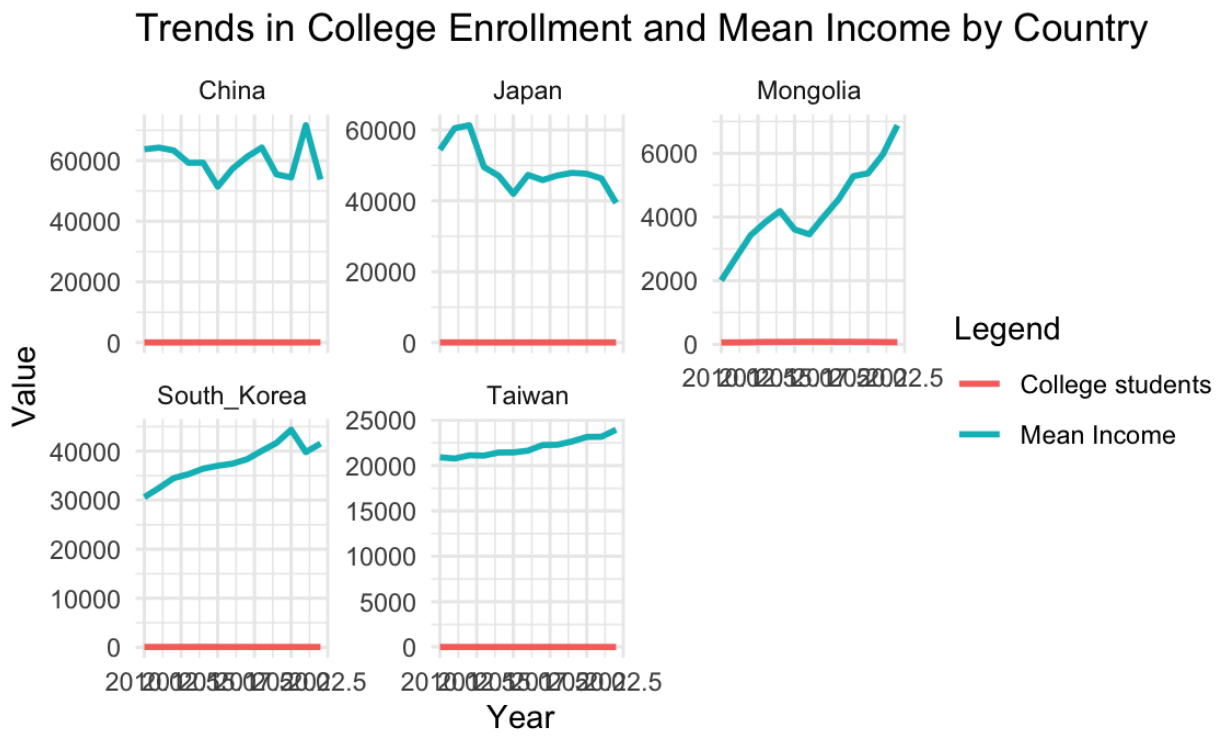
China's data point (red) occupies the higher end of both enrollment and income, reflecting its large-scale student population and relatively high average income levels. Other countries, such as Japan and South Korea, show much lower enrollment volumes but moderate to high income. There is also a visible clustering of points by country, suggesting that country-level differences drive much of the variation in the relationship between total enrollment and mean income.




Graph 3: Trends in College Enrollment and Mean Income by Country:

This panel of time series line charts shows trends from 2010 to 2022 in both college enrollment (red line near to bottom) and mean household income (blue-green line) across each country.

Mean income generally increased over time in Mongolia, South Korea, and Taiwan. indicating steady economic growth in these countries. In contrast, China and Japan show more fluctuation but maintain relatively higher income levels overall. Across all countries, the college enrollment lines appear nearly flat, reflecting either little change over the period or much smaller scales relative to the levels of income.




## Conclusion:

This project has been important to my academic and personal development in several ways. First, it strengthened my skills in data analysis, comparative research, and critical thinking, all of which will be valuable in my coursework and future research at Albion College. Learning how to collect, clean, and interpret large datasets from different countries has also prepared me for potential careers in international development, policy analysis, or education research. Also, I'm planning to present my findings at the Elkin R. Isaac Research Symposium to share insights with other students and faculty and to receive feedback that will help refine my analysis.

Personally, this experience made a significant difference in my life. As an international student, researching trends in countries that share cultural and historical connections with my own background in Mongolia helped me feel more connected to the region's progress and challenges. It also reinforced my belief in the transformative power of education to reduce poverty and expand opportunity. Completing this project has increased my confidence as a researcher and made me even more motivated to pursue work that contributes to equity and social progress both during my time at Albion and in my career beyond college.

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