Female Electoral Success and the Survival of Girl Children in India

Nabaneeta Biswas Department of Economics Marshall University

Christopher Cornwell Department of Economics University of Georgia

Laura V. Zimmermann Department of Economics University of Georgia

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Abstract

In India, a strong cultural preference for sons often leads to sex-selective abortion or neglect of girls in early childhood. We explore the possibility that female electoral successes increase girl survival. We leverage the timing and location of births to over 500,000 mothers between 1977-2004 to estimate whether the gender composition of elected district representatives affect the probability of a female birth and postnatal survival. Our research design exploits the quasirandomness of female victories in close man-woman elections in a regression discontinuity framework. We find that an increase in elected female representatives in the district lowers the probability of a girl birth, but improves girls' postnatal survival. We show the reduced probability of a girl birth is driven by fertility declines in the presence of son preference. In addition, we find that the effect of female electoral success reverses after political reform or policy favoring girls is introduced, suggesting the impact of individual victories depends on a broader based commitment to raise the status of women.

JEL codes: D72, 114, J13, O12

1 Introduction

In India, a strong cultural preference for sons, in combination with the introduction of ultrasound technology in the 1980s, has led to a dramatic rise in the sex ratio and millions of "missing" women (Bhalotra and Cochrane (2010), Jha et al. (2011)). Although India has banned the use of prenatal diagnostic technologies for sex determination, the ban is routinely ignored. Sex-selective abortion is not the only means for exercising a preference for a son, differential postnatal treatment raises the relative mortality of girls (Gupta (1987) and Kishor (1993)). The rising sex ratio has grossly distorted marriage markets, leaving millions of men without any prospect of finding a wife and leading to bride trafficking and other crimes against women.¹

Son preference has its roots in strong cultural commitments to patrilineal descent and patrilocality. The family name and inheritance rights are passed down exclusively through male children. Married couples typical reside in the residence or community of the husband's parents. Thus, sons are responsible for providing financial support to aging parents. Daughters bring the added costs of dowry payments.

Efforts to weaken son preference and raise the status of daughters have ranged from removing educational barriers to conditional cash transfers. In principle, such efforts are more likely with greater female political representation. There are studies suggesting that increasing the number of female elected officials improves policy commitment towards women's issues and weakens gender stereotypes (Bhalotra and Clots-Figueras (2014) and Beaman et al. (2012)). For example, Chattopadhyay and Duflo (2004), Iyer et al. (2011), Ghani et al. (2013), Clots-Figueras (2012) and Bhalotra and Clots-Figueras (2014) show that greater political representation expands access to drinking water, the justice system, healthcare, and employment opportunities.

Female legislators in India are also symbols. As members of the highest decision-making body in a state and administrators in district councils, they are in position to shape society's perception of

¹A UNODC (2013) report documents large-scale bride trafficking in Punjab and Haryana based on primary field surveys. Anecdotal evidence points to rape and forced polyandry of the trafficked brides.(urlhttps://www.theguardian.com/global-development/2014/dec/17/india-bride-trafficking-foeticide). Similar phenomena are reported in China with Zhang (2010) linking the rising incidence of sex crimes against women to the gender imbalance in the population.

gender roles. Female election victories over male rivals challenge the established male hegemony and may more broadly affect the status of women in society. Hence, through their influence on both policy and perception, India's elected women can potentially improve health outcomes for girls.

In this paper, we are interested in whether female political victories translate into better survival prospects for girl children. We examine the relationship between female electoral success and the likelihood of girl births and post-natal mortality, focusing on competitive district-level, state assembly elections. Our research design starts with matching the fertility history of over 500,000 mothers from the District Level Household and Facility Survey (DLHS) to district election outcomes from 1977–2004. Conducted in 2002–04, the DLHS covers 594 districts in 36 states and union territories and provides detailed demographic information on each surveyed household. We compile the election outcomes by mapping results from over 3,000 constituencies to districts for all elections during the sample period. We leverage the timing and location of births to estimate whether the gender composition of elected district representatives affect the probability of a female birth and postnatal survival. Because unobserved voter preferences may be correlated with candidate gender and girl survival, we exploit the quasi-randomness of female victories in close man-woman elections as an instrument for the share of state assembly seats won by women. Our analysis sample consists of over a million births, representing 585 of the 594 existing districts in 2005.

