Communal Violence and Long-Run Educational Attainment: Evidence from India

Meghna Laha*

September 19, 2026

Abstract

This paper examines how exposure to communal violence shapes long-run educational attainment in India, focusing on the 2002 Gujarat violence, widely considered one of the most severe episodes of communal conflict in post-independence India. Beginning on February 28, three days of intense violence resulted in large-scale deaths and displacement, followed by further outbreaks of violence in the following months. To estimate the causal impact, I use individual-level data from the 2019–21 National Family Health Survey (NFHS-5) and a cohort-based difference-in-differences design that exploits variation in exposure across regions and age. I compare individuals who were of school-going age during the violence with older cohorts who were old enough to have completed their schooling, in Gujarat, relative to the rest of India. I find that Grade 12 completion declined by 6 percentage points, which is approximately 23% relative to the sample mean, and total years of schooling fell by 0.5 years (nearly 7%). The violence was disproportionately targeted towards women and children, and consistent with that, I find that the declines were more concentrated among the youngest cohorts at the time of violence. Heterogeneity analyses show that the education losses were larger among females than among males, with Muslim females experiencing the largest declines. The short-run effects, as analyzed using earlier survey waves, provide suggestive evidence of immediate disruptions, including lower completion rates and greater delays in grade progression.

JEL Classification: D74, I24, I25, J16
Keywords: Communal Violence, Education and Gender, Human Capital, India

*John E. Walker Department of Economics, Clemson University. Address: 309-C Wilbur O. and Ann Powers Hall, Clemson, SC 29634. E-mail: mlaha@clemson.edu.

I want to thank my advisor, Dr. Michael D. Makowsky, and my dissertation committee members, Dr. Curtis Simon, Dr. Jonathan Leganza, and Dr. Devon Gorry, for their guidance, encouragement, and support throughout this project. I also thank the participants of the Labor Workshop and the Public Workshop at Clemson University for their thoughtful comments and constructive feedback. This paper has also benefited from presentations at the Australasian Development Economics Workshop (2026), the Development Workshop in the South (2026), the Midwest Economics Association Annual Meeting (2026), and the Southern Economic Association Annual Meeting (2025). All remaining errors are my own.

1. Introduction

Communal violence, or violence perpetrated across religious or ethnic lines, can impose substantial social costs, including immediate and visible losses such as deaths, displacement, and disruptions to daily life. In religiously diverse countries such as India, such conflicts are particularly salient Horowitz (2000). Evidence from India suggests that exposure to communal violence during childhood can have lasting effects on adult decision-making, including lending decisions and judicial stringency (Fisman et al., 2020; Bharti & Roy, 2023). These same formative years are also crucial for making active investments in human capital, and any disruptions induced by communal conflicts can have important implications for long-run educational attainment.

This paper examines how exposure to communal violence during critical school-going ages affects long-run educational outcomes. I focus on the 2002 Gujarat violence, widely regarded as one of the most severe episodes of Hindu–Muslim conflict in post-independence India (Jaffrelot, 2003; Varshney, 2004). Although the most intense violence unfolded over a three-day period beginning on February 28, normalcy did not return until the spring of 2003. This period was marked by increased unrest, large-scale casualties, including deaths of more than 2000 people and displacement of more than 200,000 people. Both women and children were particularly targeted and were victims of extreme brutality, contributing to an environment of prolonged insecurity. Iyer et al. (2026) calculate the implied state-level GDP losses associated with lagged riot exposure and report a loss of 8.87% for Gujarat in 2003, the largest among all state–year observations in their sample.

I use difference-in-differences and event-study designs to estimate the causal effect of violence by exploiting the variation in age at exposure and state of residence, similar to the design used in Duflo (2001). Related strategies exploiting geographic and cohort variation in conflict exposure have been used to estimate the consequences of conflict in other settings (Shemyakina, 2011; Akresh, 2008; Bundervoet et al., 2009; Bellows & Miguel, 2009; P. Singh & Shemyakina, 2016). Using data from the most recent wave of the National Family Health Survey (NFHS-5)[1], I compare individuals who were of school age in 2002 (ages 5–23) to those who were old enough to have already completed schooling (ages 24–35), within Gujarat and relative to the rest of India. I find that the school age cohorts of 2002 attain, on an average, 0.5 fewer years of schooling, a 7 percent decline relative to the sample mean, and are 6 percentage points less likely to complete Grade 12, approximately a

[1]NFHS-6 was conducted in 2023–24. As of September 2026, only the national, state, and district fact sheets have been released; the unit-level survey data are not yet publicly available.

23 percent reduction. To put this estimate in context, education expansion policies such as the District Primary Education Program (introduced in 1994) and its successor, *Sarva Shiksha Abhiyan* (launched in 2001), were associated with gains of roughly 0.16–0.18 years of schooling(Azam & Saing, 2017; Nandi et al., 2023)[2]. Relative to these gains from policies aimed at expanding access to schooling, the estimated loss of 0.5 years represents a substantial educational setback.

The educational losses varied considerably across gender and religion, with larger declines for female and Muslim students, who were also disproportionately affected by the violence (Khanna, 2008). The estimated decline in years of schooling was 0.7 years among females, compared with 0.2 years among males, and 1.2 years among Muslims, compared with 0.4 years among Hindus. Muslim females experienced the largest loss, at approximately 1.5 years. Because females and Muslims complete fewer years of schooling on average than males and Hindus, respectively, these larger estimated losses suggest that the violence compounded pre-existing inequalities and widened gender and religious gaps in educational attainment. A similar pattern also holds for Grade 12 completion: female students are 7.2 percentage points less likely to complete Grade 12 than male students, compared to 4.5 percentage points. By religion, Hindus are 5 percentage points less likely to complete grade 12, compared to 7 percentage points for Muslims, with the largest decline, at 9 percentage points, observed among Muslim female students.

Educational losses also varied with the religious composition of the district of residence. Among Hindu students, declines were larger in districts where the Hindu population share was below the state average, whereas Muslim students experienced larger losses in districts where the Hindu population share exceeded the state average. These patterns suggest that the neighborhood's religious composition also shaped educational outcomes and is consistent with the perceived concerns for safety and reluctance to travel through areas dominated by another religious community, and accounts of increased residential segregation reported after the violence.

Event-study estimates indicate that these effects are concentrated among individuals who were of primary school-age (5–10 years) at the time of the violence. The results are robust to alternative specifications, including synthetic control methods, different control group definitions, additional covariates, alternative survey wave, and various leave-one-out analyses.

I examine additional short-run effects using the earlier rounds of the National Family Health Survey, NFHS-2 (1998–99) and NFHS-3 (2005–06) to better explore the potential mechanisms that

[2]DPEP targeted districts with poor educational indicators to expand access to primary education and improve school infrastructure. SSA was launched in 2001 as its successor, with the goal of achieving universal elementary education.

contribute towards the long-run losses. The earlier survey rounds observed the affected cohorts while they were still of school-going age, which allows me to examine the grades they had completed, the age at which they were enrolled in a particular grade and thus any age-for-grade delays as well as whether these outcomes differed by household composition. In contrast, NFHS-5 was conducted approximately 17 years after the violence, by which time these cohorts had largely completed their education, and are also part of different households. Consequently, NFHS-5 is well-suited for studying the long-run effects on completed educational attainment, but cannot be used to examine the short-run disruptions in schooling that occurred immediately after the violence. In the short run, I find lower completion rates in Grades 8 and 12, along with significant age-grade delays, that is, the students were older for their grades. These patterns are consistent with dropouts at higher grades, lack of re-enrollment, discontinuous grade progression and grade repetitions and could be plausible pathways behind the observed long-run declines. The disruptions were also more pronounced in households with only girls than in boys-only or mixed households, suggesting that barriers to continued schooling differed by the gender composition of children in the household.

This paper contributes to the broader literature on the educational consequences of violence. One strand examines armed conflict and political violence, including the civil war in Tajikistan (Shemyakina, 2011), Naxalite violence in Nepal (Valente, 2014), the Rwandan genocide (Akresh, 2008), Boko Haram conflict in Nigeria (Bertoni et al., 2019), violent attacks in Timor Leste (Justino et al., 2014), civil conflict in Peru (Leon, 2012), and terrorist attacks in Kenya (Alfano & Görlach, 2023) and Pakistan (Javeid et al., 2023). These studies examine how exposure to violence negatively affects school participation and educational attainment across different institutional and conflict settings. A related strand examines criminal and police violence, including drug-related violence in Mexico (Brown & Velásquez, 2017; Márquez-Padilla et al., 2015), exposure to homicides in Brazil (Koppensteiner & Menezes, 2021), police killings (Ang, 2021) and gun violence (Cabral et al., 2026) in the United States and mass shootings in Norway (Bharadwaj et al., 2021). This literature examines how violence in children's local environments affects attendance, learning, and subsequent educational attainment.

In India, existing research on violence and education has examined armed conflicts, including the Punjab insurgency—a decade-long separatist conflict spanning the 1980s and early 1990s—and the Naxalite conflict, or left-wing extremism (P. Singh & Shemyakina, 2016; Diwakar, 2024). Sharma & Sunder (2025) examines the effects of everyday crime on educational outcomes such as test scores. While these studies provide evidence on several forms of violence, the long-run educational

consequences of communal violence remain relatively understudied. My paper addresses this gap by examining how exposure to the 2002 Gujarat violence affects long-run effects on educational attainment, with particular attention to differences across gender, age at exposure, and religious identity.

This paper also contributes to the literature on Hindu–Muslim conflict in India. A large strand examines the determinants of communal violence, emphasizing intercommunal civic networks (Varshney et al., 2002), electoral incentives and political organization (Wilkinson, 2004; Brass, 2011), historical legacies (Jha, 2014), economic conditions (Thomas & John Sergenti, 2010; Mitra & Ray, 2014), and exposure to religious media (Yang et al., 2025). A smaller but growing body of research examines the consequences of communal violence. Iyer et al. (2026) finds that riot exposure reduces subsequent economic activity and GDP, while Fisman et al. (2020) document greater bias in the lending decisions of bank managers exposed to riots. Bharti & Roy (2023) finds that exposure to communal violence affects judicial officers' propensity to grant bail. Iyer & Shrivastava (2018) and Ticku (2026) examine how exposure to riots shapes electoral outcomes. Ghose & Pandey (2025) examines how the 2002 Gujarat violence affected women's marital and socioeconomic outcomes.

There is however very limited evidence on the educational cosequences of Hindu-Muslim conflict. A closely related study is Kalra (2021), which exploits plausibly exogenous variation in riot exposure associated with the planned route of the 1990 Ram Rath Yatra, a Hindu nationalist campaign, to examine educational attainment among Muslims. The study finds evidence of lower primary school completion among some cohorts already in school during the violence, alongside gains among those who were born after 1990. Kalra links these later gains to residential segregation following violence-induced displacement, suggesting that stronger within-community ties may have supported children's education through access to role models and community resources. Focusing on the 2002 Gujarat violence, Ghose & Pandey (2025) examine women's marital outcomes and find earlier marriage and lower educational attainment among women who married after the violence. My paper complements these studies by examining how exposure to communal violence during school-going ages shapes long-run educational attainment. Whereas Ghose & Pandey (2025) compare cohorts defined by year of marriage, I exploit variation in age at exposure and examine educational outcomes among both men and women. I complement Kalra (2021) by studying a different episode, the 2002 Gujarat violence, with a focus on different margins of education and find declines in education for both Hindu and Muslim students.

2. Background:

2.1 Gujarat:

Gujarat is a state located in the western part of India and one of the 28 states in the country (Figure A1a). The state covers an area of 196,024 km^2, making it the fifth-largest Indian state by area. According to the 2011 Census, Gujarat had a population of approximately 60.4 million, making it the ninth-most populous state in India. Approximately 42.6% of the population resides in urban areas. The state is divided into 34 districts, which serve as its primary administrative divisions (A1b)[3]. Hindus constitute the majority of the population, accounting for roughly 88.57%, while Muslims account for 9.67%. The remaining population includes other religious groups, such as Jains, Sikhs, Christians, and Buddhists. Gujarat is one of India's most industrialized states and has the country's fourth-largest state economy, with a gross state domestic product (GSDP) of INR 33.24 trillion (approximately US $ 350 billion).

2.2 Gujarat Violence, 2002

2.2.1 Context and Outbreak:

Gujarat has a long history of Hindu–Muslim conflict, particularly in the urban pockets, with the city of Ahmedabad emerging as a recurrent site of such conflict (Field et al., 2008; Jaffrelot, 2003). The 2002 Gujarat violence, however, stands out as one of the most severe episodes of communal violence in post-independence India in terms of its scale, geographic spread, and brutality and unlike previous riots, it spread beyond the urban areas [4]. On February 27, 2002, a train, *Sabarmati Express*, carrying Hindu Pilgrims caught fire in the town of Godhra, resulting in the death of 57 Hindu pilgrims, including 25 women and 14 children. The circumstances surrounding the Godhra train fire and its cause remain contested.[5] At the time it was widely believed that Muslim mobs were

[3] In 2002, Gujarat had 25 districts, which were later reorganized to form the current 34 districts.

[4] Nearly, 15-16 districts out of the then 25 districts were affected and impact was most intense in the districts of Ahmedabad, Anand, Mehsana, Sabarkantha, Panchmahal, Vadodara, Bharuch and Dahod (Lokhande, 2015)

[5] Several reports describe altercations between Hindu and Muslim passengers, including an alleged confrontation with a Muslim shopkeeper at Godhra railway station. Shortly after leaving the station, the train was stopped when the emergency chain was pulled repeatedly. It eventually came to a halt in the middle of a predominantly Muslim neighborhood inhabited by Ghanchis, a community from which many of Godhra's street vendors reportedly came. Depending on the source, between 500 and 2,000 people surrounded the coaches and attacked them with stones and torches. Coach S–6 subsequently caught fire, resulting in the deaths of 57 people (Jaffrelot, 2003; Lokhande, 2015).Several committees and commissions were constituted to investigate the cause of the fire. The Banerjee Committee, constituted by the then Union Government, concluded that the fire originated inside the coach and was accidental, a finding similar to those of other independent investigations. In contrast, the Nanavati-Mehta Commission,

responsible for the fire, and this triggered the three-day period of intense violence that started on 28th February. In the days following, widespread violence was witnessed primarily against Muslim communities in the state.

The episode was characterized by extreme brutality, including widespread sexual violence, mass killings, and attacks on women and children. Contemporary reports document gang assaults, the killing of entire families, stabbings and stonings, the burning of homes, and the looting and destruction of Muslim-owned businesses, highlighting the scale and severity of violence (Jaffrelot, 2003; Lokhande, 2015). Women were disproportionately affected, with numerous fact-finding reports documenting the gendered nature of the violence. These accounts describe cases of rape and other forms of sexual violence, as well as the mutilation and burning of women (Human Rights Watch, 2002). The victims included young girls, pregnant women and babies (Amnesty International, 2005). Muslims were not the only victims, and in several instances Hindu women were also subjected to attacks (Farasat & Jha, 2016). A majority of the survivors did not register complaints with the police due to fear and social stigma. Therefore, official figures of the number of victims are unavailable but many independent reports by women's groups estimate that a minimum of 350 women must have been assaulted and raped (Khanna, 2008).

Official government figures report approximately 1,000 deaths including 790 Muslims and 254 Hindus, 223 people were reported missing and nearly 2,500 individuals were injured (BBC News, 2005). However, independent investigations and human rights organizations estimate that close to 2,000 Muslims were killed in the months following the initial incident, with many more injured. (Amnesty International, 2005). In addition, more than 200,000 Muslims were displaced as homes and businesses were systematically looted and destroyed, with property losses estimated at 1 billion (Srivastava, 2011). Subsequent inquiries documented serious failures in policing, investigation, and prosecution, raising concerns about widespread under-reporting of crimes.

2.2.2 Aftermath:

Immediately after the outbreak of violence, many fled to community-majority areas and sought refuge in dargahs, *madrassas*, and schools that were converted into relief camps. As violence continued, additional camps were established, with more than 100 operating across Gujarat two months later (Khanna, 2008). Although the most intense violence was concentrated in the initial three days,

appointed by the Government of Gujarat, concluded that the fire was a premeditated act intended to harm the passengers. (Jaffrelot, 2012)

sporadic attacks and casualties persisted thereafter, prolonging insecurity and displacement in the weeks that followed (The Times of India, 2002).

The conditions were particularly difficult for women and children. Pregnant women had to give birth in overcrowded and unsanitary relief camps, as persistent insecurity prevented many displaced families from accessing health services (Khanna, 2008). Children faced disruptions not only to their education but also to their physical well-being, as overcrowded camp conditions heightened the threat of measles and other disease outbreaks in Ahmedabad (Human Rights Watch, 2002). These effects extended beyond the relief camps. Amid pervasive fear and uncertainty, many parents of female students reported being unwilling to send their daughters to school(Srivastava, 2011).

This event also intensified residential segregation, leading to the creation of ghettoized Muslim neighborhoods. Janmohamed (2013) documents the growing concern among residents of Juhapura, one of the largest Muslim ghettos in India, about the lack of space and what will happen when the roughly 400,000 residents' children grow up and must compete for space in just four high schools serving the entire population. Sheth & Haeems (2006) similarly notes that parents were reluctant to send their daughters far from home for schooling, which limited the educational options available to girls in their neighborhoods. She further observes that most schools in Muslim neighborhoods are Urdu-medium and extend only through the 7th grade. Beyond this, there were also reports of school closures in the affected areas. While many schools across the state postponed or canceled examinations altogether, some schools reportedly held exams only under police protection.

2.3 Education in India

School education in India is organized into four stages: primary (Grades 1–5, ages 6–10), upper-primary (Grades 6–8, ages 11–13), secondary (Grades 9–10, ages 14–16), and higher-secondary (Grades 11–12, ages 16–18). Net Enrollment Ratios (NER), defined as the number of children in the official age group enrolled at a given level of education divided by the total population of that age group, decline markedly across these stages, from approximately 76% in primary and 67% in upper-primary to 47% in secondary and 36% in higher-secondary as of 2024–25.(Mehta, 2025b) This pattern points to substantial attrition as students progress to higher grades. Institutional support for schooling is also concentrated at the elementary level. Under the Right to Education (RTE) Act, 2009, free and compulsory education is guaranteed for children ages 6–14, corresponding broadly to primary and upper-primary education. Similarly, the Mid-Day Meal Scheme provides meals to children in government and government-aided schools through Grade 8, reducing the cost of school

attendance and providing an additional incentive for enrollment and attendance at the elementary level[6]. Beyond upper-primary education, schooling is no longer compulsory, and students are no longer covered by this program, increasing the importance of household decisions about whether to continue schooling. Consistent with this institutional structure, dropout is concentrated at the secondary and higher-secondary levels.

Gross Enrollment Ratios (GER) reveal a second feature of educational progression in India. Unlike NER, GER includes all students enrolled at a given level regardless of age and is substantially higher: approximately 90% at the primary and upper-primary levels, 78% at the secondary level, and 58% at the higher-secondary level. The sizable GER–NER gap indicates substantial age–grade mismatch, whereby many students attend grades outside their official age range. This mismatch may arise from late or early school entry, grade repetition, or interruptions in schooling followed by re-entry (Mehta, 2025a). The NFHS-5 data exhibit a pattern consistent with delayed progression. Figure A4 shows that a non-trivial share of individuals remains enrolled in school beyond age 18, the normative age for completing higher-secondary education.

An important feature of the Indian school system is the role of examinations at the secondary and higher-secondary levels. At the end of Grade 10, students typically take a board examination, after which they choose an academic stream, such as science, commerce, or humanities for Grades 11 and 12. At the end of Grade 12, students take another set of board examinations. Performance in these examinations, often together with scores from entrance examinations, plays an important role in determines access to higher education. Completing Grade 12, or higher-secondary education, is an important educational milestone for labor-market access. Many entry-level corporate positions and government recruitment requires high-school transcripts. Chen et al. (2022) estimates that completing higher-secondary education is associated with a 5.8% higher annual return for workers relative to those with no formal education.

3. Data

I use data from the latest round of the National Family Health Survey (NFHS-5), conducted in India between 2019 and 2021. NFHS-5 is a cross-sectional data, part of the Demographic and Health Surveys (DHS) program and provides nationally representative data. The survey covers 707 districts across 28 states and 8 union territories and collects detailed information through household,

[6]The Right to Education (RTE) Act and the Mid-Day Meal Scheme were implemented nationwide and therefore should not affect my analysis.

women's, and men's questionnaires.

The primary analysis relies on data from the Household Questionnaire, which records information on all usual household members. This questionnaire provides detailed demographic characteristics and educational outcomes for each individual, allowing the construction of long-run educational outcomes for cohorts exposed to violence at different ages.

The survey reports respondents' current age at the time of interview. Using this information, I calculate each individual's age in 2002, the year of the Gujarat violence. The sample consists of individuals who were between 5 and 35 years old in 2002. Applying these restrictions yields a final sample of 1,134,707 observations (see Table 1). Figure A2 show the distribution of the individuals by age. This age range allows for a comparison between cohorts plausibly exposed to violence during their school-going years and cohorts who were old enough to have completed their education prior to the violence. Accordingly, I define two cohorts central to the identification strategy: a school-going cohort (ages 5–23 in 2002) and an older cohort (ages 24–35 in 2002), who were unlikely to have been enrolled in high school at the time of the violence. NFHS-5 is particularly well suited for this analysis for two reasons. First, its large nationally representative sample provides sufficient statistical power to estimate treatment effects precisely and examine heterogeneity across gender, religion, and age at exposure. Second, because the survey was conducted nearly two decades after the 2002 Gujarat violence, it includes cohorts that have largely completed their education, allowing me to estimate the long-run effects of violence on educational attainment.

The primary educational outcomes of interest are: (i) total years of schooling, ranging from 0 to 12 and thus capturing K-12 education in India, and (ii) an indicator for Grade 12 completion, constructed from the years of education measure reported in the NFHS-5. [7]

I also use the 2001 Census Data for the district level population statistics in Gujarat. According to the 2001 Census there were only 25 districts in Gujarat but by 2019 the number of districts increases to 33. I map the newly created districts back to their original parent districts, to ensure a match between the 2001 Census Data and the 2019 NFHS 5 data.

To examine short-run effects, I complement the main analysis with additional data sources from earlier survey rounds—NFHS-2 (1998–99) and NFHS-3 (2005–06). Given their timing, these surveys provide a suitable basis for examining short-run educational outcomes closer to the period of violence.

[7] In the NFHS-5, the measure of total years of education reflects the highest grade successfully completed rather than the actual number of years spent in schooling. Consequently, if an individual completes Grade 5 over a period longer than five years, the reported years of education would still be recorded as 5.

Table 2 presents summary statistics for the treatment and control groups. Columns (1) and (2) report statistics for the older cohort in Gujarat and the rest of India, respectively, while Columns (3) and (4) present the corresponding statistics for the school-age cohort. While I observe statistically significant differences between the treated and control groups in most of my outcome variables, it is important to note that these are the raw differences. Besides, the magnitude of these differences is not very large. However, two key patterns must be noted. First, Gujarat has a higher proportion of Hindus (88% compared to 75% in the control states) and appears relatively more affluent, as reflected in the wealth index. Second, although the older cohort in Gujarat has higher average years of schooling and almost similar level of grade 12 completion compared to the rest of India, this advantage does not extend to the school-age cohort. In fact, the school-age cohort in Gujarat has lower total years of schooling and grade 12 completion compared to the rest of India. These patterns are important for interpreting subsequent results, as they suggest that while Gujarat historically exhibited an educational advantage, this gap has narrowed for younger cohorts, particularly among women.

