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Persistent inequalities in adolescent motherhood in Peru (1981–2017): From wide approaches to intercategorical mapping

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ABSTRACT

Adolescent motherhood in Peru has declined over the past four decades; however, pronounced socioeconomic disparities persist. Drawing on microdata from the 1981, 1993, 2007, and 2017 population censuses—which contain sample sizes more than two orders of magnitude larger than those of Demographic and Health Surveys (DHS)—this study examines the long-run evolution of inequalities in adolescent motherhood. We employ relative risk measures, concentration indices, and their decompositions. We also apply a descriptive intercategorical approach that identifies small, multiply disadvantaged groups, a methodology feasible only with large amounts of data, such as census microdata. National prevalence decreased from 15.4% in 1993 to 11.5% in 2017; nonetheless, the risk ratio between adolescents in the poorest and richest wealth quintiles remained strikingly high. The concentration index (CI) declined between 1981 and 2007; however, this trend reversed after 2007. Decomposition analysis shows that between 1981 and 2007, the main factor statistically contributing to inequality was education level, accounting for approximately one-third of the total CI. Finally, the intercategorical mapping reveals that in 2017, three groups jointly defined by wealth, education, ethnicity, region, and rurality continued to face adolescent motherhood rates of 43%, levels that have remained virtually unchanged since 1993.

1. Introduction

Adolescent motherhood remains a public health problem worldwide, particularly in low- and middle-income countries, with some studies and international organizations reporting negative effects on the physical and mental health of adolescent mothers and their children, as well as on educational attainment, labor market insertion, and long-term human development (Chandra-Mouli et al., 2014; WHO, n.d; CEPAL-OPS, 2011). Each year, an estimated 12 million adolescent births occur in these countries, around half of which are unintended, with another 6 million abortions, more than 3.5 million of them considered unsafe (Grulich et al., 2025; Guttermacher Institute, 2020). Despite global declines in adolescent fertility, Latin America and the Caribbean have made limited progress, moving from the third-to the second-highest teenage pregnancy rate worldwide between 1990 and 2020. This persistence contrasts with declining total fertility and reflects deep structural inequalities, as adolescent fertility is more prevalent among poorer, less educated, rural, and Indigenous adolescents, where restricted access to sexual and reproductive health services, gender-based violence, social stigma, and adverse contextual conditions converge to increase vulnerability (Gianella et al., 2017; Braverman--Bronstein et al., 2022; Braverman-Bronstein et al., 2023).

Peru has not been immune to this problem. Despite progress in health and education in recent decades, the adolescent motherhood rate has shown only modest decreases. Using microdata from the national censuses for 1981, 1993, 2007, and 2017, we estimate that adolescent motherhood in the country was 14.04%, 11.91%, 11.67% and 10.14% in those years, respectively. These figures reflect a slight decrease at the national level, with severe inequalities across territories, education levels, rurality, and ethnic groups. For example, in the 2017 Census, adolescent motherhood was systematically higher in the Amazonian region, reaching rates of up to 33% in the provinces of Atalaya (Ucayali department), Putumayo (Loreto department), and Puerto Inca (Huanuco department). Among poor adolescents with no education or only

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primary in the Amazonian region, motherhood rates exceed 40%. By comparison, in 2017, Niger, Mozambique, the Central African Republic, Equatorial Guinea, and Mali were the five countries with the highest adolescent fertility rates in the world, ranging from 15.5% to 17% (World Bank, 2025)[1]

Various studies have identified multiple determinants of adolescent pregnancy in international contexts. Chung et al. (2018), in a systematic review of 67 studies in low- and middle-income countries, conclude that factors such as low education rates, poverty, and limited access to contraceptives are consistently associated with teenage pregnancy. However, they warn of a lack of studies that consider causal effects and structural dimensions (similar results are found in Pradhan et al., 2015). In Latin America, studies such as those by Gianella et al. (2017) and Bancalari et al. (2025) highlight that the region has high rates compared to other parts of the world, and that these tend to reproduce inequalities by income level, rurality, and education, with Peru being one of the countries with the most significant gaps between quintiles and urban-rural areas. In Peru, the national literature has also documented multiple dimensions of the problem. Mendoza and y Subiría (2013) conducted one of the first comprehensive studies of adolescent pregnancy, while Favara et al. (2020), using the Young Lives longitudinal study, revealed that factors such as single-parent households, low school performance, and early sexual relations are predictors of teenage pregnancy.

The importance of intersectionality for understanding health inequalities has been highlighted by WHO (2025), which reminds us that racism and classism often exacerbate each other. The progress of this approach in studies on health inequality is evaluated by Harari and Lee (2021), who, in a systematic review, identified 65 studies on intersectionality in health. Baird et al. (2021) highlighted the importance of this approach for marginalized adolescents in LMICs. Methods in intersectional quantitative research have been discussed by Bauer and Scheim (2019a, b), among others. In Latin American public health, recent scholarship has begun to articulate a regionally grounded approach to intersectionality. Arias-Uriona et al. (2023) provide one of the first large-scale quantitative applications of intersectionality in Latin America, demonstrating its empirical relevance for examining stratified health outcomes. White et al. (2025) refer to the twentieth-century regional 'social medicine' movement and use the term "interseccionalidad" to link intersectional analysis with longstanding structural perspectives on health in the region. Saquimux et al. (2025), in a review of debates in Latin American public health, also trace discussions of overlapping systems of domination that predate Crenshaw (1989) and advocate for a complex analytical framework from a decolonial gender perspective. Despite these important contributions, intersectional public health research in Latin America remains at an early stage. This challenge is compounded by the region's specific and diverse historical configuration of colonialism, racial stratification, territorial exclusion, and dependent capitalist development.

