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Understanding Latin America's Fertility Decline: Age, Education, and Cohort Dynamics

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Abstract

This paper examines the sharp decline in fertility across Latin America using both period and cohort measures. Combining Vital Statistics, Census microdata, and UN population data, we decompose changes in fertility by age, education, and joint age–education groups. We show that the decline in period fertility between 2000 and 2022 is driven primarily by reductions in within-group birth rates rather than by changes in population composition, with the largest contributions coming from younger and less-educated women. Comparing the cohort born in the mid 1950s and the one born in the mid 1970s, we find that the decline in completed fertility reflects not only delayed childbearing but also substantial reductions in the average number of children per woman. This is driven primarily by lower fertility among mothers rather than by rising childlessness. Our findings provide new evidence on the nature of Latin America's transition to below-replacement fertility and highlight several open questions for future research.

JEL Classification: J11, J13
Keywords: Demographic Change, Completed Fertility, Fertility Decline, Latin America, Childlessness, Parity
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1 Introduction

Latin America and the Caribbean (LAC) have experienced a very sharp fall in fertility over time (see Figure 1). In 1950, the crude birth rate (defined as the number of live births per 1000 people in a given year) was 43.5, slightly above that of Asia and significantly above that in Europe and North America. In 2023 it was at 14.2, similar to the regional average in Asia and converging to the European and North American averages of 8.5 and 10.5. Hence LAC has definitively joined the group of countries whose fertility is or will soon be below replacement. While the main unanswered question is why is this trend is taking place in so many regions of the world, an important and absolutely necessary first step to providing an answer is to study the quantitative patterns behind this trend. It is especially valuable to do this in the Latin American context in which the fertility decline has been extremely fast and which furthermore has received very little attention.

To shed light on the rapid fertility decline in LAC, this paper focuses on diverse aspects of fertility, in particular period fertility and completed fertility. The former gives an important snapshot of the demographic drivers of fertility in a given year and how these have changed. Change can happen for a variety of factors ranging from demographic shifts, changes in the timing of when women have children, or smaller family size. Completed fertility, on the other hand, is about the average number of children per woman at the cohort level. Changes in completed fertility can also be governed by demographic shifts other than age and by behavioral changes. To facilitate comparisons, we divide our sample into three groups (high, middle, and low) according to their total fertility rate (TFR) in the year 2000. We also include the US in our analysis, as it provides an interesting contrast with other countries in the region. Our analysis draws on multiple data sources. We combine Vital Statistics, the UN World Population Prospects, and Census microdata to study changes in period fertility and completed fertility, and to assess the contribution of shifts in demographic structure and educational attainment to these trends. In addition, we examine the role of childlessness and changes in the average number of children among women who become mothers in shaping overall fertility dynamics.

We start by examining how fertility changed between 2000 and 2022, using the general fertility rate in each year, where the latter is defined as the number of live births per 1000 women of reproductive age. As this covers women of a wide range of ages, there can be several demographic factors responsible for changes in this figure in addition to behavioral changes. We examine how shifts in the age distribution and educational attainment of women as well as fertility changes of *given* age and education groups have contributed to the fertility decline by decomposing the overall fertility decrease into several additive components: changes in fertility rates for given groups, changes in the shares of these groups, and the interaction of these two changes.[1] Overall, we find that most of the change stems from decreases in the fertility rates of given groups, especially that of women

[1] See Kearney et al. (2022) for an excellent analysis of falling birth rates in the US, starting with the "great recession" of 2008. She conducts a similar decomposition of period fertility between 2007 and 2019, but for groups that are defined by age, education, and race/ethnicity.

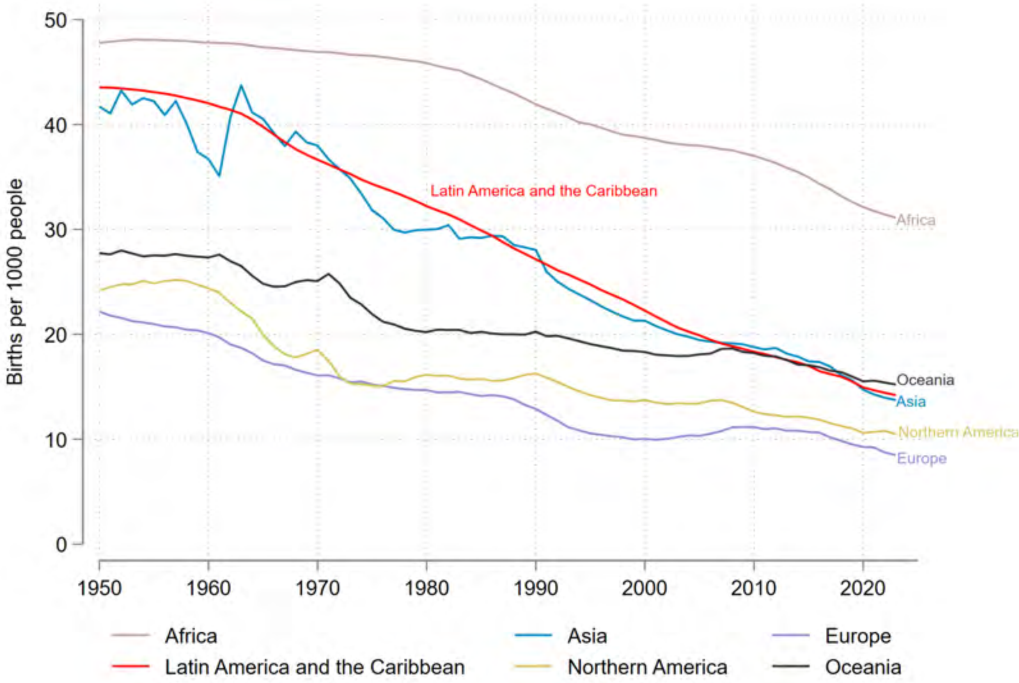
between the ages of 20 and 29, though there is interesting heterogeneity across countries. The analysis of combined age-education groups shows that for all LAC countries the most important contributors to the fall in the GFR comes from younger women with less than high school, followed by those with a high school degree.

We next turn to studying how completed fertility has changed over two cohorts separated by twenty years: an older cohort born in the mid 1950s and a younger cohort born in the mid 1970s. Importantly, both cohorts have reached the end of their reproductive lives, allowing us to contrast the average total number of children a woman has across cohorts. Completed fertility is critical to understanding longer-run population dynamics as it allows one to distinguish whether fertility trends present in any given year or number of years stem from changed timing (e.g., women postponing having children to when they are older) or from a decrease in the average number of children women have. A drawback of the latter is that it requires waiting until a cohort has finished having children, introducing a substantial time gap between current fertility measures such as the general fertility rate or the total fertility rate and a cohort's completed fertility rate.

We investigate the roles of both increasing educational attainment and changes in completed fertility rates at given education levels. Depending on the total fertility rate group the country belongs to, most of the change comes from women with less than primary education and women with primary but not secondary education completed. For all countries, the change in fertility behavior dominates the change in educational structure of the population, though the latter plays a significant role for some countries, especially those from the highest total fertility rate group. This is a very different conclusion from what we obtain for the US where completed fertility actually increased (though by very little) between these cohorts. In the US, women with a college degree are the group most responsible for the increase in completed fertility. Lastly, we also examine the role of childlessness vs decreased fertility among those who become mothers in explaining the decline in completed fertility. The latter has been found to be quantitatively important in OECD countries (see Geruso and Spears (2025)). We find that in the US childlessness decreased, explaining over 70% of the small increase in completed fertility between the two cohorts. In contrast, although childlessness increased in LAC, it plays a quantitatively small role in explaining the fall in completed fertility (less than 10% on average); declining fertility among mothers is the driver of lower completed fertility.

Although a causal analysis is outside the scope of our paper, we end by presenting some simple correlations and contrasting them with what has been found for various OECD countries. In particular, we examine the changing correlation between fertility and per capita GDP, female labor force participation, and gender norms. We find a strong negative correlation between per capita GDP and fertility and between the latter and more progressive gender norms. Perhaps surprisingly, the correlation between female labor force participation and fertility is very weak. Doepke et al. (2023), on the other hand, finds a positive relationship between per capita GDP and fertility. While these cross-country correlations are suggestive, the endogeneity of these outcomes does not permit a causal analysis though there may be ways to make use of quantitative models and both cross-sectional and time-series variation within a country to gain better traction on understanding the driving forces.

Figure 1: Evolution of Crude Birth Rates Across World Regions



Note: The figure shows the evolution of the crude birth rate, measured as the total number of live births per 1000 people in a given year. *Source:* Our World in Data based on UN World Population Prospects.

Our paper contributes to a recent literature that documents and analyzes the sustained fall in fertility, most of it related to developed countries. Kearney et al. (2022) studies the fall in birth rates in the US after the 2008 financial crisis and concludes that one needs to adopt a cohort analysis to understand why women are having fewer children. Kearney and Levine (2025) adopt a cohort perspective and examine the potential role of rising childlessness and changes in parity for six advanced economies. Doepke et al. (2023) provide an excellent overview of the recent literature in the economics of fertility in advanced economies. This literature faces the challenge of the breakdown of old stylized facts, e.g., the cross-sectional and cross-country negative relationship between income and the quantity of children or between fertility and labor force participation. The quality-quantity tradeoff (Becker, 1960), central to the earlier literature, is argued to have been replaced by other quantitatively more important forces such as the conflict between career and family, greedy jobs that require many hours (Goldin, 2014), norms regarding childcare, and a move towards more time-intensive parenting (Doepke & Zilibotti, 2019) though it is hard to find more than suggestive evidence regarding most of these alternatives. Indeed, while both Doepke et al. (2023) and Kearney and Levine (2025) provide illuminating discussions about possible drivers, it is difficult to eliminate or confirm them giving the paucity of data and the more complex forces hypothesized to play a central role.[2] Goldin (2025) hypothesizes that some Asian and European countries that currently have ultra-low fertility are the result of a mismatch between the fast economic growth they experienced after WWII and the slow pace of changing norms. Interestingly, Briselli and González (2025) put the responsibility of low fertility in European countries on the gender gap in attitudes towards housework and provide cohort-level poll evidence in support of this. Unfortunately, the questions used in this analysis are not available in Latin American polls.

There has been significantly less work done on the fertility decline in Latin America, in part because of the challenges presented by the data. Cabella and Velázquez (2025) have a nice summary of the literature in this area, especially the contributions by demographers. The authors study the contribution of educational attainment and behavioral changes to the recent decline in period fertility (2010-2022) as measured by the TFR for five Latin American countries.[3] They too find that behavioral changes are responsible for the greatest share of the fall in fertility. Using age-specific fertility rates, they show that the recent fertility decline is largely driven by reductions in adolescent and young adult fertility. Pardo et al. (2025) study six countries in LAC that experienced fertility declines between 2011 and 2020 with fertility rates that were low (TFR of 1.5 to 2.1) or very low (1.3 to 1.5) by the end of that period.[4] Noting that Latin America is characterized by high adolescent fertility and that it used to display a bimodal distribution of first-birth rates, they find that fertility decline among adolescents is moving those countries towards the bell-shaped figure that characterizes this relationship in advanced economies.[5] Decomposing the decline in the total fertility rate into contributions of age- and birth-order–specific fertility rates, they find that declines in first birth rates among adolescents and young adults (15–24) plays a significant role and that for some countries (Argentina and Uruguay) the decline in rates for higher order children (2+) and later ages (25-49) contributes substantially to the decline in fertility. This within-group pattern is consistent with our findings and suggests that fundamental behavioral changes, not compositional shifts, underlie Latin America's recent fertility decline. Our analysis complements this earlier literature by, first, broadening the coverage of the analysis of period fertility to a substantially larger sample of countries and, second, studying completed fertility. The latter is fundamental to understanding the longer-run population dynamics and to identifying not only demographic changes but also distinguishing between postponement, increases in childlessness, and behavioral changes of specific groups of women.

[2]There have been several advances in models of fertility to explain current fertility patterns. See Doepke et al. (2023) and Bloom et al. (2024).

[3]The countries are Argentina, Brazil, Chile, Costa Rica, and Uruguay.

[4]They study Argentina, Brazil, Chile, Colombia, Mexico, and Uruguay

[5]The decline in adolescent fertility during the second decade of the twenty-first century is particularly noteworthy given that the region maintained persistently high adolescent fertility rates despite steep decreases in fertility and educational expansions over the preceding decades. See Garbett et al. (2025) for an analysis of adolescent fertility across 15 Latin American countries between 1960 and 2020.

The paper is organized as follows. Section 2 describes our data sources and the set of countries included in the analysis, which varies by data requirements. Section 3 analyzes changes in period fertility between 2000 and 2022, focusing on the role of demographic and educational change. Section 4 marks the beginning of the second part of the paper, where we study completed fertility from a cohort perspective, comparing cohorts born around 1953/54 and 1973/74. In addition to a decompositional analysis by education, it documents cross-country changes in completed fertility, analyzes the evolution of childlessness and its contribution to overall fertility declines, and examines how the distribution of parity evolved across cohorts. Section 5 presents a few correlations between fertility outcomes and socioeconomic characteristics. Finally, Section 6 concludes.

2 Data Sources and Sample Countries

We study how fertility patterns have evolved across Latin America by analyzing age-specific fertility rates, fertility differentials by maternal education, completed fertility, and parity distributions. As discussed below, data requirements vary across these topics and not all countries in the region have data that permits each of these topics to be analyzed. Accordingly, for each topic we include all countries in the region for which the necessary data are available.

To facilitate comparison, we group countries into three categories based on their Total Fertility Rate (TFR) in 2000: countries with low TFR (1.61–2.25: Brazil, Chile, Cuba, United States, and Uruguay); countries with middle TFR (2.41–2.87: Argentina, Colombia, Costa Rica, Dominican Republic, Mexico, Panama, Peru, and Venezuela); and countries with high TFR (3.08–4.58: Belize, Bolivia, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, and Paraguay).[6] Although these cutoffs are arbitrary, they allow us to contrast fertility patterns among countries that began the 21st century with relatively similar fertility rates. Note that we have also included the United States among the low TFR countries as it is useful to have a comparison country from outside the region. Figure 2 shows the evolution of the crude birth rate over time for each of the three TFR categories.

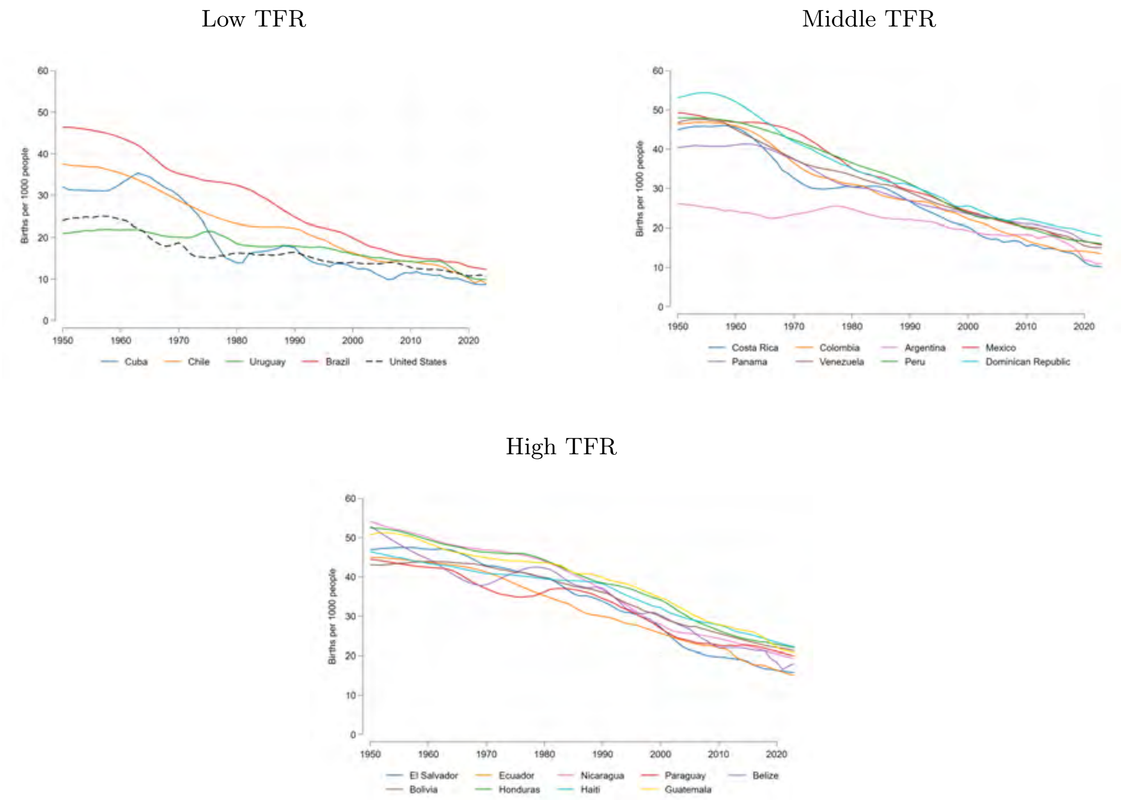
To study how changes in age-specific fertility and shifts in the underlying age composition contributed to the evolution of the General Fertility Rate (the GFR) we use data from the United Nations World Population Prospects (WPP), which provides harmonized information on population counts by age and sex, as well as live births by mother's age for all countries worldwide.[7] The WPP's comprehensive coverage and harmonization adjustments make it the most complete and appropriate data source for the age-based decomposition analysis presented in Section 3.1. We also use WPP estimates when analyzing age-fertility profiles across successive cohorts (Section 4.1), as these data allow

[6]See Appendix Table B.1 for each country's TFR in the year 2000.

[7]The World Population Prospects compiles information from multiple sources, including population Censuses, Vital Statistics, Household Surveys, and official statistics. See https://population.un.org/wpp/methodology for more details.

us to track cumulative fertility at each age for successive cohorts. An alternative would be to rely on Vital Statistics on live births. This data is not publicly available for many Latin American countries, however. In Appendix Figure B.1 we assess the reliability of the WPP by comparing its data with that obtained from Vital Statistics for the subset of countries where both sources are available. Overall, the WPP data aligns remarkably closely with official birth registration data. For only some cases (e.g., Chile in the most recent years) the fit is less precise, reflecting WPP adjustments to account for incomplete or missing birth registration.[8]

Figure 2: Evolution of Crude Birth Rates by group in LAC



Note: The figure shows the evolution of the crude birth rate for three groups of LAC countries classified by their total fertility rate in 2000. The CBR is measured as the total number of live births per 1000 people in a given year. *Source:* Our World in Data based on UN World Population Prospects.

To analyze how changes in the distribution of the levels of women's education and changes in education-specific fertility drove changes in the GFR (Section 3.2), we combine multiple data sources, prioritizing those with the best availability and quality of maternal education data.[9] In contrast to the analysis based solely on age, we do not use the WPP data as it does not report births by mother's education. For countries with high-quality Vital Statistics that report births by mother's age and educational attainment, we use that

[8]Appendix Figure B.1 provides additional details.

[9]See Cabella and Velázquez (2025) for a discussion of some of the issues related to obtaining education measures.

data to construct education-specific birth counts—the numerator for computing fertility rates by education level. For the denominator (population of women by age and education), we rely on harmonized household survey microdata from SEDLAC.[10] We rescale these survey-based counts so that the total number of women in each age group matches the corresponding WPP population estimates. There are several countries, however, for which Vital Statistics cannot be used either because they are not publicly accessible or because they have important quality issues.[11,12] In that case we use Census microdata whenever possible, constructing education-specific fertility measures for the year preceding the Census (as the data is for prior year prior.)[13]. Appendix Section B4 provides detailed information on the countries for which we rely on Census data and the specific Census years used in this analysis. Educational attainment is harmonized across data sources into three mutually exclusive categories: less than high school completed; high school completed but no college/university degree; and college graduates. Appendix Table B.3 reports, by country, the data source used for the education-specific decompositions, the period covered, and notes on classification choices and missing education.

Our analysis of completed fertility and parity across cohorts by maternal education (Section 4.2) also uses Census data and the June Current Population Survey (CPS) studying the completed fertility of women age 40-44.[14] Completed fertility summarizes the cumulative fertility of entire cohorts making Census data particularly well suited as they provide retrospective information on lifetime fertility through "children ever born" questions and include information on respondents' educational attainment. We cannot use Vital Statistics as the series are insufficiently long to analyze cohort changes in completed fertility. We identify birth cohorts based on women's reported age at the time of each Census or survey and compute completed fertility and parity for each cohort using responses to "children ever born" questions, which is asked of women of age 12 or 15 and older, depending on the Census. Our analysis here is limited to Argentina, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, and Uruguay as the cohort analysis requires using the Census for particular periods. For example, we need to observe our older cohort born in 1953-1957 when they are 40 to 44 years old. This implies that we need a Census from

[10]SEDLAC is a joint initiative of CEDLAS (Universidad Nacional de La Plata) and the World Bank that provides harmonized household survey microdata across Latin American and Caribbean countries.

[11]These issues stem from problems with the maternal education variable, including missing information, the complete absence of education measures, and changes in the definition of educational attainment that prevent consistent harmonization across years (e.g., Brazil, Colombia, Ecuador, Mexico, and Uruguay). Additional data limitations include sharp year-to-year fluctuations that generate implausible discontinuities and restricted access to microdata for certain years during the study period.

[12]Countries for which needed microdata from Vital Statistics are not publicly available include Bolivia, Cuba, Haiti, Honduras, Nicaragua, Panama, Paraguay, Peru, and Venezuela.

[13]Although Brazilian Vital Statistics microdata are available for a longer period, a complete and consistent measure of mothers' education can only be constructed from 2013 onward. Census data were not a viable alternative, as microdata from the most recent census are not yet publicly available. Hence we chose to exclude it from the analysis.

[14]We use ages 40-44 as the terminal ages as this allows us to conduct our analysis for a larger number of cohorts than using ages 45-49 as the cutoff.

1997 or a few years later.[15] Similarly, to study the completed fertility of the younger cohort born in 1973-1977 requires a Census from 2017 or a few years later. In this section of the paper we modify our education categories by further subdividing the lowest education category into less than primary completed and primary+, where the latter includes individuals who completed primary education but did not graduate from high school. This refinement is necessary because the cohorts we analyze are old enough that a substantial share of women still have less than completed primary schooling. Appendix Table B.4 provides detailed information on Census years, cohort definitions, and the ages at which we measure completed fertility for each country.

3 Period Fertility: The Role of Demographic Changes

In this section we examine the change in period fertility between two years: 2000 and 2022. We use the general fertility rate (GFR) as our measure of fertility, where the latter is defined as the number of live births per 1000 women of childbearing age, rather than the crude birth rate (CBR). While both fertility measures are informative, the first sheds light on the actual behavior of the relevant group (women who potentially may have children) whereas the latter is more useful for macroeconomic analysis as it folds behavior and age structure into one per-capita birth flow. We define childbearing ages to be between 15 to 44 and group them into 5-year bins as is standard.[16] During this period there were important demographic changes, as both the age structure and education composition of the region's population changed. The GFR provides a useful simple snapshot of fertility in a given year and is easily disaggregated as will be seen below.