4. Empirical Strategy

4.1 Identification Strategy

I estimate the causal effect of the 2002 Gujarat violence on educational attainment by exploiting variation in exposure across birth cohorts and regions. Identification comes from comparing individuals who were of school-going age at the time of the violence with older cohorts who were old enough to have completed their schooling before 2002, in Gujarat, relative to the rest of India. The identifying assumption is that, in the absence of violence, educational attainment across cohorts would have evolved similarly in Gujarat and the rest of India. I plot the raw means and event-study graphs to assess the plausibility of the parallel-trends and no-anticipation assumptions.

The baseline estimates are obtained from a difference-in-differences specification that identifies the average effect of exposure to the violence. To examine how the effects vary by age at exposure and to assess the identifying assumption graphically, I estimate an event-study specification that allows treatment effects to differ across age cohorts.

4.2 Treatment and Control Groups

I treat the 2002 Gujarat violence as the event, defining Gujarat as the treated state and the remaining Indian states as the control group. A within-state design comparing districts with high and low levels of violence is less appropriate for two reasons as explained by Ghose & Pandey (2025). First, Gujarat exhibits substantial intrastate migration. According to the 2011 Census, approximately 84.6% of migrants enumerated in Gujarat had moved within the state.[8] Gujarat was also one of India's leading destinations for interstate migrants, receiving approximately 2.03 million migrants, or 9.2% of the national total. This substantial inflow is consistent with the state's relatively high levels of urbanization and industrialization (Sugandhe, 2024). By contrast, recent interstate out-migration from Gujarat was relatively limited: approximately 540,000 individuals enumerated elsewhere in India reported Gujarat as their previous state of residence, equivalent to 0.89% of Gujarat's 2011 population. Migration is largely driven by employment for men and marriage for women, both of which typically occur within state boundaries. Consequently, individuals frequently move across districts within Gujarat. Since the NFHS does not record migration histories, a district-level analysis would be unable to account for spillovers arising from such intra-state mobility. By contrast, relatively low levels of inter-state migration reduce concerns that exposed individuals subsequently appear in the control group, supporting the use of Gujarat as the treated unit. Second, the violence was geographically widespread, affecting 16 of Gujarat's 24 districts.[9] This leaves few credible within-state control districts that were plausibly unexposed to the violence. These considerations motivate a state-level research design in which Gujarat constitutes the treated unit. Section 6 presents a series of robustness checks using alternative control groups, including neighboring states, non-neighboring states, northern states, and southern states. I find qualitatively the same results across all these different control group specifications.

4.3 Definition of Exposure Cohorts

Since the violence occurred at a single point in time, exposure is determined by an individual's age in 2002. Individuals who were still of school-going age at the time of the violence (2002) constitute the *post-period cohorts*, while those who had plausibly completed their education before 2002 form the *pre-period cohorts*. This gives me the second dimension of a Difference-in-Difference approach.

[8] Nationally, approximately 88% of migration was intrastate, compared with 12% interstate.

[9] The affected districts were Ahmadabad, Anand, Banas Kantha, Bharuch, Bhavnagar, Dohad, Gandhinagar, Junagadh, Kheda, Mahesana, Panch Mahals, Patan, Rajkot, Sabar Kantha, Surat, and Vadodara (Outlook India, 2002b,a).

In India, children typically begin school at age five or six.[10] Although Grade 12 is typically completed by age 18 under uninterrupted progression, delays in school completion are common. Figure A4a, which plots the cumulative distribution of age at Grade 12 completion using NFHS-5, shows that completion increases sharply between ages 16 and 19 but continues into the early twenties, plateauing only around age 23 for both males and females. This pattern is consistent with Figures A4b and A4c, which show that a non-trivial share of individuals remain enrolled beyond age 19. Similar evidence from NFHS-2 (1998–99), shown in Figure A5, suggests that individuals complete grade 12 beyond age 19, and therefore delays in school completion predates the 2002 violence.

To ensure that observed educational outcomes reflect completed schooling rather than ongoing enrollment, I restrict the sample to individuals who were between 5 and 35 years old in 2002. Based on the evidence presented above, individuals aged 23 years or younger in 2002 are classified as the exposed cohort, while those aged 24 years or older constitute the comparison group, as they would have been old enough to have completed their schooling before the violence.

For the event-study analysis, I group individuals into eight age bins corresponding to meaningful stages of educational progression. Figure A3 shows the distribution of these age bins for Gujarat and the rest of India. This grouping serves two purposes. First, reported ages exhibit substantial heaping at values ending in 0 or 5, as shown in Figure A2. Such age-heaping is well documented in Indian survey data (M. Singh et al., 2022); grouping individuals into age bins therefore reduces the noise associated individual age cohorts. Also, since my analysis has one treated state, the number of observations per age-cohort in Gujarat is also very thin. Second, the bins are defines according to the typical ages at which important stages of schooling are completed, making the event-study estimates easier to interpret.

Within the exposed cohort, individuals aged 5–18 are classified as *treated*, as they were of school-going age and violence would have affected their schooling trajectories. Individuals aged 19–23 are classified as *partially treated*, as they would have been affected by the violence if their were delays in school completion. Individuals aged 24–35 constitute the *not-treated* comparison group and serve as the pre-treatment cohorts in the empirical analysis.

[10] Under the National Education Policy (NEP) 2020, children are required to be six years old at the time of admission to Grade 1. Prior to 2020, admission ages varied across states, with children typically entering school at age five or six depending on state-specific admission rules.

4.4 Event-Study Specification

To examine how treatment effects vary by age at exposure and to assess the identifying assumption graphically, I estimate the following event-study specification:

$$Y_{isb} = \alpha + \sum_{k \neq k_0} \delta_k \left(\mathbf{1}\{\text{AgeBin}_i = k\} \times \text{Gujarat}_s \right) + \lambda_b + \theta_s + \varepsilon_{isb}, \tag{1}$$

where Y_{isb} denotes the educational outcome for individual i residing in state s and belonging to age bin b. The variable AgeBin_i classifies individuals according to their age in 2002, with the 24–27 age group (k_0) serving as the omitted reference category. The indicator Gujarat_s equals one for individuals residing in Gujarat and zero otherwise. The specification includes age-bin fixed effects, λ_b, which account for common differences in educational attainment across age cohorts, and state fixed effects, θ_s, which absorb cohort-invariant differences across states. The coefficients of interest, δ_k, measure the difference in educational outcomes between Gujarat and the rest of India for each age bin relative to the omitted reference group (individuals aged 24–27 in 2002). This age group is chosen as the baseline because its members would have been old enough to have completed their schooling before the violence, while remaining close in age to the treated cohorts. Standard errors are clustered at the state level.

The average effect of exposure to the 2002 Gujarat violence is estimated using the following difference-in-differences specification:

$$Y_{isb} = \alpha + \beta \left(\text{SchoolAge}_i \times \text{Gujarat}_s \right) + \lambda_b + \theta_s + \varepsilon_{isb}, \tag{2}$$

where Y_{isb} denotes the educational outcome for individual i residing in state s and belonging to age bin b. The indicator SchoolAge_i equals one if the individual was aged 23 years or younger in 2002 and zero otherwise, while Gujarat_s equals one for individuals residing in Gujarat and zero otherwise. The specification includes age-bin fixed effects, λ_b, which account for common differences in educational attainment across age cohorts, and state fixed effects, θ_s, which absorb cohort-invariant differences across states. The coefficient of interest, β, captures the average effect of exposure to the 2002 Gujarat violence on educational attainment. Standard errors are clustered at the state level.

5. Results:

5.1 Main Results:

The two primary educational outcomes examined are total years of schooling and Grade 12 completion. Figure 1 presents the raw cohort means and the corresponding event-study estimates from Equation (1). Figure 1a and 1b plot average outcomes by age in 2002 for Gujarat and the rest of India. For older untreated cohorts (ages 24–32 in 2002), educational outcomes in Gujarat closely track those, or is slightly higher than the rest of India. Among younger cohorts, however, the mean of the outcomes in Gujarat is lower relative to the rest of India. This divergence begins for the partially treated cohorts and becomes progressively larger for cohorts exposed to the violence at younger ages, suggesting that exposure during earlier stages of schooling had more severe consequences.

Figures 1c and 1d report the corresponding event-study coefficients. For both outcomes, the estimates for untreated cohorts are small, statistically insignificant, and centered around zero, providing support for the parallel trends assumption. The partially treated cohorts exhibit modest negative effects, while the coefficients for fully treated cohorts become increasingly negative as age at exposure decreases. The largest declines are observed for individuals who were of primary-school age (5–10 years) during the riots, indicating that educational losses were greatest among children exposed during the earliest stages of schooling. The similar patterns across both educational outcomes strengthen the evidence that the violence had persistent adverse effects on educational attainment.

Table 3 reports the corresponding difference-in-differences estimates from Equation (2). Column (1) shows that exposure to the 2002 Gujarat violence reduced total years of schooling by approximately 0.5 years. Relative to the sample mean of 6.97 years, this corresponds to a decline of roughly 7 percent. Column (2) shows that exposure reduced Grade 12 completion by 5.9 percentage points, representing approximately a 22.6 percent decline relative to the baseline completion rate.

5.2 Heterogeneity Analysis:

5.2.1 Heterogeneity by Gender:

The description of the event clearly indicates that women were disproportionately victimized, and to examine the heterogeneous effects, I carry out the analysis separately for males and females. Figure 2 presents the raw cohort means and event-study estimates for total years of schooling and Grade 12 completion, disaggregated by gender. Figures 2a and 2b show that, for older untreated

cohorts, educational outcomes in Gujarat broadly track those in the rest of India for both male and female. For cohorts exposed during their school-going years, however, educational attainment in Gujarat diverges from that in the rest of India with the divergence becoming progressively larger for younger cohorts. While, the figures show increased divergence for both male and female, the pattern is much more pronounced among females, suggesting that female educational attainment was disproportionately affected by the violence.

The event-study estimates in Figures 2c and 2d reinforce these patterns. For both educational outcomes, coefficients for untreated cohorts are small and statistically insignificant, providing support for the identifying assumptions. The partially treated cohorts exhibit modest negative effects, while the coefficients for treated cohorts become increasingly negative with younger age at exposure. Across nearly all treated cohorts, the estimated effects are consistently larger for girls than for boys, with the largest declines observed among girls who were of primary-school age during the riots. The differences between the male and female coefficients are statistically significant, as can be seen from the pooled estimates in Figure 2e & 2f. This is consistent with the anecdotal evidence about how the education of girls was particularly more vulnerable in the aftermath of the violence.

Table 4 quantifies these differences. Columns (1) and (2) show that exposure reduced total years of schooling by approximately 0.3 years for boys and 0.7 years for girls, corresponding to declines of roughly 3.8 percent and 15 percent relative to their respective sample means. The larger proportional decline for girls reflects both the greater treatment effect and their lower baseline levels of educational attainment. Columns (3) and (4) report similar patterns for Grade 12 completion. Exposure reduced the probability of completing Grade 12 by approximately 4.5 percentage points for boys and 7.2 percentage points for girls, corresponding to declines of about 14.5 percent and 34 percent relative to baseline completion rates.

5.2.2 Heterogeneity by Religion:

Next, I examine heterogeneity in the educational effects of the violence by religious identity, given the nature of the violence. Table 2 shows that Gujarat has a pre-dominantly higher Hindu population (roughly 88%) and low Muslim population (roughly 11%). The 2002 Gujarat violence primarily involved Hindu and Muslim communities, and therefore understanding whether its educational consequences differed across these groups is of particular interest. Figure 3 presents the raw cohort means and event-study estimates for total years of schooling and Grade 12 completion, disaggregated by religion. Figures 3a and 3b show that educational outcomes in Gujarat are parallel to the rest of

India for older, untreated cohorts among both Hindus and Muslims. For Hindus, the means are very close to the rest of India, but for Muslims, there are level differences, despite parallel trends, especially in Figure 3a where the average years of schooling in Gujarat is higher than the rest of India for the untreated cohorts. For treated cohorts, however, outcomes diverge, with educational attainment in Gujarat falling below that in the rest of India for both Hindus and Muslims. While Muslims exhibit lower baseline educational attainment than Hindus across all cohorts, this gap widens noticeably among the cohorts exposed to the violence, suggesting that the educational losses were disproportionately concentrated among the Muslim population. The event-study estimates in Figures 3c and 3d reinforce these findings. For both educational outcomes, coefficients for untreated cohorts remain close to zero, while those for treated cohorts become increasingly negative as age at exposure decreases. Although both religious groups experience declines in educational attainment following exposure, the estimated effects are consistently larger in magnitude for Muslims, particularly among the youngest exposed cohorts. Given the targeted nature of the violence, and the casualties and displacement that the Muslim community experienced, these results reinforce the disproportionate impact of the violence. Figures 3e and 3f compare the estimated effects for Hindu and Muslim students. The decline in total years of schooling is significantly larger among Muslims, whereas the effects on Grade 12 completion do not differ significantly between the two groups. This pattern highlights the distinction between the intensive and extensive margins of educational attainment. Total years of schooling captures the intensive margin, the magnitude of the reduction in total years of education, while Grade 12 completion captures the extensive margin of whether an individual crosses a specific educational threshold. Thus, although Muslims experienced a larger reduction in overall schooling, the violence reduced the likelihood of Grade 12 completion of both Hindus and Muslims.

Table 5 quantifies these differences. Total years of schooling declined by approximately 0.4 years for Hindus, corresponding to a 5.7 percent reduction relative to the Hindu sample mean, compared with a decline of 1.2 years for Muslims, or 18.9 percent relative to the Muslim sample mean. Similarly, exposure reduced the probability of completing Grade 12 by approximately 5 percentage points for Hindus (18.5 percent) and 7 percentage points for Muslims (33 percent). These results indicate that although the violence adversely affected educational attainment across both religious groups, its effects were substantially larger for Muslims, thereby widening pre-existing educational disparities between Hindus and Muslims.

5.2.3 Heterogeneity by Gender & Religion:

Finally, I examine whether the gender differences documented above vary across religious groups by estimating the effects separately for Hindu and Muslim males and females. Figures 4 and 5 present the corresponding raw cohort means and event-study estimates. The graphical evidence reinforces the preceding results. Educational attainment declines for all cohorts exposed to the violence, with the effects becoming more pronounced for younger cohorts. Within both religious groups, the declines are consistently larger for females than for males, and the largest reductions are observed among Muslim girls, particularly among those exposed during their primary-school years.

Table 6 reports the corresponding difference-in-differences estimates. The estimates confirm the patterns observed in the figures. For total years of schooling, the largest decline is observed for Muslim females, who lose approximately 1.5 years of education (27%), compared with 0.8 years (11.6%) for Muslim males, 0.6 years (10.7%) for Hindu females, and 0.2 years (2.5%) for Hindu males. A similar ordering emerges for Grade 12 completion, with Muslim females experiencing the largest decline (9 percentage points; 56.3%), followed by Hindu females, while the estimate for Muslim males is not statistically significant. Overall, these results indicate that the educational consequences of the 2002 Gujarat violence were disproportionately borne by girls, particularly Muslim girls.

5.2.4 Heterogeneity by Composition of Districts in Gujarat, Census 2001:

Residential segregation along religious and caste lines is substantial in India. Asher et al. (2026), using highly granular neighborhood-level data, show that residential segregation of Muslims and Scheduled Castes is high by global standards and is associated with systematically worse access to public services, including schools, health facilities, water, sewage, and electricity. Religious segregation also intensified following the 2002 Gujarat violence, with communities increasingly concentrating in neighborhoods with a higher percentage by their own religious group (Engineer, 2002; Wahid, 2019). Field et al. (2008) documents that 71% of the population lived in completely homogeneous neighborhoods post 2002, which is reflective of increasing intolerance of living with members of another religion.

Motivated by this evidence, I examine whether the educational effects of the violence vary with the religious composition of districts. Since Hindus constituted approximately 89% and Muslims 9% of Gujarat's population in the 2001 Census, I classify districts as above or below the average district Hindu population share, with the former representing relatively more Hindu-homogeneous

districts and the latter more religiously mixed districts. Figures 6a and 6b and Table 7 show slightly larger adverse effects in more mixed districts: total schooling declines by approximately 0.6 years in below-average-Hindu-share districts compared with 0.4 years in above-average districts, while Grade 12 completion falls by 6 and 5 percentage points, respectively. The religion-specific estimates provide further suggestive evidence that relative minority status within a district also matters. Hindus experience larger declines in more religiously mixed districts (Figures 6c and 6d), whereas Muslims experience larger declines in districts with higher Hindu population shares (Figures 6e and 6f). These provide suggestive evidence that the educational consequences of the violence were more pronounced when an individual's religious group constituted a smaller share of the local population.

6. Robustness Checks:

I conduct a series of robustness exercises to assess the sensitivity of the main results. Specifically, I examine the validity of the control group, implement an alternative research design, conduct a leave-one-out analysis to assess the sensitivity of the estimates, and perform additional checks to address potentially confounding events.

6.1 Synthetic Controls

The baseline event-study analysis groups individuals into age bins to mitigate age heaping in reported ages[11]. This approach substantially reduces measurement error and estimating the model using single-year age cohorts produces noisier estimates and greater sensitivity to age-heaping. In addition, Gujarat differs from other Indian states along several socioeconomic and demographic dimensions, raising the possibility that comparisons with the rest of India may not fully capture the appropriate counterfactual. To address both concerns, I complement the event-study analysis with a synthetic control approach following Abadie & Gardeazabal (2003) and Abadie et al. (2010), which constructs a comparison unit that closely resembles Gujarat in the pre-treatment period without relying on age binning.

The synthetic control method constructs a counterfactual trajectory for Gujarat, referred to as *Synthetic Gujarat*, as a weighted combination of states from a donor pool. The donor weights are chosen to ensure that the synthetic control closely reproduces Gujarat's pre-treatment characteristics and educational outcomes. Table A2 reports the weights assigned to each donor state. Under the

[11] Age heaping is a data pattern where people state ages ending in preferred numbers like zero or five instead of their real age. I observe that in my data as shown in Figures A2

identifying assumption that, in the absence of the 2002 violence, Gujarat would have followed the trajectory of its synthetic counterpart, the post-treatment divergence between observed Gujarat and Synthetic Gujarat identifies the causal effect of the violence.

The predictor set includes educational outcomes for older, unexposed cohorts, the proportion of individuals with no formal schooling, the household wealth index, the share of the population residing in urban areas, average household size, and the religious composition of the state, measured by the shares of the Hindu and Muslim populations. These variables capture key socioeconomic and demographic characteristics associated with educational attainment and ensure a close pre-treatment fit between Gujarat and its synthetic counterpart. Tables A3 report the predictor balance for the total years of schooling and Grade 12 completion specifications.

Figures A6 present the synthetic control estimates for total years of schooling and Grade 12 completion. Observed Gujarat and Synthetic Gujarat closely track one another for cohorts older than 23 years in 2002, indicating a pre-treatment fit. For cohorts exposed to the violence during their school-going years, however, educational outcomes in Gujarat diverge sharply from those of Synthetic Gujarat. The divergence increases for younger exposed cohorts and is evident for both total years of schooling and Grade 12 completion. These patterns closely mirror the baseline event-study estimates, providing additional evidence that the observed reductions in educational attainment are attributable to exposure to the 2002 Gujarat violence rather than to pre-existing differences between Gujarat and other Indian states.

6.2 Alternate Control Groups

Gujarat differs from other parts of India along several observable dimensions. As shown in Table 2, it is relatively wealthier, has a higher share of the Hindu population, and exhibits distinct socioeconomic characteristics. These differences raise the concern that the baseline estimates may partly reflect structural differences between Gujarat and the rest of India rather than the causal effect of the 2002 violence.

To address this concern, I re-estimate the event-study specification in Equation (1) using several alternative control groups. First, I restrict the control group to states that share a geographic boundary with Gujarat—Madhya Pradesh, Maharashtra, and Rajasthan. Comparing Gujarat with neighboring states improves comparability in terms of economic conditions, demographic composition, and regional characteristics, and follows the approach adopted in previous studies (e.g., Anukriti, 2018; Ghose & Pandey, 2025).

Figures A7c and A7d present the corresponding event-study estimates for total years of schooling and Grade 12 completion. The estimates indicate persistent reductions in educational attainment among cohorts exposed to the violence relative to comparable cohorts in neighboring states. While the estimated effects on Grade 12 completion are less precisely estimated, with wider confidence intervals owing to the smaller comparison sample, the overall pattern remains consistent with the baseline findings.

Second, I exclude the neighboring states from the control group to assess whether the baseline estimates are driven by spillover effects to geographically proximate states. The corresponding event-study estimates, presented in Figure A8, closely resemble the baseline results, suggesting that the main findings are not driven by spillovers to neighboring states.

Finally, I estimate the specification using only the northern states of India and, separately, only the southern states of India as control groups [12]. Southern states of India has higher levels of literacy compared to the northern parts of the country. These alternative control groups therefore allow me to assess whether the estimated decline in educational outcomes in Gujarat is sensitive to systematic differences in baseline educational attainment across the states comprising the control group. Figures A9 and A10 show that the results remain qualitatively unchanged under both specifications. Table A4 and Figure A11 present the DiD estimates across the alternative control-group definitions. The estimated coefficients are consistently negative and statistically significant across specifications, with the exception of Grade 12 completion when the control group is restricted to neighboring states. The estimated effects are also larger in magnitude when southern states are used as the comparison group. Across all alternative control-group definitions, the declines remain concentrated among cohorts exposed during their school-going years, with the largest effects observed for the youngest exposed cohorts. These results indicate that the main findings are not driven by the particular composition of the control group and are robust to alternative choices of comparison states.

6.3 Leave one out Analysis

To examine whether the results are driven by any particular control state or district within Gujarat, I conduct a leave-one-out robustness exercise. Specifically, I repeatedly re-estimate the main specification in equation (2), each time excluding one state from the sample. Figures A12a

[12]The Northern states of India include Jammu and Kashmir, Himachal Pradesh, Punjab, Chandigarh, Uttarakhand, Haryana, NCT of Delhi, Uttar Pradesh, Bihar, Sikkim, Assam, West Bengal, Jharkhand, Odisha, Ladakh. The Southern states include Chattisgarh, Andhra Pradesh, Karnataka, Goa, Lakshwadeep, Kerala, Tamil Nadu, Puducherry, Telangana. I exlcude the neighboring states while creating the Southern states control group.

and A12bpresent the resulting estimates for Total Years of Schooling and Grade 12 completion, respectively, when each state is excluded in turn. Figures A12c and A12d perform a similar exercise by excluding one district at a time.

The coefficients remain stable across all iterations and are quantitatively similar to the baseline estimates, indicating that the results are not driven by any single state or district. Gujarat is numerically coded as 24 and therefore does not appear as a separate coefficient in the figures.

Next, I assess whether the results are sensitive to the inclusion of particular age cohorts. Specifically, equation (2) is re-estimated while sequentially excluding one age cohort at a time. Figures A13a and A13b show that the estimated coefficients remain stable across all leave-one-out iterations. Finally, I re-estimate the main specification by excluding each age bin in turn. Figures A13c and A13d demonstrate that the estimates remain stable, further confirming that the results are not driven by any specific age bins.