We conceptualize intersectionality as a structural analytic framework in which social categories—gender, age, ethnicity, educational attainment, class, and territorial location—are not additive attributes (Crenshaw 1989; Collins, 2015). Rather, they are mutually constitutive and dynamically intertwined, jointly producing and structuring complex forms of social inequality. Within this framework, this study has two main objectives: (i) to analyze inequality, using indicators such as the concentration index and its decomposition along socioeconomic related factors to quantify magnitudes and drivers of disparities of adolescent motherhood rates (ages 15-19) and its dynamics, in the long-term 1981 – 2017 period; (ii) to identify the social groups with the most significant prevalence and the long-term dynamics of intercategorical differentials between 1993 and 2017, using large-scale census microdata. This strategy enables us to overcome the limitations of surveys such as the DHS and to deepen our quantitative understanding of the phenomenon's territorial and social dynamics with a descriptive intersectional approach.

2. Social and political context for health in Peru, 1981-2017

The study period spans nearly four decades during which Peru experienced significant social, political, and economic transformations. From 1981 to 1993, the country underwent severe economic deterioration and hyperinflation, an internal armed conflict that disproportionately impacted Indigenous and rural communities and state retrenchment from many rural areas (McClintock, 1998; Comisión de la Verdad y Reconciliación [CVR], 2004). These crises further weakened an already fragile public health infrastructure and amplified geographic and ethnic inequalities, reinforcing longstanding patterns of exclusion (Sheahan, 1999).

The period 1993–2003 was marked by macroeconomic stabilization, gradual economic recovery, targeted rural infrastructure investments, and the reopening and expansion of primary health services (Cotlear, 2016). Following the restoration of democracy in 2001, accelerated economic growth, driven by a commodities boom, contributed to rapid poverty reduction and increased government revenues, enabling higher public expenditures on social and health services. A new poverty-reduction program was launched with social protection programs such as Juntos, a conditional cash transfer targeting rural poor women with children. Health policy also prioritized equity through the Seguro Integral de Salud (SIS), which aimed to expand service utilization by eliminating out-of-pocket user fees in public health facilities (Francke, 2013). Nonetheless, persistent and substantial disparities indicate that, despite improved coverage and survival, the structural determinants of disadvantage were addressed only partially (Watson et al., 2015; Cotlear, 2016).

Regarding reproductive health, in the period 1995-2000, Fujimori's government emphasized a forced sterilization program as a key component of a broad effort to reduce fertility. This program reduced confidence in and use of health services over the long term (Leon-Ciliotta et al., 2025). Since the 1990s, there has been an expansion of contraceptive availability in public facilities, including increased provision of modern methods. National Sexual and Reproductive Health Plans set targets for maternal mortality reduction, expanded family planning, and promoted adolescent sexual health (MINSA 2013). Policies included school- and community-based interventions, family planning access for adolescents, and comprehensive sexuality education; implementation varied due to political and cultural resistance. Also, barriers remained, including cultural stigma, limited youth-friendly services, supply-chain issues, and limited public budgets and capacity across regions. (UNFPA 2022). Unmet need for family planning decreased from 11.5% to 8.5% between 2000 and 2017, while the modern contraceptive prevalence rate for married or in-union women 15–49 rose slowly from 49% to 56.4%. However, adolescent contraceptive use of modern methods increased from 22% to 30% (INEI, 2025), showing the persistence of a wide gap in adolescents' access to modern anticonceptive methods.

[1] International organizations use the adolescent birth rate or adolescent fertility as a worldwide indicator, which captures the total number of live births among women aged 15 to 19. More specialized studies adopt the broader concept of "adolescent pregnancy") which encompasses live births, ongoing pregnancies, stillbirths, miscarriages, and abortions (Guttermacher Institute, 2020). Our study focus on adolescent motherhood, defined as the proportion of women aged 15 to 19 who have had at least one live birth, due to limitations of the census data. Nevertheless, we use international indicators and studies of adolescent pregnancy and adolescent fertility as reference points in the discussion to facilitate comparability with existing literature and global statistics, acknowledging that by definition adolescent motherhood rates are always lower than adolescent fertility or pregnancy rates.

3. Methodology

The data sources for this study are the last four Peruvian population censuses: 1981, 1993, 2007, and 2017. We use questions that ask whether adolescents aged 15 to 19 have had live-born children. Based on these data, we can estimate the adolescent motherhood rate for the four censuses. This rate is the percentage of women aged 15 to 19 who have at least one live-born child.[2] Because we have complete census data, there is no need for a confidence interval, because we are calculating the exact differences between our interest groups based on the universe of individuals being analyzed.

A limitation of the study is that the National Statistics Institute (INEI) lost the microdata from three regions of the country (Loreto, San Martín, and Apurímac) in the 1981 census. These regions represented 7.2% of our study population in 2017. If those departments were excluded from the 2017 calculation, the adolescent pregnancy rate would decrease by 0.5%. Excluding these regions makes the differences between groups appear slightly smaller, as these regions, on average, have more socially vulnerable conditions and adolescent motherhood rates above the national average. Another limitation is that for the rest of the microdata from the 1981 population census, the available data is a representative sample of around 25%, equivalent to approximately 3.8 million observations. For the remaining censuses, we have complete census data.

Peru's ethnic composition—based on mother tongue in the 2017 census—included 10% of adolescent women identifying as Quechua and 1% as Aymara from the Andean region, as well as 1% from over 50 Amazonian indigenous groups. Unfortunately, the 1981 Census appears unreliable for capturing data on Amazonian Indigenous peoples. Notably, information from the departments of Loreto and San Martín, which are among the most populous in the Amazon region, is missing. Furthermore, there was no targeted effort to register the Amazonian Indigenous population systematically, most of whom reside in remote rural areas that are difficult to access—a challenge that had been addressed since 1993. Our estimate of the motherhood rate among Amazonian Indigenous adolescents based on the 1981 census data was 3.7%, significantly lower than the national average and the prevalence observed in subsequent years. Since Quechuas constitute 87% of the total indigenous population, we analyze the evolution of adolescent motherhood from 1981 to 2017 within the broader indigenous group and present results for Amazonian indigenous adolescents since 1993.

