Educational Differences and Fertility Transition in Peru: A Cohort Analysis of Women Born Between 1936 and 1984

Topic and Theoretical Focus:

This study examines the fertility transition in Peru, focusing on cohorts of women born between 1936 and 1984. The research is grounded in demographic transition theory, particularly exploring how educational attainment has shaped fertility patterns over time. The study aims to investigate the intra-national homogeneity of these transitions while also comparing patterns across different educational groups.

The theoretical framework primarily draws on Bongaarts' (2003) "permanent difference" model, which suggests that while overall fertility declines across all social groups during a demographic transition, significant differences between educational groups persist. This model challenges earlier assumptions about the convergence of fertility behaviors and highlights the enduring impact of social stratification on reproductive patterns. The study also incorporates diffusion theory (Cleland & Wilson, 1987) to understand how new reproductive norms and behaviors spread within countries, potentially leading to intra-national homogeneity in fertility transitions. This theory posits that ideas and behaviors related to fertility control can spread through social networks, potentially transcending socioeconomic boundaries.

The research explores multiple mechanisms through which education influences fertility. These include improved access to contraceptive information and methods, as education enhances knowledge and decision-making skills related to family planning. Changes in reproductive preferences are also examined, as higher education often leads to altered perceptions of ideal family size. The study considers increased female empowerment and autonomy, recognizing that education can enhance women's bargaining power within relationships and their ability to make independent reproductive decisions. Higher opportunity costs of childbearing due to increased labor market opportunities for educated women are also taken into account. Finally, the research incorporates Lutz's (2021) concept of a cognitive transition that prioritizes quality over quantity in child-rearing, suggesting that education may fundamentally alter how individuals perceive the costs and benefits of having children.

The study aims to contribute to the broader literature on fertility transitions in Latin America by providing a detailed analysis of Peru's experience. By focusing on both inter- and intra-national differences, it seeks to offer a nuanced understanding of how fertility patterns have evolved in response to changing social, economic, and cultural conditions. This approach allows for a comprehensive examination of the role of education in shaping reproductive behaviors within the specific context of Peru's demographic transition.

Data Sources:

The study utilizes data from 23 Demographic and Health Surveys (DHS) conducted in Peru between 1986 and 2022. Specifically, it uses data from surveys conducted in 1986, 1991/92, 1996, 2000, and annually from 2004 to 2022. This extensive time span allows for a comprehensive analysis of fertility trends over nearly four decades. The analysis focuses on a sample of 116,298 women aged 40-49 at the time of the survey, representing women at the end of their reproductive years. This age group was chosen to ensure that the fertility histories captured are nearly complete, providing a more accurate picture of lifetime fertility patterns.

The Peruvian DHS, known locally as "Encuesta Demográfica y de Salud Familiar" (ENDES), provides comprehensive information on fertility, family planning, maternal and child health, and socioeconomic indicators. It employs a stratified, multi-stage cluster sampling design, covering both urban and rural areas across all 24 departments and the Constitutional Province of Callao in Peru. This sampling strategy ensures representation of Peru's diverse geographic and socioeconomic landscapes.

Key variables from the ENDES include complete birth histories, which provide detailed information on the timing and spacing of all births. Educational attainment is measured in years of schooling completed and highest level achieved. The surveys also include a household wealth index, which serves as a proxy for socioeconomic status. Ages at first sexual intercourse, first union, and first birth are recorded, allowing for analysis of the timing of key life course events. Information on contraceptive use and

knowledge is collected, providing insights into family planning practices. The surveys also gather data on ideal family size, offering a perspective on fertility preferences.

The ENDES has undergone some changes over the years, including increased sample sizes and more frequent data collection (shifting from every five years to annual surveys from 2004 onwards). These changes have enhanced the precision of estimates and allowed for more detailed subnational analysis. The consistency in core questionnaire items across survey rounds ensures comparability over time, making the ENDES an invaluable resource for studying long-term demographic trends in Peru.

