Effect of the Right to Education Act in India on Fertility Behaviors and Marriage Characteristics

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Abstract

This paper exploits an education policy in India generated by a 2010 schooling reform to examine the effect of education on fertility and related behavior. The key element of the reform was that it required students to complete eight years of primary education (age 6-14 years). An instrumental variable difference-in-difference approach is used that measures the exogenous variation in treatment intensity in different states across birth cohorts measured by birth year and birth months. The reform led to an increase in education, a delay in marriage, postponing sexual activity and reduced fertility beginning at the age of 22. The paper also examines the pathways through which increased education affects fertility. The findings suggest early use of modern contraceptives, reduction in the marital education gap, increased literacy and utilization of healthcare services contribute to reduced fertility. These results are consistent with women having greater control over their fertility decision and increased empowerment thereby highlighting the importance of the policy efforts of the government to employ in their effort to promote education.

Keywords: education, fertility, India

JEL Codes: I25, J13, J18

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1 Introduction

Adolescent childbearing adversely affects maternal and child well-being, including health, labor force participation, and earnings (Angrist and Evans, 1996; Duflo, 2001). Consequentially, reducing teenage childbearing and promoting quality education for young women is a key factor in achieving the Millennium Development Goals (MDGs) of reducing poverty, improving maternal health, and empowering women. Development economists and institutions have emphasized the role of female education in fertility, health, human capital formation, and investment in female education has been adopted as a development tool in many developing countries (Schultz, 1994; Ainsworth et al., 1996). The establishment of the United Nations Girl's Education Initiative (UNGEI) in 2000 ensures that young women to have the opportunity to receive a quality education. An explicit objective of all these efforts is to reduce birth rates of low-income population. Furthermore, the World Bank Group reinforced their adoption of the Sustainable Development Goals (SDGs) in 2020 to improve gender equality and empower girls and women. Educating girls and promoting gender equality is part of a broader and holistic effort at the World Bank, which includes financing and analytical work to remove financial barriers that keep girls out of school, prevent child marriage, improve access to reproductive health services, reduction of birth rates and strengthen skills and job opportunities for adolescent girls and young women. This renewed push for the reduction of population growth and fertility, through education, emphasizes the importance of examining educational interventions as a tool to reduce birth rates and the lasting impacts on fertility for women, and the channels through which such a relationship may occur.

This paper exploits a natural experiment: an education policy in India generated by a 2010 schooling reform to examine the effect of education on fertility and related behavior. The key element of the reform was that it required students to complete eight years of primary education (age 6-14 years). The scale of the policy allows for the use of a nationally representative sample of households throughout India. I use data from two rounds of the National Family Health Survey (NFHS)- 4 and 5 conducted in India, which generates a large sample of approximately 1,200,000+ Indian women born between 1965 and 2006. The survey provides state and national information for India on fertility, reproductive health and other behaviors. The effect of the reform's implementation is distributed across many birth cohorts. The reform's timing, along with these data, enables a thorough investigation of its effect on Indian women into their teenage and consecutive years. The timing and degree of the implementation of the reform differed across states. Given the continuity in the transition from untreated birth cohorts to treated cohorts in different states, I use an instrumental variable difference-in-difference approach to evaluate the impact of the schooling reform as an exogenous variation in education.[1]

The literature focusing on the developing countries suggests a larger and more prevalent effect of education on fertility, as may be expected - Indonesia (Duflo, 2001), Nigeria (Osili and Long, 2008), Kenya (Chicoine, 2012), Sub-Saharan Africa (Mahy and Gupta, 2002) etc. However, other previous work using exogeneous variation in education in developed settings has found less robust results (McCrary and Royer, 2011; Black et al., 2008). The work in this paper is the first to study the 2010 Indian education policy thereby complementing to the literature by reviewing the relationship between female education and fertility behaviors causally from a developing country perspective. The paper also examines in detail the mechanisms through which increased education impacts fertility. First, the *"incarceration effect"* (also called institution effect) to the extent that the educational attendance reduces time available to engage in child bearing, thus postponing the decision to have one's first child. Second, *"human capital effect"*; increased education results in an increase in current and expected future human capital and this higher level of human capital could change fertility decisions. Third, the *"knowledge effect"*: better educated women have more knowledge about contraception and family planning. Lastly, the *"autonomy effect"*: women with higher education earn higher incomes, decide to have fewer kids of better quality, pair with men who have the same preferences for children as they do and have more power to be respected in their own fertility decisions. In all these four cases, if women tend not to have children while continuing to attend school, there should be a natural and rather mechanical effect of schooling on fertility, thus delaying the beginning and possibly shortening women's reproductive life in developing countries. These mechanisms are described in more detail in the later sections and the paper discuss possible tests to distinguish between them.

The findings in the paper show that the schooling policy led to an increase in total years of education, and that it substantially affected the fertility outcomes of women. The reform led to postponement of marriage and lowered the fraction of women who began childbearing at the age of 18 by 1.7 percentage points. More importantly, the effect on total fertility persisted and became

[1] The dispersion of the reform's impact on education across a number of cohorts in different states in different time makes a regression discontinuity approach unsuitable.

increasingly negative at older ages, eventually lowering a woman's fertility by 0.195 births at the age of 25. The reform's effects exhibit heterogeneity among the urban and rural communities with similar levels of education, highlighting the importance of this study's broad scope.

Due to the staggered implementation of the reform across different states, it is likely that the reform (instrument) is measuring some unobserved endogenous change in the demand for education before the policy was implemented thereby generating biased 2SLS estimates. In a pair of regressions, I try to resolve such policy adoption endogeneity issue using some state level characteristics that might be correlated with the adoption of the law. I use the average state level GDP growth rate and GDP per-capita as a proxy for educational investments in a state. My findings verify that the wealthy states didn't implement the policy earlier and do not bias my baseline findings. By using state specific linear time trend in birth cohort, I demonstrate that the model is not capturing a general change that is occurring throughout the population, but rather an effect that is isolated to Indian women who were treated by the reform.

The breadth of the Indian education reform and the depth of data availability through the NFHS enable a uniquely detailed investigation into the potential mechanisms driving the reduction in fertility seen after the reform. I am able to rule out a number of explanations proposed in the literature. The most direct link between schooling and the reduction in a woman's fertility is the *"incarceration effect"* proposed in Black et al. (2008). The persistence of the reform's effect for older ages and the lack of evidence that more highly educated populations saw a larger reduction in fertility suggest that the incarceration effect is not a significant cause of the decline in fertility. I also find increased probability of *"knowledge effect"* about the use of contraception before having their first child, utilization of health care services, exposure to mass media about family planning and fertility practices. I find no evidence that the reform impacted the likelihood of a woman ever having a pregnancy terminated. Furthermore, in agreement with Mocan and Cannonier (2012) findings from Sierra Leone, evidence of increased empowerment for these women is supported by the increased likelihood of being tested for HIV/AIDS.

An increase in a woman's education, such as that generated by the 2010 schooling reform, could also lead to increased selectivity when finding a partner. This assortative matching Lavy and Zablotsky (2011) may then affect fertility outcomes through spousal characteristics. I find evidence that the reform led to a change in the age or education between a woman and her husband. The effect of the reform in reducing the average marital education gap was significantly high thereby highlighting increased *"autonomy effect"*. Although, the NFHS does not collect individual income data, the increase in total years of education led to increased household wealth, and possibly to greater empowerment within the household with the Indian women having a final say on household purchases, spending earnings or making decisions about their health care.

The paper proceeds as follows. The literature on education and fertility behaviors is studied and discussed in detail in section 2. The 2010 reform is explained in greater detail in section 3. The data used in this paper is described in section 4. The empirical model and instrument used to estimate the effect of the reform on education and fertility behavior and marriage characteristics is presented in section 5. The results are discussed in section 6. Section 7 concludes and discusses some of the limitations of this paper.

2 Literature Review

The past 50 years have seen immense transformations in the educational and the reproductive expectations of young people in the developing world: educational levels are going up everywhere (UNESCO statistics), and fertility trends are downward slopping (early fertility and fertility in general). Numerous studies report strong associations between female education and early fertility behavior: teenage pregnancy, age at first birth, contraception use. This evidence has been used as an argument in favor of targeting educational expenditures towards girls. However, most of these studies are based on correlations between years of education and early fertility behavior, often after controlling for community, peers, household and individual characteristics. Part of the correlation between maternal education and early fertility behavior may reflect the influence of unobserved background variables correlated with education (in particular personal fertility preferences). This lack of evidence to explain the causal process is mainly due to the endogeneity of the two decisions: schooling and fertility timing.

While there are reasons to expect that a birth during the teen years will often lead to the termination of schooling (time incompatibility, issues of financial support, absence of daycare facilities, cultural factors), it is unclear whether the causality runs from early pregnancy to low levels of schooling or the other way around (endogeneity of choices). A few methodologies have been tried in order to address the possible reverse causality link between education and teenage fertility: comparison between sisters Geronimus and Korenman (1992) or between single and twin births Grogger and Bronars (1993) to avoid omitted variable bias; instrumentation of age at first birth by age at menarche Ribar (1999); miscarriage as an instrument for teenage mothers Hotz et al. (2005). The most conclusive studies have used variation in length of schooling laws (McCrary and Royer, 2011; Leon et al., 2004; Black et al., 2004), or timing of school construction (Breierova and Duflo, 2003; Osili and Long, 2008), or compulsory schooling laws in a regression discontinuity approach or instrumental variable approach (Kırdar et al., 2018; Chicoine, 2012) and all conclude to a reduction in the probability of teenage childbearing due to an additional year of schooling.

Using data from California and Texas, McCrary and Royer (2011) found no evidence that increasing education by beginning school at younger ages reduced fertility. Exploiting changes in compulsory school laws in the U.S. and Norway, Black, Black et al. (2008) found that increased schooling led to a reduction in fertility. However, the results from Monstad et al. (2008) suggested that the result in Norway may be evidence that women were only postponing their births from their teens and early twenties to their late thirties. Work by Lavy and Zablotsky (2011) found that increased access to school in parts of Israel due to the end of military rule led to decreased fertility for Arab women. The literature focusing on the effect in developing countries suggests a larger and more prevalent effect of education on fertility, as may be expected. In Indonesia, Breierova and Duflo (2004) found mixed evidence of education's effect on fertility. They estimated that increased levels of primary education generated by a large-scale school construction project led to fewer births for women by the age of 15 but had no effect on the number of children born to women by the age of 25. However, they found evidence that the increase in maternal schooling led to reduced levels of child mortality. More robust evidence was discovered in Nigeria, where Osili and Long (2008) found that the expansion of universal primary education led to reductions in fertility for women at the age of 25. Chicoine (2012) found that lengthening primary school by one year due to a policy change in Kenya led to an increase in education, a delay in marriage, and reduced fertility beginning at the age of 20.

