A Cohort Perspective on Latin America's Fertility Transition*

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Abstract

Latin America's momentous fertility transition is now in the domain of history, allowing a cohort perspective on the decline of completed fertility. Using census microdata from 17 Latin American countries, we track female birth cohorts from the 1920s to the 1970s by subnational region to document the extent to which cohort fertility decline coincided with other demographic and socioeconomic processes. Across cohorts within subnational regions, children ever born fell one-for-one with mortality decline. Expansions in urbanization, multigenerational living, women's and husbands' education, women's employment, and the non-agricultural sector all predicted declines in ever-born and surviving fertility, but women's education and sectoral composition were the dominant forces after covariate adjustment. Fertility decline was not systematically linked with improvements in children's outcomes, including school enrollment, literacy, primary completion, and non-employment. These cohort facts challenge theories of fertility decline centered on women's work and children's education but support others emphasizing women's education.

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1 Introduction

In the 1950s and 60s, Latin America led the world in population growth, growing 70% from 1950 to 1970 (United Nations, 2024). Yet a momentous decline in the region's fertility rates soon slowed its growth, mirroring similar declines in other world regions over the second half of the twentieth century (Lam, 2011). The total fertility rate fell from 5.9 in 1960 to below the replacement level at present, with the fastest decline in the 1970s and 1980s (United Nations, 2024). The region's shift from high to low fertility is now an object of history, and one benefit of history is that it places cohort lifetime outcomes in rear view. This paper uses census microdata to develop new cohort facts on the decline of fertility in Latin America, strengthening the evidentiary base for evaluating theories that focus on lifetime fertility rather than the flow of births over time.

In Latin America as elsewhere, research on the fertility transition has scrutinized the flow of births by period more than their lifetime cumulation by cohort.[1] Demographers have long debated the conceptual merits of period versus cohort approaches to studying fertility (Hajnal, 1947; Ryder, 1956; Bhrolchain, 1992; Bongaarts and Feeney, 1998), but the prevailing focus on period measures may reflect practical considerations. In studies of historical fertility decline in the West (e.g., Coale and Watkins, 1986), data on births often do not disaggregate by the age or birth cohort of the mother, necessitating a period orientation. In studies of contemporary fertility decline in low- and middle-income countries (e.g., Bongaarts and Watkins, 1996; Bryant, 2007), disaggregated data are more readily available, but a desire to track and understand transitions in real time leads to a period orientation, since studying a cohort's completed fertility requires waiting until it has completed the reproductive period. However, data on completed fertility are now available for populations that underwent fertility decline in the mid-twentieth century. We assemble such data for Latin America based on census microdata from IPUMS International (Ruggles et al., 2025), using 63 censuses from all 17 Spanish- and Portuguese-speaking countries in South, Central, and North America.

The period and cohort approaches are complementary because they account for social change through different lenses (Schoen, 2004). Many theories of the fertility transition emphasize socioeconomic change, but in period data, some socioeconomic aggregates do not represent the same families as do standard fertility aggregates. For example, Becker and Lewis (1973) and Caldwell

[1] See, e.g., Palloni (1990), Guzmán et al. (1996), Potter et al. (2002), Potter et al. (2010), Adserà and Menendez (2011), Laplante et al. (2015), Jaramillo-Echeverri (2024), and Arana-Ovalle et al. (2025).

(1980) link declining fertility with rising children's education. But the children represented in a typical school enrollment rate may have mothers outside the age range of the total fertility rate. A cohort approach that tracks fertility, socioeconomic circumstance, spousal attributes, and child outcomes across groups of women who were born in the same time and place resolves this temporal mismatch. We study how the decline of completed fertility related to other demographic and socioeconomic patterns across cohorts.

We estimate these relationships in cohort aggregates for 333 subnational regions within the 17 countries. We rely on a fixed-effect regression framework that relates cohort average fertility to cohort averages of other demographic and socioeconomic variables, net of region fixed effects and country-by-cohort fixed effects. The other variables include offspring mortality, marriage, multigenerational living, urbanization, migration, education, labor force participation, industrialization, and child schooling and work. Many may be co-determined with fertility, and the census data may not include all relevant covariates, so our results are descriptive rather than causal.

The facts are numerous, some consistent with existing knowledge, others more surprising. Falling offspring mortality was associated with falling ever-born but not surviving fertility: fertility responses offset but did not outpace mortality decline, consistent with period and individual-level evidence and demonstrating that this offset operated cumulatively over maternal lifetimes.[2] Considered separately, increases in urbanization, industrialization, women's and men's educational attainment, women's employment, and multigenerational living all predicted fertility decline. These variables displayed large continent-wide gains across sample cohorts, consistent with each playing a fertility-reducing role as in leading theories of fertility change (Bongaarts and Watkins, 1996; Schultz, 1997; Casterline, 2001; Galor, 2011; Bongaarts and Hodgson, 2022).

However, covariate adjustment shows that rising educational attainment—especially of women—and industrialization explain the other relationships. Rising women's education accounts for 39% of the sample-wide decline of children ever born and 58% of the decline of surviving children, confirming one of demography's most durable findings in cohort variation during a historic episode of fertility decline.[3] Rising husbands' education and non-agricultural work each account for 5–13% of

[2] See, e.g., Preston (1978), Lee (1997), Cohen and Montgomery (1998), and Palloni and Rafalimanana (1999).

[3] References on women's education and fertility include Cleland and Rodriguez (1988), Weinberger et al. (1989), Jejeebhoy (1995), Martin (1995), Li et al. (2017), Liu and Raftery (2020), and Schoumaker and Sánchez-Páez (2026). Experimental and quasi-experimental studies confirm that women's education reduces fertility (Osili and Long, 2008; Duflo et al., 2015; Keats, 2018; Ozier, 2018; Duflo et al., 2024), albeit using African rather than Latin American data.

the declines. But rising women's employment accounts for none, challenging theories that emphasize women's market work (Schultz, 1985, 1997, 2007)—though this finding does not entirely rule out opportunity-cost mechanisms that depend on wages rather than participation *per se*.

Support for theories linking fertility decline with rising children's schooling (Becker and Lewis, 1973; Willis, 1973; Caldwell, 1980) is similarly thin. Across Latin America, children's enrollment, literacy, and primary completion did rise across successive cohorts, while children's employment fell. Yet at the subnational level, fertility decline was *not* systematically associated with these changes. This unexpected fact matches recent cohort patterns in sub-Saharan Africa (Vogl, 2025) and complicates arguments that these well-known theories explain modern fertility decline.

These cohort facts complement period portraits and deepen cohort portraits of Latin America's fertility transition. We build on existing studies that take a cohort perspective on Latin America's transition (Reher and Requena, 2014; Onofri et al., 2026) by investigating subnational patterns and relating them to other demographic and socioeconomic processes.[4] Our approach fits into a broader literature tracking historical cohort fertility transitions in the United States (Jones and Tertilt, 2008; Bailey and Hershbein, 2018) and around the globe (Frejka, 2017).[5] A cohort perspective is especially useful for assessing fertility theories that emphasize lifetime resources and decisions, like when to leave school, whether to work at prime ages, whether to educate one's children, and how many children to have over the life course. A growing demography literature emphasizes a cohort perspective on novel phenomena in richer countries, such as the emergence of sub-replacement fertility (Myrskylä et al., 2013; Zeman et al., 2018; Hellstrand et al., 2021; Guzzo and Hayford, 2023; Hwang, 2023). The proliferation of census microdatasets from around the world enables a cohort perspective on the momentous decline of fertility in poorer countries after World War II.

2 Cohort Histories from Census Microdata

We assemble a panel of national and regional birth cohort aggregates from census microdata collected and harmonized by IPUMS International (Ruggles et al., 2025). At both geographic levels, we define a cohort to be a group of women born in the same place in the same five-year period. We

[4] Batyra et al. (2023) and Cavagnoud and Castro Martín (2025) also take a cohort approach to studying fertility transition in Brazil and Peru, respectively.

[5] Lerch (2019), discussed below, also takes a cohort approach to studying trends in urban-rural fertility gaps in contemporary low- and middle-income countries.

aggregate all outcomes, including those of husbands and children, using women's place and period of birth, in effect characterizing a broad spectrum of family outcomes for each female birth cohort. Most of the analysis uses regional cohorts, but some cohort time series plots use national cohorts.

The capacity to classify women by place of birth rather than place of residence is a major advantage of census data relative to other sources of demographic microdata spanning many countries. For example, the Demographic and Health Surveys typically collect granular data only on the place of residence. Classifying women by place of residence raises concerns about selective internal migration, which may relate to fertility and education decisions. In contrast, classifying them by place of birth rules out bias from selective migration.[6] We operationalize regions as first-level administrative divisions, typically called departments, provinces, or states. Some censuses also recorded second-level administrative divisions of birth, most commonly called districts or municipalities. For consistency, however, we rely on the first-level subdivision throughout. Even so, the first-level units vary dramatically in area and population, placing some feasibility bounds on consistency.

Criteria at both the census and country levels guide our selection of IPUMS samples. To be included in our analysis, a *census* must have data on the first-level administrative division of birth, as well as children ever born, surviving children, and years of education. A *country* must meet two further criteria. First, it must have multiple censuses satisfying the census criteria dating back to 1990 or earlier, thus covering the cohorts at the center of fertility decline in most countries. Second, it must have multiple censuses that allow linkage of women with their husbands and children, allowing us to study a range of family attributes and outcomes.

These criteria lead to a sample of 63 censuses from all 17 Spanish- and Portuguese-speaking countries in North, Central, and South America.[7] The 17 countries include Argentina and Uruguay, which completed their fertility transitions long before the mid-twentieth century (Guzmán et al., 1996). We initially keep these countries to confirm their low and stable fertility, but we then drop them to focus on the process of fertility decline.

Following the choice of countries and censuses, the next decision involves the selection of women and children within them. The age range is a key issue for both groups. For women, we start with 45-59, after childbearing is complete and before old-age mortality accelerates. Many fertility

[6] National censuses omit international emigrants, but nternal migrants are more numerous (United Nations, 2009).

[7] In the Caribbean, only the Dominican Republic and Haiti meet the selection criteria, and conventional definitions of Latin America exclude the latter.

correlates exhibit strong age patterns in middle age, so for most of the analysis, we further restrict the range to 45-49. For children, we focus on ages 12-15. Below age 12, many censuses do not ask about employment, and children have not had a chance to complete primary school. Above age 15, maternal coresidence declines rapidly, ruling out the linkage of children with their mothers (Appendix Figure A1).[8] We include all children aged 12-15 who have mothers in the relevant cohorts, regardless of their mothers' age at the time of interview.[9] The combined sample contains 13,494,945 women aged 45-59, 5,298,181 women aged 45-49, and 16,685,898 children aged 12-15.

We pool 63 censuses and form national or regional cohort cells, with birth cohorts ranging from 1920-24 to 1975-79. The 17 countries contain 333 subnational regions.[10] We use sampling weights to compute cell averages; when a cell combines data from multiple censuses, we rescale each census's weights in proportion to its contribution to the cell. To maintain precision and comparability across cells, we discard cells with fewer than 100 observations. The minimum cell size shrinks the regional cohort sample from 2867 to 2639 cells based on women aged 45-59, from 2228 to 1840 cells based on women aged 45-49, and from 2861 to 2508 based on children aged 12-15.

3 Cohort Aggregates and Theories of Fertility Decline

What insights can cohort aggregates from census microdata give into theories of fertility decline? We rely on several characteristics of women, their husbands, and their children. Other than counts of children, we study marriage, household structure, residential sector, and migration; own and spousal education, employment, and sector of employment; and proxies for children's human capital. This section describes how we construct each variable and how it relates to theories of fertility decline.

