

Project Report

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Introduction

Access to education is a crucial driver of social and economic development. Over the past two decades, countries in Latin America have made significant efforts to expand educational opportunities at the primary, secondary, and tertiary levels. This project analyzes trends in school enrollment rates in four major Latin American countries — Brazil, Argentina, Chile, and Venezuela — over the course of the 21st century, with a focus on the period from 2000 to 2022. Using data from the World Bank’s World Development Indicators, accessed via the wbgapi Python package, we examine gross enrollment percentages at each educational stage.

Gross enrollment rates measure the total number of students enrolled in a given education level — regardless of age — as a percentage of the official school-age population for that level. Rates above 100% are possible and often reflect the presence of over-aged or under-aged students who have entered school early, repeated grades, or returned to education later in life. By tracking changes over time, gross enrollment rates offer insight into access, retention, and progression through the education system.

This analysis aims to identify overall trends, cross-country differences, and potential points of educational expansion or stagnation. Scatterplots for each country visualize enrollment patterns at each level of schooling. In the results section, we interpret these trends to better understand how educational participation has evolved across the region in the early 21st century.

Data Description

We are looking at data for four of the biggest South American countries: Argentina, Brazil, Chile, and Venezuela. Our data contains the gross percentage of enrollment of each type of education in the 2000s per year. To clean the data before SQL operations, the education series names were changed to primary, secondary, and tertiary for readability, and the CSV's were melted and combined to separate each data point into its own row for easier processing in one file. For each country and level of education, the count and range of years were pulled, as well as the minimum and maximum enrollment. For example, overall tertiary enrollment ranged between 27.98 for Venezuela in 2000 to 107.13 in Argentina in 2021, and for Chile specifically, primary enrollment ranged between 99.37 in 2021 to 106.87 in 2008.

For some countries, there is data missing from a few years, with counts ranging between 6 years of data for Venezuela's tertiary enrollment to 23 years of Argentinian data. Whether it was reported or not, we will take this lack of data into consideration in our analysis. To analyze this data, we will create scatter plots showing the trends in gross enrollment for each country and compare them side by side.

