Male Sterilization and Persistence of Violence: Evidence from Emergency in India

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Abstract

Can forced sterilization programs targeting men lead to male-perpetrated violence? This paper investigates the impact of a government-mandated male sterilization program introduced in India on the rise of violence. Launched in April 1976, the program predominantly targeted men and saw heterogeneous implementation across India over 10 months. Using various household surveys and newly digitized historical data sources, we study whether the program triggered unintended effects on violence, measured by crime rates. Using a difference-in-differences strategy by exploiting geographical variation in coercion intensity, we find that an increase in exposure to the program led to an increase in violent crime rates of 7% on average, which persisted over time. Violent crimes against women primarily drive the increase in crime rates, as rapes are increasing by 22% on average. We find that the program was ineffective in reducing fertility, so we hypothesize that a forced sterilization program targeting men may increase violence against women through one main channel: the procedure inducing trauma, impacting perceptions of masculinity. In line with this channel, we see that districts with high coercion intensity correlate with more harmful gender norms: higher levels and acceptance of Intimate Partner Violence, lower bargaining power of women and lower contraception adoption.

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1 Introduction

> "Nobody has any quarrel with the economic policies of the Prime Minister, but the way in which they are being implemented, I'm sure, will lead to an explosion."
>
> qtd. in *India After Gandhi: The History of the World's Largest Democracy*, Guha (2007) (514), on the 1976-77 sterilization program during the *Emergency*.

Since the beginning of the 19th century, many countries have implemented Malthusian policies (Malthus, 1798), which aim to curve fertility rates to avoid potential issues due to overpopulation and limited resources. However, some programs have faced allegations of enforcing coercive measures such as involuntary sterilizations, forced abortions, and other practices which infringe upon individual autonomy and reproductive rights. Notable examples of such programs include China's "One-Child Policy" and India's 1977 Family Planning Program (Liu and Han, 2023; Gupte, 2017a). Furthermore, critiques and ethical concerns surrounding population control initiatives have intensified, particularly in light of human rights violations stemming from the use of violence or instances of cultural insensitivity (León-Ciliotta et al., 2022; Alsan and Wanamaker, 2018; Patel, 2017; Kendall and Albert, 2015; Pegoraro, 2015).

Extensive literature exists on the negative influence of forced program implementation and coercion on trust, health, and economic consequences (Lowes and Montero, 2021; Nunn, 2008), as well as how it leads to backlashes against the intended goals of such programs (Fouka, 2019; Wheaton, 2020). However, one natural but unexplored channel is that forced programs could create a feeling of general discontent against the state, and then lead to built-up anger and trigger unintended effects on violence in the public and interpersonal spheres. Violence has major economic and social consequences, surprisingly not documented in the implication of the implementation of forced programs.

In this paper, we examine how a forced male sterilization program in India from April 1976 to February 1977 influenced violence. The program used coercive methods -and sometimes resorted to violence- to implement a policy which aimed to reduce fertility during *Emergency India*, a state of emergency declared by the government to fight poverty. The program resulted in sterilizing 8.1 million people comprising 6.2 million men, as compared to 1.5 million in the previous year, one of the largest compulsory sterilization programs in history. Forced fertility policies may influence violence through several mechanisms, including the potential for reduced fertility leading to changes in gender roles and ratios, the possibility of trauma induced by the procedure, and the impact on perceptions of masculinity that may trigger resorting to violence. We aim to fill the gap in the link

between forced programs and violence by addressing the following question: Could coercive male sterilizations lead to a rise in male-perpetrated violence?

We create a novel dataset by digitizing district-level government and administrative documents on sterilizations and crime rates, from 1972 to 2013. We measure the degree of districts' implementation of coercive methods with the growth rate of sterilizations conducted between 1975-76 and 1976-77, which approximates the surplus sterilizations performed during that period, meaning that a high increase in sterilizations during 1976-77 indicates coercion (Pelras and Renk, 2023). We use static and dynamic difference-in-differences strategies with geographical variation in coercion intensity to investigate the impact of exposure to the program on crime rates.

We find that exposure to coerced sterilization increases violent crime rates by 7% on average, which persists over many years. This effect is primarily driven by rapes, which increase up to 124% in the most exposed district, with an average increase of 22%. We document that rapes are likely committed by younger cohorts rather than the ones directly targeted by the program of forced vasectomies and that the effect remained significant in highly exposed districts until 2013, the end of our study, pointing to the possibility of cultural transmission of violence against women.

We also find a small effect on murders, which increase by 4% on average. Additionally, we observe a reduction in the female population in the more heavily impacted districts, hinting at potential gender-based violence targeting women.

Our dynamic difference-in-differences setting documents that the parallel trends assumption holds, indicating that the results are causal. To test the robustness of the results, we use an alternative treatment variable that incorporates past sterilization achievements, the growth rate between the mean of yearly sterilization rates between 1970 and 1976 and the sterilization rate in 1976-77. The causal link between the sterilization program and the increase in violent crimes remains robust.

Finally, we explore plausible mechanisms through which a forced sterilization program targeting men may influence violence towards women. First, reduced fertility could lead to changes in gender roles and ratios and predict an increase in domestic violence (Aizer, 2010; Anukriti, 2014). However, using a representative household survey, we demonstrate that heightened coercion intensity slightly increased birth rates, predominantly among families lacking a son born before 1976, indicating that the program did not reach its intended goal of reducing fertility. Then, the procedure could have induced trauma, and impacted perceptions of masculinity, triggering violence (Bosson et al., 2009). In line with this channel, we use the 1999 Demographic and Health Survey to study whether high coercion intensity districts are correlating with more harmful gender norms for women. We indeed find that coercion intensity correlates with higher levels and acceptance of Intimate Partner Violence, lower bargaining power of women, and lower contraception adoption,

suggesting more harmful attitudes against women.

The contribution of this paper is threefold. First, we add to the literature on the backlash of forced interventions and their long-lasting effects (Nunn, 2008; Lowes and Montero, 2021; Alsan and Wanamaker, 2018; Liu and Han, 2023; Fouka, 2019; Wheaton, 2020; De la Rupelle and Zhang, 2023). Extensive research in this literature consistently demonstrates that interventions characterized by coercion or violence, are often associated with detrimental effects on health, education, and wealth outcomes. In terms of wealth outcomes, forced interventions have been found to perpetuate cycles of poverty, hindering economic progress within targeted populations. Closer to our setting, León-Ciliotta et al. (2022) study the long-run effects of a coercive family planning program in Peru that sterilized 300,000 women, highlighting the negative impact of the usage of contraceptives on children's health. Our paper is the first to study that forced programs can lead to an increase in interpersonal violence and to find a positive impact of forced sterilizations targeting men on violence against women.

Second, this paper also contributes to the literature on cultural norms, identity and violence. Previous studies have shown that men's behaviour can be heavily influenced by norms surrounding masculinity (Akerlof and Kranton, 2000) and that men may be more likely to engage in violent or aggressive behaviour to defend their honour or assert their masculinity. For example, Cao et al. (2021) study the impact of honour norms on crime and show that areas with a stronger culture of honour have higher rates of violent crime, especially among men. Baranov et al. (2023) study how the shortage of women during Australia's colonial past led to the emergence of a hyper-masculine identity among men, which resulted in higher crime rates and poorer mental health for men and boys. Forced sterilization could also have negative consequences on masculinity norms and thus negatively impact well-being. Our study contributes to this literature by examining the impact of a possible shock on men's sense of virility (Scott, 2014) on violent behaviour, using the historical context of the forced vasectomies policy in India. We find that forced intervention on men's bodies or fertility abilities is associated with a rise in violence against women.

Finally, we also add to the literature on the impact of sterilization on well-being (Rao, 1997; De la Rupelle and Dumas, 2020; Anukriti, 2014; Byker and Gutierrez, 2021), that have demonstrated worse health outcomes for women and increased incidents of domestic violence stemming from female sterilization. Regarding *Emergency India*, Sur (2023) and Pelras and Renk (2023), find it led to higher mistrust in medicine and institutions, lower demand for public healthcare, and worse child health outcomes. We contribute to this literature by showing that the implementation of a coerced male sterilization program was ineffective in achieving its intended goal of reducing fertility but moreover created a violent backlash against women from men not targeted by the program, remaining relevant for more than 35 years after the implementation of the program.

This paper is organized as follows. Section 2 gives the historical background of the Emergency period. Section 3, presents the datasets used for this paper. Section 4 states our empirical strategies. Section 5 shows the results. Section 6 shows robustness tests. In section 7, we explore potential mechanisms that would drive the results. Section 8 concludes.

2 Emergency and Forced Sterilizations: Historical Background

2.1 Policy Objectives During the Emergency Period

During the late 1960s and early 1970s, India underwent a period characterized by economic and political turmoil. Following the Green Revolution, food production declined. The international oil crisis of 1973 had amplified the cost of imported oil, leading to a sharp decline in export revenues and a record-high inflation rate (Jaffrelot and Anil, 2021). Moreover, in June 1975, the conviction of Indira Gandhi, the Prime Minister of India and leader of the Indian National Congress, by the Allahabad High Court for electoral malpractices during the 1971 national election put her Prime Ministerial position in jeopardy.[1] In response, she declared a National Emergency on June 25th, ostensibly to stabilize internal disorder (Gwatkin, 1979; Jaffrelot and Anil, 2021).

In June 1975, the government initiated incentivized sterilization, offering radios or payment as incentives; however, the program faced participation rates that were deemed insufficient to meet their intended targets. In February 1976, the government introduced a comprehensive five-point program encompassing family planning, tree planting, a ban on dowry, an adult education program known as "each-one-teach-one," and the abolition of social caste distinctions.[2] Emphasizing the critical necessity of population control, the government argued that family planning was consistent with all religious beliefs, and therefore, no individual should be exempted from sterilization on religious grounds (Mehta, 2012). These assertions were notably supported by Western nations, with the World Bank providing 66 million US dollars in humanitarian aid to India between 1972 and 1980 to support the implementation of sterilization programs (Gupte, 2017b). Consequently, compulsory sterilization became integrated into a broader poverty reduction initiative.

[1] Frequent strikes within the Indian National Congress due to diverging viewpoints resulted in its split in 1969. Indira Gandhi won the 1971 central elections with the radical slogan "garibi hatao" (eradicate poverty).

[2] Among these, the family planning program stood out as the most significant point and was the primary focus of implementation within the five-point program.