6.4 Dropping Spiked Ages

I next examine whether age heaping in the NFHS data affects the results by re-estimating the event-study specification in Equation (1) after excluding observations with heaped ages. As shown in Figure A2, the distribution of reported ages exhibits clear spikes at ages ending in 0 and 5 in the survey year, reflecting the well-documented tendency for respondents to round their ages. Because age in 2002 is constructed from the reported survey-year age, this heaping carries over to the calculated age in 2002. The top panels (Figures A3a and A3b) show the distribution of age in 2002, while the bottom panels (Figures A2c and A2d) show the corresponding distribution of reported age in the survey year. The spikes in age at exposure correspond directly to ages ending in 0 or 5 in the survey year.

To address this concern, I conduct a robustness check by re-estimating the main specification after excluding individuals whose reported ages in the survey year are 25, 30, 35, 40, 45, and 50. For example, if a state was surveyed in 2019, these exclusions correspond to ages 8, 13, 18, 23, 28, and 32 in 2002.

The results, shown in Figures A14 and A15, remain broadly consistent with the baseline estimates after excluding these heaped ages. However, because this restriction reduces the sample size, the estimates exhibit wider confidence intervals and some evidence of pre-trend fluctuations.

6.5 Additional Controls

I re-estimate my main specification by including additional controls such as wealth index, place of residence (urban/rural), and household size. The specification is given by:

$$Y_{isb} = \alpha + \sum_{k \neq k_0} \delta_k \left(\mathbf{1}\{\text{AgeBin}_i = k\} \times \text{Gujarat}_s \right) + \mathbf{X}_i'\boldsymbol{\beta} + \lambda_b + \theta_s + \varepsilon_{isb}, \tag{3}$$

where Y_{isb} denotes the educational outcome for individual i, residing in state s, and belonging to age bin b; $\mathbf{1}\{\text{AgeBin}_i = k\}$ is an indicator equal to one if individual i belongs to age bin k, with age bin k_0 serving as the omitted reference category; Gujarat_s is an indicator equal to one if the individual resides in Gujarat and zero otherwise; and $\mathbf{X}_i$ is a vector of individual and household characteristics, including the household wealth index, place of residence (urban/rural), and household size. The terms λ_b and θ_s denote age-bin and state fixed effects, respectively. Standard errors are clustered at the state level.

These controls are included as a robustness check rather than in the main specification because, given my identification strategy, I do not observe these characteristics for individuals at the time of the violence. Since individuals are observed approximately 17 years after the violence occurred, these variables may themselves be influenced by the event and are therefore potentially endogenous. For example, household wealth and current place of residence may have been affected by the violence. Nevertheless, including a set of controls provides a useful sensitivity check for the baseline results.

Figures A16 and A17 show that the results remain robust to the inclusion of these controls, although the point estimates are somewhat smaller in magnitude compared to the baseline specification.

6.6 Alternative Survey Wave: NFHS-4

As an additional robustness check, I re-estimate the main specifications using NFHS-4 data. Table A5 highlights the key differences between the survey waves: the Gujarat sample is smaller in NFHS-4, the share of Muslims is lower, and the sample is more urban relative to NFHS-5. Moreover, since NFHS-4 was conducted in 2015–16, the youngest cohort (aged 5–10 in 2002) is only 18–23 years old at the time of the survey and may not have completed schooling. For these reasons, estimates based on NFHS-4 are expected to be noisier. Despite these limitations, the main results remain qualitatively consistent. I continue to find negative effects on educational outcomes across the

full sample and key subgroups, as shown in Figures A18 and A19. However, the estimates for total years of schooling exhibit some pre-trends, and results disaggregated by religion are noisier, particularly due to the smaller Muslim sample. In addition, estimates for the youngest cohort should be interpreted with caution, as many individuals may not have completed their education at the time of the survey.

6.7 Gujarat Earthquake

Gujarat experienced a major earthquake in 2001, which primarily affected the district of Kutch and may confound my results. While the impact was most severe in Kutch, several other districts were also affected[13] (Lahiri et al., 2001). Following (Ghose & Pandey, 2025), I re-estimate my main specification after excluding these affected districts. Figure A20, suggest that my results remain largely robust to this exclusion for both the outcome variables and across two different control-group definitions.

6.8 Gujarat Floods

During the 2005 monsoon season, several Indian states experienced severe flooding, including Gujarat, Maharashtra, Karnataka, Assam, Bihar, and Madhya Pradesh (Government of India, 2005). Because some of the comparison states were also affected by this natural disaster, concerns about differential exposure between the treatment and control groups are somewhat mitigated. Nevertheless, residual confounding cannot be ruled out entirely. To address this concern, I re-estimate the main specification after excluding flood-affected districts.[14] The results, presented in Figures A21, are broadly similar across both outcomes and across the two control-group definitions, suggesting that the main findings are robust to excluding flood-affected districts.

7. Discussion of Short-Run Results:

This section examines the short-run educational outcomes of the 2002 Gujarat violence using the earlier rounds of the National Family Health Survey, NFHS-2 (1998–99) and NFHS-3 (2005–06). Unlike NFHS-5, which was conducted approximately 17 years after the violence and therefore captures only completed educational attainment, these earlier surveys provide information on

[13]The severely affected districts include Ahmedabad, Jamnagar, Kutch, Patan, Rajkot, and Surendranagar.

[14]The flood-affected districts of Gujarat in 2005 include Vadodara, Ahmedabad, Navsari, Surat, Surendranagar, Anand, and Kheda.

current school enrollments shortly before and after the riots. I use this to analyze changes in completion of Grades 8 and 12, delays in grade progression, and heterogeneity in these effects by household composition in the immediate aftermath of the violence. Together, these complement the long-run results and provide suggestive evidence on potential mechanisms through which the violence affected education in the long-run. A limitation of this analysis is that NFHS-2 and NFHS-3 provide only one pre-conflict and one post-conflict survey round. Therefore, the short-run analysis relies on relatively limited data and does not allow me to trace the evolution of outcomes over multiple periods before and after the violence.

7.1 Grade Completion and Age-Grade Delays in the Short-Run

First, I examine how the violence affected school completion rates in the short run using data from the National Family Health Surveys conducted before and after the violence (NFHS-2: 1998–99 and NFHS-3: 2005–06).[15] I focus on completion of two key schooling thresholds: Grade 8 among those aged 14–17, and Grade 12 among those aged 18–23 [16].

Next, I examine age-grade delays to assess whether the violence impacted students' grade progression. An individual is classified as delayed if they have not completed Grade 8 by age 15, or Grade 12 by age 19. These thresholds correspond to the expected ages of grade completion under normal progression without any grade repetition or discontinuities while allowing for typical variation in school entry. The analysis is restricted to individuals aged 23 years or younger. Together with the grade completion measures, these outcomes allow me to examine whether exposure to the violence affected not only the likelihood of completing key grade levels but also the age at which students are enrolled in particular grades. Increased age delays in school completion would indicate discontinuous schooling either through grade repetition or dropouts.

To estimate the short-run effects, I implement a difference-in-differences specification comparing outcomes in Gujarat to those in other states before and after the 2002 riots. The estimating equation is given by

$$Y_{ist} = \alpha + \beta(Post_t \times Gujarat_s) + \gamma_t + \theta_s + \lambda_b + \varepsilon_{ist} \tag{4}$$

[15] Table A6 presents summary statistics for the two survey rounds.

[16] Individuals who were ages 14–17 at the time of NFHS-3 in 2005 were approximately ages 11–14 in 2002, at the time of the violence. They therefore correspond to the upper-primary-age group in the baseline analysis. Similarly, individuals ages 18–23 in 2005 were approximately ages 15–20 in 2002, placing them within the secondary- and higher-secondary-age groups at the time of the violence.

where Y_{ist} denotes the schooling outcome for individual i in state s and survey year t. The term θ_s represents state fixed effects, γ_t denotes survey fixed effects and λ_b denote age fixed effects. The indicator $Post_t$ equals one for NFHS-3 (2005–06) and zero for NFHS-2 (1998–99), while $Gujarat_s$ identifies individuals residing in Gujarat. The coefficient of interest, β, captures the differential change in schooling outcomes in Gujarat after the violence relative to other states. Standard errors are clustered at the state level. All specifications are estimated on age-eligible samples for the respective outcomes and are further stratified by gender and religion.

Table A7 presents difference-in-differences estimates of grade completion across key schooling thresholds and reveals a clear pattern of heterogeneous effects. For males, exposure to violence is associated with no statistically significant effect at Grade 8, but a substantial decline in Grade 12 completion (7.1 percentage points). For females, there are significant declines at higher levels, 3 percentage points at Grade 8 and 5.4 percentage points at Grade 12, highlighting the heterogeneity by gender. A similar pattern emerges across religious groups. Among Hindus, the effects are more pronounced at higher levels of schooling, particularly Grade 12, where completion declines by 5.5 percentage points. In contrast, Muslim individuals experience large and statistically significant declines at both schooling thresholds: Grade 8 completion falls by 12 percentage points and Grade 12 completion by 7.4 percentage points. These negative effects indicate a reduction in progression beyond minimum schooling levels and points to increased costs of or reduced investments in continued education in the post-violence period.

Table A8 complements the school-completion results by examining delays in grade progression. The estimates show a consistent pattern of positive and statistically significant effects at Grades 8 and 12, indicating that the violence not only reduced the likelihood of reaching these schooling thresholds but also slowed educational progression among students who remained in school. For males, exposure is associated with a 4 percentage point increase in delays at Grade 8 and an 8.6 percentage point increase at Grade 12. A similar pattern is observed for females, with delays increasing by 5 percentage points at Grade 8 and 5.4 percentage points at Grade 12. Among Hindus, delays increase by 3.1 percentage points at Grade 8 and 6.3 percentage points at Grade 12. The effects are substantially larger among Muslims, with delays increasing by 13.9 percentage points at Grade 8 and 7.7 percentage points at Grade 12. The results point to a consistent pattern of disruptions in education. If students who temporarily leave school are less likely to re-enroll, or if delays in grade progression generate learning losses that increase the risk of subsequent dropout, these short-run disruptions can accumulate over time and translate into persistent reductions in

educational attainment.

7.2 Household Re-allocation of Wealth

Violent events can affect educational outcomes through multiple channels, one of which is the destruction of household assets and the resulting income shocks. In response to such shocks, households may reallocate resources across children, with educational investments in boys and girls potentially acting as substitutes (P. Singh & Shemyakina, 2016). Consistent with this mechanism, Diwakar (2024) show that in districts more exposed to Naxalite violence, household expenditure on education increases in all-boys and mixed-gender households but declines in all-girls households. These findings suggest that during periods of conflict, households may deprioritize investments in girls' education, contributing to larger educational losses for girls relative to boys. In addition, violence can reduce the perceived returns to education for girls relative to boys due to increased insecurity, mobility constraints, early marriage considerations, and existing patriarchal norms in the Indian context.

It is not feasible to directly test this mechanism in the present study because the NFHS does not collect information on household expenditure. I provide suggestive evidence by examining heterogeneity in educational outcomes by household composition. Household composition observed in NFHS-5 (2019–21) cannot be used for this purpose because it is measured approximately 17 years after the 2002 violence. Over this period, many individuals would have left their parental households due to marriage, employment, or independent household formation, implying that the observed household structure is unlikely to reflect the household in which educational decisions were made at the time of exposure. By contrast, the earlier survey rounds (NFHS-2 and NFHS-3) capture household composition much closer to the timing of violence, and therefore provide a more appropriate setting for examining this question. Using the same specification as in Equation (4), I estimate the effects on Grade 8, and Grade 12 completion separately for children living in mixed-gender households (those with at least one boy and one girl aged 5–23) and single-gender households (those with only boys or only girls in the same age range).

The results, presented in Table A9, reveal a consistent pattern of negative effects at higher levels of schooling across all household types. In mixed-gender households, both boys and girls experience declines at higher levels, particularly at Grade 12 (4.8 percentage points for boys and 4.4 percentage points for girls). In single-gender households, boys in boys-only households experience large declines at Grade 12 (10.5 percentage points). Most notably, girls in girls-only households

experience negative and significant effects across all schooling thresholds, a sharp 14.5 percentage point decline at Grade 8, and a 7.7 percentage point decline at Grade 12, making them the most affected group. These results suggest that, while disruptions at higher grades are widespread, they are not evenly distributed. The consistent declines in school-completion rates among girls in girl-only households highlight the role of household constraints and decisions, and are consistent with the results that adverse shocks affect girls disproportionately.

8. Conclusion

This paper examines the long-run educational consequences of the 2002 Gujarat violence by exploiting variation in exposure across birth cohorts and regions. Using a cohort-based difference-in-differences design, I find that exposure to communal violence significantly reduced both completed years of schooling and the likelihood of completing Grade 12. The largest educational losses are concentrated among individuals exposed at younger ages, with disproportionately larger effects for females and the Muslims. Additional evidence from earlier rounds of the National Family Health Survey indicates that these long-run effects were preceded by immediate disruptions in educational progression, reflected in lower grade completion and increased age-grade delays.

This paper contributes to the literature on conflict and human capital by providing evidence that communal violence can have persistent, long-run consequences for educational attainment. The findings further demonstrate that the costs of violence are not borne equally; instead, they accumulate over time and widen existing inequalities by disproportionately affecting already vulnerable groups. These results have important policy implications. Post-conflict recovery efforts should extend beyond restoring physical infrastructure to supporting children's continued educational progression, particularly during transitions into secondary and higher secondary grades, when the risk of disruption appears greatest. Targeted educational support for vulnerable populations, especially girls and minority communities, may help mitigate the long-run human capital costs of communal violence.

References

Abadie, A., Diamond, A., & Hainmueller, J. (2010). Synthetic control methods for comparative case studies: Estimating the effect of california's tobacco control program. *Journal of the American statistical Association*, *105*(490), 493–505.

Abadie, A., & Gardeazabal, J. (2003). The economic costs of conflict: A case study of the basque country. *American economic review*, *93*(1), 113–132.

Akresh, R. (2008). *Armed conflict and schooling: Evidence from the 1994 rwandan genocide* (Vol. 3516). World Bank Publications.

Alfano, M., & Görlach, J.-S. (2023). Terrorism, media coverage, and education: Evidence from al-shabaab attacks in kenya. *Journal of the European Economic Association*, *21*(2), 727–763.

Amnesty International. (2005, January 27). *India: Justice, the victim—Gujarat state fails to protect women from violence* (Tech. Rep. No. ASA 20/001/2005). Amnesty International. Retrieved from https://www.refworld.org/reference/countryrep/amnesty/2005/71494

Ang, D. (2021). The effects of police violence on inner-city students. *The Quarterly Journal of Economics*, *136*(1), 115–168.

Anukriti, S. (2018). Financial incentives and the fertility-sex ratio trade-off. *American Economic Journal: Applied Economics*, *10*(2), 27–57.

Asher, S., Jha, K., Novosad, P., Adukia, A., & Tan, B. (2026, February). *Residential segregation and unequal access to local public services in india: Evidence from 1.5m neighborhoods* (NBER Working Paper No. 34818). National Bureau of Economic Research. doi: 10.3386/w34818

Azam, M., & Saing, C. H. (2017). Assessing the impact of district primary education program in india. *Review of Development Economics*, *21*(4), 1113–1131.

BBC News. (2005, May 11). *Gujarat riot death toll revealed.* http://news.bbc.co.uk/2/hi/south_asia/4536199.stm.

Bellows, J., & Miguel, E. (2009). War and local collective action in sierra leone. *Journal of public Economics*, *93*(11-12), 1144–1157.

Bertoni, E., Di Maio, M., Molini, V., & Nistico, R. (2019). Education is forbidden: The effect of the boko haram conflict on education in north-east nigeria. *Journal of Development Economics*, *141*, 102249.

Bharadwaj, P., Bhuller, M., Løken, K. V., & Wentzel, M. (2021). Surviving a mass shooting. *Journal of Public Economics*, *201*, 104469.

Bharti, N. K., & Roy, S. (2023). The early origins of judicial stringency in bail decisions: Evidence from early childhood exposure to hindu-muslim riots in india. *Journal of Public Economics*, *221*, 104846.

Brass, P. R. (2011). *The production of hindu-muslim violence in contemporary india.* University of Washington Press.

Brown, R., & Velásquez, A. (2017). The effect of violent crime on the human capital accumulation of young adults. *Journal of development economics*, *127*, 1–12.

Bundervoet, T., Verwimp, P., & Akresh, R. (2009). Health and civil war in rural burundi. *Journal of human Resources*, *44*(2), 536–563.

Cabral, M., Kim, B., Rossin-Slater, M., Schnell, M., & Schwandt, H. (2026). Trauma at school: The impacts of shootings on students' human capital and economic outcomes. *Review of Economic Studies*, *93*(1), 327–365.

Chen, J., Kanjilal-Bhaduri, S., & Pastore, F. (2022). *Updates on returns to education in india: Analysis using plfs 2018-19 data* (Tech. Rep.). IZA Discussion Papers.

Diwakar, V. (2024). Conflict trajectories and education: Gender-disaggregated evidence from india. *Defence and Peace Economics*, *35*(3), 320–338.

Duflo, E. (2001). Schooling and labor market consequences of school construction in indonesia: Evidence from an unusual policy experiment. *American economic review*, *91*(4), 795–813.

Engineer, A. (2002). Gujarat: An area of darkness. *Secular Perspective, issue of April*, 16–30.

Farasat, W., & Jha, P. (2016). Splintered justice: Living the horror of mass communal violence in bhagalpur and gujarat. *Three Essays Collective*.

Field, E., Levinson, M., Pande, R., & Visaria, S. (2008). Segregation, rent control, and riots: The economics of religious conflict in an indian city. *American Economic Review*, *98*(2), 505–510.

Fisman, R., Sarkar, A., Skrastins, J., & Vig, V. (2020). Experience of communal conflicts and intergroup lending. *Journal of Political Economy*, *128*(9), 3346–3375.

Ghose, D., & Pandey, D. (2025). The effects of communal violence on women's marital outcomes. *Demography*, *62*(3), 1087–1108.

Government of India. (2005). *India: South west monsoon 2005 – flood situation report, 15 aug 2005.* https://reliefweb.int/report/india/india-south-west-monsoon-2005-flood-situation-report-15-aug-2005. (Originally published 15 August 2005)

Horowitz, D. L. (2000). *Ethnic groups in conflict, updated edition with a new preface*. Univ of California Press.

Human Rights Watch. (2002). *We have no orders to save you: State participation and complicity in communal violence in gujarat* (Tech. Rep.). Human Rights Watch.

Iyer, S., Petrukhin, D., & Shrivastava, A. (2026). *The economic costs of religious riots in india* (CEPR Discussion Paper No. 21638). Paris and London: Centre for Economic Policy Research. Retrieved from https://cepr.org/publications/dp21638

Iyer, S., & Shrivastava, A. (2018). Religious riots and electoral politics in india. *Journal of Development Economics*, *131*, 104–122.

Jaffrelot, C. (2003). Communal riots in gujarat: The state at risk?

Jaffrelot, C. (2012). Gujarat 2002: What justice for the victims? the supreme court, the SIT, the police and the state judiciary. *Economic and Political Weekly*, *47*(8), 77–89. Retrieved from https://www.jstor.org/stable/41419907

Janmohamed, Z. (2013). Muslim education in ahmedabad in the aftermath of the 2002 gujarat riots. *Studies In Ethnicity & Nationalism*, *13*(3), 466.

Javeid, U., Pratt, S., Li, H., & Zhao, G. (2023). The effect of terrorism on continuing education: evidence from pakistan. *Education Economics*, *31*(3), 376–396.

Jha, S. (2014). 'Unfinished Business': Historic complementarities, political competition and ethnic violence in gujarat. *Journal of Economic Behavior & Organization*, *104*, 18–36.

Justino, P., Leone, M., & Salardi, P. (2014). Short-and long-term impact of violence on education: The case of timor leste. *The World Bank Economic Review*, *28*(2), 320–353.

Kalra, A. (2021). *A 'ghetto'of one's own: Communal violence, residential segregation and group education outcomes in india* (Tech. Rep.). Center for Open Science.

Khanna, R. (2008). Communal violence in gujarat, india: Impact of sexual violence and responsibilities of the health care system. *Reproductive Health Matters*, *16*(31), 142–152.

Koppensteiner, M. F., & Menezes, L. (2021). Violence and human capital investments. *Journal of Labor Economics*, *39*(3), 787–823.

Lahiri, A. K., Sen, T. K., Rao, R. K., & Jena, P. R. (2001). Economic consequences of gujarat earthquake. *Economic and Political Weekly*, 1319–1332.

Leon, G. (2012). Civil conflict and human capital accumulation: The long-term effects of political violence in perú. *Journal of Human Resources*, *47*(4), 991–1022.

Lokhande, S. B. (2015). *Communal violence, forced migration and the state: Gujarat since 2002*. Cambridge University Press. doi: https://doi.org/10.1017/CBO9781107588332

Márquez-Padilla, F., Pérez-Arce, F., & Rodríguez-Castelán, C. (2015). The (non-) effect of violence on education: Evidence from the'war on drugs' in mexico.

Mehta, C. A. (2025a). *Decoding enrolment ratios: An analysis of udise+ 2020-21 to 2024-25 data, implications for universal school education by 2030 envisaged in nep 2020.* https://educationforallinindia.com/decoding-enrolment-ratios-an-analysis-of-udise-2020-21-to-2024-25-data/.

Mehta, C. A. (2025b). *Impact of net enrolment ratio (ner) at school level on higher education in india.*

Mitra, A., & Ray, D. (2014). Implications of an economic theory of conflict: Hindu-muslim violence in india. *Journal of political economy*, *122*(4), 719–765.

Nandi, A., Haberland, N., & Ngo, T. D. (2023). The impact of primary schooling expansion on adult educational attainment, literacy, and health: Evidence from india's sarva shiksha abhiyan. *International Journal of Educational Development*, *102*, 102871.

Outlook India. (2002a). *History of communal violence in gujarat.* Retrieved from https://www.outlookindia.com/national/history-of-communal-violence-in-gujarat-news-217988

Outlook India. (2002b). *Mapping the violence.* Retrieved from https://www.outlookindia.com/national/mapping-the-violence-news-217990

Pathak, D. N., & Lodrick, D. O. (2026). Gujarat. In *Encyclopedia britannica.* Retrieved from https://www.britannica.com/place/Gujarat

Sharma, S., & Sunder, N. (2025). Crime and human capital in india. *World Development*, *196*, 107161.

Shemyakina, O. (2011). The effect of armed conflict on accumulation of schooling: Results from tajikistan. *Journal of Development Economics*, *95*(2), 186–200.

Sheth, S., & Haeems, N. (2006). 'sisters under the skin': Events of 2002 and girls' education in ahmedabad. *Economic and political weekly*, 1708–1712.

Singh, M., Kashyap, G. C., & Bango, M. (2022). Age heaping among individuals in selected south asian countries: evidence from demographic and health surveys. *Journal of Biosocial Science*, *54*(4), 725–734.

Singh, P., & Shemyakina, O. N. (2016). Gender-differential effects of terrorism on education: The case of the 1981–1993 punjab insurgency. *Economics of Education Review*, *54*, 185–210.

Srivastava, A. (2011). 'engendering'communal violence: An note on the 2002 gujarat communal riots. In *Proceedings of the indian history congress* (Vol. 72, pp. 1400–1404).

Sugandhe, A. (2024). Migration between the states of india: Changes during 2001 to 2011. *International Journal of Management Issues and Research*, 49.

The Times of India. (2002, March 4). Stray incidents take gujarat toll to 544. *The Times of India*. Retrieved from https://timesofindia.indiatimes.com/india/stray-incidents-take-gujarat-toll-to-544/articleshow/2794743.cms

Thomas, A., & John Sergenti, E. (2010). Economic growth and ethnic violence: An empirical investigation of hindu–muslim riots in india. *Journal of Peace research*, *47*(5), 535–546.