3.1 The Age Structure of the Population

We start our analysis by examining how shifts in the age composition of women and in the fertility of each age group have contributed to the change in the GFR, using data from the United Nations World Population Prospects. Over this period, the GFR fell on average by 20.6, 30.8, and 51.4 births per 1000 women age 15-44 in the low, middle, and high TFR groups respectively. Figure 3a shows birth rates per 1000 women in each 5-year age group for the years 2000 (lighter bars) and 2022 (darker bars), averaged over the LAC countries in each TFR category. The last row gives the GFR, i.e., the number of live births per 1000 women age 15-44, again averaged over the countries in the TFR category. Appendix Figure A.1 provides the information at the country level. On average (and as shown in the Appendix also across all individual LAC countries), there is a clear shift in the age profile of fertility: birth rates fell sharply among women of ages 15–29. Fertility also declined, albeit more moderately, at ages 30–34. For the 35–39 and 40–44

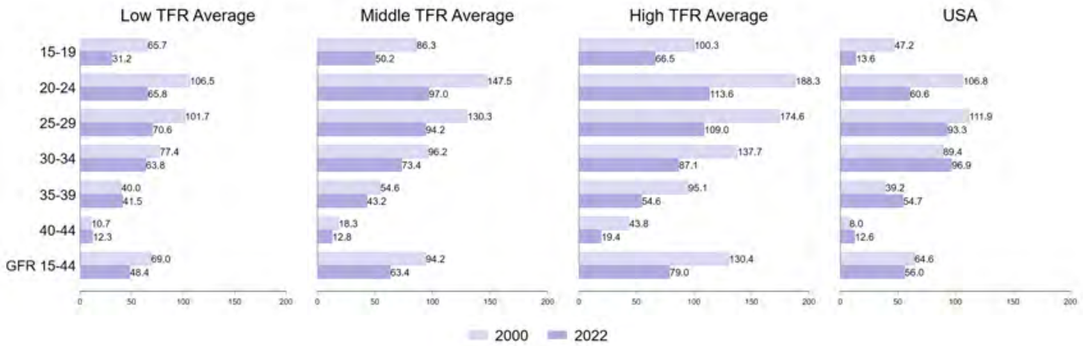
[15] We prefer to use the closest possible date so as not to have problems with differential mortality across women.

[16] We chose 44 rather than 49 because there are few births for the 45-49 ages and using a younger cutoff allowed us to conduct our analysis for a larger number of cohorts.

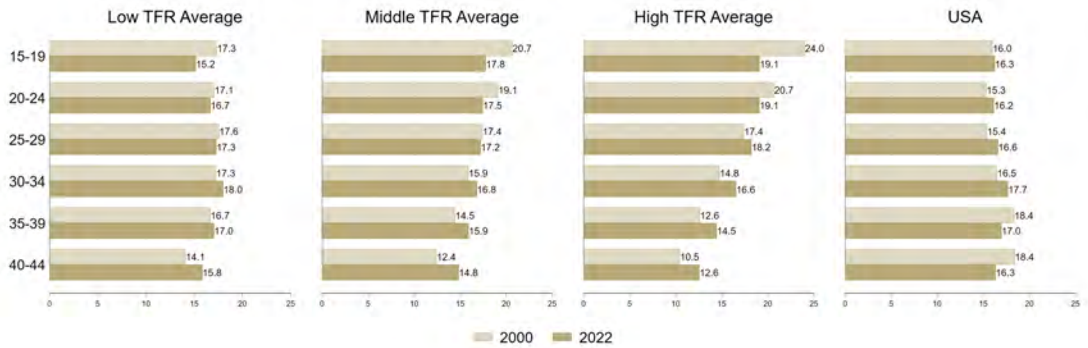
age groups, fertility actually increased on average in the low-TFR countries, but decreased for the other two categories. The US pattern is similar to that of the low-TFR countries, except that fertility increased as well for the 30-34 age group. In all countries, the fall in teenage pregnancy is especially dramatic, including in the United States. In the region, it declined by over 50% for the low TFR countries and by 42% and 34% on average for the middle and high TFR countries, respectively. It is still high for all TFR groups relative to the US, indicating that we may expect to see further declines for this age group in the future.

Figure 3: Age-Specific Birth Rates and Population Structure, 2000–2022

(a) Birth Rates per 1000 Women by Country Group



(b) Population Share by Country Group



Note: The upper panel shows age-specific birth rates for 2000 and 2022 per 1000 women in that age group. The last row gives the total change per 1000 women in the population of women age 15-44 (i.e., the GFR); the lower panel shows the share of each age group in the population of women age 15-44 for those same years. Lighter bars correspond to values in 2000, darker bars to values in 2022. *Source:* Authors' calculations based on UN World Population Prospects.

Turning next to the age composition of the population, Figure 3b shows how the share of each age group changed between 2000 and 2022, averaged over the countries in each TFR group. Appendix Figure A.1 presents the same analysis for each individual country. On average, the change in demographic structure was relatively modest across all TFR groups, changing by only 1-2.9 percentage points in each age category with the exception of the 15-19 age group in high TFR countries, which decrease by close to 5 percentage points. In general, the population is aging, consistent with declining fertility. Two interesting exception are the US and Cuba (see Appendix Figure A.1) which have both seen a (modest) increase in the younger age categories at the expense of the older ones.

To quantify the relative contribution of changes in age structure versus those of age-specific fertility to the total change in the GFR (B/P) between 2000 and 2022, we decompose the latter into several additive components as shown in equation 1. The first term is what we call the "rate effect" (RE). It gives the contribution of the change in the fertility rate of each age group keeping constant the age composition of the population at its initial 2000 level. The second component is the "composition effect" (CE). It gives the contribution arising from the changes in the age composition of the population. Each age group's change is weighted by the difference in its birth rate relative to the GFR (all in the year 2000), i.e., the change in the share of a group is weighted positively if its fertility was above the mean and negatively otherwise. Lastly, there is the interaction effect of the two changes (IE).

$$\Delta\left(\frac{B}{P}\right)_{t_o,t_1} = \underbrace{\sum_i s_{i,t_o}\Delta\left(\frac{B}{P}\right)_{i,t_o,t_1}}_{\text{Rate effect (RE)}} + \underbrace{\sum_i \left(\frac{B_{i,t_o}}{P_{i,t_o}} - \frac{B_{t_o}}{P_{t_o}}\right)\Delta s_{i,t_o,t_1}}_{\text{Composition effect (CE)}} + \underbrace{\sum_i \Delta s_{i,t_o,t_1}\Delta\left(\frac{B}{P}\right)_{i,t_o,t_1}}_{\text{Interaction effect (IE)}} \quad (1)$$

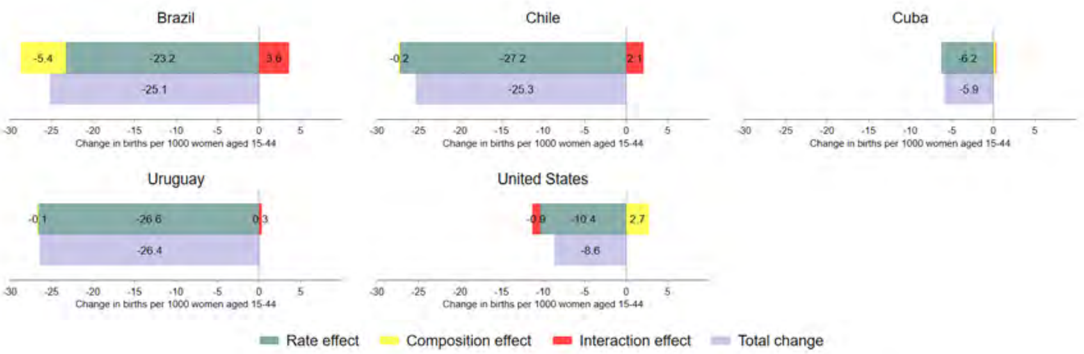
Figure 4 shows the magnitude of these components by country. The rate effect is shown in green, the composition effect in yellow, the interaction effect in red. The total change in GFR is shown in purple – it is, of course, equal to the sum of the three components. Rectangles to the left of zero on the graph show components that contributed to decreasing the GFR; those on the right worked to increase it.

As expected given the patterns documented above, the decline in birth rates is overwhelmingly driven by the rate effect. In all countries, reductions in age-specific fertility explain virtually the entire change in births per 1000 women. The contribution of the composition effect is small almost everywhere and in most countries in the region it also serves to decrease the GFR. The United States (and to a smaller extent, Cuba, Guatemala, Haiti, and Paraguay) is an exception insofar as the composition effect moves in the opposite direction, i.e., the change in the age structure keeping age-specific birth rates constant at their year 2000 levels would increase the GFR.

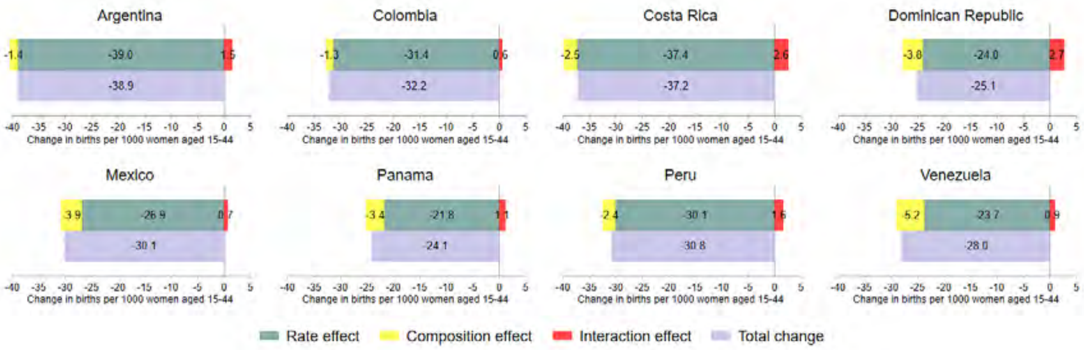
We can explore in greater depth the contribution of each age group to the change in the GFR. Figure 5 provides a heat map that indicates the percentage by which each age group contributed to the total change in the gross fertility rate between 2000 and 2022. The left panel shows, for each age group on the x-axis, the share of the overall decline attributable to that group, adding its rate, composition, and interaction effects and dividing by the total change in the GFR. In this figure, positive values indicate groups that contributed to the *reduction* in the GFR, whereas negative values indicate groups that contributed to increasing the GFR. The shading reflects the intensity of each group's contribution, with darker reds denoting larger contributions to the decrease in the GFR and darker blues denoting larger contributions to increasing the GFR.[17] Countries are ordered by the magnitude of their total decline in their GFR, shown in the right panel.

Figure 4: Age Decomposition of the Change in the GFR

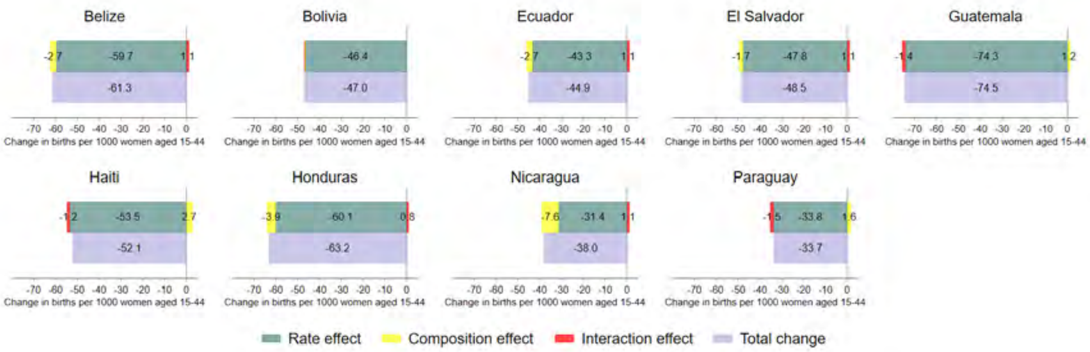
(a) Low TFR



(b) Middle TFR



(c) High TFR



Note: The components (rate, composition, and interaction effects) refer to the decomposition of the change in the gross fertility rate per 1000 women of age 15-44 between 2000 and 2022 as shown in equation 1. The total change in the GFR (shown in purple) is decomposed into a rate effect (changes in group-specific birth rates shown in green), a composition effect (shifts in the population distribution across age groups shown in yellow), and an interaction effect (the interacted effect of both changes shown in red). *Source:* Authors' calculations based on UN World Population Prospects.

[17] Intervals are defined by dividing the range of contributions to the decline in the GFR into 10 equal-sized intervals by TFR group; the same interval width is then applied to the range of contributions to the increase in the GFR.

To illustrate how to interpret the decomposition, consider the United States and the 20–24 age group. The latter is the single largest contributor to the decline in the USA's GFR, accounting for close to 83% of the total decrease over this time period. Fertility per 1000 women in this age group fell by 46.2 births (as can be seen in Figure 3). Furthermore, the share of women aged 20–24 in the population of childbearing age increased modestly by 0.9 percentage points.[18] Using equation 1, the rate effect for this group is -7.09 per 1000, meaning that if the age composition had remained constant at its 2000 levels, the decline in fertility among 20–24 year-olds alone would have reduced the overall GFR by 7.09 births per 1000 women. The composition effect, however, works in the opposite direction: because this age group had above-average fertility in 2000 (106.8 births per 1000 women compared to the overall GFR of 64.6), the increase in their population share would have increased the GFR by 0.35 per 1000 had their fertility rate had remained constant. Lastly, the interaction effect for this group is -0.38. Its sign captures the fact that this age group simultaneously experienced both declining fertility and an increasing population share, which contributes to lowering the GFR. The combined effect of all three components is simply the sum of these three effects, i.e., -7.12 per 1000, reflecting that the dramatic decline in fertility of this group was much larger than the compositional change that would have otherwise increased the GFR.

We now turn to examining these contributions across all age groups and countries as shown in the heat map of Figure 5, starting with the low TFR group. For Brazil, Chile, and Uruguay – the countries with the largest overall declines in their GFR — women below the age of thirty account for most of the fall in the GFR, which is to be expected given the changes in their age-specific birth rates and population shares as can be seen in Appendix Figure A.1. In particular, the 20–24 age group is the single largest contributor to the decline in every country in this group except Cuba. Older ages (35–44), on the other hand, either have small contributions to the decline in the GFR or actually increase slightly the GFR (Chile and Uruguay). Cuba displays a much flatter contribution profile across ages (with the exception of the 25-29 age group), reflecting its more muted decline in adolescent fertility. Finally, the United States stands out for showing a highly polarized pattern: the sharp fall in fertility among younger women drives the overall decrease in the birth rate, whereas older women provide a substantial contribution to increasing the GFR. This is the only country for which older ages offset a substantial part of the decline generated by younger groups.

Turning next to the middle TFR countries, the decline in the GFR is driven overwhelmingly by younger women. In every country, the 20–24 group provides the largest contribution, followed in several countries by the 25–29 group, mirroring the sharp reductions in these age-specific birth rates and the small changes in their population share which also tends to decrease the GFR. The contribution of age groups in the range 35–44 to declining GFR are more modest and no country, with the exception of the Dominican

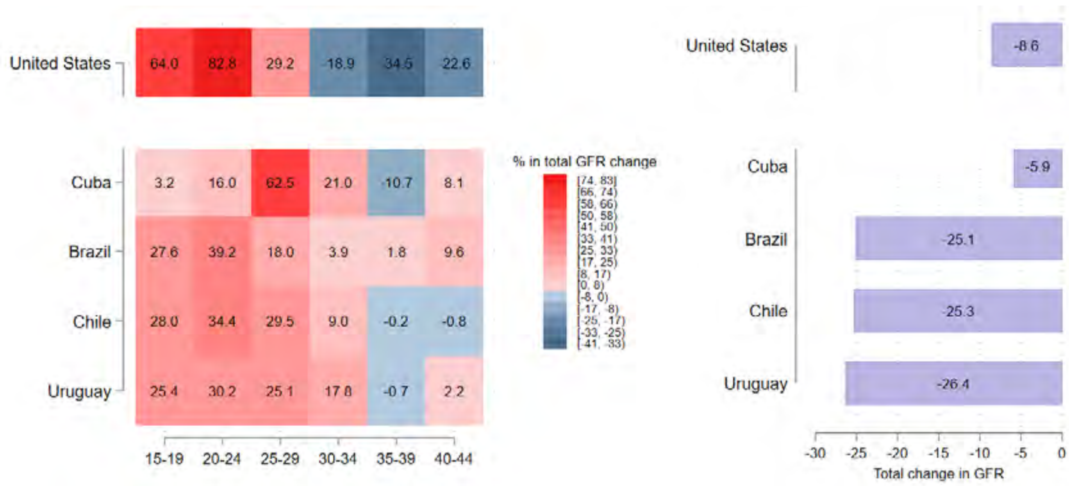
[18] The numbers shown in all figures have been rounded to one decimal place, hence the disparity in any calculations.

Republic, has older groups increasing the GFR. Overall, the pattern in this group is more uniform across countries than in the low-TFR group, with most of the contribution to the change in the GFR concentrated among women under age 30.

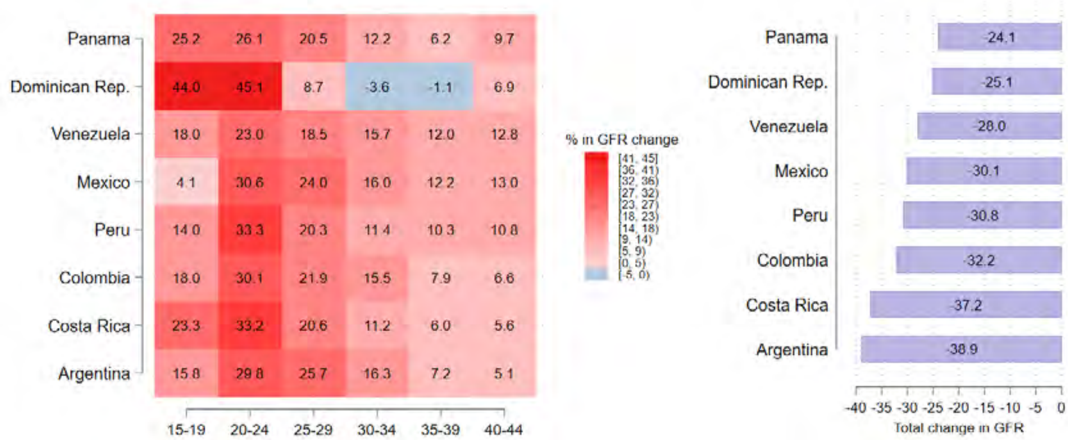
Figure 5 shows an even more uniform pattern among the high-TFR countries. With the exception of the 15-19 age group in Paraguay, all age groups contribute to the decline in the GFR, with particularly large contributions from ages 20–29. Unlike the other two TFR groups, women in their thirties and early forties also contribute substantially to the fall in the GFR, reflecting the very large reductions in fertility across the entire reproductive age range that can be seen in Appendix Figure A.1. This TFR group stands out for displaying the broadest and most evenly distributed age-based decline in birth rates.

Figure 5: Contribution by Age Group to the Change in the GFR

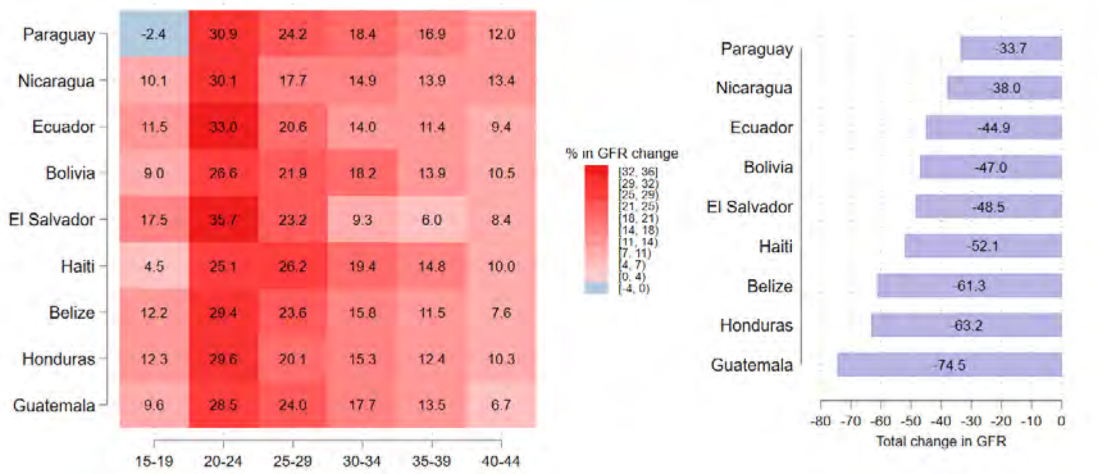
(a) Low TFR



(b) Middle TFR



(c) High TFR



Note: The percentage in each rectangle represents each age group's contribution to the total change in the gross fertility rate, based on the sum of its components (birth rate, composition, and interaction effects). The total change is calculated over women aged 15–44. Positive values indicate age groups contributing to the overall negative GFR trend, while negative values correspond to groups that increase the GFR. Countries are ordered by the absolute value of their change in the birth rate. Intervals are defined by dividing the range of contributions to the decline in the GFR into 10 equal-sized intervals; the same interval size is then applied to the range of contributions to the increase in the GFR. *Source:* Authors' calculations based on UN World Population Prospects.

To sum up, the data reveals a clear and region-wide pattern: the decline in fertility across LAC over the past two decades is driven primarily by sharp reductions in birth rates at younger ages, especially among women 20–24 and, to a slightly smaller extent, 25–29. Falling adolescent fertility also plays a substantial role, and most countries show meaningful declines at ages 30–34 as well. Despite differences in TFR levels across groups of countries, the overall picture is remarkably consistent: LAC's fertility decline has been powered by large and widespread reductions in the fertility rate of women below the age of 35, with changes at older ages contributing relatively little. Furthermore, changes in the population shares by age group have overall not been quantitatively important.

3.2 The Education Structure of the Population

Over the last twenty years, the education profile of the population also changed, with the average years of education increasing in all countries. As fertility varies significantly by education, the change in the latter could have driven the overall change in fertility. We examine this focusing on women aged 20-44 and using data on fertility rates by maternal education for a subset of LAC countries where such information is available from Vital Statistics or Census data, and the US. As noted in the data section, information on maternal education is not consistently available for the full sample of countries. Consequently, the analysis here is restricted to a subset of LAC countries for which comparable information can be constructed. We rely on either Vital Statistics or Census microdata, depending on the availability and quality of information on maternal education, as described in the data section.[19] Note that, for this analysis, unlike in the previous section where we rely on a harmonized data source (the WPP) for all countries, the years used for comparison may vary across countries. In all cases, we select the years closest to 2000 and to 2022 that are available and reliable for each country.

We classify women into three education groups—less than high school completed (denominated "Less than High School"), those with at least a high school degree but not a college/university degree (denominated "High School +"), and lastly college graduates (denominated "College Graduate").[20] The left-hand side of Figure 6 compares the fertility rate in circa 2000 and circa 2022 (the exact year depends on the data source of the country) of women age 20-44 by level of education; the right-hand side shows the share of each education level in the population of all 20-44 years old women for the same two periods. We decided to omit women age 15-19 as the analysis of adolescent fertility can be found in the prior section and the majority of adolescents will go on to obtain more education.[21]

As shown in Figure 6, fertility fell for every education category across all TFR groups with the exception of college-educated women in Costa Rica. For Chile – the only low-TFR LAC country with available data – the steepest decline in fertility came from women with secondary + education, who reduced their births by 19 per 1000 women. College-educated women and those with less than a high-school diploma showed a smaller decline of about 9 births. In the United States, the decline is smaller, especially among women in the secondary + education category. It is interesting to note that for each education category, fertility is lower in Chile than in the US. This is reflected in their total fertility rates: 1.18 versus 1.67, respectively, in 2022.[22] In the middle- and high-TFR groups, women with lower education levels account for the largest absolute reductions in fertility. The largest decline by far for the two countries in the high-TFR group is the fertility rate of women with less than high school.

The educational composition of the population shifted markedly toward higher attainment, as shown in Figure 6. The share of women with less than high shool dropped considerably across all TFR groups, falling around 26 percentage points in Chile and in middle TFR countries and more than 35 percentage points in high TFR countries, where the initial share of this group was above 50%. Most of the offsetting increase in shares oc-

[19] We use Census data for Bolivia, Ecuador, Mexico, and Panama, and Vital Statistics for the remaining countries.