We find that increasing female representation by one standard deviation lowers the likelihood of a female birth by 0.4 percentage points and the effect is statistically significant at the ten percent level. This translates into a decrease from an average of 92 to 90 female births for every 100 male births. At the same time, we show that greater female representation lowers overall fertility by 0.7 percentage points, without affecting the likelihood of male births. The combination of these findings imply that the increased prenatal sex selection is motivated both by son preference and the desire for fewer children. This is consistent with Jayachandran (2014), who attributes a large share of the decline in girl births in India to falling fertility. We also demonstrate that female representation improves the postnatal survival of girls relative to boys. The opposing effects on prenatal and postnatal survival are consistent with the quality-quantity tradeoff documented in Hu

and Schlosser (2015). Prenatal sex-selection lowers unwanted female births and therefore leads to reduced postnatal discrimination against the girls that are carried to term. The positive effect on postnatal survival appears to come through the influence of female representation on the relative parental investment in girls. We present evidence that breastfeeding duration and tuberculosis vaccinations rise following female electoral success.

While the overall effect of female representation on the girl births is negative, this result masks an important interaction between individual candidacies and nationwide initiatives intended to raise the status of women. In the 1990s, India created "reserved" seats for women in local governing bodies that are known as the *Panchayati Raj* system. After this reform, we find that estimated effect of female political success on the likelihood of girl births reverses."Post-reservation", a one standard deviation increase in female representation leads to seven additional female births per 100 boys born. The heterogeneous impact of elected women before and after the political reform suggests a strengthening of their political voice owing to broad-based female representation at local levels through the reservation. It also highlights the relevance of women's overall political agency in improving outcomes for girls.²

The post-reservation increased likelihood of a female birth is consistent with Kalsi (2017), who finds that male births are less likely at higher birth parities following reservations. Her results suggest a potential role-model effect of female leadership in local governments with the effect being limited to rural households. Despite the vast literature on sex selection and political liberalization in India, Kalsi's is the only other study that has connected the two.

Unlike Kalsi (2017), we focus on female politicians as members of a state legislative assembly (MLA) rather than as leaders of village or district councils. At this level, there are no quotas or other institutional initiatives to promote female representation. Women's political quotas only apply to legislative bodies at the village, block and district levels under the *Panchayati Raj* system. Thus, in our analysis, female political representation comes from competitive elections rather than

²Similarly to the reservation action, the nationwide ban on fetal sex diagnostic tests in 1996 also reverses the effect of female legislators on girl births. Post-ban, a one standard deviation increase in the share of female representatives leads to six additional female births per 100 male births. As with the reservation policy, the testing ban amplified the impact of elected female representatives and newly elected women raised the efficacy of the ban.

appointments to reserved seats.

The issue of women's political representation has gained importance in India. Constitutional amendments have reserved seats for women in local governments, but not in state and national governments. Our findings strengthen the case for mandating the reservation of one third of state assembly seats for women. Female headcount in state assemblies influence policy adoption and administration that affect the status of girls and women. Female candidacy and success in state elections has remained low limiting their say in state policymaking and visibility in the political domain. Increasing their numbers can strengthen the overall political agency of women and shift policy focus towards the needs of their own gender.

2 Background

2.1 Son preference, ultrasound technology and sex selection

India is one of a handful of Asian countries with an abnormally high ratio of boys to girls at birth. It is also the only country besides China with a higher infant mortality rate for girls. Since 1981, India's child sex ratio (CSR), the ratio of boys to girls aged 0-6 years, has increased from 1.03 to 1.09. The natural CSR is about 1.03, which prevails in countries where there is no significant cultural preference for sons.³

As remarkable as this increase is, the national CSR masks stark regional differences. Figure 1 shows the evolution of state-level CSR between 1981-2011, based on Indian Census data. As the maps indicate, the overall rise in the sex ratio has been led by states in northern and western India, where the CSR approaches (and in some areas exceeds) 1.2. The northern and western states are generally the more economically developed, educated and urban, which suggests the problem of prenatal sex selection is not concentrated among the rural poor. In fact, the highest sex ratios are found in Punjab and Haryana, two of India's richest states. They also have a higher concentration of Sikhs and high-caste Hindus, among whom son preference is especially strong.

³See Waldron (1983), Johansson and Nygren (1991) and Rodgers and Doughty (2001).

