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Understanding the Puzzle of Healthcare Use:

Evidence from India

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Executive Summary

In India, households' use of healthcare services is a puzzle. The puzzle is as follows. Even though most private healthcare providers have no formal medical qualifications, a significant fraction of households uses fee-charging private healthcare services, which are not covered by insurance. While the absence of public healthcare providers could, in part, explain the high use of the private sector, this cannot be the only explanation. The private share of primary healthcare use is higher even in the market with a qualified doctor offering free care through public clinics, and still majority of primary healthcare visits are made to providers with no formal medical qualification. This paper examines the reasons for the existence of such a puzzle in India. Combining contemporary household-level data with archival records, I examine the aggressive family planning program implemented during the emergency rule in the 1970s and explore whether the coercion, disinformation, and carelessness under which the program was undertaken could partly explain the puzzle. Exploiting the timing of emergency rule, state-level variation in the number of sterilizations, and an IV approach, I show that the states heavily affected by sterilization policy have a lower level of public healthcare usage today. I also provide the mechanism for this practice showing that the states heavily affected by forced sterilization have a lower level of confidence towards the government hospitals and doctors and a higher level of confidence towards private hospitals and doctors in providing good treatment.

1. Introduction

In India, households' use of healthcare services is a puzzle. The puzzle is as follows. First, a significant fraction of households uses fee-charging private healthcare services, which is not covered by insurance (CPR 2011; International Institute for Population Sciences (IIPS) 2017; Peters et al. 2002).[1] Second, major fractions of private healthcare providers have no formal medical qualifications (Rohde and Viswanathan 1995; Banerjee, Deaton, and Duflo 2004).[2] Public healthcare providers are more qualified and offer free services but have around 20% of the market share (Muralidharan et al., n.d.).[3] Third, while the absence of public healthcare facilities or personnel could, in part, explain the high use of the private sector, this cannot be the only explanation. The private share of healthcare use is higher even in the market with a qualified doctor offering free care in a public hospital, and still majority of healthcare visits are made to providers with no formal medical qualification (Das, Holla, et al. 2016). Fourth, within India, there is a considerable variation in the types of healthcare usage across states (Peters et al. 2002; Muralidharan et al., n.d.). Why is such a puzzle exist in India?

This paper examines a plausible reason for the existence of such a paradox in India. In particular, I question whether the current practice of healthcare use has historical routes. Combining contemporary household-level data with archival records, I examine the aggressive family planning program implemented in India during the emergency rule in the 1970s and explore whether the coercion, disinformation, and carelessness under which the program was undertaken could partly explain the puzzle.

India experienced a brief period of autocratic rule between June 1975 and January 1977.[4] The autocratic period, popularly known as "the emergency," was proclaimed by then prime minister Indira Gandhi which, under the Indian constitution, suspended a wide range of civil

[1] For example, India has one of the highest proportions of private health spending anywhere in the world constituting 82% of all health expenditure. Only five countries (Cambodia, the Democratic Republic of the Congo, Georgia, Myanmar, and Sierra Leone) have a higher dependence on private financing (Peters et al. 2002).

[2] For example, according to the Indian Medical Association, about 1 million unqualified doctors or quacks practice allopathic medicine in India. https://www.ima-india.org/ima/left-side-bar.php?pid=291. Accessed on 28th January 2021

[3] The MAQARI project. http://pubdocs.worldbank.org/en/161151429125257286/pdf/13-Medical-Advice-Quality-and-Availability-in-Rural-India-MAQARI-Karthik-Muralidharan.pdf. Accessed on 28th January 2021.

[4] The autocratic rule (the emergency) was officially ended in March 1977. However, it was substantially relaxed in January 1977.

liberties. A unique policy that affected the general population during this period was the introduction of an aggressive family planning program through forced sterilization.[5] The policy—implemented in April 1976—led to a sharp increase in the number of sterilizations (see Figure 1). About 8.3 million sterilizations were performed in a single year between April 1976 and March 1977, more than three times the previous year's figure. Historical records, court rulings, and anecdotal evidence suggest that these sterilization targets were accomplished through incentives and disincentives, coercion, disinformation, carelessness, and fear (Shah Commission of Inquiry 1978; Panandiker, Bishnoi, and Sharma 1978).

I hypothesize that the forced sterilization policy may have unintended effects on future healthcare usage in India. There are genuine reasons to believe that the policy could have unintended consequences. First, all sterilizations, mostly administered through coercion and disincentives, were performed by government doctors in public hospitals or temporary sterilization camps established by the government. Due to increased pressure, targets to meet, and carelessness, no aftercare was administered, which sometimes led to serious side effects, including death. Second, disinformation was delivered by public healthcare workers to motivate individuals for sterilization. In a survey of 4 Indian states during the force sterilization period, Panandiker, Bishnoi, and Sharma (1978) provide a summary of the kinds of disinformation provided to motivate sterilization acceptors:

> *What was often told was that sterilization, vasectomy or tubectomy, is a simple, quick and safe operation which stops child birth permanently... To the more circumspect of the prospective clients it was also quietly added that in case of need for a child-birth later it could be* ***reversed also****. Nobody explained how an operation is performed, in what manner it stops the conception and what its consequences are to the health of a person… As the program was generally time and target bound, their mission was "Quick Catch" rather than to carry conviction. (p. 104)*

Considering these insights, I examine the consequences of forced sterilization policy on India's future healthcare practice.

To test my hypothesis, I use data from India's national representative National Family and Health Survey in 2015-16 (NFHS-4) to examine the sources of households' healthcare use. To measure the exposure to forced sterilization policy, I digitize and use various state-level

[5] From now on, I refer "the aggressive family planning program through forced sterilization" as "forced sterilization policy" or "the policy" for simplicity

sterilization performance statistics from the historical yearbooks published by the Ministry of Health and Family Planning, Government of India. I find that higher exposure to the forced sterilization policy is associated with lower use of public healthcare facilities today. My results are robust to a variety of controls and a number of alternative measures of exposure to the forced sterilization policy.

After establishing that forced sterilization policy has a negative association with the use of public healthcare facilities today, I next turn to the task of addressing the concern of reverse causality and omitted variable bias using an instrumental variable approach. To identify the causal impact, I need an instrument that exogenously determine the sterilization performance during this period. For this, I exploit the unique history of the implementation of forced sterilization policy and use distance from New Delhi to state capitals as an instrument. I construct the instrument considering the insights from the emergency period that the forced sterilization policy was aggressively undertaken due to the active role played by Sanjay Gandhi: the son of the prime minister Indira Gandhi (Gwatkin 1979; Chandra 2017; Indian National Congress 2011; Nayar 2013). Due to Mr. Gandhi's personal influence, forced sterilization was aggressively undertaken in northern parts of India, and distance from New Delhi, which was *previously irrelevant*, emerged as an important determinant of excess sterilization performance and itself capable of explaining two-thirds of the variation in performance among the states (Gwatkin 1979). Based on these insights, I use distance from New Delhi to state capitals as an instrument to capture the variation in exposure to the forced sterilization policy. The unique history of the implementation of forced sterilization during the emergency period provides a basis for the exogeneity of my instrument. I also perform two falsification tests to empirically show the exogeneity of my instrument.[6]

The IV regression produces estimates that are similar to the OLS estimates. I find that an average increase in excess sterilization (from zero to about 3.2 times) decreases the use of public healthcare facilities today by about 18.6 percentage points. This is relative to a sample mean of 44.2 percent for our sample as a whole. It suggests that the forced sterilization policy has a large, negative, and significant effect on the use of public healthcare facilities in India.

Finally, I examine the plausible channels through which the forced sterilization policy

[6] This instrument is also empirically tested in Sur (2021) to examine the impact of forced sterilization policy on India's current vaccination practice.

affects the use of public healthcare facilities. To explore the mechanisms, I first examine the reasons for which households do not use public healthcare facilities. I use the data from NFHS-4 that asks an additional question to households who do not use public healthcare facilities, explaining the reasons. I find that the exposure to forced sterilization policy on standard supply-side constraints—such as no nearby facility, facility timing not convenient, health personnel often absent, and waiting time too long—are minimum, sometimes negative, and statistically insignificant. This suggest that supply side factors are less likely to be the mechanism for higher usage of private healthcare facilities. However, higher exposure to the forced sterilization policy has a positive and significant effect on household answering 'poor quality of care' and 'others' as their reasons for not using public health care facilities.

I dig a little deeper to understand the reasons for household responding 'poor quality of care' and 'others' as their reasons for not using public healthcare facilities. Because public healthcare workers delivered disinformation to motivate individuals for sterilization during the forced sterilization period, I additionally check whether mistrust is a plausible channel. I use data from Indian Human Development Survey-II in 2011-12 (IHDS-II) on confidence in institutions to examine how exposure to forced sterilization policy affects trust. The IHDS-II asks households separate questions on confidence in government hospitals and doctors and private hospitals and doctors to provide good treatment. I find that households belonging to highly exposed states to forced sterilization policy exhibit a lower level of confidence in government hospitals and doctors and exhibit a higher level of confidence in private hospitals and doctors in providing good treatment. The results imply that a lower level of confidence or mistrust towards government hospitals and doctors is a plausible mechanism for lower usage of public healthcare facilities.

This paper builds on and contributes to diverse literature. First, it contributes to our understanding of the puzzling factors associated with India's current healthcare use. Several studies have documented that supply-side determinants, such as lower public healthcare spending, no nearby healthcare facility, absence of healthcare personnel, facilities often closed, and quality of healthcare, as contributing factors for lower usage of public healthcare facilities in India (Peters et al. 2002; Banerjee, Deaton, and Duflo 2004; De Costa and Diwan 2007; Das, Holla, et al. 2016). Besides, due to higher usage of private health care facilities in India, there are recent initiatives towards training unqualified private healthcare practitioners for better healthcare delivery (Government of Telangana 2015; Das, Chowdhury, et al. 2016). However, little causal evidence

exists on why people use private healthcare facilities in the first place, especially in the market with a qualified doctor offering free care in a public hospital. Similarly, we know little about the causal pathways through which individual or social characteristics influence households' decisions to use healthcare services. I build on and contribute to this literature in three ways. First, I provide an empirical investigation of the importance of historical events in shaping India's current healthcare usage. Second, I offer causal evidence through which historical characteristics influence decision-making for households' healthcare usage. Third, I provide a plausible mechanism for this puzzling practice today.

Health care provision is a public good, and universal health coverage is considered to be an integral part of Sustainable Development Goals (Goal 3, Target 3.8). In order to achieve universal healthcare coverage in low and middle-income countries, international organizations such as the World Bank advocate delivering healthcare through free or nominally priced medical care in publicly-run facilities staffed by qualified doctors (World Bank 2003). However, a significant fraction of households in these countries visits fee-charging private health care provider (Grépin 2014). Furthermore, households in low and middle-income countries spend a substantial portion of their resources on healthcare (World Bank Group 2019).[7] This paper builds on and contributes to the literature on understanding a potential reason for such a practice. I present evidence suggesting that historical interventions in the past could have a long-term and persistent effect on such health-seeking behavior.

The remainder of the paper is structured as follows. Section 2 provides a brief background of the emergency period and the forced sterilization policy. Section 3 explains the historical and contemporary data used in the empirical analysis. Section 4 presents the OLS and IV results. Section 5 offers the mechanisms, and section 6 concludes.