Data Analysis

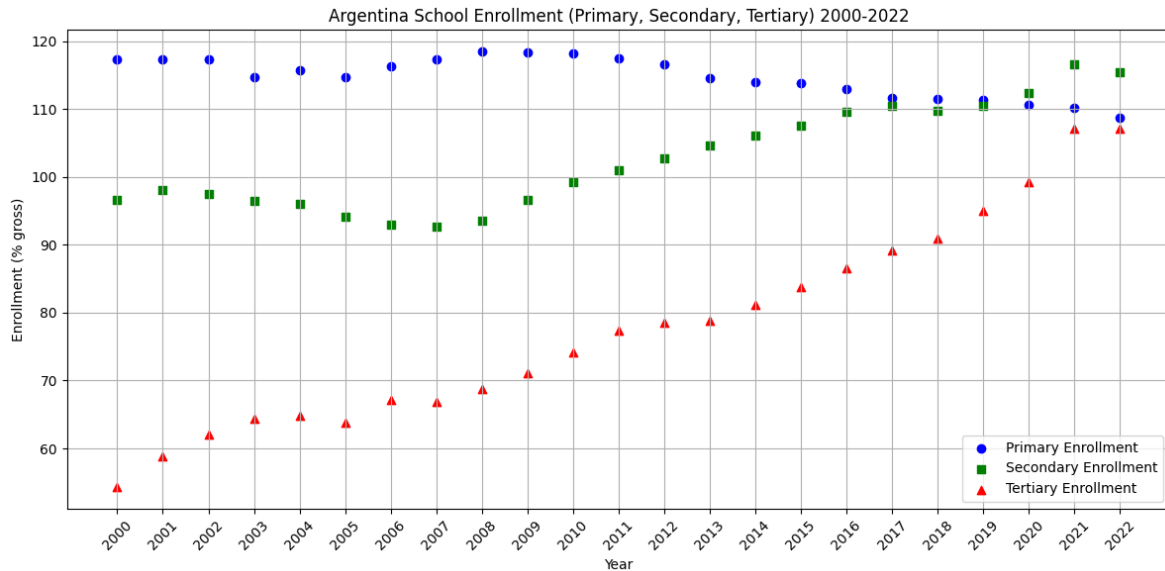


Figure 1: Argentina Enrollment

In Argentina, gross enrollment rates across all education levels showed distinct trends between 2000 and 2022. Primary enrollment began at approximately 117% and experienced a gradual decline to 109% by 2022, though it remained consistently above 100% throughout the period. Secondary enrollment initially declined slightly from 97% to around 93% by 2007 but subsequently exhibited a strong upward trend, surpassing primary enrollment rates by 2021 and reaching approximately 115% by 2022. Tertiary enrollment, starting at 55% in 2000, demonstrated steady and sustained growth, with a particularly sharp increase after 2010, culminating at roughly 107% by 2022. These patterns suggest significant improvements in secondary and tertiary educational access over the 21st century, alongside a slight stabilization in primary-level participation.

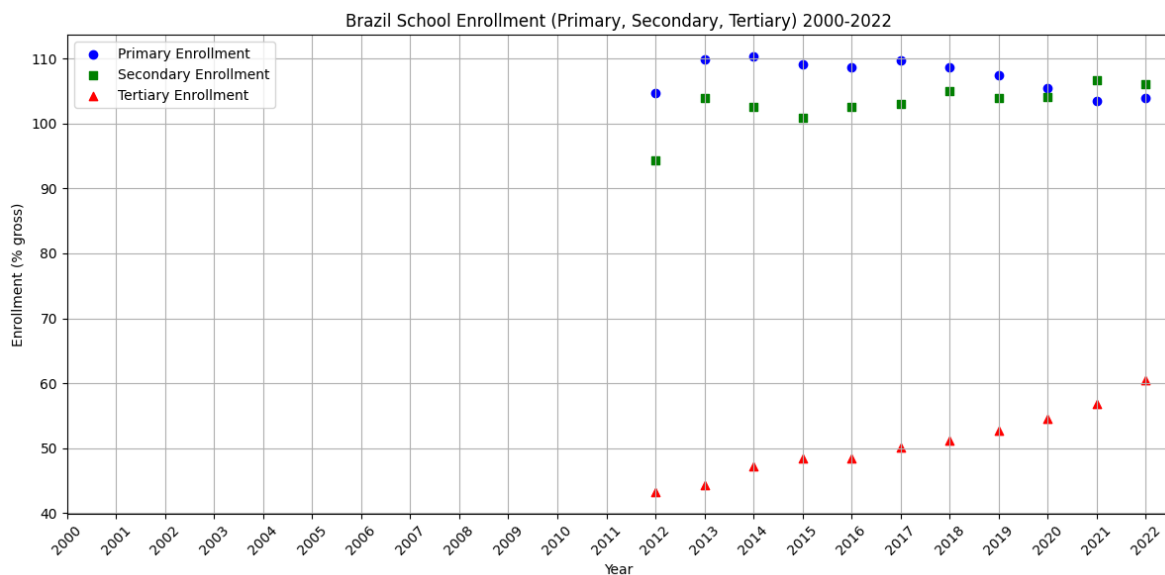


Figure 2: Brazil Enrollment

In Brazil, gross enrollment data from 2012 to 2022 indicate relatively stable participation at the primary and secondary education levels, with primary enrollment fluctuating between 104% and 110%, and secondary enrollment steadily rising from approximately 94% to 106%. Tertiary enrollment started significantly lower, at around 43% in 2012, but experienced gradual growth over the decade, reaching approximately 60% by 2022. Unlike Argentina, Brazil's tertiary enrollment expansion appears more moderate, though upward, suggesting steady but slower improvements in higher education access.