Ticku, R. (2026). Riot rewards? religious conflict and electoral outcomes. In *Economics, religion and public policy* (pp. 137–171). World Scientific.

Valente, C. (2014). Education and civil conflict in nepal. *The World Bank Economic Review*, *28*(2), 354–383.

Varshney, A. (2004). Understanding Gujarat Violence. *Contemporary Conflicts*, *26*, 1–5.

Varshney, A., et al. (2002). *Ethnic conflict and civic life: Hindus and muslims in india* (Vol. 510). Yale University Press New Haven, CT.

Wahid, A. (2019). Narratives of segregation: Ghettos of ahmedabad.

Wilkinson, S. (2004). Votes and violence. *Electoral Competition and Ethnic*.

Yang, D., Saia, A., Kovvuri, A., Ahmed, R., & Brimble, P. (2025). *Ancient epics in the television age: Religious identity and the rise of hindu nationalism in india* (NBER Working Paper No. 33417). National Bureau of Economic Research. Retrieved from https://doi.org/10.3386/w33417 doi: 10.3386/w33417

A. Tables

Table 1: Sample of Interest: Individuals 5–35 in 2002

	Control (Other States) (1)	Treatment (Gujarat) (2)
Total Observations	1,134,707	58,989
Pre-Period		
Older Cohort (24–35 years in 2002)	320,456	17,397
Male (=1)	155,955	8,792
Post-Period		
School-Age Cohort (5–23 years in 2002)	814,251	41,592
Male (=1)	391,237	20,990

Note: The sample is restricted to individuals in the age group 5–35 in 2002, the year of the Gujarat Violence. By the NFHS-5 survey period (2019–21), these individuals were aged 22–52, ensuring that all cohorts were old enough to have potentially completed twelve years of schooling. Gujarat is the treated state, while all other Indian states constitute the control group.

Table 2: Summary Statistics

	Pre-Period Cohort			Post-Period Cohort		
	Older Cohort (24–35 in 2002)			School-Age Cohort (5–23 in 2002)		
	Control (Other States) (1)	Treatment (Gujarat) (2)	Difference (2) − (1)	Control (Other States) (3)	Treatment (Gujarat) (4)	Difference (4) − (3)
Control Variables:						
Hindu (=1)	0.75	0.89	0.14***	0.74	0.88	0.14***
Muslim (=1)	0.11	0.09	-0.02***	0.12	0.10	-0.02***
Male (=1)	0.48	0.50	0.02***	0.47	0.50	0.03***
Urban (=1)	0.26	0.31	0.05***	0.25	0.31	0.06***
Household Size	4.85	5.05	0.19***	5.56	5.86	0.30***
Male Household Head	0.88	0.91	0.03***	0.85	0.90	0.05***
Wealth Index (1–5)	2.98	3.31	0.33***	2.94	3.21	0.27***
Educational Outcomes:						
Grade 12 Completion	0.15	0.15	0.00	0.31	0.25	-0.05***
Male	0.22	0.21	-0.01***	0.36	0.30	-0.06***
Female	0.09	0.10	0.01***	0.27	0.21	-0.06***
Total Years of Education	5.34	5.63	0.29***	7.70	7.52	-0.17**
Male	6.83	6.96	0.13***	8.50	8.38	-0.12***
Female	3.95	4.28	0.33***	6.95	6.42	-0.31***

Note: This table reports summary statistics for the older cohort (aged 24–35 in 2002) and the school-age cohort (aged 5–23 in 2002) using data from the 2019–21 National Family Health Survey (NFHS-5). Columns (2) − (1) and (4) − (3) report differences between Gujarat and other states within each cohort.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 3: Impact of Violence Exposure on Educational Outcomes

	Total Years of Schooling (1)	Grade 12 Completion (2)
SchoolAge × Gujarat	−0.502***	−0.059***
	(0.099)	(0.011)
Sample Mean	6.97	0.26
Observations	1,193,696	1,193,045
R-Squared	0.14	0.08

Note: This table reports coefficient estimates from Specification (2). Column (1) uses Total Years of Schooling as the outcome variable, while Column (2) uses Grade 12 Completion as the outcome variable. Standard errors clustered at the state level are reported in parentheses. All specifications include age and state fixed effects.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 4: Impact of Violence Exposure on Educational Outcomes by Gender

	Total Years of Schooling		Grade 12 Completion	
	Male	Female	Male	Female
	(1)	(2)	(3)	(4)
SchoolAge × Gujarat	-0.271^{***}	-0.681^{***}	-0.045^{***}	-0.072^{***}
	(0.095)	(0.113)	(0.011)	(0.012)
Sample Mean	7.98	6.03	0.31	0.21
Observations	576,974	616,674	576,974	616,674
R-Squared	0.099	0.22	0.06	0.12

Note: This table reports coefficient estimates from Specification (2), disaggregated by gender. Columns (1)–(2) use total years of schooling as the outcome variable, while Columns (3)–(4) use Grade 12 completion as the outcome variable. Standard errors clustered at the state level are reported in parentheses. All specifications include age and state fixed effects.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 5: Impact of Violence Exposure on Educational Outcomes by Religion

	Total Years of Schooling		Grade 12 Completion	
	Hindu	Muslim	Hindu	Muslim
	(1)	(2)	(3)	(4)
SchoolAge × Gujarat	-0.448^{***}	-1.206^{***}	-0.054^{***}	-0.071^{***}
	(0.110)	(0.239)	(0.012)	(0.027)
Sample Mean	6.99	6.32	0.27	0.21
Observations	898,919	145,597	898,429	145,513
R-Squared	0.15	0.20	0.09	0.10

Note: This table reports coefficient estimates from Specification (2), disaggregated by religion. Columns (1)–(2) use total years of schooling as the outcome variable, while Columns (3)–(4) use Grade 12 completion as the outcome variable. Standard errors clustered at the state level are reported in parentheses. All specifications include age and state fixed effects.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 6: Impact of Violence Exposure on Educational Outcomes by Gender and Religion

	Total Years of Schooling				Grade 12 Completion			
	Hindu		Muslim		Hindu		Muslim	
	Male	Female	Male	Female	Male	Female	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SchoolAge × Gujarat	-0.205*	-0.643***	-0.837***	-1.477***	-0.040***	-0.067***	-0.050	-0.090***
	(0.109)	(0.125)	(0.182)	(0.304)	(0.012)	(0.014)	(0.030)	(0.024)
Sample Mean	8.08	5.97	7.25	5.46	0.32	0.21	0.26	0.16
Observations	434,731	463,666	70,158	75,349	434,731	463,666	70,158	75,349
R-Squared	0.10	0.22	0.16	0.27	0.07	0.12	0.10	0.12

Note: This table reports coefficient estimates from Specification (2), disaggregated by religion and gender. Columns (1)–(4) use total years of schooling as the outcome variable, while Columns (5)–(8) use Grade 12 completion as the outcome variable. Standard errors clustered at the state level are reported in parentheses. All specifications include age and state fixed effects.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 7: Impact of Violence Exposure on Educational Outcomes by Religious Composition of Districts

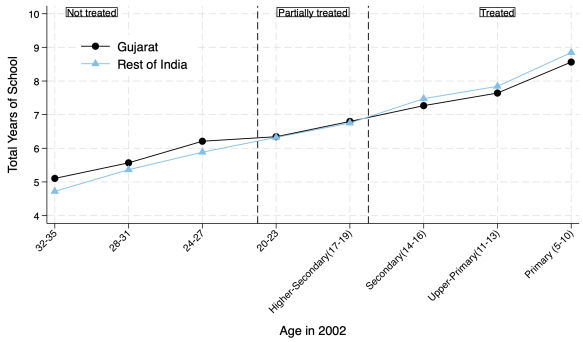
	Total Years of Schooling		Grade 12 Completion	
	Above Average Hindu	Below Average Hindu	Above Average Hindu	Below Average Hindu
	(1)	(2)	(3)	(4)
SchoolAge × Gujarat	-0.443***	-0.633***	-0.054***	-0.064***
	(0.099)	(0.099)	(0.011)	(0.011)
Sample Mean	6.98	6.98	0.26	0.26
Observations	1,167,863	1,155,674	1,167,863	1,155,674
R-Squared	0.14	0.15	0.08	0.09
Controls	No	No	No	No

Note: This table reports coefficient estimates from Specification (2), disaggregated by the Hindu population share of Gujarat districts. Columns (1) and (2) use Total Years of Schooling as the outcome variable, while Columns (3) and (4) use Grade 12 Completion. For each outcome, estimates are reported separately for districts with above- and below-average Hindu population shares, based on the 2001 Census. Standard errors clustered at the state level are reported in parentheses. All specifications include age and state fixed effects.

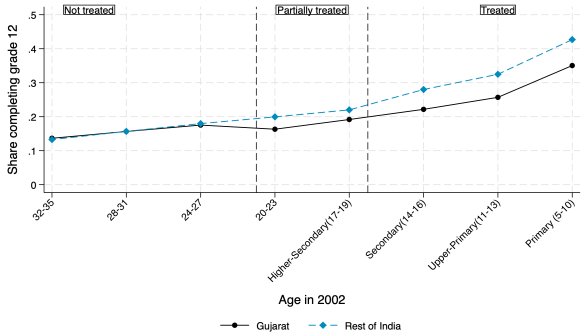
* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

B. Figures

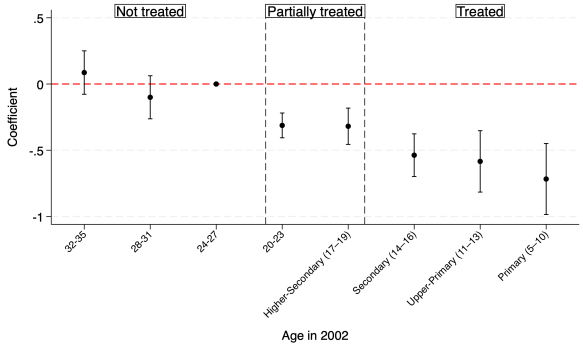
Figure 1: Raw Means and Event Study: Education Outcomes



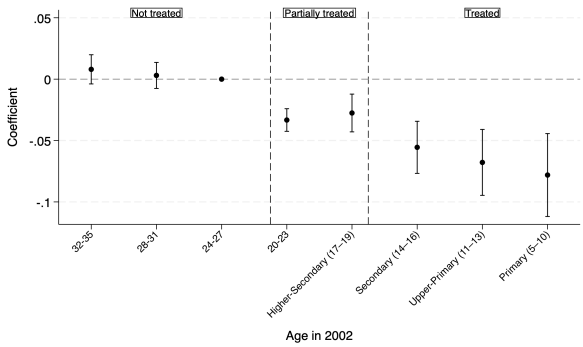
(a) Raw Means - Total Years of School



(b) Raw Means - Grade 12 Completion



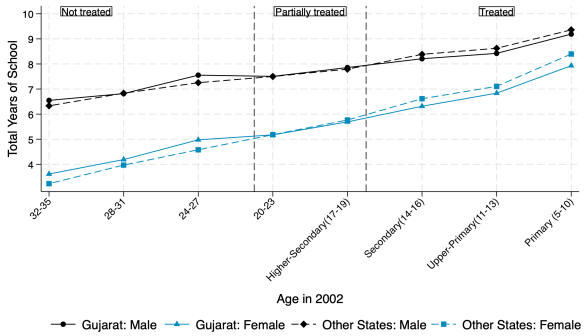
(c) Event Study Estimates - Total Years of School



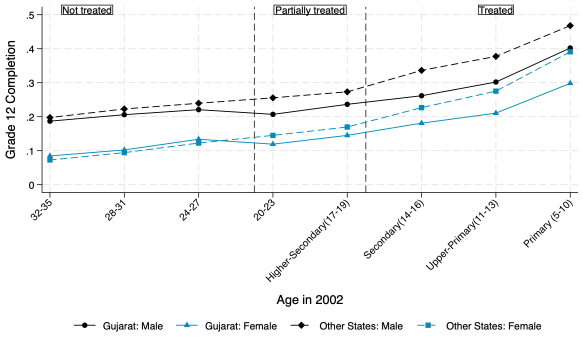
(d) Event Study Estimates - Grade 12 Completion

Note: This figure presents raw mean comparisons and event-study estimates for the two main educational outcomes - Total Years of Schooling and Grade 12 Completion, using data from the National Family Health Survey (NFHS-5). Panels (a) and (b) plot raw mean outcomes by age-at-exposure for Gujarat and the rest of India, while Panels (c) and (d) report event-study coefficient estimates. The results indicate a decline in educational attainment among individuals exposed to the 2002 Gujarat violence during their school-going years. Standard errors are clustered at the state level.

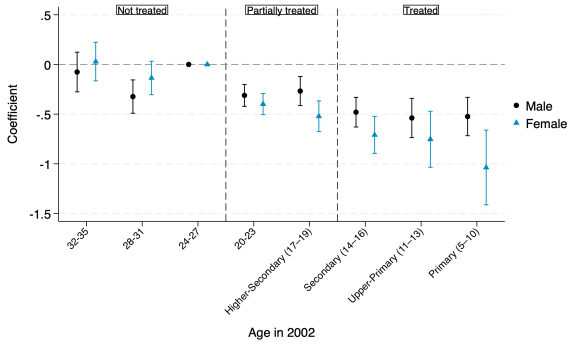
Figure 2: Raw Means and Event Study: Education Outcomes by Gender



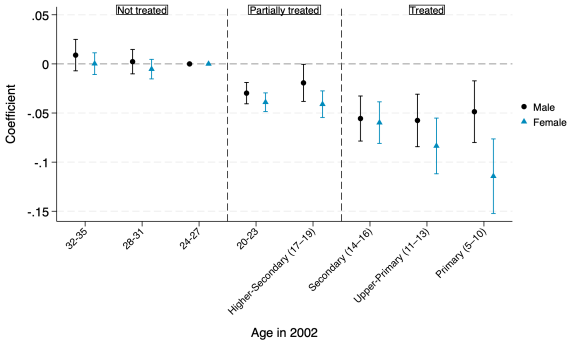
(a) Raw Means - Total Years of School



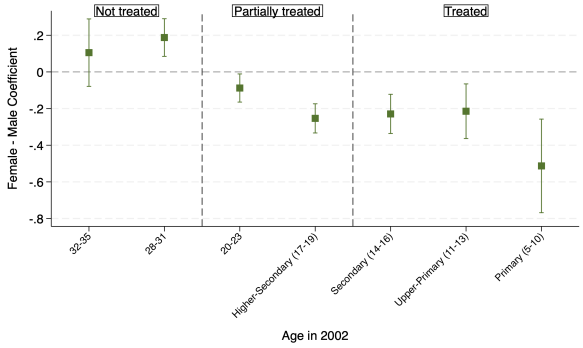
(b) Raw Means - Grade 12 Completion



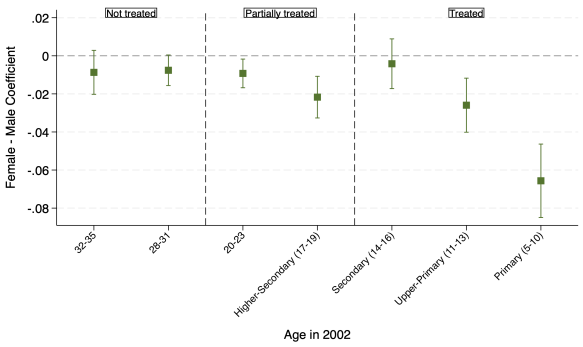
(c) Event Study Estimates - Total Years of School



(d) Event Study Estimates - Grade 12 Completion



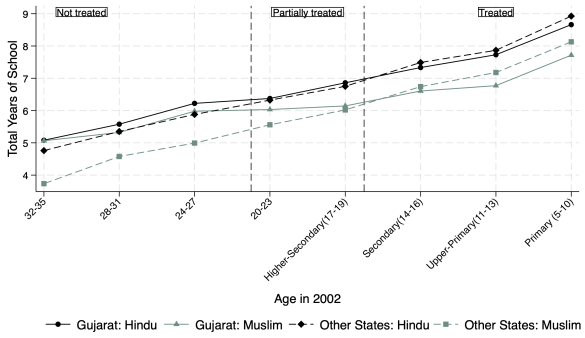
(e) Pooled Estimates - Total Years of School



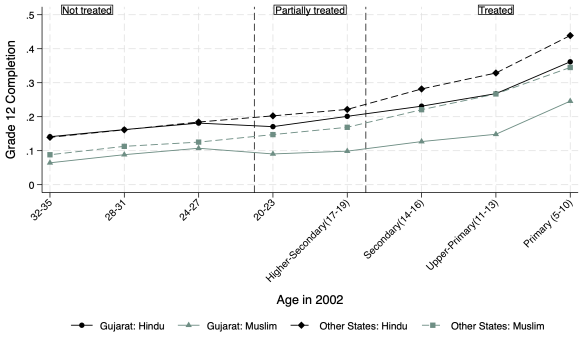
(f) Pooled Estimates - Grade 12 Completion

Note: This figure presents raw mean comparisons and event-study estimates for the two primary educational outcomes - Total Years of Schooling and Grade 12 Completion, disaggregated by gender, using data from the National Family Health Survey (NFHS-5). Panels (a) and (b) plot raw mean educational outcomes by age-at-exposure cohorts for Gujarat and the rest of India, while Panels (c) and (d) report event-study coefficient estimates. Panels (e) and (f) shows the difference between the male and female coefficients. The results indicate a decline in educational attainment among both boys and girls who were exposed to the 2002 Gujarat violence during their school-going years, with the effects being substantially larger for girls. Standard errors are clustered at the state level.

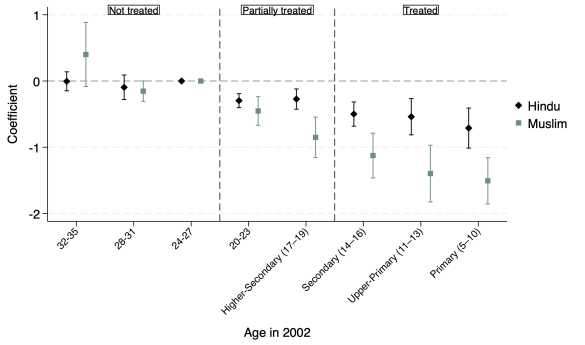
Figure 3: Raw Means and Event Study: Education Outcomes by Religion



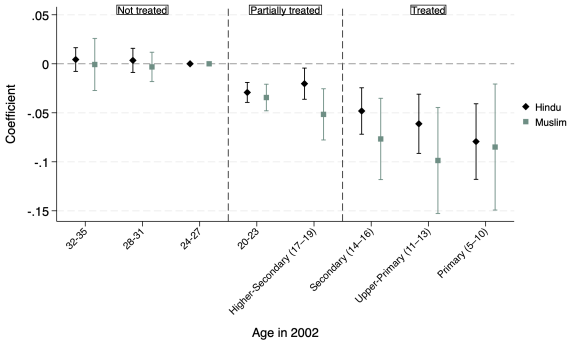
(a) Raw Means - Total Years of School



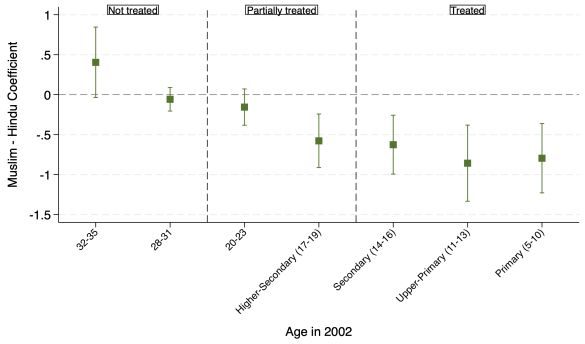
(b) Raw Means - Grade 12 Completion



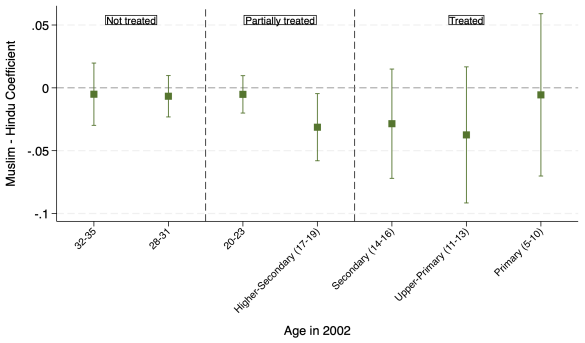
(c) Event Study Estimates - Total Years of School



(d) Event Study Estimates - Grade 12 Completion



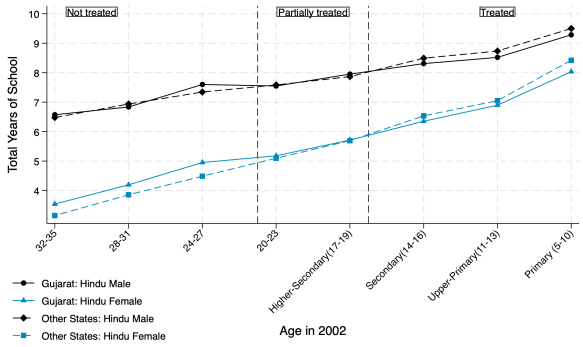
(e) Pooled Estimates - Total Years of School



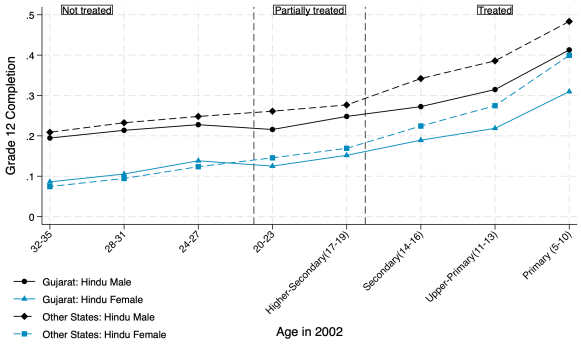
(f) Pooled Estimates - Grade 12 Completion

Note: This figure presents raw mean comparisons and event-study estimates for the two primary educational outcomes - Total Years of Schooling and Grade 12 Completion, disaggregated by religion, using data from the National Family Health Survey (NFHS-5). Panels (a) and (b) plot raw mean educational outcomes by age-at-exposure cohorts for Gujarat and the rest of India, while Panels (c) and (d) report event-study coefficient estimates. Panels (e) and (f) shows the difference between the Hindu and Muslim coefficients. The results indicate a decline in educational attainment among both Hindus and Muslims who were exposed to the 2002 Gujarat violence during their school-going years. Standard errors are clustered at the state level.