Many studies use the DHS surveys on reproductive health in developing countries. Using the census allows us to obtain a much larger number of observations and to produce reliable estimates for inter-categorical mapping. In 2017, census-based estimates of adolescent motherhood of 10,4% are nearly identical to the DHS-based estimate of 10.6%. In addition, the trends from both sources between the 1980s and 2020 are similar (see Fig. 1). We use motherhood rates, as Peruvian censuses do not include the questions required for estimating adolescent pregnancy, an indicator much used in public health. However, Fig. 1 shows that DHS estimates for adolescent motherhood and adolescent pregnancy, which include pregnancies, abortions, and stillbirths, are very similar.

Based on a social determinants of health approach, for the historical 1983-2017 analysis, we use the following sociodemographic variables and categories:

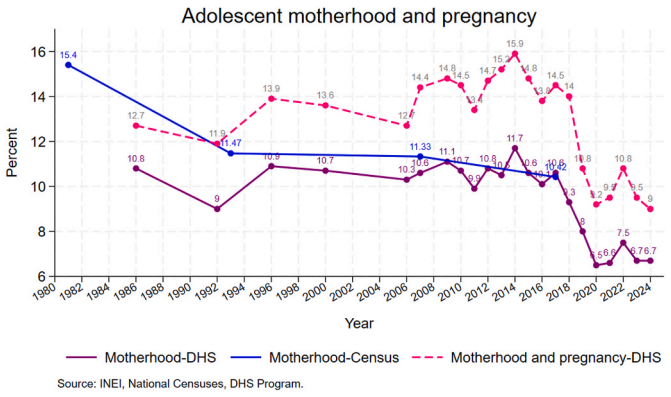


Fig. 1. Evolution of adolescent motherhood in Peru, 1981 – 2017: Censuses and DHS.

- Educational Level: No education or primary, Secondary, Tertiary, considered as reaching the level not necessarily completing it.[3]
- Ethnicity, characterized by mother tongue: Indigenous or non-Indigenous.[4]
- Locality: Lima city, other cities, and rural areas.
- Natural region: Coast, Andes, and Amazon.
- Quintiles of Wealth.[5]

To approximate differences between groups, we use the relative risk, which measures the ratio of the probability of an event occurring in one group to the probability of the same event happening in another group. The relative ratio compares the incidence of motherhood between two groups, such as Indigenous adolescents versus non-Indigenous adolescents. Our variable of interest can be interpreted as the probability that an adolescent has been a mother, so the interpretation is straightforward. As usual, the relative ratio places the group with better conditions in the denominator and the more disadvantaged group in the numerator, indicating how much more likely it is that the more disadvantaged group will experience the adverse event (such as adolescent motherhood) than the reference group. We can first compare these ratios between different groups and over time.

To conduct a more comprehensive analysis of inequality, we calculate the Concentration Curves and the Concentration Index (CI) for the 1981, 1993, 2007, and 2017 censuses, employing the Wealth Index as the ordering variable.[6] This measure, as outlined by the World Health Organization (2013), provides a summary of socioeconomic inequalities

[2] The same indicator (proportion of women 15-19 with at least one birth) is used by Bancalari et al. (2025), and they refer to it as "teenage pregnancy". As the Peruvian censuses do not ask when the deliveries were made, we cannot use the indicator usually used with DHS, such as "women 20 to 24 that had a birth prior to age 20". It includes births before the age of 15.

[3] We summarize "no education" with "primary" because in the last census the percentage of adolescents with "no education" was only 1% (2% in 2007 and 6% in 1993). For facility we use only "Primary" as comprising "No education or primary".

[4] This same question was asked in the four censuses analyzed. Another way for identifying diverse ethnicities would be self-identification, this type of question was made only in the 2017 census. This impedes the inclusion in the analysis of Afro-Peruvians, who were 3,6% of the population in 2017. Peru has 55 Indigenous peoples with 48 languages other than Spanish, 44 of them belonging to Amazonian Indigenous peoples. As many of these groups have small populations, our analysis summarizes all indigenous groups in one category.

[5] Because the censuses do not have measures of expenditures or income, as a proxy for household welfare, we estimate a Wealth Index similar to those used in international studies based on DHS surveys. Further details on the method and its ability to replicate actual income measures are presented in Huaroto et al. (2026).

[6] As estimates are obtained from population censuses, we do not display confidence intervals, as they represent the total population, except for the 1981 census, which is a 25% random sample of the population. Yet, we opted not to present them as standard errors are too small due to the large sample size.

and reflects the overall situation of the population. The CI, analogous to the Gini index but applied to health and social variables, quantifies the extent to which adolescent motherhood is concentrated among disadvantaged groups. A negative CI indicates that the phenomenon is more prevalent among less affluent sectors.

Following the methodology established by Wagstaff et al. (2003), we examine the intra-census contributions of the available socioeconomic variables to the observed levels of inequality in adolescent motherhood.

The method consists of estimating an OLS regression according to formula 1:

$$prob.maternity_i = \alpha + X_i'\beta + \varepsilon_i \quad (1)$$

Where X_i is a set of K health determinants. The decomposition is then estimated using the following formula:

$$C = \sum_{k=1}^{K} \frac{\beta_k \overline{x}_k}{\mu} C_k + \frac{G^* C_\varepsilon}{\mu} \quad (2)$$

Where C_k is the Concentration Index for the variable x_k, and $\overline{x}_k$ is its average, and β_k is the coefficient of that variable estimated using equation (1). The sum of all these terms can be understood as the deterministic part of the Concentration Index. The term G^*C_ε is the generalized Concentration index of ε_i, which can be understood as the "residual" part of the C.