2.2 Practical Implementation Methods

Prior to the Emergency, states had the authority to decide on family planning, and although the prospect of implementing compulsory sterilization was considered in certain states, no definitive actions were taken. However, with the imposition of the Emergency, Indira Gandhi introduced Constitutional amendments, centralizing the authority for formulating family planning programs within the central government. Subsequently, the National Population Policy was drafted in 1976, prompting the central government to rally state political leadership and local administration to establish sterilization targets and camps. These targets were computed based on past sterilization accomplishments, with each state being assigned quotas to be fulfilled by any means necessary. [3]

The central government advocated for state-level incentives and disincentives for family planning, and it decided to allocate aid to states based on their family planning performance. Additionally, it authorized and endorsed coercive measures for sterilization. State governments had the authority to withhold employee promotions and payments, including those of school teachers, until they either underwent sterilization themselves or met their assigned quotas. This was enforced through the threat of employment termination to ensure compliance. Furthermore, the government mandated the presentation of sterilization certificates for access to basic amenities such as housing, irrigation, ration cards, and public healthcare facilities. Households with two or three children were notably pressured into sterilization through a combination of monetary incentives and disincentives (Tarlo, 2003; Schlesinger, 1977; Jaffrelot and Anil, 2021). This aggressive family planning program resulted in 8.3 million sterilizations in 1976–77, the majority of which (6.2 million) were vasectomies, a substantial increase compared to the 1.5 million vasectomies performed in 1975-76. Approximately 2,000 men lost their lives due to botched procedures. Figure 1 illustrates the district-level spatial distribution of sterilizations conducted during 1976-77.

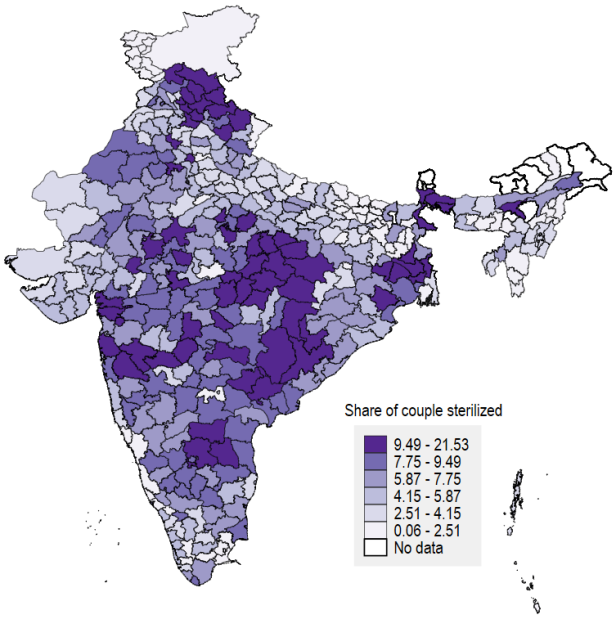
The procedure entailed the surgical interruption of the vas deferens, the conduits for sperm. This involved a minor incision in the scrotum, where the vas deferens were either cut or obstructed. At the time, vasectomies were considered a definitive sterilization method as reverse procedures were not performed.

While some district and state leaders were aligned with Indira Gandhi's objectives, others may have complied out of fear, given the prevalent practice of imprisoning political opponents without trial at the time. Additionally, Sanjay Gandhi planned to visit various districts and states, exerting pressure on local governments to employ coercive methods to demonstrate quota fulfilment (Jaffrelot and Anil, 2021). The specific channels guiding districts in opting for coercive methods lack clear

[3] District officers and police commissioners were commended with gold medals for their dedicated efforts in achieving these set targets (Gupte, 2017b).

identification. Section 5 studies potential channels for the implementation of coercive methods.

Figure 1: Spatial distribution of sterilization intensity in 1976-77



Notes: This map shows the district-level geographical variation of the share of sterilized couples in 1976-77, the year of implementation of the forced sterilization program. Darker shades indicate that more individuals underwent sterilization during the program. Source: Jolly (1986)

2.3 Transition and the Post-Emergency Landscape

In 1977, a series of widespread protests erupted across India, demanding an end to the Emergency and the initiation of new elections. In response, Indira Gandhi, under counsel, opted to terminate the Emergency period and the forced sterilization program, subsequently paving the way for the organization of elections. The public voted her out of power, electing two opposition party politicians from the Janata Party, Morarji Desai (1977-79) and Charan Singh (1979-80), as successive Prime Ministers, who did not re-conduct the sterilization program.

In 1978, the new Government appointed a commission of inquiry, led by Justice Jayantilal Chhotalal Shah, to investigate any illegal practices during the Emergency period. *The Shah Commission Final Report: General Observations* (1990) uncovered numerous illicit practices, particularly concerning coerced vasectomies. The commission documented complaints from unmarried and elderly men who were coerced into undergoing vasectomies, highlighting the pervasive confusion and forced nature of that era.

Despite discontent about the program, Indira Gandhi was reelected for the fourth time as Prime

Minister in 1980. During this last term, she faced escalating opposition from Jarnail Singh Bhindranwale, an orthodox Sikh leader gaining popularity. In 1983, Bhindranwale was accused of plotting terrorist activities against India and amassing weaponry within the Golden Temple, his religious headquarters. In June 1984, after failed negotiations between the National Congress Party and Jarnail Singh Bhindranwale, Indira Gandhi authorized the Indian army to carry out "Operation Blue Star," leading to his removal and subsequent death. A few months later, Indira Gandhi herself was assassinated by two of her Sikh bodyguards, triggering a wave of violent unrest in India, known as the "anti-Sikh riots" (Das and Rohilla, 2020).

3 Data

3.1 Treatment: the growth rate of sterilized married couples between 1975-76 and 1976-77

To construct our treatment variable, we rely primarily on the comprehensive dataset provided by Jolly (1986), which documents the percentage of couples sterilized in all Indian districts spanning from 1970 to 1980. Complementing this dataset, we extend our research to include the data on tubectomies and vasectomies obtained from the Government's State or District statistical abstracts, covering approximately 66% of the total districts.[4] Furthermore, we supplement our analysis with information extracted from the annual yearbooks of the Ministry of Health and Family Welfare spanning the years 1971-72 to 2000-2001[5], providing state-level insights into the prevalence of vasectomies, tubectomies, and the average age of men undergoing vasectomies.

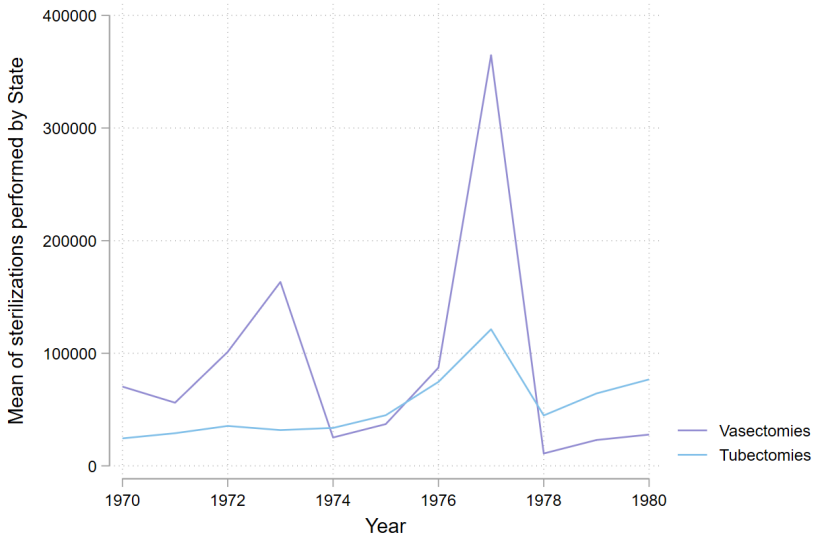
Through analysis of state-level yearbooks, we observe from Figure 2 that vasectomies were the primary form of sterilization during this period. This indicates that the proportion of sterilized married couples can be used as a suitable proxy for understanding the spatial distribution of vasectomy rates in different districts. This enables us to examine the effects of the forced sterilization program across Indian districts. In Figure 3, we display the linear relationship between sterilizations on the left and vasectomies on the right. We sourced this data from the government's state or district statistical abstracts, where the percentage of married couples from Jolly (1986) is multiplied by the district-level population from the Indian Census of 1971. These graphs confirm the reliability of the Jolly (1986) dataset for studying sterilizations in India and its suitability as a proxy

[4]This extensive sterilization dataset was collated through joint efforts with fellow researchers Balasubramanyam Pattath, Charlotte Perlas, and Andréa Renk. The dataset, alongside the one from Jolly (1986) that we digitized specifically for this study, is employed in Pelras and Renk (2023).

[5]Digitized by Andréa Renk for Pelras and Renk (2023)

for vasectomies during the same period.

Figure 2: Average of vasectomies and tubectomies performed in India 1970-80



Notes: Authors' computation using the annual state-level yearbooks of the Ministry of Health and Family Welfare. This graph represents the average of vasectomies and tubectomies performed in India between 1970 and 1980. It shows that most of the forced sterilizations performed in 1976-77 were vasectomies and that there was a considerable increase in the number of vasectomies performed compared to previous years. The peak of vasectomies in 1973 was the result of the introduction of a voluntary vasectomy program.

We acknowledge the substantial pressure imposed by the government and the concerns about data integrity. However, we argue that official data is unlikely to have been compromised due to stringent monitoring protocols and close workplace supervision. Furthermore, historical records do not provide evidence of internal resistance or data manipulation attempts.

For the empirical analysis, we define district-level coercion intensity as:

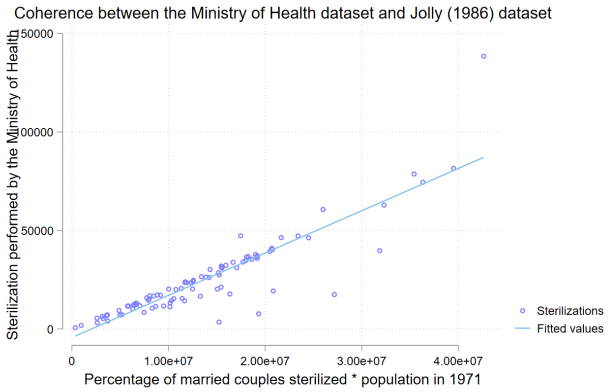
$$CI_d = \frac{Ster_d^{77} - Ster_d^{76}}{Ster_d^{76}}$$

Where Ster_d^{77} and Ster_d^{76} are percentages of sterilized couples in the year 1976-1977 and 1975-1976 respectively.