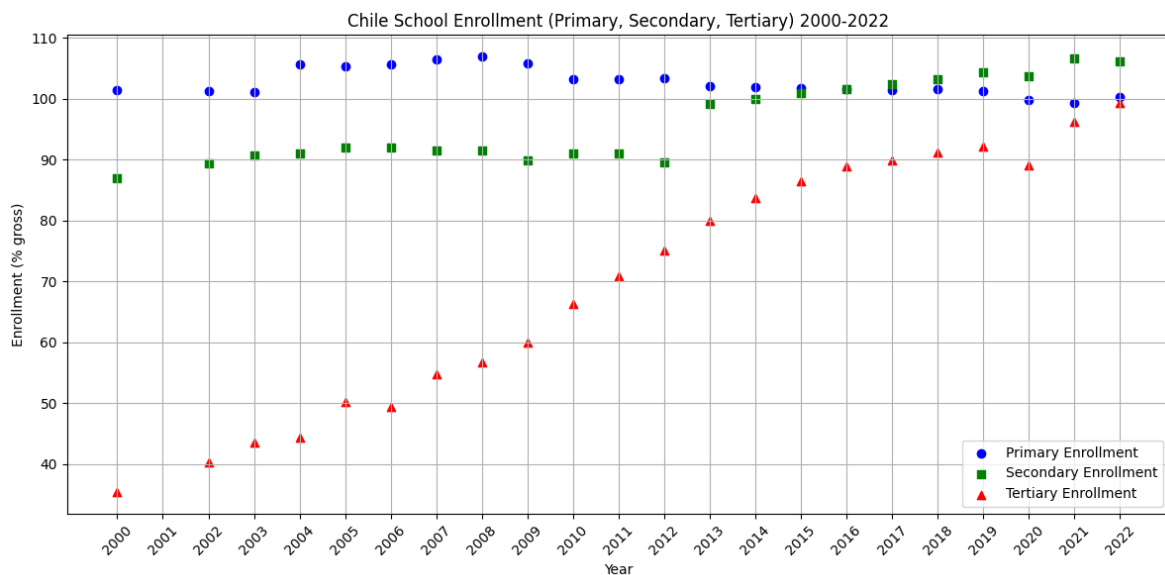


Figure 3: Chile Enrollment

In Chile, gross enrollment rates from 2000 to 2022 reveal similar patterns to those observed in Argentina. Primary enrollment began at approximately 110% in 2000 and experienced a gradual decline, stabilizing at around 100% by 2022. Secondary enrollment showed consistent growth over the period, starting at 85% in 2000 and reaching nearly 110% by 2022. Tertiary enrollment exhibited the most significant increase, starting at 40% in 2000 and rising sharply to approximately 95% by 2022. These trends highlight substantial progress in secondary and tertiary education access, with primary enrollment stabilizing at high levels.

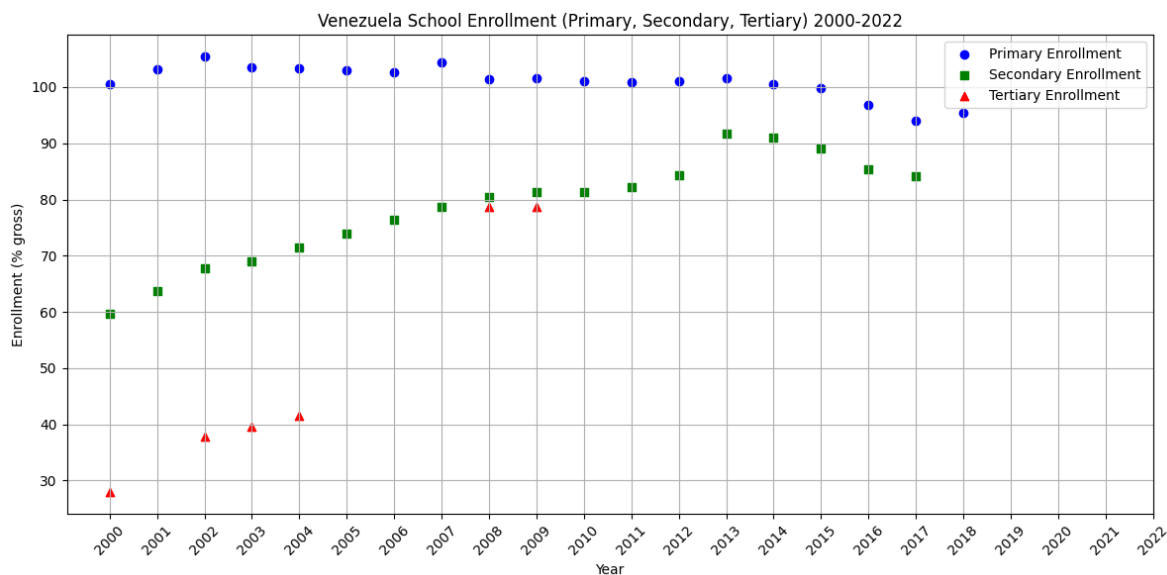


Figure 4: Venezuela Enrollment

In Venezuela, gross enrollment rates from 2000 to 2022 show a slight decrease in primary school enrollment, starting at approximately 105% in 2000 and declining to around 100% by 2022. Secondary school enrollment, on the other hand, exhibited a modest increase, rising from about 70% in 2000 to nearly 80% by 2022. These trends suggest a stabilization in primary education participation and gradual improvement in access to secondary education over the observed period.