We also use simple decomposition on one variable. If the rate R_{ti} is the adolescent motherhood rate in the period t for subgroup i, then $R_{ti} = M_{ti}/N_{ti}$ where M represents mothers and N the total number of adolescents. Then:

$$R_t = \Sigma\left(R_{ti} * \frac{N_{ti}}{N_t}\right); \quad (3)$$

$$R_1 - R_0 = \Sigma\left(R_{1i} * \frac{N_{1i}}{N_1}\right) - \Sigma\left(R_{0i} * \frac{N_{0i}}{N_0}\right) \quad (4)$$

Let us use the method of adding and subtracting the time component $\Sigma\left(R_{1i} * \frac{N_{0i}}{N_0}\right)$

$$R_1 - R_0 = \underbrace{\left[\Sigma\left(R_{1i} * \frac{N_{1i}}{N_1}\right) - \Sigma\left(R_{1i} * \frac{N_{0i}}{N_0}\right)\right]}_{\text{(Composition effect)}} + \underbrace{\left[\Sigma\left(R_{1i} * \frac{N_{0i}}{N_0}\right) - \Sigma\left(R_{0i} - \frac{N_{0i}}{N_0}\right)\right]}_{\text{(Effect of rate changes)}} \quad (5)$$

We also develop a quantitative descriptive intersectionality with an intercategorical approach, mapping groups defined by the simultaneous presence of multiple structural disadvantages (McCall, 2005). Using census microdata from 1993, 2007, and 2017,[7] we construct groups that reflect every possible combination of categories across five key dimensions: educational attainment (no schooling or primary education; secondary education; tertiary education), ethnic identification (Indigenous or non-Indigenous), territorial location (Metropolitan Lima; other urban areas; rural areas), natural region (Coast; Andes; Amazon), and socioeconomic status (wealth quintiles). Each intersectional group thus represents a unique configuration of these five variables, enabling the identification of precise social positions in which multiple forms of disadvantage may converge. As some groups are too small, we select the 93 groups with more than 1000 adolescent mothers in the two years used for this analysis, 1993 and 2017.[8] This excludes 4,8% of adolescents in 2017. No group with more than 100 mothers has a motherhood rate higher than the top three reported. 54.2% of all the excluded are Indigenous, even though they represent only 12% of the national total. Supplementary material engages in detail with the volume and characteristics of those excluded and presents a robustness analysis showing that reducing the threshold to 100 mothers does not change the results.

4. Results

a Adolescent motherhood and its changes 1981–2017

Historical analysis of the 1981, 1993, 2007, and 2017 censuses shows a moderate but sustained reduction in adolescent motherhood at the national level, with a significant decrease between 1981 and 1993 and much slower advances afterwards.[9] In 1981, the rate was 15.4%, decreasing to 11.5% in 1993, leveling off between 1993 and 2007, and reaching 10.4% in 2017. The total motherhood rate (among women aged 15 to 48) decreased by 56% during this period, while adolescent motherhood decreased by 32%. The stagnation of the reduction of adolescent motherhood, particularly in the 1993-2007 period, may be associated with less trust in health services as a result of the forced sterilization in the late 90s (Leon-Ciliotta et al., 2025).

A disaggregated analysis of adolescent motherhood by socioeconomic variables reveals persistent inequalities (Table 1).

In 2017, the relative risk between the poorest (Q1) and richest (Q5) quintiles remained more than six times higher, despite a substantial reduction in adolescent motherhood among the poorest quintile, which declined from 33.1% in 1981 to 17.7% in 2017. In 2017, adolescent motherhood rates in rural areas stood at 16.7%, much less than the 30.3% in 1981 but still more than double the rate observed in Metropolitan Lima. Among natural regions, the Amazon maintains the highest adolescent motherhood rate (19.1% in 2017), despite a significant decrease from 1981 (39.3%).

Adolescent motherhood by education level represents one of the most significant gaps (see Fig. 2). In 2017, the adolescent motherhood rate was 4.8% among those with tertiary education, 10.4% among those with secondary education, and 25.8% among those with primary education. Although there has been progress in educational access, the adolescent motherhood rate increased at all three levels between 1993 and 2017, and at the secondary and tertiary levels since 1981. The effect of composition — more adolescents with secondary or tertiary education, who have lower rates — has been key to the national rate decrease.

The adolescent motherhood rate for indigenous adolescents declined markedly between 1981 and 1993 and continued to diminish afterwards, but it was still 1.4 times that of non-indigenous adolescents in 2017 (see Fig. 3).

Among Quechuas, adolescent motherhood dropped from 25.5% in 1981 to 13.1% in 2017; among Aymaras, from 27% to 9.8%. Nevertheless, Indigenous Amazonian adolescents show the highest rates: 31% in 2017, with a marginal decrease from 1993 (38.2%). For the Afro-Peruvian population, the analysis is limited to 2017, as this is the only census that includes questions on ethnic self-identification. Consequently, motherhood rates can be estimated only for that year, yielding a rate of 14.8%, which is higher than those observed among Indigenous and mestizo populations.

[7] Since the 1981 Census data is based on a 20% sample of the population and 3 regions are missing, it does not support the calculation of reliable indicators at this level of disaggregation.

[8] From a total of 206 groups with registered cases.

[9] Adolescent motherhood rates estimated from DHS are 10,8% in 1988, 10,9% in 1994-96, and 10,6% for 2016-17, showing no decline over this period. However, the Censuses have a universal database, much broader than DHS; in 2017, we found 1′147,498 female adolescents aged 15 to 19 in the census vs 4710 in the 2017 DHS and 9568 in DHS 2016-2017 considered together. The questions asked in both cases are similar.

Table 1
Adolescent motherhood rate and relative risk.

	1981	1993	2007	2017
Residence				
Lima Metropolitan	9.3	6.5	7.7	6.9
Other Cities	12.4	9.9	10.2	10.3
Rural	30.3	20.1	18.4	16.7
Natural Region				
Coastal	11.2	7.9	8.9	8.7
Andean	18.8	12.5	10.7	9.8
Amazon	39.3	25.8	22.2	19.1
Level of education				
Primary Education 1/	26.9	20.5	24.1	24.9
Secondary Education	8.2	8.2	9.7	10.4
Tertiary Education	5.6	3.0	5.1	4.8
Ethnic group				
Non-Indigenous	13.7	10.6	10.7	9.9
Indigenous	22.6	16.7	16.2	14.1
Socioeconomic groups				
Poorest Q1	33.1	23.4	20.7	17.7
Poorer Q2	20.4	15.2	14	14.6
Middle Q3	11.9	9.0	10.5	10.4
Richer Q4	7.2	5.9	7.3	6.5
Richest Q5	4.4	3.2	4.0	2.9
Relative Risk				
Residence				
Rural/Lima City	3.3	3.1	2.4	2.4
Other Cities/Lima City	1.3	1.5	1.3	1.5
Natural Region				
Andean/Coast	1.7	1.6	1.2	1.1
Amazon/Coast	3.5	3.3	2.5	2.2
Maximum level of education				
Primary/Tertiary Education	4.8	6.8	4.7	5.2
Secondary/Tertiary Education	1.4	2.7	1.9	2.2
Ethnic group				
Indigenous/Non-Indigenous	1.7	1.6	1.5	1.4
Socioeconomic groups				
Q1/Q5	7.6	7.4	5.1	6.0
Q3/Q5	2.7	3.1	2.6	3.6

1/Includes adolescents with no education.