Research Methods:

The study employs a comparative, longitudinal approach to analyze fertility patterns across cohorts and educational groups. The sample is divided into eight cohorts: one covering birth years 1936-1949, and seven five-year cohorts from 1950 to 1984. This cohort approach allows for the examination of both period and cohort effects on fertility patterns.

The methodology includes cohort analysis, grouping women into birth cohorts to track changes in fertility patterns over time. This approach helps distinguish between changes due to period effects (affecting all age groups at a particular time) and cohort effects (specific to particular birth cohorts). The study calculates several fertility measures. Cohort fertility rates are computed to measure the average number of children born to women in each cohort by the end of their reproductive years. Parity progression ratios are calculated to examine the probability of women having an additional child at each parity level. The distribution of birth orders is analyzed to understand how family size patterns have changed across cohorts and educational groups. Median ages at key reproductive milestones (first sexual intercourse, first union, first birth) are computed to examine changes in the timing of these events. The study also analyzes the evolution of educational profiles across cohorts, tracking how the distribution of women across different educational categories has changed over time. This analysis is crucial for understanding the context of fertility changes and the potential impact of educational expansion on reproductive behaviors.

Fertility differentials by educational level are examined in detail, comparing fertility rates, family size distributions, and reproductive timing across different educational groups within each cohort. This allows for an assessment of how the relationship between education and fertility has evolved over time. The research investigates changes in family size preferences and reproductive behaviors across cohorts and educational groups. This includes analysis of ideal family size and contraceptive use patterns, providing insights into how attitudes and practices related to fertility control have changed.

Several specific indicators are used to analyze fertility patterns: the descendance rate by birth order (TD_n) measures the proportion of women in a cohort who have had at least n children, the total fertility rate (TFR) provides an overall measure of fertility levels for each cohort, the distribution of birth orders (P_n) shows the proportion of women with 0, 1, 2, or more children in each cohort, and family size expansion probabilities (a_n) measure the likelihood of having an additional child at each parity level. Educational levels are categorized according to the International Standard Classification of Education (UNESCO, 2012): No education (including those with incomplete primary education), Primary (completed primary to incomplete secondary), Secondary (completed secondary to incomplete higher education), and Higher education (completed university or technical higher education). The study employs various statistical techniques to analyze these data, including descriptive statistics, cross-tabulations, and regression analyses where appropriate. Trends are visualized using graphs and charts to illustrate changes over time and differences across educational groups.

Findings:

The study reveals significant changes in the educational composition of cohorts over time, reflecting the expansion of education in Peru. The proportion of women with no education decreased dramatically from 20.9% in the 1936/49 cohort to 3.2% in the 1980/84 cohort. This decline represents a major shift in educational access and attainment over the study period. Conversely, the proportion of women with secondary education nearly doubled, from 20.5% to 38.6%, indicating a substantial increase in high school completion rates. The most significant change was observed in higher education, where the

proportion more than doubled from 12.2% to 29%. This increase in tertiary education reflects both expanded educational opportunities and changing social norms regarding women's education.

A clear downward trend in Peruvian fertility is observed, reflecting the country's demographic transition. The total fertility rate decreased from 5.59 children per woman in the 1936/49 cohort to 3.23 in the 1980/84 cohort, a reduction of 42.2%. This decline represents a fundamental shift in reproductive behaviors over the study period. The pace of fertility decline varied across cohorts, with the most rapid changes occurring in the cohorts born between 1950 and 1969.

Marked and persistent differences in fertility rates are observed between educational groups. Women with no education consistently show the highest fertility rates, although these have decreased significantly over time, from 7.45 children per woman in the 1936/49 cohort to 5.12 in the 1980/84 cohort. This represents a 31.3% reduction, indicating that even the least educated groups experienced substantial fertility decline. Women with higher education maintain the lowest fertility rates, decreasing from 2.91 to 2.28 children per woman over the same period, a 21.6% reduction. The smaller percentage decrease among highly educated women reflects their already low fertility in the earlier cohorts.