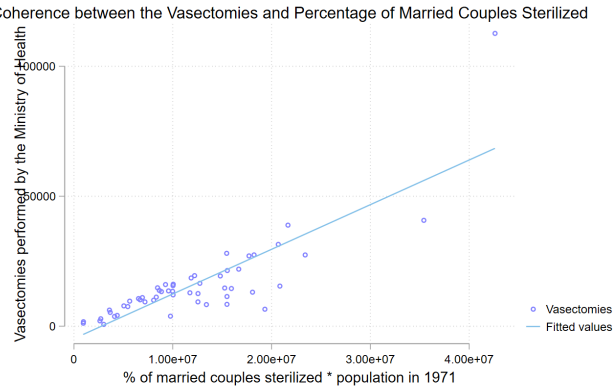
The variable CI_d can be interpreted as the growth rate of the percentage of couples who were sterilized between the years 75-76 and 76-77. It indicates coercion intensity, with higher values

Figure 3: Coherence between the Ministry of Health Dataset and Jolly (1986) 1976-77

(a) Sterilizations performed and percentage of sterilized married couples

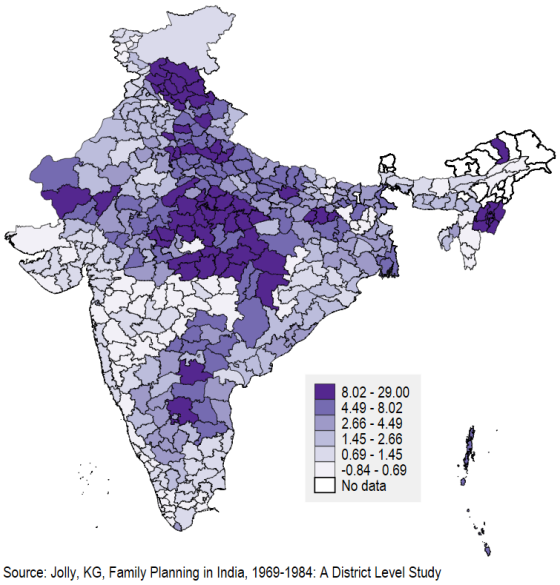


(b) Vasectomies performed and percentage of sterilized married couples



Notes: These graphs show the linear regression between the number of sterilizations and vasectomies performed using the source of the Indian Health Ministry, and Jolly (1986) that we use for our treatment variable, the share of sterilized couples, times the population at the district level in 1976-77. These graphs validate the relevance of the source of data for our treatment variable to study vasectomies.

Figure 4: Coercion Intensity Index: All India



Notes: This map represents the geographical variation of our treatment variable, coercion intensity throughout India. The coercion intensity index is defined as the growth rate of the share of sterilized married couples between 1975-76 and 1976-77. Darker shades indicate a higher use of coercion in the district.

suggesting districts significantly increased sterilization performed because of pressure, likely implying the use of coercive methods to promote vasectomies. Figure 4 shows the spatial distribution

of the coercion intensity index, the measure goes from -0.84% to 26.72%. We discuss several robustness measures in Section 6.

3.2 Main outcome: crime rates at the district-level from 1972 to 2013

We digitized district-level crime data available on the Indian National Bureau of Crimes website, detailing annual reports of crimes reported to or by police forces, all under the Indian Penal Code, from 1972, the first year available, to 2013.

Gender information of perpetrators and victims at the district level is unavailable, but state-level aggregates are computed by gender. These tables reveal that men commit crimes at rates ranging from 4 to 4485 times more than women, with a mean of 90 times higher.

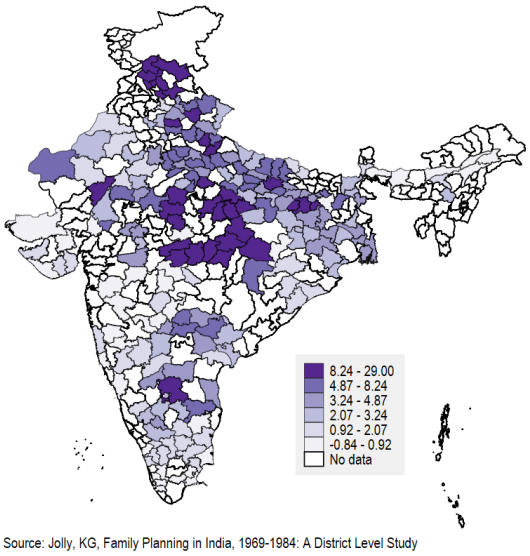
We categorize crimes into different types: violent crimes (murder, rape, and kidnapping), property crimes (robbery, counterfeiting, theft, dacoity[6], burglary, and trust), riots, and cheating crimes and then we run separate regressions for each category. The descriptive statistics of this dataset can be found in Table 1.

We are able to follow 197 districts each year from 1972 to 2013 out of approximately 360 districts in 1972. If one year the district was not present in the official, due to missing reports or forgetfulness, we dropped it from the database, except for the four districts of Delhi which were lacking for one or two years, as the capital is an important place to keep in our analysis. We could match this data to the sterilization dataset, represented in Figure 5. We then have a total of 8267 observations, except for property crimes that were removed from the online-available dataset from 2000 to 2012, which restricts the analysis to 5903 observations.

Although we recognize the potential for under-reporting in crime data, especially for sexual and violent offences, researchers working with Indian police data generally assume a consistent pattern of under-reporting each year (Anderson and Genicot, 2015). Hence, we proceed with the common assumption that analyzing variations in reported crimes reflects actual variations in the occurrence of these crimes.

[6]Equivalent of banditry.

Figure 5: Coercion intensity Index: Crime Dataset



Notes: This map represents the geographical variation of our treatment variable, coercion intensity focusing on the districts present in our analysis of crime rates. The coercion intensity index is defined as the growth rate of the share of sterilized married couples between 1975-76 and 1976-77. Darker shades indicate a higher use of coercion in the district.

	Mean	
Total crimes	2526.83	
Violent crimes	112.78	
Property crimes		846.20
Riots	127.47	
Rapes	32.24	
Cheating	52.90	
Murders	49.00	
Observations	8267	5903

Table 1: Descriptive statistics of crime rates 1972-2013

Notes: This table presents the yearly average numbers of crime rates per 1 million inhabitants in India from 1972 to 2013 for the districts of our analysis, except for property crimes that stop in 2000.

3.3 Additional variables and covariates

We consider that districts with strong state capacity, which have a high ability to implement programs, may have been able to implement more forced vasectomies and may be the ones with more crime rates reporting due to more police forces presence. While our approach does not necessitate random treatment, factoring in state capacity helps us explore links between administrative capabilities and forced vasectomies, enriching our understanding of their connection to crime rates. To do this, we digitized state-level police force data from the National Bureau of Crimes website for 1972-2013. This dataset was not available after 2013, which makes it the last year of our study.

Oldenburg (1992) previously showed a positive correlation between male-female ratios and crimes, particularly murders. As the crime dataset does not provide any information on the specific characteristics of victims, studying the censuses could shed light in some areas. We use the 1971, 1981 and 1991 Indian censuses to compute sex ratios. We also track two age groups, specifically those aged 0-5 and 5-10 years old in 1971, as they would correspond to the 20-25 and 25-30 age groups in 1991. Due to our census data limitation which categorizes individuals as 35 and older, we were unable to follow older cohorts.

4 Empirical Strategy

4.1 Main specification

To understand the effect of the 1976-77 forced sterilization campaign on crime rates, we use spatial differences in coercion intensity and time variation. Our dataset spans 1972 to 2013, offering insights into long-term crime trends. We employ a two-way fixed effects approach.

We use a difference-in-differences analysis:

$$Y_{d,t} = \theta_t + \eta_d + \beta * CI_d * Post_t + X_{s,t} + v_{d,t} \tag{1}$$

$Y_{d,t}$ is the crime rate per 1 million inhabitants, of violent and property crimes, murders, riots, cheating and rapes, in district d at time t. θ_t and η_d are time and district-fixed effects. CI_d is the Coercion Intensity Index at the district level. $Post_t$ takes 1 after 1976, as the shock of forced vasectomies lasted 6 months starting April 1976. Finally, $X_{s,t}$ are state-level controls, including only the number of total police forces. Time and district fixed effects help us control for individual and time-specific variations, enabling us to estimate the causal effects of coercion intensity on

crime rates. β_1 is the coefficient of interest.[7]

This identification strategy accounts for any district-level characteristics that may influence the outcome, assuming the parallel trends assumption holds. The recent difference-in-differences literature (de Chaisemartin and D'Haultfœuille, 2020; Callaway and Sant'Anna, 2021) does not impact our study. Our treatment, coercion intensity, was applied simultaneously to all districts in the same year, eliminating staggered implementation. Importantly, the possibility of negative weights for the coefficients does not pose a threat to our identification.

Finally, we examine sex ratios at the district level to gain deeper insights into the demographics of crime victims, given that crime data do not specify this information. We use a similar difference-in-differences analysis as in equation 1, With $Y_{d,t}$ being the number of men divided by the number of women in district d at time t. CI_d is the coercion intensity measure, and $Post_t$ takes 1 for the census waves of 1981 and 1991, i.e. after the forced vasectomies episode. A positive and significant β means that the number of men increased compared to the number of women in districts with high coercion intensity.

4.2 Threats to identification

The crucial assumption in difference-in-differences models is that treatment and control districts follow similar trends in the absence of treatment (parallel trends assumption). To validate our assumptions, we conduct event-study designs in both analyses to examine pre-treatment trends.

To assess the parallel trends assumption, we introduce a treatment dummy variable for coercion intensity in our analysis. This variable must accurately reflect districts with high exposure while maintaining a balance between those with low and high coercion intensity. The median value of coercion intensity is 3.38%, implying a 3.38% rise in the proportion of sterilized married couples between 1975-76 and 1976-77. Since this value does not represent a significant increase in coercion, we opted to assign a value of 1 to districts with coercion intensity exceeding the mean of 5.1%. Subsequently, we re-examine the outcomes for districts with the highest coercion intensity, the top 25% of our sample, denoting coercion intensity above 6%.

$$Y_{d,t} = \theta_t + \eta_d + \beta_t \times Dci_d \times \sum_{i=1972}^{\geq 2013} \mathrm{P}_t + X_{s,t} + v_{d,t} \tag{2}$$

[7]The coefficient β divided by the mean of the outcome indicates the percentage increase in the outcome for every 1 percentage point increase in the coercion intensity variable after the forced vasectomy period.

In equation 2, we use event study methodology to analyze crime rates per 1 million inhabitants by regressing them on year-specific dummy variables. $Y_{d,t}$ is the number of crimes per 1 million inhabitants in district d in year t. Instead of using a single dummy variable set to 1 after 1976, we now employ a dummy variable P_t, which equals 1 for each year from 1972 to 2013 (excluding 1976) and includes linear time trends. The event study design illustrates the $\beta_{d,t}$ coefficients for each year, helping us compare high and low coercion intensity districts for better result interpretation. Dci_d is a dummy that takes 1 if the district had a coercion intensity, CI_d above the mean, 5.1%. We also do the regression for the 25% more exposed district, Dci_d then takes the value 1 for a coercion intensity above 6%. θ_t and η_d are time and district fixed effects. $X_{s,t}$ is a state-level control variable which is the number of total police force at the state level in year t.