Researchers and policy makers are interested in finding ways of reducing early childbearing which has been shown to have potentially adverse consequences on the mother, her child and the society. Early childbearing has been linked to higher rates of maternal and child morbidity and mortality, lower educational achievements, and lower family income. Larger completed family size is one of the long-term demographic effects of adolescent fertility because the timing of the first birth is usually an indicator of future fertility patterns. One way of reducing early fertility is to directly improve girls' knowledge about family planning; another is to give them alternative opportunities via schooling. Most programs are of the first kind: they are aimed at enhancing young people's ability to avoid early childbearing and directly influence the process of decision making by adolescent girls at the time of choice. Interventions in the second category are intended to influence sexual decision indirectly by developing and strengthening adolescents' motivation to avoid early childbearing. They assume that broadening opportunities, especially through educational enhancement, will provide meaningful alternatives to childbearing. The aim of this paper is to investigate the potential of the second strategy: does education reduce fertility and if so, by how much?

In least developed countries, where teenage fertility rates are much higher than in more developed countries (see Figure 1), the debate about education and fertility timing has very real consequences. Sub-Saharan Africa and Africa still displays some of the highest levels of fertility in the world followed by Oceania and Asia. India is home to the more stunted children than any other country and is one of the ten countries with the largest burden of teenage pregnancy. In 2017, an estimate of 11.8 million teenage pregnancies occurred in India. According to the National Family Health Survey 4 (NFHS 4), 7.9% of women aged 15-19 years, were already mothers or pregnant at the time of the survey, with the prevalence higher in rural areas (9.2%) compared to urban areas (5%). The burden of teenage pregnancies was highest in Tripura (18.8%), West Bengal (18%) and Assam (14%) in the country (NFHS-4) (See Figure 2).[2] India is in the midst of a demographic transition that exhibits striking spatial differences. With few exceptions, fertility and mortality have been declining, but from greatly varying levels and at different speeds from state to state. Yet the rate of decline is slow with high level of population still persisting. Aside from the intrinsic importance of understanding these patterns of decline, the diversity of the Indian experience provides an opportunity to reexamine various interpretations of the fertility transition (Visaria and Visaria, 1995; Bloom, 2011; Chauhan and Nagarajan, 2021).

(Drèze and Murthi, 2001) re-examines the determinants of fertility levels and fertility decline, using panel data on Indian districts for 1981 and 1991 and finds that women's education is the most

[2]Source: https://feminisminindia.com/2021/01/19/what-contributes-to-teenage-pregnancies-in-india/

important factor explaining fertility differences across the country and over time. Low levels of child mortality and son preferences also contribute to lower fertility. By contrast, general indicators of modernization and development such as urbanization, poverty reduction and male literacy bear no significant association with fertility. (Sen et al., 2021) investigates the role of fertility in explaining the educational gap between Muslims and Hindus in India. Using decomposition techniques, they find that family size accounts for about 11% of the gap in years of schooling between high caste Hindus and Muslims. While examining the likelihood of completion of different levels of education, the contribution of family size increases with the level of education, rising to 15% for secondary education. Even in tribal areas, (Magill and Wilcox, 2007) finds that education is a significant determinant of the fertility level. While the education of both wife and husband has retarding effect on fertility, using a bi-variate analysis they find that the number of live births born is significantly less when wives are more educated than husbands.

Work by (Shah and Steinberg, 2019) investigates whether national trends in educational data changed around the time of the policy I study in my paper using household surveys and administrative data. They find school-going increases after the passage of the law and school infrastructure improved both before and after the right to education act (RTE). They also found that the number of students who have to repeat a grade falls precipitously after the policy is enacted, in line with the official provisions of the law. (Chatterjee et al., 2020) estimates the causal impact of the policy on private supplemental education by comparing the growth of tutorial institutions in highly competitive educational markets to that in less competitive educational markets. They find a strong impact of the law on the private tutoring market and show that this holds across alternative definitions of highly competitive districts.

The present study continues in the same vein as the above-mentioned papers yet is different for two main reasons. First, I use data from a developing country: India, where almost 35%percent of the population is under age 15, and only 5 percent is age 65 and older, where more than half of women are married before the legal minimum age of 18. Among women age 20-49, the median age at first marriage is 17.2 years. Overall, one in six women age 15-19 have begun childbearing: 12 percent have become mothers and 4 percent were pregnant with their first child at the time of the survey. Among women age 20-49, half had a birth before they were 20 years old, and more than one in four before they were 18 years old. Early childbearing is most common in rural areas and among women with no education (NFHS- 3).[3] The question of teenage and young women fertility is there of very real consequences on demographic changes and the accumulation of human capital. Second, my data is the last recent publicly available data for the youngest cohorts born between 1965 and 2006. This allows me to study the fertility behavior of women in their teenage years till age 25.

Lastly, prior to this paper, there is no literature that has studied the effect of this reform on fertility and associated behaviors. The work in this paper is the first to study the RTE Act and to review the relationship between female education and fertility in India. It took India 62 years after Independence to guarantee school education as a fundamental right for its young children. Its current lacunae notwithstanding, the RTE Act remains one of the most important reforms in India's school education, and its future may yet determine how India overcomes its most fundamental problems of poverty and exclusion. This paper will help to suggest the most effective strategy to reorient the Indian educational structure further in order to have a significant impact on fertility. I use a instrumented difference-in-differences methodology design by exploiting the variation in policy exposure in different states of India in different time across month-year of birth cohorts. I examine in detail the pathways through which increased education impacts fertility.

3 Compulsory Schooling: Right to Education (RTE) Act

In 2000, just 86 percent of Indian children were in primary schools, and the survival rate to grade 5 was 47 percent (UNESCO (2003)), underscoring India's longstanding challenge in providing broad access to schooling. With the worldwide push for expanded access in the Educational for All Initiative (UNESCO (2000a)), India began a push for universal access. Passing the Right to Education Act followed a complicated path described in Appendix A, but the key features for this research paper are summarized. In 2002, the 86th amendment to the constitution introduced Article 21(a) which stated that "the State shall provide free and compulsory education to all children of the age of six to fourteen years in such manner as the State may, by law, determine.[4] The RTE Act was first presented to the parliament in 2006, but it was rejected with lack of funds

[3] Source: https://dhsprogram.com/pubs/pdf/frind3/frind3-vol1andvol2.pdf

[4] Source:https://www.india.gov.in/my-government/constitution-india/amendments/constitution-india-eighty-sixth\-amendment-act-2002

cited as the official reason.[5] However, the RTE Act gained approval from the Union Cabinet in 2008 and then passed through the Lower and Upper House of the Indian parliament in July and August 2009, making it national law. The law came into effect in the whole of India except the state of Jammu and Kashmir from 1 April 2010.

Subsequently, the state governments implemented the RTE Act by passing it in their own state legislatures, although not all states passed the Act in their legislatures at the same time. (See Appendix Table 1 for details about the time of each state's legislative enforcement). The last states passed it in 2012, three years after its enactment in the Indian Parliament. Jammu and Kashmir was exempted from this law till the status was withdrawn with the abrogation of Article 370 in October, 2019 bringing the newly-formed Union Territory under the purview of the RTE. The Act was finally implemented in May 2020 in the state.[6] The Act makes education a fundamental right of every child between the ages of 6 and 14 and specifies minimum norms in elementary schools. The title of the RTE Act incorporates the words 'free and compulsory'. 'Free education' means that no child, other than a child who has been admitted by his or her parents to a school which is not supported by the appropriate government, shall be liable to pay any kind of fee or charges or expenses (direct (school fees) or indirect cost (uniforms, textbooks, mid-day meals, transportation)) which may prevent him or her from pursuing and completing elementary education. No school or person while admitting a child cannot collect any capitation fee and subject the child or his or her parents or guardians to any screening procedure. Any school or person, if in contravention of the provisions of sub-section 13 of the Act: (1) receives capitation fee, and shall be punishable with fine which may extend to ten times the capitation fee charged and (2) subjects a child to screening procedure shall be punishable with fine which may extend to Rs 25,000 for the first contravention and Rs 50,000 for each subsequent contravention.

'Compulsory education' casts an obligation on the appropriate government and local authorities to provide and ensure admission, attendance and completion of elementary education by all children

[5] Source:https://timesofindia.indiatimes.com/india/Centre-buries-Right-to-Education-Bill/articleshow/1748745.cms

[6] I exclude the state Jammu and Kashmir from my analysis for several reasons. First, it implemented the policy 10 years later than the national law was announced due to the state having a special political status. Second, the birth years analogous to the interview year age in the NFHS-4 data doesn't allow me to use the individuals to be treated by the reform. Third, NFHS-5 also does not have observations based on birth cohort to be treated by the policy adoption timing. Fourth, including this state for my analysis even as a control state doesn't change the results (not shown in the paper) due to very less number of observations for this state.

in the 6-14 age group. If a child above 6 years of age has not been admitted in any school or could not complete his or her elementary education, then he or she shall be admitted in a class appropriate to his or her age. However, if a case may be where a child is directly admitted in the class appropriate to his or her age, then, in order to be at par with others, he or she shall have a right to receive special training within such time limits as may be prescribed. The RTE Act keeps a check on all neighbourhoods through regular surveys and identifies children who are eligible for receiving an education but do not have the means to. However according to the Act, it does not include any penal provisions in case parents or teachers do not adhere to its provisions.[7] Educational challenges have been prevalent at both the centre and states for many years in India. The law maps out roles and responsibilities for the centre, state and all local bodies to rectify gaps in their education system in order to enhance the quality of education in the country. However, the different economic and developmental stages of states have led to variation in implementation of the RTE Act, a finding recently also extended by (Shah and Steinberg, 2019). There also exists significant district-level heterogeneity in complying with RTE norms irrespective of economic status of the district and state.

4 Data

Data for this study is taken from a cross-sectional, population-based data from a multi-round survey of National Family Health Survey (NFHS) waves 4 and 5 conducted in 2015–16 and 2019-2021. The previous three rounds of NFHS were conducted in 1992–93, 1998–99 and 2004–05.[8] NFHS is India's largest household survey for health planning and policy formulation in the country. It is conducted by the Ministry of Health & Family Welfare (MoHFW), Government of India.[9] NFHS-4 and NFHS-5 used a stratified two-stage sampling design to get a representative sample from the country. In total from both the waves, total sample of approximately 1,200,000+ women

[7] Critics of the policy to punish parents had said then that it was much more important to fight the root causes of absenteeism – such as poverty and lack of access – rather than put all the onus on parents. Source: https://thewire.in/education/parents-should-be-punished-if-kids-dont-go-to-school-says-government-panel

[8] I do not use NFHS-1,2 and 3 because the birth year of all the woman for these data sets are not affected by the RTE Act. Even though woman surveyed in these waves can be a part of the control group. But I chose to eliminate these waves to have a proper balance of data in the treatment as well as the control group.