While there is a trend towards convergence in the rates for first births across educational levels in more recent cohorts, differences persist and even widen for higher-order births. In the 1980/84 cohort, the rates for first births vary between 0.95 and 0.98 across all educational levels, indicating near-universal childbearing. However, for eighth and higher-order births, rates range from 0.30 for women with no education to 0 for women with higher education. This pattern suggests a partial homogenization of reproductive behaviors for having at least one child, but continued divergence in decisions about larger families.

A general trend towards smaller families is observed across all educational levels. However, a significant proportion of women with no education (53.3%) and primary education (37.1%) still have 5 or more children in the most recent cohort, indicating the persistence of traditional reproductive patterns in certain segments of society. In contrast, only 3% of women with higher education in the 1980/84 cohort have 5 or more children, down from 16.7% in the 1936/49 cohort. The majority of highly educated women (66.8%) in the most recent cohort opt for 1-2 children.

The analysis of median ages at first sexual intercourse, first union, and first birth reveals complex patterns of change. There is a partial convergence in the age at first sexual intercourse across educational levels in more recent cohorts, with the gap between the highest and lowest educational groups narrowing over time. However, a divergence is observed in the age at first union and first birth, with higher educated women increasingly postponing these events. For example, in the 1980/84 cohort, women with no education experience their first sexual intercourse at 16 years, first union at 17.5 years, and first birth at 18.5 years, while women with higher education do so at 20, 26, and 26 years respectively.

The study notes significant intergenerational changes in reproductive behaviors. While women with higher education have significantly delayed first union and first birth, maintaining a considerable interval between these events and first sexual intercourse, women with lower education show a pattern of earlier and more compressed onset of these events. This divergence in life course patterns reflects broader socioeconomic inequalities and differing opportunities across educational groups.

The findings underscore the persistence of significant inequalities in women's life trajectories in Peruvian society according to their educational level. These differences reflect disparities in opportunities, access to information and reproductive health services, and social norms governing family formation across different socioeconomic strata. The study suggests that while education has been a powerful factor in reducing fertility, its effect is moderated by broader socioeconomic conditions.

Conclusions:

The study concludes that while educational expansion has been a key driver in Peru's fertility transition, it has not led to complete convergence in reproductive patterns. The persistent differences between educational groups reflect the applicability of Bongaarts' "permanent difference" model in the Peruvian context. This suggests that factors associated with educational level, such as access to information, economic opportunities, and cultural norms, continue to exert a lasting influence on reproductive decisions.

The findings suggest that the mere expansion of education, while crucial, may not be sufficient to completely eliminate disparities in fertility. Other factors, such as structural socioeconomic inequalities, differences in access to reproductive health services, and the persistence of cultural norms specific to each social group, seem to perpetuate these differences. This highlights the complex interplay between education and other social and economic factors in shaping fertility patterns.

The research emphasizes the need for a more holistic approach that considers the complex interaction between education, socioeconomic conditions, and cultural norms in shaping reproductive behaviors. It suggests that future research should explore the specific mechanisms through which education influences fertility in the Peruvian context, as well as the interactions between education and other socioeconomic factors. This could include investigating how education affects women's empowerment, labor market participation, and decision-making power within relationships, all of which can influence fertility outcomes.

The study also emphasizes the importance of complementing quantitative studies with qualitative research examining different family generations of women. This intergenerational approach would allow for a better understanding of how the role of education in reproductive decisions has evolved over time and how fertility-related values and practices are transmitted between generations. Such research could provide valuable insights into the cultural and social mechanisms that perpetuate or challenge traditional fertility norms.

Finally, the research underscores the need for policies that address not only access to education but also the socioeconomic and cultural barriers that influence reproductive decisions. This approach is crucial for effectively addressing persistent inequalities in reproductive patterns and promoting more equitable demographic transitions. Policies could include targeted interventions to improve access to reproductive health services for less educated women, programs to promote gender equality and women's empowerment across all educational levels, and initiatives to address the economic barriers that may influence fertility decisions among different social groups.

In conclusion, this study provides a comprehensive picture of the relationship between education and fertility transition in Peru, demonstrating both the power of education in shaping reproductive behaviors and the persistent influence of broader social and economic factors. These findings have important implications for demographic theory, policy development, and future research directions in the field of population studies in Latin America and beyond.