Another potential concern is the presence of other interventions that may have targeted the same districts over the years, especially in our long-term analysis of crime patterns. However, we find this threat to be unlikely for several compelling reasons. First, our treatment variable $\mathbf{CI}_d$ is continuous, making it unlikely to represent other program implementations. Second, there were no subsequent similar programs in India after the period we examine. Third, it is improbable that a program capable of influencing violence would have been implemented with the same intensity in the same regions due to various factors, such as political changes and shifts in the state's workforce. In fact, Pelras and Renk (2023) suggests that households more exposed to the program were more likely to vote for incumbent parties, indicating a change in representation after the Emergency period. Finally, the other programs initiated by Sanjay Gandhi during the Emergency were not implemented with the same intensity or proven efficacy and are unlikely to have had an impact on violence.[8]

5 Results

We first study the implementation of coercion intensity to have a better understanding of this program, then we present the results on crime rates.

5.1 Investigating the implementation process of coercion intensity

While our identification strategy allows us to identify a causal impact of the program on crime rates whether the program was randomly implemented or not, we still provide information regarding the

[8]The other programs announced were tree planting, a ban on dowry, an adult education program known as "each-one-teach-one," and the abolition of social caste distinctions.

implementation process of coercion intensity. We correlate 1977 forced vasectomies and several socio-economic variables from the 1971 Indian Census, Ministry of Health Reports, and the Lok Sabha elections of 1971. These variables include population size, the proportion of farmers and workers, the share of the literate population, the number of achievers of primary education and middle education, the share of scheduled tribes and finally the share of candidates from the same party as Indira Gandhi, the Indian Nation Congress (INC) elected at the state level. Correlating these variables with our measure of coercion intensity gives insights into the factors determining the implementation of forced vasectomies.

In Table 2, the implementation is observed to correlate with a higher proportion of middle school achievers, presumably due to the reliance of the program on educated state workers, who are more likely to have attained middle-school education. Notably, there appears to be no substantial correlation with other variables such as population size, literacy rates, tribal population, or workforce composition. Surprisingly, the absence of a clear association between the share of political leaders from the Indian National Congress, the party of Indira Gandhi, and the program's implementation raises intriguing questions. Although this lack of correlation does not explicitly uncover the reasons behind the varying implementation of the reform across districts, it provides insight into the absence of discernible mechanisms that could establish the exogeneity of the treatment. However, as discussed in Section 4, the potential endogeneity of the treatment does not pose a threat to our identification strategy.

Table 2: Correlations between Forced Vasectomies and District and State-level variables

	Coercion Intensity
Population in 1971	-0.00000121 (-0.96)
Working population in 1971	-0.00000563 (-1.00)
Farming population in 1971	0.00000973 (1.60)
Household Industry in 1971	0.0000318 (1.23)
Literates at 35 in 1971	-0.00000885 (-0.69)
Achievers of primary education in 1971	-0.00000819 (-1.50)
Achievers of middle education in 1971	0.0000214** (2.61)
Scheduled tribes in 1971	-0.00000139 (-1.05)
Share of candidates from the INC at the state level in 1971	5.646 (1.14)
Observations	315

t statistics in parentheses

Notes: This table shows correlations between state and district-level demographic and political variables and our coercion intensity measure. This shows that the implementation of coerced vasectomies is only correlated with the share of middle school achievers, which historically makes sense as coercion mainly took the form of threats towards state workers, more likely to achieve higher education. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.2 Impact of coercion intensity on crime rates

We present the results of the regressions on crimes, up to 2013. As reliable data regarding police forces at the state level were not accessible beyond 2013, making it challenging to control for this fact, we conclude our analysis at 2013.

In Table 3, we observe a long-term positive relationship between coercion intensity and violent crimes, finding that a 1 percentage point increase in coercion intensity corresponded to a 1.3% increase in overall violent crimes. The mean of coercion intensity is 5.1%, so the average increase is 7%, with a maximum increase of 30% for the more coerced district. Furthermore in Table 4, when examining specific crime categories, we found that rapes increased on average by 22%, murders by 4%, cheating decreased by 10%, and riots decreased by 10% on average. In the most exposed district, with a coercion intensity of 29%, rapes increase by 124%.

Table 3: Impact of Forced Vasectomies on Crime Categories 1972-2013

Dep. Var.: rates of	(1) Total crimes	(2) Property Crimes	(3) Violent Crimes
Coercion Intensity × Post	10.32	-2.389	1.29**
	(13.44)	(4.93)	(0.53)
Observations	8267	5903	8267
Standard errors clustered district-level	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean	2526.83	846.2	102.36

Standard errors in parentheses

Notes: This table presents the results of running the static difference-in-differences specification shown in equation 1 of coercion intensity on crime rates per 1 million inhabitants. The unit of observation is the district. We control with police forces at the state level. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Table 4: Impact of Forced Vasectomies on crime rates 1972-2013

Dep. Var.: rates of	(1) Rapes	(2) Murders	(3) Cheating	(4) Riots
Coercion Intensity × Post	0.93***	0.43**	-1.34***	-1.1
	(0.29)	(0.24)	(0.41)	(0.73)
Observations	8267	8267	8267	8267
Standard errors clustered district-level	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes
Mean	21.86	49	52.9	127.47

Standard errors in parentheses

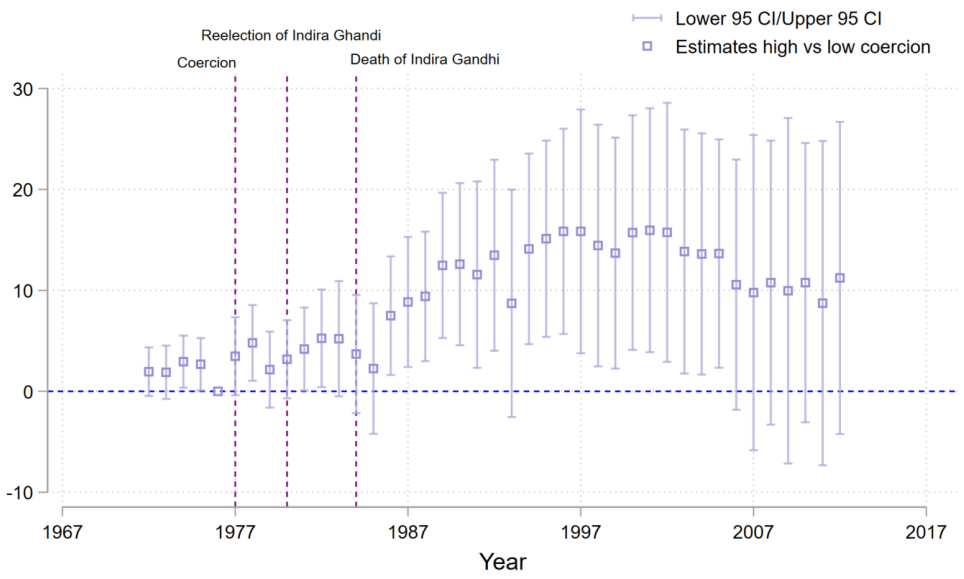
Notes: This table presents the results of running the static difference-in-differences specification shown in equation 1 of coercion intensity on crime rates per 1 million inhabitants. The unit of observation is the district. We control with police forces at the state level. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Figures 6, 7 and 8 show event-study plots for rapes, murders and riots. We first note that the parallel trend assumption holds in the analyses of rapes and murders, but not riots. We, then, do not find a causal effect for the analysis of the decline in riots, as targeted districts seemed to have lower rates of political opposition against the police or the state.

We can see a change in trends following 1977 that becomes significant after 1985. The assassination of Indira Gandhi in 1984 marked a turning point in Indian history, with the ensuing violent episodes, the anti-Sikh riots, potentially contributing to a surge in violence during that period and a relish of violence. It could also be the symbol of the end of this dark episode in India's history, and the end of the fear that such a program would happen again.

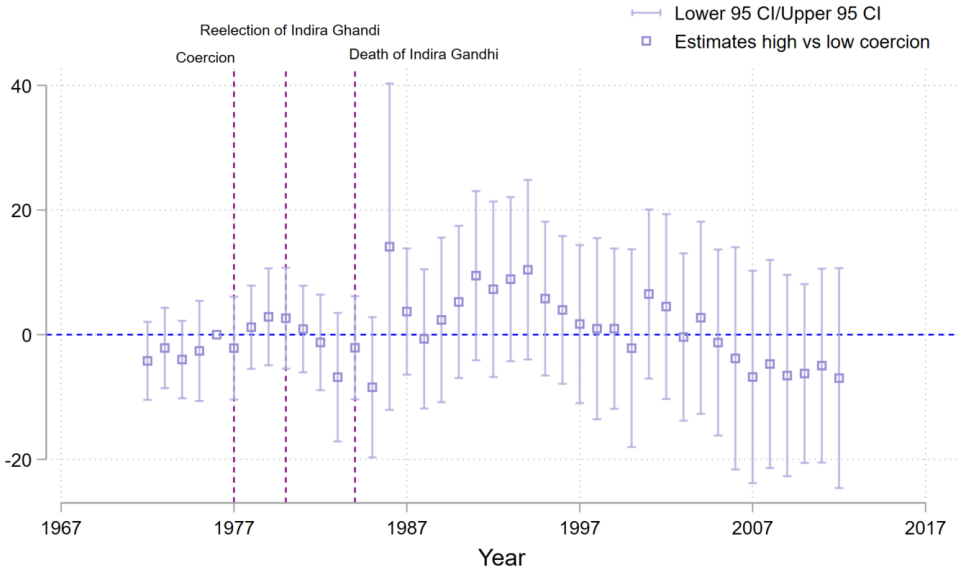
We conduct the event study for the top 25% most exposed districts (Figure 9). The influence of

Figure 6: Event Study: Impact of coercion intensity on rapes 1972-2013



Notes: This figure plots the estimated β coefficients from a regression of the form given in equation 2. The dependent variable is the number of rapes per 1 million inhabitants. The event takes place in 1977. The coefficient of 1976 is normalized to zero. The vertical lines reflect the 95% confidence intervals. We control with police forces at the state level.

Figure 7: Event Study: Impact of coercion intensity on murders 1972-2013



Notes: This figure plots the estimated β coefficients from a regression of the form given in equation 2. The dependent variable is the number of murders per 1 million inhabitants. The event takes place in 1977. The coefficient of 1976 is normalized to zero. The vertical lines reflect the 95% confidence intervals. We control with police forces at the state level.