2. Context: Emergency Rule and the Forced Sterilization in India

On June 25, 1975, Prime minister Indira Gandhi declared a national emergency under Article 352 of the Indian constitution.[8] The exact reason for the declaration of emergency rule is controversial

[7] For a detailed overview of healthcare market, healthcare utilization, and access to healthcare in developing countries, see Dupas (2011); Das and Hammer (2014); and Dupas and Miguel (2017)

[8] Article 352 (1) states that "If the President is satisfied that a grave emergency exists whereby the security of India or of any part of the territory thereof is threatened, whether by war or external aggression or armed rebellion, he may, by Proclamation, made a declaration to that effect in respect of the whole of India or of such part of the territory thereof as may be specified in the Proclamation Explanation A Proclamation of Emergency declaring that the security of India

to this day. However, sociologists, political scientists, and historians agree that a combination of economic and political difficulties concerning her and India could be the most predictable factor.[9]

The emergency rule allowed Ms. Gandhi to suspend a wide range of civil liberties under Indian constitution. Thousands, including leading opposition leaders, were arrested, the press censored, public gatherings and strikes were declared illegal. With all the power in Ms. Gandhi's hand, she undertook a series of constitutional amendments and introduced new legislations to govern the country. The executive power of the emergency also allowed the central government to give directions to states as to the manner in which the executive power thereof is to be exercised. However, on January 23, 1977, Ms. Gandhi unexpectedly called for an election in March. She released opposition leaders from jail, lifted press censorship, and permitted public meetings once again. The emergency period officially ended in March after the Indian National Congress party's defeat in the Lok Sabha election (lower house of the Indian parliament).

A distinctive feature synonym with the emergency period was an aggressive family planning program through sterilization.[10] It started in April 1976, just about a year after the proclamation of the emergency. The aggressive family planning program started with a New Population Policy (NPP) introduced to the parliament by the Ministry of Health and Family Planning.[11] The NPP mainly concentrated on propagating sterilization as the method of family planning. With the NPP's introduction, the central government authorized and endorsed a series of coercive measures for sterilization and, in extreme cases, the provision for compulsory sterilization. The central and state governments substantially increased the financial rewards for sterilization acceptors. Through a range of incentives and disincentives, they pressured their employees to get sterilized and motivate others to do so. In some cases, quotas were imposed at the district level. Additionally, state and central government employees were given quotas to produce people for sterilization. In other cases, citizens were required to produce sterilization certificates to access basic facilities, such as public healthcare, irrigation, and subsided food through ration cards. Some extreme measures were also undertaken. For example, the state

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or any part of the territory thereof is threatened by war or by external aggression or by armed rebellion may be made before the actual occurrence of war or of any such aggression or rebellion, if the President is satisfied that there is imminent danger thereof."

[9] For a detailed overview of the emergency period, see Dhar (2018) and Nayar (2013).

[10] For a detailed overview of the family planning program during the emergency rule period, see Panandiker, Bishnoi, and Sharma (1978), Shah Commission of Inquiry (1978), and Gwatkin (1979).

[11] For a detail overview about the NPP, see Singh (1976).

government in Maharashtra passed a bill allowing compulsory sterilization of couples with three or more children (Shah Commission of Inquiry 1978; Panandiker, Bishnoi, and Sharma 1978).[12]

The aggressive nature of the family planning program and concentration of effort on propagating sterilization only resulted in about 8.3 million sterilizations between April 1976 and March 1977, more than three times the number in the previous year. During the peak, over 1.7 million sterilizations were performed in September 1976 alone, a figure that equaled the annual average for the ten preceding years (Gwatkin 1979). The majority of the sterilization involved the men undergoing vasectomy. About 75% of the total sterilizations was achieved through vasectomy.

Historical records, court rulings and previous studies suggest that incentives and disincentives were provided, sterilization quota was imposed, and coercion was enforced to motivate individuals to undergo sterilization during this period.[13] For example, as a form of incentives in Uttar Pradesh, a motivation bonus—of 6 rupees per person motivated—for sterilization were provided to the full-time family planning staff in excess of their quota. Additionally, as a form of disincentives, over 24000 employees of the Department of Health and Family planning were not paid their salary in June 1976 for their failure to complete their quota for the April-June quarter (Panandiker, Bishnoi, and Sharma 1978). Some extreme rules were also made. In a letter by the Chief Secretary of Bihar (the senior-most position held in the civil services of the states in India), the following decision was informed to Divisional Commissioners:

> *"Non-achievement of targets would render officers and staff of Health Department liable to punishment e.g. censure in case of achievement short of cent per cent, stoppage of increment with cumulative effect if achievement was less than 75 per cent and termination of service if achievement fell short of 50 per cent"* (Shah Commission on Inquiry 1978 p. 172)

Anecdotal evidence suggest that individuals were influenced and disinformed to accept sterilization during the forced sterilization period. In a survey of 4 Indian states during the force sterilization period, Panandiker, Bishnoi, and Sharma (1978) found that about 72 percent of the sterilized people are motivated by the influence of government officials and more than 58 percent

[12] This was not approved by the central government and eventually returned to the state for revision.
[13] For a detailed discussion on quota enforcement, incentives and disincentives, coercion, and fear towards sterilization during the emergency, see Panandiker, Bishnoi, and Sharma (1978) and Shah Commission of Inquiry (1978).

were influenced by family planning (healthcare) staff. Only about 19 percent of them did with their own initiatives and the remaining 9 percent were motivated by friends and relatives. Non have adopted sterilization due to the lure of money and no one cited any case where money had played a motivating part. They note the following environment in which most individuals were sterilized:

> *"The common sites for the camps in the rural areas were big villages, locations where village festivals and fairs were held, including weekly markets, and sometimes the primary health centers themselves. In the towns the camps were generally held near the crowded localities inhibited by the lower middle and poor class people. Preparations for the camps were made well in advance. Mobile units of medical staff were deputed to perform the operations. Family planning field staff would go round the neighboring villages or localities usually in government vehicles to exhort and "persuade" people to come forward for sterilization. Revenue officials, block staff and school teachers were also often pressed into service for mobilizing people for operation at the camps and generally free transport—trucks, pick-ups, etc.— were provided to carry people to camp-sites. At the camps, the assembled people were given refreshments, usually tea and snacks, before operation, and care was taken that nobody slipped away. Where camps were held jointly or separately for tubectomy, women patients were kept in improvised wards for 4 or 5 days and, besides free dressing and medicine, were given free meals. Every acceptor, whether of vasectomy or tubectomy, was also given a cash award at the time of his or her discharge from the camp." (p. 108-111)*

The aggressive nature of the program also led to serious consequences including medical complications, death, and sterilization of ineligible individuals. Once a person was sterilized and allowed to go home, he or she was generally forgotten and left to fend for himself or herself in case any complications arose. Due to increased pressure, targets to meet, and carelessness, no aftercare was administered, which sometimes led to serious side effects, including death. According to the report published by Indian government, 1778 complaints of deaths related to sterilization have been registered. In several instances, ineligible individuals were sterilized as well. For example, in Uttar Pradesh, 11434 individuals with less than two children, 164 unmarried individuals and 69 persons over 55 years were sterilized (Shah Commission of Inquiry 1978).

This was the first major program since independence where the people were pitted against the government. Everything the later did was suspect and created a credibility gap in the

government's relationship with the people. The level of coercion, disinformation, and carelessness associated with sterilization during this period allowed a free scope for the rumors and fears to spread. As a result, a large number of people tried to avoid being caught for sterilization. Whenever a sterilization campaign was launched or camp held, a scare spread through word of mouth to distant places and among a large number of people *"Nasbandi-wale aerate hein, Hoshiya rahena, Bhai."* (The operators of sterilization are coming. Beware.) (Panandiker, Bishnoi, and Sharma 1978).

The legacy of the forced sterilization policy also remained in peoples' minds and can be felt even after the emergency rule is over. For example, the sterilization program become the biggest political issue and played an important role in the subsequent elections in March 1977 and the defeat of Ms. Indira Gandhi's Indian National Congress party. To repair the family planning's legacy, the Indian government changed the name of the Department of Family Planning to the Department of Family Welfare. In the post-emergency period, the family planning program shifted from vasectomy to tubectomy, where women become as the primary target (Basu 1985). The word "emergency" itself became synonymous with "sterilization," and individuals even today refer to the emergency period as the sterilization period (Tarlo 2000). The emergency rule remains controversial today and it is considered to be one of the darkest periods in the history of Indian democracy.

3. Data Sources and Description

3.1. Historical Data

The historical data on sterilization for this paper comes from the historical yearbooks published by the Ministry of Health and Family Planning, Department of Family Planning, Government of India. The yearbooks report yearly statistics on family planning programs performed between April and March every year along with various demographic and health statistics. Notably, the historical yearbooks include the number of sterilizations performed and the types of sterilization performed at the state-level.

I collected the historical yearbooks from the Ministry of Health and Family Welfare archive and digitized the sterilization data. Figure 1 presents the total number of sterilizations along with the types of sterilization performed in India every year since the starting of the program in 1956.

As we can see, there is a sharp increase in the total number of sterilizations performed in 1976-77. We also see that most sterilizations performed during this period were vasectomy.

Figure A1 in the Appendix presents the total number of sterilizations performed between April 1976 and March 1977 at the state-level. To provide a better measure of state-level variation in the exposure to the forced sterilization policy, I present the number of excess sterilizations performed in 1976-77 normalized by its performance in 1975-76 in Figure 2. To provide a visual representation, I group the sterilization measures into several broad categories and denote a greater number of sterilizations performed by darker shades. As we can see, the exposure to the forced sterilization policy was particularly higher in northern parts of India. As I explain in detail in my IV analysis, this was because of the unique history of this period where Mr. Sanjay Gandhi: the son of the prime minister played an important role. Due to his personal influence forced sterilization was aggressively undertaken in northern parts of India, and distance from New Delhi, which was previously irrelevant, emerged as an important determinant of excess sterilization performance.

3.2. Contemporary Data

I combine the historical data on exposure to forced sterilization policy with two nationally representative household survey datasets from India—National Family and Health Survey in 2015-16 (NFHS-4) and Indian Human Development Survey-II in 2011-12 (IHDS-II). The NFHS-4 is a stratified two-stage sample that covers all Indian states and union territories. The IHDS-II surveys cover all states and union territories of India, with the exception of Andaman and Nicobar Islands and Lakshadweep.

My primary outcome is the data on household's sources of healthcare from NFHS-4. The NFHS-4 asks a question on the source of healthcare that household members generally use when they get sick.[14] It categorizes healthcare sources into four groups: Public health sector, NGO or trust hospital/clinic, private health sector, and others. I construct an indicator variable measuring whether the household members generally use the public health sector. In the NFHS-4 sample, about 45% of households report using public healthcare facilities.[15] In Figure 3, I present the

[14] The question the NFHS-4 ask is– When members of your household get sick, where do they generally go for treatment?
[15] This number is weighted by sample weights. The unweighted figure is about 47%.

average number of households who generally use public healthcare facilities at the state-level. As we can see, there is a wide variation in the use of public healthcare facilities at the state-level. This is consistent with previous findings by (Peters et al. 2002; Muralidharan et al., n.d.), showing that there is a large variation in the types of healthcare usage across states.

I also use additional data to examine the mechanism through which the forced sterilization policy influence decision-making for healthcare utilization. My first additional outcome variables to explore the mechanisms are the reasons for which households do not use public healthcare facilities from NFHS-4. The NFHS-4 asks an additional question to households who do not use public healthcare facilities, explaining the reasons. Respondents are allowed to provide multiple answers. It reports a total of 6 reasons that include: no nearby facility, facility timing not convenient, health personnel often absent, waiting time too long, poor quality of care, and others. I consider each possible reason separately as my outcome of interest to understand the factors that are affecting a household's intention not to visit public healthcare facilities.

My second additional outcome variable to explore the mechanism is the data on confidence in institutions from Indian Human Development Survey-II in 2011-12 (IHDS-II). Because disinformation was delivered by public healthcare workers during the forced sterilization period, I use this data to test whether mistrust is a plausible channel for the current practice of healthcare use. The IHDS-II asks households questions on confidence in hospitals and doctors to provide good treatment. It asks questions for government hospitals and doctors and private hospitals and doctors separately. The respondents can choose between three possible answers: a great deal of confidence, only some confidence, and hardly any confidence at all. The IHDS-II assigns the value 1 to "a great deal of confidence," 2 to "only some confidence," and 3 to "hardly any confidence at all."