[20] Educational attainment is harmonized across data sources into three mutually exclusive categories defined in Appendix Table B.2. When we rely on Vital Statistics, we measure education using the mother's reported schooling at the time of birth registration. This sometimes requires us to harmonize categories over time as countries change their classifications and, when a country uses years of schooling, we map the latter into our education categories. When we rely on Census microdata, we harmonize education definitions following IPUMS guidelines. Appendix Table B.3 reports, by country, the source used for the education-specific decompositions, the period covered, and notes on classification choices and missing education.

[21] Furthermore, if we do include it in the analysis, its size as one group rather than three (as other age groups are distinguished by education) implies that changes in its fertility rate will have disproportionate importance in the decomposition analysis.

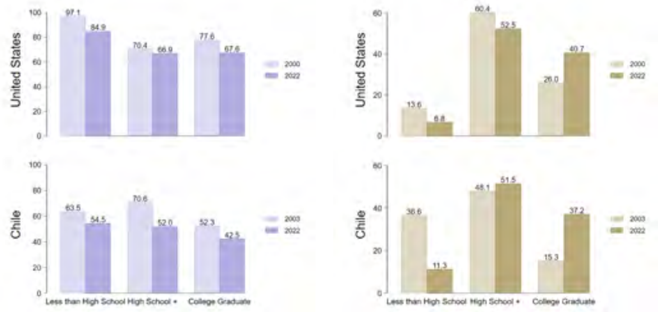
[22] Data from Our World in Data, Fertility Rate dataset (https://ourworldindata.org/fertility-rate).

curred more or less equally in the two higher-education categories in the low-TFR group and mostly in the high school + group in the middle TFR group. The proportion of college-educated women increased substantially, particularly in the low and high TFR countries. The US shows a different pattern: both lower education categories fell, leading to a large increase in the college graduate share, though not as large as that witnessed in Chile.

Figure 6: Education-Specific Birth Rates and Population Structure

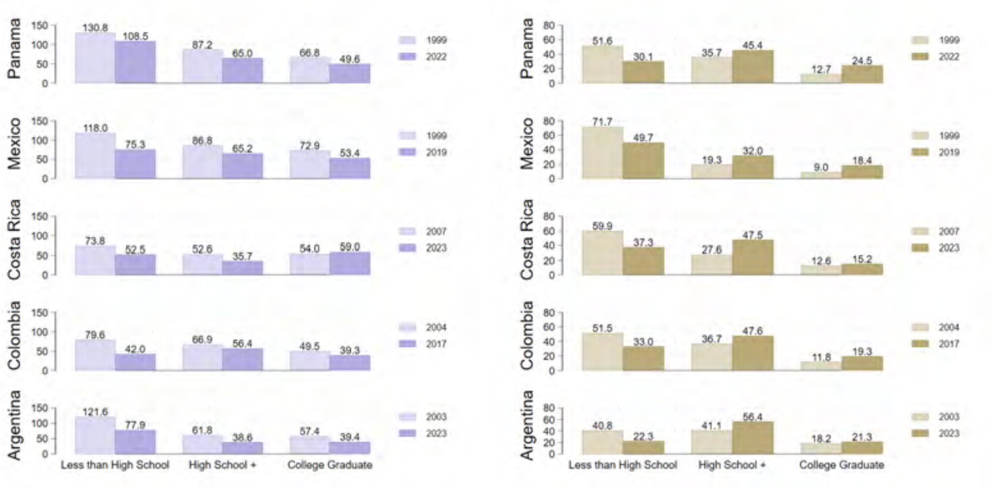
(a) Low TFR

Birth rates per 1000 Women | Population Share



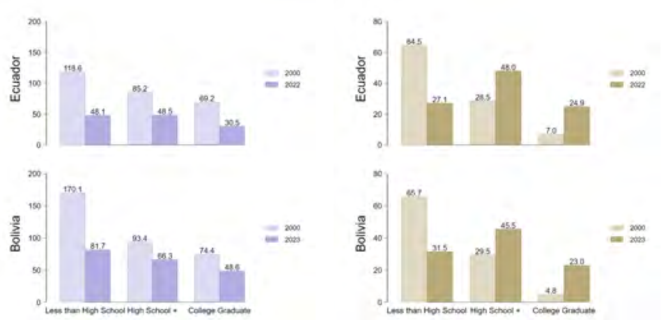
(b) Middle TFR

Birth rates per 1000 Women | Population Share



(c) High TFR

Birth rates per 1000 Women | Population Share



Note: The graphs on the left-hand side show education-specific birth rates per 1000 women of age 20-44 for low, middle, and high TFR countries, respectively. The graphs on the right-hand side show the corresponding share of women age 20-44 that belong to each education group. Education is grouped into three categories: less than high school graduate, high school graduate without a college degree, and college graduate. Lighter bars correspond to the year closest to 2000 and darker bars to the year closest to 2022 for each country. *Source:* Authors' calculations based on National Vital Statistics, SEDLAC, and National Censuses.

We can conduct the same decomposition exercise as before to quantify how changes in the educational composition of the population versus changes in the fertility rates of each education group contributed to the fall in a country's GFR. That is, in equation 1 we now define groups by education rather than age and restrict the analysis to women of age 20-44.

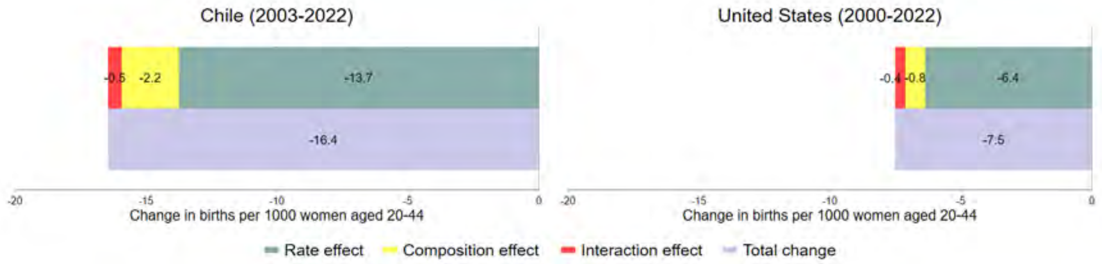
The results are presented in Figure 7. As is clear from the figure, the rate effect is again the dominant force in all countries, i.e., changes in education-specific fertility rates account for most of the decline in the GFR. Nonetheless, and unlike in the case of the age-only decomposition, the composition effect here is quantitatively important, accounting for a significant share of the overall fall in the GFR in most Latin American countries, ranging from 13.4% in Chile to 39.2% in Bolivia, with a simple average of 25.3% across the LAC sample. In contrast, in the US the composition effect accounts for 10.7% of the total change in the GFR.[23] The increased importance of the composition effect in LAC reflects the region's rapid educational upgrading. As women increase their education, this works, ceteris paribus, to decrease the overall birth rate. This force is especially important when fertility differs significantly across education groups (as in Bolivia) and less so when the birth rate is more similar (as in Colombia). Note that the large differences in birth rates across education groups is no longer a prominent feature of the data in the later period (circa 2022), indicating that compositional changes due to education are likely to play a much smaller role in the future. Lastly, the interaction effect also plays a quantitatively significant role for the high-TFR countries, working to increase the GFR there. This is due to the fact that in both Bolivia and Ecuador, women with the lowest level of education had large falls in fertility as well as large decreases in their share of the population. Overall, this analysis allows us to conclude that LAC's large fertility decline

[23]Note that the total change in GFR over this time period is not the same as in the prior section as the age range is smaller.

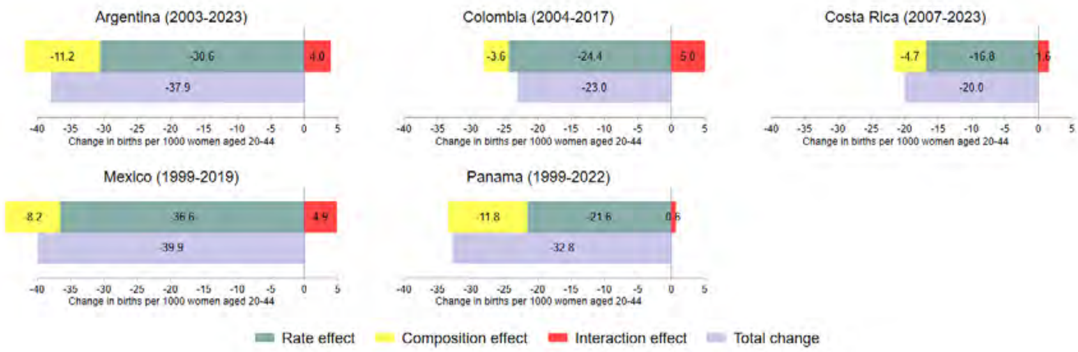
has been mostly driven primarily by behavioral changes within education groups rather than by compositional shifts in the educational distribution. The still-ongoing increases in female education, however, have worked to reinforce this trend, reinforcing the overall reduction in birth rates.[24]

Figure 7: Education Group Decomposition of the Change in the GFR

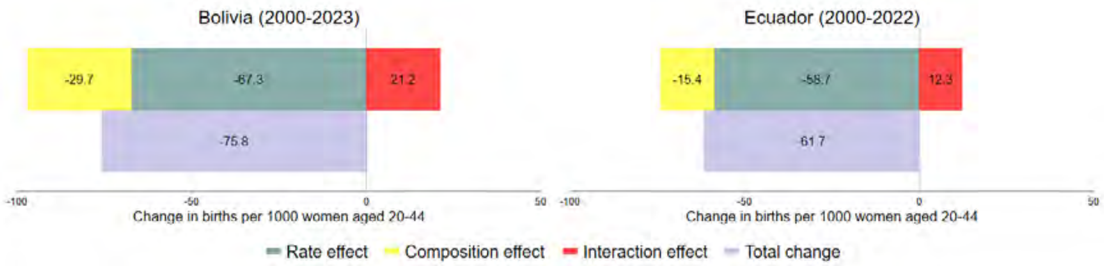
(a) Low TFR



(b) Middle TFR



(c) High TFR



Note: The components (rate, composition, and interaction effects) refer to the decomposition of the change in the gross fertility rate per 1000 women of age 20-44 between the closest available year in 2000 and the closest available year in 2022, as shown in equation 1, using three education groups: less than high school graduate, high school graduate but without a college degree, and college graduate. The total change in the GFR (shown in purple) is decomposed into a rate effect (changes in group-specific birth rates shown in green), a composition effect (shifts in the population distribution across education groups shown in yellow), and an interaction effect (the interacted effect of both changes shown in red). *Source:* Authors' calculations based on National Vital Statistics, SEDLAC and National Censuses.

[24]We postpone a heat map analysis of education to the next section where we combine education with age for a fuller understanding of the changing relationship between age, education, and fertility.

3.3 Combining the Age and Education Structure of the Population

In this last analysis of period fertility, we incorporate both sources of demographic change by defining groups by age and education combined in equation 1, using the same 5-year age groups for women ages 20 to 44 and the three education categories defined previously. As before, we compute changes in the fertility rate of each group as well as changes in age-education population shares, and then decompose the total change into changes in birth rates keeping constant the group shares, changes in the composition of the population keeping constant their fertility rates, and the interaction effects of the two changes combined.

Appendix Figure A.2 shows, for each country, how fertility rates and the composition of the population changed across these 15 groups. Fertility-rate changes broadly replicate the age patterns shown earlier across education groups, while population shares shift markedly toward higher education: college graduates in low-TFR countries, secondary-educated women in middle-TFR countries, and away from primary-educated women in high-TFR countries. Not surprisingly, as can be seen in Appendix Figure A.3, the largest part of the change in GFR is driven by the rate effect in almost all countries, with the exception of Costa Rica. The composition effect plays a quantitatively important role and tends to follow the same pattern as in the education-only decomposition, reinforcing the rate effects in decreasing fertility, whereas the interaction effects remain modest throughout. The US is an exception in that the composition effect worked to increase fertility.

The heat map of Figure 8 summarizes the age–education contributions to the GFR decline. In the low-TFR countries (US and Chile), women in the age range of 20–24 drive the decline, led by those with high school + education. Women with less than a high-school education move fertility in the opposite direction at older ages in both countries. In the United States, rising fertility among older women across all education levels partially offsets the overall decline in the GFR, with the exception of college graduates in the oldest age group of 40-44.

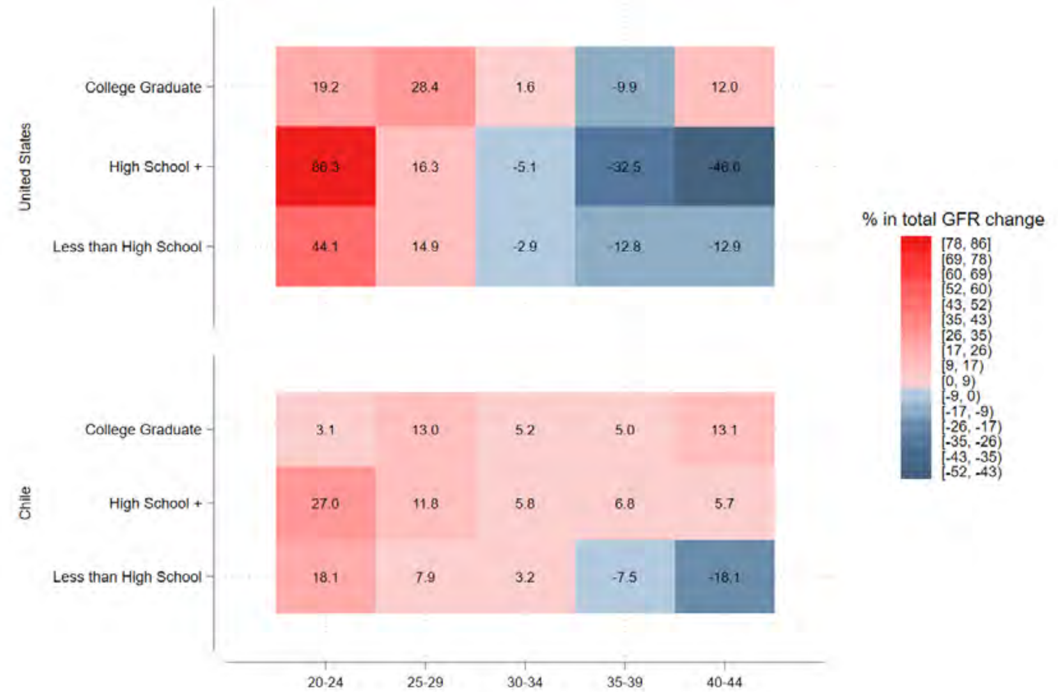
In the middle-TFR countries, the largest contribution to the fall in the GFR tends to be women with less than high-school education of age 20-24 followed by those with 25-29. College-educated women of all ages, on the other hand, contribute relatively little to falling fertility, and in Costa Rica they actually help increase the country's GFR for some age groups, though minimally. Similarly, women with less than high school also contribute to increasing fertility a bit at older age groups in all countries in this group with the exception of Mexico.

In high-TFR countries (Bolivia and Ecuador), the groups responsible for the decline are spread more evenly across the age-education groups, with the largest contributors being women of age 20–29 with less than a high-school education.

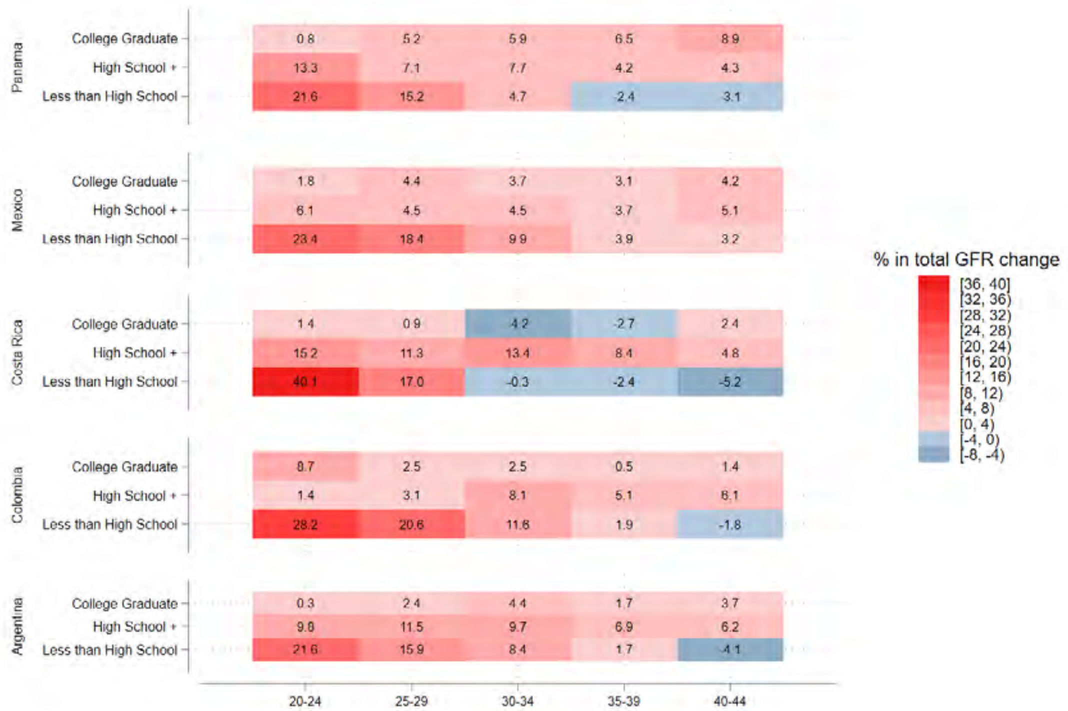
Overall, the fall is the GFR is primarily a result of decreased fertility among younger and less-educated women, with more educated women either contributing a relatively small fraction to the decline or in some cases actually contributing to increase the GFR.

Figure 8: Contribution by Age-Education Group to the Change in the GFR

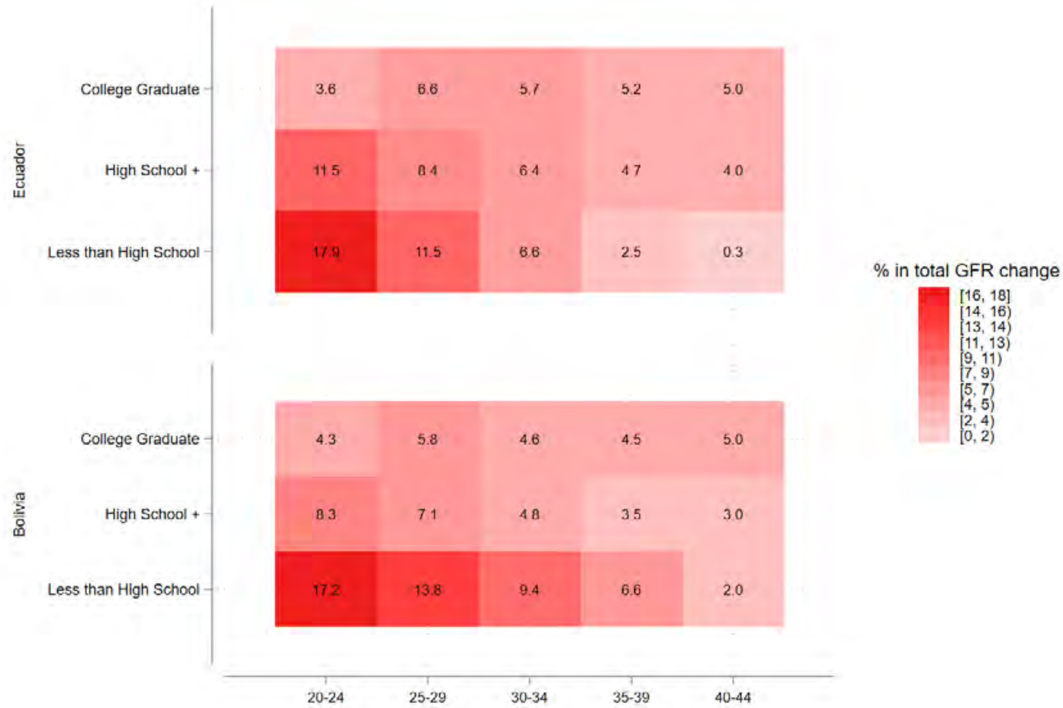
(a) Low TFR



(b) Middle TFR



(c) High TFR



Note: The percentage represents each age-education group's contribution to the total change in the gross fertility rate, based on the sum of its components (birth rate, composition, and interaction effects). Education is grouped into three categories: less than high school graduate, high school graduate without a college degree, and college graduate. The total change in the GFR is calculated over women aged 20–44 for years circa 2000 and 2022. Positive values indicate age groups contributing to the overall negative GFR trend, while negative values correspond to groups increasing the GFR. Intervals are defined by dividing the range of contributions to the decline in the GFR into 10 equal-sized intervals; the same interval width is then applied to the range of contributions to the increase in the GFR. *Source:* Authors' calculations based on National Vital Statistics, SEDLAC and National Censuses.

4 Completed Fertility: A Cohort Analysis

The prior section showed the importance of behavioral changes, i.e., changes in fertility rates of fixed categories of the population, as drivers of the observed decrease in fertility in a period spanning a bit over two decades. While compositional changes played a role, they were relatively minor compared to decreases in fertility of younger women. Notably, however, this decrease was not driven primarily by changes in the fertility of adolescents (although this played a quantitatively significant role as well), but by women in their early or late twenties. Changes in period fertility, however, do not indicate changes in longer-run behavior as they can simply reflect behavioral changes arising from contemporaneous shocks or a cohort change in behavior towards postponing births to older ages. While both the timing and total quantity of children matter in terms of how an economy reacts, long-run population dynamics are driven by completed fertility. In particular, how completed fertility compares with the replacement rate (approximately 2.1) governs whether, abstracting from migration, a country's population grows or shrinks.[25] We now turn to examining how completed fertility changed over time by studying the behavior of two cohorts: one born in the mid 1950s and the other in the mid 1970s.

4.1 The Age Profile of Fertility Across Cohorts

We start our analysis by examining how the age profile of fertility has changed over a longer period of time and for a larger number of cohorts. This permits us to see not only how completed fertility has changed, but also how the age profile of fertility has evolved over time. We study five-year cohorts, starting with the cohort born in 1954–1958 and ending with the cohort born in 2004–2008, for a total of eleven cohorts. As before, we end with the age of 44 as fertility after this age is very low and this allows us to study completed fertility for more cohorts. Using data from the UN World Population Prospects, we construct cohort-specific age profiles of fertility for each country. The WPP provides age-specific information on births and female population by year, which allows us to follow the cumulative number of live children ever born to women in a given birth cohort over the life cycle. Figure 9 shows the age-cohort profiles for two countries in each TFR group as well as for the United States. Appendix Figure A.4 does the same for all LAC countries in our analysis.

Across all LAC countries, the figure shows that each successive cohort has reduced its cumulative average fertility at each age, reaching the end of its reproductive life with substantially lower average number of children. Chile in the low-TFR group illustrates this pattern clearly (Figure 9a). The 1954–1958 cohort ended its reproductive life with about 2.8 children, the 1974–1978 cohort fell below the replacement level of 2.1, and the most recent cohort to complete its fertility (1979–1983) dropped to 1.9. Brazil also experienced substantial declines relative to the oldest cohorts, but the most recent cohorts (whose fertility is not yet complete), at this point appear more similar to one another than in Chile. The US, on the other hand, is strikingly different both from the other low-TFR countries and also from countries in the other TFR groups. In the US, completed fertility increased almost continuously from the 1954–1958 cohort onward until recently. The 1984–1988 cohort—now nearing age 40—has already surpassed the completed fertility of the 1954–1958 and 1959–1963 cohorts, though it will likely finish below its immediate predecessor, indicating that the US is likely to have entered a phase of declining completed fertility. This view is reinforced by the behavior of the youngest cohorts which all show lower cumulative fertility for each given age. Earlier US cohorts reached age 35 with roughly the same number of children—consistent with delayed but stable completed fertility—yet the three most recent cohorts approach age 35 with noticeably lower average fertility. Cuba (in Appendix Figure A.4) is also somewhat different from the other countries in the low

[25] The replacement rate is the total fertility rate required to yield exactly one daughter per woman, taking into account both the sex ratio at birth, the age profile of births, and the proportion of women that survive to each age. For most countries in LAC, this is close to the number in the US or other low-mortality countries of 2.1.