[9] Each successive round of the NFHS has had two specific goals: a) to provide essential data on health and family welfare needed by the MoHFW and other agencies for policy and programme purposes, and b) to provide information on important emerging health and family welfare issues.

of 15–49 years and 1,000,000+ men of age group 15–54 years were interviewed through separate questionnaires using computer assisted personal interviewing method.[10]

Figure 3 shows the timeline of events in accordance to the data available. The respondents to be affected by the 2010 RTE Act implemented in states has to be 14 years old or less than that in 2010 to not drop out from school. To assign appropriate treatment to each respondent, I take into account their birth cohort (measured by birth month and birth year) based on the RTE state rules as shown in Appendix Table 1. For example, respondent surveyed in NFHS-4 or NFHS-5 were of age 15-49. So, individuals surveyed in 2021 (current age: 15-49) to be affected by the policy in 2010 (must be of age 14 or less in 2010) are the individuals in the age group 15-25 (in survey year 2021) with their corresponding birth years as 1996-2006 as per the NFHS-5 survey data. The control group is all the respondents with age greater than 14 years in a state when the policy was implemented and can drop out of school with less years of education.

NFHS-4 and NFHS-5 provides extensive information on key indicators of the utilization of maternal and child health services, nutrition, fertility, reproductive health, quality of family planning services, domestic violence, infant and child mortality etc. Besides these indicators, it also collects biomarkers information on haemoglobin, blood pressure, random blood glucose, height, weight and HIV. NFHS-4 and 5 is different from other previous rounds of NFHS-1, 2 3 since its overall sample size is decided in such a way that it can provide indicators at district, state/union territory and national levels. Additionally, the NFHS-4 and 5 data provides separate estimates for rural and urban areas of 157 districts where around 30–70 percent population residing in urban India as per 2011 census.[11].

Summary statistics for the sample used in this paper are shown in Table 1.[12] The average respondent included in this paper's sample is 29 years old with 7 years of education.[13] Woman in

[10] I use only the dataset for women for my analysis in this paper as the fertility outcomes in the women questionnaire is more detailed than the men questionnaire.

[11] For more details of survey design and questionnaires, you can refer to the NFHS report. Check NFHS-4 report: http://rchiips.org/nfhs/NFHS-4Reports/India.pdf. Check NFHS-5 report: http://rchiips.org/nfhs/NFHS-5_FCTS/India.pdf

[12] The summary statistics doesn't include the state Jammu and Kashmir where the reform came into force in a later date in 2020 and is excluded from my analysis for reasons cited earlier.

[13] Some respondents don't have full information on their date of birth. When date of birth data is missing, the NFHS attempts to estimate the correct month or year of birth using other information collected in the survey. The inclusion of observations with imputed month or year data only introduces some minor inconsistency across outcome variables for younger ages.

the sample, on average, began sexual activity before the age of 16, followed by marriage, before giving birth to their first child shortly after the age of 20. Large fractions of women are married between the ages 18 and 20 and have their first child by age 20; the largest increase in the fraction of women becoming sexually active is between the ages of 18 and 25. Finally, women included in the sample have an average of about two and a half births by the age of 25. Additionally, women have the desire of having at least 3 children in the given sample.

5 Econometric Framework

5.1 Baseline Estimates via Ordinary Least Squares

As discussed earlier, the previous literature has established a negative relationship between fertility and education. I begin by demonstrating that this relationship exists within India for individuals born between 1965 and 2006. This is done by estimating an ordinary least squares (OLS) model. In the initial specification, total years of education ($Educ_{isc}$), is used as an individual's measure of education. The model estimated is defined by the equation:

$$Y_{isc} = \beta_0 + \beta_1 Educ_{isc} + \beta_2 \mathbf{X}_i + \alpha_s + \zeta_c + \epsilon_{isc} \quad \textbf{(OLS)} \tag{1}$$

where i is the individual, s is the state, Y is the outcome variable (fertility measures). $\mathbf{X}_i$ is the vector of some potential control variables- religion, district, urban/rural areas, ethnicity. These covariates are either constant over an individual's life or occur prior to schooling decisions being made, which leaves few available variables. α_s is the state fixed effects, ζ_c is the birth cohort fixed effects where cohort c is defined by the interaction of the birth year and birth month of an individual i, and ϵ_{isc} is the unobserved characteristics. Estimates are weighted using sampling weights provided by the NFHS, and the standard errors are robust and clustered at the state level.

Using the model described in equation (1), I estimate the relationship between total years of education and four outcomes: first intercourse, marriage, and birth, as well as a woman's total fertility. I do this for each age between 15 and 25. The reform's timing enables me to investigate effect on Indian women till age 25.[14] In Panel A of Table 2, I show the relationship between years of education and first intercourse. Each cell is a separate regression, and the outcome variable

[14]Due to the NFHS limiting their data collection to women under 50, the density of observations is smaller for the older cohorts in the sample.

is equal to one if the respondent reported having intercourse before or at the specified age. The number of observations changes due to restricting the sample to include only observations older than the given age.[15] The results in Panel A suggest a statistically significant negative correlation between education and young women becoming sexually active, with the largest negative relationship occurring at age 18 and 20. The results in Panel B are evidence that there is also a negative relationship between years of education and marriage at each age.[16] In Panel C of Table 2, I show the relationship between years of education and first birth. As with the two previous panels, the estimates are statistically significant across all ages, and a pattern emerges showing that the correlation between years of education and a mother's first birth is most negative at age 19 and 20. Finally, the estimates for total number of births at each age are shown in Panel D of Table 2. The correlation between years of education and total fertility remains negative for all the ages and becomes increasingly negative at older ages.

The OLS results in Table 2 suggest that as education increases women postpone their sexual activity, marriage, and childbearing. However, these results do not account for the endogeneity problems of selection bias and reverse causality, thereby overstating in absolute value the true effect of education on fertility outcomes. The estimates are likely to be biased if education is correlated with unobservable characteristics such as social and cultural norms, religious beliefs, and family background that also affect the woman's likelihood of postponing the establishment of a family. Usually, these factors are established and shaped during childhood and remain constant over time. However, there are other unobservable factors that affect both education and fertility and vary over time. For example, preferences for risky behaviors (during adolescence, the predisposition to engage in risky behavior changes) imply both a higher probability of becoming pregnant and higher probability of educational failures. Individuals who are more likely to continue further in their schooling are likely to be the same individuals who would have fewer children and possibly postpone marriage due to both a better innate understanding of personal health and possibly career ambition. This suggests that the negative relationship between schooling and the various outcomes could be driven by these omitted characteristics. Moreover, human capital accumulation

[15] Panel A has fewer observations because some women chose not to report at what age they became sexually active. Furthermore, observations were dropped if a woman reported having a child at a certain age, but not having their first sexual intercourse at that age or before.

[16] Minimum legal age to get married for women in India is 18 years. Recently in February 2022, the government has raised the legal age of marriage for women to 21 from 18 years.

and reproductive decisions are either joint decisions, which result in a potential reverse causality problem. In order to address these concerns, I implement an instrumental variables (IV) strategy that induces exogenous variation in schooling due to the 2010 education reform in India but is uncorrelated with other characteristics, which affects women's fertility outcomes.

5.2 Identification Strategy: The Estimated Likelihood of Being Treated by the 2010 Right to Education Act

The goal of this present study is to uncover the impact of the RTE on the fertility outcomes of the woman. As noted earlier, it is difficult to establish causality between education and fertility because of the endogeneity of the two variables. Education may be a proxy for unobservable variables, such as parental background, personal motivation, personal skills and ability, peer effects, local women's empowerment, which in turn may be decisive factors of fertility decisions. To avoid the endogeneity issue, I choose to use an instrumental variable (IV) technique. The IV methodology is often useful in such randomized experimental set up when the treatment itself cannot be randomly assigned because of the noncompliance and the lack of embargo problems. This approach relies on the assumption that the probability of compulsory education in school is correlated with experimenting the 8 years of minimal education curriculum ($Reform_{isc}$), while the latter only has an impact on fertility through education (exclusion restriction). The instrument is defined as below:

$$Reform_{isc} = \begin{cases} 1 & \text{if individual i in the birth cohort c is affected by the reform in the state s} \\ 0 & \text{otherwise} \end{cases}$$

The probability of starting school at age A depends on the individual's birth cohort c affected by the reform in the state s. $Reform_{isc}$ should be positively correlated with the total number of years of education ($Educ_{isc}$). The reform dummy is exogenous implying that the instrument is as good as randomly assigned (independence assumption). This means that individuals with different values of the instrument do not systematically differ in their potential outcomes (i.e. in any unobserved variables that affect the outcome). The independence assumption can be challenged if there was a correlation between the implementation (timing or intensity) of the reform and pre-reform fertility rates in the states. Figure 4 provides some evidence supporting the exogeneity of reform implementation and women's fertility decisions. In most states, reforms took place when teenage fertility rates were either decreasing or remaining stagnate, suggesting the timing of the reform was not driven by fertility trends in particular. Furthermore, monotonicity, rules out the existence of individuals that reduce their investments in schooling/education as a result of the reform (called defiers). The monotonicity assumption fails if there are women who are induced by the reform requirements to drop out of school (defiers). This seems counter-intuitive, so it seems plausible to assume there are no defiers.

However, the greatest threat to identification is that the generations most exposed to the law are also most exposed to other social changes, such as social media and changing cultural perceptions. Identification relies on having women from the same generation in both treated and control groups. This comes from two sources- (1) staggered implementation of the law across states and (2) individuals who were just above or below the age cut-off of the policy when it was passed. Since some individuals born before may be also affected by the reform, the estimate is likely to be biased downwards and will thus be a conservative estimate of the impact of years of education on early fertility. However, the concern indicated in (2) disperses off because of the special provision of the reform that does not affect the cohorts around the threshold. The reform is such that if a child above six years of age has never been admitted to school or though admitted, could not complete elementary education, then the child will be admitted to an age appropriate class and complete elementary education.[17] The reform facilitates a child admitted to an age appropriate class to be given special training to enable him or her to be at par with other children. Given the varied life experiences of these children, it is recognised in the field of education that their mental capabilities are higher than that of entry level 6-year old children, and that they are indeed capable of accelerated learning. This allows me to use all the potential cohorts to be affected by the reform in my regressions and not to isolate cohorts around the threshold as a part of identification. I discuss in detail about concern (1) as a potential threat to the identification strategy in the later section.

[17]The overall objective of age appropriate admission for these children is to save them from the humiliation and embarrassment of sitting with younger children. When older children are forced to sit in a class younger than their age, they tend to be teased, taunted, suffer lower self esteem, and consequently drop out.

5.3 The Reduced-Form and 2SLS Model

I verify that the instrument predicts the change in education, the endogenous variable in the OLS model. This first stage relationship can be described by the following equation:

$$Educ_{isc} = \gamma_0 + \gamma_1 Reform_{isc} + \gamma_2 \mathbf{X}_i + \delta_s + \phi_c + u_{isc} \quad \textbf{(First Stage)} \tag{2}$$

$Reform_{isc}$ is the potential treatment for education of the individuals when the policy came into force in different states. In Table 3, I present the estimates of γ_1 using total years of education as the dependent variable in panel A. The estimates in Table 3 show that the instrument predicts statistically significant increases in education due to the reform with F-statistics larger than 10. In column (2), the reform is estimated to increase years of education by 0.64 years when all the covariates are used in the regression.