The sharp rise in CSRs, particularly after the 1991 Census, reflects the introduction and dissemination of ultrasound technology, which provided expanding access to non-invasive fetal sex determination. According to Anukriti et al. (2018),ultrasound availability increased rapidly in the 1990s through a reduction in tariffs on medical technology that led to more imports and loosening of regulations that sparked domestic production. The interaction between son preference and ultrasound availability has made sex-selective abortion a common practice. Bhalotra and Cochrane (2010) show that as many as a half million girls were aborted annually between 1995-2005.⁴ This occurred despite India's outlawing the use of ultrasound for sex determination in 1994, with the passing of the Pre-Natal Diagnostic Techniques (PNDT) Act. The nationwide ban came into full force in 1996 and the PNDT was updated in 2003 to include newer technologies like chorionic villus sampling. However, owing to the strength of son preference, enforcement is weak and the problem of sex selection has continued largely undeterred (Visaria (2007), Arnold et al. (2002)).

2.2 India's political structure and female representation

India is a parliamentary democracy, with systematic division of power at the state and central levels. There are 29 states and seven union territories, each divided into multiple, single-member electoral constituencies (seats) that are represented in the state legislature. The boundaries of these constituencies are drawn to ensure approximately equal number of inhabitants in each constituency. Consequently, state assemblies vary in size according to the state's population and the number of assembly seats in a state ranges from 30 to 400. Districts are an intermediate level of local governance between state and village government. A district may contain anywhere between 1 and 37 electoral constituencies with no district overlap of any individual constituency. Figure 2 illustrates the district and state boundaries for all the states under study.

India has a multi-party system with numerous political organizations distributed across the political spectrum. Constituency elections are routinely held every five years and candidates are

⁴In 1971, the Medical Termination of Pregnancy Act legalized abortion in cases where the mother's life is in danger or when pregnancy arises from contraceptive failure or rape. Abortions carried out for other reasons were prohibited.

elected on a first-past-the-post system, so that the candidate earning the maximum votes wins. States may also hold mid-term elections at shorter intervals in the event of a political crisis where the governing coalition loses the confidence of majority of the state legislators and an alternative government cannot be formed, but none occur in our sample. All citizens above the age of 18 with a sound mind and no criminal record are eligible to vote in these elections. To compete in these elections one must be a registered voter above the age of 25 and a resident of the constituency.

State governments contribute to several key policy areas, including law and order, health, and education. The primary legislative body is the Legislative Assembly (LA) or *Vidhan Sabha*, which is responsible for state planning and policy decisions. However, the constitution of India allows for a bicameral structure at the state level, so some states may also have a Legislative Council (LC) or *Vidhan Parishad*. Members of the LA are chosen through state elections, while members of the LC are appointed by the LA, the Governor and other sub-district local governing bodies. Currently, seven states have a bicameral structure, and where it exists, the LA has more legislative power than the LC.

Members of state assemblies are defacto members of the district council or *Zila Parishad* of the respective districts from which they are elected. The council also consists of elected representatives of other sub-district governing bodies that have separate elections, independent of the state elections. Figure 3 illustrates the political and administrative hierarchy within a state. Each circle denotes an independently elected administrative system and all administrative units within a circle follow the same election cycle. The block and village council are part of rural administration while the municipalities and city councils govern only urban areas within a district. The arrows indicate whether members of this system are represented in the district council.

Functioning as a link between the state and local administrative bodies, the district council performs multiple supervisory functions. It coordinates the activities and approves the budget of all local governing bodies within its jurisdiction. It is responsible for the maintenance of primary and secondary schools, hospitals, dispensaries, minor irrigation works. More importantly, the district council oversees the implementation of various development schemes and renders advice to the

state governments on their execution. The council's budget primarily consists of the grants received from the state government as well as its share in the land revenue and other local taxes.

Women are significantly under-represented in India's elective offices. Between 1977-2004 women comprised less than 4 percent of the pool of contestants and about 4.5 percent of all winners in state elections. Nearly 30 percent of the district electoral years do not have female candidates and less than 25 percent are exposed to a female politician. Female representation in political parties was also low. Almost 50 percent of the female candidates competed independently, without any political backing. The 1993 constitutional amendment reserved one-third of all seats in village and district councils for women but there are no quotas for women in state assemblies.⁵ While the average level of female political participation over the period has been low, the number of female candidates and election winners has been increasing. Figures 4 and 5 show that the share of female candidates and district seats won by women increased from from 3-4 percent in 1980s to about 7-8 percent in 2000s. As documented by Bhalotra et al. (2018) and Brown et al. (2018), female electoral successes have positive downstream effects on the number of female candidates.

2.3 Channels of influence

Our analysis exploits within-district changes in the female share of elected MLAs to identify the effects of female political representation on girl births and post-natal mortality. Female MLAs could promote these outcomes through both policy and role-model channels.