Figure 8: Event Study: Impact of coercion intensity on riots 1972-2013

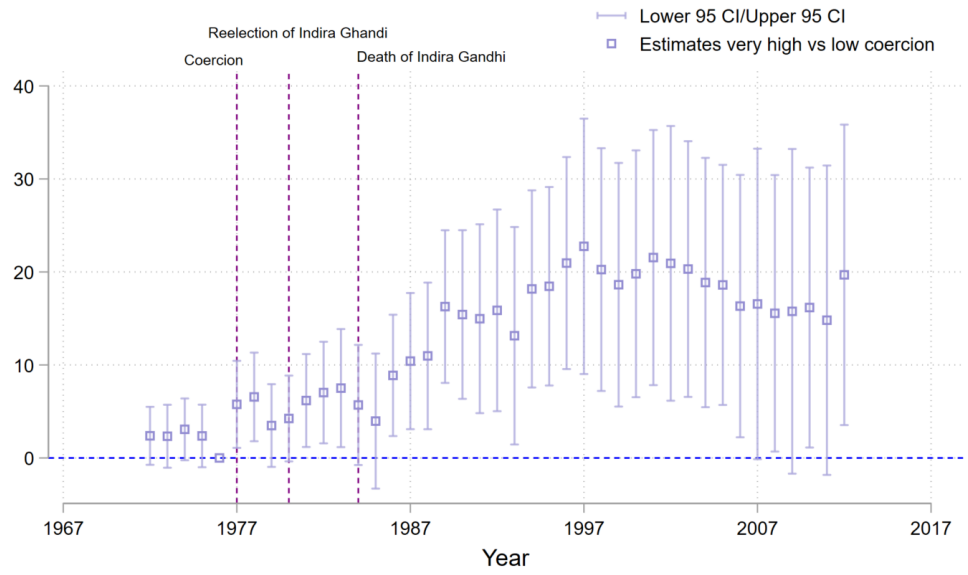
Notes: This figure plots the estimated β coefficients from a regression of the form given in equation 2. The dependent variable is the number of riots per 1 million inhabitants. The event takes place in 1977. The coefficient of 1976 is normalized to zero. The vertical lines reflect the 95% confidence intervals. We control with police forces at the state level.

coercion intensity on rape rates in these districts remains significant until the end of our study in 2013, which spans over 35 years since the program's implementation.

In Figure 10, we analyzed the age groups of rape perpetrators in India using data from the Bureau of Crimes (1988-2020). It is evident that the most common age groups for committing rapes are 18-30 and 30-50 years old. Notably, the Ministry of Health's reports indicate that the average age of men who underwent vasectomies in 1977 was 35. This suggests that the individuals committing the crimes are more likely to be a different generation from those directly targeted by forced vasectomies, as the latter group would have been 46 years old in 1988, potentially implicating their children. This observation aligns with a growing body of literature on the relationship between exposure to violence during childhood and adolescence and the display of violence in early adulthood (Mrug et al., 2016).

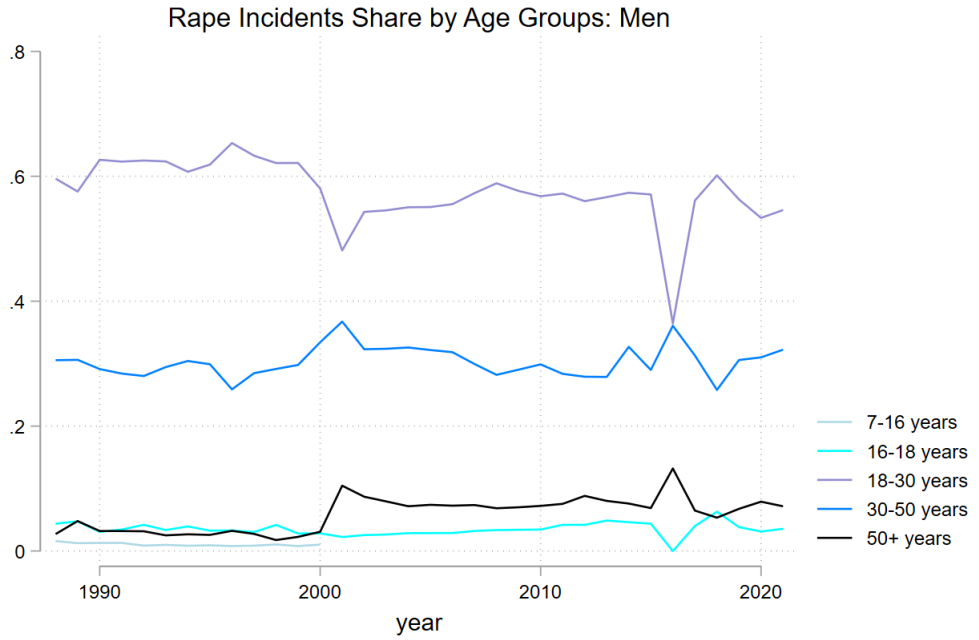
Although individual characteristics data is absent in the Indian crime dataset, it is important to note that within this dataset, rape is categorized as an offence against women. To better understand if the observed effect on murders, albeit small (Figure 7), might also target women, we analyze the sex ratios from the Indian censuses in 1971, 1981, and 1991. Oldenburg (1992) has previously shown a positive correlation between male-female ratios and murders in Uttar Pradesh, suggesting that murders could potentially be a form of violence that disproportionately impacts women.

Figure 9: Event Study: Impact of coercion intensity on rapes for the 25% more exposed districts



Notes: This figure plots the estimated β coefficients from a regression of the form given in equation 2, with high coercion district being the top 25% of our sample with a coercion intensity of 6%. The dependent variable is the number of rapes per 1 million inhabitants. The event takes place in 1977. The coefficient of 1976 is normalized to zero. The vertical lines reflect the 95% confidence intervals. We control with police forces at the state level.

Figure 10: Age-groups of rape perpetrators in India, 1988-2020



Notes: This figure shows the percentage of rapes that are committed by different age groups in India, from 1988 to 2021. Men belonging to the 18-30 years and the 30-50 years age groups are the ones who commit around 90% of rape incidents in India.

Table 5: Sex ratios and coercion intensity

	(1)	(2)	(3)
Dep. Var. Sex ratio of the	Total population	0-5 y.o in 1971	5-9 y.o in 1971
Coercion Intensity × Post	0.0007**	0.003***	0.002**
	(0.0003)	(0.0009)	(0.001)
Observations	991	966	966

Notes: This table presents the results of running the static difference-in-differences specification shown in equation 1 of coercion intensity on the sex ratios in India, defined as male relative to females. The unit of observation is the district. A positive coefficient means a relative decrease of women relative to men. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

In Table 5, we find that a 1 percentage point increase in coercion intensity is associated with a small increase in sex ratios over time, for the overall population. We find that this result is also significant for the two age groups we were able to follow. These results suggest that murders could be directed as well against women.

The prominence of crimes against women in our analysis suggests that the forced vasectomies program of 1976-77 may have played a role in shaping or reinforcing prevailing concepts of masculinity, thereby influencing patterns of violence in society (Bosson et al., 2009). We discuss this mechanism further in Section 7.

6 Robustness

To ensure the robustness of our findings, we employ an alternative treatment measure. A potential critique of our primary treatment variable is the possibility that coercive methods might have been applied in districts that were already reaching high numbers of voluntary vasectomies in 1976. To address this concern, we introduce a new approach: we calculate the growth rate between the annual mean achievements spanning from 1970 to 1976 and the achievements specifically in 1977. This adjustment allows us to factor in the influence of prior achievements on our analysis.

We can see in Table 6 that the effect on violent crimes persists with this new measure, but in Table 7 we see that the only persistent effect remains on rape. This alternative treatment confirms the causal impact of forced vasectomies on the increase of rapes.

Table 6: Impact of Forced Vasectomies on Crime Categories with an alternative treatment measure

Dep. Var.: rates of	(1) Total crimes	(2) Violent crimes	(3) Property crimes	(4) Riots
Coercion Intensity × Post	6.510	1.439*	5.869	-0.00639
	(17.59)	(0.842)	(4.635)	(0.683)
	(90.52)	(4.290)	(22.71)	(3.511)
Observations	8267	8267	5903	8267
Standard errors clustered	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes
Mean	2526.83	112.78	846.20	127.47

Standard errors in parentheses

Notes: This table presents the results of running the static difference-in-differences specification shown in equation 1 of coercion intensity on crime rates per 1 million inhabitants with an alternative measure for coercion intensity, the growth rate between sterilization share in 1976-77 and the means of past sterilization shares. The unit of observation is the district. We control with police forces at the state level. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Table 7: Impact of Forced Vasectomies on crime rates with an alternative treatment measure

Dep. Var.: rates of	(1) Rapes	(2) Murders	(3) Cheating
Coercion Intensity × Post	0.852*	0.514	-0.729
	(0.441)	(0.347)	(0.541)
Observations	8267	8267	8267
Standard errors clustered	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Mean	32.24	49.00	52.90

Standard errors in parentheses

Notes: This table presents the results of running the specification shown in equation 1 of coercion intensity on crime rates per 1 million inhabitants with an alternative measure for coercion intensity, the growth rate between sterilization share in 1976-77 and the means of past sterilization shares. We control with police forces at the state level. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

7 Mechanisms

We hypothesize that a compulsory male sterilization program may impact violence through various channels. First, reduced fertility rates may lead to women spending less time caring for children, prompting their increased involvement in the labour force. These shifts could potentially contribute to instances of domestic violence, in line with findings from the male backlash literature (Aizer, 2010; Erten and Keskin, 2018; Bhalotra et al., 2021; Anukriti, 2014). Second, the forced medical procedure itself might cause psychological trauma and elevate the risk of subsequent criminal behavior and domestic abuse (Oehme et al., 2012; Becker-Blease and Freyd, 2005; Mrug et al., 2016). Lastly, by targeting men and their sense of masculinity (Scott, 2014), the program could instigate feelings of emasculation, potentially fostering a desire to reaffirm masculinity through the adoption of masculine-oriented norms, including resorting to violence (Baranov et al., 2023; Bosson et al., 2009).

We explore these distinct channels in the following sections, but due to limitations in data availability, we are unable to disentangle the last two channels and therefore treat them collectively.

7.1 Fertility and labour force participation

7.1.1 Data

To study the effect of coercion intensity on fertility, we use the National Sample Surveys (NSS) of 1986-87, 42nd round. The dataset is the Survey on Maternity, Child Care, Family Planning, and Utilisation of the Public Distribution System. We restrict the sample to include only the immediate family of the head of the household because the data only gives a clear characterization of the children of the head of the household. This leaves us with 75% of the sample and 54,044 households.[9].

Outcome variables. Our primary outcome variable focuses on the count of births to examine the program's effects on fertility. This count encompasses all mothers within the age range of 15 to 50, who are either spouses of the household head or household heads themselves.

Control variables. The 42nd round of NSS encompasses a comprehensive set of individual and household characteristics, which we utilize for controlling factors such as age, sex, education levels of household members, caste, and occupation sectors in our analysis. Detailed summary statistics

[9]For example if household i has two daughters-in-law and three grandchildren, we will not be able to distinguish the mothers based on the serial number of grandchildren because all grandchildren have the same serial number i.e. 6

of the sample are presented in Table 8. Additionally, we augment these variables with district controls from the 1971 census.