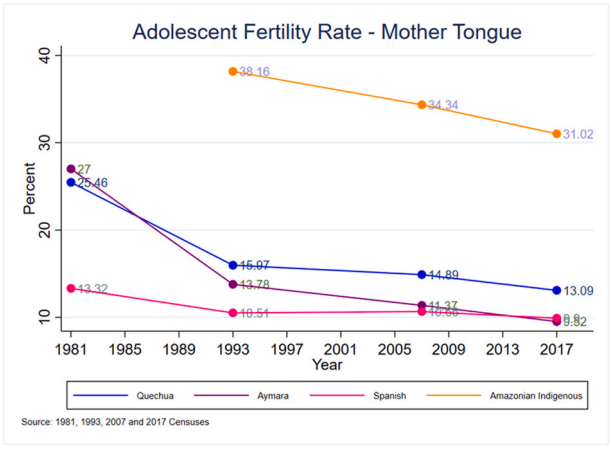


Fig. 3. Evolution of the adolescent motherhood rate by mother tongue.

opportunities that enable the postponement of adolescent motherhood.

Decomposition analysis presented in Table 2[10] shows that between 1981 and 2007, the main factor contributing statistically to inequality was education level, accounting for approximately one-third of the total CI. In 2017, however, its relative weight decreased substantially (from 33% to 19%), displaced by an increase in the contribution of territorial area, particularly the rural/urban difference, with 28% of the inequality. The natural region (Amazon and Andean highlands vs. Coast) showed a decreasing contribution over time, declining to only 1% of the CI in 2017, compared with 11% in 1993. In contrast, being Indigenous has also been a significant factor over the years, decreasing until 1993, but rising again between 1993 and 2007 and 2017. These results suggest that education gaps have lost relative weight to territorial inequalities, possibly because of improvements in educational coverage. Discrimination towards indigenous adolescents remains, together with structural obstacles to adolescents accessing reproductive health services, persist in rural areas.

The breakdown by specific categories confirms these patterns (see Table 3). While the "Andes" variable makes a negative contribution to the CI (because motherhood is lower despite greater poverty), "Amazon"

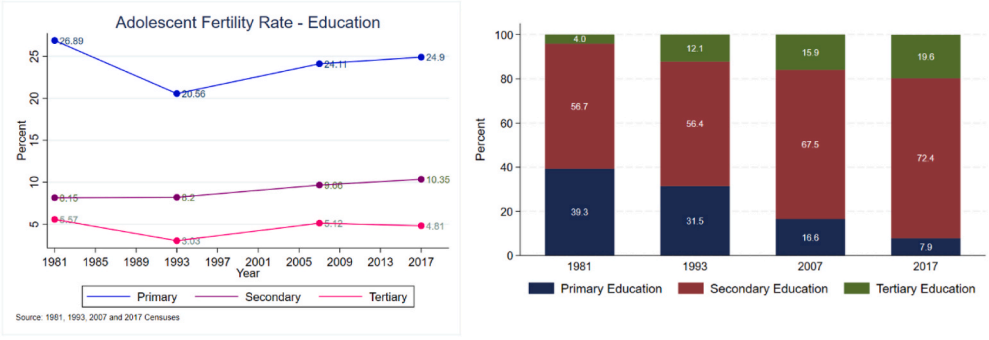


Fig. 2. Historical evolution of the adolescent motherhood rate, by educational attainment.

b. Concentration index and Concentration Curves of adolescent motherhood and its decomposition analysis

The results reveal a slow decline in inequality from 1981 (CI = −0.368) to 1993 (CI = −0.346), followed by a greater decline in 2007 (CI = −0.282), then a slight increase in 2017 (CI = −0.289). Between 2007 and 2017, the poorest (quintile 1) had a lower proportion of total adolescent motherhood, but quintiles 2 and 3 had a higher proportion (Fig. 4). Although this recent figure does not negate the progress made in previous decades, it suggests a plateauing of disparities in access to consistently contributes between 9% and 13%, reflecting its double burden of structural poverty and a high incidence of the phenomenon. Similarly, the category "primary or no education" accounted for 15% of total inequality in 2017, down from more than 35% in the past. The "secondary" category shows negative or marginal contributions, reinforcing the critical gap between those with access to this level of education and those without.

[10] The background regressions are shown in the Supplementary Material.

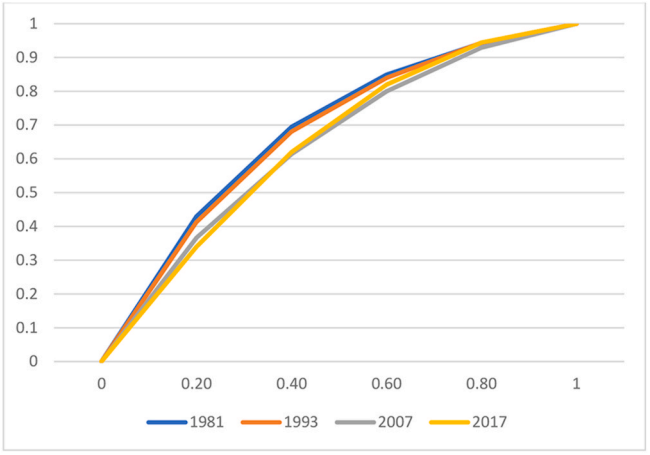


Fig. 4. Adolescent motherhood concentration curves.
Source: Own estimates based on the Population Censuses of 1981, 1993, 2007, and 2017.