In contrast to the substantial understanding of the canonical 2x2 difference-in-difference (DD) model, I use the above equation as the fixed effects DD estimator with treatments usually occurring at different times. Some units of observation are treated at a particular time based on the policy enactment in a particular state as the treatment group and untreated units are interpreted as the control group.

Using the first stage estimates, the main empirical specification is defined by the equation:

$$Y_{isc} = \pi_0 + \pi_1 \widehat{Educ}_{isc} + \pi_2 \mathbf{X}_i + \theta_s + \lambda_c + \tau_{isc} \quad \textbf{(Second Stage, 2SLS)} \tag{3}$$

π_1 here can be expressed as the ratio of reduced form and first stage coefficients (IV/ Wald estimator). In other words, it measures the average effect of treatment on the compliers (LATE). It says that the estimate is given by the difference in outcomes for the groups intended and not intended for treatment divided by the difference in actual treatment for these groups. In summary, an instrument, which is as good as randomly assigned, affects the outcome through a single known channel, has a first stage, and affects the causal channel of interest only in one direction, can be used to estimate the average causal effect for women who were induced by the reform requirements to receive free and compulsory education (compliers).

Due to the fact that the measure of education does not perfectly capture the full impact of the 2010 reform, I also focus on the estimates from the reduced-form model (intention to treat estimates or ITT) given by the following equation:

$$Y_{isc} = \rho_0 + \rho_1 Reform_{isc} + \rho_2 \mathbf{X}_i + \sigma_s + \omega_c + \mu_{isc} \quad \textbf{(Reduced Form)} \tag{4}$$

where i is the individual, Y is the outcome variable (fertility measures). All covariates and the fixed effects are the same as described in the OLS model, equation (1). The variable $Reform_{isc}$ is the instrument described in the previous subsection.

6 Results

6.1 2SLS and Reduced Form Results

In Table 4, I report the 2SLS results for each age from 15 to 25, using the same four outcomes examined previously: first intercourse, marriage, and birth, along with total fertility. Each point estimate is generated from a separate regression. The results in Panel A, for first intercourse, are statistically significant for women in their teenage years till age 21. The largest negative relationship occurs at age 18 estimating the effect of education because of the reform led to a 8.5 percentage point decline in the likelihood of a woman becoming sexually active. Pre-marital sex for teenage women does reduces through the impact of the reform on education. For later ages, the results are not statistically significant, but the negative relationship still holds. I find a negative coefficient in Panel B, for marriage, the results are negative and statistically significant beginning at age 15. The estimates indicate that the years of education affected by the reform led to women being 7.2 percentage points less likely to be married by the age of 20. These results suggest that women are postponing marriage from their early teens to late twenties. The estimated effect on marriage remains negative, although smaller in magnitude compared to age 20, for ages 24 and 25. The results for age at first birth, reported in Panel C, establish a similar pattern. Trailing the dip in the marriage results, the estimated effect of education because of the reform on the likelihood that a woman has given birth by age 18 is statistically significant at the 95 percent confidence level. The result then increases in magnitude and slightly in significance, estimating that the reform led to a 3.2 percentage point reduction in the likelihood of a woman giving birth by age 21. The estimated effect becomes slightly more negative as the women move at age 24 and 25. The effect of delaying a women's first birth lags the effect on marriage by between one or two years, suggesting that the effect on first birth may be related to women delaying marriage. Although the reduction in marriage may play a role in delaying childbearing, it cannot explain the entire result. It is in the early ages that the reform leads to postponed sexual activity, possibly explaining some of the more persistent effect which is seen in panel C. Although insignificant, there is also evidence that the reform led to decreasing the likelihood of women in their late twenties becoming sexually active or married or waiting to have their first child. This suggests that the RTE act may also have led to other changes in behavior.

Beyond the postponement of women's initial fertility, the results in Panel D show the evolution of the effect of education through the reform's effect on total fertility across different ages. At age 23, the results show that the years of education affected by the reform led to a statistically significant reduction of 0.055 births. The results in Panel D demonstrate that the effect becomes increasingly negative for women in their twenties. By age 25, the reform led to a reduction of 0.195 births, which is significant at the 95 percent confidence interval. Although a woman's fertility is not complete at this age, but due to fewer data availability I cannot further comment on the change in the fertility behavior of women in their twenties due to the change in their education via the reform. The results in Panel D reveal an interesting insight. The magnitude of the result on total fertility is increasing for women in their twenties, providing evidence the effect is not driven solely by an incarceration effect. This is evidence that the human capital accrued by women with higher levels of schooling plays an important role in reducing fertility rates, even into the woman's mid-twenties.

Table 5 reports the reduced-form results i.e. the effect of the reform directly on the fertility outcomes as reported previously. The results are similar to the 2SLS results reported in Table 4 in terms of the direction of change in the estimated effect of the reform. The level of significance for different ages also holds true compared to the results in Table 4. This validates that the reduced-form estimates are not subject to issues accruing to instrument problem thereby showing that the effect of the reform on education had the same and consistent effect as the reform have had on the fertility outcomes.

6.2 Threats to Identification Strategy & Robustness Checks

The instrument used in this paper is assigned based on the individual getting affected in their birth cohort due to the enactment of the reform enacted in each state. As the first stage involves treatment status assignment using a DD method, there exists a policy endogeneity concern expressed in section 5.1 earlier. The policy adoption endogeneity is not completely resolved using IV approach or controlling for fixed effects. The instrument is valid if the reform only affects the outcomes of interest through its effect on total years of education. The 2SLS estimates for marriage and fertility behaviours will be biased if the instrument is capturing a secular trend in women's propensity to attend and advance through their levels of education. It is likely that the instrument is measuring some unobserved endogenous change in the demand for education before 2010, an arbitrary point in time.

I address this issue in the paper in two ways. I use some state level characteristics that might be correlated with the adoption of the RTE law to see if they have any predictive power. First, in one set of auxiliary regression, I include a control for the average state level GDP growth rate[18] from 2000-2010 with the linear trend in birth cohort. I use the average state level GDP growth rate as a proxy for educational investments in a particular state due to the absence of state level educational expenditures or literacy rate data each year. Including such a control interacted with birth cohort linear trend allows me to figure out whether the growth rates in each state prior to the implementation of the RTE act is picking up the effect on education more than the instrument. The results are shown in Table 6.[19] The estimates demonstrate a nearly identical pattern to the baseline results reported in Table 4.[20] The pattern in Panel A also mirrors closely the results from the baseline estimates. The reform's effect on marriage is largest for the ages 17 to 20, as it was without the GDP growth in linear birth cohort control. The estimates for first birth again lag that of marriage. The estimates for total fertility also remain similar to the baseline results but increase slightly in magnitude for later ages. The results in Table 6 suggest that the pre-treatment GDP growth rate accounting for the strength and wealth of the state are not driving the results with the implementation of the policy. Furthermore, the correlation between the pre-treatment GDP growth rate and the policy implemented in different time in different states, in results not shown, is found to be significantly negative. This again verifies, that the wealthy states didn't implement the policy earlier. The differences in states growth do not bias my conclusions.

Second, in another set of auxiliary regression, I rerun the equation (3) controlling for the state

[18]Data collected from MOSPI (Ministry of Statistics and Programme Implementation), Government of India. The growth rates are measured at a constant price 1999-2000.

[19]The number of observations is reduced because of the missing values for the GDP growth rate in some states.

[20]The first stage results are robust and are reported in the appendix.

level GDP per capita for pre-treatment year i.e. 2009 interacted with the linear trend in birth cohort.[21] This alternative control allows me to measure indirectly the per capita income level of a state prior to the reform. Differing state per capita income might mean that some states are more likely to adopt the law sooner, so the instrument might be picking up such characteristics. The results are reported in Table 7 and are found to be robust.[22] The estimates in all the panels are very similar to those seen previously n the baseline model.

As a part of robustness check I re-run the 2SLS results controlling for state specific linear time trend based on the birth cohort. The results are shown in Table 8. Although I lose the significance level for some ages but the direction of changes in the magnitude of the coefficients remains similar to the baseline results as shown in Table 4.

6.3 Exploration of Potential Mechanisms

In addition to the reform's effect on the beginning of sexual activity, marriage, and childbearing discussed in the prior sections, additional mechanisms could provide further insight into the link between total years of education and fertility.

6.3.1 Predicting Fertility Practices

Previous work has studied the relationship between education and access to information (Thomas et al., 1991); increases in education may lead women to better understand healthcare options available to them and take better decisions about fertility outcomes. Table 9's first column demonstrates that the increased education generated by India's policy change resulted in a favourable fertility preference by the women and her partner after their first birth. A potential consequence of this could be an increase in abortions, which may have contributed to the reduction in fertility. The NFHS classifies any pregnancy not ending in a live birth termination, but an increase in the use of abortion to avoid having a child would still lead to an increase in recorded terminations.[23] The result in Table 8's first column demonstrates that the increased education generated by India's

[21]Data collected from MOSPI (Ministry of Statistics and Programme Implementation), Government of India and are measured at a constant price 1999-2000.

[22]The first stage results are robust and are reported in the appendix.

[23]The abortion laws in India for unmarried girls state that the legal age of abortion is 18 years. A woman who is unmarried and over 18 years of age can provide her own written consent to get an abortion. Legal age if below 18 years, then they must have written consent. This consent has to come from her guardian along with a specific reason for the abortion of pregnancy. The legal abortion time period in India is 12 weeks of the foetus for any unmarried girl, by any registered medical practitioner.

policy change did not lead to more respondents reporting having ever having a terminated pregnancy. Furthermore, unintended pregnancies may lead women to seek unsafe abortions (Singh et al., 2018), and unsafe abortion is one of the major causes of maternal mortality in India (Yokoe et al., 2019). I also test a measure of whether respondents' last pregnancy was unwanted. The second column in Table 9 reports that the reform's effect on increasing total years of education reduced the probability that a woman's last pregnancy was reported as unwanted by 1.8 percentage points. Column 3 in Table 9 shows the effect of the reform on increasing education did not lead to reduce the fertility preferences of having more child after first birth.

India has continued its efforts to expand the range and reach of contraceptive options through rolling out new contraceptives and delivering a full range of family planning services at all levels. The estimates in Column 4 and 5 shows the effectiveness of the reform in increasing education leading to increased likelihood of women having more knowledge and awareness of using any and modern contraception before having their first child. As further evidence of the reform's effect on the empowerment of these women, the last column show that the reform led to increases in the likelihood of being tested for HIV/AIDS by 7 percentage points. This evidence suggests that information and preferences alone may not be enough to change fertility outcomes.