Finally, I also use aggregate data on population and healthcare facilities and personnel to control for potential covariates that could affect both exposures to forced sterilization and current healthcare utilization. I collect population data from the 2011 population census to construct state-level population density. Additionally, I collect healthcare facility and healthcare personnel data from Rural Health Statistics to construct hospital per 1000 population and doctors per 1000 population at the state level.

4. Empirical Analysis

4.1. Correlation Analysis and OLS Estimates

I begin by showing a simple relationship between historical exposure to the forced sterilization policy and India's current healthcare use through a scatter plot. Figure 4 presents the correlation between the total number of sterilizations performed in 1976-77 (expressed in 100,000 individuals) and the percentage of households who generally use public healthcare facilities calculated from NFHS-4 at the state-level. In Figure A2 in the Appendix, I present the same correlation plot but scaling the symbols so that the sizes represent the population of the state (from the 2011 census) for a better visualization. As we can see, the sterilization performance in 1976-77 is strongly associated with lesser use of public healthcare facilities.

I then examine this relationship by controlling for household, geographic, and health care characteristics that are also potentially important determinants for a household's healthcare utilization. My baseline estimating equation is:

$$y_{\mathrm{hcs}} = \alpha + \beta \text{Forced Sterilization}_{\mathrm{s}} + \gamma_1 \mathrm{X}^{\mathrm{H}}_{\mathrm{hcs}} + \gamma_2 \mathrm{X}^{\mathrm{C}}_{\mathrm{cs}} + \gamma_3 \mathrm{X}^{\mathrm{S}}_{\mathrm{s}} + \epsilon_{\mathrm{hcs}} \qquad (1),$$

where *h* indexes households, *c* NFHS-4 clusters, and *s* states. The variable y_{hcs}, denotes my outcome variable that varies at the household level *h*. It is an indicator variable that measures whether the household usually uses public healthcare facilities or not. The variable $Forced\ Sterilization_s$ denotes one of our measures of exposure to the forced sterilization policy in state *s*. (I will discuss this variable in more detail below). $\mathrm{X}^{\mathrm{H}}_{\mathrm{hcs}}$, $\mathrm{X}^{\mathrm{C}}_{\mathrm{cs}}$, and $\mathrm{X}^{\mathrm{S}}_{\mathrm{S}}$ are vectors of household-level, NFHS-4 cluster-level, and state-level control variables, respectively.

The household-level control variables $\mathrm{X}^{\mathrm{H}}_{\mathrm{hcs}}$ include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether the household has a BPL (below poverty line) card, and an indicator for whether any household member is covered by health insurance. These controls are intended to proxy for household income and wealth. $\mathrm{X}^{\mathrm{C}}_{\mathrm{cs}}$ is a vector of NFHS-4 cluster-level covariates intended to capture the characteristics of the place where the household lives, such as altitude in meters, altitude squared, and an indicator of whether the cluster is urban. $\mathrm{X}^{\mathrm{S}}_{\mathrm{S}}$ is a vector of covariates meant to capture state-level characteristics that are likely to be correlated with the use of public healthcare facilities. They

include population density per square kilometers (in log), hospital per 1000 population, and doctors per 1000 population. Because NFHS-4 is a stratified two-stage sample designed to produce indicators at the district, state, national levels and separate estimates for urban and rural areas, under-sampling and over-sampling are observed in many places. To account for this issue, I conduct the regression analysis using weights defined in the NFHS-4.

I present the OLS estimates of equation (1) in Table 1. In the first column, I use the total number of sterilizations performed in a state in 1976-77 (expressed in 100,000 individuals) as my measure of the intensity of the forced sterilization policy. The estimated coefficient for $Forced\ Sterilization_s$, β, is negative and statistically significant. This is consistent with my hypothesis that the forced sterilization has a negative effect on households' usage of public healthcare facilities.

A possible concern with the above estimation is that the distribution of my explanatory variable, Total Sterilizations Performed in 1976-77 (in 100,000), is right-skewed with a large number of observations taking on small values. We can see this from Figure A3, which plots the histogram of the number of sterilizations performed in 1976-77 at the state-level. To account for this issue, I estimate equation (1) using the natural log of the number of sterilizations performed in 1976-77 as my measure of the intensity of the forced sterilization policy. I present the estimates in Column 2. The results are similar to column (1) as I find a significant negative correlation between this measure of forced sterilization and the usage of public healthcare facilities.

In Columns 1 and 2, I use the total number of sterilizations performed in 1976-77 to measure the forced sterilization policy's exposure. One potential limitation of this measure is that it does not account for the number of sterilizations that would have happened anyway in the absence of the National Population Policy (NPP) under which forced sterilization policy was undertaken. Accounting for this difference is important because sterilization, as a family planning method, has been performed in India since the 1950s, as shown in Figure 1. In Column 3, I account for this issue and use an alternative measure of forced sterilization policy measured by excess sterilization performed in 1976-77 over and above the 1975-76 numbers.[16] Additionally, in

[16] Alternative measures of excess sterilization performed in 1976-77, such as deducting the average of the last two years or last three years, are also possible. Using such alternative measures produce nearly identical results.

Column 4, I report estimates using the natural log of the excess number of sterilizations performed in 1976-77. As we see, the results are similar using these alternative sterilization measures.

Finally, I report the estimates considering a better measure of forced sterilization policy that collectively accounts for India's emergency rule, size of states, and state-level historical characteristics associated with sterilization performance. The estimates reported in Columns 3 and 4 use the absolute number of sterilizations to measure forced sterilization policy. Some shortcomings of these measures are that they a) do not account for the difference in the size of states and b) do not account for any state-level historical factors associated with the level of sterilization performance that I do not capture in our estimation. To account for these issues, in Column 5, I report the estimates normalizing the excess sterilization performed using sterilization figures in the previous year (1975-76). Specifically, I define $Forced\ Sterilization_s$ as,

$$Excess\ Sterilization_s = \frac{\#\ of\ sterilization\ in\ \ (1976{\sim}77)_s - \#\ of\ sterilization\ in\ (1975{\sim}76)_s}{\#\ of\ sterilization\ in\ (1975{\sim}76)_s}$$

I normalized the previous years' figures (which was also a part of the emergency rule period) to account for the effect of emergency rule in India and isolate the impact of forced sterilization policy from India's emergency rule.[17] This is because India's emergency rule could itself affect my outcome in several ways since this period was primarily governed by autocratic rule, and numerous policy changes were made during this period. As we see, the results I obtain in Column 5 remain robust to this alternative specification.

In Section B of the Appendix, I present a series of robustness and sensitivity checks. I briefly discuss them here. I first verify whether my results are sensitive to the inclusion and exclusion of controls. To verify this, I report estimates adding each set of controls sequentially for each of my measures of forced sterilization (Table B1–B5). I also check my results for robustness to considering excess vasectomy only, which constituted the majority of sterilization operations

[17] Using alternative measures such as normalizing by the average of the last two years or last three years also produce nearly identical results.

(as can be seen from Figure 1), as an alternative measure of $Forced\ Sterilization_s$ (Table B6). As we can see, my findings are robust to these alternative specifications and different measures of forced sterilization policy.

For the remainder of the analysis, I use state-level excess sterilizations performed in 1976-77 normalized by its sterilization figure the year before in 1975-76 as my baseline measure of exposure to forced sterilization policy (the specification from Column 5 of Table 1). This provides a better measure that accounts for India's emergency rule and normalized by both size and state-level historical characteristics associated with sterilization performance. However, as I illustrate in Table 1, my results do not rest on this choice only.

4.2. Instrumental Variable Analysis

In Section 4.1, I find that forced sterilization policy has a negative association with the use of public healthcare facilities today. In this section, I turn to the task of addressing the concern of reverse causality and omitted variable bias using an instrumental variable approach. To identify the causal impact, I need an instrument that exogenously determine the sterilization performance during this period. For this, I exploit the unique history of the implementation of forced sterilization policy and use distance from New Delhi to state capitals as an instrument to capture the state-level variation in exposure to the excess sterilization performed during the emergency rule in India.

The unique history of the implementation of forced sterilization policy is as follows. Various authors, including Gwatkin (1979), Nayar (2013), and Chandra (2017) describe that the forced sterilization policy was aggressively undertaken due to the active role played by Sanjay Gandhi: the younger son of the then prime minister Indira Gandhi. Although Mr. Gandhi had not been officially elected or held any official position, he rapidly rose to power during the emergency period. Family planning was a key element of his self-declared five-point program that become his central theme of public address.[18] Due to his personal influence, sterilization was aggressively undertaken in the northern part of India, particularly states adjacent to New Delhi. As a result, distance from New Delhi, which was previously irrelevant, emerged as an important determinant of excess sterilization performance and itself capable of explaining two-thirds of the variation in

[18] The other four programs were adult education, abolition of dowry, plantation of trees and eradication of caste system

performance among the states (Gwatkin 1979). This unique history of the implementation of forced sterilization policy during the emergency period and the personal influence of Sanjay Gandhi provides a basis for the construction and the exogeneity of my instrument.

I report the IV estimates in Table 2, including each set of control variables sequentially from Columns 1-4. Panel A reports the first stage estimates for the instrument. The first-stage estimates show that distance from New Delhi to state capitals is negatively correlated with excess sterilization performed during the emergency rule in India. This is consistent with Gwatkin's (1979) finding suggesting that distance from New Delhi is an important determinant of excess sterilization performance. In Panel B, I present the second-stage estimates. The second-stage estimates suggest a negative and statistically significant effect of the forced sterilization policy on the current use of public healthcare facilities. In section C of the Appendix, I check my results for robustness to considering excess vasectomy only, which constituted the majority of sterilization operation (Table C1). As we can see, the estimates are robust to these alternative specifications and similar to the results reported in Table 2.

Not only are the negative coefficient estimates of Table 2 statistically significant, but they are also economically meaningful. Column 4 of Table 2 indicates that an average increase in excess sterilization —from zero to about 3.2 times— decreases the use of public healthcare facilities today by about 18.6 percentage points. This is relative to a sample mean of 44.2 percent for our sample as a whole. It suggests that the forced sterilization policy has a sizable effect on the use of public healthcare facilities in India.

Falsification Tests—My IV strategy rests on the assumption that the instrument I use—distance from New Delhi to the state capital— is exogenous and satisfies the exclusion restriction. I provide some qualitative evidence, including Gwatkin (1979), supporting that my instrument is driven by the personal influence of the son of the then prime minister and in particular, it is not correlated with sterilization performance previously. In this section, I perform two falsification tests to show the exogeneity of my instrument empirically.

My first falsification exercise consists of examining sterilization performance before 1976. Because Mr. Sanjay Gandhi had no personal influence over sterilization before 1976, my instrumental variable should have no predictive power on sterilization performance before 1976. First, I present the relationship between my instrument and excess sterilization performed in 1975-

76 in Panel A of Figure A4. The scatter plot suggests no association between distance from New Delhi to state capitals and excess sterilization performed in 1975-76. I formally test this relationship by estimating a placebo IV analysis in Columns 1 of Table 3. As we can see, distance from New Delhi to state capitals has no predictive power for excess sterilization performed in 1975-76 in the first stage and healthcare facility use in the second stage.

I also undertake a second falsification exercise using excess female sterilization, or tubectomy, which was not the main focus during the forced sterilization period (Shah Commission of Inquiry 1978; Gwatkin 1979; Basu 1985). The forced sterilization program was not focused on female sterilization because tubectomy constituted major abdominal surgery that needed a longer hospitalization period for recovery. On the contrary, vasectomies are relatively quick to perform, and recipients can be discharged on the same day of the operation. During the emergency period, sterilization was mostly performed in temporary camps, and existing infrastructure also struggled to cope with a large number of operations due to the increased pressure and the intention to meet the target. Therefore, tubectomy was not the main focus during this period.