Table 8: Summary Statistics: Maternity Survey

	N	Mean	s.d.
Household Characteristics			
Hh with 1 child before 1976	54173	0.31	0.46
Hh with 2 children before 1976	54173	0.23	0.42
Hh with 3 children before 1976	54173	0.20	0.40
Hh with $\geq$4 children before 1976	54173	0.14	0.35
Educated males	50937	0.49	0.46
Educated females	54173	0.27	0.41
Low caste	54173	0.26	0.44
Rural	54173	0.66	0.47
Hh size	54173	5.72	2.59
Mother Characteristics			
Age	54794	39.27	10.11
At least 8 years of education	54794	0.26	0.44
Husband has at least 8 years of education	54794	0.41	0.49
No. of living children	54794	2.81	1.74
Husband salaried or self-employed	54794	0.73	0.45

Notes: This table presents the summary statistics of our sample for the fertility and education study.

We also use the 1961, 1971, 1981 and 1991 Indian censuses to compute the share of female labour force participation, defined as the share of working women in the population of women older than 15 at the district level.

7.1.2 Empirical strategy

To assess the effect of the excessive sterilization in 1976-77 on the number of births, we utilize spatial differences in coercion intensity and household-level variation in the number of children a couple had prior to the coercive campaign. Since the program primarily targeted husbands with children, we focus on children born after 1977 in households with already existing children before 1977, specifically in districts with high coercion intensity. These households were most likely affected by the program, making it the key area to observe its effects.

We run the following regression equation:

$$\begin{aligned} \text{Post\_N}_{i,d} = \alpha + \sum_{n=1}^{\geq 4} \text{Pre\_N}_{i,d,n}\, \beta_n + \gamma\, \text{CI}_d + \sum_{n=1}^{\geq 4} (\text{CI}_d \times \text{Pre\_N}_{idn})\, \mu_n \\ + \psi_1\, \text{MAge}_{i,d} + \psi_2 \text{MAgesq}_{id} + \mathbf{X}'_{\mathbf{1}i}\, \phi_1 + \mathbf{X}'_{\mathbf{2}d}\, \phi_2 + \delta_s + \varepsilon_{ids} \end{aligned} \tag{3}$$

where Post_N_{id} is the number of children born post-1976 in household i in district d. Pre_N_{idn} is

the dummy that takes the value 1 if the number of children born before 76 is equal to n where n $\in \{1,2,3,\geq 4\}$, for household i in district d. *MAge* is the mother's age, and *MAgesq* is the mother's age squared in 1976. The vectors $\mathbf{X_1}$, $\mathbf{X_2}$ comprise household and district level controls, δ_s is state fixed effects, and the standard errors are clustered at the district level.[10] Including the state and time-fixed effects with a district-level treatment variable, helps pinpoint the treatment's effect within districts while accounting for state and time variations.

We implement the following event-study design (similar to crime rates) to understand the effect on number of births at the district level:

$$Y_{d,t} = \theta_t + \eta_d + \beta_t \times CI_d \times \sum_{t=1972}^{\geq 1985} \mathrm{P}_t + v_{d,t} \tag{4}$$

In contrast to our primary analysis where a dummy variable took the value of 1 after 1976, we now employ P_t, a dummy variable that equals 1 for a specific year t ranging from 1972 to 1985. We exclude 1976, one year prior to the treatment, following the convention in event study literature, and incorporate linear time trends. Here, CI_d represents a treatment dummy variable for "high" coercion intensity. We assign a value of 1 to districts with coercion intensity exceeding the mean of 4.5%.[11] The event study graph plots the $\beta_{d,t}$ coefficients for each year, differentiating between high and low coercion intensity districts for easier result interpretation.

For the labour force participation, we use the same regression as the main specification, equation 1. The variable post takes 1 for the 1981 and 1991 waves, 0 otherwise.

7.1.3 Impact of coercion intensity on fertility and labour force participation

We find that a 1 percentage point increase in coercion intensity leads to a very small positive increase in fertility post-1976. By splitting the sample between households that yet did not have sons before 1976 and the ones that did, we see in columns 3 and 4 of Table 9 that this result is mostly driven by families who did not have a son. These results indicate that there was a backlash on the number of births in districts with higher forced vasectomies and that parents were afraid of not being able to have sons. This result contributes to a large literature on son preference in India (Sen, 1992). As well, we see an increase in births in families with three children who already have

[10] Household controls include: the share of educated females in the household, the share of educated males in the household, caste and urban sector dummies. District-level controls include a share of the scheduled caste population in 1971, the share of the scheduled tribe population in 1971, the share of the literate population in 1971 and the share of the urban population in 1971.

[11] The variation in mean values between crime and fertility analyses is because the fertility analysis covers all districts, whereas the crime analysis includes 197 districts.

a son, meaning that large families also feel pressure to have more children.

Table 9: Impact of forced vasectomies on number of births

	Whole sample		No sons born pre 1976		At least one son pre 1976	
	(1) Poisson	(2) OLS	(3) Poisson	(4) OLS	(5) Poisson	(6) OLS
Coercion intensity	-0.01***	-0.01	-0.01***	-0.01	-0.01***	-0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
One child pre 76 × Coercion intensity	0.01***	0.01**	0.01***	0.01**		
	(0.00)	(0.00)	(0.00)	(0.00)		
Two children pre 76 × Coercion intensity	0.02***	0.01**	0.02***	0.02*	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Three children pre 76 × Coercion intensity	0.03***	0.02***	0.01	0.02	0.02***	0.01**
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Four children pre 76 × Coercion intensity	0.02**	0.01	-0.02	-0.02	0.01	-0.00
	(0.01)	(0.01)	(0.02)	(0.03)	(0.01)	(0.01)
Observations	54044	54044	23129	23129	30915	30915
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes
District Controls	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Mean of dep. var.	1.234	1.234	1.695	1.695	0.888	0.888

Notes: This table presents the results of a static difference-in-differences specification state in equation 3 of coercion intensity on births. The unit of observation is the household. District controls include literacy rates, workers' share, farmers' share, household industry, middle school achievements, scheduled casts, and tribes. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

To better understand the fertility results, we conducted an event study analysis. As seen in Figure 11, the increase in fertility became noticeable in 1983, aligning with Indira Gandhi's fourth term in office during a period of heightened tensions with Sikh religious militants. This suggests that households in the districts previously affected by the 1976-77 forced vasectomies may have been concerned about a potential re-implementation of such a program.

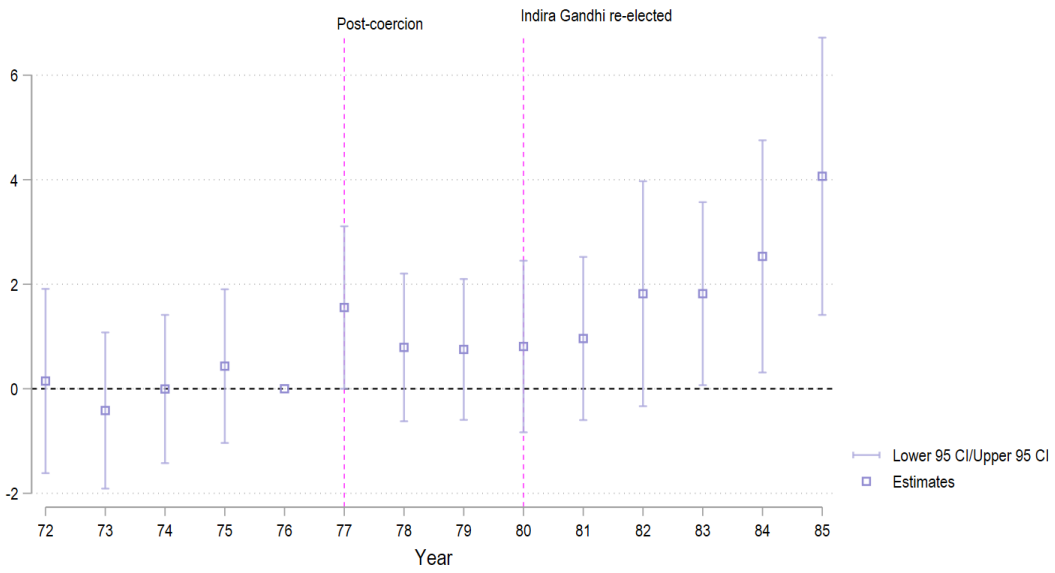
Although we see a small positive effect of coercion intensity on the number of births, we find that sterilization in 1976-77 did have a negative impact on the number of births in the short run in the households that were potentially most impacted. The results are provided in Table A9. This negative evidence on fertility shows that a household's exposure to sterilization is jointly determined by the district of residence and the number of children the household had before 1976.

We see in Table 10 that female labour force participation declines by 1% with an increase of 1 percentage point in coercion intensity.[12]

As we find that the program had the opposite effect of reduced fertility and an increase in female labour force participation, we rule out this channel as a mechanism for violence.

[12]This result echoes the work of Prasad (2022) who studies the link between the female sterilizations performed during the program and labour force participation, using the 1993 Demographic and Health Survey to create a measure of the fraction of women who were sterilized in a district in a year during the Emergency period. While this treatment measure has potential issues of misrepresentation at the district level and may not be reflective of the forced program that targeted men, we also find with our measure that the program led to a decrease in female labour force participation.

Figure 11: Event Study: Births 1972-1985



Notes: This figure plots the estimated β coefficients from a regression of the form given in equation 4. The dependent variable is the number of births. The event takes place in 1977. The coefficient of 1976 is normalized to zero. The vertical lines reflect the 95% confidence intervals.

Table 10: Female labour force participation and coercion intensity

Dependant Variable:	Female Labour Force Participation
Coercion Intensity × Post	-0.003***
	(0.0005)
Observations	1301
Mean	0.28

Standard errors in parentheses

Notes: This table presents the results of running the static difference-in-differences specification shown in equation 1 of coercion intensity on female labour force participation in India, defined as the share of female workers in the total population of women. The unit of observation is the district. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

7.1.4 Robustness on fertility: Placebo tests and alternative treatments

To assess the robustness of our fertility results, we conducted placebo tests. Specifically, we manipulated the timing of household treatments to investigate the impact of forced vasectomies on births across the study period from 1967 to 1985. We conducted separate regression analyses for households with varying numbers of children (one, two, three, and four or more) for each year, using the

same regression equation as presented in Equation 3. The results for each year are summarized in Tables A1 to A7.

Notably, we observed statistically significant coefficients for households with more than two children in the year 1973, but no such significance was evident in the years preceding it. Furthermore, the results for 1979 and 1982 indicated a significant effect on births, reaffirming the earlier observed effect on fertility.

We also explore an alternative measure of coercion intensity. In 1973, as illustrated in Figure 2, there was a notable surge in sterilization procedures, mostly vasectomies, largely attributable to the commencement of incentivized sterilization initiatives in India. To assess coercion intensity differently, we calculate the growth rate between 1972 and 1973 as a control variable, to see the effect on births of a voluntary vasectomy program. Figure A1 shows the geographic variation in "placebo" coercion intensity in the year 1973.[13] While the sterilization intensity in 1973 was comparatively lower than that in 1977, our analysis in Table A8 reveals that incentivized sterilization programs resulted in reduced offspring numbers for households residing in districts with higher sterilization rates. This finding adds to our understanding of why the coercive measures implemented during the 1977 sterilization episode did not yield the anticipated impact on fertility. Several factors may contribute to this phenomenon: potential resistance towards forced government policies, or concerns among families where husbands did not opt for vasectomy that the program might resurface in subsequent years, motivating them to have more children.