6.3.2 Predicting Marriage Characteristics and Economic Resources

I find evidence that changes in the husband's characteristics played a role in reducing fertility. Due to assortative matching it could be expected that women affected by the reform, may have married men with more desirable characteristics, leading households to make different decisions regarding fertility. Estimates in the first and second column in panel A of Table 10 demonstrate that women are marrying men with a significant increase in total years of education by their husband affected by the reform and that the reform did affect the age difference between husband and wife. Even though the age difference estimate is not significant, but the reform reduced the marital age difference by 2.6 percentage points. This means that the reform affected both the gender as expected allowing both the husband and wife to have increase their years of education. This leads to the expected result that women in this sample marry same type of men and they reduce marital education gap between husband and wife by 0.540 total years of education. These results provide evidence that the fertility decline was driven by changes in the husband's characteristics as well, but that women may have increased their ability to make their own personal decisions due to the large reduction in the marital education gap as shown in the last column. The estimate in the last column is insignificant but positive in magnitude which shows respondents' autonomy in having a final say in making decisions in the household. Women with more education can influence maternal health by shaping the extent to which they can afford and access healthcare and bolster women's autonomy in the home. This increased empowerment is likely essential to women's ability to affect fertility decisions if so desired.

The estimates in panel B of Table 10 measures the economic resources and elucidates further increasing women's empowerment and their ability to independently make decisions in family planning. While I do not quantify empowerment in this study, but I believe that such a reform creates transformative role in terms of further educational attainment which echoes the sentiment of women empowerment in India. NFHS data does not include questions about income. I assess economic resources with a measure of respondent's employment in the last twelve months (0/1). I did not find a significant increase in women's employment due to the reform. Although, the increase in education is not likely to increase women's relative earning potential, which could have positively affected bargaining power in the household decision process. But evidence of increased empowerment can be seen in column 3 and 4 with significant increased likelihood in occupational status and contributing to the household wealth.[24] The last column is a measure of economic resources which is a dichotomous indicator of whether a respondent reported having health insurance at survey. I find their probability of being insured due the effect of the reform by 0.3 percentage points. The estimate is insignificant.

6.3.3 Predicting Utilization of Reproductive Healthcare Service in Last Pregnancy

Women's education is theorized to protect maternal health by influencing fertility practices that aggravate the risk of maternal morbidity and increasing women's access to and use of preventative and palliative antenatal healthcare. Along with the previous measures, this section allows me to understand women empowerment through increase in education that may lead women to better understand healthcare options available to them and take better care of their health. The first

[24] Occupational status is based on NFHS standardized broad categories. The measure of household wealth created by the NFHS is based on household assets and durable goods. This measure is divided into quintiles and captures households' wealth relative to other households in the survey.

column in Table 11 shows a positive significant effect of the reform to increase years of education for women increased their probabilities of attending at least one antenatal checkup during their last pregnancy. Antenatal healthcare visits should increase the detection of hypertensive disorders and anemia (McCarthy and Maine, 1992), which can contribute to preterm birth (Scholl and Reilly, 2000) and convulsions, brain hemorrhaging, comas, or cardiac arrest during pregnancy (Duley, 1992). I also find a positive effect of education on visiting health care provider in the past 12 months. Women's education allowed them to take preventative measures to protect their health and I find significant increase on their consumption of iron supplements at last pregnancy.

Moreover, delivering children in hospitals and other formal healthcare centers, as opposed to in one's home, should improve postnatal health by reducing the risk of postpartum infection and providing skilled birth attendants who are equipped to address complications during delivery (Graham et al., 2001). Thus, the hypothesized positive effects of women's education on healthcare utilization may help to alleviate the direct causes of maternal mortality through the prevention of semi-avoidable complications and the early detection and management of unpreventable complications or preexisting conditions. Table 11, last column shows that increasing women's education by the reform heightened their probability of delivering their last birth in a healthcare center by 3 percentage points.

6.3.4 Predicting Cognitive Skills and Mass Media Exposure

The final analytical component explores the other pathways by which women's education may affect fertility practices and healthcare utilization, and implicitly maternal health. The first is cognitive skills, proxied only by literacy in the NFHS data. Literacy was assessed by asking all respondents to read the same sentence and is defined as 1 if a respondent was able to read the entire sentence and 0 if she was not. The results presented in Table 12 shows that increase in women's education through the reform increased the probability of literacy by 10 percentage points. The second is exposure to the mass media (newspaper, magazine, TV, Radio) and is defined as 1 if a respondent reads newspaper/magazine and/or watches TV and/or listens to radio almost every day or at least once a week, 0 otherwise. Exposure to the reform shows increased likelihood of a woman exposed to media thereby addressing the corresponding effects of increasing awareness and learning more about family planning, fertility practices and healthcare utilization.

7 Conclusion

The results in this paper show that the right to education (RTE) law in India could be a significant policy lever for the government to employ in their effort to promote education. The increase in total years of education, driven by the 2010 RTE reform, is also shown to greatly impact a woman's fertility decisions. It led to postponed marriage and sexual activity, and reduced levels of fertility.

The results for fertility demonstrate that the effect is not confined to the time period that women attend school, and becomes increasingly negative for women in their early twenties. This suggests, along with other evidence, that the incarceration effect is not driving the reduction in fertility. The results are likely not driven by changes in the likelihood that a woman ever had a pregnancy terminated but changes in spousal characteristics does have an effect on family planning decisions. Furthermore, widespread knowledge of contraceptives alone seems to significantly affect fertility. The reform led to a reduction in the marital education gap, increased women empowerment and increased utilization of healthcare services. This evidence is consistent with the idea that an increase in education can lead to women having greater control over the household fertility decision, and ultimately, lower levels of fertility.

Despite its merits, this study faces some limitations. Given the latest NFHS data, I am able to trace a woman's fertility behavior only till age 25 and not beyond that. I also have literacy as the only measure of cognitive skill in the NFHS which is very basic and exhibits little variation across women. Further analyses are needed to verify the extent to which cognitive skills are a plausible driver of changes in women's fertility practices and healthcare use. Lastly, the NFHS data do not provide a full employment history. This prevents me from understanding the labor force participation and from testing whether education reform may have affected women's fertility decisions via changes in women's labor force participation.

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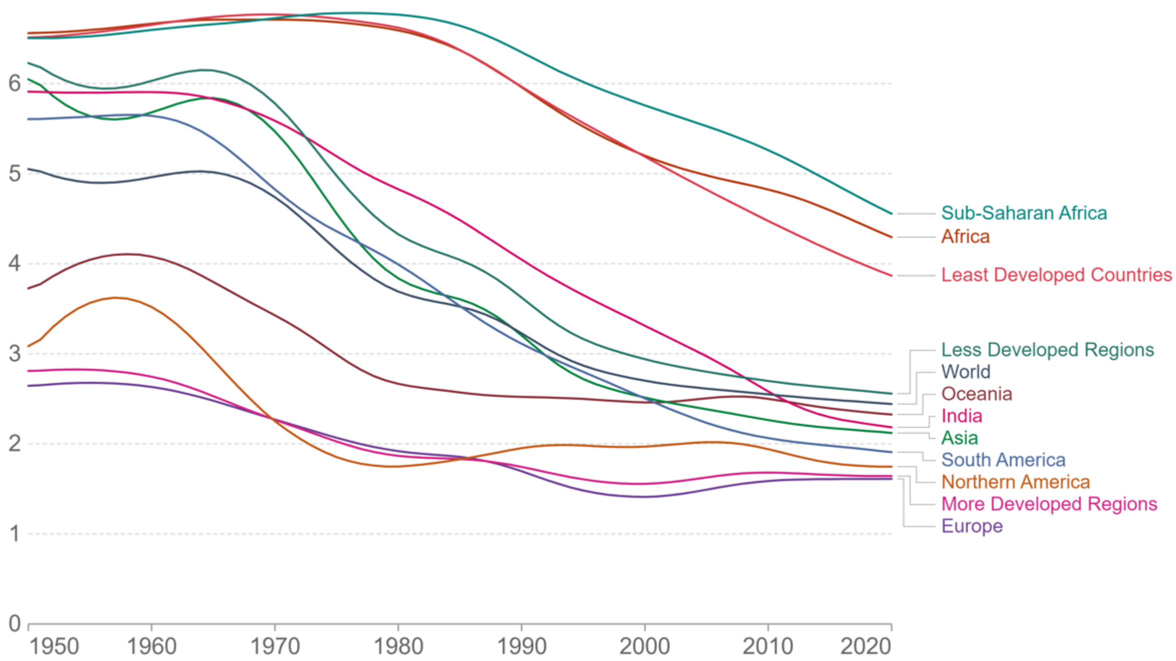
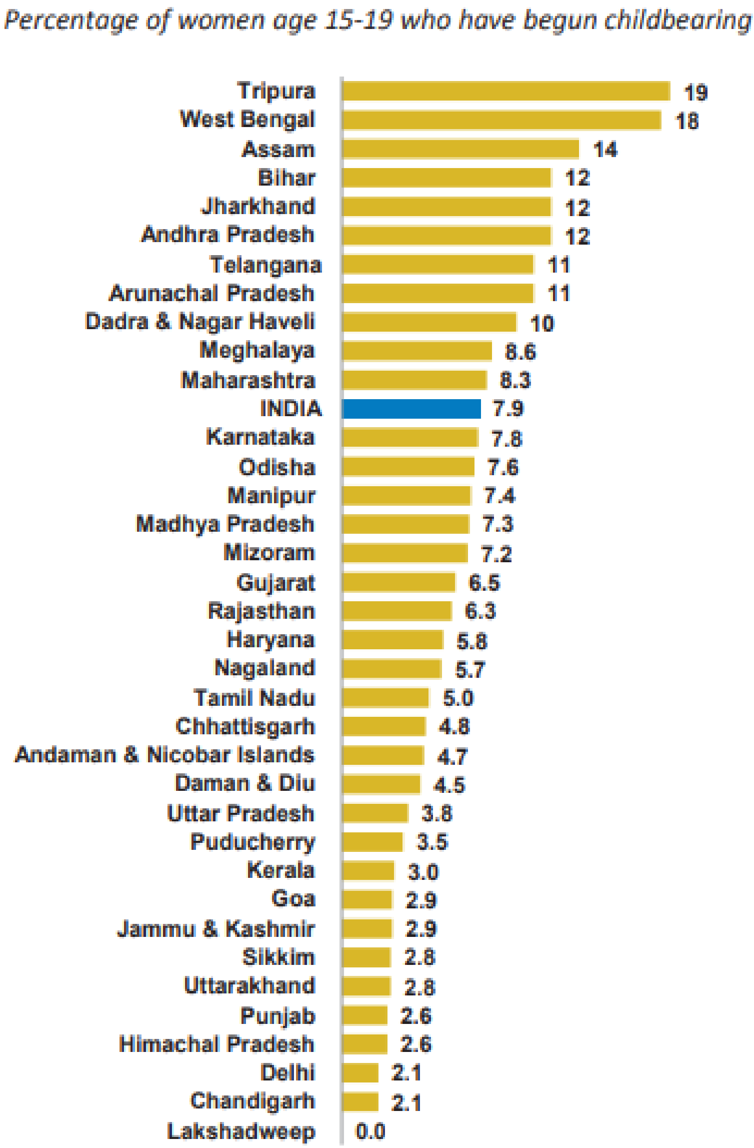
Figure 1: Children Per Woman



Source: United Nations- Population Division (2019)

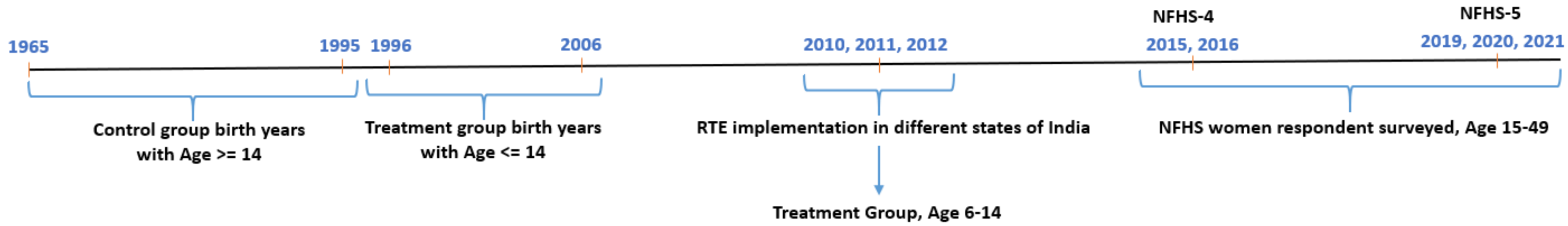
Note: Children per woman is measured as the total fertility rate, which is the number of children that would be born to the average woman if she were to live to the end of her child-bearing years and give birth to children at the current age-specific fertility rates.