This narrative provides a falsification test for my instrument. I present the relationship between my instrument and excess tubectomies performed in 1976-77 in Panel B of Figure A4. The scatter plot suggests no association between distance from New Delhi to state capitals and excess tubectomy performed in 1976-77. I formally test this relationship by estimating a placebo IV analysis in Column 2 of Table 3. The estimate in Column 2 suggests that my instrument variable does not have predictive power for excess female sterilization performed during the forced sterilization period in the first stage and healthcare use in the second stage.

These two falsification tests somehow suggest that the instrument I use in my estimation is plausibly exogenous. In Section D of the Appendix, I report estimates adding each set of controls sequentially for each falsification test (Tables D1-D2). As we can see, the estimates are robust to these alternative specifications and similar to the results reported in Table 3.

5. Mechanisms

In the previous section, I have found that the forced sterilization policy has had a negative and sizable effect on public healthcare use in India. In this section, I turn to examine plausible channels or mechanisms through which the forced sterilization policy has negatively affected the use of public healthcare facilities in India. I first explore the reasons provided by the households in the

NFHS-4 questionnaire. I then examine confidence in healthcare facilities and doctors as a plausible direct mechanism.

5.1. Examining the Reasons in NFHS-4

The NFHS-4 asks an additional question to households who do not use public healthcare facilities, explaining the reasons. It reports a total of 6 reasons that include: no nearby facility, facility timing not convenient, health personnel often absent, waiting time too long, poor quality of care, and others. Respondents are allowed to provide multiple answers. I consider each answer separately as my outcome of interest to understand whether forced sterilization policy has any effect on households answering these factors as their reasons for not visiting a public healthcare facility.

I present the results in Table 4. As we can see, the exposure to forced sterilization policy on standard supply-side factors—such as no nearby facility, facility timing not convenient, health personnel often absent, and waiting time too long—are minimum, sometimes negative, and statistically insignificant. These estimates suggest that supply-side constrains are not the mechanism for which households do not use public healthcare facilities in areas where the sterilization exposure was high.

However, column 5 suggests that higher exposure to the forced sterilization policy has a positive and significant effect on household answering 'poor quality of care' as their reasons for not using public health care facilities. Finally, the estimates in column 6 suggest that households are more likely to answer 'other' as their reason for not using public healthcare facilities in states where sterilization exposure was higher.

In Section E of the Appendix, I present a series of robustness and sensitivity checks. I first verify whether my results are sensitive to the inclusion and exclusion of controls (Table E1). Second, I check my results for robustness to considering excess vasectomy (Table E2). As we can see, the estimates are overall robust to these alternative specifications and similar to the results reported in Table 4.

5.2. Confidence in Healthcare Facilities and Doctors

In this section, I dig a little deeper to understand the plausible reasons for household responding 'poor quality of care' and 'other' as their reasons for not using public healthcare facilities. I check whether mistrust in public healthcare and its personnel is a plausible channel for the current

practice of healthcare use. Several studies have shown that health interventions in the past is associated with mistrust in medicine (Alsan and Wanamaker 2018; Martinez-Bravo and Stegmann 2021; Lowes and Montero 2018).

I test for this channel in this context because disinformation was delivered by public healthcare workers to motivate individuals for sterilization during this period. Besides, during the forced sterilization period, after a person is sterilized and discharged from the camp or hospital, he or she was generally forgotten and left to fend for himself or herself in case any complications arose, which led to serious side effects, including death. For example, according to the report published by the Shah Commission of Inquiry (1978), 1778 complaints of deaths related to sterilization have been registered. Therefore, I check whether mistrust is a plausible channel.

I use data from Indian Human Development Survey-II in 2011-12 (IHDS-II) on confidence in institutions to examine how exposure to forced sterilization policy affects trust. The IHDS-II asks households separate questions on confidence in government hospitals and doctors and private hospitals and doctors to provide good treatment. The respondents can choose between three possible answers: a great deal of confidence, only some confidence, and hardly any confidence at all. The IHDS-II assigns the value 1 to "a great deal of confidence," 2 to "only some confidence," and 3 to "hardly any confidence at all."

To provide a visual understanding, I first present the association through scatter plots in Figure 5. In panel (A), I plot the correlation between excess sterilizations in 1976–77 on confidence in government hospitals and doctors. In panel (B), I plot the correlation between excess sterilizations in 1976–77 on confidence in private hospitals and doctors. We see a positive association in panel (A) and negative association in panel (B). It suggests that households belonging to highly exposed states to forced sterilization policy exhibit a lower level of confidence in government hospitals and doctors and exhibit a higher level of confidence in private hospitals and doctors in providing good treatment.

I then examine this relationship through IV regression in Table 5. In column 1, I estimate the relationship between forced sterilization policy on confidence in government hospitals and doctors. Additionally, in column 2, I estimate the relationship between forced sterilization policy on confidence in private hospitals and doctors. As we can see, the results are similar to the association I found in Figure 5. The results imply that a lower level of confidence or mistrust towards government hospitals and doctors is a plausible mechanism for lower usage of public

healthcare facilities. In Section F of the Appendix, I report a series of alternative analyses showing that the results are overall robust and similar to the results reported in Table 5.

6. Conclusion

In this paper, I examined the importance of historical events in shaping current healthcare use in India. In particular, I examined whether the aggressive family planning program under which a forced sterilization policy was implemented during the period of emergency rule in the 1970s could partly explain the lower use of public healthcare facilities today.

I examined the households' source of healthcare usage using data from the NFHS-4. I found that greater exposure to the forced sterilization policy is associated with lower use of public healthcare facilities today. I also found that the results were robust to a variety of controls, a number of alternative measures of exposure to the forced sterilization policy, and examining the impact through an IV approach.

I then examined plausible mechanisms. I first examined the reasons for which households do not use public healthcare facilities. I found that the exposure to forced sterilization policy on standard supply-side constraints is not important. However, higher exposure to the forced sterilization policy has had a large, positive, and significant effect on households answering 'poor quality of care' and 'others' as their reasons for not using public health care facilities.

Going a bit further, I examined the reasons for households responding 'poor quality of care' and 'others' as their reasons for not using public healthcare facilities. I explored the possibility whether mistrust is a plausible channel for the current practice of healthcare use. I used data from the IHDS-II on confidence in institutions and found that households belonging to highly exposed states to forced sterilization policy exhibit a lower level of confidence in public hospitals and doctors and exhibit a higher level of confidence in private hospitals and doctors in providing good treatment. These results imply that a lower level of confidence or mistrust towards public hospitals and doctors is a plausible mechanism for lower usage of public healthcare facilities. This can be expected since public healthcare staff provided disinformation to motivate individuals to accept sterilization and no proper aftercare was administered during the sterilization period.

My results provide robust evidence suggesting that historical interventions in the past have had a strong and persistent impact on shaping health-seeking behavior in India. This has important implications for understanding the puzzling factors behind the higher demand for private healthcare facilities, even in the market with a qualified doctor offering free care in a public

hospital. These findings also highlight the unintended consequences associated with medical interventions in the past and the importance of understanding such contexts for the design and implementation of public policy and future intervention.

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Figure 1: Number of Sterilizations Performed in India (1956-82)

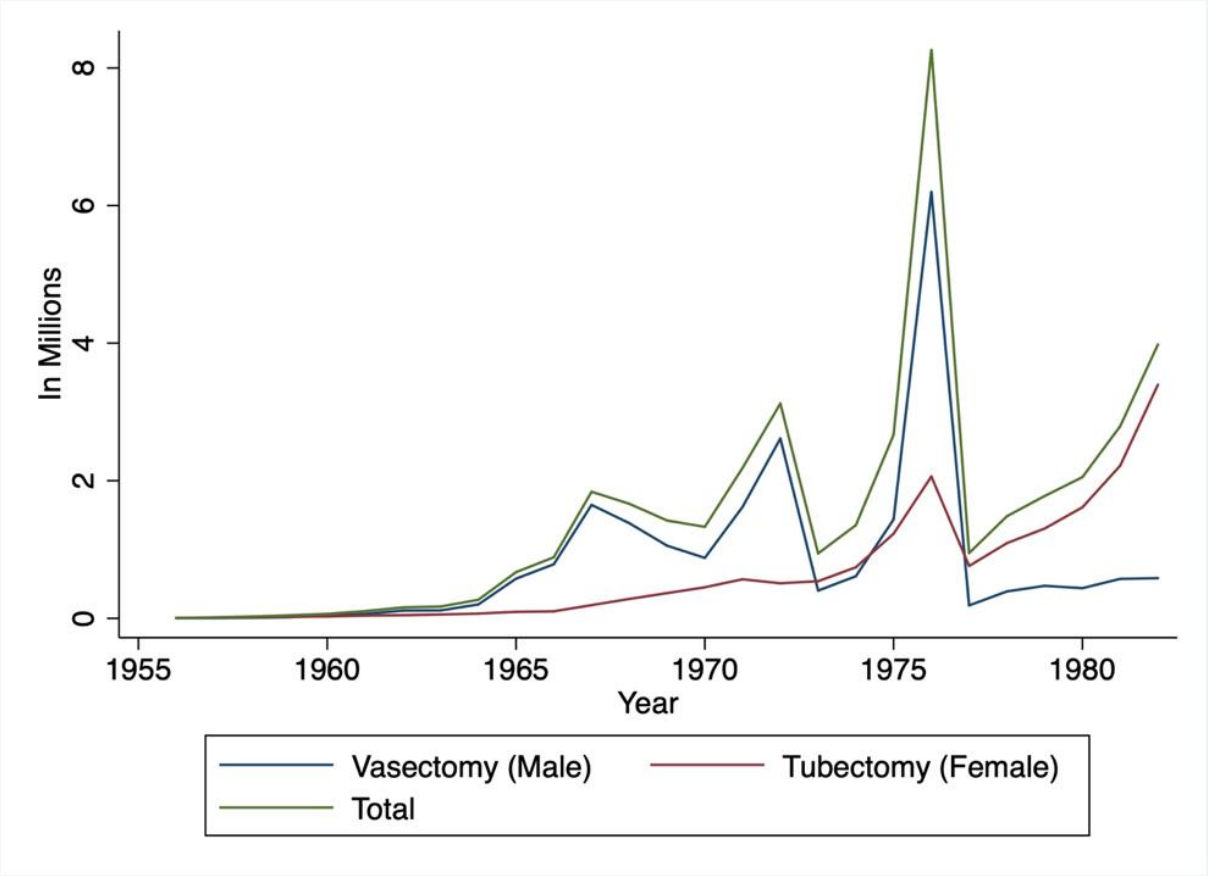


Figure 2: Excess Sterilizations Performed in 1976-77 (Normalized by 1975-76 Numbers)