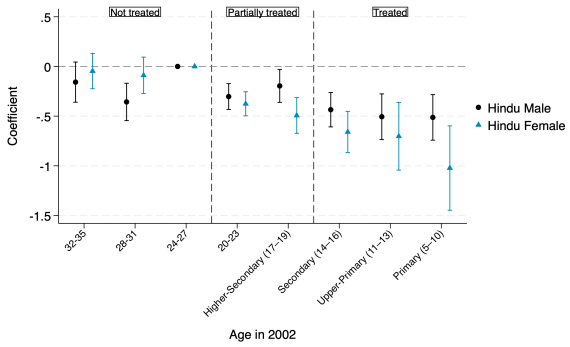
Figure 4: Raw Means and Event Study: Education Outcomes by Gender: Hindu



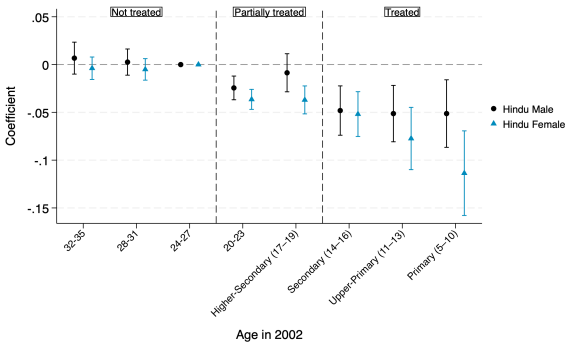
(a) Raw Means - Total Years of School



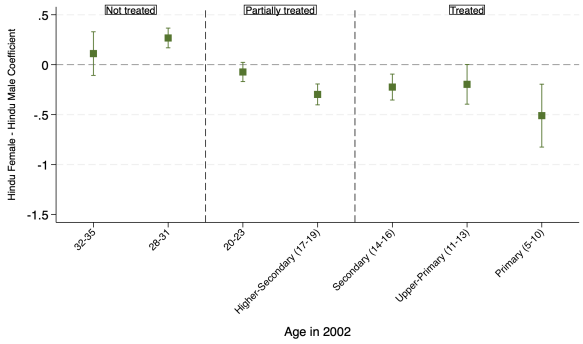
(b) Raw Means - Grade 12 Completion



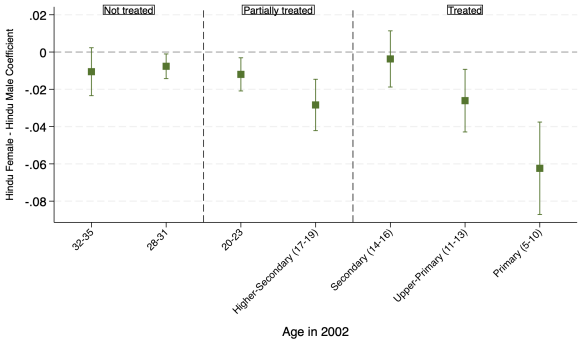
(c) Event Study Estimates - Total Years of School



(d) Event Study Estimates - Grade 12 Completion



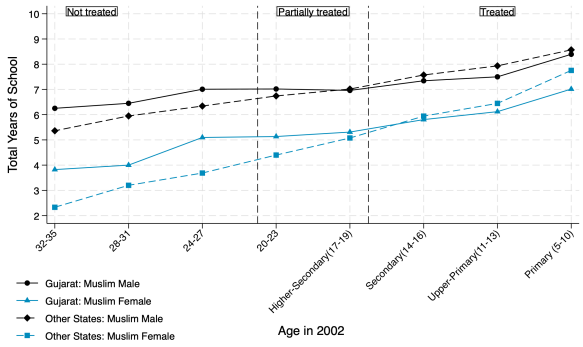
(e) Pooled Estimates - Total Years of School



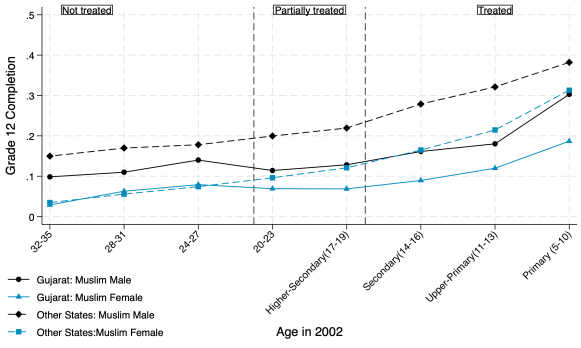
(f) Pooled Estimates - Grade 12 Completion

Note: This figure presents raw mean comparisons and event-study estimates for the two primary educational outcomes - Total Years of Schooling and Grade 12 Completion, disaggregated by gender for the Hindu population, using data from the National Family Health Survey (NFHS-5). Panels (a) and (b) plot raw mean educational outcomes by age-at-exposure cohorts for Gujarat and the rest of India, while Panels (c) and (d) report event-study coefficient estimates. Panels (e) and (f) shows the difference between the male and female coefficients. The results indicate a decline in educational attainment among both Hindu girls and boys who were exposed to the 2002 Gujarat violence during their school-going years. Standard errors are clustered at the state level.

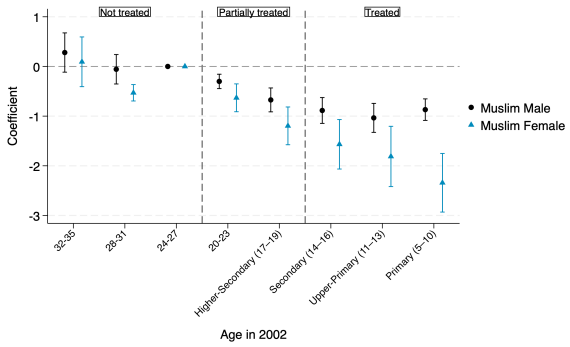
Figure 5: Raw Means and Event Study: Education Outcomes by Gender: Muslim



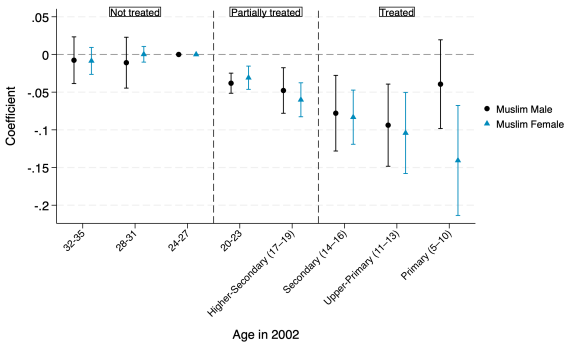
(a) Raw Means - Total Years of School



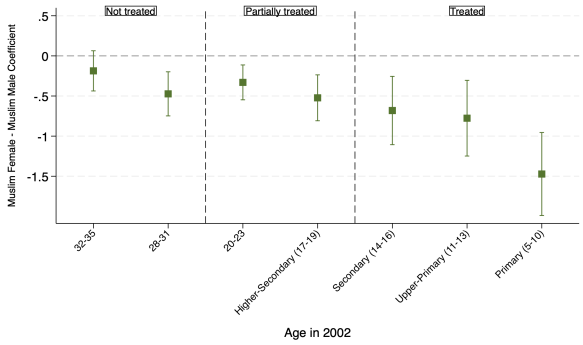
(b) Raw Means - Grade 12 Completion



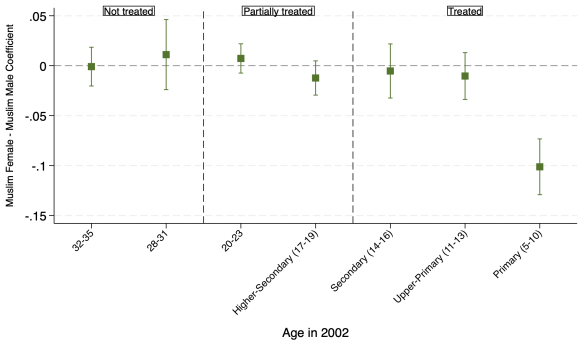
(c) Event Study Estimates - Total Years of School



(d) Event Study Estimates - Grade 12 Completion



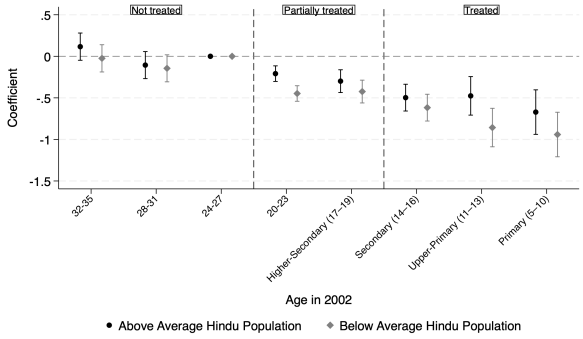
(e) Pooled Estimates - Total Years of School



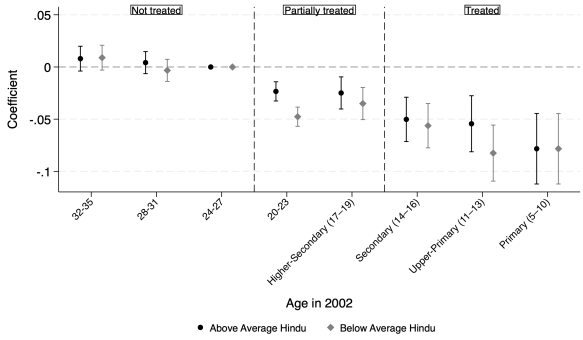
(f) Pooled Estimates - Grade 12 Completion

Note: This figure presents raw mean comparisons and event-study estimates for the two primary educational outcomes - Total Years of Schooling and Grade 12 Completion, disaggregated by gender for the Muslim population, using data from the National Family Health Survey (NFHS-5). Panels (a) and (b) plot raw mean educational outcomes by age-at-exposure cohorts for Gujarat and the rest of India, while Panels (c) and (d) report event-study coefficient estimates. Panels (e) and (f) shows the difference between the male and female coefficients. The results indicate a decline in educational attainment among both Muslim girls and boys who were exposed to the 2002 Gujarat violence during their school-going years. Standard errors are clustered at the state level.

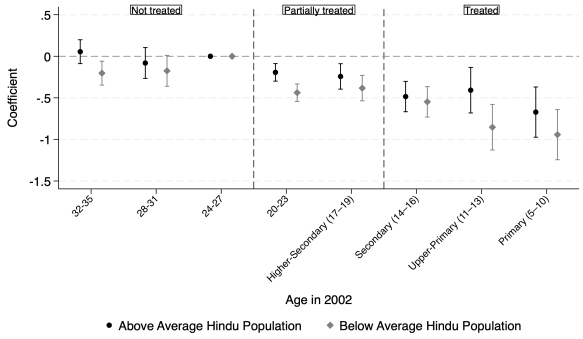
Figure 6: Heterogeneity by Religious Composition of Districts in Gujarat, 2001



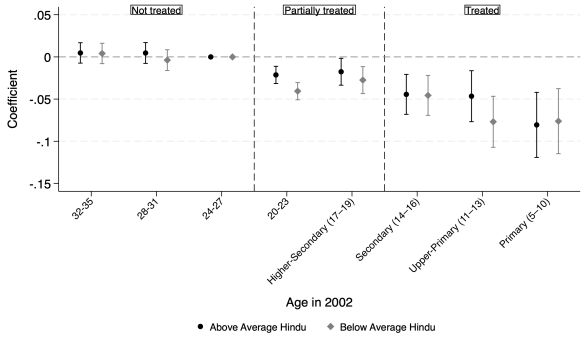
(a) Total Years of Schooling



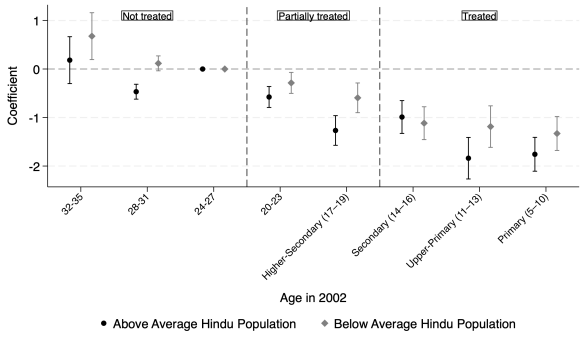
(b) Grade 12 Completion



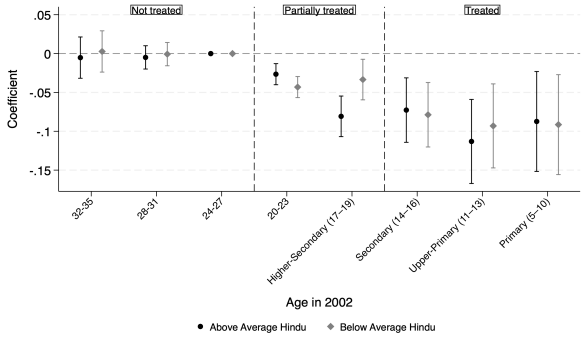
(c) Total Years of Schooling for Hindu Population



(d) Grade 12 Completion for Hindu Population



(e) Total Years of Schooling for Muslim Population

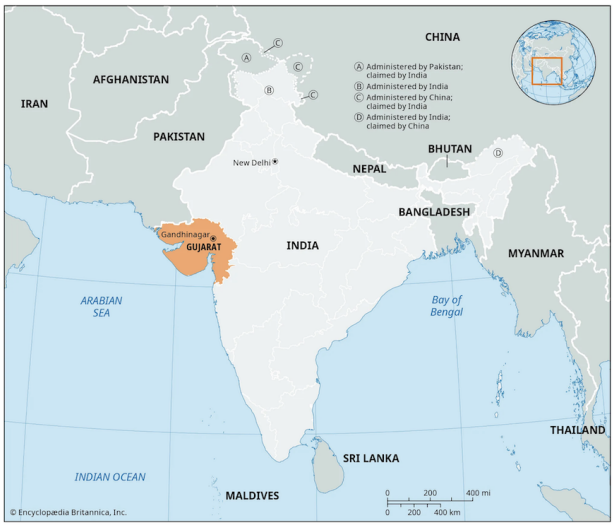


(f) Grade 12 Completion for Muslim Population

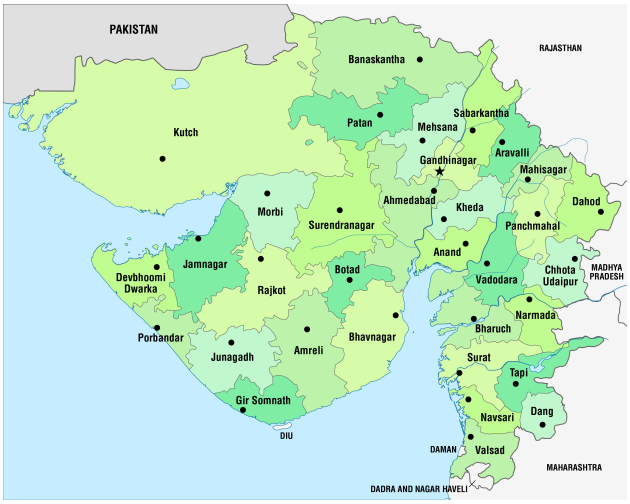
Note: This figure presents event-study estimates for the two primary educational outcomes—Total Years of Schooling and Grade 12 Completion, using data from the National Family Health Survey (NFHS-5), disaggregated by the religious composition of districts in Gujarat based on the 2001 Census. Districts are categorized as "Above Hindu Population" or "Below Hindu Population" depending on whether their Hindu population share is above or below the average Hindu population share of Gujarat. Panels (a) and (b) compare estimates across districts with above- and below-average Hindu population shares. Panels (c) and (d) restrict the sample to the Hindu population, while Panels (e) and (f) restrict the sample to the Muslim population.

Appendix

Figure A1: Map of Gujarat



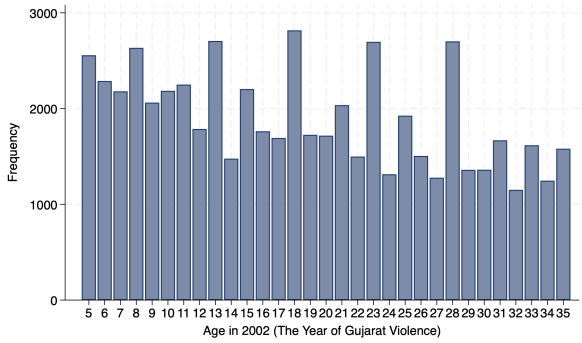
(a) Location of Gujarat in India



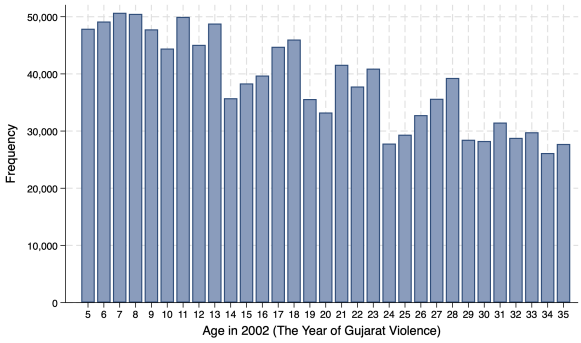
(b) Administrative map of Gujarat

Note: Gujarat is one of India's 28 states and currently comprises 34 districts. Source for panel (a): Encyclopedia Britannica (Pathak & Lodrick, 2026); source for panel (b): Wikipedia.

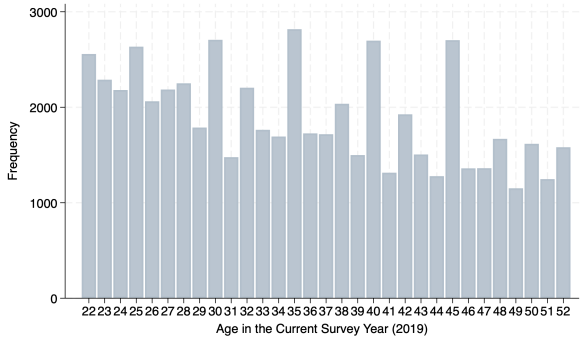
Figure A2: Distribution of the Sample by Age



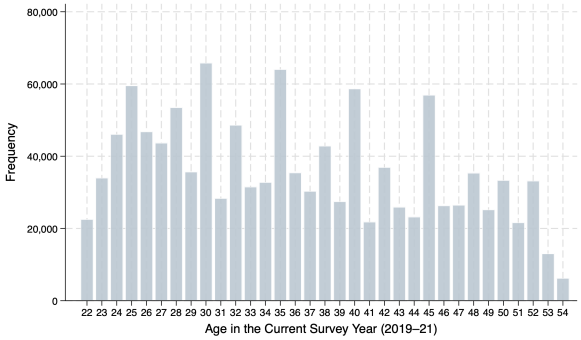
(a) Gujarat: Age in 2002



(b) India: Age in 2002



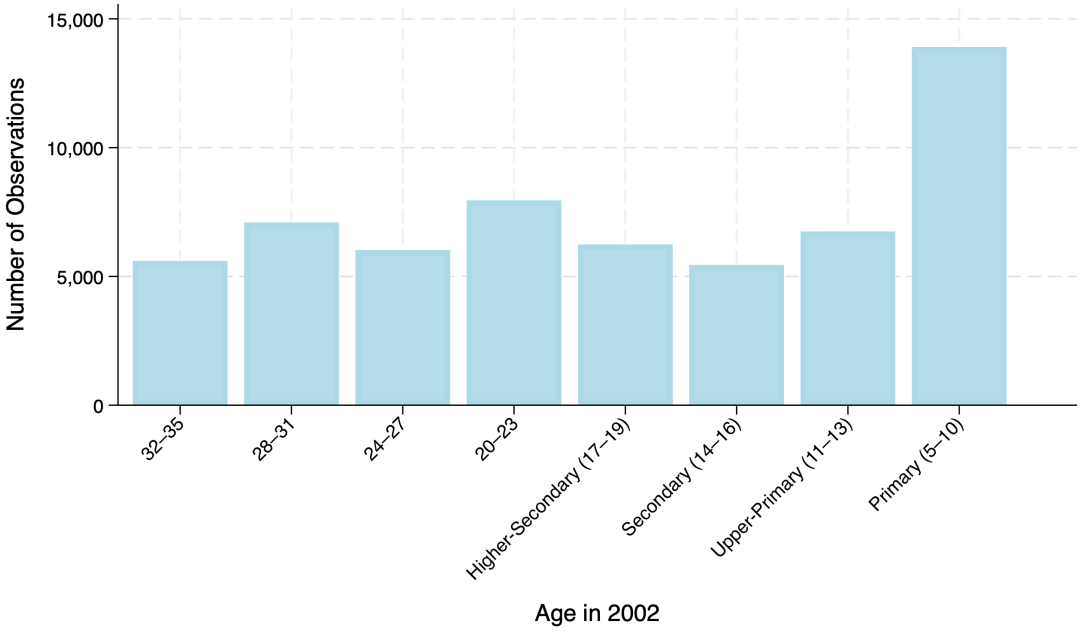
(c) Gujarat: Current Age



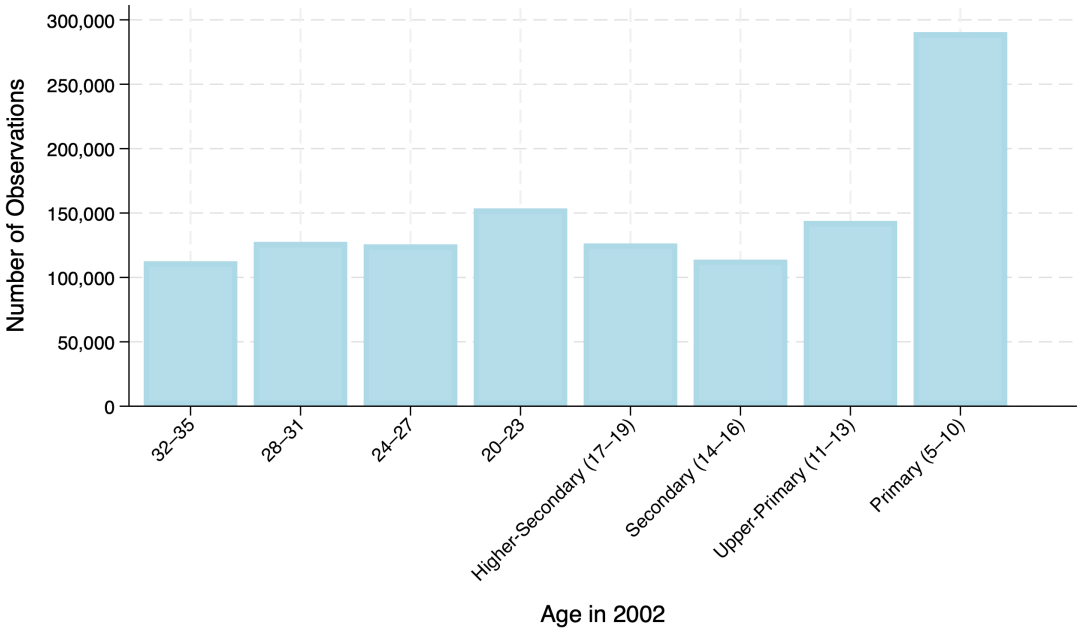
(d) India: Current Age

Note: This figure presents the distribution of individuals by age using NFHS-5 data. The left column reports the Gujarat sample, while the right column reports the India sample. The top row displays age in 2002, and the bottom row displays age at the time of the survey, which is used to calculate individuals' age in 2002.