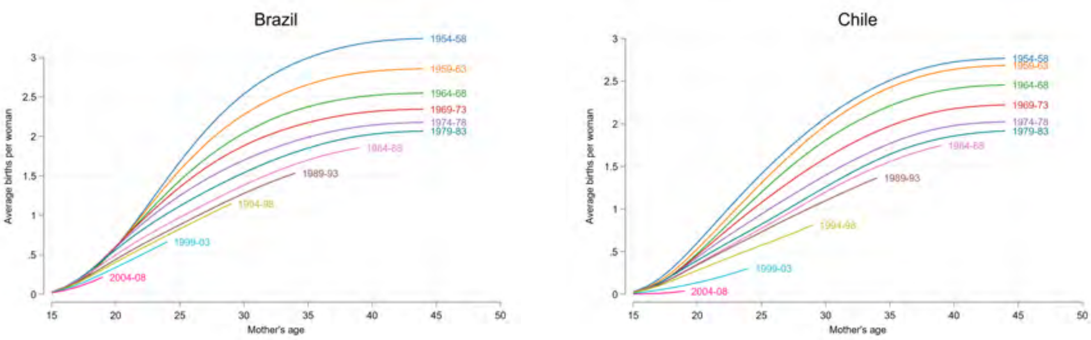
TFR category. Its completed fertility was already low for the 1954-59 cohort (2.1), more in line with that of the US than the other LAC countries (e.g. Chile's completed fertility for that same cohort was 2.8), and the fertility profiles of more recent cohorts are very similar, perhaps indicating that they have reached a relatively stable profile, albeit at a low level.

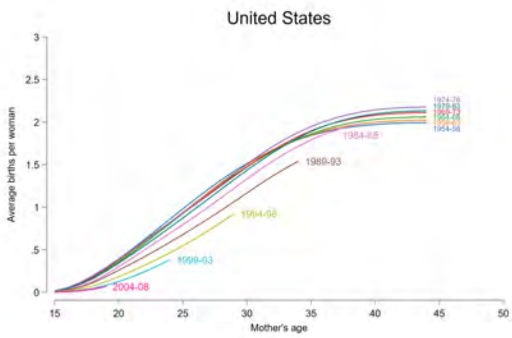
The middle-TFR countries show a similar pattern. Mexico's completed fertility, for example, declined from 4 children in the oldest cohort to just above 2.1 for the cohort born in 1979–1983 that recently finished its reproductive cycle. The younger cohorts that have not yet completed their reproductive years show fairly similar age-specific fertility profiles to one another, so it is possible that they may end with completed fertility close to the replacement rate or a bit below. Colombia on the other hand (along with Argentina and Costa Rica, as shown in the Appendix Figure A.4) experienced significant declines that continue deepening in recent cohorts. Unlike Mexico, in these countries younger cohorts show both delay in having children and lower cumulative fertility at each age, suggesting their transition to below-replacement fertility is both sustained and deepening.

Among high-TFR countries, older cohorts have completed fertility rates above replacement —between 2.5 and 3 in several countries—but the decline in completed fertility has been sustained and substantial. Completed fertility in El Salvador, for example, decreased from above 4 to close to 2.5 for the cohort that most recently finished its reproductive cycle (1979–1983), and younger cohorts continue to diverge from the life-cycle pattern of previous cohorts, though with some variation as Nicaragua and Paraguay show greater convergence. In sum, the regularity of decline across cohorts in all LAC countries indicates that fertility reduction has been gradual but pronounced rather than the behavior of only the most recent cohorts. The US is an exception insofar as fertility was already low for the oldest cohort, younger cohorts actually had higher completed fertility, and only the most recent cohorts appear to be likely to attain significantly lower completed fertility.

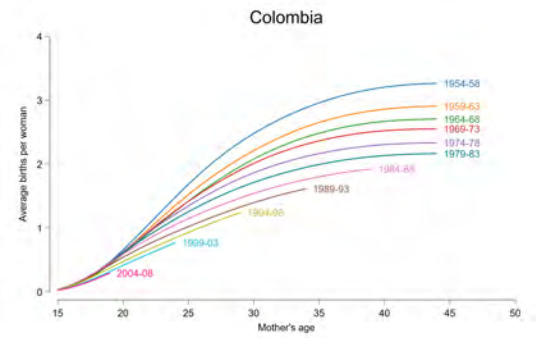
Figure 9: Age-Specific Fertility by Cohort

(a) Low TFR

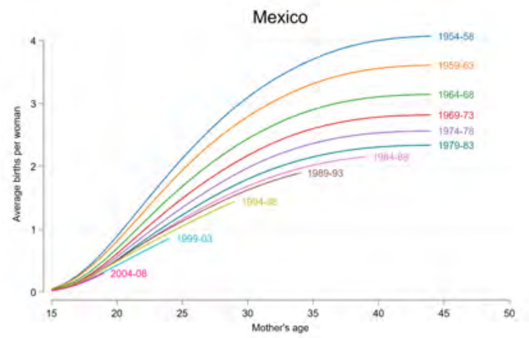




(b) Middle TFR

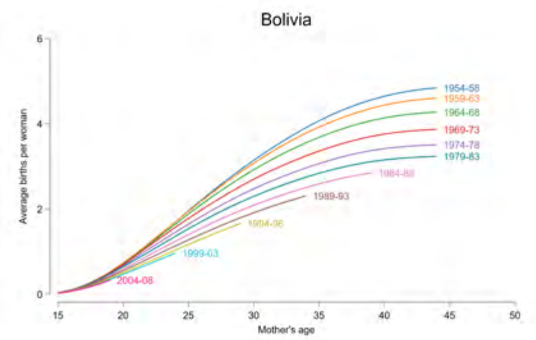


Colombia

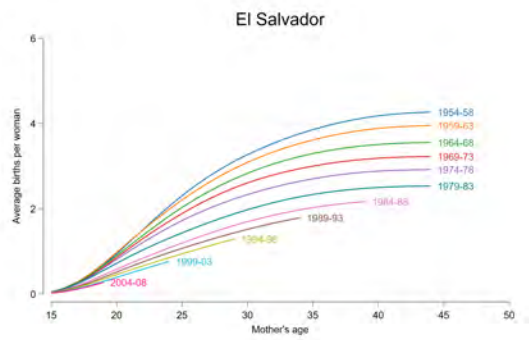


Mexico

(c) High TFR



Bolivia



El Salvador

Note: For each country and five-year birth cohort from 1954–1958 to 2004–2008, the figures report the cumulative average number of children a woman has had by each age. Age-specific birth rates are computed as the ratio of births to the female population at each age. Cumulative fertility profiles are constructed by summing age-specific birth rates across ages. *Source:* Authors' calculations based on UN World Population Prospects.

4.2 Education and Completed Fertility

The cohort profiles in the previous section showed a sustained decline in the number of live children ever born across successive cohorts in every Latin American country. In this section, we focus on completed fertility and its relationship with education for two reference cohorts born twenty years apart: women born in the years 1954-58 and those born in 1974-78. Unlike in the preceding section, which relied on WPP data, here we use Census microdata for the Latin American countries and the June CPS for the United States to obtain information on maternal education since the WPP does not provide fertility measures disaggregated by mothers' educational attainment.[26] We verified consistency across data sources by comparing completed fertility for the same cohorts at the same observed ages in the WPP and the Census microdata without conditioning on education. The estimates align closely.

We measure completed fertility using self-reported lifetime fertility from Census questions on children ever born reported by women ages 40–44 unless the absence of a Census requires us to use older ages for the same cohort – up to age 54– as a result of the timing of the last available Census.[27] Given the time period we analyze, instead of using the same three education categories as before, we further subdivide the least educated category into less than primary completed and primary +, where the latter includes all individuals who have completed primary education but did not graduate from high school. Our LAC analysis here is unfortunately limited to Argentina, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, and Uruguay. This restriction stems from the two-cohort analysis which requires at least one Census 2017 or later and one earlier Census from the 2000s.

Figure 13 shows the evolution of completed fertility using the Census datasets. In accordance with our observations in the prior section using WPP data, there is a marked decrease in completed fertility over time for all LAC countries but slightly rising completed fertility in the US. Between the cohort born in the mid 1940s and the one born in the mid or late 1970s, completed fertility fell by around one child in Chile, Uruguay, and Ecuador, and by more than 2.5 children in the remaining countries (with a more modest decline in Argentina). In the United States, changes are modest and even become slightly positive for the youngest cohorts. High-TFR countries start from very large average family sizes and converge toward values that remain above replacement. Low- and middle-TFR countries start from clearly above-replacement levels. The former end with completed fertility levels close to, or even below, replacement (as in the case of Uruguay). Interestingly, the completed fertility levels of middle and low-TFR countries are all very similar by the time of the last cohort.

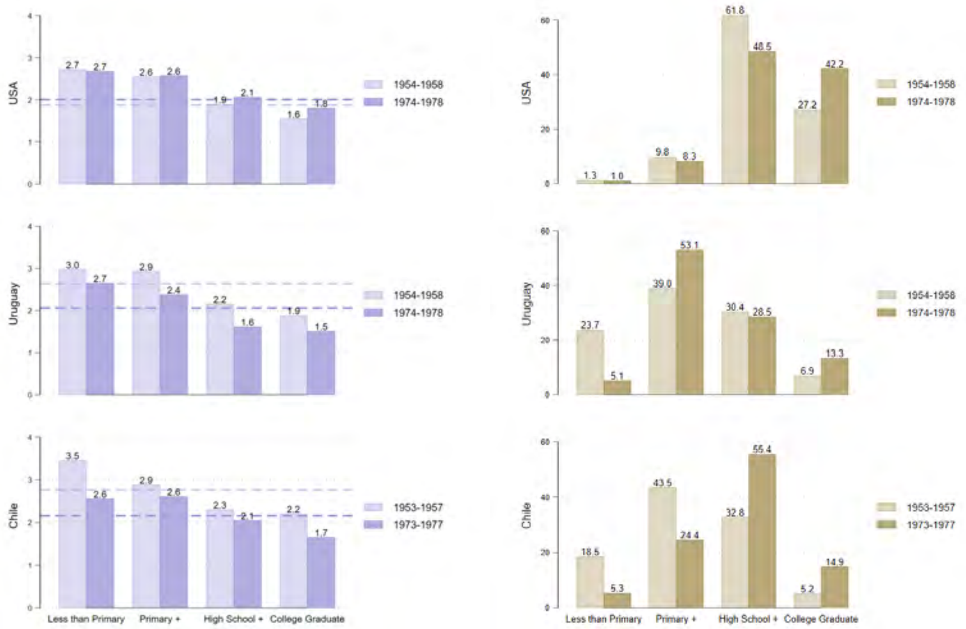
[26] We study the 1974-78 rather than the more recent 1981-85 cohort in order to preserve comparability since some countries most recent publicly available Census is 2017 or 2018 (e.g., Peru and Colombia). Appendix Table B.4 provides detailed information on Census years and the ages at which each cohort is observed in each country.

[27] See Appendix Section B7 for details.

Figure 10: Education-Specific Completed Fertility and Population Structure by Cohort

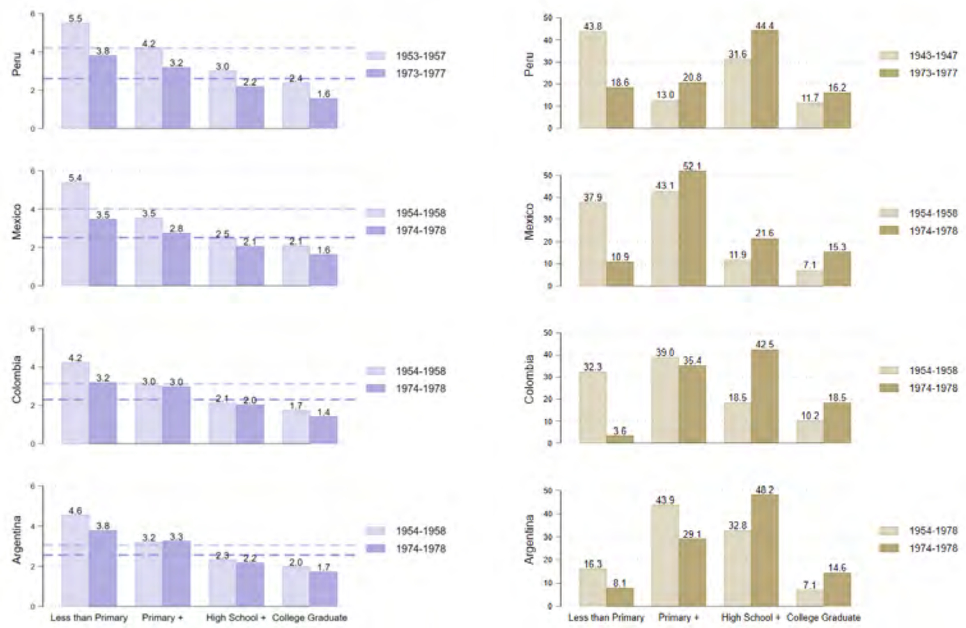
(a) Low TFR

Completed Fertility | Population Share



(b) Middle TFR

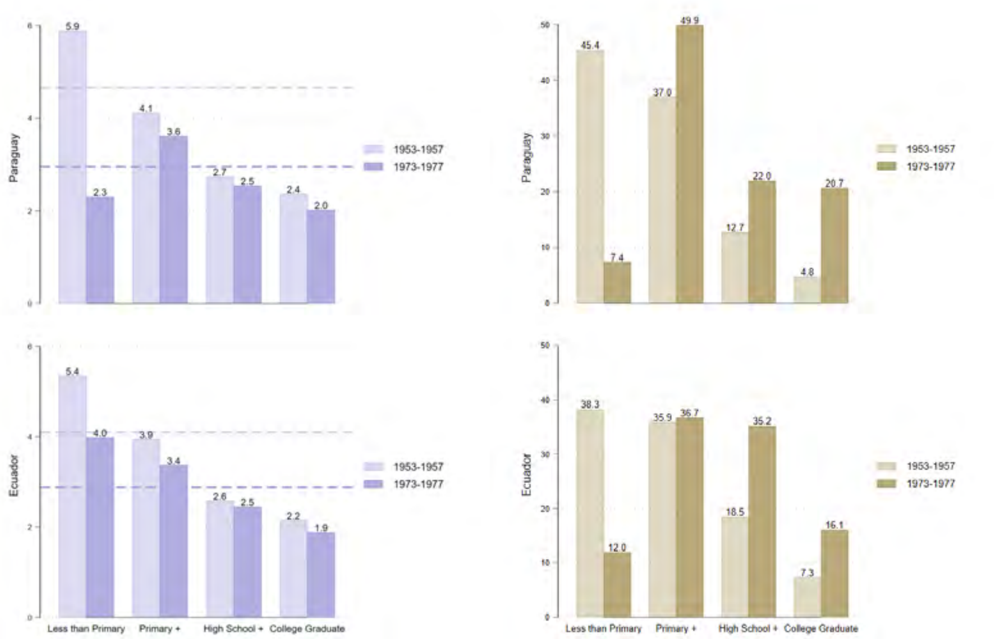
Completed Fertility | Population Share



(c) High TFR

Completed Fertility

Population Share



Note: The left-hand panels show education-specific completed fertility for low, middle, and high TFR countries, respectively. The right-hand panels show the corresponding population shares of women in cohort population. Education is grouped into four categories: less than primary graduate, primary graduate without high school graduate, high school graduate without a college degree, and college graduate. Lighter bars correspond to cohorts of women born between 1954–1958 or 1953–1957 (depending on data availability), whereas darker bars correspond to cohorts born between 1974–1978 or 1973–1977. Dashed horizontal lines represent completed fertility for the cohort (not conditioning on education), with the lighter line for the older cohort and the darker line for the younger cohort. *Source:* Authors' calculations based on National Censuses obtained from IPUMS, REDATAM, or processed directly from Census microdata. See Appendix Section B7 for details on data sources, Census years, and the ages of each cohort at the time completed fertility is calculated.

We now turn to our main focus of our completed fertility analysis by education: the 1954–58 and 1974–78 cohorts.[28] Figure 10 compares, by level of education, completed fertility and population share for the two cohorts. Across all countries, completed fertility fell in every education group, but the size of the decrease varies systematically with education. In high- and middle-TFR countries, women with lower levels of education experience the largest absolute reductions in completed fertility. For example, women with less than completed primary saw decreases of around 2 children in Peru and Mexico and by one child in Colombia. Women with completed secondary and tertiary education also reduced their completed fertility but by relatively little. They were already having barely 2 children (with the exception of Peru and both high-TFR countries). Paraguay saw a very large decrease of over 3.5 children for the population with less than primary education.

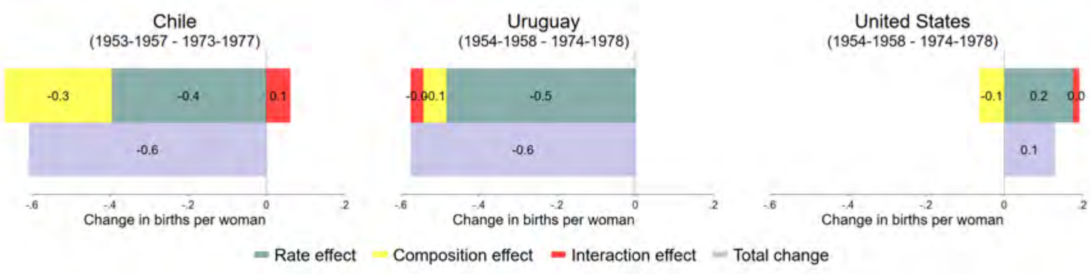
[28]Cohort definitions vary slightly depending on data availability, which in turn depends on the Census year in each country: the older cohort corresponds to women born between 1954–1958 or 1953–1957; the younger cohort corresponds to those born between 1974–1978 or 1973–1977.

The educational composition of the female population changed dramatically over these two cohorts: the share of women with less than primary decreased sharply in every country (e.g., in Paraguay it fell from around 45% of the population to around 7%) and in Colombia and especially in Chile and Argentina, the share with primary + did as well. The shares of women with secondary and especially tertiary education expanded everywhere. Interestingly, although Uruguay's population is significantly less educated than Chile's, the completed fertility at each education level other than less than primary is lower for both cohorts. The US is an exception to the patterns above. Although education levels increased there as well, with all but college graduates decreasing their share, the completed fertility of individuals without a high school education barely budged. These individuals, however, account for 9-10% of the population. The completed fertility of both high school and college graduates, on the other hand, actually increased – a very different pattern from all the LAC countries.

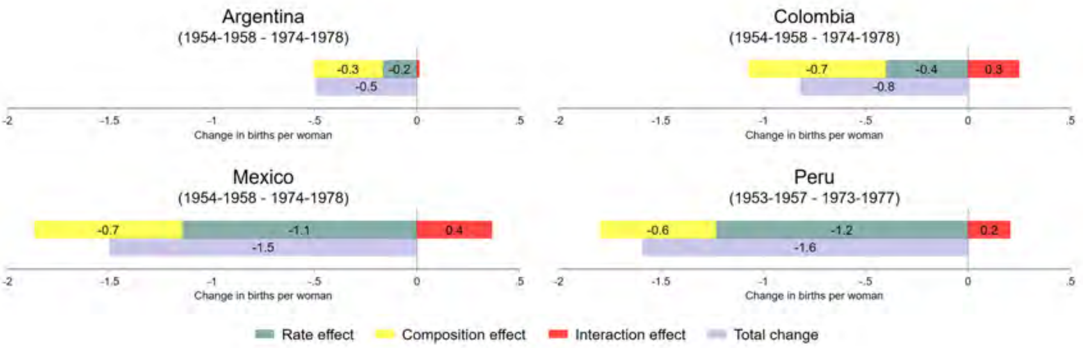
We next turn to quantifying for each country the importance of the change in the educational composition of the female population versus the change in the fertility behavior of each education group in accounting for the change in completed fertility over these two cohorts. As before, we use equation 1, where the groups are given by the 4 levels of education. As shown in Figure 11, the rate effect is generally the most important factor: lower completed fertility within education groups accounts for most of the decline completed fertility between the two cohorts in every country except Ecuador and Argentina. In most Latin American countries, the composition effect also matters and reinforces this pattern, as higher levels of education are associated with lower completed fertility. This mechanism plays an especially strong role in countries that combined rapid gains in secondary and tertiary education—such as Chile and Colombia—with a clear negative gradient between education and fertility. The interaction term remains small but typically works to increase fertility (with the exception of Uruguay): education categories that shrank markedly in size also reduced their fertility sharply, which dampened the drop in aggregate births that would have arisen had these groups kept their initial population weight.

Figure 11: Education Group Decomposition of the Change in Completed Fertility

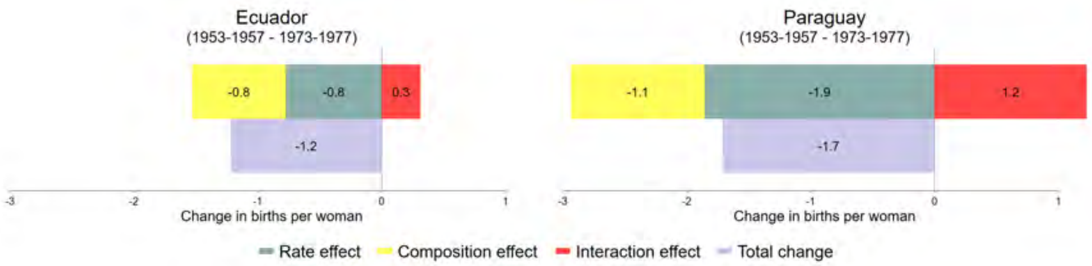
(a) Low TFR



(b) Middle TFR



(c) High TFR



Note: The components (rate, composition, and interaction effects) refer to the decomposition of the change in completed fertility between the cohort of women born in 1954–1958 or 1953–1957 (depending on data availability) and the cohort born between 1974–1978 or 1973–1977, as shown in equation 1, using four education groups: less than primary graduate, primary graduate without high school graduate, high school graduate without a college degree, and college graduate. The total change in completed fertility (shown in purple) is decomposed into a rate effect (changes in group-specific completed fertility shown in green), a composition effect (shifts in the population distribution across education groups shown in yellow), and an interaction effect (the interacted effect of both changes shown in red). *Source:* Authors' calculations based on National Censuses obtained from IPUMS, REDATAM, or processed directly from Census microdata. See Appendix Section B7 for details on data sources, Census years, and the ages of each cohort at the time completed fertility is calculated.

The United States stands out as a very different case. As seen previously, completed fertility rose noticeably between the two cohorts among more educated women (those with secondary and especially college education) and changed little among less educated women, who already represented a very small share of the population. This pattern generates a significant positive rate effect that raised the completed fertility of the younger cohort. At the same time, educational attainment increased, thereby lowering completed fertility and generating a negative composition effect. Overall, the composition effect did not offset the strong increase in fertility among more educated women, so completed fertility ends up slightly higher for the more recent cohort.

Figure 12 presents, for each country, heat maps of each education group's contribution to the total change in completed fertility between the two cohorts. Among low-TFR countries, women with high school + in Chile (Figure 12) and women with primary + in Uruguay account for most of the decline. These groups combine large and rising population shares with sharp fertility reductions, so both the rate and interaction effects work to decrease aggregate completed fertility. In Chile, they also generate a sizable composition effect, as their initial completed fertility already was well below the country average. In the United States, the small increase in completed fertility (around 0.1 births per woman) comes from more educated women: those with high school + account for 62% of the increase and college graduates for 46%. The two lowest education groups together contribute to decreasing completed fertility but their combined effect is less than 9%.