Fertility All censuses collected data on children ever born and surviving children. We average both variables at the national or regional cohort level. The count of children ever born is a close proxy for completed fertility, given that sample women were over 45 at the time of the census. The count of surviving children accounts for any mortality that preceded the census. Given the

[8] We exclude Chile from the analysis of child outcomes because school enrollment is unavailable in two censuses, and work is unavailable for 12-14 year-olds in all censuses.

[9] If we only included children aged 12-15 when their mothers were 45-59, then our sample would over-represent children with older mothers. We partly mitigate this issue by including children before their mothers turned 45.

[10] In some cases, we group primary administrative divisions to maintain stable borders over time, combining the IPUMS boundaries for place of birth and place of residence.

concentration of mortality risk in the first years of life, it can be interpreted as a rough proxy for the count of children who survived to school age. The relevance of these counts to theories of fertility transition depends on whether families target gross or net fertility in their childbearing decisions.

Mortality The effect of child mortality on fertility is the topic of a longstanding empirical literature in demography and the social sciences (Cohen and Montgomery, 1998).[11] Our measure of offspring mortality is the share of the cohort's children who died before the census. For the middle-aged mothers in the sample, most offspring mortality likely occurred before the child reached age 5.[12] So the offspring mortality share can be seen as a proxy for the child mortality rate. A key question will concern whether mortality-related declines in gross fertility were rapid enough to also reduce net fertility. Theories of "hoarding" children to hedge against mortality risk predict a reduction of net fertility, but others do not.[13]

Marriage Marriage is a classic proximate determinant of fertility (Bongaarts, 1978). The censuses include marital status but not the age at marriage or other aspects of marital history. Our analyses thus rely on the share never-married. Consistent with the proximate determinants framework, we consider this share to be co-determined with fertility, as fertility outcomes and intentions may affect partnership formation. Evidence suggests that legal marriage does not act as a constraint on childbearing in Latin America, at least in recent decades (Laplante et al., 2015). Nevertheless, a comprehensive portrait of Latin America's fertility transition must consider nuptiality.

Multigenerational living Research on motherhood has recently turned to another dimension of family structure and living arrangements that may influence fertility: the availability of grandmothers. The census data allow us to observe women's rates of coresidence with their mothers and mothers-in-law. Human evolutionary theorists have long posited that grandmothers lessen the burden of children on mothers, so that women's long postmenopausal lifespans enable their daughters

[11]Higher child mortality may raise fertility (i) because parents replace their deceased children, (ii) because parents hedge against future mortality risk by bearing more children, (iii) because child death shortens postpartum amenorrhea, or (iv) because communities establish norms to offset the burden of mortality beyond the nuclear family (Preston, 1978). Fertility may also affect mortality, for example through short birth spacing (Molitoris et al., 2019).

[12]In 1980, mortality rates in Latin America and the Caribbean were 68 per 1000 among infants, 5 per 1000 among 1-5 year-olds, 1 per 1000 among 5-9 year-olds, and 1 per 1000 among 10-14 year olds (United Nations, 2024).

[13]Empirical and theoretical research by both social demographers and economists (Cohen and Montgomery, 1998; Doepke, 2005; Nobles et al., 2015; Ager et al., 2018) suggests that replacement is common, but "hoarding" is not.

to bear more children of their own (Jones, 1998), although studies have found mixed associations of grandmother availability with fertility (Sear and Coall, 2011). Multigenerational living depends in part on survival so may be correlated with offspring mortality rates. Further, coresidence with an elderly family member may increase care needs and crowding, which could decrease fertility. Maternal coresidence may also be a response to the absence of a spouse, as Esteve et al. (2022); Becca et al. (2026) emphasize in the Latin American context.

Urbanization and Migration Researchers have observed lower urban fertility and earlier urban fertility decline in settings as varied as historical Europe (Jaffe, 1942; Galloway et al., 1998) and contemporary developing countries (Lerch, 2019).[14] Such patterns have raised interest in how urban life and migration shape fertility as far back as Notestein (1945).[15] We measure urbanization using the share of a regional birth cohort living in an urban *locality* in adulthood. We measure migration using the share of a regional birth cohort living in a different *region* in adulthood. The format of the census data necessitates the local definition of urbanization and regional definition of migration. Given these definitions, a region can urbanize with no migration, and a woman can migrate without switching urban-rural status. Furthermore, more than in any other domain we study, these variables have limited interpretability across national borders. The definition of an urban locality and the scale of the primary administrative division both vary across countries.[16]

Adult Education A prime socioeconomic determinant of fertility is the education of adults, particularly women (Cleland and Rodriguez, 1988; Weinberger et al., 1989; Martin, 1995). Researchers cite a wide range of mechanisms, including women's opportunity cost of time, autonomy, bargaining power, knowledge, and attitudes (Jejeebhoy, 1995; Schultz, 1997; Diamond, 1999). Given the strong correlation between women's education and their husbands', we average years of education for women and their coresident husbands, if present.

[14]In Lerch's analysis of Demographic and Health Survey data from 60 low- and middle-income countries, urban non-migrants have the lowest fertility rates, followed by rural-to-urban migrants with the next-lowest, and then urban-to-rural migrants with the third-lowest, and then rural non-migrants with the highest.

[15]Potential mechanisms include the rise of the non-agricultural sector, the expansion of schooling, and the diffusion of cultural innovations related to the value of children, individualism, and contraception.

[16]For example, Mexico designates localities with more than 2500 population as urban, while Colombia assigns this label only to the official seat of the secondary administrative division. Furthermore, the Brazilian state of São Paulo—a single region in our coding—has a larger population than every Central American country.

Adult Labor Labor market outcomes are central to economic theories of fertility decline. For women and their coresident husbands separately, we calculate the share employed and—conditional on employment—the share working in the non-agricultural sector.[17] Women's employment is a proxy for the opportunity cost of raising children (Becker, 1960; Schultz, 1985). Husbands' sector captures the structural transformation of the economy but is also correlated with urbanization, which the censuses measure poorly. The roles of industrialization and urbanization will be hard to distinguish. Further, participation and sector are both co-determined with fertility.

Child Schooling and Labor Child schooling is also co-determined with fertility. Since Becker and Lewis (1973) and Willis (1973), economists have noted a trade-off between the quantity of quality of children, which tends to drive them in opposite directions. Social demographers have noted similar forces, in addition to several cultural mechanisms, which cause fertility to fall with rising schooling among children (Caldwell, 1980). The census data allow us to look at four child outcomes related to parental investments in human capital: school enrollment, literacy, primary school completion, and employment. We compute shares for these four variables by maternal cohort. The offspring mortality share also partly measures human capital investment, to the extent that it responds to parental investments in health.

4 Cohort Fertility Decline by Country

Our analysis begins by documenting cohort fertility decline across the 17 countries. At this juncture, we seek only to depict the cohort fertility transition, not assess its relation to other demographic and socioeconomic processes. The depiction will help us further refine the sample before the subsequent analysis of these other processes. Here we draw on the full sample of 45-59 year-old women, rather than the restricted 45-49 sample, lengthening the cohort time-series for each country.

Figure 1 plots completed fertility rates by cohort and country, establishing that the vast majority of Latin American countries saw dramatic declines in ever-born fertility but more muted declines in surviving fertility. Except for Argentina and Uruguay, every country entered with average children ever born exceeding five and exited at least one lower, most at least two lower. Declines in

[17] We find that women's non-agricultural shares and husbands' employment rates are uniformly high, so our regression analyses focus solely on women's employment and husbands' sector.

surviving fertility were less pronounced because child mortality fell. Bolivia, Guatemala, Honduras, and Nicaragua saw little sustained reduction in fertility net of mortality. However, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Mexico, Panama, Paraguay, Peru, and Venezuela all saw sustained declines in surviving children, in most cases exceeding two per woman.

These results make clear that Argentina and Uruguay had already completed their fertility transitions. This conclusion is consistent with existing research that dates these countries' transitions decades earlier than their counterparts' (Guzmán et al., 1996). Because these cohorts offer little insight into the process of fertility decline in the available cohorts, we remove them henceforth.

5 Analysis of Regional Cohorts

The remainder of the paper examines demographic and socioeconomic predictors of cohort fertility at the regional level. The analyses are descriptive: all of the variables may correlate with unmeasured determinants of fertility, and some may be jointly determined with fertility. The results are best read as facts about how demographic and socioeconomic variables co-evolved with cohort fertility decline, useful for assessing theories even absent causal identification.

5.1 Methods

We use regression for two purposes: (i) to summarize sample-wide cohort trends in key variables and (ii) to relate changes in cohort fertility to changes in other variables. Because we are interested in fertility *change*, we focus on fixed-effect models that isolate variation within regions across cohorts. In all estimations, the unit of analysis is the regional cohort cell. We denote cell averages for women born in subnational region j in country k in quinquennium t by $\bar{y}_{jkt}$.

To summarize sample-wide cohort trends in fertility and its correlates, we first estimate a regression with cohort fixed effects τ_t and subnational region fixed effects δ_{jk}:

$$\bar{y}_{jkt} = \tau_t + \delta_{jk} + \epsilon_{jkt} \tag{1}$$

The cohort fixed effects τ_t capture how outcome $\bar{y}_{jkt}$ evolves on average across cohorts, net of changes in the regional composition of the sample from one cohort to the next. If every cohort had data from every region, resulting in a balanced regional cohort panel, then the region fixed effects would be unnecessary, and the cohort fixed effects would simply capture the mean of $\bar{y}_{jkt}$ by cohort. But the national series in Figure 1 make clear that the sample composition varies by cohort. The two-way fixed effect regression specification allows us to summarize the evolution of average outcomes while accounting for changes in composition. To make the results as informative as possible, we compute composition-adjusted cohort means by adding the mean of the region fixed effects back into the cohort fixed effects: $\mu_t = \tau_t + \bar{\delta}_{jk}$. Unlike the cohort effects τ_t, these composition-adjusted means μ_t have informative levels.

The paper's main objective is to characterize how changes in regional cohort fertility (still denoted $\bar{y}_{jkt}$) relate to changes in regional cohort averages of other demographic and socioeconomic variables (now denoted $\bar{x}_{jkt}$). To this end, we enrich Equation (1) in two ways. First, we include $\bar{x}_{jkt}$ on the right-hand side, allowing us to estimate the conditional association of $\bar{x}_{jkt}$ and $\bar{y}_{jkt}$. Second, we allow the cohort fixed effects τ_{kt} to vary by country, allowing us to absorb any country-specific trends, for example due to cross-country differences in variable definitions. Following these two changes, the main estimating equation becomes:

$$\bar{y}_{jkt} = \beta \bar{x}_{jkt} + \tau_{kt} + \delta_{jk} + \epsilon_{jkt} \tag{2}$$

The coefficient β captures the association of $\bar{x}_{jkt}$ with $\bar{y}_{jkt}$ net of birth region fixed effects and country-cohort fixed effects. Statistical identification of β comes from comparing within-region cohort changes among regions in the same country. Due to the country-cohort fixed effects, cross-country comparisons of changes never play a role; due to the birth region fixed effects, cross-sectional comparisons of regions in the same country never play a role. For computing standard errors, we allow the idiosyncratic errors ϵ_{jkt} to be clustered by region.