Figure A3: Distribution of the Sample by Age-Bins



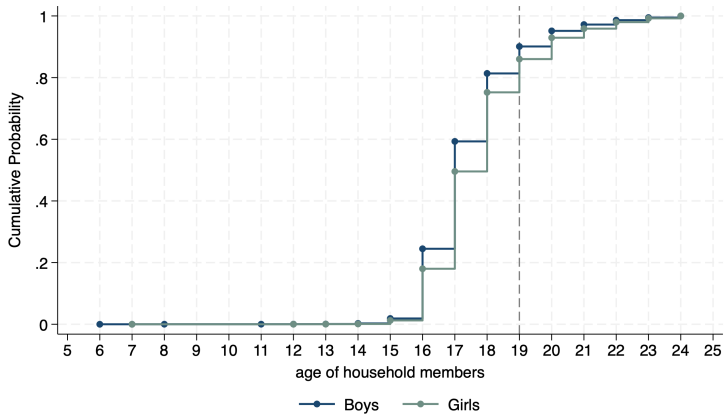
(a) Gujarat: Age in 2002



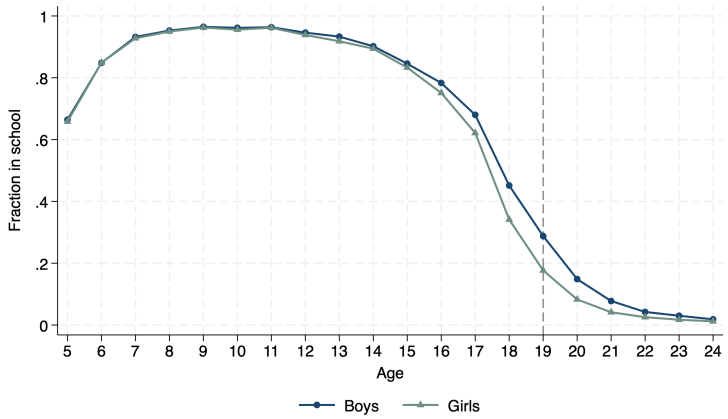
(b) India: Age in 2002

Note: This figure shows the distribution of the sample across the eight age bins used in the analysis, based on individuals' age in 2002. Panels (a) and (b) report the distributions for Gujarat and the rest of India, respectively.

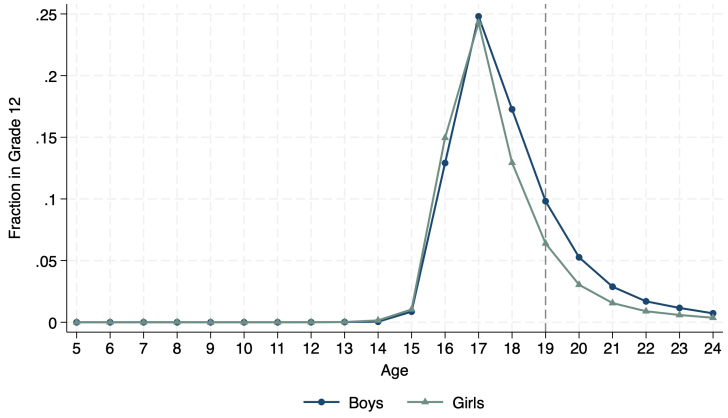
Figure A4: Age Profiles of School Enrollment and Grade 12 Completion



(a) Cumulative distribution of Grade 12 completion by age



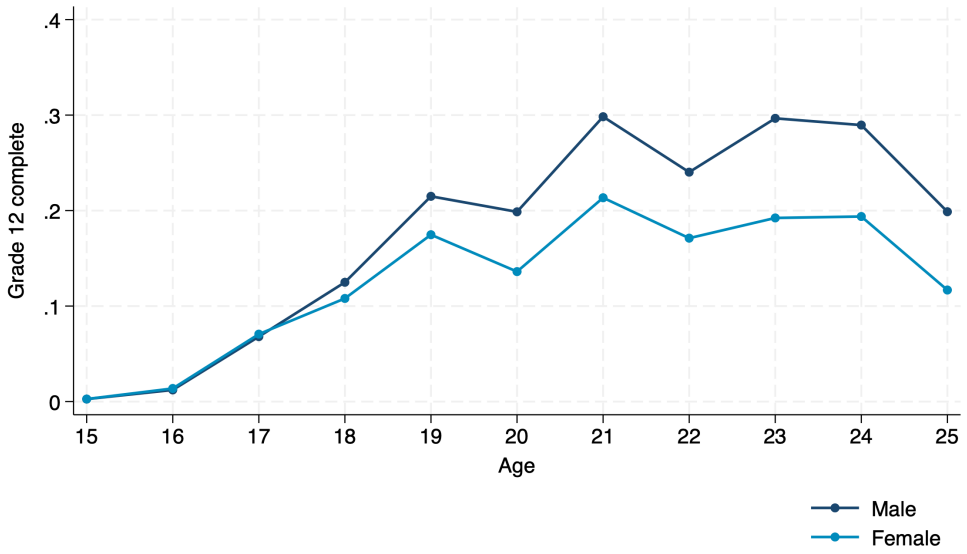
(b) Fraction of students currently enrolled in school by age



(c) Fraction of students enrolled in Grade 12 by age

Note: This figure summarizes age patterns in schooling using NFHS-5 data, separately for boys and girls. Panel (a) plots the cumulative distribution of Grade 12 completion by age. Panel (b) shows the fraction of individuals currently enrolled in school at each age. Panel (c) shows the fraction of individuals enrolled specifically in Grade 12 at each age. In all panels, the horizontal axis denotes age at the time of the survey, and the vertical axis reports the corresponding cumulative probability or proportion.

Figure A5: Age Profile of Grade 12 Completion by Gender



Note: This figure plots the fraction of individuals who have completed Grade 12 by age, separately by gender, using NFHS-2 (1998–99) data. Because NFHS-2 does not report enrollment status for individuals older than 18, it is not possible to determine how many individuals in this age group remain enrolled in school.

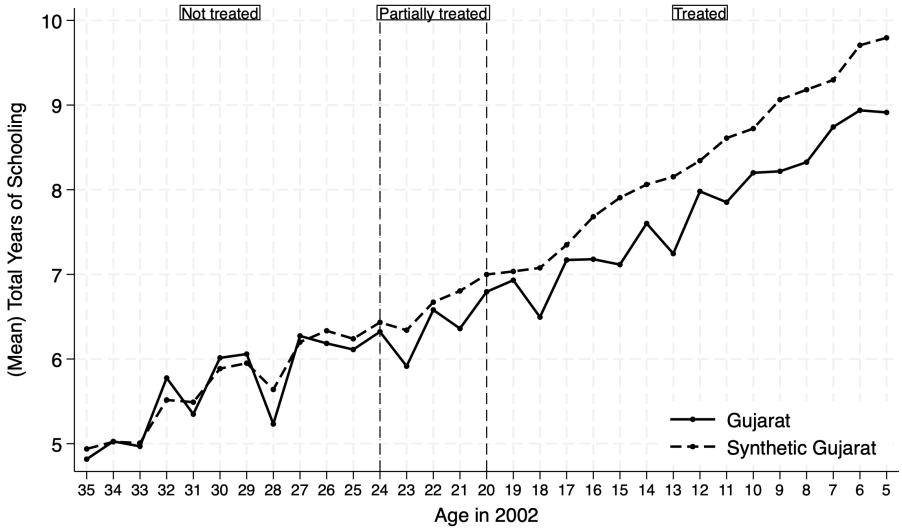
Table A1: Gujarat Districts by Religious Composition

Above Hindu	Below Hindu	Above Muslim	Below Muslim
Banas Kantha	Kachchh	Kachchh	Banas Kantha
Patan	Ahmadabad	Patan	Mahesana
Mahesana	Jamnagar	Ahmadabad	Sabar Kantha
Sabar Kantha	Junagadh	Rajkot	Gandhinagar
Gandhinagar	Anand*	Jamnagar	Surendranagar
Surendranagar	Kheda	Junagadh	Porbandar
Rajkot	Bharuch	Anand	Amreli
Porbandar	Surat	Kheda	Bhavnagar
Amreli	The Dangs	Bharuch	Panch Mahals
Bhavnagar			Dohad
Panch Mahals			Vadodara
Dohad			Narmada
Vadodara			Surat
Narmada			The Dangs
Navsari			Navsari
Valsad			Valsad
N = 16	**N = 9**	**N = 9**	**N = 16**

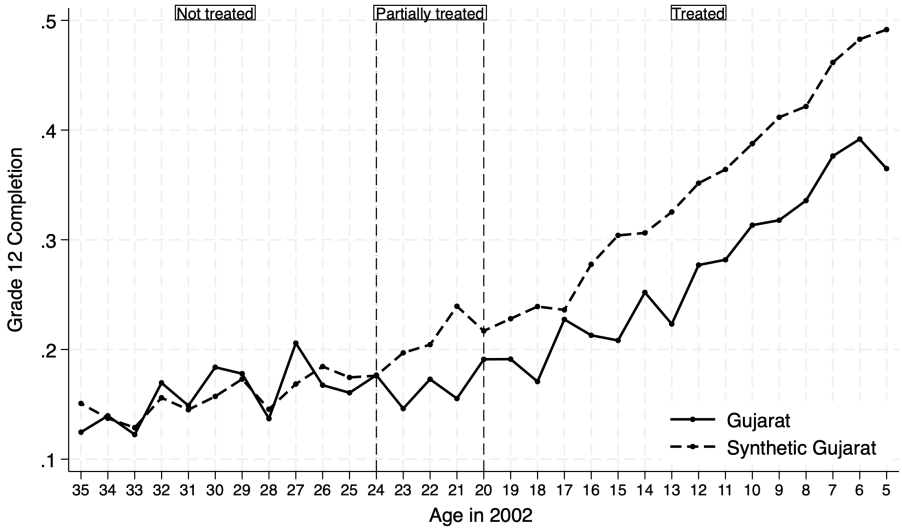
Note: This table classifies Gujarat districts according to their Hindu and Muslim population shares relative to the corresponding state averages reported in the 2001 Census. In 2001, Hindus constituted approximately 89% of Gujarat's population, while Muslims constituted approximately 9%. Districts with a Hindu (Muslim) population share above the corresponding state average are classified as Above Hindu" (Above Muslim"), while those with shares below the state average are classified as Below Hindu" (Below Muslim").

Figure A6: Synthetic Control Analysis

(a) Total Years of School



(b) Grade 12 Completion



Note: The figure plots the estimates using synthetic controls approach and using data from NFHS-5.

Table A2: Synthetic Control Weights

State	Total Years of School	Grade 12 Completion
Jammu & Kashmir	0.000	0.040
Himachal Pradesh	0.000	0.000
Punjab	0.000	0.000
Chandigarh	0.000	0.000
Uttarakhand	0.000	0.000
Haryana	0.000	0.000
NCT of Delhi	0.000	0.000
Rajasthan	0.189	0.235
Uttar Pradesh	0.224	0.142
Bihar	0.000	0.000
Sikkim	0.208	0.091
Arunachal Pradesh	0.000	0.000
Nagaland	0.000	0.000
Manipur	0.000	0.000
Mizoram	0.000	0.000
Tripura	0.000	0.000
Meghalaya	0.000	0.000
Assam	0.000	0.000
West Bengal	0.000	0.000
Jharkhand	0.000	0.000
Odisha	0.000	0.000
Chhattisgarh	0.000	0.000
Madhya Pradesh	0.000	0.000
Dadra & Nagar Haveli and Daman & Diu	0.000	0.275
Maharashtra	0.000	0.112
Andhra Pradesh	0.000	0.000
Karnataka	0.197	0.000
Goa	0.000	0.000
Lakshadweep	0.000	0.000
Kerala	0.137	0.000
Tamil Nadu	0.000	0.000
Puducherry	0.000	0.000
Andaman & Nicobar Islands	0.045	0.105
Telangana	0.000	0.000
Ladakh	0.000	0.000

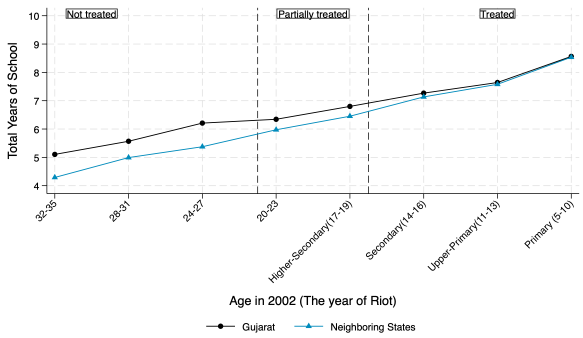
Note: The table reports unit weights used to construct the synthetic control for each specification. Weights are non-negative and sum to one within each column. States with zero weights do not contribute to the synthetic control.

Table A3: Balance for Predictors Across Gujarat and Synthetic Gujarat

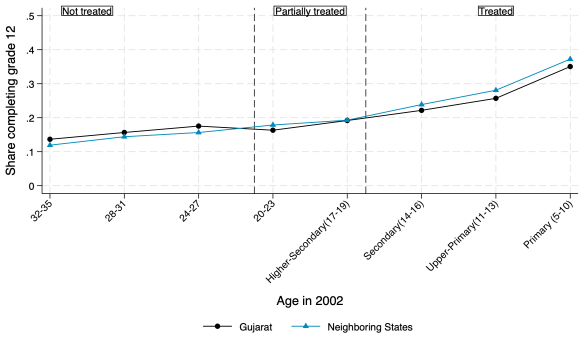
	Total Years of Schooling		Grade 12 Completion	
	(1)	(2)	(3)	(4)
Predictor	Gujarat	Synthetic Gujarat	Gujarat	Synthetic Gujarat
Lagged Outcome Variables				
Age 35	4.817	4.938	0.125	0.151
Age 34	5.027	5.022	0.140	0.137
Age 33	4.968	5.008	0.122	0.129
Age 32	5.777	5.517	0.170	0.156
Age 31	5.349	5.491	0.149	0.145
Age 30	6.014	5.886	0.184	0.157
Age 29	6.059	5.952	0.178	0.173
Age 28	5.233	5.640	0.137	0.146
Age 27	6.273	6.200	0.206	0.168
Age 26	6.185	6.334	0.167	0.184
Age 25	6.112	6.239	0.161	0.175
Age 24	6.322	6.433	0.177	0.176
Covariates				
No Education	0.144	0.144	0.144	0.146
Household Size	5.748	5.481	5.748	5.411
Wealth Index	3.224	3.194	3.224	3.219
Urban Resident	0.320	0.253	0.320	0.333
Hindu	0.897	0.869	0.897	0.884

Note: This table reports the mean values of the predictors used to construct the synthetic controls for Total Years of Schooling and Grade 12 Completion. Lagged outcome variables correspond to age-specific values for ages 24–35. Covariates include the proportion of the population with no education, average household size, wealth index, urban residence, and the proportion of Hindus. For each outcome, the first column reports values for Gujarat and the second reports values for Synthetic Gujarat.

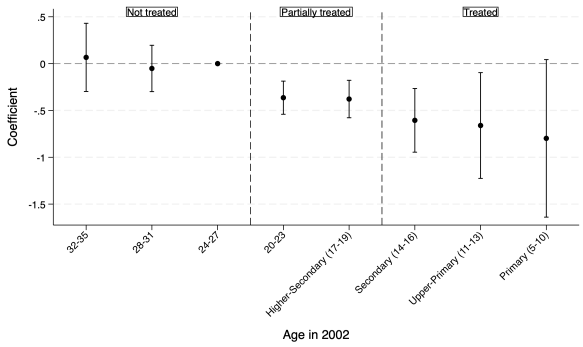
Figure A7: Robustness Check: Alternate Control Group - Only Neighboring States



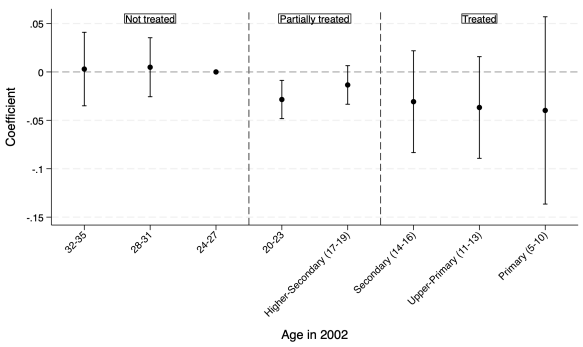
(a) Raw Means - Total Years of School



(b) Raw Means - Grade 12 Completion



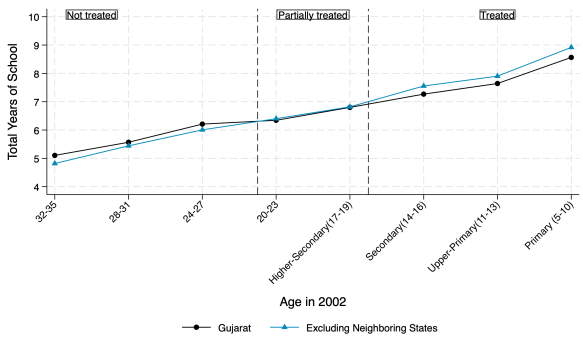
(c) Event Study - Total Years of School



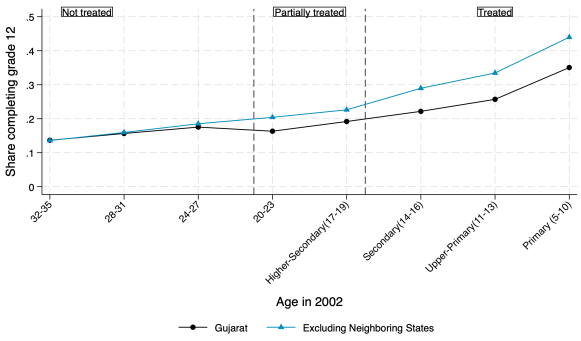
(d) Event Study - Grade 12 Completion

Note: This figure presents raw mean comparisons and event-study estimates for the two primary educational outcomes - Total Years of Schooling and Grade 12 Completion, using data from the National Family Health Survey (NFHS-5) and the control group only includes the neighboring states - Madhya Pradesh, Rajasthan and Maharashtra. Panels (a) and (b) plot raw mean educational outcomes by age-at-exposure cohorts for Gujarat and the rest of India, while Panels (c) and (d) report event-study coefficient estimates.

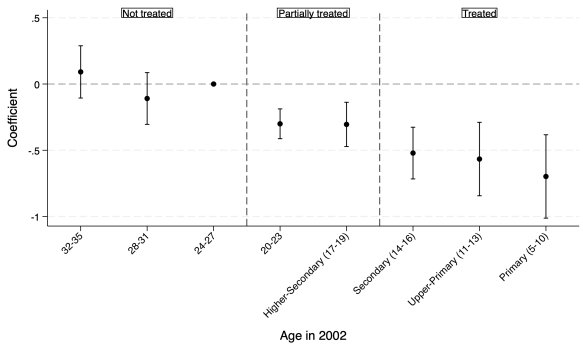
Figure A8: Robustness Check: Alternate Control Group - Excluding Neighboring States



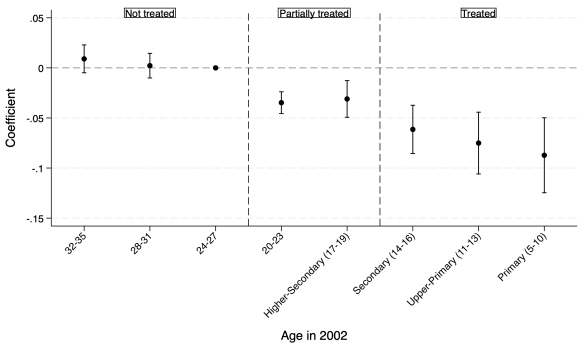
(a) Raw Means - Total Years of School



(b) Raw Means - Grade 12 Completion



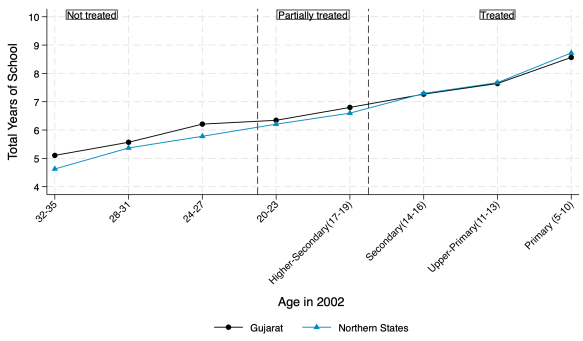
(c) Event Study - Total Years of School



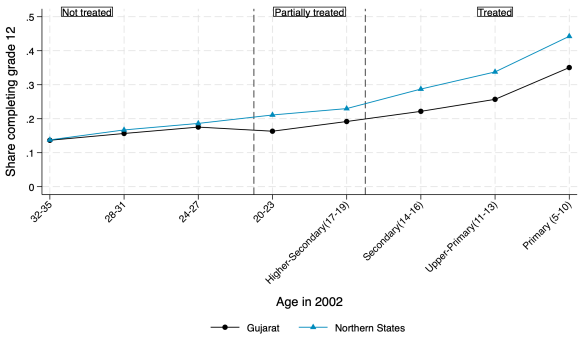
(d) Event Study - Grade 12 Completion

Note: This figure presents raw mean comparisons and event-study estimates for the two primary educational outcomes - Total Years of Schooling and Grade 12 Completion, using data from the National Family Health Survey (NFHS-5). The control group includes all states other than the neighboring states of Gujarat. Panels (a) and (b) plot raw mean educational outcomes by age-at-exposure cohorts for Gujarat and the rest of India, while Panels (c) and (d) report event-study coefficient estimates.

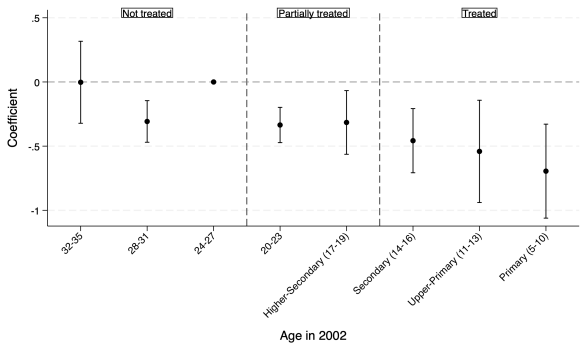
Figure A9: Robustness Check: Alternate Control Group - Only Northern States



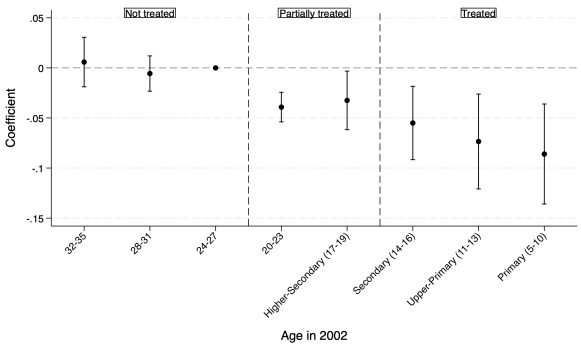
(a) Raw Means - Total Years of School



(b) Raw Means - Grade 12 Completion



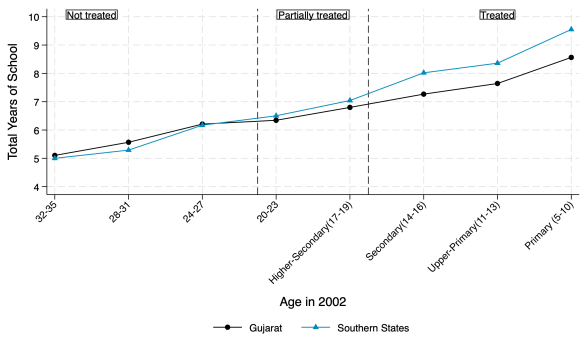
(c) Event Study - Total Years of School



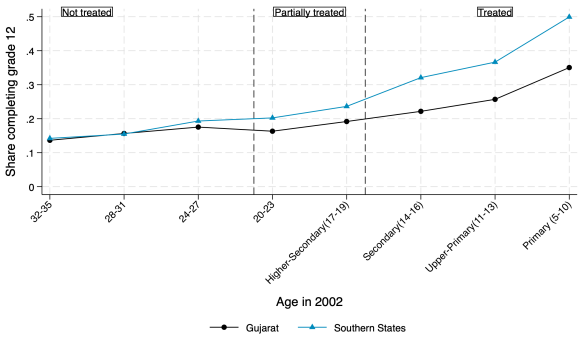
(d) Event Study - Grade 12 Completion

Note: This figure presents raw mean comparisons and event-study estimates for the two primary educational outcomes - Total Years of Schooling and Grade 12 Completion, using data from the National Family Health Survey (NFHS-5). The control group includes only the Northern States of India, excluding the neighboring states. Panels (a) and (b) plot raw mean educational outcomes by age-at-exposure cohorts for Gujarat and the rest of India, while Panels (c) and (d) report event-study coefficient estimates.