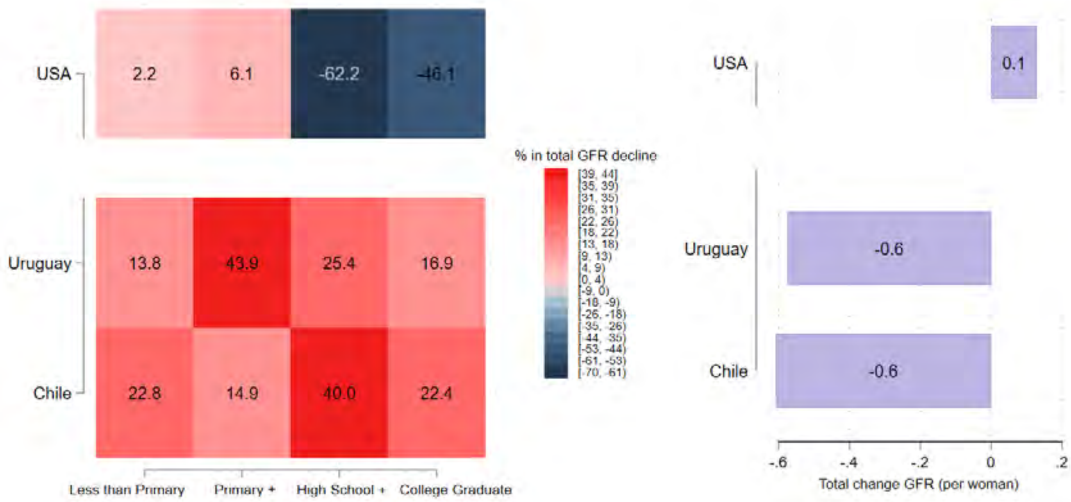
In middle-TFR countries, the decline in completed fertility is due mainly to women with less than primary school education, who transition across cohorts from being a large share with high completed fertility, to a much smaller and lower completed fertility in the younger cohort. Women with secondary + education also play a quantitatively significant role mostly through the composition channel as they already have below-average completed fertility and their share rises sharply.

Lastly, in the high-TFR countries, women with less than primary complete education drive most of the change: their population share drops steeply and their fertility falls as well, generating a large negative contribution to overall completed fertility.

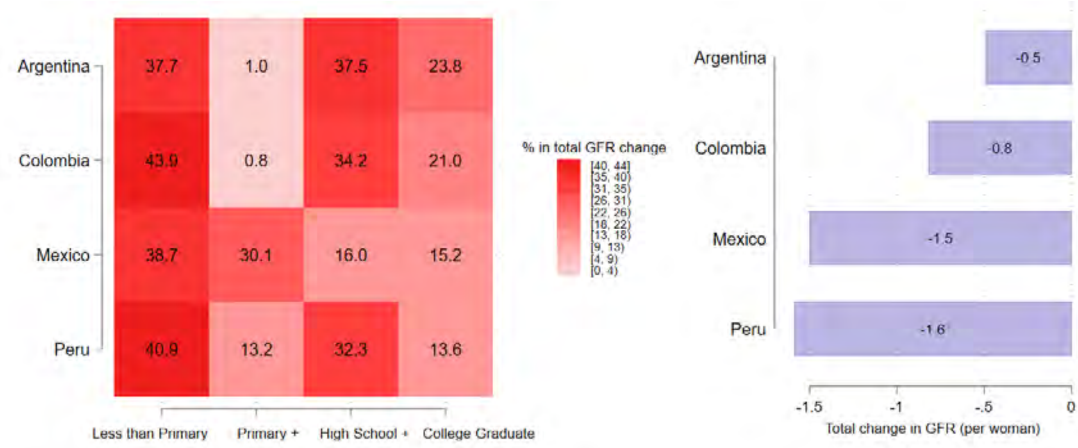
Taken together, the cohort evidence confirms that the change in fertility in Latin America differs from that in the United States for these cohorts and reflects, on the one hand, a broad reduction in realized family size across all education levels and, for several countries in the middle or high TFR groups, from a significant increase in educational attainment.

Figure 12: Contribution by Education Group to the Decline in Completed Fertility

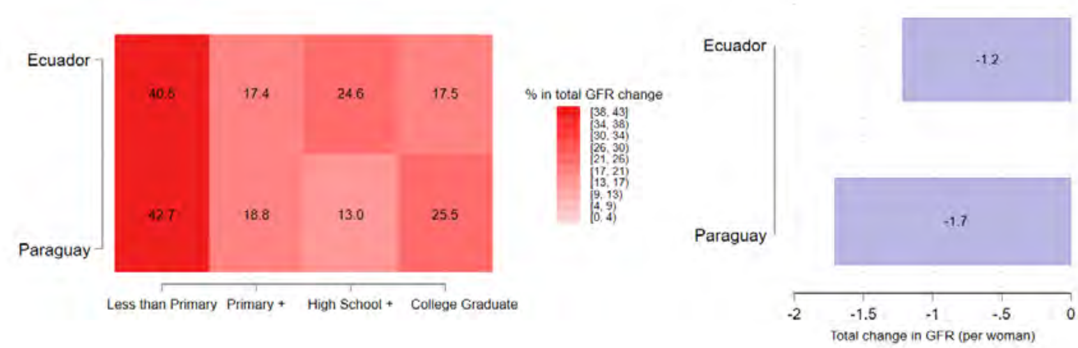
(a) Low TFR



(b) Middle TFR



(c) High TFR



Note: The percentage represents each education group's contribution to the decline in completed fertility across the two cohorts (1954–1958 or 1953–1957 and either 1974–1978 or 1973–1977), based on the sum of its components (birth rate, composition, and interaction effects). Education is grouped into four categories: less than primary graduate, primary graduate without high school graduate, high school graduate without a college degree, and college graduate. The total change is calculated over all women in the cohort. Positive values indicate education groups contributing to decreasing completed fertility whereas negative values correspond to groups moving completed fertility in the opposite direction. Countries are ordered by the absolute value of the change in their birth rate (moving upward on the vertical axis corresponds to a larger reduction in completed fertility between cohorts). Intervals are defined by dividing the range of contributions to the decline in completed fertility into 10 equal-sized intervals; the same interval width is then applied to the range of contributions to the increase in completed (in panel (a), twice this interval width is used in order to avoid an excessive number of groups). *Source:* Authors' calculations based on National Censuses obtained from IPUMS, REDATAM, or processed directly from Census microdata. See Appendix Section B7 for details on data sources, Census years, and the ages of each cohort at the time completed fertility is calculated.

4.3 The Change in Completed Fertility: Parity and Childlessness

The previous section documented substantial declines in completed fertility across Latin American countries, with most of them declining to levels close to replacement by the 1974–78 cohort and with younger cohorts showing evidence of further declines in the future. While these aggregate measures provide a clear picture of the overall fertility decline, they mask important heterogeneity in the underlying distribution of family sizes. For example, a woman who has fewer children and a woman who remains childless both contribute to a lower level of completed fertility, but understanding the mechanisms or thinking about how policies may affect population growth may require distinguishing between these two.

Recent research on the decline in fertility in several high-income countries shows that both margins—childlessness and family size among mothers—contribute meaningfully to falling birth rates, with their relative importance varying across contexts. Geruso and Spears (2025) examine the contribution of childlessness versus lower average completed fertility among mothers for 19 countries over two cohorts (similar to ours) using the Human Fertility Database. They find that on average 38% of the change was accounted for by increasing childlessness. In high-fertility settings, the fertility decline often begins with reductions in very large families as contraceptive access expands, child labor declines, and desired family size falls. In contrast, low-fertility contexts may experience rising childlessness alongside further declines in family size among those who become mothers. These patterns matter because rising childlessness may reflect changing preferences regarding parenthood, changes in partnership formation, or gender gaps in attitudes towards sharing childcare responsibilities, whereas reductions in higher-order births among mothers may relate more to the direct and indirect costs of child rearing, access to family planning, and norms about optimal family size.[29] For Latin America, where the fertility decline occurred more rapidly and from higher baseline levels than in many developed economies, the role of each margin remains an important empirical question.

We start by examining changes in the distribution of completed parity—defined as the total number of children a woman has at the end of her reproductive years.[30] The right-hand panels of Figure 13 present the distribution of completed fertility for each country, showing the share of women with zero, one, two, three, and four or more children at the end of their reproductive lives starting with cohorts born in the 1940s and ending with cohorts born in the mid 1970s.

Several patterns emerge clearly from the graphs. First, in all countries the modal parity decreases, with the two-child family becoming the most common outcome. In the low-TFR Latin American countries (Chile and Uruguay), there is a sharp increase in the share of women with two children and, to a lesser extent, with one child, together with a very sharp decline in the share with four or more children. Perhaps contrary to prior

[29] Of course, both childlessness and parity may be affected by similar forces as well.

[30] See Pardo et al. (2025) for a decomposition analysis for several countries of the contribution of changes in the parity distribution to period fertility.

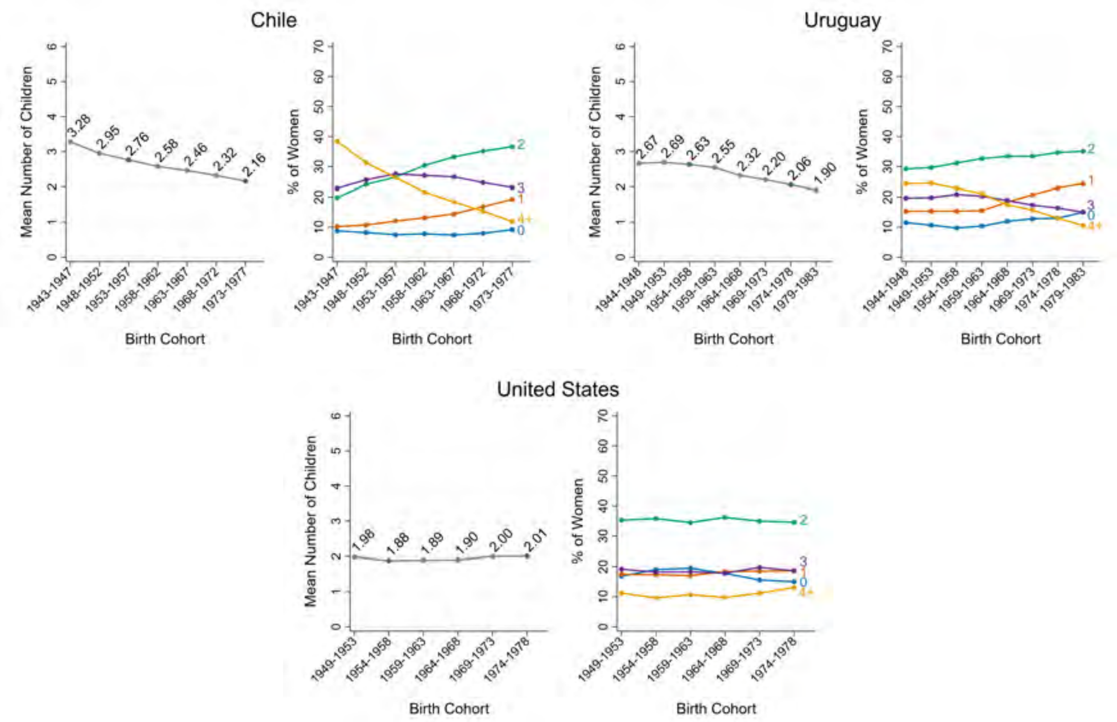
expectations, the increase in childlessness is small in absolute value (though often large as a percentage increase over the prior value). Uruguay has the largest increase from about 11.5% to roughly 15%. In the United States the picture is very different: parity patterns remain remarkably stable across all cohorts, with a slight decrease in the proportion with no children and an increase in those with four or more children.

In the middle-TFR group there is greater heterogeneity. Mexico, Colombia, and Peru show striking declines in the share of women with four or more children, similar to the low TFR group, whereas Argentina already starts with a lower share of 4+ parity which continues to decline slowly, remaining substantially above the 4+ share in the low-TFR countries. In these middle-TFR countries the share of childless women remains low, at around 10%. A similar pattern is also present for the high-TFR countries (Ecuador and Paraguay) which saw large drops in the share of 4+ parity and transitioned to two children as the modal outcome a bit later than the other countries (but rather similar to the experience in Mexico).

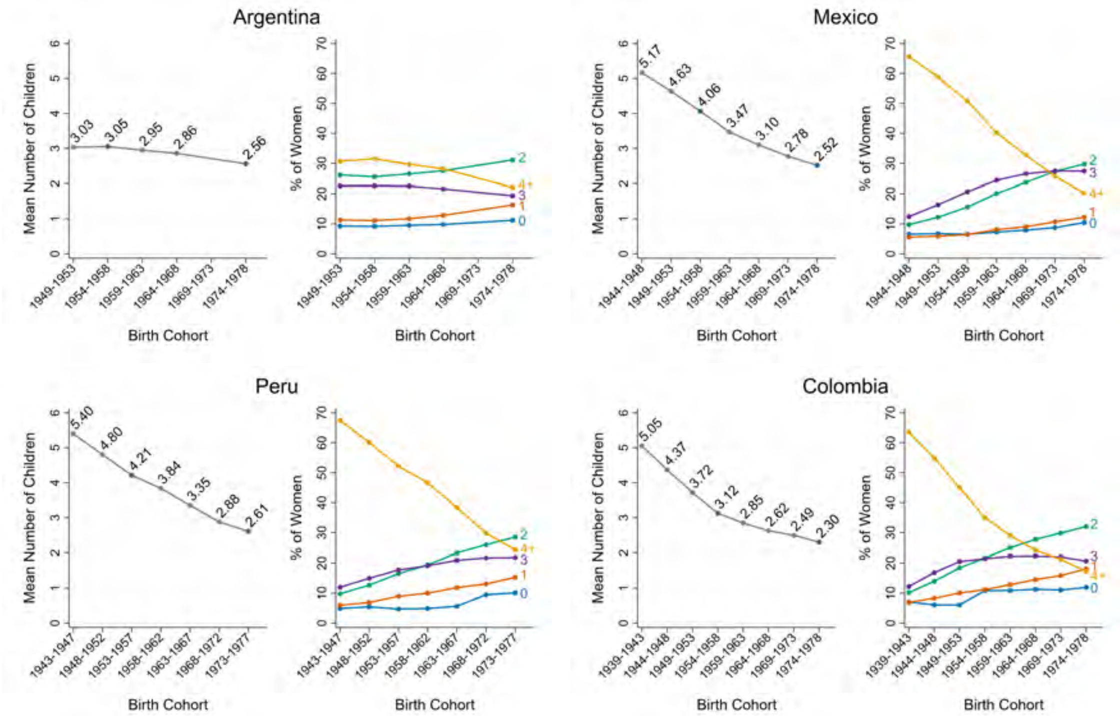
Overall, the parity analysis shows that Latin America's fertility decline reflects a broad transformation in family size across the distribution. The widespread shift away from large families, the emergence of a two-child norm, and only modest increases in childlessness jointly contribute to lower completed fertility.

Figure 13: Completed Fertility and Completed Parity by Cohort

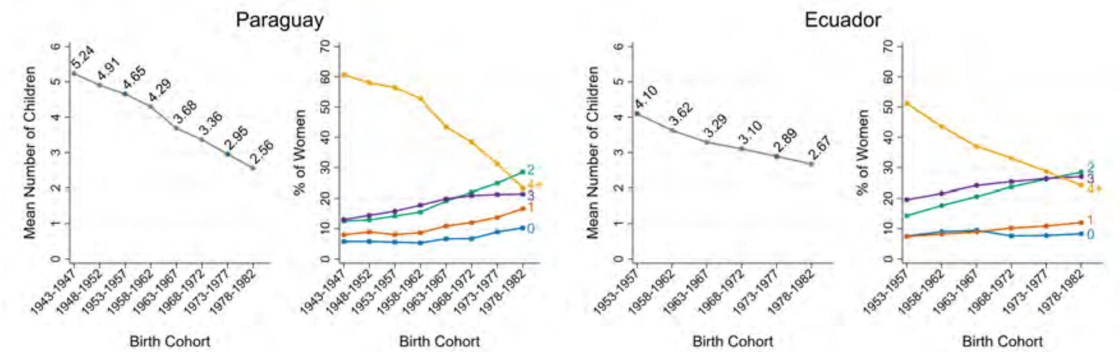
(a) Low TFR



(b) Middle TFR



(c) High TFR



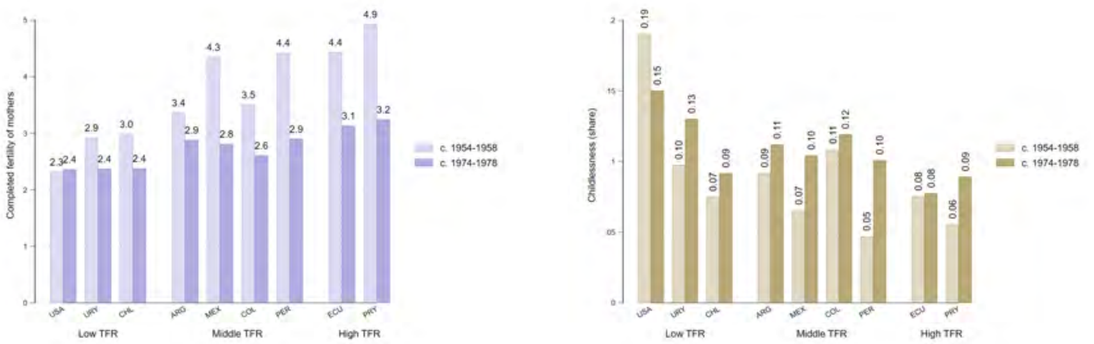
Note: Within each panel, the left-hand side figure shows completed fertility for the cohort on the x axis; the right-hand side figure shows the percentage of women at each parity level (0, 1, 2, 3, and 4+ children). Data points for completed fertility are labeled with the corresponding value. The points in blue are the completed fertility levels of the two cohorts that we analyze in depth. *Source:* Authors' calculations based on National Censuses obtained from IPUMS, REDATAM, or processed directly from Census microdata. See Appendix Section B7 for details on data sources, Census years, and cohort ages at the time completed fertility is measured.

We can also examine more formally the quantitative importance of childlessness to completed fertility by decomposing the change across the two cohorts of interest into components attributable to rising childlessness and to declining fertility among mothers. For this, we again make use of equation 1, where the groups are now defined as only two: mothers versus non-mothers. The completed fertility rate of the former is changing over time whereas that of the latter, by definition, remains zero. Hence the decomposition will pick up the changing shares of these two groups and the changing fertility rates of mothers.

Before turning to the decomposition results, it is useful to examine how the underlying components evolved over our two cohorts. Figure 14 documents how both completed fertility among mothers and the share of mothers changed across cohorts for each country in our sample. Panel (a) shows that completed fertility among mothers declined substantially in all LAC countries – by approximately 0.5 children in Uruguay, Chile, and Argentina, and by around 1.5 children in Mexico, Peru, Ecuador, and Paraguay – whereas the United States experienced a modest increase of 0.1 children. This pattern confirms that, even among women who became mothers, there has been a widespread shift toward smaller family sizes throughout Latin America. Panel (b) shows that the share of non-mothers increased in most LAC countries by 2–3 percentage points. Peru saw an exceptionally high increase of 5 percentage points whereas Ecuador and Colombia saw a small increase of less than 1 percentage point. The United States is distinguished by the large share of childless women in the earlier cohort (19 percent), which fell by around 4 percentage points for the mid 1970s cohort. This leaves it still higher, but much closer, to the shares of childless women in the region. The more modest declines in the share of mothers across LAC, particularly when compared to the substantial declines in fertility among mothers, already suggests that the intensive margin will dominate in the decomposition.

Figure 14: Completed Fertility and Childlessness, by Cohort

(a) Completed Fertility for Mothers (b) Population Share

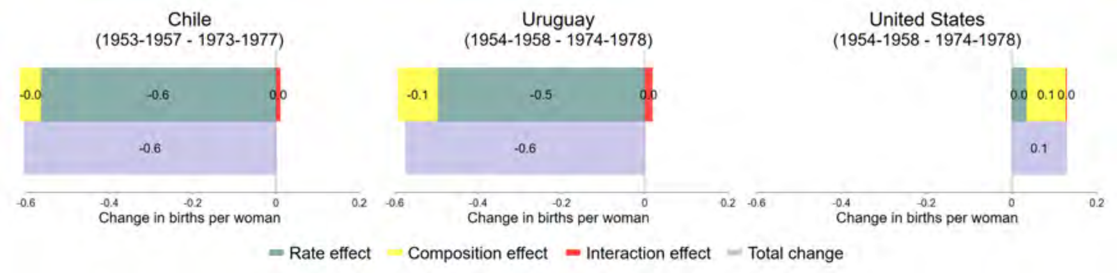


Note: The left-hand panel shows cohort-specific completed fertility for Low, Middle, and High TFR countries. The right-hand panel shows the population shares of childless women in each cohort. Lighter bars correspond to cohorts of women born in 1954–1958 or 1953–1957 (depending on data availability), while darker bars correspond to cohorts born between 1974–1978 or 1973–1977, respectively. *Source:* Authors' calculations based on National Censuses obtained from IPUMS, REDATAM, or processed directly from Census microdata. See Appendix Section B7 for details on data sources, Census years, and the ages of each cohort at the time completed fertility is calculated.

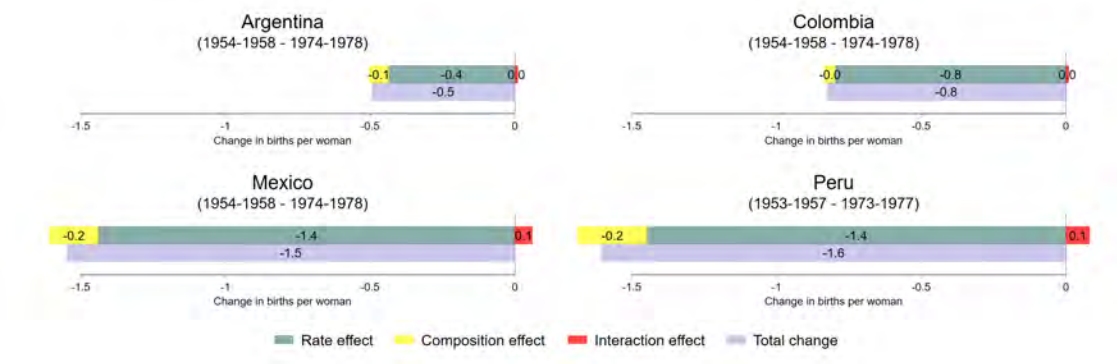
Figure 15 presents the decomposition results for the countries in our sample. The pattern is clear and consistent across LAC: the rate effect dominates in every country. Declining fertility among mothers accounts for around 87 to 99% of the total decline in completed fertility Latin American countries. Rising childlessness (the composition effect) contributes between 0.8 to 17%, and the interaction effect is fairly small everywhere. This pattern contrasts sharply with the United States, where there was a modest increase in completed fertility between the two cohorts, driven primarily by decreasing childlessness (the composition effect accounts for 72%).