Figure 2: Teenage Childbearing by State/UT in India



Source: National Family Health Survey (NFHS- 4)

Figure 3: NFHS Timeline of Events



Interview Year Age	Reform Year Age	Birth Years Affected by the Reform
(NFHS-4) 2015: 15-19	2010: 10-14	1996-2000
(NFHS-4) 2016: 15-20	2010: 9-14	1996-2001
(NFHS-5) 2019: 15-23	2010: 6-14	1996-2004
(NFHS-5) 2020: 15-24	2010: 5-14	1996-2005
(NFHS-5) 2021: 15-25	2010: 4-14	1996-2006

Table 1: Summary Statistics

Variable	Mean	Std. Dev.
Age	29.83	9.827
Total years of education	7.197	5.155
Age at first intercourse	15.078	8.644
Age at first marriage	18.714	3.928
Age at first birth	20.758	3.764
Fraction with first intercourse by age		
15	0.387	0.283
18	0.241	0.427
20	0.271	0.444
22	0.266	0.442
25	0.293	0.455
Fraction first married by age		
15	0.060	0.239
18	0.129	0.336
20	0.124	0.330
22	0.094	0.292
25	0.051	0.330
Fraction with first birth by age		
15	0.018	0.133
18	0.079	0.271
20	0.116	0.320
22	0.106	0.307
25	0.064	0.245
Total fertility by age		
15	0.000	0.006
18	0.002	0.051
20	0.012	0.112
22	1.023	1.130
25	2.046	0.209
Ideal number of children	3.760	5.379
Fraction Working	0.242	0.428

Data Source: National Family Health Survey (NFHS-4 & 5). Sample includes women born between 1965 & 2006. The sample also excludes state Jammu and Kashmir.

Table 2: OLS: Total Years of Education and First Intercourse/Marriage/Birth and Total Fertility, by Age

A. First Intercourse by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Education	-0.009***	-0.011***	-0.013***	-0.016***	-0.015***	-0.016***	-0.012***	-0.010***	-0.008***	-0.004***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
N	880157	802875	703971	585050	443766	338923	246811	185350	135872	99359	72091
B. First Marriage by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Education	-0.008***	-0.009***	-0.011***	-0.012***	-0.011***	-0.009***	-0.007***	-0.004***	-0.001***	0.001	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
N	1181598	1109673	1017293	904461	786947	684523	599353	534690	484190	445664	416512
C. First Birth by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Education	-0.003***	-0.004***	-0.007***	-0.008***	-0.010***	-0.010***	-0.009***	-0.007***	-0.005***	-0.003***	-0.001***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
N	1265943	1242910	1201527	1135029	1044239	936111	827411	733656	655817	595190	548494
D. Total Fertility by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Education	-0.000**	-0.000***	-0.000***	-0.000***	-0.001***	-0.001***	-0.001***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	1284814	1236461	1188714	1143810	1092633	1050685	1000317	959609	911700	868911	827032

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. Each estimate is from a separate regression. In panels A, B, and C the dependent variable is equal to one if the event occurred by the given age, in panel D the dependent variable is total fertility by the given age. The sample is restricted to only include observations older than the age specified in each column. The sample also excludes state Jammu and Kashmir. All regressions include the fixed effects for birth-cohorts, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.

Table 3: First Stage

A. Dependent Variable: Total Years of Education		
	Without Covariates	**With Covariates**
$Reform_{isc}$	0.666***	0.642***
	(0.136)	(0.146)
N	1286768	1284814
F-stat	23.981	19.3358

*** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the measure of education. Each column is a separate regression without and with the covariates. The sample excludes state Jammu and Kashmir. $Reform_{isc}$ is the probability of being treated by the reform in each state, and the variable ranges from 0 to 1. All regressions include the fixed effects for birth-cohort, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.

Table 4: Second Stage: Age at First Intercourse/Marriage/Birth and Total Fertility, by Age

A. First Intercourse by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.049***	-0.041***	-0.056*	-0.085**	-0.068**	-0.068**	-0.073*	-0.025	-0.038	-0.016	-0.055
	(0.016)	(0.015)	(0.033)	(0.040)	(0.027)	(0.028)	(0.044)	(0.016)	(0.024)	(0.015)	(0.105)
N	880157	802875	703971	585050	443766	338923	246811	185350	135872	99359	72091
B. First Marriage by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.038***	-0.043***	-0.055**	-0.052**	-0.067***	-0.072**	-0.057	-0.060	-0.030	-0.017	-0.020
	(0.007)	(0.011)	(0.028)	(0.024)	(0.021)	(0.028)	(0.035)	(0.057)	(0.070)	(0.024)	(0.026)
N	1181598	1109673	1017293	904461	786947	684523	599353	534690	484190	445664	416512
C. First Birth by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.003	-0.005	-0.008	-0.017**	-0.026**	-0.026***	-0.032***	-0.014	-0.021	-0.040**	-0.041**
	(0.004)	(0.005)	(0.005)	(0.007)	(0.012)	(0.008)	(0.009)	(0.016)	(0.025)	(0.020)	(0.019)
N	1265943	1242910	1201527	1135029	1044239	936111	827411	733656	655817	595190	548494
D. Total Fertility by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	0.000**	0.001	-0.007	-0.006	-0.004	-0.002	-0.060	-0.026	-0.055**	-0.162**	-0.195**
	(0.000)	(0.000)	(0.005)	(0.015)	(0.010)	(0.012)	(0.040)	(0.025)	(0.026)	(0.034)	(0.066)
N	1284814	1236461	1188714	1143810	1092633	1050685	1000317	959609	911700	868911	827032

*** p<0.01, ** p<0.05, * p<0.1. Each estimate is from a separate regression. In panels A, B, and C the dependent variable is equal to one if the event occurred by the given age, in panel D the dependent variable is total fertility by the given age. The sample is restricted to only include observations older than the age specified in each column. The sample also excludes state Jammu and Kashmir. All regressions include the fixed effects for birth-cohorts, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.

Table 5: Reduced Form: Age at First Intercourse/Marriage/Birth and Total Fertility, by Age

A. First Intercourse by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
$Reform_{isc}$	-0.031***	-0.027***	-0.039*	-0.054**	-0.044***	-0.048***	-0.048	-0.072	-0.063	-0.025	-0.020
	(0.005)	(0.008)	(0.021)	(0.021)	(0.014)	(0.015)	(0.028)	(0.056)	(0.067)	(0.016)	(0.014)
N	880157	802875	703971	585050	443766	338923	246811	185350	135872	99359	72091
B. First Marriage by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
$Reform_{isc}$	-0.020***	-0.022***	-0.027*	-0.023**	-0.027***	-0.024***	-0.014***	-0.011*	-0.003	-0.006*	-0.004
	(0.004)	(0.006)	(0.014)	(0.010)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.004)	(0.003)
N	1181598	1109673	1017293	904461	786947	684523	599353	534690	484190	445664	416512
C. First Birth by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
$Reform_{isc}$	-0.002	-0.003	-0.004	-0.010*	-0.015**	-0.015***	-0.017***	-0.007	-0.009	-0.014***	-0.011***
	(0.002)	(0.003)	(0.004)	(0.005)	(0.007)	(0.004)	(0.003)	(0.007)	(0.008)	(0.003)	(0.004)
N	1265943	1242910	1201527	1135029	1044239	936111	827411	733656	655817	595190	548494
D. Total Fertility by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
$Reform_{isc}$	0.000**	0.000	-0.004	-0.003	-0.002	-0.001	-0.037*	-0.037	-0.044**	-0.157**	-0.198***
	(0.000)	(0.000)	(0.002)	(0.009)	(0.006)	(0.007)	(0.021)	(0.081)	(0.021)	(0.073)	(0.018)
N	1284814	1236461	1188714	1143810	1092633	1050685	1000317	959609	911700	868911	827032

*** p<0.01, ** p<0.05, * p<0.1. Each estimate is from a separate regression. In panels A, B, and C the dependent variable is equal to one if the event occurred by the given age, in panel D the dependent variable is total fertility by the given age. The sample is restricted to only include observations older than the age specified in each column. The sample also excludes state Jammu and Kashmir. Reform is the probability of being treated by the reform in each state, the variable ranges from 0 to 1. All regressions include the fixed effects for birth-cohorts, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.

Table 6: Second Stage Controlling for State Level Average Pre-Treatment GDP Growth Rate Interacted with Linear Birth Cohort: Age at First Intercourse/Marriage/Birth and Total Fertility, by Age

A. First Intercourse by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.047***	-0.040***	-0.056*	-0.085**	-0.069**	-0.070**	-0.075	-0.116	-0.039	-0.017	-0.054
	(0.013)	(0.014)	(0.034)	(0.043)	(0.028)	(0.027)	(0.045)	(0.094)	(0.051)	(0.029)	(0.102)
N	875462	798412	699861	581443	440819	336496	244869	183809	134674	98459	71408
B. First Marriage by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.038***	-0.043***	-0.055**	-0.052**	-0.067***	-0.071**	-0.057	-0.059	-0.029	-0.016	-0.020
	(0.007)	(0.011)	(0.028)	(0.025)	(0.021)	(0.028)	(0.036)	(0.056)	(0.067)	(0.024)	(0.025)
N	1175024	1103324	1011296	898926	781936	680006	595301	531061	480917	442687	413769
C. First Birth by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.003	-0.005	-0.008	-0.017**	-0.026**	-0.026***	-0.032***	-0.014	-0.021	-0.040**	-0.041**
	(0.004)	(0.005)	(0.005)	(0.007)	(0.012)	(0.009)	(0.009)	(0.015)	(0.024)	(0.019)	(0.019)
N	1259105	1236132	1194878	1128642	1038198	930527	822312	729003	651593	591311	544887
D. Total Fertility by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	0.000*	0.001	-0.007	-0.006	-0.004	-0.002	-0.059	-0.026	-0.056**	-0.162**	-0.205**
	(0.000)	(0.000)	(0.004)	(0.016)	(0.010)	(0.013)	(0.037)	(0.025)	(0.027)	(0.066)	(0.089)
N	1277918	1229781	1182270	1137586	1086624	1044880	994732	954235	906565	863998	822337

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. Each estimate is from a separate regression. In panels A, B, and C the dependent variable is equal to one if the event occurred by the given age, in panel D the dependent variable is total fertility by the given age. The sample is restricted to only include observations older than the age specified in each column. The sample also excludes state Jammu and Kashmir. All regressions include the fixed effects for birth-cohorts, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.