Table 2
Decomposition of inequality in adolescent motherhood.

	% contributed to adolescent motherhood CI			
	1981	1993	2007	2017
Rural-Urban	25%	22%	22%	28%
Ethnicity	3%	1%	5%	6%
Natural Region	6%	11%	6%	1%
Education	32%	31%	33%	19%
Accounted	**66%**	**66%**	**65%**	**54%**

Source: Compiled by authors

Table 3
Decomposition of CI in adolescent motherhood, by category of study variables.

	% Contribution to Concentration Index			
	1981	1993	2007	2017
Andean	−3%	−2%	−7%	−8%
Amazon	9%	13%	13%	9%
Rural	25%	22%	22%	28%
Other urban	0%	−1%	−1%	−1%
Indigenous	3%	1%	5%	6%
Primary	36%	38%	35%	15%
Secondary	−4%	−7%	−2%	3%
Accounted	66%	64%	64%	53%

Source: Compiled by authors

Finally, the share of the concentration index accounted for by the full model declines markedly, from approximately 66% between 1981 and 2007 to just 54% in 2017. This drop suggests that non-observable factors — such as social norms, sexual violence, quality of health services, or institutional failures in social protection — have gained relative importance. This underscores the need to adopt multidimensional and intersectional approaches to the design of public policies, as improvements in structural variables alone, such as education or urban access, do not appear sufficient to close adolescent motherhood gaps.

c. **Decomposing changes in adolescent motherhood rates**

We analyze how adolescent motherhood evolved very differently during the 1981-1993 period than during 1993-2017 (see Table 4). The first period in Peruvian contemporary history was one of intense economic crisis, political violence, and institutional collapse. This scenario changed dramatically, and the period from 1993 to 2017 was marked by economic stabilization, poverty reduction, and the expansion of health and social programs.

Table 4
Decomposition of rate changes.

	Changes from 1981 to 1993		Changes from 1993 to 2017	
	Composition	Rate change	Composition	Rate change
QUINTILES				
Q1	0.0%	−2.0%	0.0%	−1.1%
Q2	0.0%	−1.0%	0.0%	−0.1%
Q3	0.0%	−0.4%	0.0%	0.2%
Q4	0.0%	−0.3%	0.0%	0.1%
Q5	0.0%	−0.2%	0.0%	0.0%
AREA				
Rural	0.6%	−2.3%	−1.2%	−0.9%
Other Urban	0.1%	−1.1%	0.5%	0.2%
Metropolitan Lima	−0.2%	−0.9%	0.1%	0.1%
Total	0.4%	−4.3%	−0.5%	−0.5%
NATURAL REGION				
Amazon	1.4%	−0.9%	0.3%	−0.8%
Andean	0.0%	−2.0%	−0.1%	−0.9%
Coast	−0.4%	−2.0%	0.0%	0.4%
Total	0.9%	−4.9%	0.2%	−1.2%
EDUCATIONAL LEVEL				
Primary	−1.6%	−2.5%	−5.9%	1.4%
Secondary	0.0%	0.0%	1.7%	1.2%
Tertiary	0.2%	−0.1%	0.4%	0.2%
Total	−1.4%	−2.6%	−3.8%	2.8%
ETHNICITY				
Non Indigenous	0.5%	−2.5%	0.3%	−0.6%
Indigenous	−0.8%	−1.1%	−0.4%	−0.4%
Total	−0.3%	−3.7%	−0.1%	−0.9%

As previously shown, in the 1981-1993 period, there was a considerable decline in adolescent motherhood, from 15.4% to 11.5%. Adolescent motherhood rates diminished in all groups and at a quicker pace in the more disadvantaged groups: people experiencing poverty, rural, with only primary education. Only the Amazon region, with higher motherhood rates, falls behind. Changes in geographic composition raised motherhood rates slightly, as the proportion of adolescents living in urban areas and on the Coast increased. More adolescents with secondary or tertiary education and non-Indigenous people helped to reduce motherhood rates. However, the predominant effect was the reduction across almost all categories.

This dynamic changed considerably after 1993. The motherhood rates in the better-off groups – wealthier quintiles in Lima and the Coast, and those with higher education - went up. Rural, Andean, and Amazon regions had lower motherhood rates. The composition effect is only relevant at the education level; adolescents continue to improve their education levels, and the lower motherhood rates for adolescents with secondary or tertiary education are much lower than those for adolescents with primary education.

d. Analysis of intersectional groups (2017 and evolution 1993–2017)

The results show that the highest adolescent motherhood rates are concentrated in subgroups with multiple vulnerabilities. Three groups have rates exceeding 42%; they are located in the Amazon and include the poorest quintile with primary education or less, rural Indigenous, rural non-Indigenous, and urban non-Indigenous. These rates triple the highest values reported internationally, far exceeding the average adolescent fertility rates for sub-Saharan Africa (≈10%) and Latin America (≈8–10%). This finding reaffirms that when specific social dimensions intersect, even in middle-income countries like Peru, conditions persist that are equivalent to, or even worse than, those in

international contexts of extreme poverty.

Upon extending the analysis to the 10 groups with the highest rates,[11] a consistent pattern emerges: all belong to the first two quintiles, none live in Metropolitan Lima, and all have only a primary education. Although some groups include an Indigenous population, most do not, suggesting that ethnicity, although relevant, is not the only or the main vulnerability factor when combined with low resources, low education level, and localization in rural areas or the Amazon. These groups, however, represent only 4.2% of the total adolescent population, suggesting limited capacity to influence the national rate, despite their extreme vulnerability.

As illustrated in Fig. 5, where each circle's diameter represents the number of mothers, there is a strong correlation in motherhood levels across the intersectional groups over the 24 years. The three groups with the highest motherhood rates in Table 5 have remained the highest throughout these 24 years and have experienced minimal change. The list of the twenty intercategorical groups with the highest motherhood rates in 1993 and 2017 shows the continuity of most of these groups along decades.[12] Most socioeconomically advantaged groups have also shown little to no reduction in their motherhood rates during this time.