Figure 15: Childlessness Decomposition of the Change in Completed Fertility Across Two Cohorts

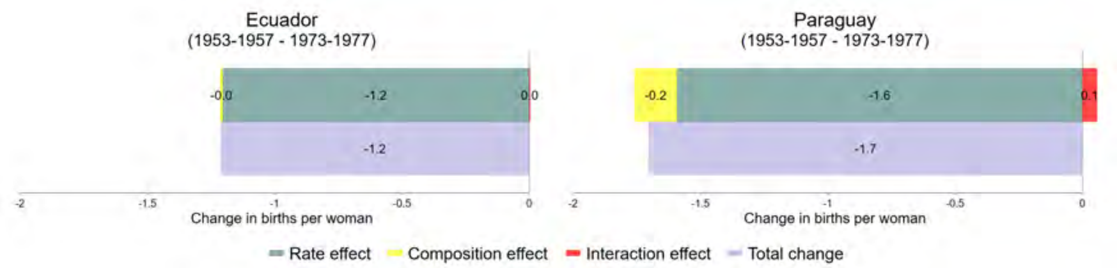
(a) Low TFR



(b) Middle TFR



(c) High TFR



Note: The components (rate, composition, and interaction effects) refer to the decomposition of the change in completed fertility between the cohort of women born in 1954–1958 or 1953–1957 (depending on data availability) and the cohort born between 1974–1978 or 1973–1977, as shown in equation 1, using two groups: women without children and women with children. The total change in completed fertility (shown in purple) is decomposed into a rate effect (changes in group-specific completed fertility shown in green), a composition effect (shifts in the population distribution across fertility groups shown in yellow), and an interaction effect (the interacted effect of both changes shown in red) *Source:* Authors' calculations based on National Censuses obtained from IPUMS, REDATAM, or processed directly from Census microdata. See Appendix Section B7 for details on data sources, Census years, and the ages of each cohort at the time completed fertility is calculated.

The dominance of the rate effect in Latin America has important implications. It shows that the region's lower completed fertility has been driven primarily by behavioral changes among women who do become mothers –specifically, the shift away from large families toward smaller family sizes documented in the parity analysis. Rising childlessness has played a secondary role, reinforcing the decline but not driving it. This pattern is consistent with the potential drivers of this change being a combination of improved access to contraception, declining desired family size, and potentially the increased time and financial costs associated with children, all operating primarily on the intensive margin, rather than with a desire or need to opt out of having children altogether.

5 Correlates of Fertility in LAC

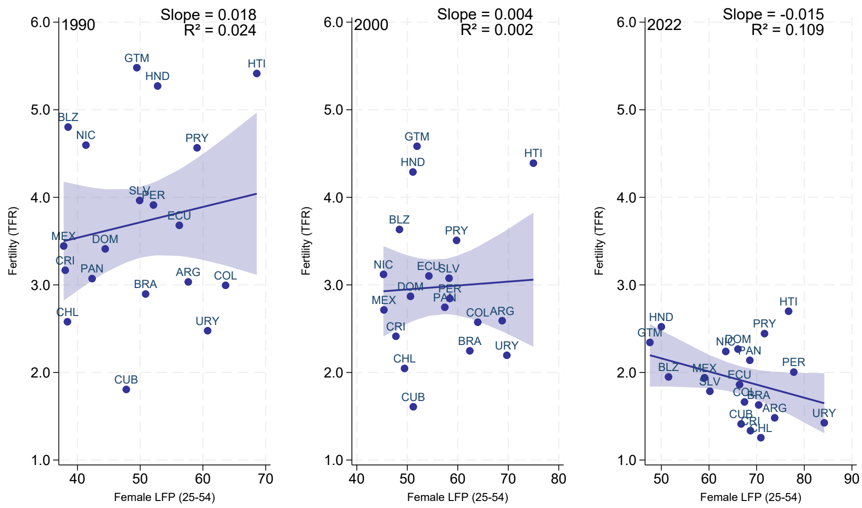
Although this paper does not aim to establish causal relationships, examining how fertility correlates with key economic and social indicators can provide useful context for understanding the region's demographic transformation. We focus on three dimensions: female labor force participation (FLFP), GDP per capita, and gender role attitudes. Figures 16-18 present cross-country correlations for Latin America and the Caribbean.

The relationship between FLFP and fertility in Latin America (Figure 16) differs from patterns documented in other countries. Doepke et al. (2023) show that across OECD economies this correlation switched from negative in 1980 (around -0.5, according to them) to positive in 1990 (around 0.75) remaining positive but lower thereafter. Kearney and Levine (2025) find that by 2023 the relationship between the two variables across the same group of countries is essentially zero (0.06). In contrast, as we show in Figure 16a, Latin America exhibits consistently weak correlations throughout the entire time period. As seen in the figure, the contemporaneous relationship between female LFP for women age 25-54 and the TFR was essentially zero in 1990 and 2000 and turned slightly negative by 2022.[31] Figure 16b, which shows the cross-country correlation between female LFP and the TFR in the same year confirms this pattern year-by-year from 1990 to 2023, revealing a shift from weakly positive correlations in the 1990s to consistently weak negative correlations from 2005 onward. This suggests that women's greater engagement with market work is not directly driving the fertility decline.

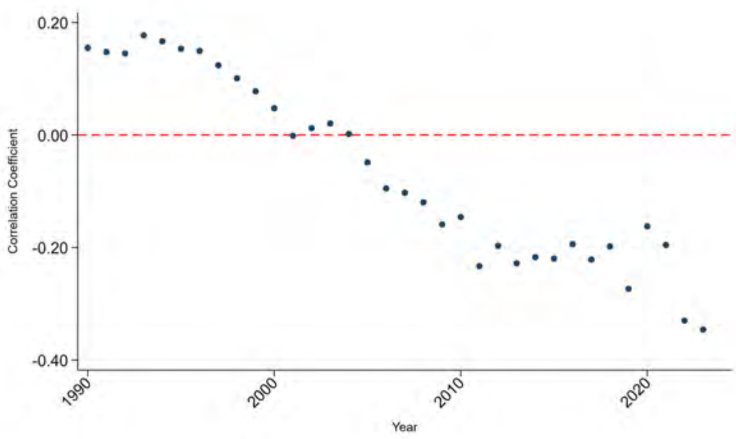
[31] The sample in Figures 16 and 17 includes the 21 countries analyzed in Section 3: Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

Figure 16: Female Labor Force Participation and Total Fertility Rate across LAC countries

(a) TFR and FLFP in 1990, 2000, and 2022



(b) Correlation between FLFP and TFR (1990-2023)

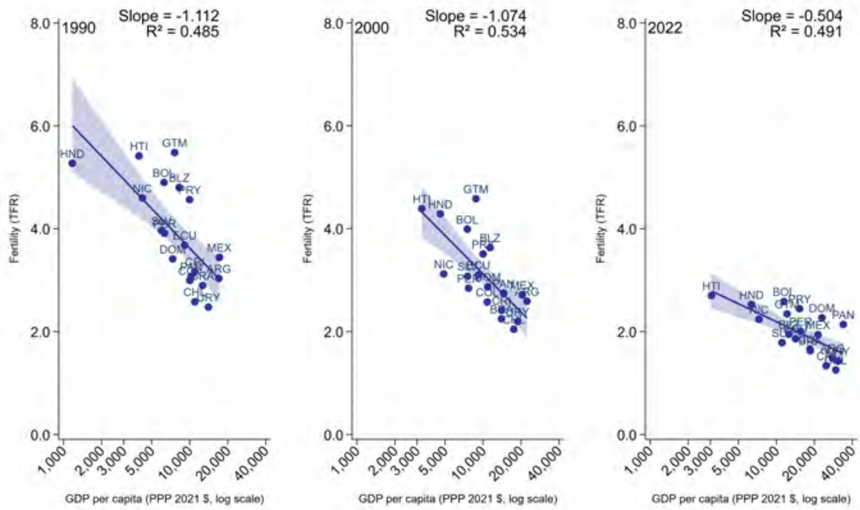


Note: Panel (a) plots TFR against contemporaneous FLFP for the 25–54 age group in 1990, 2000, and 2022. Each figure includes a linear regression line (solid blue line) with 90% confidence intervals shown as shaded areas. Panel (b) displays the year-by-year correlation coefficient between FLFP for women aged 25–54 and TFR across Latin American and Caribbean countries from 1990 to 2023. Each point represents the cross-country correlation in a given year. The red dashed horizontal line at zero provides a reference. The sample includes 21 countries: Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela. Country labels use ISO three-letter codes. *Source:* Authors' calculations based on female labor force participation rates from ILOSTAT Labour Force Statistics and TFRs from the World Bank World Development Indicators.

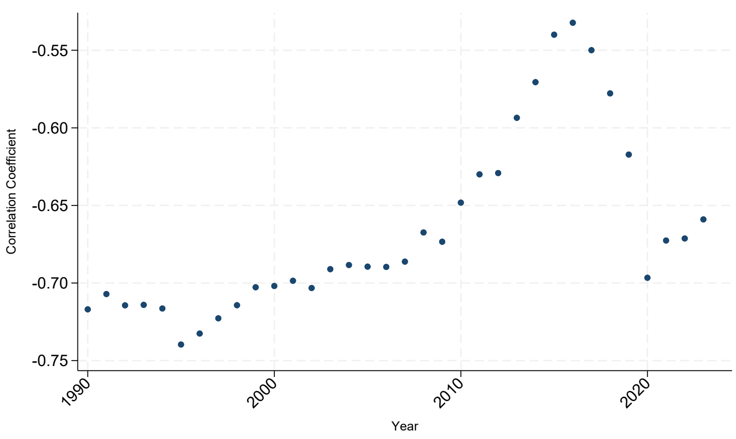
Economic development, on the other hand, shows a substantially stronger association with fertility. Figure 17a documents a robust negative correlation between per capita GDP and contemporaneous TFR at all three time points (1990, 2000, and 2022), though both the slope (and R^2) decline over time: from -1.092 in 1990, to -0.913 in 2000, and to -0.428 in 2022. Figure 17b confirms this relationship persists throughout 1990-2023, with cross-country correlations consistently between -0.5 and -0.7. The declining absolute correlation strength reflects compression in fertility rates as lower-income countries experienced rapid declines in the latter – the range in TFR narrowed from roughly 1.8 to 5.48 in 1990 to a range of 1.26 and 2.7 in 2022 – whereas income disparities remained large. Interestingly, however, the correlation differs from those in OECD countries. Doepke et al. (2023) find a negative correlation in 1980 but a positive correlation of around 0.4 starting in the 1990s.[32]

Figure 17: GDP per capita and the Total Fertility Rate pacross LAC Countries

(a) TFR and Log GDP per capita in 1990, 2000, and 2022



(b) Correlation between GDP per capita and TFR (1990–2023)



Note: Panel (a) plots TFR against contemporaneous Log GDP per capita (PPP, constant 2021 international dollars) in 1990, 2000, and 2022. Each figure includes a linear regression line (solid blue line) of the TFR on the logarithm of GDP per capita, with 90% confidence intervals shown as shaded areas. Panel (b) displays the year-by-year correlation coefficient between GDP per capita and TFR across Latin American and Caribbean countries from 1990 to 2023. Each point represents the cross-country correlation in a given year. Country labels use ISO three-letter codes. Countries included are the same as in Figure 16. *Source:* Authors' calculations based on GDP per capita data and total fertility rates from the World Bank World Development Indicators.

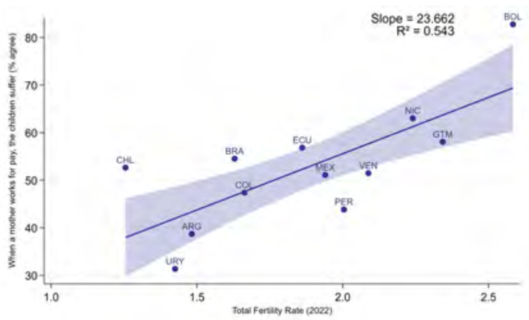
Lastly, to complement these economic indicators, we examine the correlation between

[32] This is an eyeball approximation as the exact numbers are not given.

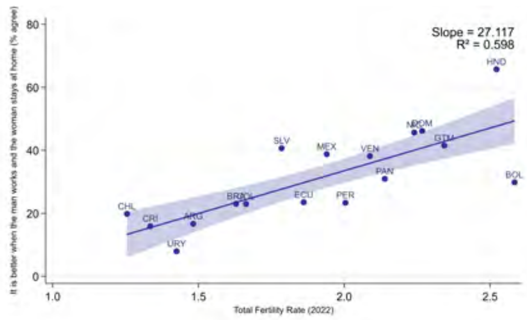
fertility and gender role attitudes using data from Latinobarometro. We make use of two questions widely used in the gender and culture literature: "When a mother works for pay, the children suffer" and "It is better when the man works and the woman stays at home". Answers to this question can be "strongly agree," "agree," "disagree," and "strongly disagree". Figure 18 graphs the relation between the fraction of individuals that respond "strongly agree" and "agree" circa 2023 (see figure note) and the TFR in 2022. As can be seen in the figure, there is a strong positive relation between traditional gender norms and fertility rates. The strength of these correlations substantially exceeds those observed for FLFP and is similar to the correlation with per capita GDP. This provides suggestive evidence that cultural change regarding gender roles and not fully captured by income or female labor force participation alone may play an important role in driving declining fertility.[33] Indeed, when we regress the contemporaneous TFR against the natural log of per capita GDP in 2022 controlling for the percent who agree with each statement, per capita GDP loses much of its predictive power, becoming statistically insignificant for the "man works, woman stays home" question whereas this gender norm remain highly significant. See Appendix Table A.1.

Figure 18: Gender Role Attitudes and Total Fertility Rate in Latin America

(a) "When a mother works for pay, the children suffer"



(b) "It is better when the man works and the woman stays at home"



Note: The figures plot total fertility rates against the percentage of respondents agreeing with traditional gender role statements in Latin American countries. Panel (a) shows agreement with "When a mother works for pay, the children suffer" and panel (b) shows agreement with "It is better when the man works and the woman stays at home." Each panel includes a linear regression line (solid blue line) with shaded areas representing 90% confidence intervals calculated using standard errors of the predicted values from the linear regression. Country labels use ISO three-letter codes. Data on gender norms from Latinobarómetro 2023 for panel (a) (except Nicaragua, 2009) and Latinobarómetro 2022 for panel (b) (except Venezuela, 2021). TFR data for 2022 from World Bank World Development Indicators.

[33] Briselli and González (2025) show, using cross-cohort and cross-country data from three years in the European Values Study, that the total fertility rate of a cohort is negatively correlated with the gender gap (women - men) in the share of respondents who think that it is important to share housework in a marriage. The TFR is measured when a 10-year cohort would have been between 26 to 35 years old, Unfortunately, this question has not been asked in the LAC region.

6 Conclusion

The sharp and sustained decline in fertility observed across Latin America over the last several decades places the region squarely among those facing below-replacement fertility, with potentially far-reaching demographic, economic, and social implications. Our analysis shows that this trend is mainly driven by changes in fertility behavior—namely, declines in birth rates within demographic groups— rather than by changes in the population structure as reflected by women's age and education distributions. Decompositions by age, education, and age-education groups reveal that the largest contributors to the decline in period fertility were younger women, particularly those of age 20–29, and especially from women with lower levels of education. While these period fertility patterns document substantial changes in fertility behavior, they do not allow us to determine whether these changes arise from women postponing motherhood or ultimately having fewer children. A cohort perspective based on completed fertility allows us to examine this. Our analysis of completed fertility shows that successive cohorts of Latin American women are not merely delaying births but rather are having fewer children on average. Furthermore, the decomposition analysis shows that declines in completed fertility are driven primarily by reductions in fertility among mothers rather than by rising childlessness. In this respect, Latin American patterns differ markedly from those observed in the United States: while changes in cohort childlessness play the main role in explaining the modest increase in completed fertility in the US between the mid-1950s and mid-1970s cohorts, rising childlessness plays only a limited role in the decline in completed fertility in Latin America, accounting on average for less than 10 percent of the decline.

We complement our analysis by examining a few correlations between fertility, income, female labor force participation, and gender norms. While we think that cultural change towards gender roles has played an important role everywhere, especially given the ease with which new images and ideas can now spread globally, the inherently endogenous nature of these relationships precludes causal interpretation without the aid of model and a clear hypothesis regarding the drivers of the change in social beliefs.[34] Future research could also examine the role of other potential drivers of fertility changes such as demographic changes arising from migration and changes in the ethnic/racial mix of a population, increasing housing prices and urbanization, the greater ease of divorce and the rise of single motherhood, the increase in inequality and its relationship to greater time-investment in children, as well as policies and labor practices that directly impact the cost of raising children ranging from childcare provision, "family-friendly" labor arrangements (e.g. part-time and flexible jobs), and reproductive health services.

[34]For example, changes in technology, policy, or urbanization. See Fernández (2025) for a discussion and a review of the literature in this area.

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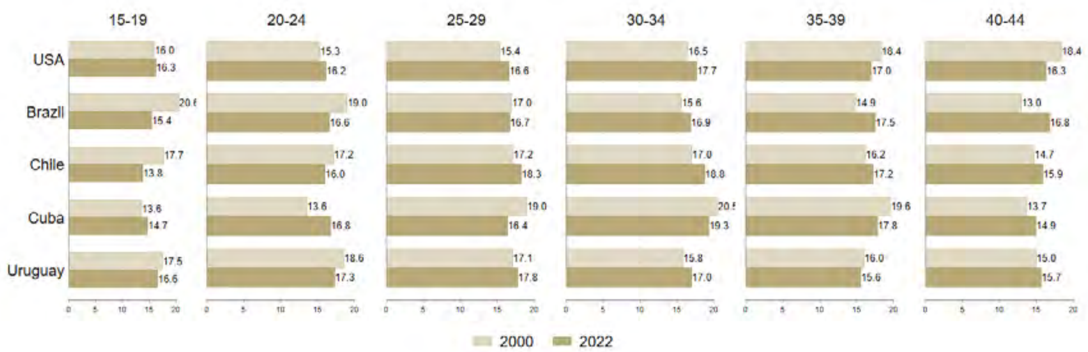
Appendix A. Figures

Figure A.1: Age-Specific Birth Rates and Population Age Structure, 2000–2022

Low TFR

(a) Birth Rates per 1000 Women

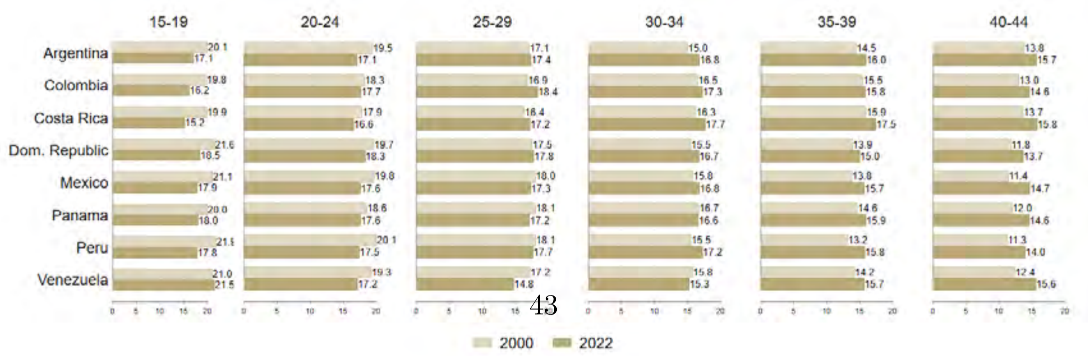
(b) Population Share



Middle TFR

(c) Birth Rates per 1000 Women

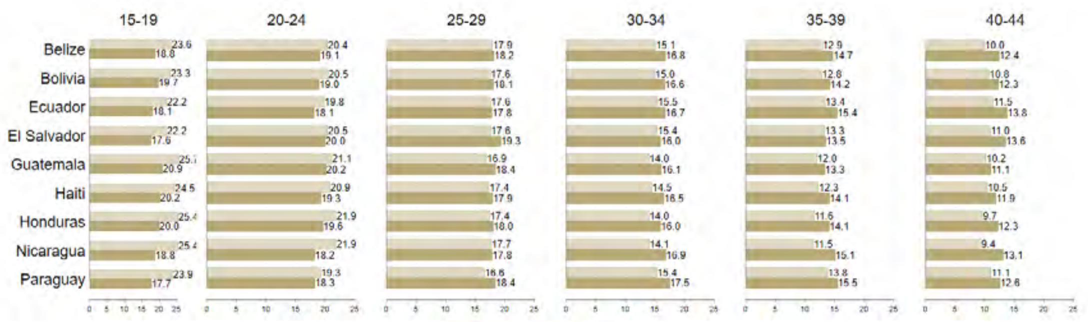
(d) Population Share



High TFR

(e) Birth Rates per 1000 Women

(f) Population Share

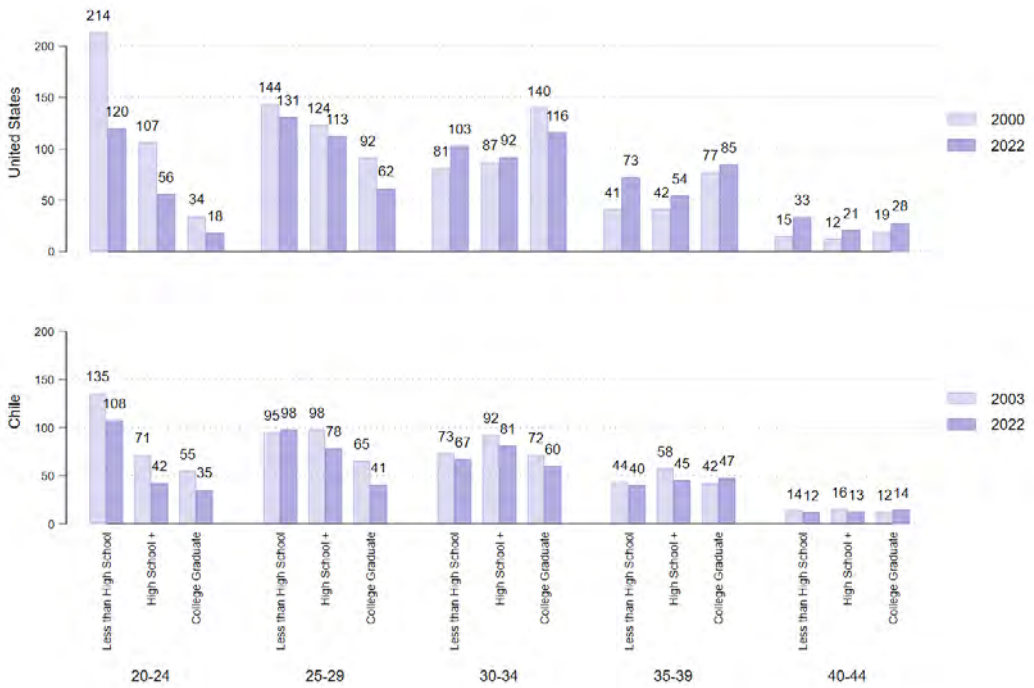


Note: Panels (a), (c), and (e) show age-specific birth rates (per 1,000 women) for Low, Middle, and High TFR countries, respectively. Panels (b), (d), and (f) show the corresponding population shares of women aged 15–44 by age group. Lighter bars correspond to values in 2000, darker bars to values in 2022. *Source:* Authors' calculations based on UN World Population Prospects.