Table 7: Second Stage Controlling for State Level Pre-Treatment GDP Per-Capita Interacted with Linear Birth Cohort: Age at First Intercourse/Marriage/Birth and Total Fertility, by Age

A. First Intercourse by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.046***	-0.041**	-0.064	-0.107*	-0.096**	-0.096**	-0.124	-0.186	-0.025	-0.009	-0.090
	(0.017)	(0.019)	(0.042)	(0.057)	(0.045)	(0.038)	(0.076)	(0.156)	(0.040)	(0.029)	(0.249)
N	875462	798412	699861	581443	440819	336496	244869	183809	134674	98459	71408
B. First Marriage by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.041***	-0.048***	-0.070	-0.066	-0.102*	-0.116	-0.119	-0.166	-0.186	-0.023	-0.040
	(0.010)	(0.016)	(0.043)	(0.041)	(0.053)	(0.079)	(0.150)	(0.027)	(0.023)	(0.022)	(0.028)
N	1175024	1103324	1011296	898926	781936	680006	595301	531061	480917	442687	413769
C. First Birth by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.005	-0.007	-0.008	-0.021*	-0.034	-0.033**	-0.045**	-0.012	-0.027	-0.064	-0.069
	(0.005)	(0.007)	(0.008)	(0.011)	(0.021)	(0.015)	(0.020)	(0.025)	(0.048)	(0.054)	(0.059)
N	1259105	1236132	1194878	1128642	1038198	930527	822312	729003	651593	591311	544887
D. Total Fertility by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	0.000*	0.001	-0.008	-0.008	-0.006	-0.007	-0.059	-0.056	-0.060**	-0.130**	-0.176**
	(0.000)	(0.001)	(0.006)	(0.017)	(0.012)	(0.017)	(0.037)	(0.096)	(0.029)	(0.056)	(0.088)
N	1277918	1229781	1182270	1137586	1086624	1044880	994732	954235	906565	863998	822337

*** p<0.01, ** p<0.05, * p<0.1. Each estimate is from a separate regression. In panels A, B, and C the dependent variable is equal to one if the event occurred by the given age, in panel D the dependent variable is total fertility by the given age. The sample is restricted to only include observations older than the age specified in each column. The sample also excludes state Jammu and Kashmir. All regressions include the fixed effects for birth-cohorts, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.

Table 8: Second Stage Controlling for State Specific Linear Time Trend in Birth Cohort: Age at First Intercourse/Marriage/Birth and Total Fertility, by Age

A. First Intercourse by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.031*	-0.011	-0.039	-0.097	-0.081	-0.154	-0.017	-0.031	-0.041	-0.102	-0.027
	(0.017)	(0.011)	(0.042)	(0.091)	(0.053)	(0.123)	(0.021)	(0.020)	(0.031)	(0.026)	(0.058)
N	880157	802875	703971	585050	443766	338923	246811	185350	135872	99359	72091
B. First Marriage by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.032***	-0.035***	-0.056	-0.049	-0.092**	-0.101**	-0.094	-0.077	-0.013	-0.006*	-0.004
	(0.010)	(0.013)	(0.047)	(0.036)	(0.043)	(0.047)	(0.084)	(0.139)	(0.207)	(0.004)	(0.003)
N	1181598	1109673	1017293	904461	786947	684523	599353	534690	484190	445664	416512
C. First Birth by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	-0.004*	-0.009**	-0.006	-0.021**	-0.039**	-0.037***	-0.045***	0.004	-0.005	-0.060	-0.070
	(0.002)	(0.004)	(0.010)	(0.011)	(0.018)	(0.012)	(0.017)	(0.027)	(0.057)	(0.054)	(0.060)
N	1265943	1242910	1201527	1135029	1044239	936111	827411	733656	655817	595190	548494
D. Total Fertility by Age:											
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
2SLS	0.000*	0.002	-0.008	-0.003	0.006	0.008	-0.059	-0.052	-0.001	-0.113**	-0.173**
	(0.000)	(0.002)	(0.006)	(0.021)	(0.027)	(0.036)	(0.044)	(0.113)	(0.117)	(0.050)	(0.074)
N	1284814	1236461	1188714	1143810	1092633	1050685	1000317	959609	911700	868911	827032

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. Each estimate is from a separate regression. In panels A, B, and C the dependent variable is equal to one if the event occurred by the given age, in panel D the dependent variable is total fertility by the given age. The sample is restricted to only include observations older than the age specified in each column. The sample also excludes state Jammu and Kashmir. All regressions include the fixed effects for birth-cohorts, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.

Table 9: Second Stage: Predicting Fertility Practices

	Ever Had Pregnancy Terminated	**Last Pregnancy Unwanted**	**Desire For More Children**	**Ever Used Any Contraceptives**	**Using Modern Contraception**	**Ever Been Tested for HIV/AIDS**
2SLS	-0.033*	-0.018***	0.017	0.023**	0.064	0.070**
	(0.019)	(0.005)	(0.013)	(0.010)	(0.054)	(0.030)
N	1284814	335948	1264402	1284814	1284805	206126

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. Each estimate is from a separate regression. The dependent variable in the first column is equal to 1 if the women and the husband desire for any (more) children after their first birth, 0 otherwise. The dependent variable in the second column equal to 1 for women ever using any contraceptive method, 0 otherwise. The third column has the dependent variable equal to 1 for women using modern contraception before having her first child, 0 otherwise. The fourth column dependent variable reports ever having a pregnancy terminated, 0 otherwise. The fifth column reports the women's' last pregnancy was unwanted, where 1 denotes that the respondent wanted no more pregnancies at the time she became pregnant and 0 denotes that she wanted the pregnancy at that time or at a later date. The last column dependent variable is equal to 1 for women who have ever been tested for HIV/AIDS, 0 otherwise. The sample excludes state Jammu and Kashmir. All regressions include the fixed effects for birth-cohorts, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.

Table 10: Second Stage: Predicting Marriage Characteristics and Economic Resources

A. Marriage Characteristics					
	Husband's Total Years of Education	**Age Difference**	**Education Difference**	**Final Say on the Household Decisions**	
2SLS	0.460***	-0.026	-0.540***	0.005	
	(0.176)	(0.240)	(0.176)	(0.027)	
N	153637	147271	153637	34602	
B. Economic Resources					
	Woman Currently Working	**Earnings Relative to Husband**	**Woman's Occupational Status**	**Household Wealth**	**Has Health Insurance**
2SLS	0.031	-0.015	1.029**	0.060***	0.003
	(0.029)	(0.036)	(0.440)	(0.020)	(0.012)
N	206126	36132	206126	1284814	1284814

*** p<0.01, ** p<0.05, * p<0.1. Each estimate is from a separate regression.

Panel A: The dependent variable in the first column is the total years of education for a woman's husband. The dependent variable in the second column is the age of the husband subtracted by the woman's age, and in the third column is the total years of education of the husband subtracted by the woman's total years of education. The dependent variable is positive if the husband is older or has completed more years of education. The dependent variable in the last column is equal to one if the woman has final say on household purchase/ spending husband's or woman's earnings/ woman's health care, 0 otherwise.

Panel B: The first column dependent variable is a measure of respondent's employment in the last twelve months equal to 1, 0 otherwise. The dependent variable in the second column is equal to 1 if the woman's earning is more than equal to husband's earnings, 0 otherwise. The dependent variable in the third column is the occupational status of the woman based on NFHS standardized categories. The third column dependent variable measures the total household wealth. The dependent variable in the fifth column is an indicator of whether a woman reported having health insurance at survey, equal to 1, 0 otherwise.

The sample excludes state Jammu and Kashmir. All regressions include the fixed effects for birth-cohorts, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.

Table 11: Second Stage: Predicting Utilization of Reproductive Healthcare Service

	Any Antenatal Healthcare Visits	**Visited Healthcare Provider**	**Iron Supplements**	**Delivery in Healthcare Center**
2SLS	0.054***	0.025	0.051***	0.030***
	(0.010)	(0.095)	(0.010)	(0.009)
N	332420	109901	334991	1284076

*** p<0.01, ** p<0.05, * p<0.1. Each estimate is from a separate regression. The dependent variable in the first column is equal to 1 if the women attended any antenatal visits at a healthcare facility, 0 otherwise. The dependent variable in the second column equal to 1 if the women has visited a health care provider in the past 12 months, 0 otherwise. The third column has the dependent variable equal to 1 if the women consumed an iron supplement during pregnancy, 0 otherwise. The fourth column dependent variable reports if the women has delivered her baby in a hospital or clinic (public or private), 0 otherwise. The sample excludes state Jammu and Kashmir. All regressions include the fixed effects for birth-cohorts, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.

Table 12: Second Stage: Predicting Cognitive Skills and Mass Media Exposure

	Literacy	**Exposure to Magazine Newspaper, TV, Radio**
2SLS	0.100***	0.052***
	(0.015)	(0.019)
N	1284814	1284814

*** p<0.01, ** p<0.05, * p<0.1. Each estimate is from a separate regression. The dependent variable in the first column is literate equal to 1 if a woman was able to read the entire sentence, 0 otherwise. The dependent variable in the second column equal to 1 if the women reads newspaper/magazine and/or watches TV and/or listens to radio frequently, 0 otherwise. The sample excludes state Jammu and Kashmir. All regressions include the fixed effects for birth-cohorts, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.

Appendix A. Institutional Background of RTE in India

The right to free and compulsory basic education has been a subject of heated debates since the beginning of independent India in 1947. These debates hinged on the premise that right to education was implicit in the right to life and personal liberty guaranteed by Article 21 – which was observed by the Supreme Court of India.[25] Further, it was also advocated by the Acharya Ramamurti Committee Report in 1990 to achieve universalization of elementary education (class 1 to class 8) as stated in the Directive Principle of State Policy.[26] While the momentum for right to education as a fundamental right was gaining in political and judicial spaces in India, government of India (GoI) through District Primary Education Project (DPEP) and Sarva Shiksha Abhiyan (SSA) was investing in physical infrastructure, training of human resources (including teachers and government officials), and trying to diffuse operational guidelines to achieve universalization of elementary education. In particular, SSA was introduced in 2004 by GoI to achieve universalization of elementary education by 2010. The central government provided additional funding to invest in demand and supply-side interventions to achieve this target (Kingdon, 2007). But the goal was elusive as right to education without its fundamental right status was still an endeavor of the state subject to its resource constraints.