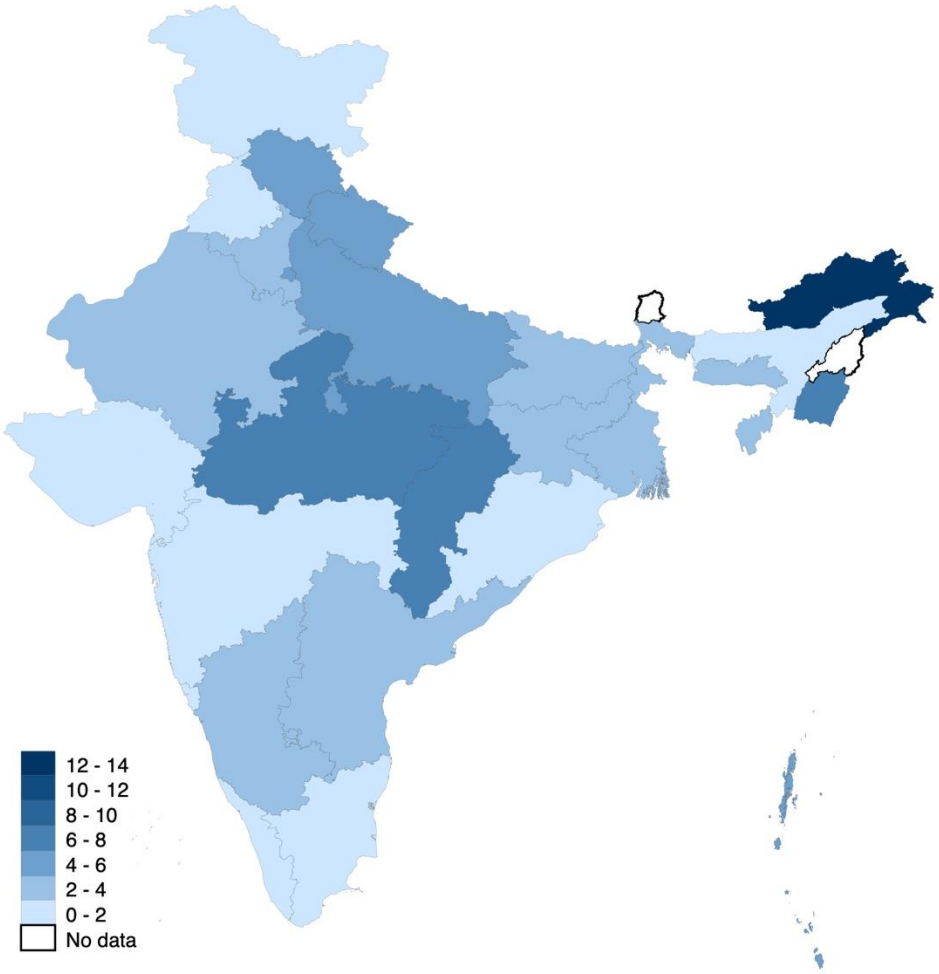


Figure 3: Households Who Use Public Healthcare Facilities (in Percentages)

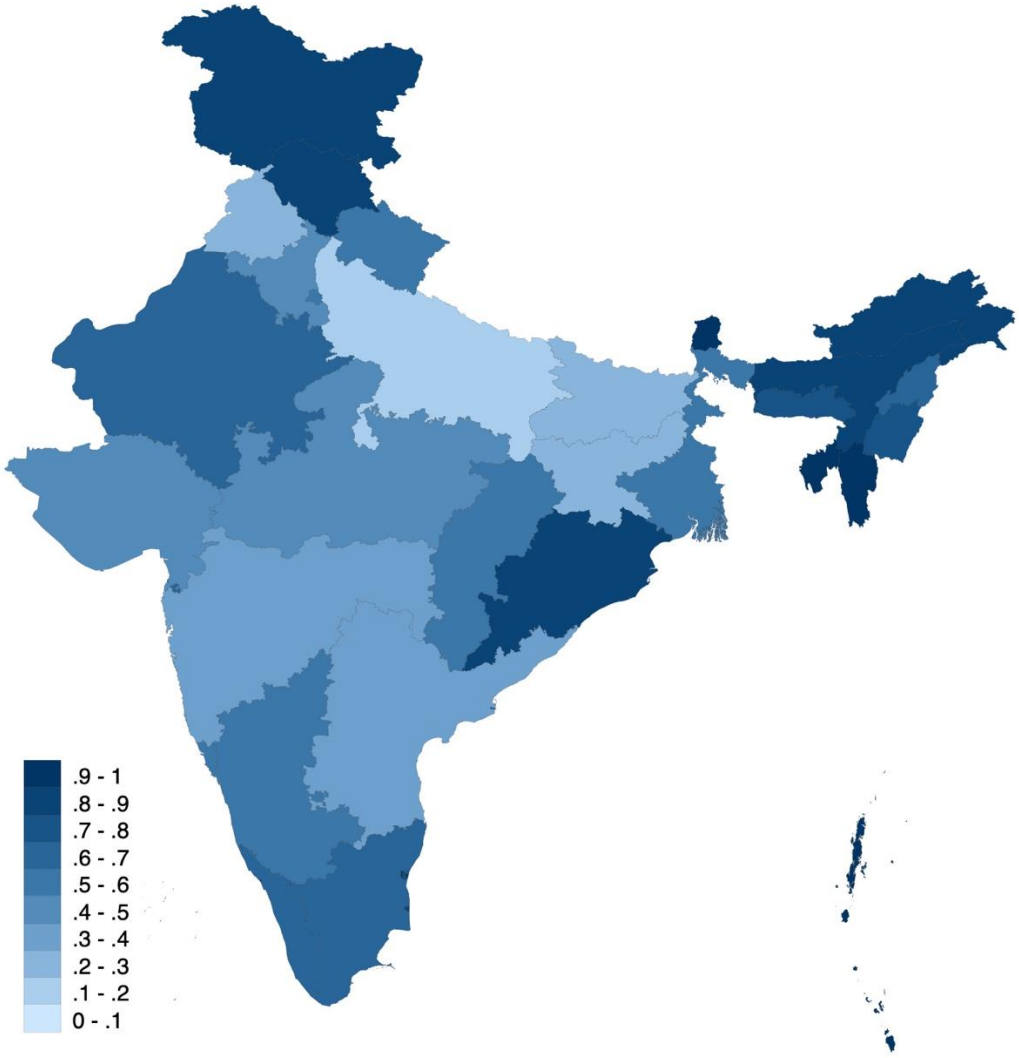


Figure 4: Association Between Number of Sterilizations in 1976-77 and Public Healthcare Use

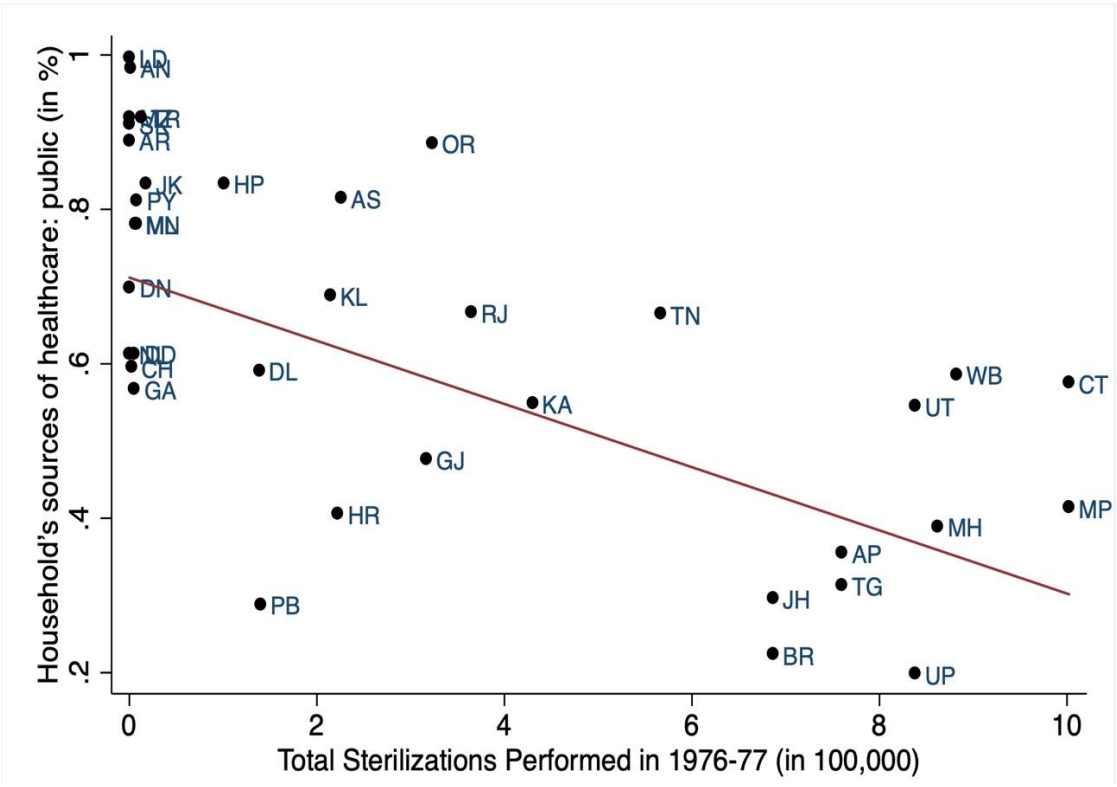
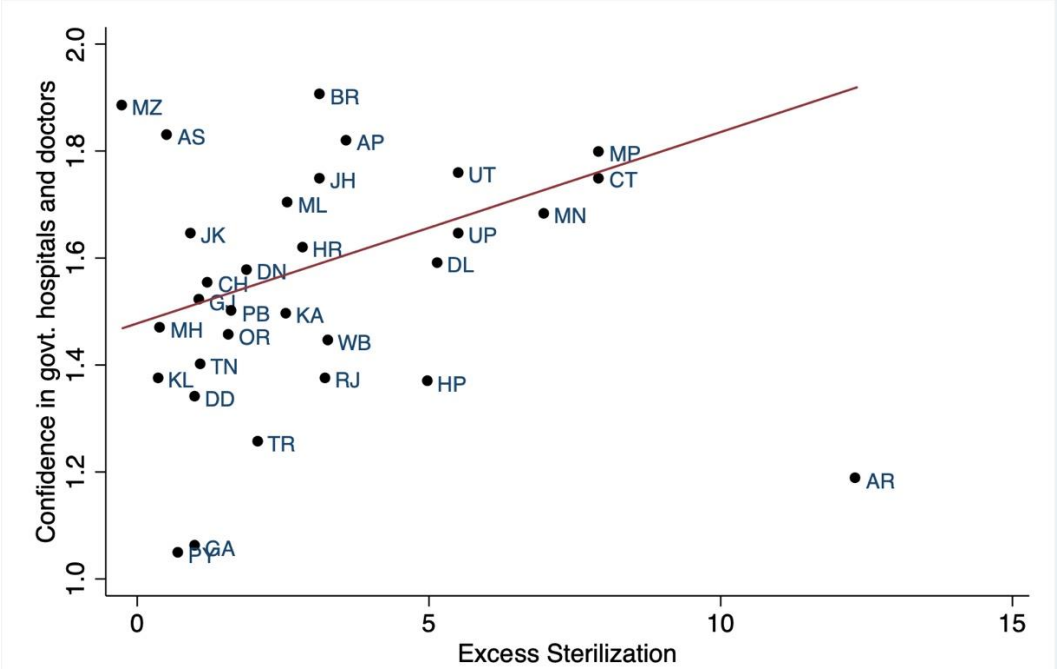
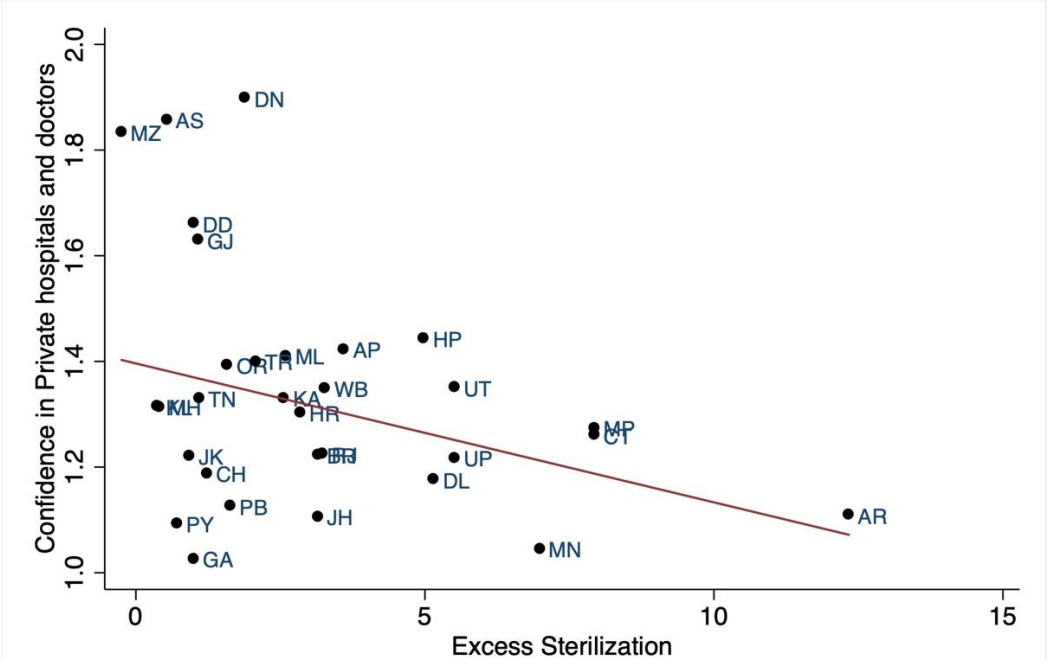