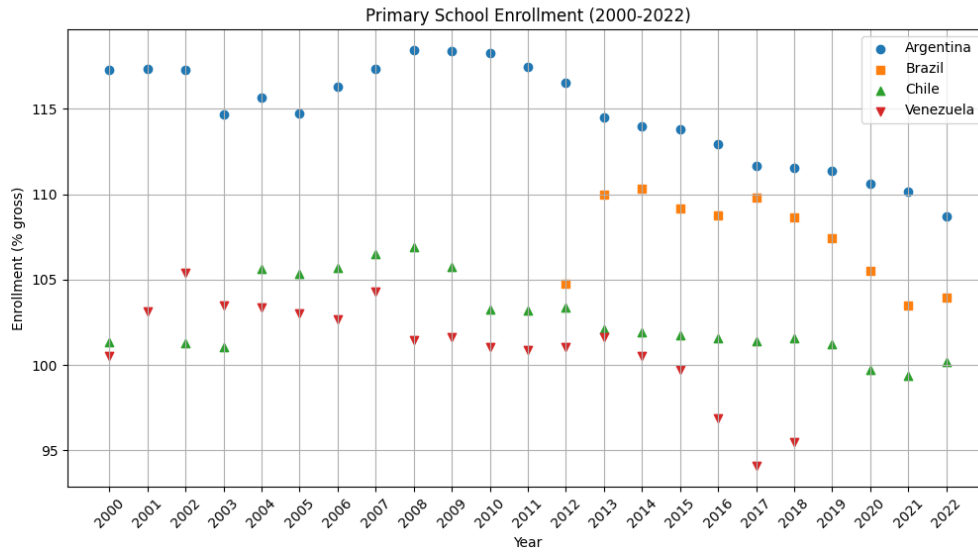


Figure 5: Primary Enrollment, Intra-Country

When comparing all four countries, one can observe that primary enrollment rates are relatively high and stable across the board, with slight declines over time. Secondary enrollment rates show significant growth in Argentina, Chile, and Brazil, while Venezuela exhibits more modest improvements. Tertiary enrollment demonstrates the most variation, with Argentina and Chile showing sharp increases, Brazil experiencing steady growth, and Venezuela lagging behind in higher education access. These trends highlight differing levels of progress and challenges in educational access across the four countries.

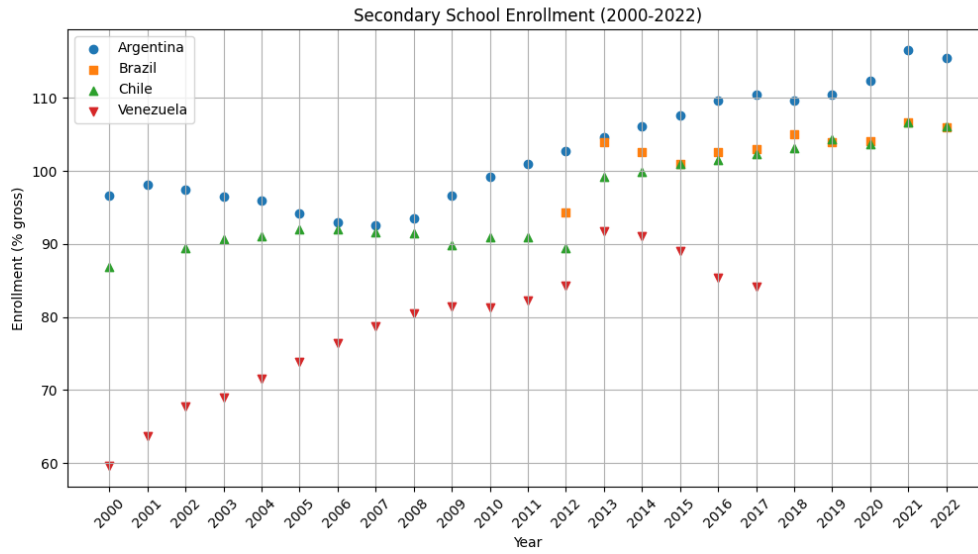


Figure 6: Secondary Enrollment, Intra-Country

In secondary enrollment, all four countries exhibit upward trends over the observed period, though the magnitude of growth varies. Argentina and Chile show the most significant increases, with secondary enrollment rates surpassing 100% by 2022. Brazil also demonstrates steady growth, reaching similar levels by the end of the period. Venezuela, however, lags behind, with secondary enrollment rates remaining below 80% in 2022. These differences highlight varying levels of progress in expanding access to secondary education across the countries.