Finally, in 2002, the 86th amendment to the constitution introduced Article 21 (a) which stated that "the State shall provide free and compulsory education to all children of the age of six to fourteen years in such manner as the State may, by law, determine."[27] Formally thereafter, the RTE Act gained approval from the Union Cabinet in 2008, and then passed through the Lower and Upper House of the Indian parliament in July and August 2009. India thus joined more than 100 countries including United Kingdom, Japan, Germany, Belgium, Norway and others where the right to education is a fundamental and justifiable right of every citizen in the country from April

[25]The two cases were Mohini Jain v. Union of India (1992) 3 SCC 666 and J P Unnikrishnan v. State of Andhra Pradesh, 1993 SCC (1) 645. In the case of J P Unnikrishnan v. State of Andhra Pradesh, 1993, the Supreme Court stated that: "The citizens of this country have a fundamental right to education. The said right flows from Article 21. This right is, however, not an absolute right. Its content and parameters have to be determined in the light of Articles 45 and 41. In other words, every child/citizen of this country has a right to free education until he completes the age of fourteen years. Thereafter his right to education is subject to the limits of economic capacity and development of the State."

[26]https://righttoeducation.in/index.php

[27]https://www.india.gov.in/my-government/constitution-india/amendments/constitution-india-eighty-sixth-amendment-act-2002

1st, 2010.[28] Consequently, the state governments enforced the RTE Act by passing it in their own state legislatures. It should be noted that not all states passed the Act in their legislatures at the same time (see Appendix Table 1 for details of time period of enforcement in each state). To elaborate, seven states/UTs - namely Andhra Pradesh, Bihar, Chandigarh, Dadra Nagar Haveli, Daman & Diu, Uttar Pradesh, and Uttarakhand - were first to pass the RTE Act in their state legislatures. But even these states took about nearly eight months to pass the Act in their own legislatures. About 20 other states passed the RTE Act in their legislatures nearly after one year and more - where four states passed it only in 2012 which is nearly two years after its enactment in the Indian Parliament. The RTE Act was not enacted in Jammu and Kashmir due to the state having a special status. With its special category status under Article 370, withdrawn, following the elimination of Article 370 in April 2019, it has been brought to the compass to follow the RTE Act from May 2020.

(Jha et al., 2013) categorized the main components of the RTE into child entitlements and institutional arrangements. In the former, RTE ensured that every child between 6 to 14 years has a right to admission in every neighborhood school. It defined neighborhood schools as 1 kilometer (km) from the habitation of a child at the primary level (grade 1 to 5) and 3 km from the habitation of a child at the upper primary level (grade 6 to 8). Although RTE provides the right to admission in neighborhood schools, it does not mandate that a child must access only these neighborhood schools to pursue elementary education. In essence, every child has a right to access these neighborhood schools but is free to access any schools of his/her preference. Further, the Act stated that private unaided schools[29] in the neighborhood has to allocate 25 percent of its seats at the entry level (class 1) for economically weaker sections and disadvantaged groups. The state was mandated to compensate for the costs incurred by the private schools. It included free midday meal, textbooks, uniforms, and notebooks as a right of every child pursuing elementary education. In addition, it made no detention policy and comprehensive continuous evaluation mandatory and guaranteed an environment free from discrimination, harassment, trauma or anxiety.

In terms of institutional arrangements, RTE mandated that all schools offering primary and

[28] I consider April 2010 as the effective cut-off date of national enforcement because all states knew from there on that sooner or later they have to comply to the provisions of the act. However for each state the "$Reform_{isc}$" variable is created based on the date the law came into force.

[29] Private unaided schools are those which are managed by private management and does not take any assistance from the state or central government in any form.

upper primary education must have a good and inclusive infrastructure in terms of weather- proof building, boys and girl's toilet, drinking water, ramps for special children, library and so on. It also specified quality indicators such as teacher-pupil ratio being 1:30 for primary[30] and 1:35 for upper primary section. The qualification of teachers, their working hours and duties were specified very clearly in the Act to ensure that children accessing these neighborhood schools are provided with a quality education.

All schools were to comply with the norms specified by RTE ACT, otherwise they faced the possibility of being de-recognized by the government. To ensure this, the Act has mandated constitution of School Management Committee and State Advisory Council, in addition empowering existing local authorities, to monitor the compliance of norms specified and take actions in the event of violations. Overall, the RTE Act ensured that there was also a complementary quality monitoring role played by the social planner. Although nationally enforced from August 2009, (Act, 2009) find regional heterogeneity in implementation and report that there were only ten states which had come up with its State RTE rules by 2011. It wasn't until 2012 that all states and union territories had drafted its RTE rules.

One of the reasons for non-uniform implementation of the Act is because of the different economic and development stages of states in India. (Jha et al., 2013) found that there were severe financial and governance challenges in Odisha, an economically poor state, whereas governance challenges plagued the implementation of RTE in Karnataka, an economically better-performing state, in India. Further, there exists district level variation in implementation of RTE Act especially in terms of providing free textbooks, maintaining the teacher-pupil ratio, availability of trained teachers, formation of School Management Committees (SMCs) and the 25% reservation of seats. (Choudhary, 2018) carried out the study in six major tribal districts in Jharkhand[31] and find considerable variations in the earlier-mentioned indicators of RTE Act both within and between the 6 districts. In Odisha, there was only 3% of schools which are fully compliant with the ten basic indicators of RTE Act; and it was below 1% of schools in districts such as Balangir,

[30] The teacher-pupil ratio was 1:30 for all schools offering primary sections with students less than or equal to 200. It must not exceed 1:40 for all schools offering primary sections with students more than 200. In terms of schools offering upper primary sections, there must be a teacher for every subject where the teacher-pupil ratio must not exceed 1:35 for schools catering to 100 students or less. For schools more than 100 students, there must be a head teacher and additional part-time instructors for work education, art, and health

[31] The six districts include Ranchi, Dumka, Gumla, Lohardaga, Pakur, and Pashchimi Singhbhum.

Nuapada, Rayagada, Nabarangpur, and Malkangiri by 2013.[32] An examination of the compliance of RTE Act in Karnataka, a better-performing state, indicate that only 17% of 60,002 primary schools adhere to the ten basic indicators of RTE Act in 2019.[33] Moreover, there was significant district wise variation in compliance of RTE norm in Karnataka. To illustrate, there were only 9.9% of schools in urban Bangalore complying to the RTE norms whereas about 34.3% of schools met the RTE norms in Gadag. The percentage of schools complying with RTE norms across the districts ranged between 6.8% in Vijayapura to 36 percent in Dakshina Kannada in 2019. Thus, it can be surmised that the implementation and compliance to RTE Act varied at the state/regional level, a feature I exploit in the identification strategy that is described in the section 5.

It is important to also highlight here the regulation of private schools under RTE Act. The compulsory compliance to norms for recognition and 25 percent reservation of seats attracted criticisms and exasperation from the private school management and the parents belonging to better income households. The compulsory compliance requirement has brought about a concern related to incentivizing corrupt practices, often drawing parallels to the days of license raj in India (Aghion et al., 2008), as the powers to make decisions are vested with the education department (Jha et al., 2013). Adding to these concerns, the state governments in India (except Karnataka, Rajasthan, Andhra Pradesh and Tamil Nadu), did not undertake any inclusive and participatory consultative process involving members from civil society, parentteacher association, and other local community members in drafting its RTE rules.

Despite these issues, the state governments have enforced and regulated the private unaided schools more strictly under RTE Act. During 2015-2018, the National Independent Schools Alliance (NISA) reports that there were 2,469 private schools closed, 13,546 private schools served closure notice and 4,482 private schools are on closure threat owing to noncompliance of RTE norms across fourteen states in India.11 While this shows that the government have enforced compliance as mandated by RTE Act, it has raised debate over the financial viability of low-cost private schools to run its operations. In sum, the RTE Act enacted in August 2009 held promises of ensuring greater access to good quality primary and upper primary education to all children up to the age of 14 years.

[32] https://odishachannel.com/index.php/4292/implementation-of-rte-act-in-odisha-abysmally-poor/

[33] https://timesofindia.indiatimes.com/city/bengaluru/only-17-primary-institutions-in-karnataka-adhere-\
to-rte-parameters/articleshow/67520125.cms

Appendix 1

Table A1: Details of state-wise enactment of RTE rules

Serial No.	State/ Union Territory	Act coming to force (from MHRD) dd-mm-yyyy
1	Andaman & Nicobar Islands	1/4/2010
2	Andhra Pradesh	1/4/2010
3	Arunachal Pradesh	3/6/2010
4	Assam	3/11/2011
5	Bihar	1/4/2010
6	Chandigarh	1/4/2010
7	Chattisgarh	15/11/2010
8	Dadra & Nagar Haveli	1/4/2010
9	Daman & Diu	1/4/2010
10	Delhi	23/11/2011
11	Goa	2/8/2012
12	Gujarat	18/2/2012
13	Haryana	3/6/2011
14	Himachal Pradesh	5/3/2011
15	Jharkhand	14/5/2011
16	Karnataka	28/4/2012
17	Kerala	6/5/2011
18	Lakshadweep	1/4/2010
19	Madhya Pradesh	26/3/2011
20	Maharashtra	11/10/2011
21	Manipur	21/10/2010
22	Meghalaya	1/8/2011
23	Mizoram	28/3/2011
24	Nagaland	21/3/2011
25	Odisha	18/10/2010
26	Puducherry	27/10/2011
27	Punjab	12/10/2011
28	Rajasthan	30/3/2011
29	Sikkim	11/8/2010
30	Tamil Nadu	12/11/2011
31	Tripura	11/7/2011
32	Uttar Pradesh	1/4/2010
33	Uttarakhand	1/4/2010
34	West Bengal	16/3/2012

Note: Individual state RTE rules were downloaded from: https://www.education.gov.in/en/rte_state_rules

Table A2: First Stage

Dependent Var: Total Years of Education		
A. First Stage: Controlling for State Level Average Pre-Treatment GDP Growth Rate Interacted with Linear Birth Cohort		
	W/O Covariates	**W Covariates**
$Reform_{isc}$	0.675***	0.530***
	(0.116)	(0.123)
N	1279847	1277918
F-stat	33.8604	18.5670
B. First Stage: Controlling for State Level Pre-Treatment GDP Per-Capita Interacted with Linear Birth Cohort		
	W/O Covariates	**W Covariates**
$Reform_{isc}$	0.464***	0.383***
	(0.117)	(0.123)
N	1279847	1277918
F-stat	15.7277	9.6959

*** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the measure of education. Each column is a separate regression without and with the covariates. The sample excludes state Jammu and Kashmir. $Reform_{isc}$ is the probability of being treated by the reform in each state, and the variable ranges from 0 to 1. All regressions include the fixed effects for birth-cohort, state and the covariates are religion, district, urban/rural area, ethnicity. Each regression is weighted by sampling weights from the NFHS data, and standard errors are clustered at the state level.