The definitions of $\bar{y}_{jkt}$ and $\bar{x}_{jkt}$ depend on the analysis. For the analysis of the adult correlates of fertility change, $\bar{y}_{jkt}$ refers to the average number of either ever-born or surviving children, and $\bar{x}_{jkt}$ refers to average demographic or socioeconomic characteristics of women or their husbands. For the analysis of the child correlates of fertility change, we keep with the convention in the literature on family size and child outcomes by placing family size on the right-hand side of the equation (Buchmann and Hannum, 2001). In this case, $\bar{y}_{jkt}$ refers to the average outcomes of children born to women in regional cohort jkt, and $\bar{x}_{jkt}$ refers to the women's average number of children.

Two choices merit further discussion. First, we run fixed-effect rather than first-difference models. Given our interest in fertility *change*, first differences may seem preferable. But the panel of regional cohorts is unbalanced, and the fixed-effect framework accommodates gaps more flexibly. Both approaches rely on variation between cohorts within a region, so they have similar interpretations in terms of regional fertility decline. Second, we analyze the level of average fertility rather than its logarithm because we wish to characterize the forces driving the historic shift from high to low fertility. Analyses using a log transformation would speak to the correlates of proportional rather than absolute changes in fertility, putting more weight on small fertility changes within regions that already had low fertility. We report some supplemental results using logs, mostly in the Appendix. But our focus is on the decline of fertility in absolute terms.

5.2 Sample

Relative to the dataset we used to describe rates of cohort fertility decline in Figure 1, we restrict the sample in two ways. First, we remove Argentina and Uruguay because these countries completed their fertility transitions before the start of our sample. Second, we remove women aged 50-59, so that all analyses of women's outcomes are based on 45-49 year-olds. This restriction ensures that we do not confuse age differences in key variables with cohort differences. Age effects on children ever born are minimal after age 45, but the same is not true of the other variables in our analysis, such as cumulative offspring mortality, cumulative migration, and employment.

After applying these restrictions while continuing to discard cells with fewer than 100 observations, we are left with 1,623 regional cohort cells based on 4,900,766 women aged 45-49 and 2,215 regional cohort cells based on 13,291,072 children aged 12-15. These cells derive from 276 and 284 regions, respectively, within the 15 countries in our main analysis sample. In both cases, the female birth cohorts span from 1920-24 to 1975-79.

Table 1 summarizes the cell-level dataset. Across regional cohort cells, average fertility is 4.59 children ever born and 4.04 surviving children. The average share of women living in an urban area is 70%, while the average share who moved from their region of birth is 31%. On average, 6% of women live with their mothers. The average of women's mean educational attainment is 5.46 years, and the average employment share is 35%. The average share married is 73%. Among husbands, average educational attainment is 5.78 years, and average employment is 84%. Among working husbands, the average agricultural share is 36%. For the 12-15 year-old children in the sample, the average share attending school is 76%, the average literacy rate is 91%, and the average primary completion rate is 55%. The average employment share is 13%.

6 Shared Cohort Trends across Regions

Figures 2 and 3 plot sample-wide cohort effects in key variables using Equation (1). In Figure 2, Panels A-H report cohort effects for variables characterizing women and their husbands in eight separate domains. Figure 3 does the same for children's outcomes. As described above, we add the mean of the region fixed effects to each cohort fixed effect to report a composition-adjusted mean.

Fertility Figure 2, Panel A, summarizes cohort fertility decline across the sample. This graph essentially aggregates the country-specific cohort time series from Figure 1, except the dataset now omits the two early-transition countries as well as women over 50. Sample-wide, average completed fertility started at 6.6 children ever born and 5.2 surviving children. Over the subsequent six decades of birth cohorts, children ever born fell by 4.2, while surviving children fell by 2.9. Holding sample composition constant, both gross and net fertility fell by more than half.

Mortality The fertility series in Figure 2, Panel A, already suggests cross-cohort declines in offspring mortality, evidenced by a narrowing gap between children ever born and surviving children. Panel B confirms the decline of the share of children who died. Among children born to women of the 1920-24 cohort, 21% died before their mothers reached their late 40s. Across the subsequent cohorts, this share fell 18 percentage points, an 86% decline. Appendix Figure A2 plots the national mortality series by country, finding downward trends in all countries.[18]

Marriage Turning to nuptiality, Figure 2, Panel C, plots cohort trends in the share never married by ages 45-49. Marriage became rarer on average across study cohorts, but the shift was small quantitatively. The share never married started at 12% in the 1920-24 cohort, fell to roughly 10% through the 1950s, and then rose to 15% by the 1975-79 cohort. The childless share also

[18] Venezuela exhibited low offspring mortality throughout, so its absolute decline was small. UN data confirm that Venezuela had low child mortality rates in 1970–2010, on par with Argentina and Uruguay (United Nations, 2024).

rose, from 8% to 11%. Childlessness is not a direct measure of nuptiality, but it is a primary mechanism through which non-marriage might be linked to children ever born. In sum, non-marriage and childlessness became slightly more prevalent sample-wide, but probably not enough to have a meaningful consequence for completed fertility. Furthermore, country-specific series reveal heterogeneity (Appendix Figure A3), with shares rising in some countries and falling in others.

Multigenerational living In Panel D of Figure 2, we consider coresidence with potential grandmothers. Women's rate of coresidence with their mothers-in-law hovered around 2% across study cohorts, but coresidence with their own mothers rose dramatically. The rate of maternal coresidence started at 3% in the 1920-24 cohort but then rose 8 percentage points, nearly quadrupling, by the 1975-79 cohort. Maternal grandmothers thus became more available to their adult daughters, although the relative importance of increased survival vis-à-vis increased coresidence conditional on survival is unclear. The low and flat rates for paternal grandmothers and the steep rise for maternal grandmothers was present in every sample country (Appendix Figure A4).

Urbanization and Migration Panel E of Figure 2 takes up population mobility and the rise of cities. Many women were living outside their birth regions in their late 40s, but this share was stable across birth cohorts at roughly 30%. In contrast, the urban share rose from 57% in the 1920-24 cohort to 77% in the 1975-79 cohort. Much of Latin America's urbanization took place before the censuses we use (Davis and Casis, 1946; Browning, 1958), but some did take place in the cohorts we study. Appendix Figure A5 plots these trends separately by country, confirming flat migration shares and rising urban shares in most countries. These patterns may in part reflect cross-country differences in the definition of an urban area and the scale of the first-level administrative division.

Adult Education The educational attainment of women and their husbands rose dramatically across study cohorts, as one can observe in Figure 2, Panel F. Women in the 1920-24 cohort averaged 2.8 years of education, while their husbands averaged 3.5. Over the subsequent half-century of birth cohorts, these averages rose to 9.6 and 9.4, respectively, roughly tripling. Appendix Figure A6 makes clear that all sample countries exhibited these increases, and in most countries, husbands and wives had similar levels of average education.

Adult Labor Panels G and H of Figure 2 turn to work, documenting divergent trends between women and their husbands. Employment rates changed dramatically for women but stayed steady for husbands, while the opposite is true for sectoral shares. The share of women engaged in market work averaged at 15% in the 1920-24 cohort and rose 44 percentage points subsequently. In contrast, the share of husbands working hovered between 80 and 90% for all cohorts. Among workers, women were uniformly employed outside of agriculture, while husbands progressively shifted out of it. In the 1920-24 cohort, half of employed husbands worked in the non-agricultural sector. By 1975-79, that share had risen to three-quarters. The sectoral transformation is linked with the urbanization patterns in Panel E, but it is less susceptible to differences in definitions across countries.[19] Appendix Figures A7 and A8 reveal that these divergent trends are common across countries. Because husbands almost universally worked, and female workers were almost universally outside agriculture, we focus below on women's employment shares and men's sectoral shares.

Child Schooling and Labor Figure 3 carries out an analogous exercise for our four children's outcomes, finding that school enrollment, literacy, and primary school completion rose, while work declined. As explained above, we focus on 12-15 year-olds, who were old enough to have data on all four outcomes in nearly every census and young enough to still nearly universally live with their mothers (Appendix Figure A1). School enrollment at these ages started at 65% among children of the 1920-24 cohort, then increased to reach 89% among children of the 1975-79 cohort. Literacy rose from 83% to 94%, and primary school completion from 41% to 68%. Meanwhile, the prevalence of work fell from 15% to 8%. The trends were visible in all countries for schooling and work but not literacy, which was already universal in some countries (Appendix Figure A9).

7 Cohort Progress and Cohort Fertility Change within Regions

In Figure 2, fertility fell across successive cohorts of women on average, while offspring survival, never-marriage, maternal coresidence, urban residence, education, and employment all rose. Husbands' education and non-agricultural work also rose. In Figure 3, school enrollment, literacy, primary completion, and non-employment increased among their children. Various theories link

[19] Nevertheless, the measurement of work sector also varies in quality across countries. In particular, many Colombian censuses had a write-in (rather than pre-coded) question about industry, which received low response rates.

fertility decline with these other developments, but continent-wide secular trends do not provide sufficient evidence on their own. The increases in schooling outcomes, for example, may have occurred in entirely different places from the decreases in fertility. Tables 2–5 rely on Equation (2) to scrutinize whether the timing and location of fertility decline line up with the timing and location of these other demographic and socioeconomic changes.

7.1 Mortality

As a first step toward characterizing the process of cohort fertility decline, we examine the relationship between offspring mortality and fertility. We take particular interest in whether fertility responded to mortality decline just enough to offset it, thus maintaining the existing number of surviving children, or instead outpaced mortality decline, so that the number of surviving children fell too. We take two approaches to answering this question using Equation (2).

In the first approach, we compare results from a regression of average children *ever born* on the share deceased with results from a regression of average *surviving* children on the share deceased. If fertility fell with mortality decline just enough to offset it, then the coefficient on the share deceased will be positive when the dependent variable is children ever born but zero when it is surviving children. If the fertility response outpaced mortality decline—consistent with "hoarding" theories—then the coefficient will be positive for both dependent variables.

In the second approach, a single regression with a log-log transformation summarizes both relationships. To see this point, start with the demographic identity that the number of surviving children S equals the number of children ever born E times the complement of the mortality share m: $S = (1 - m)E$. The question at hand involves the dependence of both counts on mortality, i.e., the functions $S(m)$ and $E(m)$. Differentiating the identity with respect to m establishes that S increases in m if and only if the elasticity of E with respect to m is greater than the odds of mortality. If the elasticity exactly equals the odds of mortality, then the fertility response exactly offsets mortality decline. A regression of log average children ever born on the log share of children estimates the elasticity, which we can then compare with the odds of offspring mortality. The estimate does not represent a causal response, but it is nevertheless useful as a descriptive tool.

Measurement error is a concern for both approaches because the dependent and independent variables are functions of the same underlying reports of births and deaths. The most natural form of measurement error would come from mothers omitting some children who died, which would lead to different bias with each dependent variable. Consider an additive measurement error that is independent of the true number of births, the true number of deaths, and the error term in Equation (2). With *children ever born* as the dependent variable (in either levels and logs), such a reporting error would bias the estimated slope upward. The omission of some deceased children reduces both reported children ever born and the reported share deceased, so that errors in the dependent and independent variables are positively correlated.[20] With *surviving children* as the dependent variable, the error would affect only the independent variable, not the dependent. The noise in the independent variable would attenuate the estimate, as in the case of classical measurement error.

Table 2 presents the results, with both approaches suggesting offsetting—not overshooting—fertility responses to mortality decline. The consistency of results is noteworthy because the most likely form of measurement error would bias the first approach toward understating, but the second approach toward overstating, the dependence of surviving fertility on mortality. Columns (1) and (3) implement the first approach, regressing one of the average counts of children on the share of children deceased. Column (2) implements the second approach, regressing log average children ever born on the log share deceased. All regressions include region fixed effects and country-cohort fixed effects, as in Equation (2).