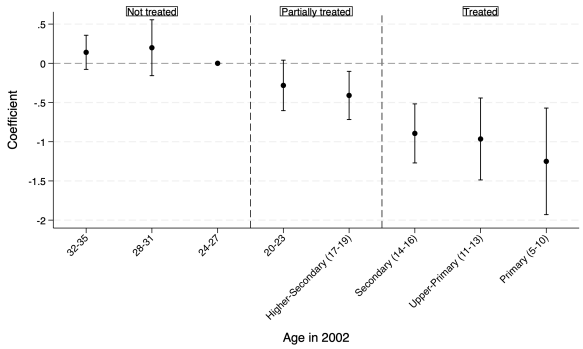
Figure A10: Robustness Check: Alternate Control Group - Only Southern States



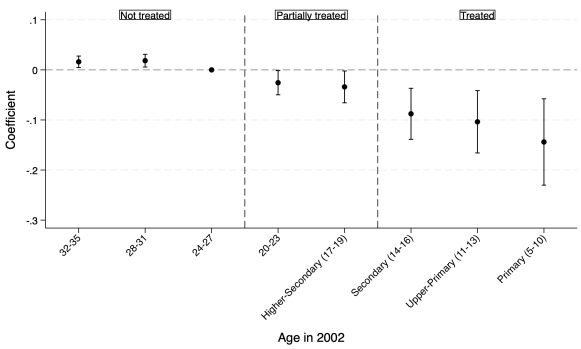
(a) Raw Means - Total Years of School



(b) Raw Means - Grade 12 Completion



(c) Event Study - Total Years of School



(d) Event Study - Grade 12 Completion

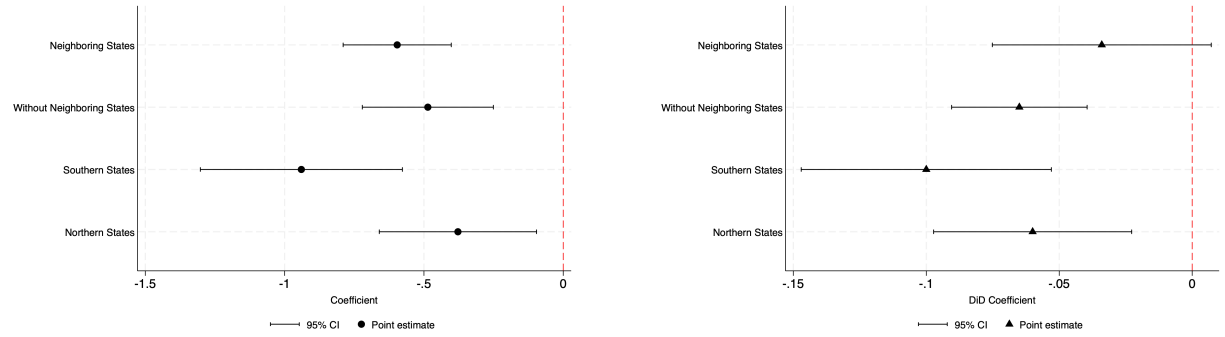
Note: This figure presents raw mean comparisons and event-study estimates for the two primary educational outcomes - Total Years of Schooling and Grade 12 Completion, using data from the National Family Health Survey (NFHS-5). The control group only includes the Southern States of India, exluding the neighboring states of India. Panels (a) and (b) plot raw mean educational outcomes by age-at-exposure cohorts for Gujarat and the rest of India, while Panels (c) and (d) report event-study coefficient estimates.

Table A4: Robustness Check: Alternate Control Groups

	Neighboring States		Without Neighboring States		Southern States		Northern States	
	Total Years of School (1)	Grade 12 Completion (2)	Total Years of School (3)	Grade 12 Completion (4)	Total Years of School (5)	Grade 12 Completion (6)	Total Years of School (7)	Grade 12 Completion (8)
SchoolAge × Violence	-0.596***	-0.034	-0.486***	-0.065***	-0.940***	-0.100***	-0.378**	-0.060***
	(0.099)	(0.021)	(0.120)	(0.013)	(0.185)	(0.024)	(0.144)	(0.019)
Sample Mean	6.70	0.23	6.97	0.26	6.97	0.26	6.97	0.26
Observations	268,739	268,739	983,278	983,278	297,900	297,900	567,675	567,675
R-Squared	0.136	0.06	0.146	0.09	0.18	0.10	0.13	0.09
Controls	No	No	No	No	No	No	No	No

Note: This table reports coefficient estimates from Specification (2) for two outcome variables: Total Years of Schooling and Grade 12 Completion. The columns present estimates using alternative definitions of the control group: neighboring states; non-neighboring states; northern non-neighboring states; and southern non-neighboring states. All specifications include age and state fixed effects. Standard errors are clustered at the state level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.



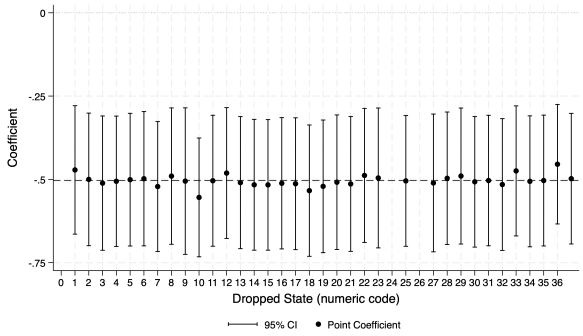
(a) Total Years of School

(b) Grade 12 Completion

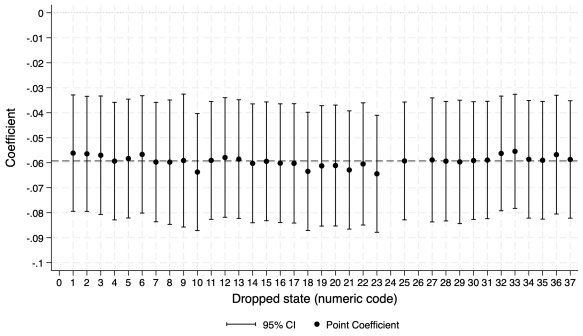
Figure A11: Difference-in-Differences Estimates Using Alternative Control Groups

Note: This figure presents difference-in-differences estimates using alternative definitions of the control group: neighboring states, non-neighboring states, southern states, and northern states. Panel (a) reports estimates for total years of schooling, and Panel (b) reports estimates for Grade 12 completion.

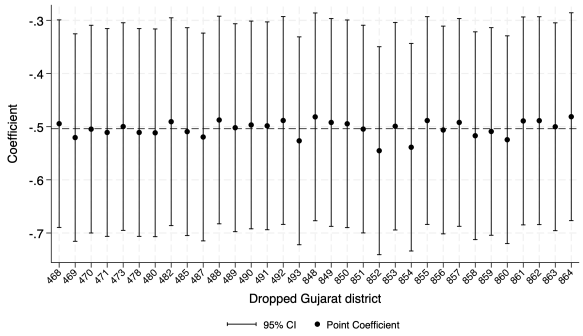
Figure A12: Leave-One-Out Analysis: Dropping States and Districts at a Time



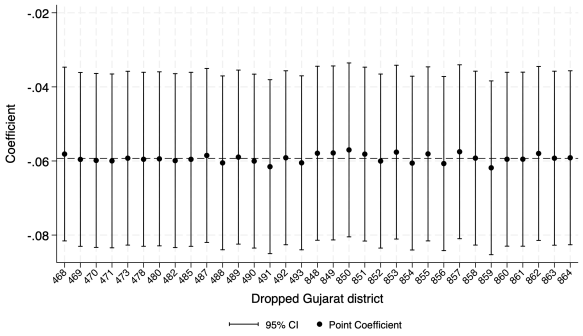
(a) Total Years of School: Dropping One State at a Time



(b) Grade 12 Completion: Dropping One State at a Time



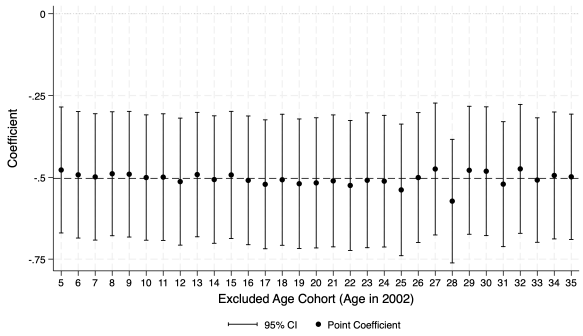
(c) Total Years of School: Dropping One District at a Time



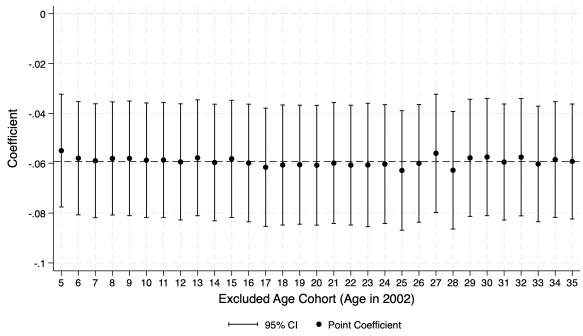
(d) Grade 12 Completion: Dropping One District at a Time

Note: This figure reports estimates from leave-one-out robustness exercises in which the model specified by equation (2) is re-estimated repeatedly. Panels (a) and (b) exclude one state from the sample at a time, while panels (c) and (d) exclude one district from the sample at a time.

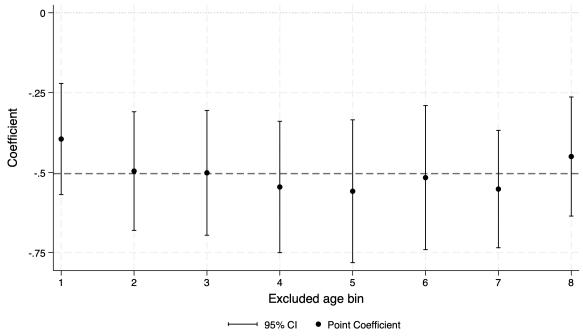
Figure A13: Leave-One-Out Analysis : Dropping Age-Cohort ad Age-Bin at a Time



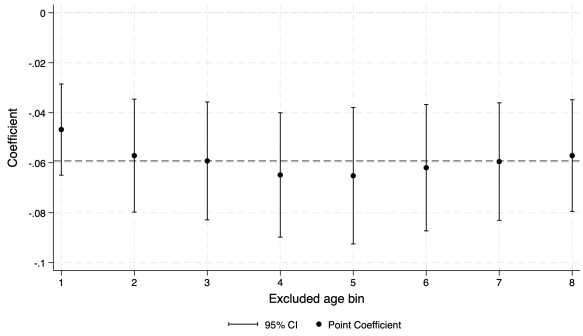
(a) Total Years of School: Dropping One Age Cohort at a Time



(b) Grade 12 Completion: Dropping One Age Cohort at a Time



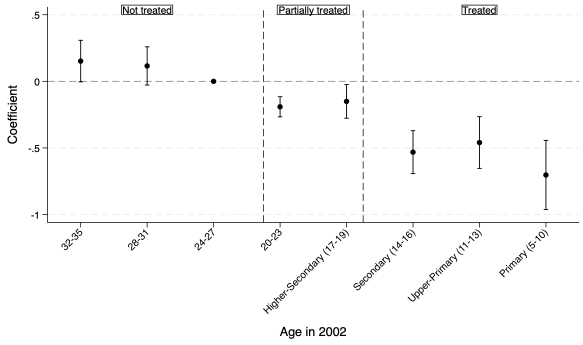
(c) Total Years of School: Dropping One Age Bin at a Time



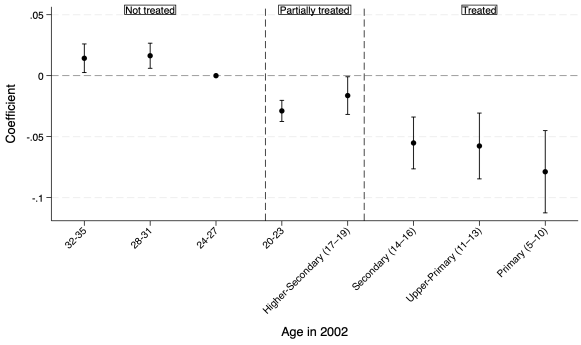
(d) Grade 12 Completion: Dropping One Age Bin at a Time

Note: This figure reports estimates from leave-one-out robustness exercises in which the model is re-estimated repeatedly after excluding one age cohort or one age bin at a time. Panels (a) and (b) present the results from excluding one age cohort in each iteration using the specification in equation (2). Panels (c) and (d) present the results from excluding one age bin in each iteration using the specification in equation (2).

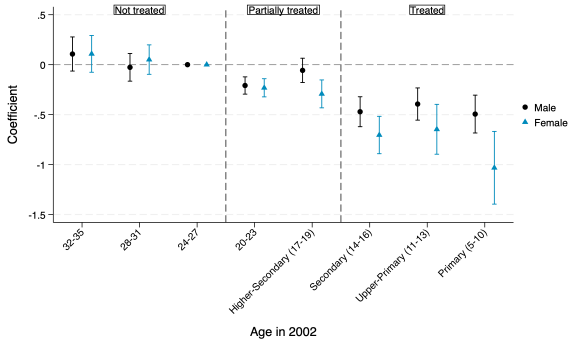
Figure A14: Robustness Check: Dropping Spiked Ages



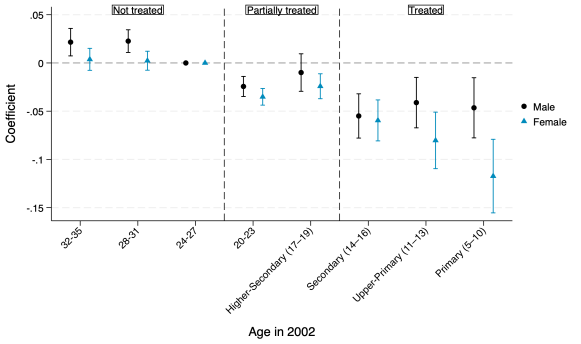
(a) Total Years of Schooling



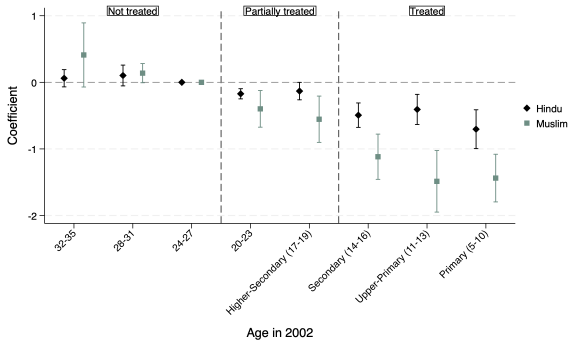
(b) Grade 12 Completion



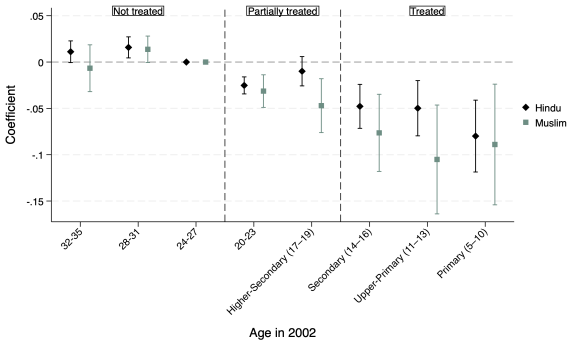
(c) Total Years of Schooling by Gender



(d) Grade 12 Completion by Gender



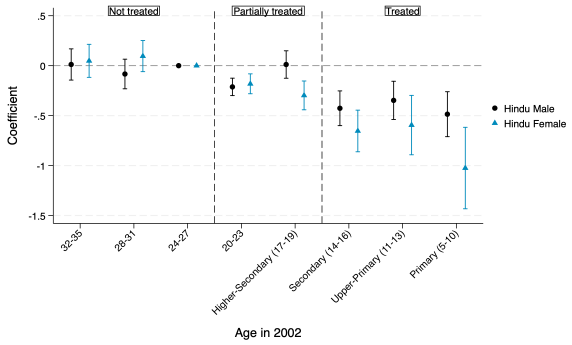
(e) Total Years of Schooling by Religion



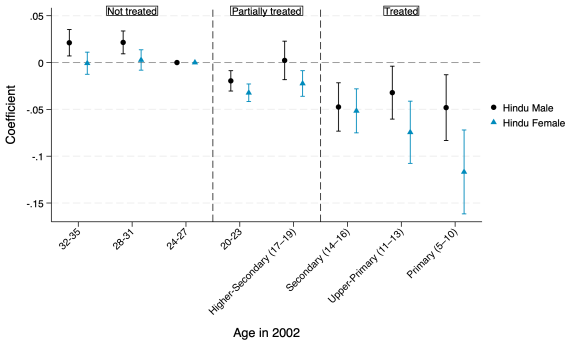
(f) Grade 12 Completion by Religion

Note: This figure presents the outcome variables *Total Years of Schooling* and *Grade 12 Completion* using NFHS-5 data after excluding heaped ages (25, 30, 35, 40, 45, and 50) from the current survey year. This serves as an additional robustness check to ensure that the results are not driven by age heaping.

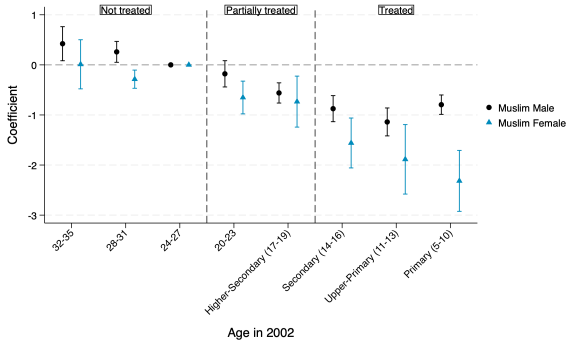
Figure A15: Robustness Check: Dropping Spiked Ages, Gender Differences by Religion



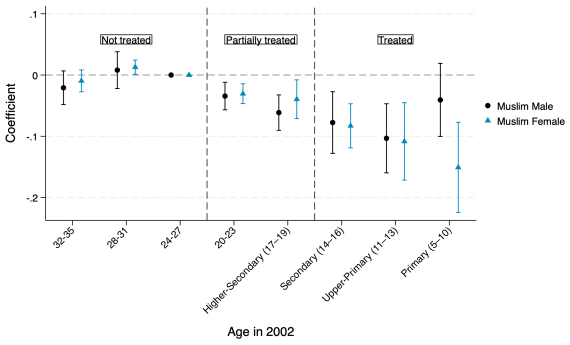
(a) Total Years of Schooling: Hindu Population



(b) Grade 12 Completion: Hindu Population



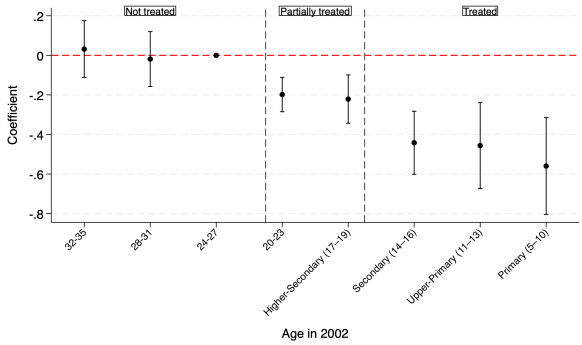
(c) Total Years of Schooling: Muslim Population



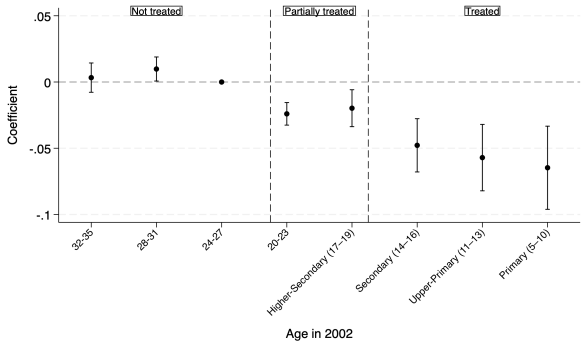
(d) Grade 12 Completion: Muslim Population

Note: This figure presents the outcome variables *Total Years of Schooling* and *Grade 12 Completion* by gender for the Hindu and Muslim populations using NFHS-5 data after excluding heaped ages (25, 30, 35, 40, 45, and 50) from the current survey year. This serves as an additional robustness check to ensure that the results are not driven by age heaping.

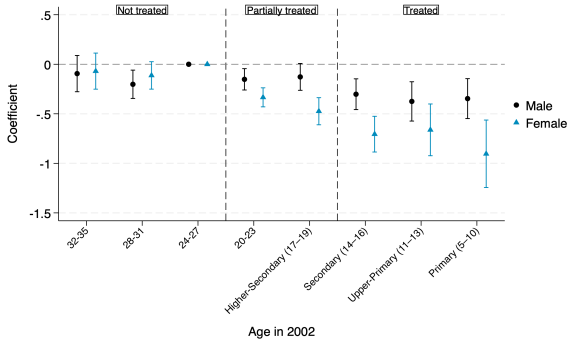
Figure A16: Robustness Check: Adding Additional Controls



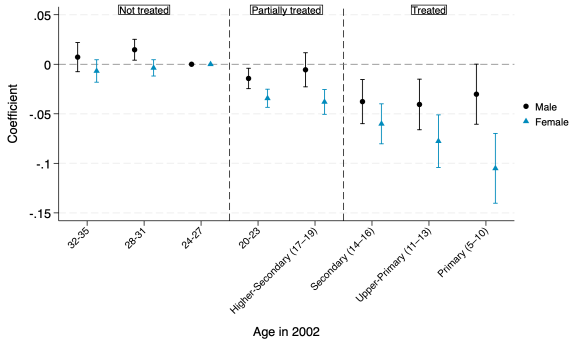
(a) Total Years of Schooling



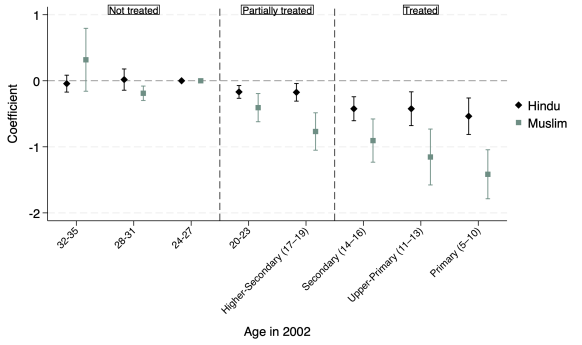
(b) Grade 12 Completion



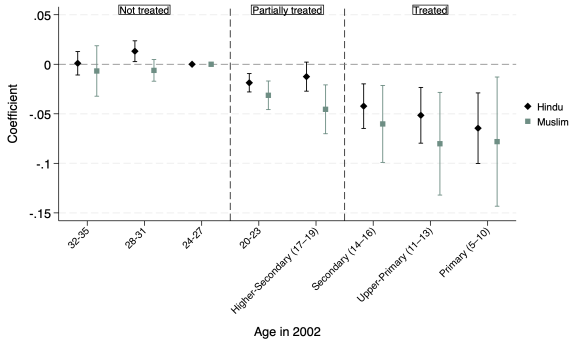
(c) Total Years of Schooling by Gender



(d) Grade 12 Completion by Gender



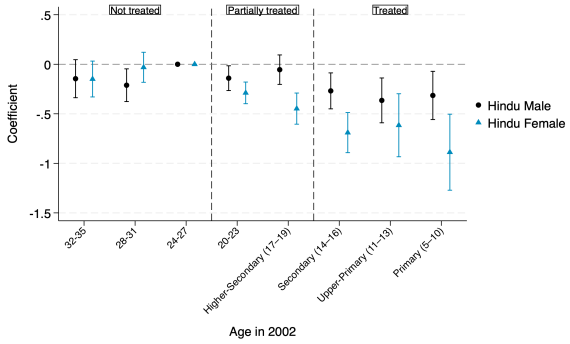
(e) Total Years of Schooling by Religion



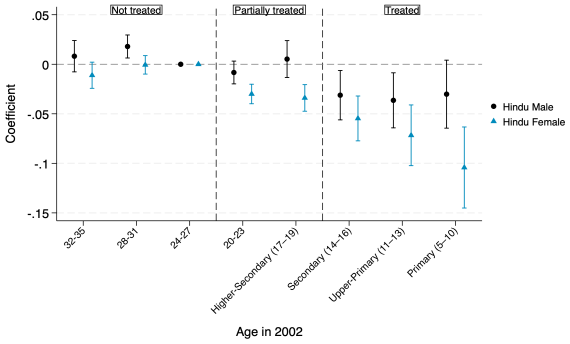
(f) Grade 12 Completion by Religion

Note: This figure presents the outcome variables *Total Years of Schooling* and *Grade 12 Completion* using NFHS-5 data after controlling for wealth index, place of residence (urban/rural), and household size.