Figure 5: Correlation Plot: Confidence in Hospitals and Doctors



Panel A: Association between excess sterilizations in 1976–77 on confidence in government hospitals and doctors



Panel B: Association between excess sterilizations in 1976–77 on confidence in private hospitals and doctors

Table 1: OLS Estimates

	Dependent Variable: Source of Healthcare - Public Sector				
	(1)	(2)	(3)	(4)	(5)
Total Sterilizations Performed in 1976-77 (in 100,000)	-0.0370***				
	(0.0112)				
Total Sterilizations Performed in 1976-77 (in log)		-0.0864***			
		(0.0232)			
Excess Sterilization Performed in 1976-77 (in 100,000)			-0.0401***		
			(0.0119)		
Excess Sterilization Performed in 1976-77 (in log)				-0.111***	
				(0.0245)	
Excess Sterilization					-0.0367**
					(0.0160)
Household Controls	YES	YES	YES	YES	YES
Geographic Controls	YES	YES	YES	YES	YES
Health Facility Controls	YES	YES	YES	YES	YES
Observations	574,022	574,022	558,755	547,495	558,755
R-squared	0.118	0.105	0.125	0.122	0.112
Mean of dependent variable	0.443	0.443	0.442	0.442	0.442

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 2: IV Estimates

	Panel A: First Stage Estimates			
	Dependent variable: Excess Sterilization			
	(1)	(2)	(3)	(4)
Distance from New Delhi to State Capitals (in 100km)	-0.229***	-0.249***	-0.245***	-0.238***
	(0.0604)	(0.0588)	(0.0581)	(0.0556)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	585,634	559,899	558,755	558,755
Mean of dependent variable	3.150	3.177	3.177	3.177
F Statistics of Excluded Instrument	14.42	17.88	17.80	18.27
	Panel B: Second Stage Estimates			
	Dependent variable: Source of Healthcare - Public Sector			
	(1)	(2)	(3)	(4)
Excess Sterilization	-0.0710***	-0.0561**	-0.0568**	-0.0586***
	(0.0248)	(0.0235)	(0.0237)	(0.0198)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	585,634	559,899	558,755	558,755
Mean of dependent variable	0.448	0.443	0.442	0.442

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Test of Exogeneity of the Instrument

	Panel A: First Stage Estimates	
Dependent variable:	Excess Sterilization (1975-76)	Excess Female Sterilization (Tubectomy)
	(1)	(2)
Distance from New Delhi to State Capitals (in 100km)	-0.0116	0.0129
	(0.0241)	(0.0113)
Household Controls	YES	YES
Geographic Controls	YES	YES
Health Facility Controls	YES	YES
Observations	558,755	558,016
Mean of dependent variable	1.415	0.748
F Statistics of Excluded Instrument	0.23	1.31
	Panel B: Second Stage Estimates	
	Dependent variable: Source of Healthcare - Public Sector	
	(1)	(2)
Excess Sterilization (1975-76)	-1.207	
	(2.204)	
Excess Female Sterilization (Tubectomy)		1.077
		(1.150)
Household Controls	YES	YES
Geographic Controls	YES	YES
Health Facility Controls	YES	YES
Observations	558,755	558,016
Mean of dependent variable	0.442	0.442

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4: Mechanism: Reasons

Dependent variable:	Reason: no nearby facility	Reason: facility timing not convenient	Reason: health personnel often absent	Reason: waiting time too long	Reason: poor quality of care	Reason: other
	(1)	(2)	(3)	(4)	(5)	(6)
Excess Sterilization	-0.00161	-0.0193*	-0.00404	0.00663	0.0596***	0.00805**
	(0.00720)	(0.0103)	(0.00883)	(0.00923)	(0.0163)	(0.00352)
Household Controls	YES	YES	YES	YES	YES	YES
Geographic Controls	YES	YES	YES	YES	YES	YES
Health Facility Controls	YES	YES	YES	YES	YES	YES
Observations	274,693	274,693	274,693	274,693	274,693	274,693
Mean of dependent variable	0.445	0.263	0.149	0.408	0.483	0.0440

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Mechanism: Confidence in Institutions

Dependent variable:	Confidence: Government hospitals and doctors	Confidence: Private hospitals and doctors
	(1)	(2)
Excess Sterilization	0.0605***	-0.0325*
	(0.0178)	(0.0167)
Household Controls	YES	YES
Geographic Controls	YES	YES
Health Facility Controls	YES	YES
Observations	40,562	40,549
Mean of dependent variable	1.577	1.308

Notes: Data are from India Human Development Survey-II (IHDS-II), 2011-12. The Unit of observation is a household. The household controls include household size, income, ten source of main income fixed effects, eight religion fixed effects, five caste fixed effects, two wealth class fixed effects (poor, middle class, (comfortable as reference group)), 16 education of the household head fixed effects, an indicator for whether any household member is covered by government health insurance, an indicator for whether any household member is covered by private health insurance, and an indicator for whether the household has a BPL card. The geographic controls include state level population density (in log) and three place of residence fixed effects. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Online Appendix for

Understanding the Puzzle of Healthcare Use: Evidence from India

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Section A: Figures

Figure A1: Number of Sterilizations Performed in 1976-77 (in 100,000)

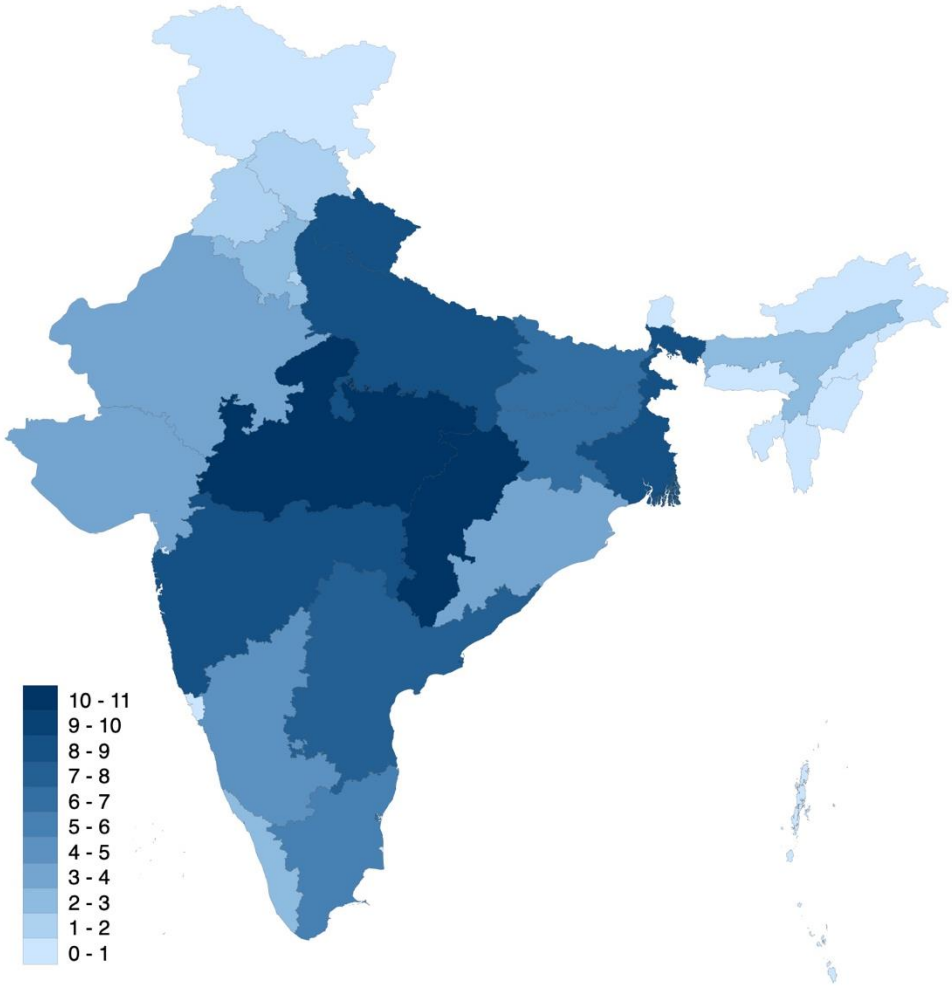


Figure A2: Correlation Plot (Population scale)