Column (1) finds a positive and statistically significant coefficient for children ever born, but column (3) finds small, negative, and statistically non-significant coefficient for surviving children. The coefficient of 6.26 (std. err. = 1.02) for children ever born implies that the sample-wide 18 percentage point mortality decline observed in Figure 2 can account for a 1.13-child reduction in ever-born fertility. Meanwhile, the coefficient of -1.21 (std. err. = 0.82) for surviving children implies that mortality decline did not account for the observed reduction in surviving fertility. These results are consistent with parents reducing fertility to keep up with mortality decline but not adjusting the target number of surviving children.

Column (2) confirms this conclusion by estimating the elasticity of ever-born fertility to offspring mortality using the log-log regression. The estimated elasticity is 0.127 (std. err. = 0.015), implying that a 10% decline in the share deceased was associated with a 1.3% decline in children ever born. As noted above, the fertility response to mortality decline reduces surviving fertility if and only

[20] In the log-log regression, the same logic also holds with multiplicative instead of additive errors.

if this elasticity is greater than the odds of mortality. The mean odds of offspring mortality across regional cohorts was 0.121, almost identical to the estimated elasticity. At least in these observational data on regional cohorts, mortality decline was associated with falling ever-born but not surviving fertility.

7.2 Women's and Husbands' Characteristics

We next turn to the demographic and socioeconomic characteristics of women and their husbands. Tables 3 and 4 estimate how these variables relate to ever-born and surviving fertility, respectively. We focus on the five remaining domains described above: (i) marriage, (ii) multigenerational living, (iii) urbanization and migration, (iv) education, and (v) work. In both tables, column (1) reports a regression of fertility on variables from a single domain using all regional cohort cells with the relevant data. Column (2) repeats the exercise but restricts the data to the common sample of regional cohort cells that have variables from all domains. The remaining columns then sequentially add covariates, keeping with the common sample. Column (3) adds women's education, column (4) further adds women's never-marriage, and column (5) controls for covariates in all domains.

The most parsimonious regressions, in columns (1)-(2) of both tables, show that changes in women's and husbands' average characteristics across all five domains were associated with changes in fertility. The associations are similar in the full sample for each domain and in the common sample across domains. Many are consistent with existing research. Consistent with marriage as a proximate determinant (Bongaarts, 1978), increases in the share never married predicted decreases in both measures of fertility. Consistent with longstanding urban-rural differences (Kuznets, 1974; Lerch, 2019), urbanization predicted the same. So did increases in women's education, long considered a fundamental determinant (Martin, 1995), and women's work, consistent with a role for women's opportunity cost of time (Schultz, 1997, 1985; Galor and Weil, 1996). The decline of agriculture also predicted fertility decline, consistent with an economic value of children in agriculture (Cain, 1977; Rosenzweig, 1977; Rosenzweig and Evenson, 1977; Lee and Kramer, 2002). Never-marriage, urbanization, women's education, women's employment, and the non-agricultural sector all expanded in Figure 2, so all five domains have the potential to explain cohort fertility decline. In more surprising results, fertility decline was associated with increases in maternal coresidence and cross-regional migration. In Figure 2, the former rose across cohorts, but the latter did not.

In the remaining columns of Tables 3 and 4, we sequentially add covariates to the common-sample regressions from column (2).[21] Column (3) adds women's education to all regressions, and several coefficients shrink. Women's education explains 30-35% of the association between maternal coresidence and fertility, 47-70% of that between urbanization and fertility, 59-82% of that between women's employment and fertility, and 27-51% of that between the non-agricultural share and fertility. Because women's schooling decisions precede decisions in the other domains, one can think of women's education as a confounder, or deeper determinant, that explains substantial parts of the other relationships.

In column (4), controlling further for never-marriage has a different interpretation, since marriage is more plainly co-determined with fertility. In other words, we cannot distinguish between never-marriage as a confounder or mediator. Regardless, never-marriage does not substantially explain the within-region associations of fertility with urbanization, migration, education, women's employment, or husbands' sector. It does, however, explain the association of rising maternal coresidence with falling fertility. So maternal coresidence mainly served as a proxy for being more educated and not being married.

Column (5) of both tables reports a multivariate regression that simultaneously includes covariates from all five domains. Here we see that rising education and structural transformation out of agriculture can explain considerable shares of fertility decline, while rising women's employment, urban residence, and maternal coresidence cannot. The coefficients on women's education are -0.24 and -0.25, respectively, for ever-born and surviving fertility. Thus, a four-year increase in average women's schooling predicted a decline of one child per woman. If we line up these quantities with the sample-wide cohort trends in Figure 2, they imply that rising women's education can account for 39% of the decline in children ever born and 58% of the decline in surviving children. The coefficients on husbands' education are smaller, -0.07 and -0.06, implying that male education can account for another 9-13% of these declines. Meanwhile, the coefficients on husbands' non-agricultural employment are -0.68 and -0.61, respectively. Moving from 100% in agriculture to 0% would predict fertility decline on the order of two-thirds of a child per woman. Based on sample-wide trends, structural transformation out of agriculture can account for 5-6% of fertility decline.

[21] Column (3) does not report coefficients on education because they would be identical to those in column (2). Column (4) does not report the coefficient on never-marriage because it would be identical to that in column (3).

Two other variables also have statistically significant associations with ever-born and surviving fertility in column (5), but the cohort trends these variables are too small for them to account for fertility decline. The coefficients on the share of women never married are -2.41 and -2.12, respectively, for ever-born and surviving fertility. However, never-marriage rose only 2.3 percentage points across cohorts sample-wide, so it can account for less than 2% of fertility decline. Similarly, the coefficients on the share living outside the region of birth are both 0.89, but the share declined 5 percentage points sample-wide, so it too can account for less than 2% of fertility decline.

Two null results in column (5) stand out. First, net of fixed effects and other covariates, the share of women living in an urban area was unrelated to children ever born and surviving children. Estimates from the parsimonious regressions in column (2) imply that urbanization can account for 9-10% of cohort fertility decline, but the inclusion of other covariates eliminates the association. However, we interpret this result as an artifact of measurement error in the urban share. Because the urban share was highly correlated with the non-agricultural share, it loses its explanatory power when we include both covariates.[22] The results strongly suggest a connection between the rise of industrialized cities and the decline of fertility, but the data do not allow us to cleanly distinguish population density from sectoral composition.

Second, net of fixed effects and other covariates, women's employment had no significant relationship with either measure of fertility. The parsimonious regressions in column (2) found that rising women's employment could account for 15-25% of cohort fertility decline, but the inclusion of other covariates shrinks the estimated coefficients more than 80% and eliminates their statistical significance. Women's work grew dramatically across study cohorts, but this ascent was not associated with fertility decline. This result challenges theories in which women's work plays a key role in fertility decline but does not entirely refute them (Schultz, 1997, 1985; Galor and Weil, 1996). Women's wage is key to these theories, and the employment rate may be a poor proxy for the wage. Women's education may be a better proxy, and rising women's education strongly predicts fertility decline. Whatever the case, if opportunity costs played a role in fertility decline, they mattered on the intensive margin (hours) rather than the extensive margin (employment).

We have analyzed cohort fertility in levels rather than logs to focus on the transition from

[22] The unconditional correlation of the non-agricultural share with the urban share is 0.87, and the correlation conditional on the fixed effects in Equation (2) is 0.49.

high to low fertility. For completeness, Appendix Tables A1 and A2 rerun the regressions with log-transformed dependent variables. These supplemental analyses speak to the predictors of proportional rather than absolute changes in fertility, so they change the nature of the question. When we analyze covariates from each domain separately, the results in logs are similar to the results in levels, but some notable differences emerge in the multivariate models. Rising women's education continues to be a dominant force, but the result for sectoral transformation is less robust. Furthermore, maternal coresidence and women's employment display significantly negative associations with log fertility, suggesting that these variables were more relevant for fluctuations in a low-fertility regime than for the transition between high- and low-fertility regimes.[23]

7.3 Child Outcomes

We follow the convention of regressing average child outcomes on average fertility using Equation (2). Because the variables reflect joint parental decisions, so the choice of independent variable is arbitrary. For each of the four measures of investment in children, we report two estimations, one for children ever born and one for surviving children.

Table 5 reveals scant evidence that fertility decline systematically coincided with rising investment in children. In within-region variation across maternal cohorts, average children ever born was not associated with children's school enrollment, nor with literacy, nor with work (Panel A). It was significantly negatively associated with primary completion (coef. = -0.015, std. err. = 0.005), but this association becomes small and statistically non-significant when we use surviving fertility in Panel B. Variation in surviving fertility also fails to predict variation in school enrollment and work. And the link between surviving fertility and literacy is significantly *positive* (coef. = 0.021, std. err. = 0.006).

Cohort fertility decline within a region was not systematically related to improvements in child outcomes. This result, which continues to hold if we model fertility in logs rather than levels (Appendix Table A3), seems at odds with a vast literature finding negative associations between family size and child schooling (Blake, 1989; Buchmann and Hannum, 2001). At the same time, applied microeconomics research has struggled to establish compelling evidence of a causal effect

[23]This finding is consistent with Doepke et al.'s (2023) argument that institutions related to women's work and care responsibilities have become relevant in low-fertility contexts.

of the former on the latter (Clarke, 2018). To assess how our results line up against the negative associations common in cross-sectional data, Appendix Table A4 re-estimates the regressions from Table 5 with no fixed effects. In pooled cross-sectional variation, average fertility is strongly negatively associated with enrollment, literacy, and primary completion, and positively associated with employment.[24] Average child outcomes are negatively associated with average fertility in the regional cross-section but not the regional cohort panel.

8 Conclusion

A cohort lens offers new insights into Latin America's historic fertility transition. We use harmonized census microdata to follow female birth cohorts from the 1920s to 1970s across subnational regions in 17 countries. These data allow us to document how other demographic and socioeconomic processes co-evolved with completed fertility.

The facts are numerous. Mortality decline went hand-in-hand with reductions in gross but not net fertility, a novel cohort-level demonstration that parents offset improved survival without otherwise reducing target family size. Many broader changes that swept Latin America across these cohorts—urbanization, industrialization, rising educational attainment, women's employment, and multigenerational living—predicted fertility decline individually, consistent with leading theories. But covariate adjustment reveals rising women's educational attainment to be the dominant force, accounting for 39% of the decline in children ever born and 58% of the decline in surviving children. Structural transformation out of agriculture contributed a further 5–6%. By contrast, the quadrupling of women's employment had no residual association with fertility decline, challenging theories in which market work drives fertility through the opportunity cost of time.

Perhaps more surprisingly, cohort fertility decline within a region was not systematically related to improvements in children's outcomes. School enrollment, literacy, primary completion, and employment all improved markedly across maternal cohorts, but these gains did not track regional fertility decline. This pattern, which aligns with Marteleto and de Souza's 2012 finding that twin births do not reduce siblings' schooling in Brazil, raises questions about the quantitative importance

[24] The cross-sectional associations are large. Depending on the measure of fertility, a one-child increase predicts a 7-9 percentage point decline in enrollment, a 4-5 percentage point decline in literacy, an 11-13 percentage point decline in primary completion, and a 3 percentage point increase in employment.

of the quantity-quality tradeoff and related fertility-schooling linkages as drivers of modern fertility transitions (Becker and Lewis, 1973; Caldwell, 1980; Galor and Weil, 2000). It does not outright reject these theories—for example, nuanced lag structures may still be possible—but if they were quantitatively important, one would expect to see cohorts with lower fertility have more educated children.[25] It also echoes recent findings for sub-Saharan Africa (Vogl, 2025), where cohort fertility decline has been strongly associated with rising women's education but not children's.