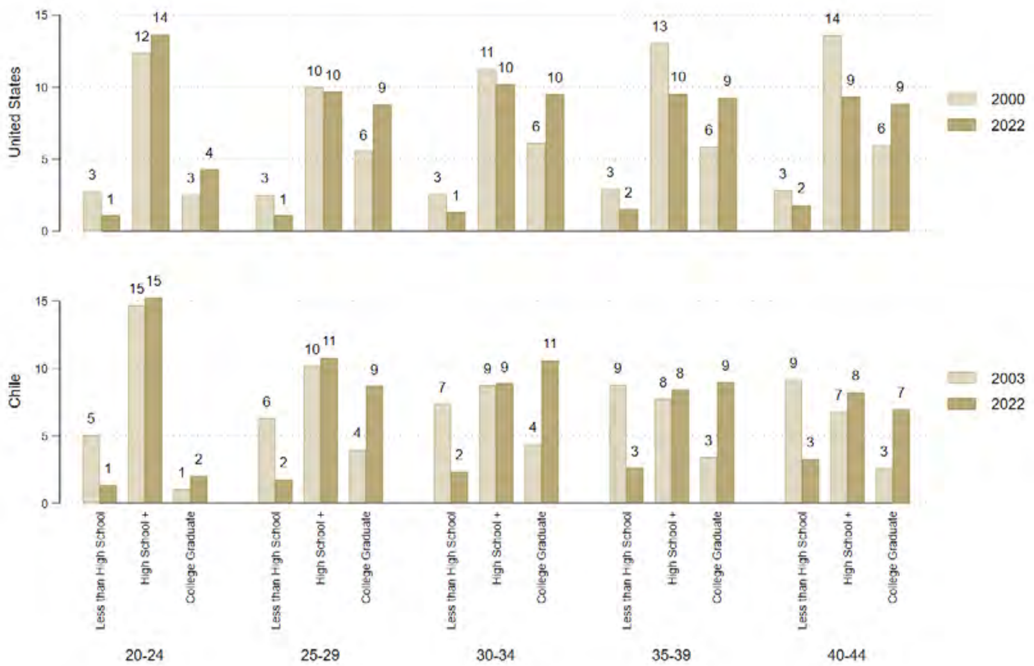
Figure A.2: Age-Education-Specific Birth Rates and Population Structure

Low TFR

(a) Birth Rates per 1000 Women

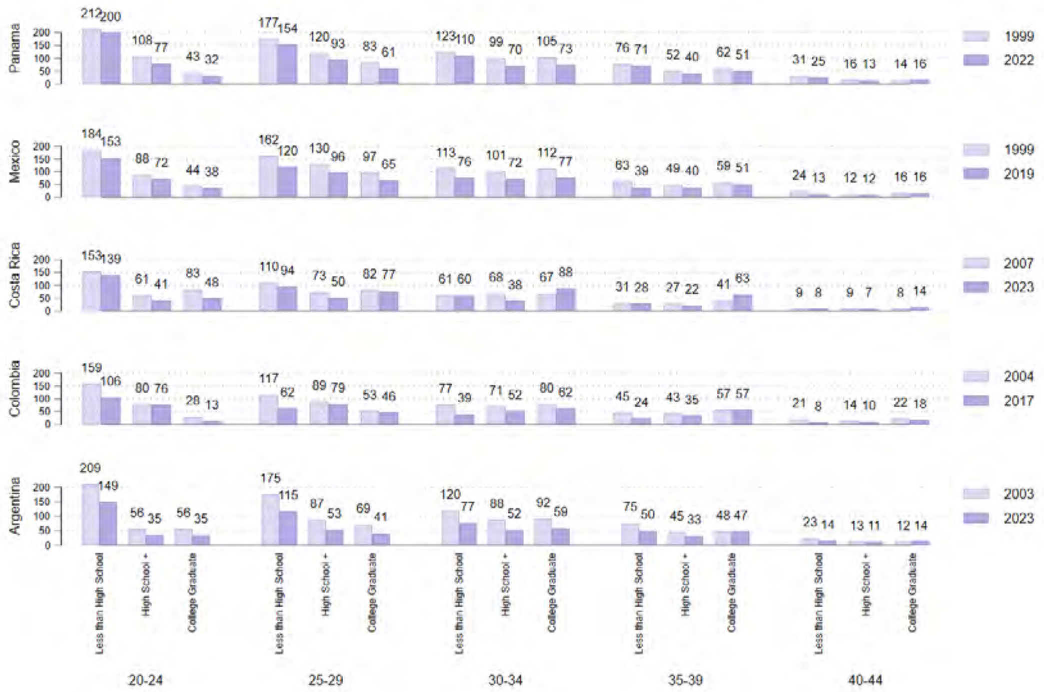


(b) Population Share

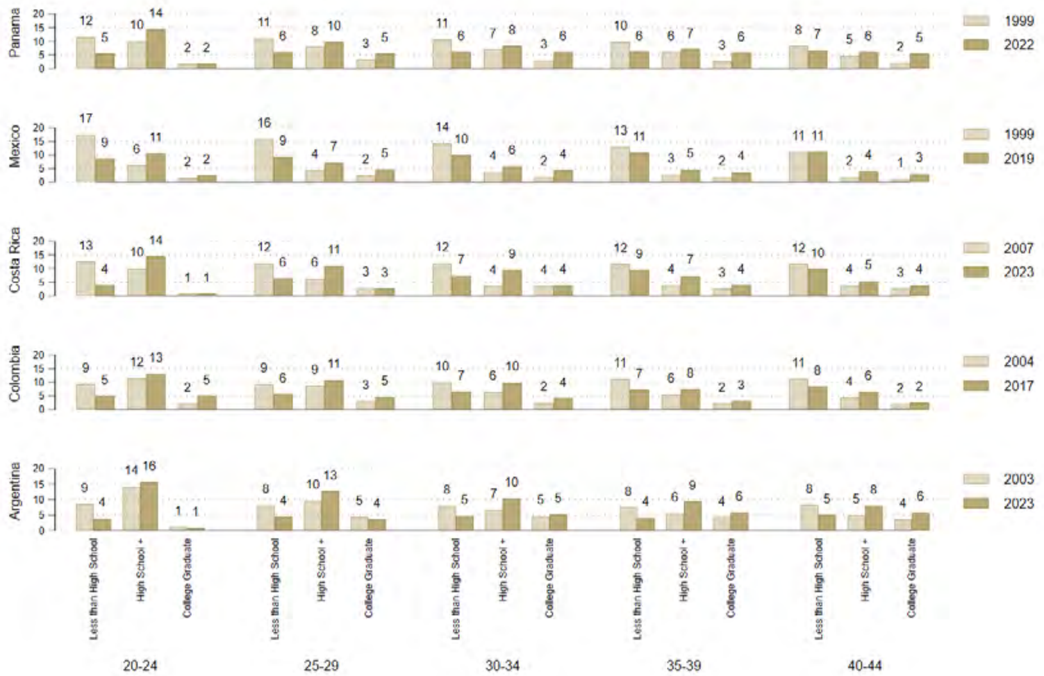


Middle TFR

(c) Birth Rates per 1000 Women

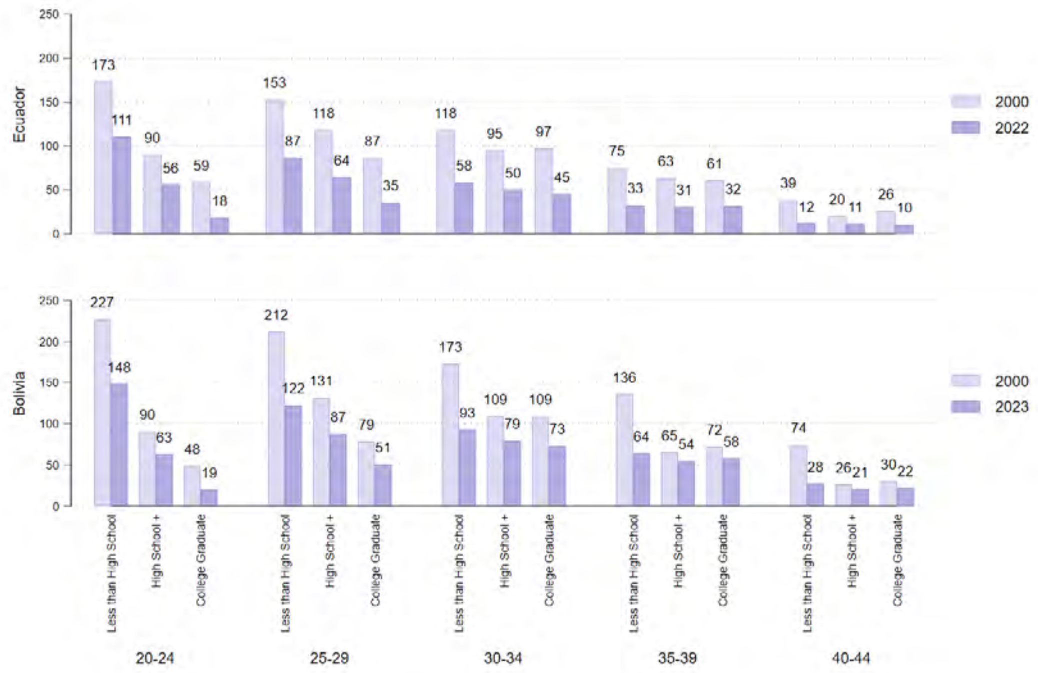


(d) Population Share

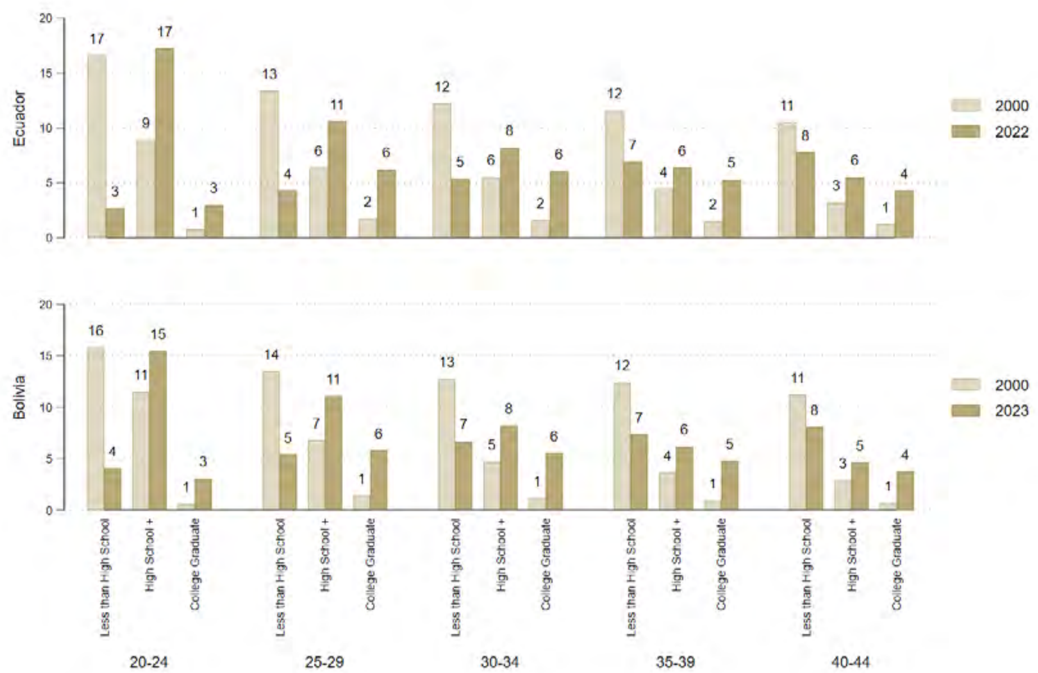


High TFR

(e) Birth Rates per 1000 Women



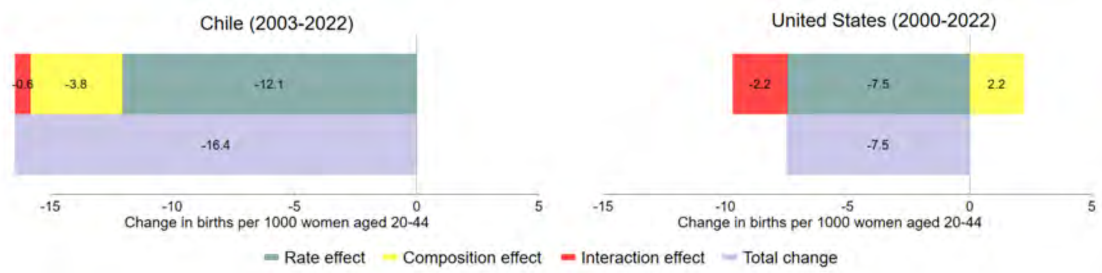
(f) Population Share



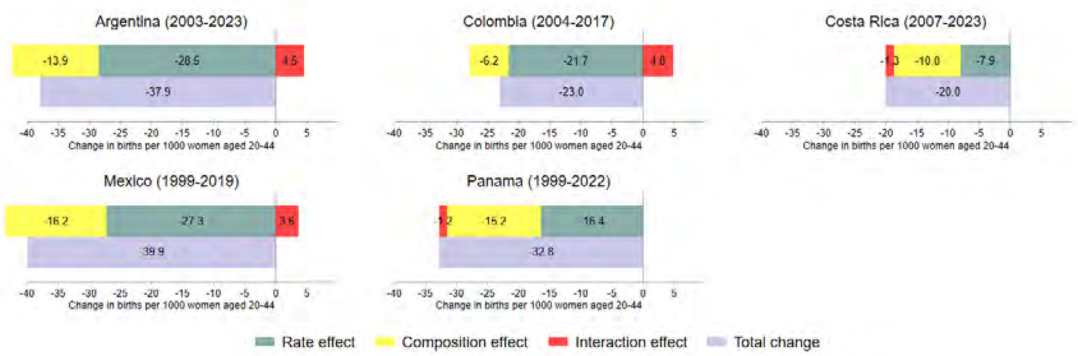
Note: Panels (a), (c), and (e) show age-education-specific birth rates (per 1,000 women) for Low, Middle, and High TFR countries, respectively. Panels (b), (d), and (f) show the corresponding population shares of women aged 20–44 by education group. Education is grouped into three categories: less than high school graduate, high school graduate without a college degree, and college graduate. Lighter bars correspond to the year closest to 2000 and darker bars to the year closest to 2022 for each country. *Source:* Authors' calculations based on UN World Population Authors' calculations based on National Vital Statistics, SEDLAC, and National Censuses.

Figure A.3: Age-Education Decomposition of the Change in the GFR by TFR Group

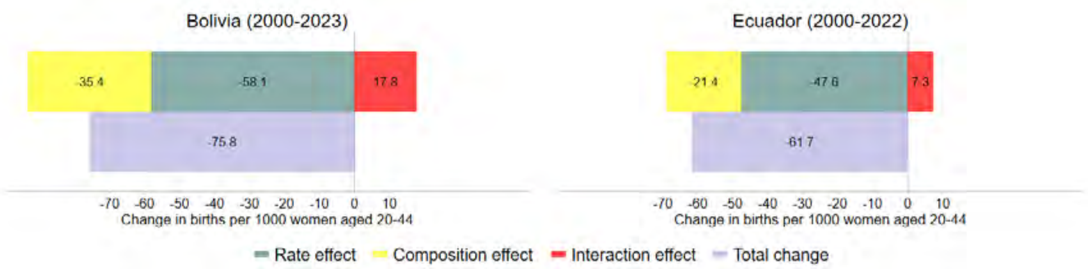
(a) Low TFR



(b) Middle TFR



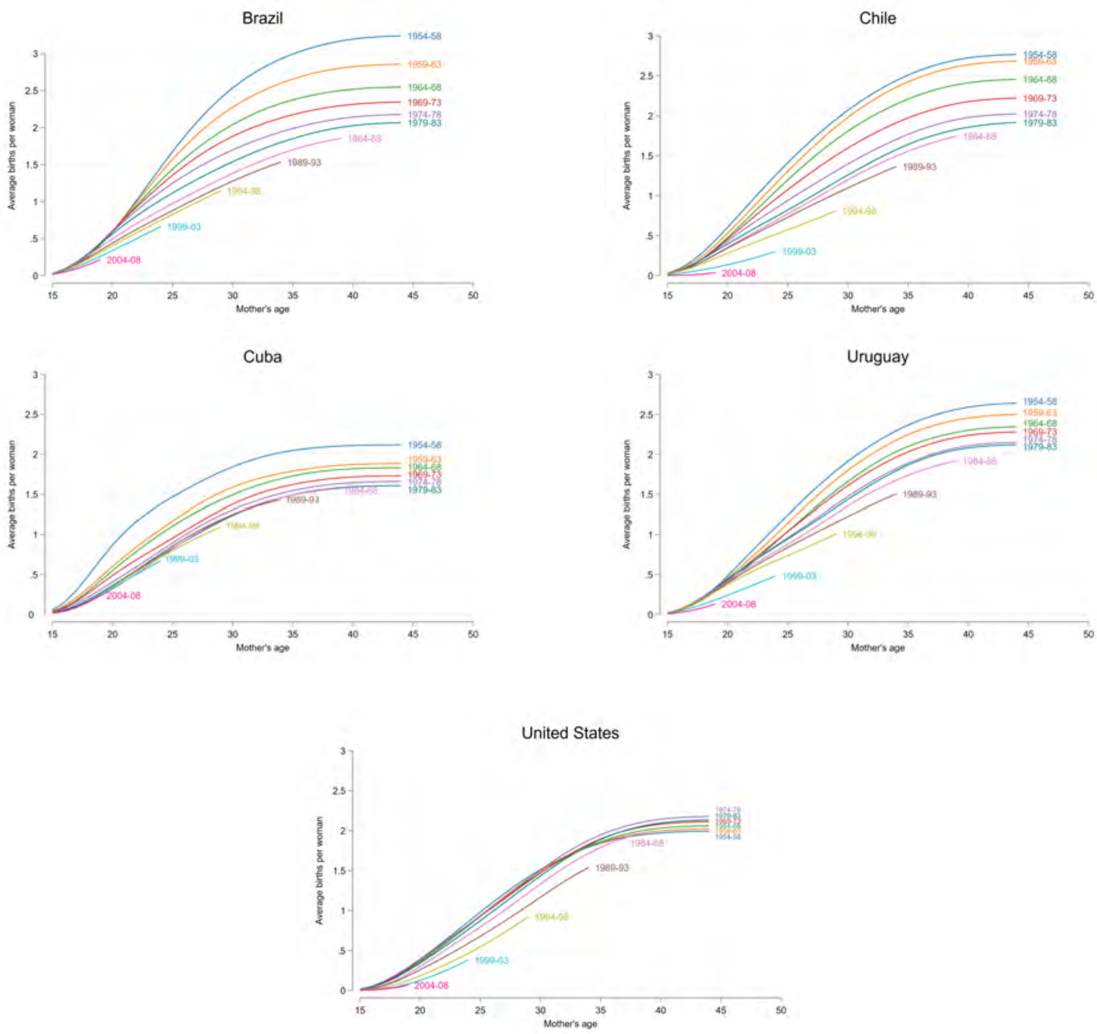
(c) High TFR



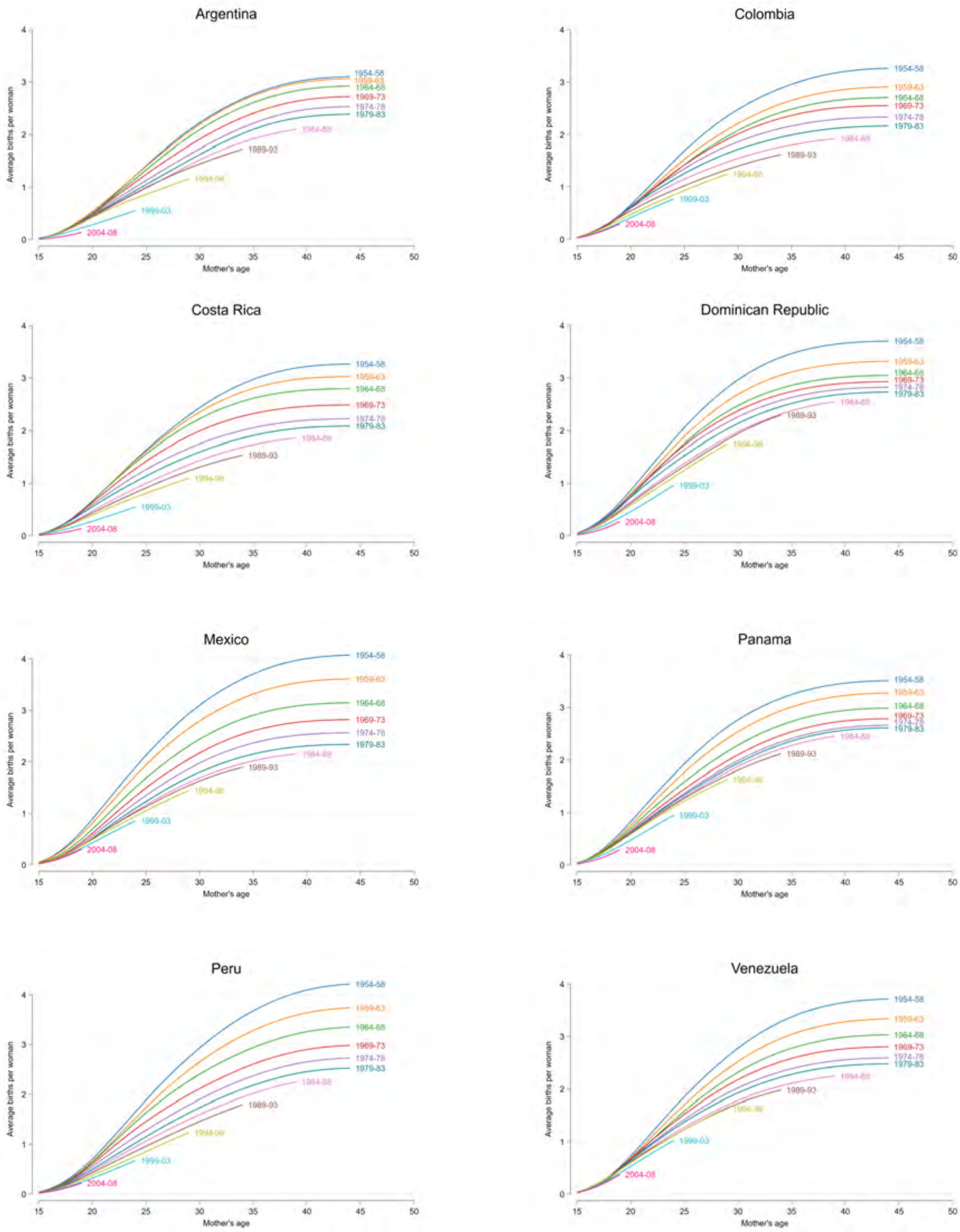
Note: The components (rate, composition, and interaction effects) refer to the decomposition of the change in the gross fertility rate per 1000 women of age 20-44 between the closest available year in 2000 and the closest available year in 2022, as shown in equation 1, using all combinations of 5-year age groups and three education groups: less than high school, high school graduate but less than college graduate, and college graduate. The group of women aged 15-19 is not separated by education. The total change in the GFR (shown in purple) is decomposed into a rate effect (changes in group-specific birth rates shown in green), a composition effect (shifts in the population distribution across age-education groups shown in yellow), and an interaction effect (the interacted effect of both changes shown in red). *Source:* Authors' calculations based on National Vital Statistics, SEDLAC and National Censuses.