7.2 The role of trauma and masculinity in inducing violent behaviours against women

It is important to consider the concept of masculinity and its potential role in explaining the increase in crimes during this period. The forced vasectomy campaign, which targeted men as a means of population control, may have threatened traditional notions of masculinity and provoked a sense of emasculation among some individuals (Scott, 2014). The resulting feelings of insecurity, loss of power, and diminished social status could have contributed to a heightened propensity for engaging in criminal behaviour as a means of reestablishing a sense of control or asserting dominance. There is a large and diverse psychology literature that documents the link between manhood and the use of aggression and violence. Bosson et al. (2009) review theories and evidence highlighting that manhood is a status that must be earned and demonstrated throughout life. This means that a possible shock on gender roles could impact men in reasserting masculinity norms. They suggest

[13] When compared to 1976-77, we see that there are differences in the districts that were exposed to higher intensities in 1973 versus 1976.

that this urge to affirm masculinity can lead to the use of aggression from men, as violence is identified as being a manly and visible behaviour.

Extensive psychological research suggests a connection between male violence towards women and exposure to childhood and adolescent trauma (Oehme et al., 2012; Becker-Blease and Freyd, 2005; Mrug et al., 2016). Although our findings do not directly identify the age of the perpetrators of crimes in high-coercion districts, evidence indicates that a majority of rape cases in India are committed by younger men, suggesting that they would have been children or adolescents during the *Emergency*. It is conceivable that witnessing the government's threat to their fathers or experiencing violence at home during that period could be considered traumatic exposures, potentially leading to increased levels of violence in adulthood.

While our dataset does not allow us to definitively establish a causal link between forced vasectomies and disruption in masculinity norms or domestic abuse, we seek to address this gap through a compensatory approach. We conducted a simple difference analysis using the 1999 Demographic and Health Surveys, which is the first household-level survey in India to include inquiries on domestic violence. Leveraging this dataset, we explore the correlation between coercion intensity and various variables, such as Intimate Partner Violence (IPV), bargaining power, and fertility dynamics.

We faced challenges conducting an age group analysis because the dataset only covers women aged 15 to 49 years old, leaving a 22-year gap between 1977 and 1999. This gap made it difficult to target the exact cohort of women affected by the 1977 program. Additionally, by 1999, masculine norms would have already diffused, making it challenging to identify a specific age group more affected than others. Consequently, we could not establish a direct age-related causal connection.

Our study focuses on married women who are either household heads or are spouses of household heads, resulting in a dataset comprising 27,449 observations. Employing a simple difference analysis, we incorporate several household and district-level controls to uncover correlations between exposure to forced vasectomies and various factors related to violence, female empowerment, and fertility dynamics.

$$Y_{id} = \alpha + \beta \text{Forced Vasectomies}_{id} + \gamma X_d + \kappa X_i + \varepsilon_{id} \tag{5}$$

The outcome variables in Table A10 include a dummy variable for IPV that takes 1 if the husband already beat his wife and several dummy variables related to acceptance of violence. The questions asked are "Is it acceptable for husbands to beat their wives if the wife ..." and ask if she's being unfaithful, if she shows disrespect, if she goes out without asking him, if she neglects the house

or the children and if she does not cook properly. A positive result indicates a positive response. In Table A11, the first four column outcome variables are questions about decision-making, 1 indicates that the wife takes part in the decision-making process and 0 that she has no word in it. Columns 5 and 6 are questions about if the wife needs permission from her husband, to go to the market or visit family, 1 indicates that she does. Finally, in Table A12, Column 1 indicates if the wife is sterilized if the couple talks about male sterilization and the number of children desired by her husband.

In Table A10, we see that districts with a higher incidence of forced vasectomies demonstrate an association with elevated levels of Intimate Partner Violence (IPV) and higher acceptance of such violence. This correlation suggests that the coercive nature of the sterilization program may have had broader negative implications for gender dynamics and relationships within these districts. Additionally, in Table A11, the presence of higher forced vasectomy rates is linked to lower bargaining power for women, indicating reduced decision-making autonomy in matters related to household affairs, including the ability to visit markets or family members.

Furthermore, the coerced vasectomy campaign seems to correlate with diminished rates of female sterilization within the affected districts. This trend may be attributed to a heightened prevalence of male sterilization, which in turn reduces the utilization of female-based contraceptive techniques. Additionally, discussions and discourse pertaining to vasectomies appear to be less prevalent within these communities. Within these districts, husbands seem to have a higher inclination for expanding their families, hinting at the possibility of altered fertility beliefs.

8 Conclusion

Can forced program implementations lead to a backlash on violence? In this paper, we study the impact of a unique historical event, the implementation of a male coercive sterilization program in India from April 1976 to February 1977, on violence. The program used coercive methods - and sometimes resorted to violence- to implement a Malthusian policy in India during a state of emergency declared by the government to fight against poverty.

Using newly digitized district-level governments and administrative documents on sterilizations and crime rates, we employ a two-way fixed effect strategy to find the causal impact of forced vasectomies, proxied by the growth rates of the share of sterilized couples between 1975-76 and 1976-77, on crime rates in India.

We find that an increase of 1 percentage point in coercion intensity leads to an increase of 1.3%

of violent crimes, while it does not impact other crime categories. Rapes and murders drive the increase in violent crime rates, increasing respectively by 4.3% and 0.8%. The increase in rapes is persistent through time and remains significant until 2013, the end of our study, for the 25% districts more exposed to forced vasectomies. We document that the murders may be directed towards women, as we see a decline in the number of women related to men in high coercion intensity districts.

We study plausible mechanisms and observe that the implementation of the program did not result in reduced fertility, its intended goal, but rather a small increase in births. This suggests a spillover effect stemming from households' fear of a potential second implementation of the program. Additionally, we find that highly exposed districts are associated with more harmful gender norms towards women.

This paper provides, to the best of our knowledge, the first empirical evidence that the implementation of a compulsory male sterilization program resulted in increased violence against women, with a cultural transmission through time. Our contribution adds to the extensive economic literature that highlights the adverse repercussions of enforced measures and their limited efficacy.

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Appendix

Table A1: Effect of coercion on number of births post-1967

	Poisson (1)	OLS (2)
Coercion intensity	-0.00	0.00
	(0.00)	(0.00)
# children pre 67=1 × Coercion intensity	0.00	-0.00
	(0.00)	(0.00)
# children pre 67=2 × Coercion intensity	0.00	-0.01
	(0.00)	(0.01)
# children pre 67=3 × Coercion intensityy	0.00	-0.01
	(0.01)	(0.01)
# children pre 67=4 × Coercion intensity	-0.01	-0.01
	(0.02)	(0.01)
Observations	39356	39356
Household Controls	Yes	Yes
District Controls	Yes	Yes
State Fixed Effects	Yes	Yes
Mean of dep. var.	2.024	2.024

Notes: This table presents the robustness results on the impact of coercion intensity on births. The unit of observation is the household. District controls include literacy rates, workers' share, farmers' share, household industry, middle school achievements, scheduled casts and tribes. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

$$\begin{aligned} \text{Post\_N}_{id} = \alpha + \sum_{n=1}^{\geq 4} \text{Pre\_N}_{idn}\,\beta_n + \gamma\,\text{CI}_d + \sum_{n=1}^{\geq 4} (\text{CI}_d \times \text{Pre\_N}_{idn})\,\mu_n \\ + \psi_1\,\text{MAge}_{id} + \psi_2 \text{MAgesq}_{id} + \mathbf{X}'_{\mathbf{1}i}\,\phi_1 + \mathbf{X}'_{\mathbf{2}d}\,\phi_2 + \delta_s + \varepsilon_{ids} \end{aligned} \tag{6}$$

In Table A4, *Post_N* is the number of children born post-1970 in household i in district d in state s. *Pre_N* is the dummy that takes the value 1 if the number of children born before 70 is equal to n where n $\in \{1,2,3,\geq 4\}$. *MAge* is the mother's age, and *MAgesq* is the mother's age squared in 1970.

Table A2: Effect of coercion on number of births post-1968

	Poisson (1)	OLS (2)
Coercion intensity	-0.00	-0.00
	(0.00)	(0.00)
# children pre 68=1 $\times$ Coercion intensity	0.00	-0.00
	(0.00)	(0.00)
# children pre 68=2 $\times$ Coercion intensity	0.00	-0.00
	(0.00)	(0.01)
# children pre 68=3 $\times$ Coercion intensity	0.00	-0.01
	(0.01)	(0.01)
# children pre 68 $\geq$4 $\times$ Coercion intensity	-0.01	-0.01
	(0.02)	(0.01)
Observations	40853	40853
State Fixed Effects	Yes	Yes
Mean of dep. var.	1.967	1.967

Notes: This table presents the robustness results on the impact of coercion intensity on births. The unit of observation is the household. District controls include literacy rates, workers' share, farmers' share, household industry, middle school achievements, scheduled casts and tribes. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Table A3: Effect of coercion on number of births post-1969

	Poisson (1)	OLS (2)
Coercion intensity	-0.00	-0.00
	(0.00)	(0.00)
# children pre 69=1 $\times$ Coercion intensity	0.00	0.00
	(0.00)	(0.00)
# children pre 69=2 $\times$ Coercion intensity	0.01**	0.01
	(0.00)	(0.01)
# children pre 69=3 $\times$ Coercion intensity	0.01	-0.00
	(0.01)	(0.01)
# children pre 69=4 $\times$ Coercion intensity	0.00	-0.01
	(0.01)	(0.01)
Observations	42465	42465
Household Controls	Yes	Yes
District Controls	Yes	Yes
State Fixed Effects	Yes	Yes
Mean of dep. var.	1.883	1.883

Notes: This table presents the robustness results on the impact of coercion intensity on births. The unit of observation is the household. District controls include literacy rates, workers' share, farmers' share, household industry, middle school achievements, scheduled casts and tribes. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Table A4: Effect of coercion on number of births post-1970

	Poisson (1)	OLS (2)
Coercion intensity	-0.00**	-0.00
	(0.00)	(0.00)
# children pre 70=1 × Coercion intensity	0.00**	0.00
	(0.00)	(0.00)
# children pre 70=2 × Coercion intensity	0.01***	0.01
	(0.01)	(0.01)
# children pre 70=3 × Coercion intensity	0.01	-0.01
	(0.01)	(0.01)
# children pre 70 ≥4 × Coercion intensity	0.01	-0.00
	(0.01)	(0.01)
Observations	44762	44762
State Fixed Effects	Yes	Yes
Mean of dep. var.	1.817	1.817