Our analysis is intentionally descriptive. Demographic and socioeconomic change have bidirectional causal linkages and may be jointly driven by unobserved forces. Research designs leveraging policies or shocks can help disentangle these linkages, the facts of where and when cohort fertility fell are crucial to formulating and assessing theories of fertility change, as well as generating hypotheses for causal work.

The paper illustrates the value of a cohort perspective on historical demographic transitions. A cohort lens connects lifetime fertility outcomes to the lifetime resources and circumstances that many theories of fertility decline emphasize. As census microdata accumulate for other world regions that underwent large 20^{th}-century fertility declines, similar cohort analyses can deepen our understanding of one of the most consequential demographic transformations in human history.

[25] As Esteve et al. (2025) note, many other changes in Latin American family structure may influence children's education.

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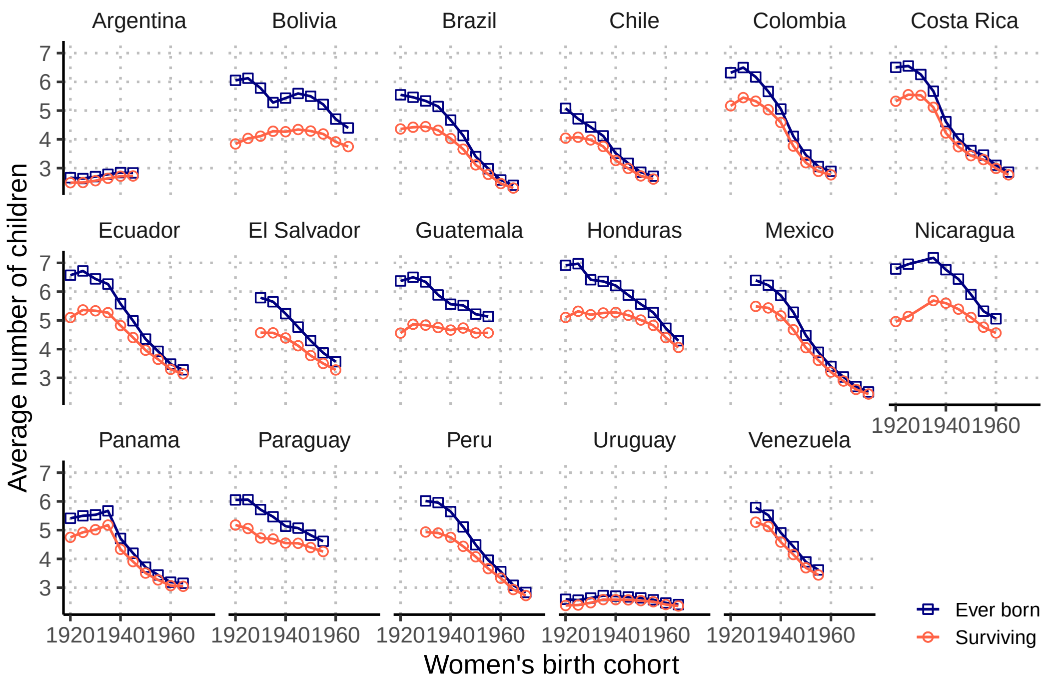
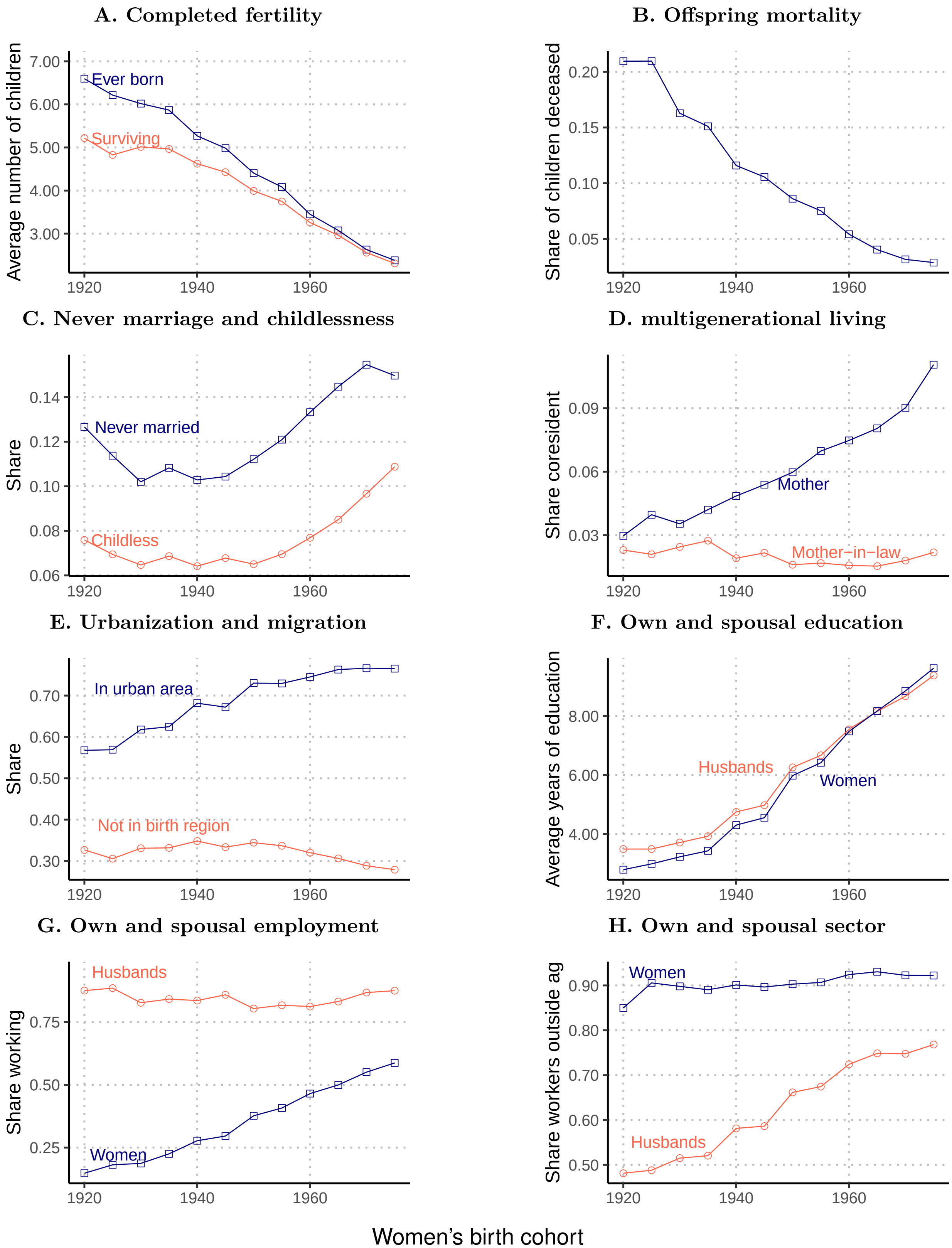
Figure 1: Completed fertility by country and cohort, women 45-59



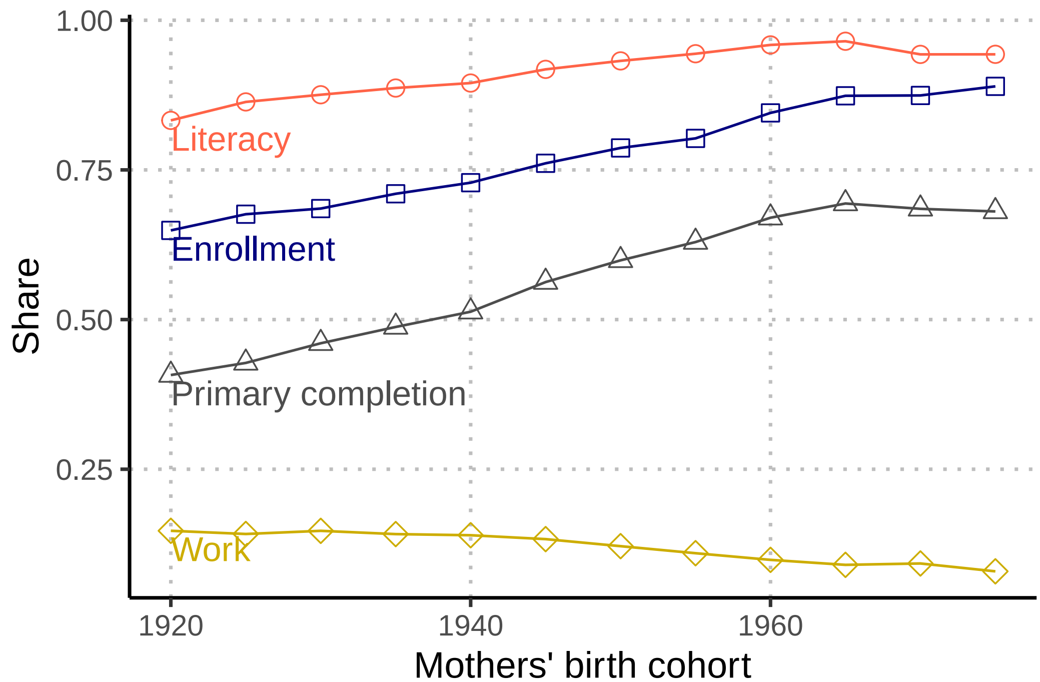
Note: Sample includes women aged 45-59. The age range is wider than in subsequent results (45-49) because completed fertility changes minimally after age 45.

Figure 2: Cohort effects in demographic and socioeconomic variables, women 45-59



Note: Points represent composition-adjusted cohort means based on regression models with birth cohort and birth region fixed effects. Standard errors are clustered by birth region. Sample restricted to departments with at least 100 women aged 45–49.

Figure 3: School and work by mother's cohort, children ages 12-15



Note: Sample includes children aged 12-15 with mothers in study cohorts. Points represent composition-adjusted cohort means based on regression models with birth cohort and birth region fixed effects. Standard errors are clustered by birth region. Chile is excluded from the analysis of child outcomes because school enrollment is unavailable in two censuses, and work is unavailable for 12-15 year-olds.

Table 1: Summary statistics, regional cohort cells

Women 45-49			Children 12-15		
Children ever born	4.59	(1.39)	Share enrolled	0.76	(0.14)
Surviving children	4.04	(1.00)	Share literate	0.91	(0.11)
Share of children deceased	0.10	(0.07)	Share completed primary	0.55	(0.24)
Share in urban area	0.70	(0.19)	Share working	0.13	(0.07)
Share not in birth region	0.31	(0.15)			
Share with coresident mother	0.06	(0.03)			
Average years of education	5.46	(2.64)			
Share working	0.35	(0.14)			
Share out of agriculture	0.10	(0.11)			
Share married	0.73	(0.05)			
Share widowed / separated	0.16	(0.05)			
Share with coresident mother-in-law	0.02	(0.01)			
Average years of education, husbands	5.78	(2.58)			
Share working, husbands	0.84	(0.08)			
Share out of agriculture, husbands	0.36	(0.20)			
Regional cohort cells	1,623		Regional cohort cells	2,215	
Women	4,900,766		Children	13,291,072	

Note: Means with standard deviations in parentheses. Cohorts are defined by the birth year of the woman or mother. Cells with fewer than 100 individuals are excluded. Non-agricultural shares are conditional on working.