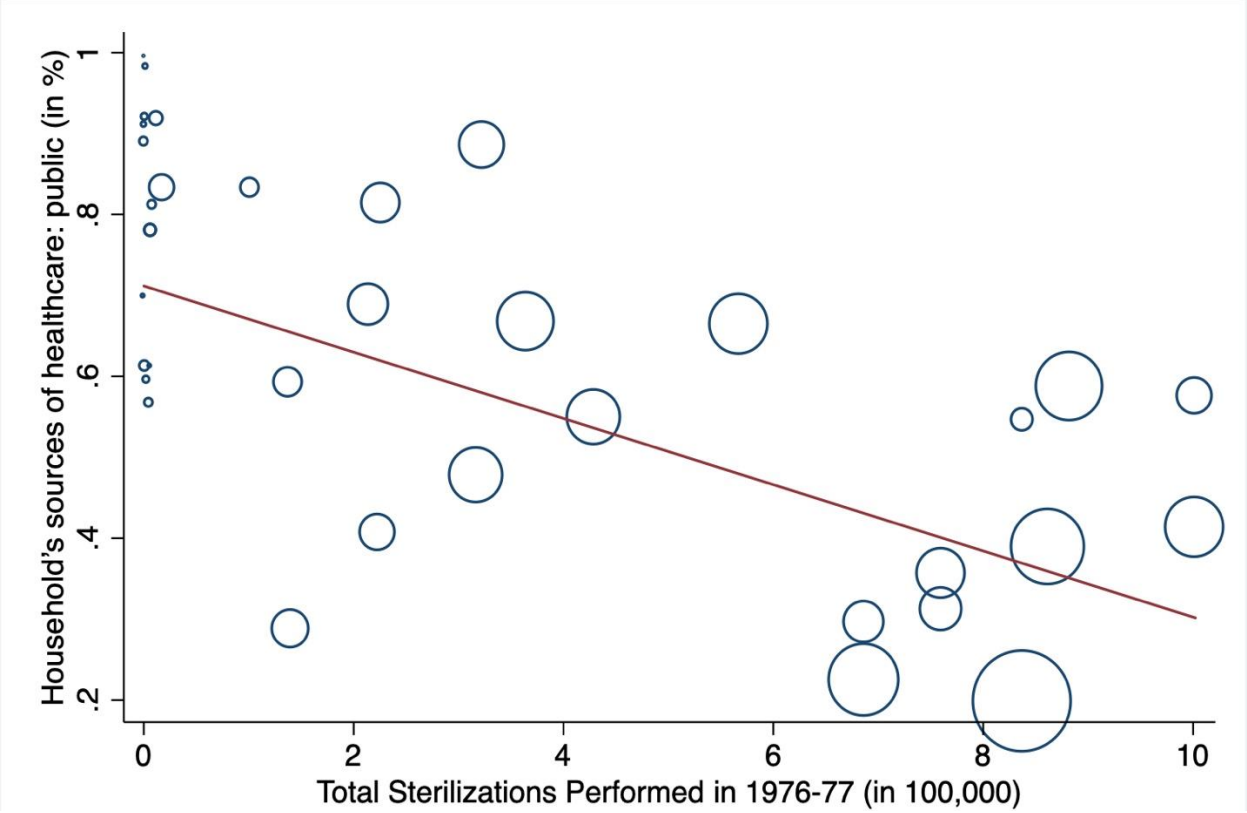


Figure A3: Histogram of the Number of Sterilizations Performed in 1976-77

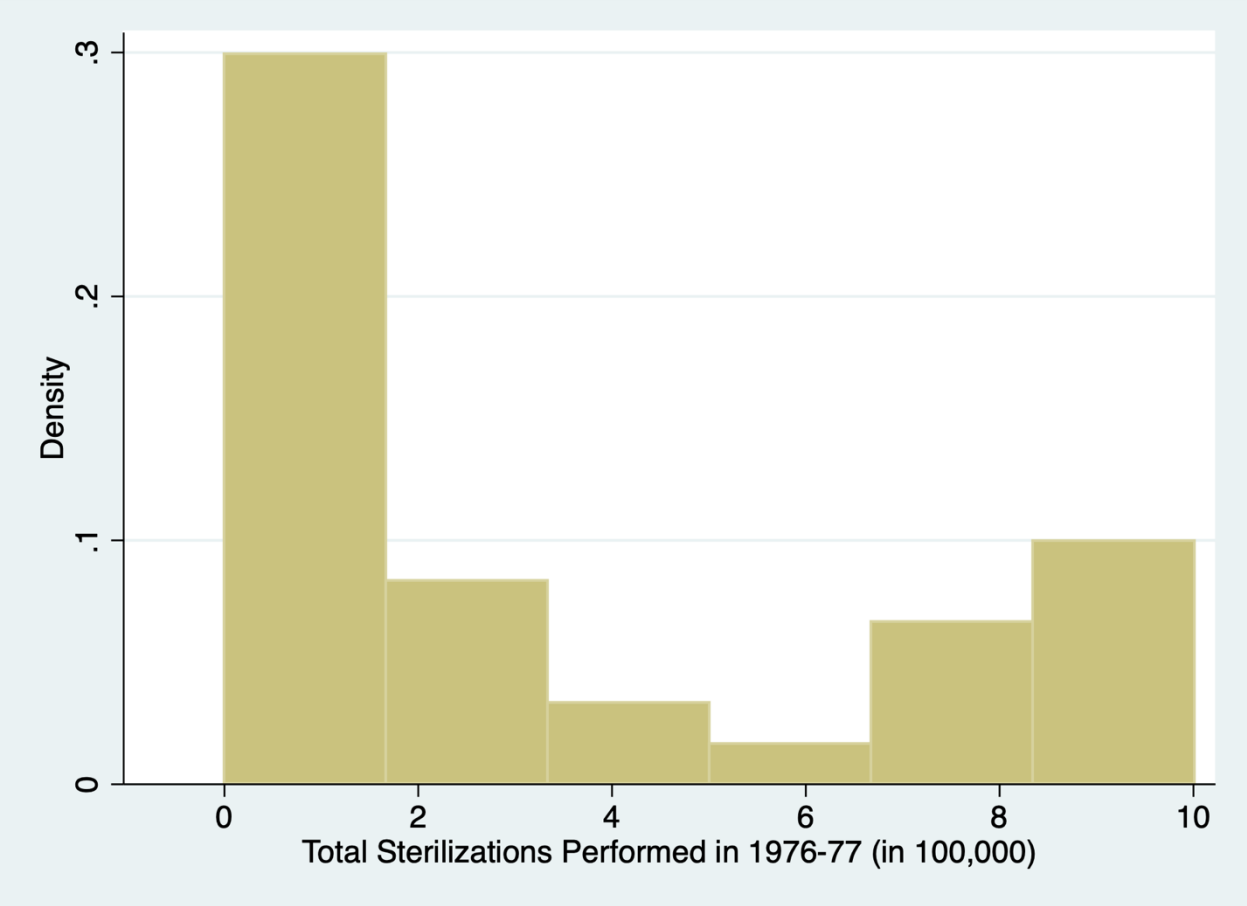
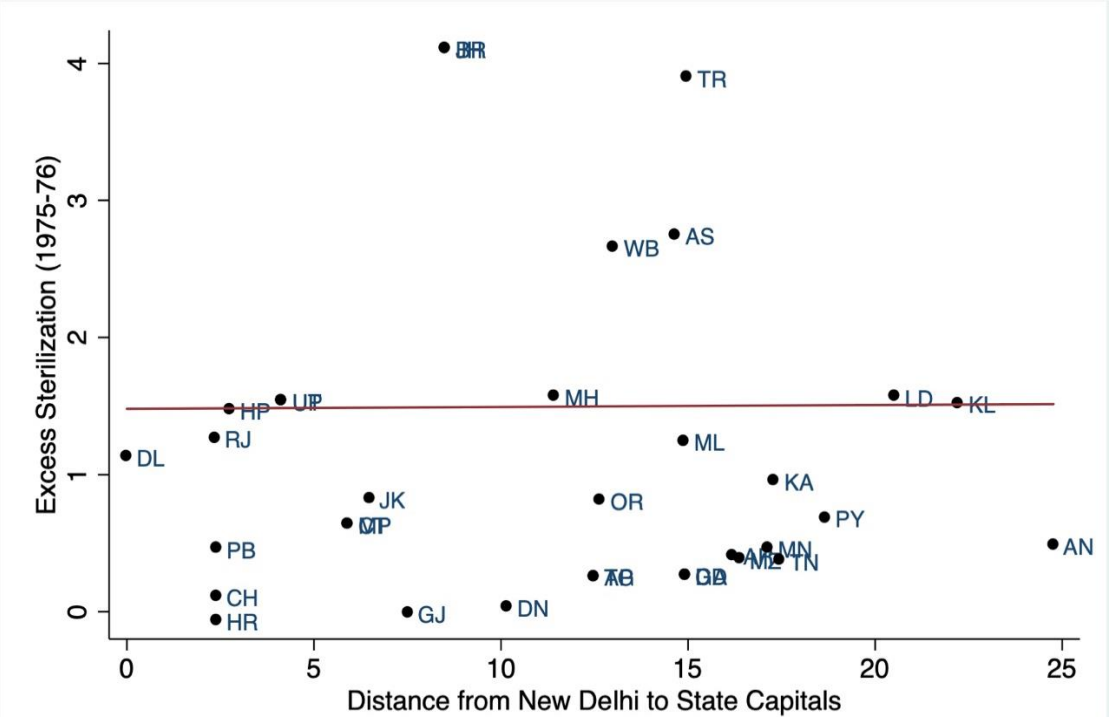
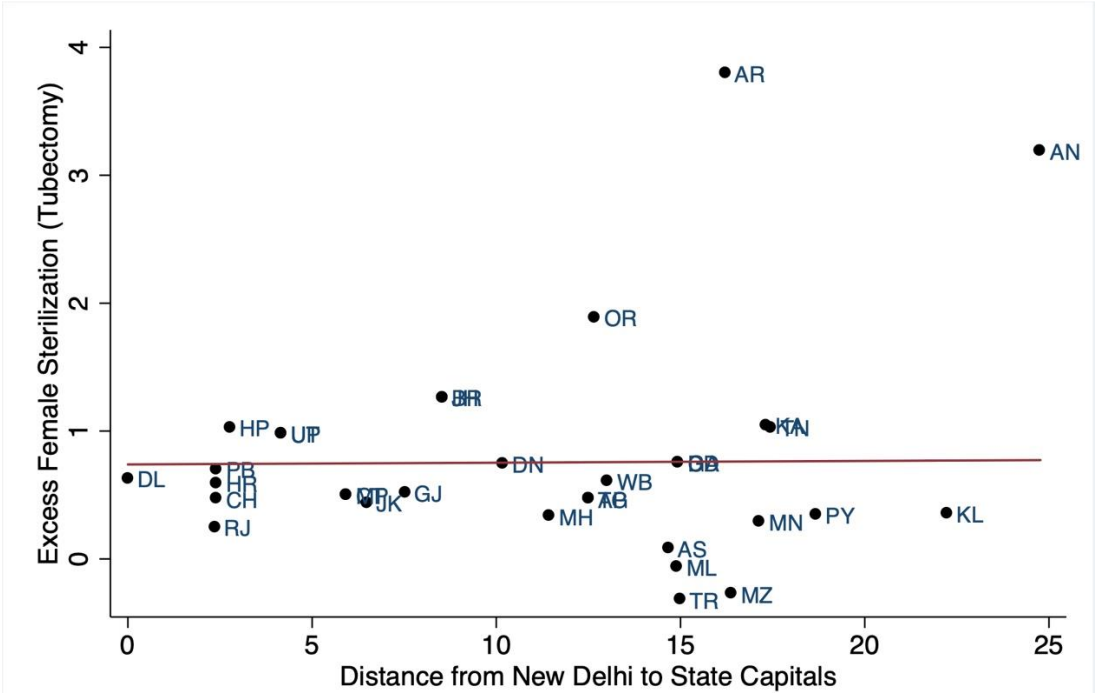


Figure A4: Falsification Test of the Instrument



Panel A: Association between distance from New Delhi to state capitals and excess sterilization in 1975-76 ***(previous year)***



Panel B: Association between distance from New Delhi to state capitals and excess Tubectomy

Section B: Robustness to OLS Estimates

Table B1: Alternative Measures of Force Sterilization Policy - Total Sterilizations Performed in 1976-77 (in 100,000)

	Dependent Variable: Source of Healthcare - Public Sector			
	(1)	(2)	(3)	(4)
Total Sterilizations Performed in 1976-77 (in 100,000)	-0.0391***	-0.0450***	-0.0448***	-0.0370***
	(0.0128)	(0.0100)	(0.00966)	(0.0112)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	601,509	575,319	574,022	574,022
R-squared	0.047	0.105	0.112	0.118
Mean of dependent variable	0.449	0.443	0.443	0.443

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table B2: Alternative Measures of Force Sterilization Policy - Total Sterilizations Performed in 1976-77 (in log)

	Dependent Variable: Source of Healthcare - Public Sector			
	(1)	(2)	(3)	(4)
Total Sterilizations Performed in 1976-77 (in log)	-0.105***	-0.118***	-0.114***	-0.0864***
	(0.0283)	(0.0240)	(0.0247)	(0.0232)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	601,509	575,319	574,022	574,022
R-squared	0.036	0.087	0.092	0.105
Mean of dependent variable	0.449	0.443	0.443	0.443

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table B3: Alternative Measures of Force Sterilization Policy - Excess Sterilization Performed in 1976-77 (in 100,000)

	Dependent Variable: Source of Healthcare - Public Sector			
	(1)	(2)	(3)	(4)
Excess Sterilization Performed in 1976-77 (in 100,000)	-0.0393**	-0.0458***	-0.0449***	-0.0401***
	(0.0152)	(0.0128)	(0.0119)	(0.0119)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	585,634	559,899	558,755	558,755
R-squared	0.042	0.098	0.105	0.125
Mean of dependent variable	0.448	0.443	0.442	0.442

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table B4: Alternative Measures of Force Sterilization Policy - Excess Sterilization Performed in 1976-77 (in log)