Notes: This table presents the robustness results on the impact of coercion intensity on births. The unit of observation is the household. District controls include literacy rates, workers' share, farmers' share, household industry, middle school achievements, scheduled casts and tribes. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Table A5: Effect of coercion on number of births post-1973

	Poisson (1)	OLS (2)
Coercion intensity	-0.01**	-0.00
	(0.00)	(0.00)
# children pre 73=1 × Coercion intensity	0.01***	0.01*
	(0.00)	(0.01)
# children pre 73=2 × Coercion intensity	0.02***	0.02***
	(0.00)	(0.01)
# children pre 73=3 × Coercion intensity	0.02**	0.01
	(0.01)	(0.01)
# children pre 73=4 × Coercion intensity	0.01	-0.00
	(0.01)	(0.01)
Observations	49631	49631
Household Controls	Yes	Yes
District Controls	Yes	Yes
State Fixed Effects	Yes	Yes
Mean of dep. var.	1.581	1.581

Notes: This table presents the robustness results on the impact of coercion intensity on births. The unit of observation is the household. District controls include literacy rates, workers' share, farmers' share, household industry, middle school achievements, scheduled casts and tribes. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

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Table A6: Effect of coercion on number of births post-1979

	Poisson (1)	OLS (2)
Coercion intensity	-0.01***	-0.01***
	(0.00)	(0.00)
# children pre 79=1 × Coercion intensity	0.01**	0.01*
	(0.00)	(0.00)
# children pre 79=2 × Coercion intensity	0.02***	0.02***
	(0.00)	(0.00)
# children pre 79=3 × Coercion intensity	0.03***	0.02***
	(0.01)	(0.00)
# children pre 79=4 × Coercion intensity	0.03***	0.02***
		(0.01)
	(0.01)	
Observations	55383	55383
Household Controls	Yes	Yes
District Controls	Yes	Yes
State Fixed Effects	Yes	Yes
Mean of dep. var.	0.858	0.858

Notes: This table presents the robustness results on the impact of coercion intensity on births. The unit of observation is the household. District controls include literacy rates, workers' share, farmers' share, household industry, middle school achievements, scheduled casts and tribes. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Table A7: Effect of coercion on number of births post-1982

	Poisson (1)	OLS (2)
Coercion intensity	-0.02***	-0.01***
	(0.01)	(0.00)
# children pre 82=1 × Coercion intensity	0.01**	0.01**
	(0.01)	(0.00)
# children pre 82=2 × Coercion intensity	0.03***	0.01***
	(0.01)	(0.00)
# children pre 82=3 × Coercion intensity	0.03***	0.01***
	(0.01)	(0.00)
# children pre 82=4 × Coercion intensity	0.04***	0.01***
	(0.01)	(0.00)
Observations	55344	55344
Household Controls	Yes	Yes
District Controls	Yes	Yes
State Fixed Effects	Yes	Yes
Mean of dep. var.	0.454	0.454

Notes: This table presents the robustness results on the impact of coercion intensity on births. The unit of observation is the household. District controls include literacy rates, workers' share, farmers' share, household industry, middle school achievements, scheduled casts and tribes. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Table A8: Effect of placebo intensity (1972-73 spike) on number of births post-1976

	Poisson	OLS
	(1)	(2)
Placebo Coercion intensity	0.02***	0.02*
	(0.01)	(0.01)
# children pre 76=1 × Placebo Coercion intensity	-0.03***	-0.03**
	(0.01)	(0.01)
# children pre 76=2 × Placebo Coercion intensity	-0.05***	-0.04***
	(0.02)	(0.01)
# children pre 76=3 × Placebo Coercion intensity	-0.11***	-0.06***
	(0.02)	(0.01)
# children pre 76≥4 × Placebo Coercion intensity	-0.10***	-0.04**
	(0.02)	(0.02)
Observations	53057	53057
Household Controls	Yes	Yes
District Controls	Yes	Yes
State Fixed Effects	Yes	Yes
Mean of dep. var.	1.234	1.234

Notes: This table presents the robustness results on the impact of volontary sterilization intensity on births. The unit of observation is the household. District controls include literacy rates, workers' share, farmers' share, household industry, middle school achievements, scheduled casts and tribes. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Table A9: Impact of sterilization on number of births

	Poisson	OLS
	(1)	(2)
Sterilization 1976-77 (%)	-0.00	-0.00
	(0.00)	(0.00)
1 child pre 1976 × Sterilization	-0.02***	-0.02***
	(0.00)	(0.01)
2 children pre 76 × Sterilization	-0.03***	-0.03***
	(0.01)	(0.01)
3 children pre 76 × Sterilization	-0.03***	-0.02***
	(0.01)	(0.01)
4 children or more pre 76 × Sterilization	-0.02*	-0.01
	(0.01)	(0.01)
Observations	58,928	58,928
Household Controls	Yes	Yes
District Controls	Yes	Yes
State Fixed Effects	Yes	Yes
Mean of dep. var.	1.190	1.190

Notes: This table presents the results on the impact of sterilization intensity on the number of kids born post-1976. The unit of observation is the household. The specifications in col. (1) is estimated using Poisson & col. (2) using OLS. Household controls include the share of educated females in households, the share of educated males in households, and caste and urban sector dummies. District-level controls include the share of SC pop., ST pop., and literate pop. & urban pop. in 1971. Robust standard errors, clustered by district. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Table A10: Domestic violence and acceptance: Correlations

	(1) IPV	(2) Unfaithfull	(3) Disrespect	(4) Goes out	(5) Neglects	(6) does not cook
Forced Vasectomies	0.031***	0.074***	0.038***	0.0529***	0.022**	0.043***
	(0.0085)	(0.011)	(0.0093)	(0.0091)	(0.00890)	(0.00835)
Observations	5844	27448	27443	27444	27448	27445
Mean	0.909	0.492	0.479	0.504	0.541	0.372

Standard errors in parentheses

Notes: This table presents the results of a static difference specification stated in equation 5 of coercion intensity on variables related to gender norms, using the 1999 Demographic and Health Survey. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Table A11: Decision-making and work: Correlations

(7)	(1)	(2)	(3)	(4)	(5)	(6)
	Cook	Health	Jewellry	Family	Market	Visit
Forced Vasectomies	0.0011	-0.054***	-0.037***	-0.0319***	0.015***	0.0024*
	(0.0035)	(0.0067)	(0.0067)	(0.0067)	(0.0030)	(0.0014)
Observations	27449	27449	27449	27449	27449	27449
Mean	0.931	0.515	0.554	0.489	0.0499	0.106

Standard errors in parentheses

Notes: This table presents the results of a static difference specification stated in equation 5 of coercion intensity on variables related to gender norms, using the 1999 Demographic and Health Survey. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

Table A12: Sterilization and fertility: Correlations

	(1)	(2)	(3)
	Sterilized	Discussed Vasectomies	Husband desire fertility
Forced Vasectomies	-0.0137**	-0.0115***	0.0352*
	(0.00649)	(0.00318)	(0.0207)
Observations	27449	27439	13379
Mean	0.453	0.036	1.831

Standard errors in parentheses

Notes: This table presents the results of a static difference specification stated in equation 5 of coercion intensity on variables related to gender norms, using the 1999 Demographic and Health Survey. *, **, and *** represent statistical significance at 10%, 5%, and 1% levels.

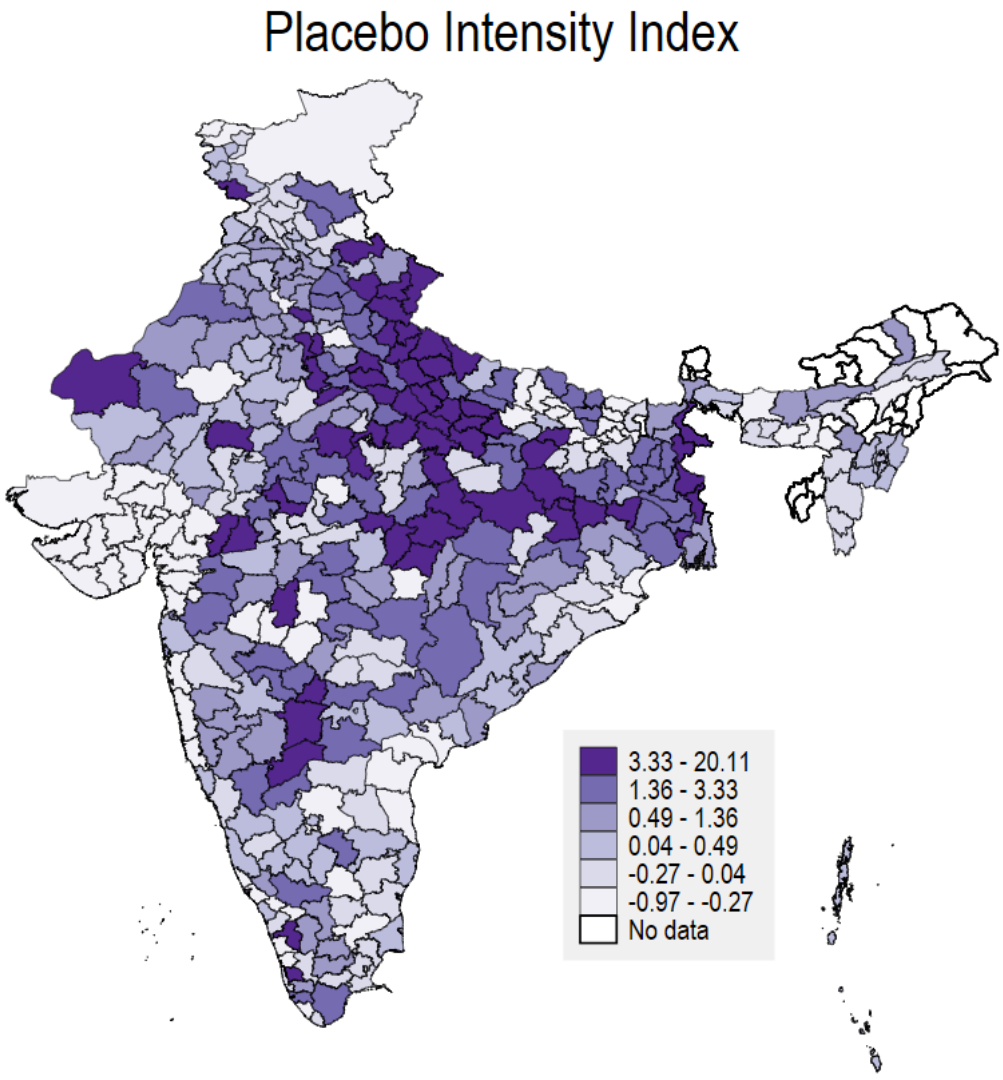

Figure A1: Placebo Intensity Index: 1973