Table 2: Offspring mortality and cohort completed fertility

	Children ever born (1)	Log children ever born (2)	Surviving children (3)
Share of children deceased	6.255***		-1.206
	(1.016)		(0.820)
Log share of children deceased		0.127***	
		(0.015)	
Regional cohort cells	1,623	1,623	1,623
Fixed effects			
Region fixed effects	X	X	X
Country-cohort fixed effects	X	X	X

Note: Standard errors clustered by women's birth region. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Demographic and socioeconomic predictors of cohort children ever born

	Full sample	Common sample			
	(1)	(2)	(3)	(4)	(5)
A. Marriage					
Share never married	-3.098***	-3.178***	-2.522***		-2.410***
	(0.650)	(0.661)	(0.594)		(0.587)
Regional cohort cells	1,623	1,466	1,466		1,466
B. Multigenerational Living					
Share with coresident mother	-2.445***	-2.125**	-1.380*	-0.360	-0.626
	(0.850)	(0.850)	(0.754)	(0.802)	(0.704)
Share with coresident MIL	-1.742	-2.131	-2.202	-2.230*	-1.119
	(1.511)	(1.497)	(1.355)	(1.319)	(1.226)
Regional cohort cells	1,623	1,466	1,466	1,466	1,466
C. Urbanization and migration					
Share in urban area	-2.166***	-1.987***	-0.934**	-0.915**	-0.271
	(0.383)	(0.349)	(0.379)	(0.384)	(0.388)
Share not in birth region	0.731**	0.601*	0.741***	0.675**	0.895***
	(0.318)	(0.324)	(0.278)	(0.285)	(0.247)
Regional cohort cells	1,535	1,466	1,466	1,466	1,466
D. Education					
Average years of education, women	-0.323***	-0.283***		-0.268***	-0.240***
	(0.044)	(0.041)		(0.041)	(0.040)
Average years of education, husbands	-0.078**	-0.100***		-0.103***	-0.067*
	(0.039)	(0.038)		(0.038)	(0.037)
Regional cohort cells	1,573	1,466		1,466	1,466
E. Work					
Share of women working	-0.888**	-1.396***	-0.253	-0.046	-0.236
	(0.430)	(0.410)	(0.383)	(0.379)	(0.360)
Share of working husbands outside ag	-1.888***	-1.576***	-0.998***	-1.012***	-0.681**
	(0.289)	(0.275)	(0.275)	(0.276)	(0.281)
Regional cohort cells	1,592	1,466	1,466	1,466	1,466
Fixed effects and covariates					
Region fixed effects	X	X	X	X	X
Country-cohort fixed effects	X	X	X	X	X
Average years of education, women			X	X	X
Share never married				X	X
All other predictors					X

Note: Standard errors clustered by women's birth region. MIL = mother-in-law. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Demographic and socioeconomic predictors of cohort surviving children

	Full sample	Common sample			
	(1)	(2)	(3)	(4)	(5)
A. Marriage					
Share never married	-2.916***	-3.114***	-2.529***		-2.124***
	(0.533)	(0.547)	(0.484)		(0.490)
Regional cohort cells	1,623	1,466	1,466		1,466
B. Multigenerational Living					
Share with coresident mother	-2.403***	-2.205***	-1.540***	-0.548	-0.780
	(0.676)	(0.668)	(0.570)	(0.602)	(0.609)
Share with coresident MIL	0.474	-0.106	-0.168	-0.196	-0.658
	(1.257)	(1.235)	(1.098)	(1.060)	(1.028)
Regional cohort cells	1,623	1,466	1,466	1,466	1,466
C. Urbanization and migration					
Share in urban area	-1.510***	-1.427***	-0.421	-0.402	-0.067
	(0.297)	(0.297)	(0.281)	(0.282)	(0.308)
Share not in birth region	0.865***	0.874***	1.008***	0.942***	0.889***
	(0.246)	(0.254)	(0.214)	(0.216)	(0.214)
Regional cohort cells	1,535	1,466	1,466	1,466	1,466
D. Education					
Average years of education, women	-0.307***	-0.265***		-0.251***	-0.247***
	(0.041)	(0.036)		(0.036)	(0.036)
Average years of education, husbands	-0.043	-0.074**		-0.076**	-0.064**
	(0.035)	(0.032)		(0.032)	(0.032)
Regional cohort cells	1,573	1,466		1,466	1,466
E. Work					
Share of women working	-1.398***	-1.675***	-0.655**	-0.455	-0.332
	(0.333)	(0.328)	(0.309)	(0.307)	(0.309)
Share of working husbands outside ag	-1.195***	-1.006***	-0.490**	-0.502**	-0.610**
	(0.214)	(0.226)	(0.205)	(0.205)	(0.236)
Regional cohort cells	1,592	1,466	1,466	1,466	1,466
Fixed effects and covariates					
Region fixed effects	X	X	X	X	X
Country-cohort fixed effects	X	X	X	X	X
Average years of education, women			X	X	X
Share never married				X	X
All other predictors					X

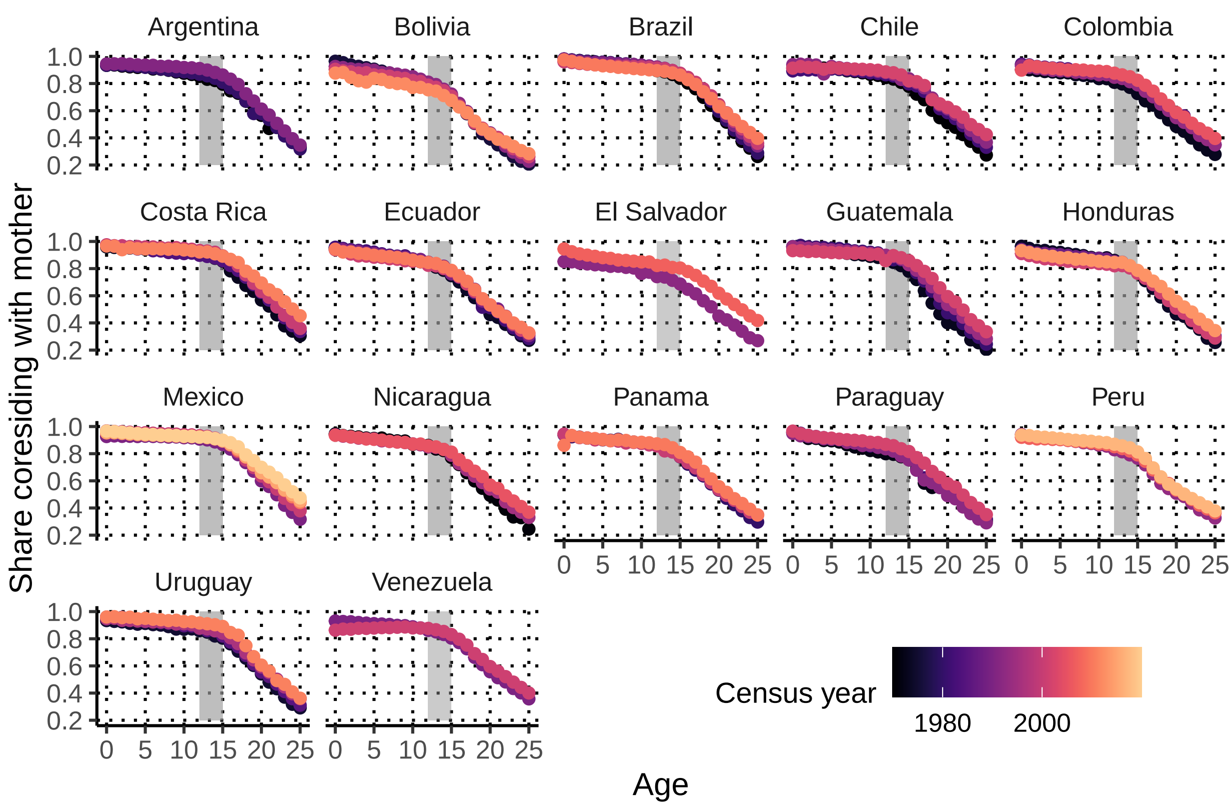
Note: Standard errors clustered by women's birth region. MIL = mother-in-law. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Cohort fertility and child school and work

	School enrollment (1)	Literacy (2)	Primary completion (3)	Work (4)
A. Children ever born				
Average children ever born	-0.009	0.004	-0.015***	0.000
	(0.006)	(0.006)	(0.005)	(0.003)
Regional cohort cells	2,215	2,215	2,215	1,976
B. Surviving children				
Average surviving children	0.002	0.021***	-0.011	-0.003
	(0.007)	(0.006)	(0.007)	(0.004)
Regional cohort cells	2,215	2,215	2,215	1,976
Fixed effects				
Region fixed effects	X	X	X	X
Country-cohort fixed effects	X	X	X	X

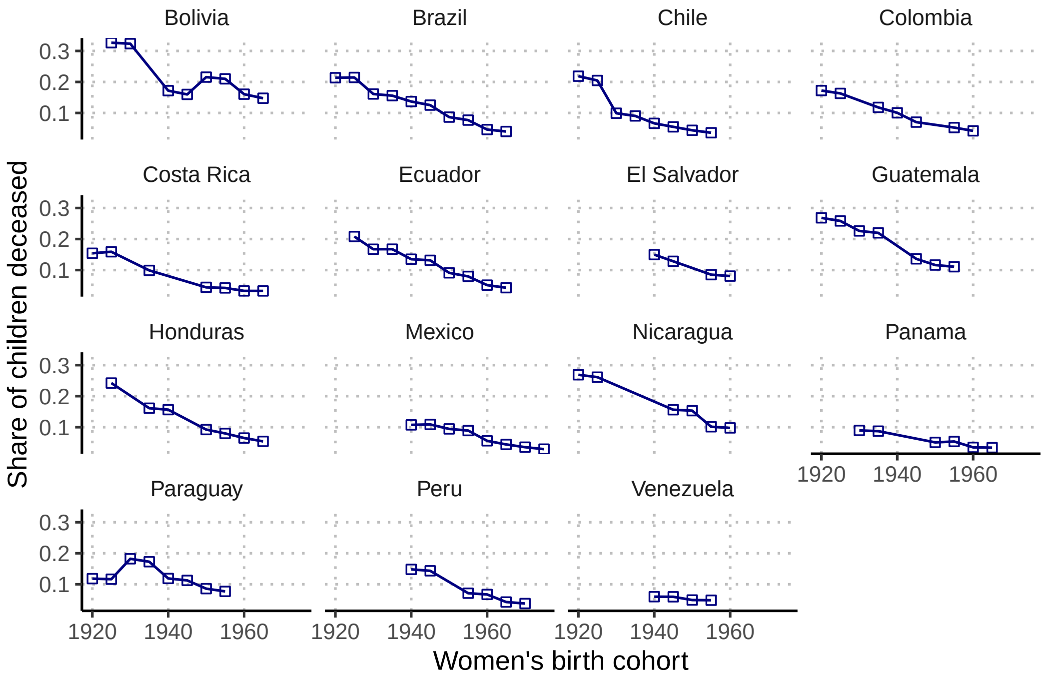
Note: Standard errors clustered by women's birth region. MIL = mother-in-law.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure A1: Maternal coresidence by age, country, and year