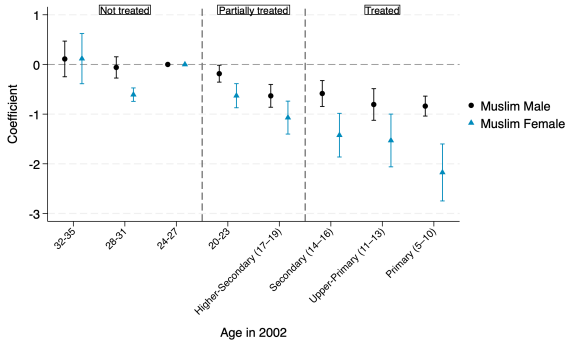
Figure A17: Robustness Check: Adding Additional Controls, Gender Differences by Religion



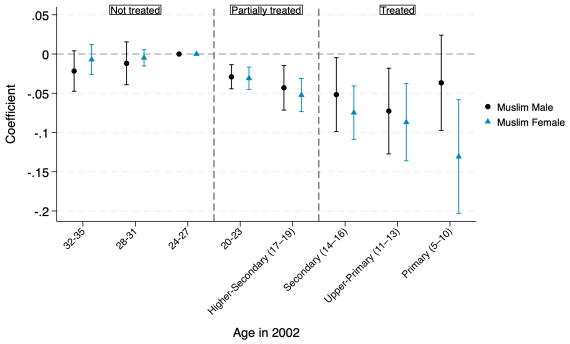
(a) Total Years of Schooling: Hindu Population



(b) Grade 12 Completion: Hindu Population



(c) Total Years of Schooling: Muslim Population



(d) Grade 12 Completion: Muslim Population

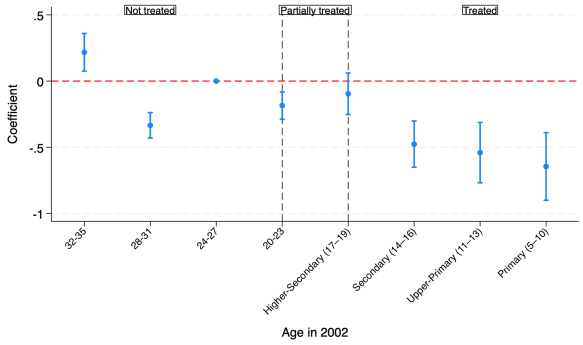
Note: This figure presents the outcome variables *Total Years of Schooling* and *Grade 12 Completion* by gender for the Hindu and Muslim populations using NFHS-5 data after controlling for wealth index, place of residence (urban/rural), and household size.

Table A5: Summary Statistics (NFHS 4 vs NFHS 5)

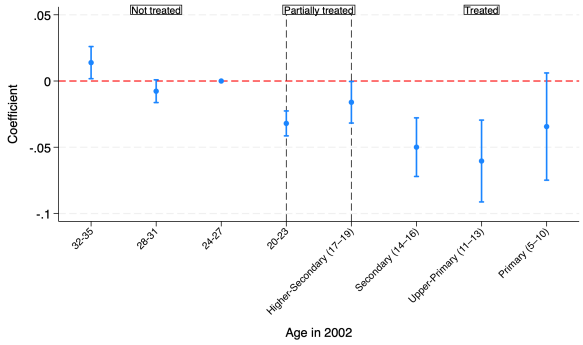
Characteristic	**NFHS-4 Gujarat**	**NFHS-5 Gujarat**	**NFHS-4 RoI**	**NFHS-5 RoI**
Total Sample size	44,056	58,989	1,231,997	1,134,707
School-Age (5-23)	30,317	40,278	863,011	787,747
Older Cohort (24-35)	13,739	18,711	368,986	346,960
Mean Current Age	32.34	35.64	31.56	36.14
% Urban	35.16%	30.18%	27.80%	23.87%
% Muslim	8.20%	10.32%	16.10%	14.72%
% Female	49.25%	49.55%	49.74%	50.45%
Mean household size	5.8	5.53	5.74	5.30
Mean wealth index	3.5	3.24	3	2.95
Mean Years of Schooling	7.12	6.92	7.07	6.98
Mean Grade 12 Completion Rate	0.29	0.27	0.34	0.35

Note: This table reports summary statistics from NFHS-4 (2015–16) and NFHS-5 (2019–21) for Gujarat and the rest of India (RoI). The school-age cohort includes individuals aged 5–23 in 2002, while the older cohort includes individuals aged 24–35 in 2002. All variables are measured at the time of the survey.

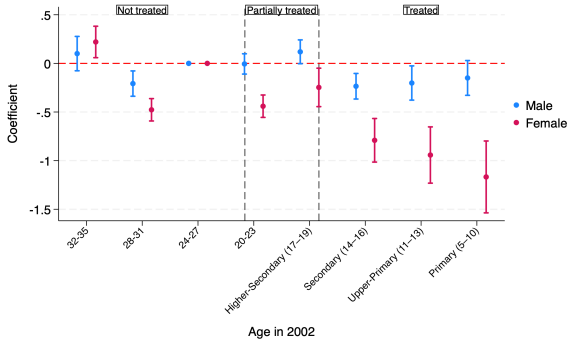
Figure A18: Event-Study Estimates Using NFHS-4 Data



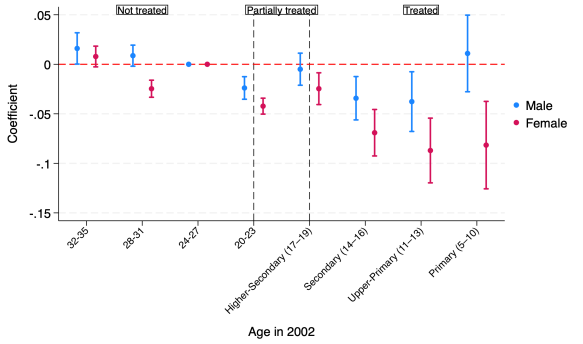
(a) Total Years of Schooling



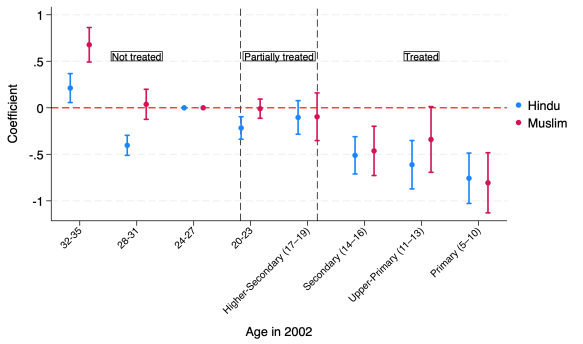
(b) Grade 12 Completion



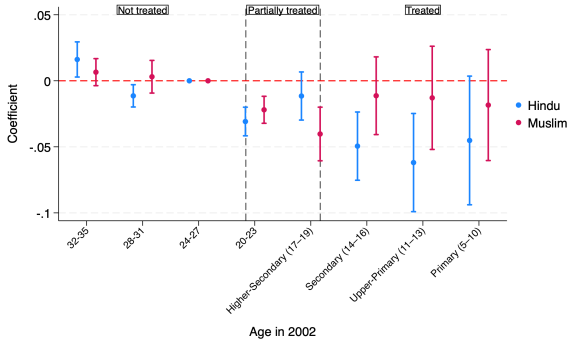
(c) Total Years of Schooling by Gender



(d) Grade 12 Completion by Gender



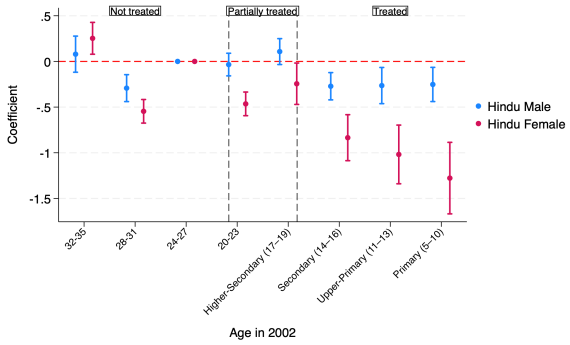
(e) Total Years of Schooling by Religion



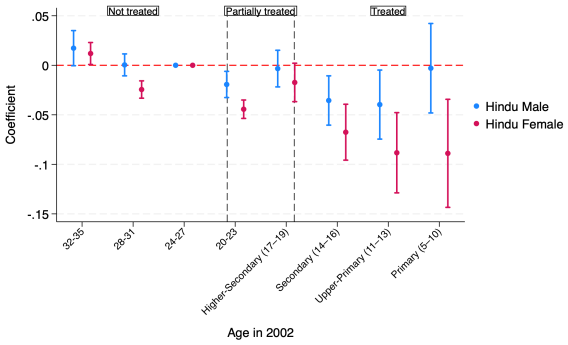
(f) Grade 12 Completion by Religion

Note: This figure presents event-study estimates for the outcome variables *Total Years of Schooling* and *Grade 12 Completion* using NFHS-4 data. Estimates are obtained using Equation (1). Standard errors are clustered at the state level.

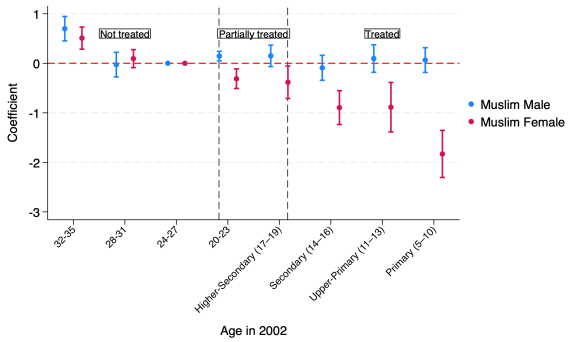
Figure A19: Event-Study Estimates Using NFHS-4 Data: Gender Differences by Religion



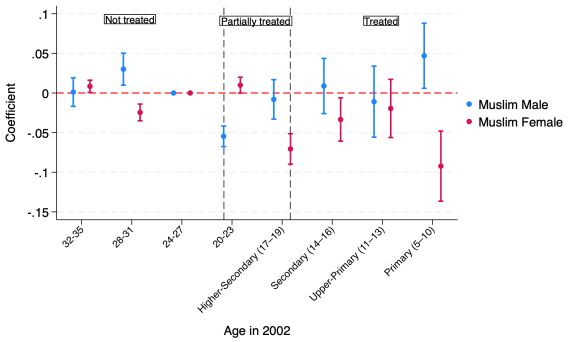
(a) Total Years of Schooling: Hindu Population



(b) Grade 12 Completion: Hindu Population



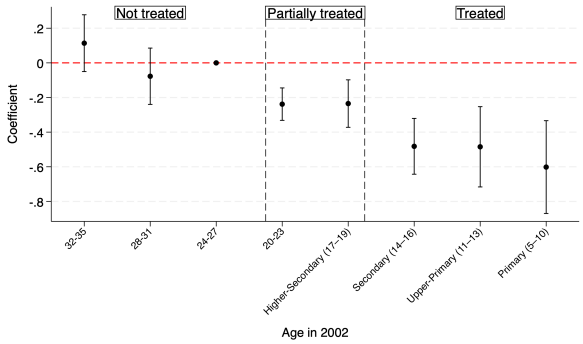
(c) Total Years of Schooling: Muslim Population



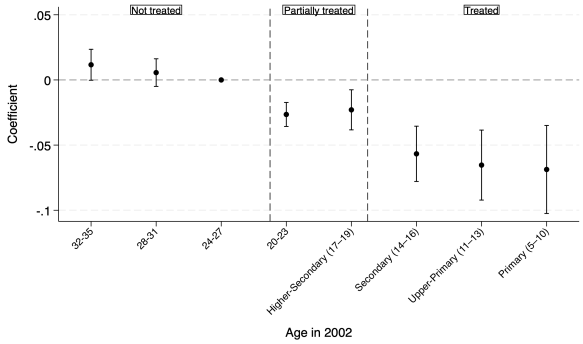
(d) Grade 12 Completion: Muslim Population

Note: This figure presents event-study estimates for *Total Years of Schooling* and *Grade 12 Completion* by gender for the Hindu and Muslim populations using NFHS-4 data. Estimates are obtained using Equation (1). Standard errors are clustered at the state level.

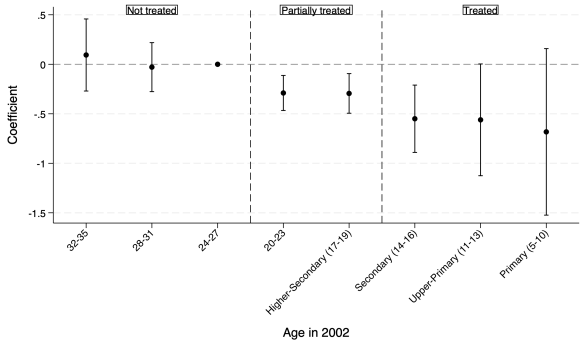
Figure A20: Robustness Check: Excluding Earthquake-Affected Districts



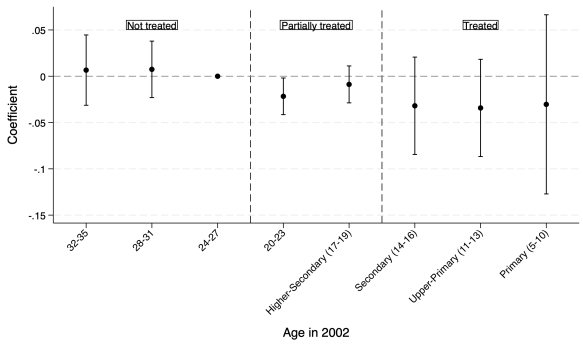
(a) Total Years of Schooling: Control Includes Rest of India



(b) Grade 12 Completion: Control Includes Rest of India



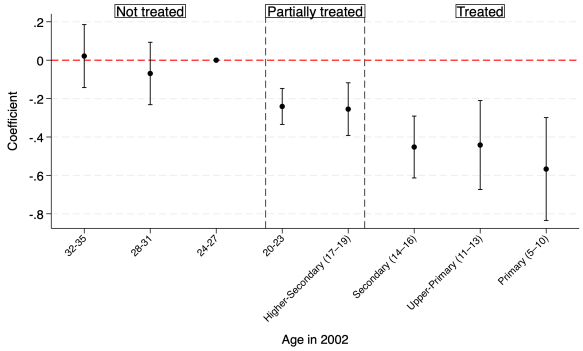
(c) Total Years of Schooling: Control Includes Neighboring States



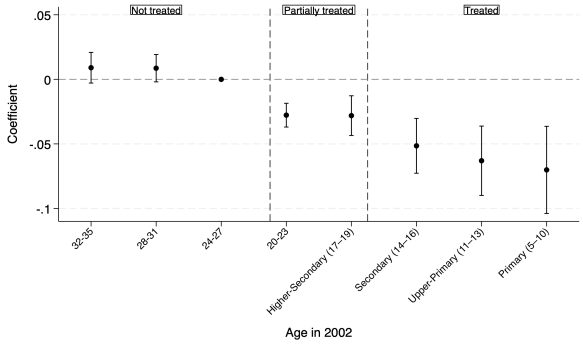
(d) Grade 12 Completion: Control Includes Neighboring States

Note: This figure presents event-study estimates after excluding earthquake-affected districts from Gujarat. Panels (a) and (b) use the rest of India as the control group, while panels (c) and (d) restrict the control group to neighboring states. Estimates are based on Equation (1). Standard errors are clustered at the state level.

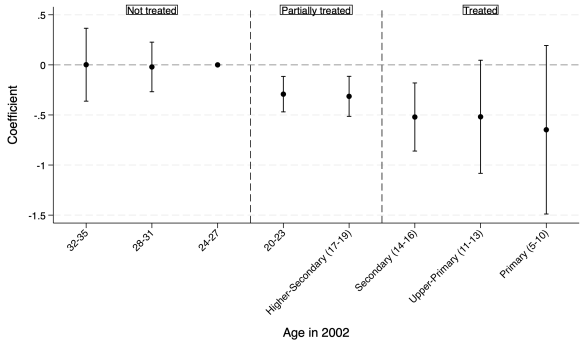
Figure A21: Robustness Check: Excluding Flood-Affected Districts



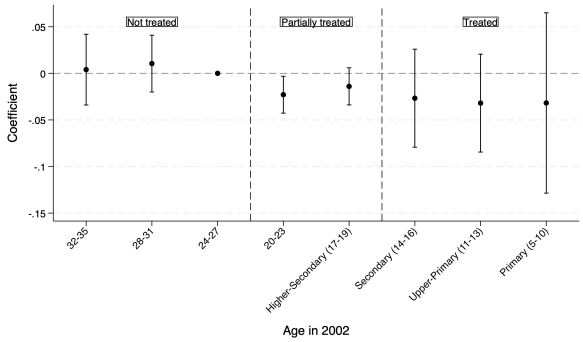
(a) Total Years of Schooling: Control Includes Rest of India



(b) Grade 12 Completion: Control Includes Rest of India



(c) Total Years of Schooling: Control Includes Neighboring States



(d) Grade 12 Completion: Control Includes Neighboring States

Note: This figure presents event-study estimates after excluding flood-affected districts from Gujarat. Panels (a) and (b) use the rest of India as the control group, while panels (c) and (d) restrict the control group to neighboring states. Estimates are based on Equation (1). Standard errors are clustered at the state level.

Table A6: Summary Statistics (NFHS-2 vs. NFHS-3)

	NFHS-2 (Pre-2002)		NFHS-3 (Post-2002)	
Characteristic	**Gujarat**	**RoI**	**Gujarat**	**RoI**
Total Sample Size	20,537	496,842	15,729	518,432
School-Age Individuals	5,332	137,225	4,489	159,414
Mean Age	19.17	25.43	26.92	26.84
Urban (%)	41.53	30.88	40.87	44.33
Muslim (%)	8.68	14.85	10.24	16.86
Female (%)	48.94	49.12	48.35	49.62
Mean Household Size	6.47	7.12	5.94	6.20
Mean Years of Schooling	4.40	4.08	4.75	4.94
Mean Grade 12 Completion Rate	0.09	0.08	0.09	0.12
Fraction of School-Age Children Enrolled	0.68	0.74	0.68	0.69

Note: This table reports summary statistics from NFHS-2 (1998–99) and NFHS-3 (2005–06) for Gujarat and the rest of India (RoI). The school-age sample consists of individuals aged 5–23 years at the time of each survey.

Table A7: Grade Completion Outcomes (DiD: NFHS-2 vs NFHS-3)

Stratification	Grade 8 Completion	Grade 12 Completion
Male	-0.02	-0.071***
	(0.013)	(0.01)
Observations	43,288	60,968
Sample Mean	0.53	0.24
Female	-0.03*	-0.054***
	(0.016)	(0.009)
Observations	41,823	64,734
Sample Mean	0.48	0.20
Hindu	-0.02	-0.055***
	(0.015)	(0.009)
Observations	61,040	91,802
Sample Mean	0.53	0.23
Muslim	-0.12***	-0.074***
	(0.023)	(0.018)
Observations	12,784	18,184
Sample Mean	0.41	0.14
State FE	Yes	Yes
Survey FE	Yes	Yes

Note: Standard errors clustered at the state level are reported in parentheses. Coefficients report the difference-in-differences estimate from Equation (4) using data from NFHS 2 & NFHS 3. Grade 8 completion is defined for individuals aged 14–17, and Grade 12 completion for individuals aged 18–23.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A8: Grade Delay Outcomes (DiD: NFHS-2 vs NFHS-3)

Stratification	Grade 8 Delay	Grade 12 Delay
Male	0.04***	0.086***
	(0.01)	(0.01)
Observations	92,877	47,123
Sample Mean	0.36	0.73
Female	0.05***	0.054***
	(0.014)	(0.01)
Observations	96,187	51,181
Sample Mean	0.48	0.78
Hindu	0.031***	0.063***
	(0.012)	(0.01)
Observations	137,282	71,916
Sample Mean	0.42	0.74
Muslim	0.139***	0.077***
	(0.014)	(0.018)
Observations	27,710	14,017
Sample Mean	0.53	0.84
State FE	Yes	Yes
Survey FE	Yes	Yes

Note: Standard errors clustered at the state level are reported in parentheses. Coefficients report the difference-in-differences estimate from Equation (4) using data from NFHS 2 & NFHS 3. Grade 8 delay is defined for individuals aged 15 or older who have not completed Grade 8, and Grade 12 delay for individuals aged 19 or older who have not completed Grade 12. The sample is restricted to individuals aged 23 or younger.

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A9: Educational Completion by Household Composition

Stratification	Grade 8 Completion	Grade 12 Completion
Mixed-Gender Households		
Boys	-0.019	-0.048***
	(0.013)	(0.009)
Observations	31,849	42,879
Sample Mean	0.51	0.21
Girls	-0.021	-0.044***
	(0.017)	(0.010)
Observations	34,317	44,194
Sample Mean	0.47	0.18
Single-Gender Households		
Boys Only Households	-0.018	-0.105***
	(0.015)	(0.013)
Observations	11,439	18,089
Sample Mean	0.57	0.31
Girls Only Households	-0.145***	-0.077***
	(0.017)	(0.011)
Observations	7,506	20,540
Sample Mean	0.55	0.21
State FE	Yes	Yes
Survey FE	Yes	Yes

Note: Standard errors clustered at the state level are reported in parentheses. Coefficients report the difference-in-differences estimate from Equation (4) using data from NFHS 2 & NFHS 3. Mixed-gender households contain at least one boy and one girl aged 5–23, and single-gender households contain children of only one gender in the same age range. Grade 8 completion is defined for individuals aged 14–17, and Grade 12 completion for individuals aged 18–23. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.