5. Discussion

Adolescent motherhood remains a significant social issue in Peru. Following a steep decline from 15.4% in 1981 to 11.5% in 1993, the subsequent 24 years up to 2017 saw only a marginal decrease of one percentage point. This trajectory stands in clear contrast to that of the Under-Five Mortality Rate, which continued to decline steadily throughout 1981–2017, including the years following 1993. Between 1993 and 2017, the U5MR fell from 101.5 to 17.7 deaths per thousand live births, representing an 83% reduction (Huaroto et al., 2026).

Contextually, the 1980s were characterized by severe economic and social crises, which may have influenced adolescent girls to delay or refrain from having children. Conversely, in the 1990s, the Fujimori government's implementation of forced sterilizations – that constituted a crime against humanity (CEDAW 2024) - eroded trust in health and reproductive services, potentially contributing to the stagnation in declining adolescent motherhood rates. Further research is needed to confirm or refute this hypothesis, particularly regarding the contrast with U5MR.

Significant territorial and socioeconomic inequalities persist, hindering progress toward achieving the Sustainable Development Goals (SDGs) that explicitly consider reducing health inequalities, particularly in sexual and reproductive health and adolescent pregnancies (Sanhueza et al., 2021). In 2017, the poorest quintile had a motherhood rate of 17%, more than six times that of the wealthiest quintile. Additionally, 26% of adolescents with only primary education had given birth, a rate 5.4 times greater than that of those who had attained tertiary education. Among Amazonian Indigenous adolescents, the motherhood rate reached 30%, three times higher than among Spanish-speaking adolescents. Furthermore, three intersectional groups—adolescents from the Amazon region with only primary education and in the poorest quintiles—exhibited motherhood rates as high as 43%. In contrast, the most privileged groups—majority urban, in the highest wealth quintiles, and with tertiary education—had motherhood rates of only 2 or 3 per 100 adolescents. Inequality fundamentally reflects underlying injustices; addressing these disparities is crucial for enabling Peru's adolescent motherhood rates to decline more rapidly and equitably.

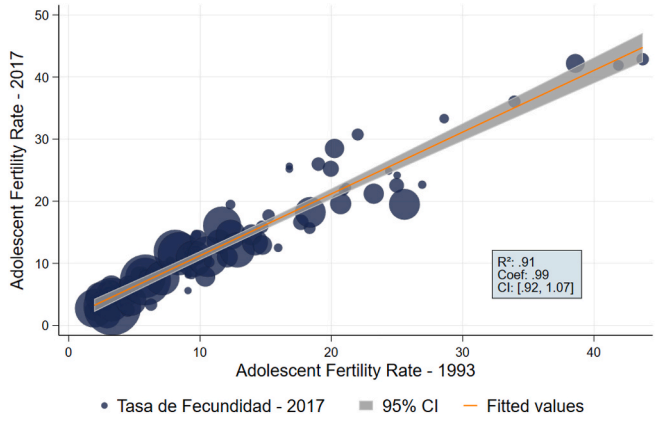


Fig. 5. Correlation between adolescent motherhood rates of intersectional groups, 1993-2017.

Measured by the Concentration Index, inequality decreased from 1981 to 2007; however, the downward trend observed in previous decades stalled between 2007 and 2017. Decomposition analysis indicates that education remains the primary driver of these inequalities, maintaining a central role over the decades. Although adolescent education levels have improved overall, those left behind by the system—with only primary education—continue to exhibit motherhood rates as high as those recorded four decades ago. While the proportion of adolescents in this group has decreased, those who remain in this situation have not experienced any notable reductions in motherhood rates.

The intercategorical mapping results show that within the specific gender and age group of adolescent girls, who already constitute a discriminated and disempowered social stratum, some groups defined by territorial location, ethnicity, educational attainment, and wealth are particularly vulnerable. Between groups, motherhood rates reveal substantial disparities that persist over time, suggesting stable patterns rather than short-term fluctuations.

The findings are consistent with the foundational premise of intersectionality: that the convergence of multiple social cleavages generates vulnerabilities and inequalities that exceed the sum of their individual effects. Moreover, the durability of these disparities over time reinforces the interpretation that they are embedded in historically constituted political and economic power structures that systematically reproduce inequality.

We can relate this discussion to the country's historical configuration of colonialism, capitalism, and patriarchy, and to the enduring effects of these structures on women's lives. Cox Hall et al. (2022) argue for a decolonial, intersectoral approach in a review of recent work on race and ethnicity in Peru. Seminal work by Francke (1990), following Davies (1981) and Collins (2015), called this the "braid of domination": "Ethnicity, class, and gender are linked but not identical forms of domination, and yet, together, they form a single, unique structure that underpins all social, institutional, and personal, public and private relations of production and reproduction in the daily flow of life and in the historical development of Latin American peoples" (p. 85). Within this matrix of domination, elevated motherhood rates among adolescents from systematically marginalized groups are not incidental but structurally produced. Social hierarchies based on ethnicity, socioeconomic status, territorial location, and gender compound disadvantage, restricting their right to education, healthcare, and material resources while simultaneously constraining agency and life opportunities. These inequalities will affect the ability of girls and adolescents to exercise their rights to education, health, and, in particular, sexual and reproductive health (CLADEM, 2016). The burden is disproportionately borne by those located at the intersection of rural residence, ethnic minority status, and poverty, where institutional exclusion and territorial disparities express and reinforce structural vulnerability.

[11] Details provided in Supplementary Material, tables S2, S3 & S4.
[12] The list is provided in Supplementary Material Tables S2 and S4.

Table 5
Groups with higher adolescent motherhood rate 2017.