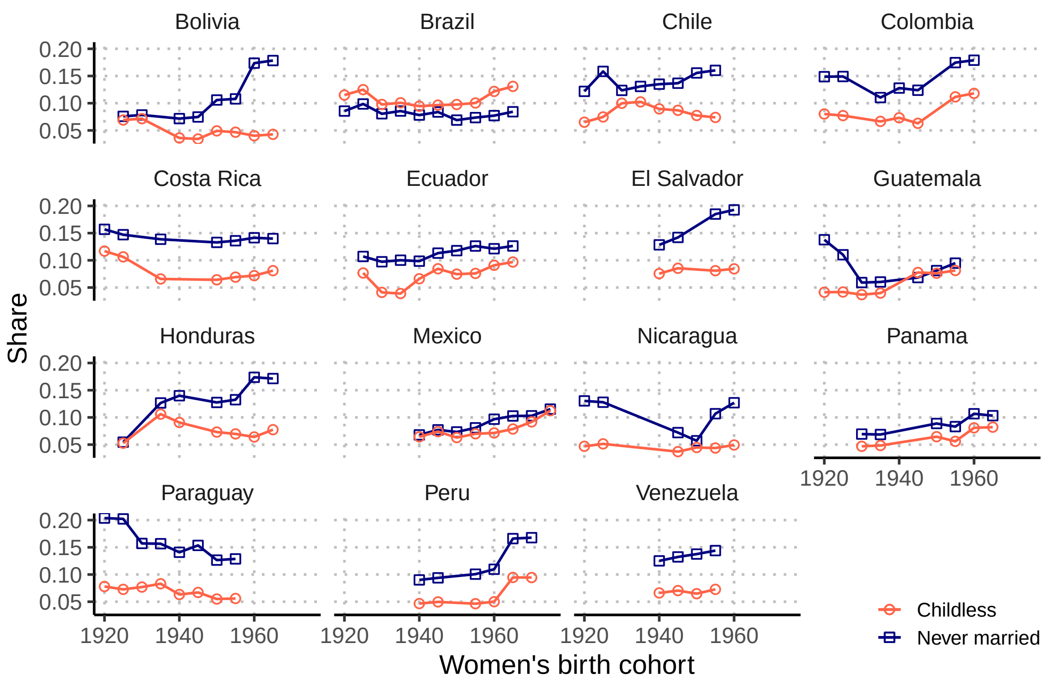
Note: Sample includes all 5-24 year-olds in study censuses. Within each country, each distinct color represents a separate census. Gray rectangle delimits the 12-15 age range for measuring child outcomes.

Figure A2: Offspring mortality by country and cohort, women 45-49



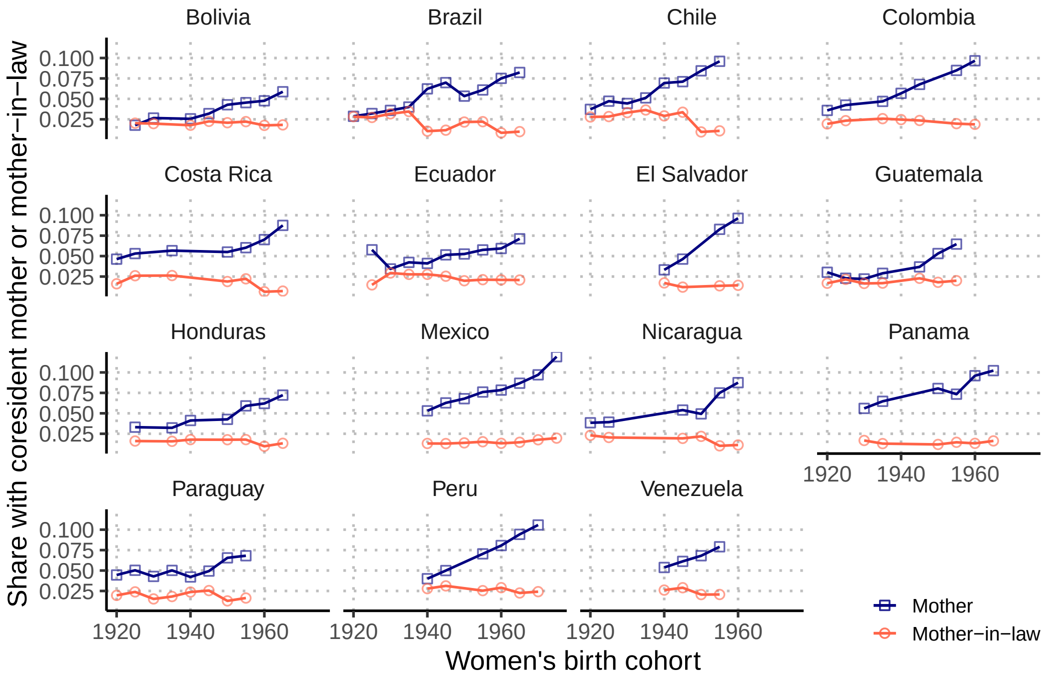
Note: Sample includes women aged 45-49. The share of children deceased equals children ever deceased divided by children ever born, irrespective of age.

Figure A3: Never marriage and childlessness by country and cohort, women 45-49



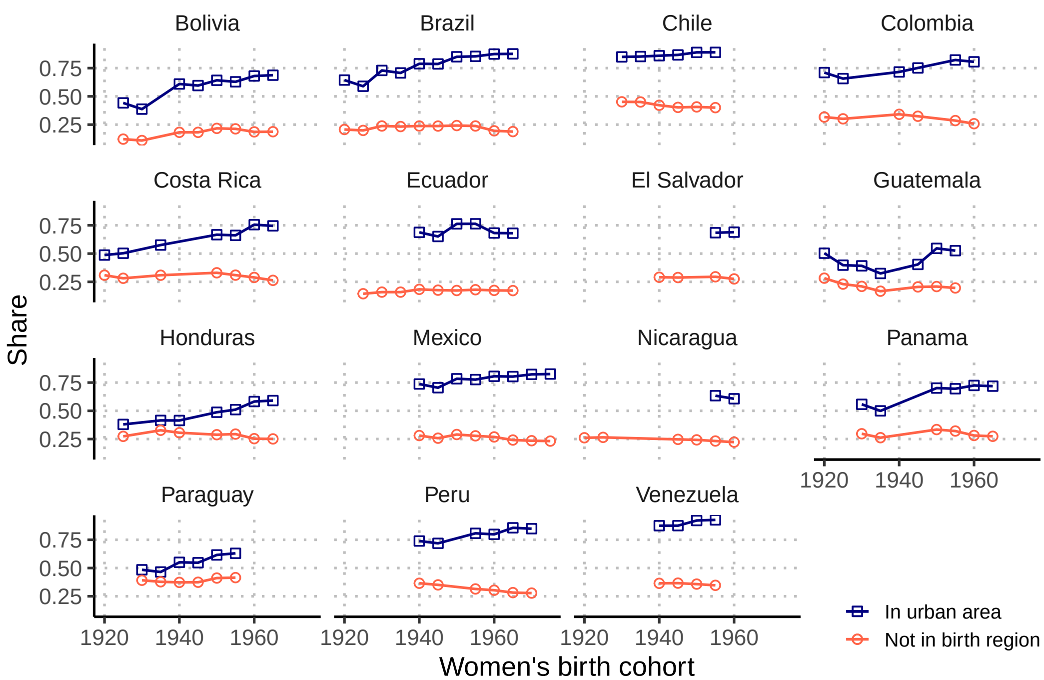
Note: Sample includes women aged 45-49.

Figure A4: multigenerational living by country and cohort, women 45-49



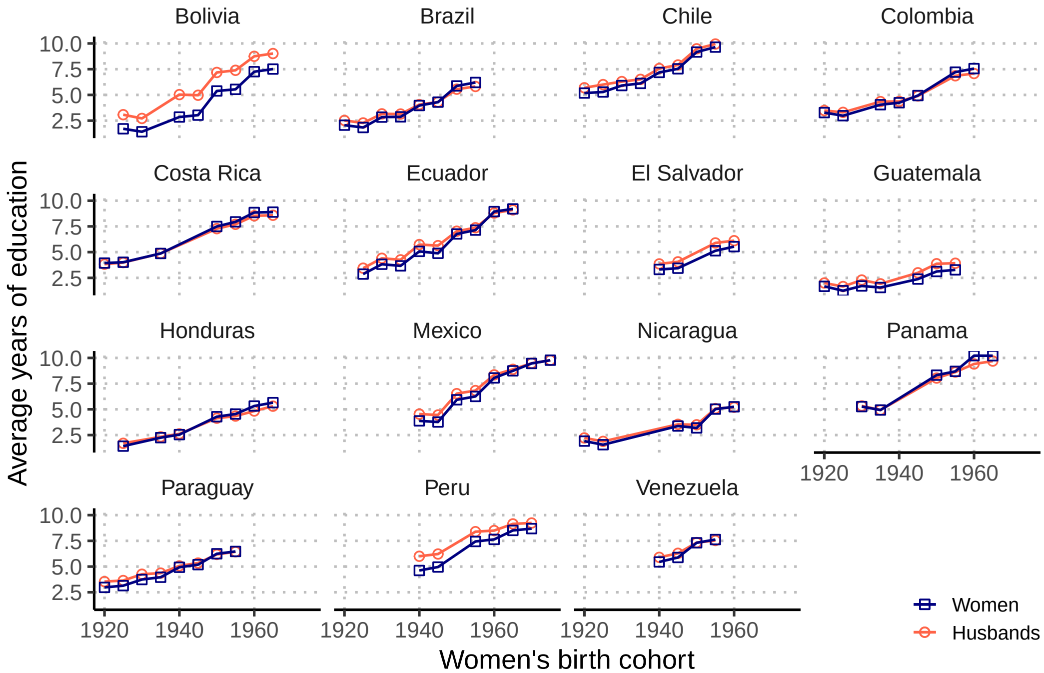
Note: Sample includes women aged 45-49. Linkage to mothers and mothers-in-law uses the coding of family interrelationships by Ruggles et al. (2025).

Figure A5: Urbanization and migration by country and cohort, women 45-49



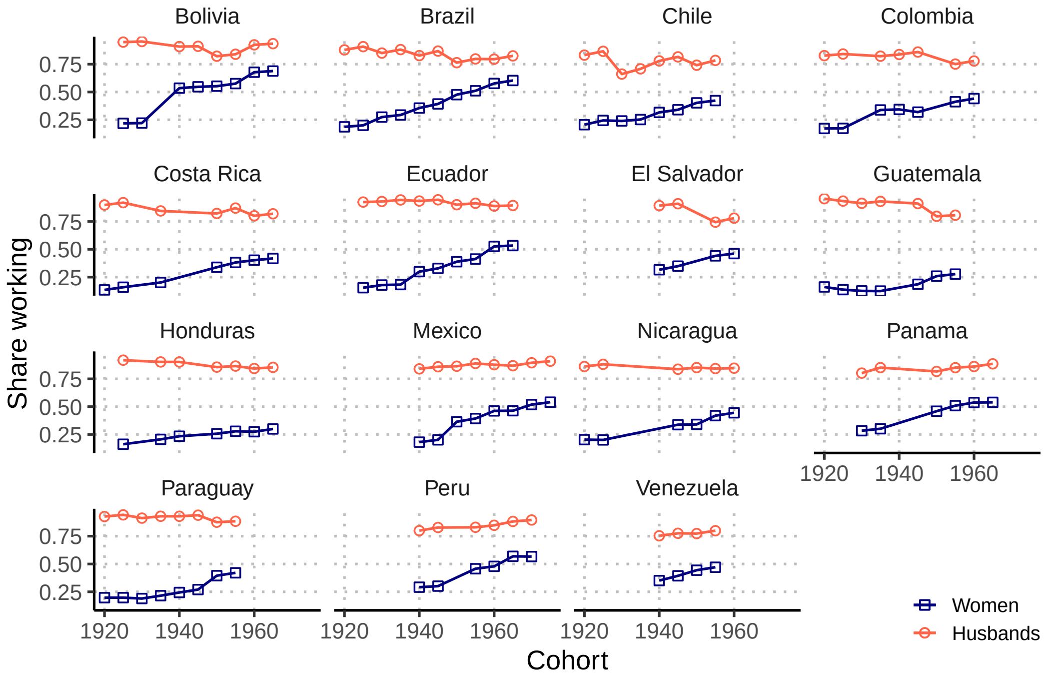
Note: Sample includes women aged 45-49. Urban residence is measured at the local level, whereas migration is measured at the region level. Urban definition varies by country, and some censuses lack data on urban residence.