Members of the legislative assembly could influence the direction of policy, the level and mix of expenditures, or the nature of public good provision to prioritize the needs of women. Besley and Case (2003), Edlund and Pande (2002) and Edlund et al. (2005) find clear gender differences in policy preferences and a shift in policy focus towards women's issues with increased female representation. In addition, female MLAs who are a part of the ruling coalition may be able to expedite programs or initiatives targeting women (Persson et al. (2000); Grossman and Helpman

⁵In 2010, a bill proposing to enact a one-third quota for women in national and state legislatures was passed by the upper house of parliament, but it has not yet been voted on in the lower house.

(2004)). Even when the policy target is gender-neutral – say, improved public health services – women and girls may be differentially affected because they stand to benefit more than men and boys.⁶

In a society characterized by male dominance and narrow gender roles, higher female participation in politics could also challenge gender stereotypes. Beaman et al. (2012) find that increasing the share of female leaders on village councils lowered parents' gender gap in aspirations for their children. Further, observing more women in positions of power may alter women's perception of themselves, tilting intra-household balance of power in favor of women. Because women invest more in children and favor redistribution, their increased say in household decision making may improve health outcomes disproportionately for girls (Thomas (1990)).⁷

3 Research Design

To investigative the link between female political representation and girl survival, we match the fertility history of over 500,000 mothers from the District Level Household and Facility Survey (DLHS) to district election outcomes over 1977–2004 period.

3.1 Fertility histories and family characteristics

We obtain the fertility histories from the second wave of District Level Household and facility Survey (DLHS). Conducted in 2002-04, the DLHS records the fertility history for over 500,000 married women, aged 15-44 years, whose marriages were consummated. For each live birth, it reports the child's gender, year of birth and birth order, whether a child is part of multiple births, and age at death if the child died. The survey also provides each household member's age, education, caste, and religion, as well as data on household construction type, assets and fuel use. The DLHS is nationally representative, covering urban and rural areas in 593 districts across 36 states and union

⁶On the other hand, improved health services could also mean easier access to modern reproductive technology and higher prenatal selection, in which case the effect on girl survival would be ambiguous.

⁷While greater female representation can raise the status of women and girls, it could also provoke resentment and retaliation by men who feel their positions threatened.

territories.⁸ Each mother is geocoded to her district of residence, so we can map each birth to the outcomes in the prior district election.

Our analysis sample begins with 443,111 mothers with complete fertility histories and household data and over 1.338 million births. Table 1 summarizes the birth and household characteristics for the mothers in the sample. The average number of total (live) births is 3.02 (2.51). Only 48 percent of live births are girls. The typical mother was married at 17, is almost 31 years old and has about 8.5 years of schooling. One-third of the mothers live in an urban area, 82 percent are Hindu and 28 percent are members of a scheduled caste or tribe, which is consistent with India's 2001 census.

3.2 Election data

We obtain constituency-level data on every state legislature election between 1977-2004 from the Election Commission of India (ECI).⁹Figure 2 shows the districts included in our sample. The ECI provides the name, gender, caste category, party affiliations and vote counts for all participating candidates. We map each constituency to its parent district accounting for district boundary changes during the time period under study. A single district has between 1 and 37 constituencies or seats. Because the district is the unit of analysis, we aggregate all constituency-level information up to the district.¹⁰

Table 2 reports the summary statistics for the election variables. Our sample includes 3,949 district–election-year observations. In a typical district, women won 4.3 percent of seats and about 25 percent of the district-years produced at least one female victory. Part of our research design leverages close man-women elections, defined by vote margins of less than 3.5 percent. Between 1977-2004, 10 percent of the district-years witness a close election between a man and a woman,

⁸For details of sampling, refer to Chapter 1 of the National Report of DLHS-2 available here: http://rchiips.org/pdf/rch2/National_Report_RCH-II.pdf.

⁹Our sample also includes the union territory (UT) of Pondicherry. However, the UTs Andaman and Nicobar, Lakshadweep, Dadra and Nagar Haveli and Chandigarh are omitted because these provinces do not have a state legislature and are governed by the Central Government. Daman and Diu is also dropped from the sample because this region switches between the status of state and UT during the sample period, holding assembly elections only in the years for which it remained a state.

¹⁰Appendix A.1 describes the mapping process. We are grateful to Datameet (http://datameet.org/) for compiling these data into a usable format from online pdfs available on the ECI website.

with the female candidate prevailing about half the time.