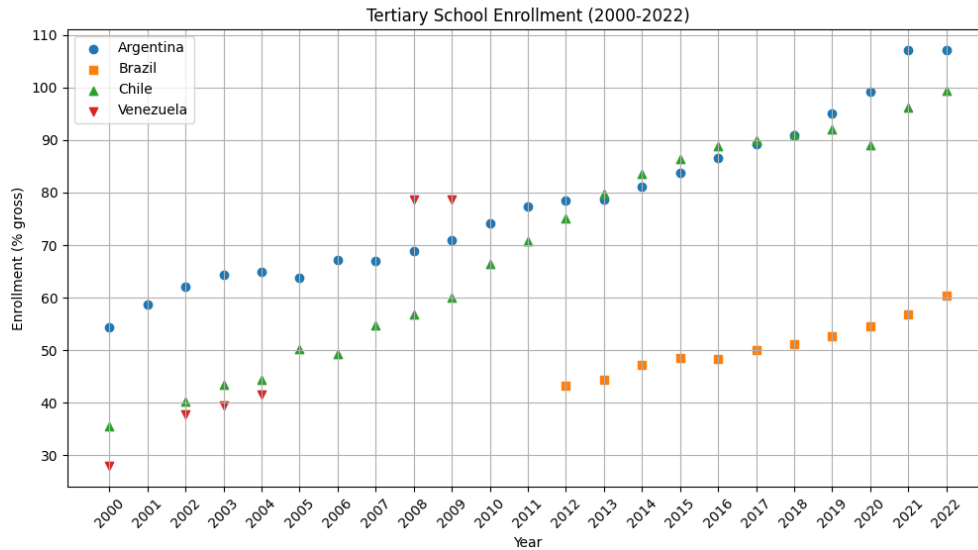


Figure 7: Tertiary Enrollment, Intra-Country

Though the data is less consistent for tertiary enrollment, there is a strong upward trend in Argentina, Chile, and Brazil, with Argentina and Chile showing the most significant increases. Brazil demonstrates steady growth, albeit at a slower pace, while Venezuela lags significantly behind the other three countries. These patterns suggest that while progress has been made in expanding access to tertiary education, disparities remain, particularly for Venezuela. The data underscores the need for targeted policies to address these gaps and promote equitable access to higher education across the region.

Results and Discussion

Our analysis of gross enrollment rates from 2000 to 2022 across Argentina, Brazil, Chile, and Venezuela shows both regional progress and country-specific differences in educational development.

Primary enrollment remained high and relatively stable in all four countries, suggesting near-universal access to basic education by the early 21st century. Secondary enrollment saw strong growth in Argentina, Chile, and Brazil — each surpassing 100% enrollment by 2022 — while Venezuela's gains were more modest, highlighting persistent challenges in expanding post-primary education.

Tertiary enrollment revealed the sharpest contrasts. Argentina and Chile nearly doubled their tertiary enrollment rates, reaching close to 100% by 2022, while Brazil showed steady but

slower growth. Venezuela lagged behind significantly, suggesting deeper structural and political barriers to higher education access.

While missing data for some years introduces minor uncertainty, the overall trends are clear. The findings highlight broad regional progress, especially in secondary and tertiary education, but also underline ongoing disparities. Argentina and Chile lead in educational expansion, Brazil follows with moderate growth, and Venezuela faces significant hurdles. Future research could investigate how economic and policy differences have influenced these trajectories.

Conclusion

Our scatter plots show a couple of interesting trends. In all four countries, we see slight decreases in average gross enrollment for primary education but significant increases in average gross enrollment for secondary and tertiary education.

These trends point to a clear conclusion: many more kids in South American countries are able to get higher education now than they did at the start of the millennia. There are numerous factors that could result in this, but South American countries have done a good job of developing policies to promote education and to make education accessible for kids. There has been a general and logically inferable increase in education all over the world, but this data highlights part of this increase in a particular location in the world: in this case South America.

Further Reading

- wbgapi: <https://pypi.org/project/wbgapi/>
- World Bank Data: <https://data.worldbank.org/>