Figure A.4: Age-specific Fertility by Mother's Birth Cohort

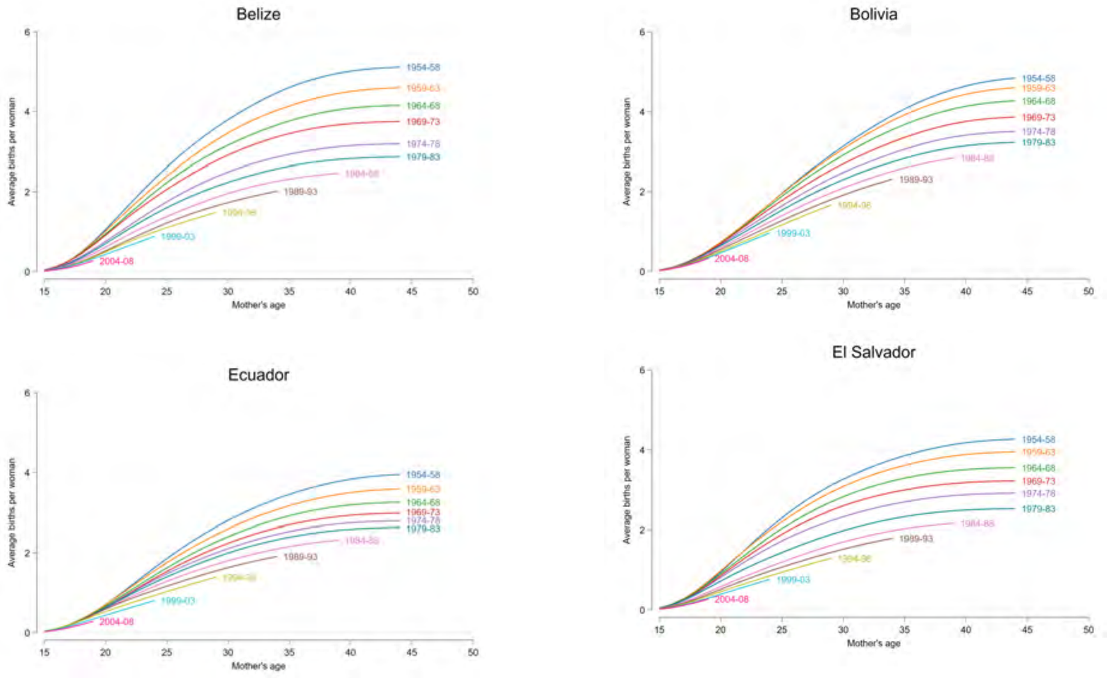
(a) Low TFR



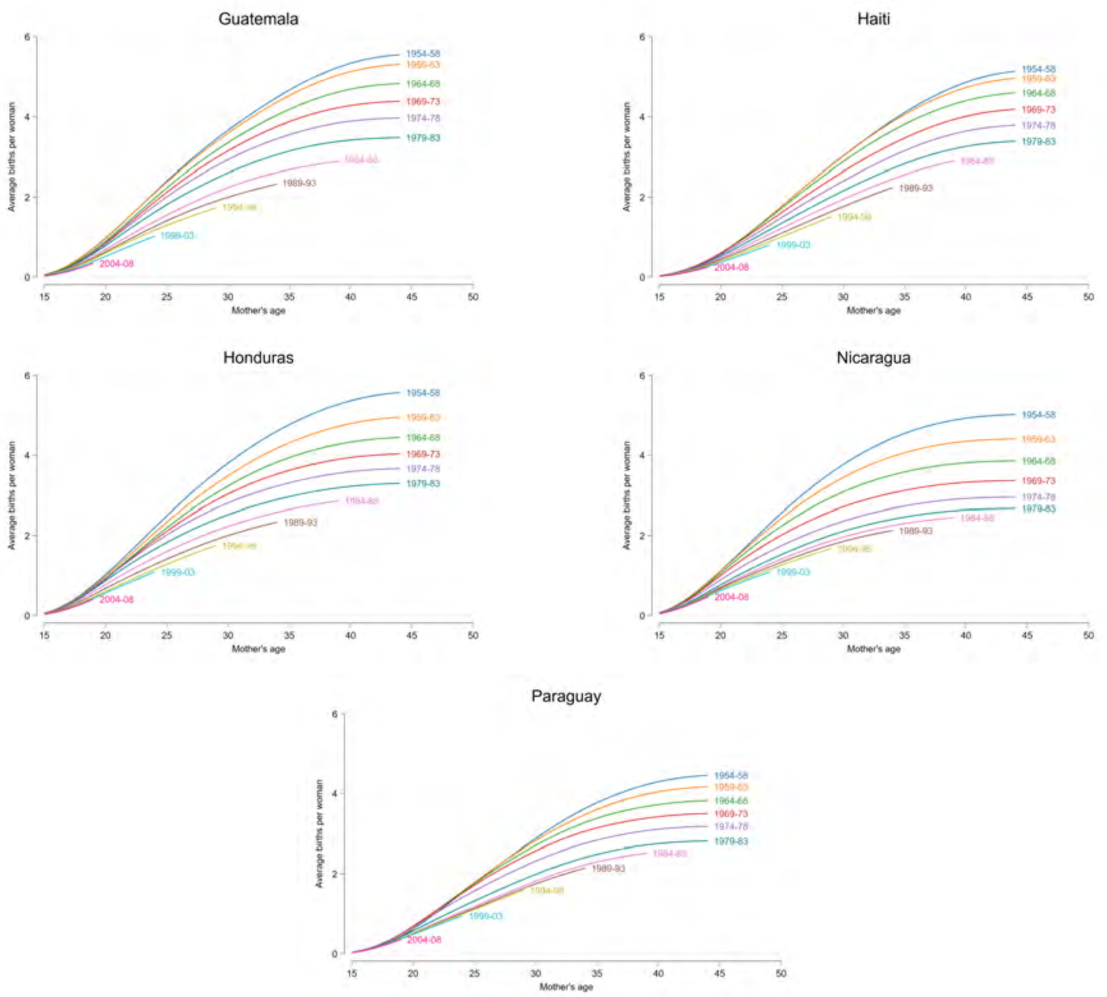
(b) Middle TFR


Argentina
Colombia
Costa Rica
Dominican Republic
Mexico
Panama
Peru
Venezuela
Average births per woman
Mother's age
1954-58
1959-63
1964-68
1969-73
1974-78
1979-83
1984-88
1989-93
1994-98
1999-03
2004-08

(c) High TFR



(d)



Note: For each country and for eleven five-year birth cohorts from 1954–1958 to 2004–2008, the figures report the cumulative average number of children a woman has had by each age. *Source:* Authors' calculations based on UN World Population Prospects.

Table A.1: TFR, per capita GDP, and Gender Norms (c. 2022)

	(1)	(2)	(3)	(4)	(5)	(6)
ln GDP pc	-0.541***		-0.178	-0.792***		-0.595**
	(0.168)		(0.202)	(0.162)		(0.222)
Man works, woman stays home (%)		0.022***	0.018**			
		(0.005)	(0.007)			
Mother works, children suffer (%)					0.023***	0.009
					(0.007)	(0.007)
Constant	7.184***	1.227***	3.094	9.585***	0.637	7.181**
	(1.637)	(0.165)	(2.131)	(1.579)	(0.366)	(2.451)
Observations	16	16	16	11	11	11
R-squared	0.427	0.593	0.616	0.727	0.566	0.772

Note: OLS regressions of TFR (2022) on natural log GDP per capita (PPP, constant 2021 int'l $) and gender attitudes (circa 2023). Gender attitudes measured as % responding "strongly agree" or "agree" with "It is better when the man works and the woman stays at home" (columns 1 to 3) and "When a mother works for pay, the children suffer" (columns 4 to 6). The sample includes 16 LAC countries in columns 1-3 and 11 countries in columns 4-6, based on Latinobarometro data availability for these variables. Columns (1) and (4) control only for log GDP, columns (2) and (5) control only for gender norms, and columns (3) and (6) control for both. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sources: World Bank WDI and Latinobarometro.

Appendix B. Data Sources, Variables and Classifications

B1. Selected countries

Table B.1 presents our classification of countries based on their Total Fertility Rate (TFR) in the year 2000 using data from Our World in Data (OWD) based on World Population Prospects. We group countries into three categories: low TFR (1.61–2.25), middle TFR (2.41–2.87), and high TFR (3.08–4.58). Although these cutoffs are arbitrary, they allow us to contrast fertility patterns among countries that began the 21st century at comparable fertility levels. The United States is included as a benchmark, representing a developed country from outside the region to provide a broader comparative context.

Table B.1: Country Classification by Total Fertility Rate (2000)

Low TFR		*Middle TFR*		*High TFR*	
Country	TFR	Country	TFR	Country	TFR
Brazil	2.25	Argentina	2.59	Belize	3.63
Chile	2.05	Colombia	2.57	Bolivia	3.99
Cuba	1.61	Costa Rica	2.41	Ecuador	3.10
United States	2.03	Dominican Republic	2.87	El Salvador	3.08
Uruguay	2.20	Mexico	2.71	Guatemala	4.58
		Panama	2.74	Haiti	4.39
		Peru	2.85	Honduras	4.29
		Venezuela	2.79	Nicaragua	3.12
				Paraguay	3.51

Source: Our World in Data (OWD) based on World Population Prospects.

This table reflects the broadest country coverage, corresponding to analyses that rely exclusively on data from the UN World Population Prospects (WPP). The set of countries included in each subsequent analysis is a subset of this list and varies depending on data availability and quality requirements. In particular, analyses that require fertility measures disaggregated by maternal education or completed fertility at the cohort level are restricted to countries for which education-specific birth records, or Census microdata are available and sufficiently consistent over time. When multiple data sources exist for a given country, we prioritize those that provide the longest and most reliable time series and allow for harmonization of educational attainment across years. For period-based analyses, we select for each country the calendar years closest to 2000 and to the most recent year available that are considered reliable given the underlying data source; consequently, the exact comparison years may differ across countries.

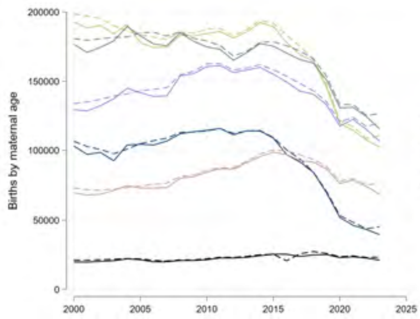
B2. Data Sources: World Population Prospects (United Nations)

For the decompositions based solely on mothers' age groups, as well as for estimates when analyzing age-fertility profiles across successive cohorts, we rely on the World Population Prospects database provided by the United Nations. This source is particularly suitable because it offers consistent information on births by mother's age and the female population by age for all countries of interest: Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, United States, Uruguay, and Venezuela. However, we restrict its use to this analysis, as these data do not allow for a breakdown by education level, only by age categories. In addition, an important advantage of using this database lies in the adjustments implemented by the United Nations to account for issues such as missing information in original data sources and delays in the registration of new births.

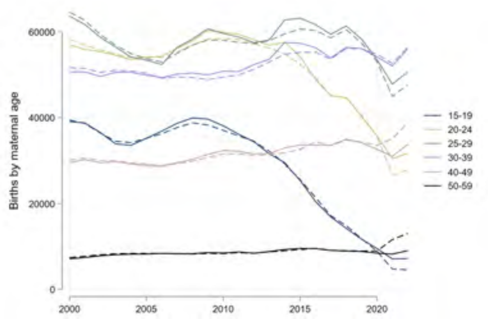
We benchmark WPP data against Vital Statistics for the subset of countries for which we rely on Vital Statistics, assessing whether any discrepancies are quantitatively meaningful (Figure B.1). Overall, the correspondence between the two sources is strong; however, in some cases—such as Chile—the fit is weaker in the most recent years. Differences in recent years may reflect delays in the registration of births in Vital Statistics, as well as the fact that WPP implements revisions and adjustments precisely to improve the accuracy of recent birth estimates.

Figure B.1: Comparison of Births between WPP and National Vital Statistics

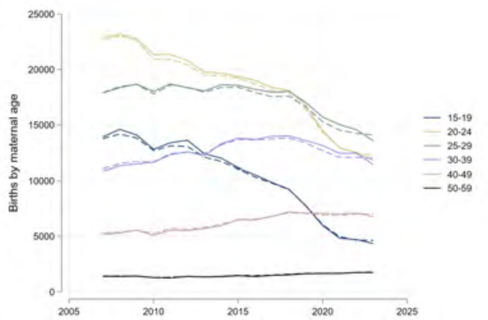
(a) Argentina



(b) Chile



(c) Costa Rica



Note: Solid lines represent data according to Vital Statistics and dotted lines represent data according to WPP (UN). *Source:* Authors' calculations based on UN World Population Prospects and National Vital Statistics.

B3. Data Sources: Vital Statistics Sources

Vital Statistics aim to record all live births, which makes them the primary source for measuring annual fertility patterns. Whenever these data are publicly available—either through online access or upon formal request—and meet minimum quality standards, defined as less than 10 percent missing information and reasonable year-to-year consistency, we rely on Vital Statistics to construct age- and education-specific fertility measures by calendar year. These criteria are met for Argentina, Chile, and Costa Rica.

Needed microdata from Vital Statistics are not publicly available for Bolivia, Cuba, Haiti, Honduras, Nicaragua, Panama, Paraguay, Peru, and Venezuela. In addition, although some countries have available birth records, we do not use them due to quality issues or missing mother's education, such as missing information, the absence of education measures, and changes in the definition of educational attainment that prevent consistent harmonization across years (e.g., Brazil, Colombia, Ecuador, Mexico, and Uruguay).

For some decomposition exercises, the analysis requires fertility series that span a sufficiently long period of time to compare different cohorts. For this reason, cohort-based decompositions rely on Census data, which report the total number of live children ever born and thus allow consistent comparisons across birth cohorts. Vital Statistics are not used for this purpose because their temporal coverage is typically limited to recent decades, making them unsuitable for reconstructing the full reproductive histories of older cohorts.

For calendar-year decompositions, our primary criterion is to rely on Vital Statistics only when the available series covers approximately twenty consecutive years, which ensures that the temporal variation underlying the decomposition is meaningful. When this condition is not met, we turn to population Censuses, which provide full-coverage information on births in the last year and on live children ever born.

It is important to note that while Vital Statistics provide the numerator for fertility rates (i.e., the number of births by mother's age and education), constructing age and education specific fertility rates also requires population denominators, that is, the number of women by age and educational attainment. Since the World Population Prospects does not provide population estimates disaggregated by educational level, we rely on household surveys processed by SEDLAC to construct these denominators. In some cases, household survey coverage does not span the same period as Vital Statistics. Consequently, the effective time span for our ratebased analyses is determined by the intersection of Vital Statistics availability and household survey coverage. The following subsection describes the household survey data used to construct these denominators.

B4. Data Sources: SEDLAC

The Socio-Economic Database for Latin America and the Caribbean (SEDLAC) is a joint initiative of the Center for Distributional, Labor and Social Studies (CEDLAS) at Universidad Nacional de La Plata and the World Bank's Poverty and Equity Group. SEDLAC provides harmonized microdata from household surveys across Latin American and Caribbean countries, ensuring cross–country comparability of key socio–economic variables, including demographic characteristics, education, employment, and income. We use these harmonized surveys to construct population denominators by age and educational attainment.

Household surveys are sample-based and therefore do not capture the entire population. To address this, we apply an adjustment factor that rescales the number of women in each age group so that the total matches the population reported by the World Population Prospects for each calendar year. This adjustment ensures consistency between our education-specific denominators and aggregate demographic estimates.

B5. Data Sources: Census

This study uses data from population Censuses conducted in ten Latin American and Caribbean countries. Our sample selection follows two key criteria: (i) countries must have conducted at least one Census from 2017 onwards, and (ii) countries must have at least one earlier Census from the 2000s. The final sample includes eleven countries: Mexico, Colombia, Uruguay, Argentina, Panama, Bolivia, Ecuador, Chile, Peru, and

Paraguay.[35]

Census data were obtained from three primary sources, depending on availability and accessibility:

- REDATAM: Regional Census data processing system maintained by CELADE-ECLAC, providing online access to a subset of Census databases through a web interface. We obtained the most recent publicly available census microdata for Argentina (2022), Bolivia (2024), Panama (2023), and Paraguay (2022) through REDATAM.
- IPUMS International: IPUMS International harmonizes and distributes census microdata worldwide. At the time of this study, the most recent census wave available in IPUMS for LAC countries was Mexico (2020), Peru (2017), and Chile (2017).[36] In this study, we use IPUMS International microdata for these three censuses, as well as for earlier census waves for all countries in our sample, except Uruguay and the United States.
- IPUMS USA (ACS): U.S. microdata come from the American Community Survey (ACS), downloaded via IPUMS USA.
- National Statistical Offices: We download Census microdata directly from official online portals maintained by national statistical institutes when available. This applies to Uruguay (INE; all census rounds used in this study), Colombia (2018), and Ecuador (2022).

B6. Educational Attainment Variable

Educational attainment is classified into three or four mutually exclusive categories, harmonized across all data sources used in this study. Table B.2 presents these categories and their definitions.

For Vital Statistics, we use the mother's reported education level at the time of birth registration. In some countries, the variable is already classified in a way that matches our categories; in others, we construct the categories ourselves using the reported years of schooling to ensure comparability across countries and years. For Census data, we rely on the education definitions provided by IPUMS International, REDATAM, and the corresponding Census codebooks. For household surveys (SEDLAC), we use the harmonized education variables produced by CEDLAS.

[35] Brazil conducted a census in 2022, but the microdata had not been publicly released at the time of writing this paper.

[36] Chile conducted a census in 2024, but the microdata were not yet publicly available at the time of writing.

Table B.2: Educational Attainment Categories

Category	Definition
Less than Primary	Individuals who have not completed primary education, including those with no formal schooling and those with incomplete primary education.
Primary +	Individuals who have completed primary education but have not completed high school education.
High School +	Individuals who have completed high school education but have not completed university education.
College Graduate	Individuals who have completed university or higher education.

Note: In some cases, the categories "Less than Primary" and "Primary +" were combined into a single group, "Less than High School" This was done when the share of individuals with less than primary education was very small, rendering a separate analysis of that category substantively uninformative.

Table B.3 summarizes the data sources used for the education-specific fertility decompositions in each country, including the type of data (Vital Statistics or Census), the years covered, and notes on the classification of educational attainment.

Table B.3: Data Sources for Education-Specific Decompositions, by Country

	Births Database: Vital Statistics			Population Database: Household Surveys		
Country	**Source**	**Available Years**	**Notes on Educational Classification**	**Source**	**Available Years**	**Notes on Educational Classification**
Argentina	Public information request to the Directorate of Health Statistics and Information (DEIS) [a]	2000–2023	Educational classifications were harmonized across the years to ensure consistency. Missing: 3.65%	SEDLAC	2003–2023	
Costa Rica	Information request to the National Institute of Statistics and Censuses (INEC) [c]	2007–2023	Missing: 2.17%	SEDLAC	2007–2023	Missing: 6.77%
Chile	Department of Health Statistics and Information (DEIS) [d]	2000–2022	The educational level category was created by combining the mother's level of education and the last completed grade. Missing: 4.81%	SEDLAC	2000, 2003, 2006, 2009, 2011, 2013, 2015, 2017, 2020, 2022	Missing: 8.10%

	Births and Population Database: National Censuses or ACS (for US)		
Country	**Source**	**Available Years**	**Notes on Educational Classification**
Bolivia	REDATAM	2001, 2012, 2024	
Colombia	IPUMS International (2005), REDATAM (2018)	2005, 2018	
Ecuador	National Statistical Office	2001, 2010, 2022	
Mexico	IPUMS International	2000, 2010, 2015, 2020	
Panama	REDATAM	2000, 2010, 2023	
United States	IPUMS USA	2000-2022	

Notes: In population censuses, missing data on educational attainment are generally not a concern. SEDLAC refers to the Socio-Economic Database for Latin America and the Caribbean, a harmonized household survey database jointly developed by CEDLAS (Universidad Nacional de La Plata) and the World Bank, designed to ensure cross-country and over-time comparability of socio-economic indicators in the region (for further details, see https://www.cedlas.econo.unlp.edu.ar/wp/estadisticas/sedlac/). IPUMS is a project that provides harmonized Census and survey microdata from around the world for social, economic, and demographic research (for further details, see https://international.ipums.org/international). Missing values indicate the share of observations without educational information in the pooled sample across all years.

[a] https://www.argentina.gob.ar/salud/deis/datos/nacidosvivos

[b] https://datasus.saude.gov.br/

[c] https://inec.cr/

[d] https://deis.minsal.cl/

B7. Census-Specific Variables

In the completed fertility and parity analysis by education, we use Census microdata for the Latin American countries and the June Current Population Survey (CPS) for the United States. This section describes the fertility measures and cohort definitions used in analyses based on this data.

a. Completed Fertility Census Variable

We measure completed fertility with "children ever born" questions asked to women aged 12+ or 15+, depending on the Census. Respondents report the total number of live births they have had over their lifetimes up to the Census date, including children who have died and those who no longer live with them.

We use ages 40–44 as the terminal ages, as this allows us to conduct our analysis for a larger number of cohorts than using ages 45–49 as the cutoff. Whenever possible, we also prefer to use the closest available Census/Survey date for a given cohort to minimize potential concerns related to mortality.

b. Birth Rates Census Variables

Latin American Censuses ask women about births in the year prior to the Census, either as a binary question or requesting the total number of children born, depending on the country. We leverage this retrospective fertility information to estimate birth rates by age group and educational attainment for the years immediately preceding the 2020s and 2000s Census rounds.

c. Cohort Construction and Age Grouping

Cohorts are identified based on the age that individuals report at the time of each Census. Cohort groups are defined by five-year age intervals. For most country-Census combinations, we could identify exact ages and construct cohorts accordingly. However, in some country-years, Census data were only available with ages grouped in five-year intervals (quinquennial age groups). In these cases, we adapted our cohort definitions to align with the identifiable age groups in those Censuses, which explains some variation in cohort boundaries across countries.

In the case of Uruguay, we exclude Census data from the age–education analysis due to limitations in the fertility information collected. Specifically, the dates of birth of the first and last child are reported in five-year intervals, preventing us from precisely identifying recent fertility events (e.g., births in 2022 when using the 2023 Census). Additionally, children's ages are also provided in five-year groups for most of the population, with single-year age only available in localities with 10,000 inhabitants or more, which introduces further measurement issues. Although microdata from the 2011 Census are available, inconsistencies in the completed-education variable in that round prevent its use in our analysis. As a result, for the 1964–1968 birth cohort we rely on individuals observed in 2023, even if they are slightly older than the corresponding cohorts from other countries. This should not materially affect comparability, as completed fertility remains largely stable beyond age 45.

Table B.4 presents the Census years used for each country and the mean age at Census for each cohort. The mean ages at Census range from 41 to 57 years across all countries and cohorts, to obtain virtually complete fertility histories.

The upper section of Table B.4 includes six countries: Argentina, Colombia, Ecuador, Mexico, Uruguay, and United States. For these countries, we track cohorts born between 1949–1953 and 1974–1978, observing them across multiple Census rounds spanning from 1993 to 2024. In the case of Argentina, we do not report the 1969—1973 cohort. In the 2022 Census, fertility information is only available for women up to age 49, which prevents us from observing the full reproductive history of this cohort. Moreover, in the 2010 Census this cohort had not yet completed fertility, defined ideally at age 44, or at least in the early forties, so it cannot be consistently included.

The lower section of Table B.4 presents three additional countries: Chile, Paraguay, and Peru. Due to differences in Census timing and data availability, cohort coverage for these countries begins with the 1948–1952 birth cohort and extends through the 1973–1977 cohort, with observations from Censuses conducted between 1992 and 2022.

Table B.4: Census Information by Birth Cohort: Sample Countries

Cohort	**Mexico**		**Colombia**		**Uruguay**		**Argentina**		**Ecuador**		**United States**	
	Census Year	**Median Age**	**Census Year**	**Median Age**	**Census Year**	**Median Age**	**Census Year**	**Median Age**	**Census Year**	**Median Age**	**Census Year**	**Median Age**
1949–1953	2000	49	1993	42	1996	45	2001	50	2001	50	1994	43
1954–1958	2000	44	2005	49	2006	50	2001	45	2001	45	1998	42
1959–1963	2010	49	2005	44	2006	45	2010	49	2010	49	2004	43
1964–1968	2010	44	2018	52	2011	45	2010	44	2010	44	2008	42
1969–1973	2015	44	2018	47	2023	52	—	—	2022	51	2014	43
1974–1978	2020	44	2018	42	2023	47	2022	46	2022	46	2018	42

Cohort	**Chile**		**Peru**		**Paraguay**	
	Census Year	**Median Age**	**Census Year**	**Median Age**	**Census Year**	**Median Age**
1948–1952	1992	42	1993	43	2002	52
1953–1957	2002	47	2007	52	2002	47
1958–1962	2002	42	2007	47	2002	42
1963–1967	2017	52	2007	42	2022	57
1968–1972	2017	47	2017	47	2022	52
1973–1977	2017	42	2017	42	2022	47