Figure A6: Own and spousal education by country and cohort, women 45-49



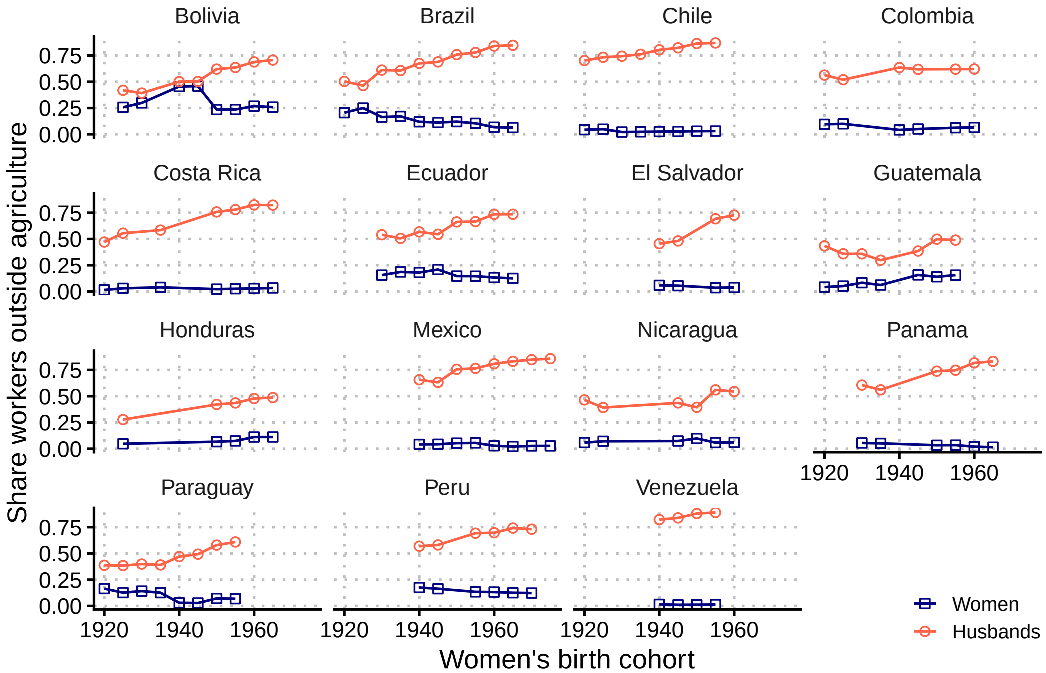
Note: Sample includes women aged 45-49 and their husbands.

Figure A7: Own and spousal employment by country and cohort, women 45-49



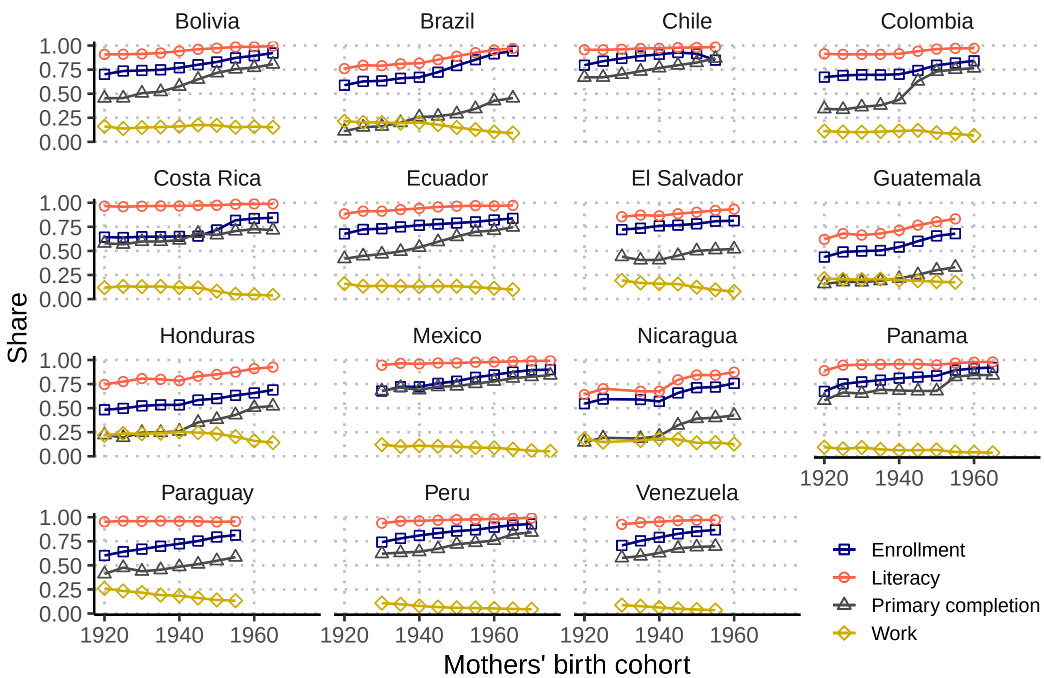
Note: Sample includes women aged 45-49 and their husbands.

Figure A8: Own and spousal sector of employment by country and cohort, women 45-49



Note: Sample includes working women aged 45-49 and working men with wives aged 45-59.

Figure A9: School and work by mother's country and cohort, children ages 12-15



Note: Sample includes children aged 12-15 with mothers in study cohorts. Chile is excluded from the analysis of child outcomes because school enrollment is unavailable in two censuses, and work is unavailable for 12-14 year-olds.

Table A1: Demographic and socioeconomic predictors of cohort log children ever born

	Full sample	Common sample			
	(1)	(2)	(3)	(4)	(5)
A. Marriage					
Share never married	-0.798***	-0.866***	-0.721***		-0.585***
	(0.111)	(0.115)	(0.098)		(0.098)
Regional cohort cells	1,623	1,466	1,466		1,466
B. Multigenerational Living					
Share with coresident mother	-0.842***	-0.819***	-0.655***	-0.393***	-0.394***
	(0.159)	(0.162)	(0.140)	(0.148)	(0.145)
Share with coresident MIL	0.133	0.012	-0.004	-0.011	0.032
	(0.276)	(0.287)	(0.243)	(0.238)	(0.230)
Regional cohort cells	1,623	1,466	1,466	1,466	1,466
C. Urbanization and migration					
Share in urban area	-0.272***	-0.272***	-0.015	-0.010	0.083
	(0.072)	(0.071)	(0.057)	(0.056)	(0.061)
Share not in birth region	0.152**	0.138**	0.172***	0.153***	0.169***
	(0.061)	(0.057)	(0.051)	(0.049)	(0.050)
Regional cohort cells	1,535	1,466	1,466	1,466	1,466
D. Education					
Average years of education, women	-0.076***	-0.068***		-0.063***	-0.057***
	(0.009)	(0.008)		(0.008)	(0.008)
Average years of education, husbands	-0.010	-0.016**		-0.017**	-0.016**
	(0.008)	(0.008)		(0.008)	(0.008)
Regional cohort cells	1,573	1,466		1,466	1,466
E. Work					
Share of women working	-0.432***	-0.496***	-0.243***	-0.188***	-0.209***
	(0.083)	(0.077)	(0.072)	(0.071)	(0.070)
Share of working husbands outside ag	-0.218***	-0.185***	-0.057	-0.060	-0.077
	(0.049)	(0.051)	(0.046)	(0.046)	(0.048)
Regional cohort cells	1,592	1,466	1,466	1,466	1,466
Fixed effects and covariates					
Region fixed effects	X	X	X	X	X
Country-cohort fixed effects	X	X	X	X	X
Average years of education, women			X	X	X
Share never married				X	X
All other predictors					X

Note: Standard errors clustered by women's birth region. MIL = mother-in-law. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A2: Demographic and socioeconomic predictors of cohort log surviving children

	Full sample	Common sample			
	(1)	(2)	(3)	(4)	(5)
A. Marriage					
Share never married	-0.825***	-0.901***	-0.764***		-0.588***
	(0.112)	(0.117)	(0.101)		(0.098)
Regional cohort cells	1,623	1,466	1,466		1,466
B. Multigenerational Living					
Share with coresident mother	-0.829***	-0.821***	-0.666***	-0.387***	-0.395***
	(0.156)	(0.159)	(0.139)	(0.144)	(0.145)
Share with coresident MIL	0.425	0.263	0.249	0.241	0.025
	(0.285)	(0.292)	(0.254)	(0.247)	(0.232)
Regional cohort cells	1,623	1,466	1,466	1,466	1,466
C. Urbanization and migration					
Share in urban area	-0.213***	-0.221***	0.031	0.037	0.084
	(0.075)	(0.075)	(0.058)	(0.057)	(0.061)
Share not in birth region	0.189***	0.194***	0.228***	0.208***	0.179***
	(0.063)	(0.060)	(0.056)	(0.053)	(0.050)
Regional cohort cells	1,535	1,466	1,466	1,466	1,466
D. Education					
Average years of education, women	-0.075***	-0.066***		-0.062***	-0.059***
	(0.010)	(0.009)		(0.009)	(0.009)
Average years of education, husbands	-0.006	-0.013		-0.014*	-0.016**
	(0.009)	(0.008)		(0.008)	(0.008)
Regional cohort cells	1,573	1,466		1,466	1,466
E. Work					
Share of women working	-0.499***	-0.536***	-0.298***	-0.239***	-0.204***
	(0.079)	(0.077)	(0.074)	(0.073)	(0.071)
Share of working husbands outside ag	-0.142***	-0.119**	0.002	-0.002	-0.081*
	(0.049)	(0.054)	(0.048)	(0.047)	(0.049)
Regional cohort cells	1,592	1,466	1,466	1,466	1,466
Fixed effects and covariates					
Region fixed effects	X	X	X	X	X
Country-cohort fixed effects	X	X	X	X	X
Average years of education, women			X	X	X
Share never married				X	X
All other predictors					X

Note: Standard errors clustered by women's birth region. MIL = mother-in-law. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A3: Cohort log fertility and child school and work

	School enrollment (1)	Literacy (2)	Primary completion (3)	Work (4)
A. Children ever born				
Log average children ever born	-0.006	0.088***	-0.041	-0.004
	(0.029)	(0.028)	(0.030)	(0.016)
Regional cohort cells	2,215	2,215	2,215	1,976
B. Surviving children				
Log average surviving children	0.033	0.129***	-0.017	-0.015
	(0.027)	(0.024)	(0.031)	(0.016)
Regional cohort cells	2,215	2,215	2,215	1,976
Fixed effects				
Region fixed effects	X	X	X	X
Country-cohort fixed effects	X	X	X	X

Note: Parentheses contain standard errors clustered by women's birth region.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A4: Pooled cross-sectional child outcome regressions

	School enrollment (1)	Literacy (2)	Primary completion (3)	Work (4)
A. Children ever born				
Average children ever born	-0.072***	-0.043***	-0.109***	0.028***
	(0.003)	(0.003)	(0.005)	(0.002)
Regional cohort cells	2,215	2,215	2,215	1,976
B. Surviving children				
Average surviving children	-0.089***	-0.048***	-0.132***	0.032***
	(0.004)	(0.004)	(0.007)	(0.003)
Regional cohort cells	2,215	2,215	2,215	1,976

Note: Standard errors clustered by women's birth region. MIL = mother-in-law.
Regressions include no fixed effects. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$