	Dependent Variable: Source of Healthcare - Public Sector			
	(1)	(2)	(3)	(4)
Excess Sterilization Performed in 1976-77 (in log)	-0.109***	-0.129***	-0.126***	-0.111***
	(0.0301)	(0.0239)	(0.0239)	(0.0245)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	574,237	548,577	547,495	547,495
R-squared	0.044	0.098	0.103	0.122
Mean of dependent variable	0.448	0.442	0.442	0.442

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table B5: Alternative Measures of Force Sterilization Policy - Excess Sterilization

	Dependent Variable: Source of Healthcare - Public Sector			
	(1)	(2)	(3)	(4)
Excess Sterilization	-0.0321	-0.0316*	-0.0330**	-0.0367**
	(0.0192)	(0.0160)	(0.0155)	(0.0160)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	585,634	559,899	558,755	558,755
R-squared	0.020	0.068	0.078	0.112
Mean of dependent variable	0.448	0.443	0.442	0.442

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table B6: Alternative Measures of Force Sterilization Policy - Male Sterilization

	Dependent Variable: Source of Healthcare - Public Sector				
	(1)	(2)	(3)	(4)	(5)
Total Vasectomies Performed in 1976-77 (in 100,000)	-0.0405***				
	(0.0129)				
Total Vasectomies Performed in 1976-77 (in log)		-0.0826***			
		(0.0237)			
Excess Vasectomies Performed in 1976-77 (in 100,000)			-0.0391***		
			(0.0127)		
Excess Vasectomies Performed in 1976-77 (in log)				-0.0978***	
				(0.0231)	
Excess Male Sterilization (Vasectomy)					-0.0143**
					(0.00538)
Household Controls	YES	YES	YES	YES	YES
Geographic Controls	YES	YES	YES	YES	YES
Health Facility Controls	YES	YES	YES	YES	YES
Observations	574,022	574,022	558,755	558,755	558,755
R-squared	0.120	0.108	0.124	0.123	0.114
Mean of dependent variable	0.443	0.443	0.442	0.442	0.442

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Section C: Robustness to IV Estimates

Table C1: Alternative Measures of Force Sterilization Policy - **Vasectomy**

	Panel A: First Stage Estimates			
	Dependent variable: Excess Male Sterilization (Vasectomy)			
	(1)	(2)	(3)	(4)
Distance from New Delhi to State Capitals (in 100km)	-0.441**	-0.527***	-0.510***	-0.490***
	(0.180)	(0.174)	(0.164)	(0.167)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	585,634	559,899	558,755	558,755
Mean of dependent variable	6.913	6.984	6.985	6.985
F Statistics of Excluded Instrument	5.98	9.18	9.63	8.62
	Panel B: Second Stage Estimates			
	Dependent Variable: Source of Healthcare - Public Sector			
	(1)	(2)	(3)	(4)
Excess Male Sterilization (Vasectomy)	-0.0369***	-0.0265**	-0.0273**	-0.0285***
	(0.0142)	(0.0110)	(0.0110)	(0.00905)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	585,634	559,899	558,755	558,755
Mean of dependent variable	0.448	0.443	0.442	0.442

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Section D: Robustness to Falsification Tests

Table D1: Test of Exogeneity of the Instrument: Excess Sterilization (1975-76)

	Panel A: First Stage Estimates			
	Dependent variable: Excess Sterilization (1975-76)			
	(1)	(2)	(3)	(4)
Distance from New Delhi to State Capitals (in 100km)	-0.00427	0.0164	0.0150	-0.0116
	(0.0316)	(0.0238)	(0.0270)	(0.0241)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	585,634	559,899	558,755	558,755
Mean of dependent variable	1.432	1.414	1.415	1.415
F Statistics of Excluded Instrument	0.02	0.47	0.31	0.23
	Panel B: Second Stage Estimates			
	Dependent Variable: Source of Healthcare - Public Sector			
	(1)	(2)	(3)	(4)
Excess Sterilization (1975-76)	-3.809	0.851	0.928	-1.207
	(27.47)	(1.335)	(1.724)	(2.204)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	585,634	559,899	558,755	558,755
Mean of dependent variable	0.448	0.443	0.442	0.442

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table D2: Test of Exogeneity of the Instrument: Excess Female Sterilization (Tubectomy)

	Panel A: First Stage Estimates			
	Dependent variable: Excess Female Sterilization (Tubectomy)			
	(1)	(2)	(3)	(4)
Distance from New Delhi to State Capitals (in 100km)	0.00239	0.00731	0.00713	0.0129
	(0.0146)	(0.0138)	(0.0133)	(0.0113)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	584,893	559,160	558,016	558,016
Mean of dependent variable	0.743	0.748	0.748	0.748
F Statistics of Excluded Instrument	0.03	0.28	0.29	1.31
	Panel B: Second Stage Estimates			
	Dependent variable: Source of Healthcare - Public Sector			
	(1)	(2)	(3)	(4)
Excess Female Sterilization (Tubectomy)	6.791	1.908	1.954	1.077
	(42.44)	(4.123)	(4.156)	(1.150)
Household Controls	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES
Observations	584,893	559,160	558,016	558,016
Mean of dependent variable	0.448	0.443	0.442	0.442

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Section E: Robustness to Examining the Reasons in NFHS-4

Table E1: Reasons for Household Generally do not Go to a Government Healthcare Facility - Sequential Inclusion of Controls

Dependent variable	(1) Reason: no nearby facility	(2) Reason: facility timing not convenient	(3) Reason: health personnel often absent	(4) Reason: waiting time too long	(5) Reason: poor quality of care	(6) Reason: other
Excess Sterilization	0.00919	-0.0274**	-0.00656	0.000316	0.0614***	0.0124*
	(0.00864)	(0.0127)	(0.00961)	(0.0148)	(0.0151)	(0.00644)
Household Controls	NO	NO	NO	NO	NO	NO
Geographic Controls	NO	NO	NO	NO	NO	NO
Health Facility Controls	NO	NO	NO	NO	NO	NO
Observations	282,333	282,333	282,333	282,333	282,333	282,333
Mean of dependent variable	0.446	0.264	0.148	0.409	0.479	0.0433
Excess Sterilization	-0.000364	-0.0228**	-0.00555	0.00385	0.0546***	0.0114**
	(0.00688)	(0.0106)	(0.00863)	(0.00924)	(0.0134)	(0.00532)
Household Controls	YES	YES	YES	YES	YES	YES
Geographic Controls	NO	NO	NO	NO	NO	NO
Health Facility Controls	NO	NO	NO	NO	NO	NO
Observations	274,936	274,936	274,936	274,936	274,936	274,936
Mean of dependent variable	0.445	0.263	0.149	0.408	0.483	0.0440
Excess Sterilization	-0.000959	-0.0231**	-0.00580	0.00364	0.0529***	0.0115**
	(0.00626)	(0.00968)	(0.00718)	(0.00865)	(0.0142)	(0.00501)
Household Controls	YES	YES	YES	YES	YES	YES
Geographic Controls	YES	YES	YES	YES	YES	YES
Health Facility Controls	NO	NO	NO	NO	NO	NO
Observations	274,693	274,693	274,693	274,693	274,693	274,693
Mean of dependent variable	0.445	0.263	0.149	0.408	0.483	0.0440
Excess Sterilization	-0.00161	-0.0193*	-0.00404	0.00663	0.0596***	0.00805**
	(0.00720)	(0.0103)	(0.00883)	(0.00923)	(0.0163)	(0.00352)
Household Controls	YES	YES	YES	YES	YES	YES
Geographic Controls	YES	YES	YES	YES	YES	YES
Health Facility Controls	YES	YES	YES	YES	YES	YES
Observations	274,693	274,693	274,693	274,693	274,693	274,693
Mean of dependent variable	0.445	0.263	0.149	0.408	0.483	0.0440

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table E2: Reasons for Household Generally do not Visit a Government Healthcare Facility - Male Sterilization

Dependent variable	Reason: no nearby facility	Reason: facility timing not convenient	Reason: health personnel often absent	Reason: waiting time too long	Reason: poor quality of care	Reason: other
	(1)	(2)	(3)	(4)	(5)	(6)
Excess Male Sterilization (Vasectomy)	-0.000813	-0.00973*	-0.00204	0.00335	0.0301***	0.00407**
	(0.00372)	(0.00576)	(0.00458)	(0.00491)	(0.0112)	(0.00183)
Household Controls	YES	YES	YES	YES	YES	YES
Geographic Controls	YES	YES	YES	YES	YES	YES
Health Facility Controls	YES	YES	YES	YES	YES	YES
Observations	274,693	274,693	274,693	274,693	274,693	274,693
Mean of dependent variable	0.445	0.263	0.149	0.408	0.483	0.0440

Notes: Data are from India's National Family and Health Survey 2015-16 (NFHS-4). The Unit of observation is a household. Household controls include age and sex of the household head, household size, nine religion fixed effects, four caste fixed effects, 21 education of the household head fixed effects, four household wealth index fixed effects, an indicator for whether any household member is covered by health insurance, and an indicator for whether the household has a BPL card. The geographic controls include altitude of the cluster in meters, altitude squared, state level population density (in log) and an indicator whether the place of residence is urban. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Section F: Robustness to Confidence in Healthcare Facilities and Doctors

Table F1: Confidence in Institutions: Sequential Inclusion of Controls

Dependent variable	Confidence: Government hospitals and doctors				Confidence: Private hospitals and doctors			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Excess Sterilization	0.0365	0.0379*	0.0400*	0.0605***	-0.0376**	-0.0317**	-0.0320**	-0.0325*
	(0.0233)	(0.0222)	(0.0233)	(0.0178)	(0.0165)	(0.0143)	(0.0154)	(0.0167)
Household Controls	NO	YES	YES	YES	NO	YES	YES	YES
Geographic Controls	NO	NO	YES	YES	NO	NO	YES	YES
Health Facility Controls	NO	NO	NO	YES	NO	NO	NO	YES
Observations	41,854	40,562	40,562	40,562	41,841	40,549	40,549	40,549
Mean of dependent variable	1.579	1.577	1.577	1.577	1.311	1.308	1.308	1.308

Notes: Data are from India Human Development Survey-II (IHDS-II), 2011-12. The Unit of observation is a household. The household controls include household size, income, ten source of main income fixed effects, eight religion fixed effects, five caste fixed effects, two wealth class fixed effects (poor, middle class, (comfortable as reference group)), 16 education of the household head fixed effects, an indicator for whether any household member is covered by government health insurance, an indicator for whether any household member is covered by private health insurance, and an indicator for whether the household has a BPL card. The geographic controls include state level population density (in log) and three place of residence fixed effects. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

Table F2: Confidence in Institutions: Alternative Measures of Sterilization

Dependent variable	Confidence: Government hospitals and doctors	Confidence: Private hospitals and doctors
	(1)	(2)
Excess Male Sterilization (Vasectomy)	0.0297***	-0.0159
	(0.00846)	(0.00992)
Household Controls	YES	YES
Geographic Controls	YES	YES
Health Facility Controls	YES	YES
Observations	40,562	40,549
Mean of dependent variable	1.577	1.308

Notes: Data are from India Human Development Survey-II (IHDS-II), 2011-12. The Unit of observation is a household. The household controls include household size, income, ten source of main income fixed effects, eight religion fixed effects, five caste fixed effects, two wealth class fixed effects (poor, middle class, (comfortable as reference group)), 16 education of the household head fixed effects, an indicator for whether any household member is covered by government health insurance, an indicator for whether any household member is covered by private health insurance, and an indicator for whether the household has a BPL card. The geographic controls include state level population density (in log) and three place of residence fixed effects. Health facility controls include hospital per 1000 population and doctors per 1000 population at the state level. Robust standard errors in parentheses clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

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