Quintile	Area	Education	Ethnicity	Region	Number of mothers	Adolescent motherhood rate
Q1	Rural	Primary	Indigenous	Amazon	1648	43
Q1	Rural	Primary	Non-Indigenous	Amazon	3967	42
Q1	Urban	Primary	Non-Indigenous	Amazon	1185	42

Source: Compiled by authors

6. Limitations

The indicator we use does not include pregnancies currently underway, those that ended in miscarriage or abortion, or stillbirths. The 2017 DHS shows that 10.9% of adolescents ages 15 to 19 are already mothers, 3.5% are pregnant, and 1.1% have had abortions or stillbirths.[13] These rates, however, correspond to only 128 cases of adolescents who are pregnant and 47 abortions or stillbirths recorded in the 2017 DHS database, which are insufficient for a minimum margin of confidence regarding the statistical indicators.[14] In comparison, the 2017 census registered 119,550 adolescent mothers nationwide, around one hundred times the total number of adolescent pregnancies registered by the 2017 DHS. This comparison highlights the advantage of the number of cases when working with the Census; nevertheless, they must be interpreted considering that women who are currently pregnant or who have had abortions or stillbirths are not included.

The indicator used captures the contemporaneous prevalence of motherhood among adolescents aged 15–19 at the time of the census, rather than the cumulative incidence of births among women who have already completed adolescence. As a result, it yields lower estimates than measures calculated as women of some older ages who report having had a birth before age 20, which were used in other studies.[15] Our indicator of motherhood also does not differentiate and considers the number of children or pregnancies. As we use microdata comprising all adolescents who answered the census, it does not include those populations that were not reached by the census.

The intercategorical mapping threshold of 1000 mothers, necessary to ensure reliable estimated rates, excludes 4.8% of adolescents in 2017. However, no intercategorical group with more than 100 mothers has a motherhood rate higher than the top three reported, and our finding that the relative positions of intercategorical groups have remained unchanged and have a very strong correlation between 1993 and 2017remains unchanged when using this lower threshold (Supplementary Material provides details of excluded groups and robustness analysis).

An intercategorical mapping such as this does not address causality, which remains a concern for variables such as education level or place of residence, as these may themselves be influenced by adolescent motherhood. This approach makes visible the internal diversity of adolescent motherhood and provides a more nuanced empirical foundation for public policy design, encouraging interventions that address intersecting forms of vulnerability rather than focusing solely on age. Nonetheless, as a quantitative intercategorical mapping grounded in predefined categories, this strategy has limited capacity to fully elucidate the sociohistorical processes through which inequalities are constituted and reproduced. While it identifies patterned disparities across groups, a comprehensive explanation of the historical and structural mechanisms generating higher pregnancy rates in specific populations lies beyond the scope of this paper and remains an important challenge for future research.

[13] Similar rates are found in previous DHS. Between 2016 and 2019, the percentage of pregnant adolescents pregnant were 2.5%.

[14] By 2023, these figures had decreased, and DHS registered 76 cases of pregnant women and 38 abortions and stillbirths.

[15] For example, Bancalari et al. (2025) refer to women 26 to 49 years old.

7. Conclusions

While at the national level adolescent motherhood has been almost stable in the two and a half decades between 1993 and 2017, inequalities faced by Indigenous adolescents, those residing in rural areas, and regions outside Lima and the coastal zones—areas traditionally considered better off—have diminished. Improved education coverage provided a basis for a comprehensive sexual education policy that reaches these populations. However, conservative groups have launched opposition campaigns against it (Gianella et al., 2017), even though data underscores the urgent need for such initiatives. Recently, a new law, promoted by religious conservative groups, changed "comprehensive sexual education" to a "sexual education based on science, biology, and ethics" and put a stop to gender equality policies, seriously jeopardizing the few advances that have been made.

This study highlights the value of using census microdata to examine phenomena characterized by low incidence but high social concentration, such as adolescent motherhood. Unlike surveys like DHS, censuses enable detailed disaggregation at finer geographical and social levels, such as intersectional groups, while maintaining acceptable margins of precision. The adopted quantitative, descriptive, intersectional approach—based on the dimensions of poverty, education, ethnicity, natural region, and rurality—allows for the identification of social configurations of heightened vulnerability that are not evident when analyzing national averages alone.

From a public policy perspective, these findings suggest that universal interventions—such as expanding school coverage or health services alone—are insufficient to address the complex and persistent intersectional inequalities. Effective strategies must incorporate detailed analysis of census data, foster territorial coordination, and implement targeted interventions tailored to specific structural risk profiles. This includes intercultural approaches, early warning systems within secondary education, and ensuring equitable access to reproductive health services in dispersed and regional contexts. Despite the Minister of Health's approval of the Multisectoral Plan for the Prevention of Adolescent Pregnancy for 2012–2021 in 2013 (MINSA 2013), a much-needed update has yet to be launched, underscoring the urgency of renewed, coordinated efforts in this domain.

CRediT authorship contribution statement

Pedro Francke: Writing – review & editing, Writing – original draft, Supervision, Methodology, Funding acquisition, Formal analysis, Conceptualization. **César Huaroto:** Writing – review & editing, Validation, Resources. **Rossana Mendoza:** Investigation, Formal analysis. **Claudia Vivas:** Visualization, Software, Data curation.

Statement

During the preparation of this work, the authors used ChatGPT to improve grammar and to resume some parts. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

Ethical declaration

All procedures underlying this study were performed in accordance

with relevant national laws and institutional guidelines. The publication of this article has been approved by all authors and, tacitly or explicitly, by the responsible authorities where the work was carried out. This research is based exclusively on secondary data previously collected by the Peruvian National Institute of Statistics and Informatics (INEI); therefore, no additional ethical approval was required for the present analysis. The original census and survey data used in this study had already received ethical approval from the competent institutions responsible for their implementation in Peru (INEI) and their use for secondary analysis is authorized by national law. The Research Ethics Committees of the Pontificia Universidad Católica del Perú (PUCP), through Letter No. 001-2026-NR-OETIIC/PUCP (2026), confirmed compliance with applicable ethical standards, stating that this study does not require special evaluation by a university ethics committee, as it does not qualify as research involving human participants, animals, or ecosystems.

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Declaration of competing interest

The authors declare that they have no competing interests; no personal relationships or activities could appear to have influenced the work reported in this paper in any way.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmph.2026.101925.

Data availability

Data will be made available on request.

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