When the fertility histories are matched to the election data by district and prior election year, we end up with an analysis sample of 439,953 mothers and 1,334,327 births over 585 districts in 29 states and one union territory.

3.3 Empirical model

We are interested in the effect of female electoral success, as represented by victories in district elections, on girl births and post-natal mortality. We begin by relating prenatal outcomes to the share of state assembly seats won by women in an empirical model of the form:

$$isgirl_{imdt} = \delta female_{d,t-1} + X_{imdt}\alpha + Z_{dt}\beta + \gamma_d + \lambda_t + \varepsilon_{imdt}$$
(1)

where the *isgirl_{imdt}* is an indicator for a female child at birth *i* to mother *m* in district *d* at time *t*; *female_{d,t-1}* is the share of state assembly seats in a district won by women in the election year immediately preceding the birth of the child; X_{imdt} contains observable mother and child characteristics that predict prenatal selection; Z_{dt} contains district-year varying controls; and γ_d and λ_t represent district and year fixed effects. We also include state-year indicators for female representation at other political tiers. We estimate (??) as a linear probability model and report standard errors clustered at the district level. For the case of post-birth mortality, we replace the *isgirl* with an indicator for the relevant mortality outcome.

Despite the rich set of controls, it is unlikely that OLS identify the effect of share seats won by women. First, the political regime may be correlated with unobserved mother characteristics that affect girl births and their timing. For example, district-level health services that influence both prenatal and postnatal survival may vary with female representation, which in turn could affect the fertility timing, birth order or child gender. Some mothers may be more likely than others to advance or defer childbearing, or engage in sex selection, depending on the status of district health services. To address this issue, we also consider specifications with mother fixed effects.

Second, OLS will also be biased if unobserved voter preferences are correlated with both politician gender and the probability of female births. While district or mother fixed effects control for voter characteristics that do not change over time, they fail to capture the time-varying component of their candidate gender preference. If women are elected more often in constituencies where electoral preferences are biased towards female candidates, such a pattern may be correlated with girl births through the policy channel or local societal attitudes about the status of women.

To deal with this problem, we instrument $female_{d,t-1}$ with the share of women winning in close male-female elections using a regression discontinuity design. The idea is that the narrow victory margin indicates an electoral outcome that is as good as random (Lee (2001)), including the winner's gender. Close elections are defined by the vote differences between the winner and runner-up of less than 3.5 percent of total votes cast. As a robustness check, we also repeat the analysis using winning margins of 2, 2.5, 3 and 4 percent. Because the existence of close elections between men and women depends on the share of female candidates participating in the district, we also control for the fraction of seats in a district that saw a close man-woman election (*shareclose*). While the outcomes of close races may be random, the existence of close races may not be. The share of female candidates in a district or the party affiliation of candidates may determine whether a constituency experiences a close election.

A key underlying of our design is that mothers do not move across districts during the sample period. The absence of migration information in the household data does not allow us to control for inter-district movement of mothers. This is potentially a problem for two reasons. First, the migration of mothers across district may lead to errors in their recorded exposure to female representation. Second, if migration occurs systematically with the political regime, then the results may suffer from selection bias. To assess the potential magnitude of this problem, we analyze population migration data from Census 1991-2001 and find that female migration across districts for purposes other than marriage remained low during the sample period. Only 13 percent of the total female population moved across districts and half of those moves were family relocations for employment purposes. Considering that the current sample also includes a significant proportion

of mothers who married through 1970s and 1980s, when post-marriage migration was even lower among women, we concluded that the potential bias from migration is not a serious concern.

4 Results

First, we present our findings on the overall impact of female political representation on prenatal and postnatal survival of girls. Then, we extend the analysis to examine how the estimated effect of female representation varies with introduction of the political quotas for women and the PNDT act against fetus sex detection. The question in this case is whether large-scale national efforts alter or amplify the impact of individual female victories.

4.1 Girl births, fertility and post-natal survival

4.1.1 Girl births

Table 3 presents our initial findings on the relationship between female electoral success and girl births. The top panel reports estimated coefficients of *female* in the structural equation using OLS and 2SLS. OLS produces an estimated *female* effect of -.019 (Column (1)), which implies that the probability of a girl birth would fall by .2 points if the female share of legislators in the district rose by 10 points (roughly one standard deviation). However, the OLS result is highly imprecise, with a standard error almost as large. The 2SLS estimates indicate a larger and more precisely estimated tradeoff. Depending on the order of the vote-margin polynomial used in the first stage (Columns (2)-(4)), 2SLS suggests that a 10-point increase in female electoral success would decrease the likelihood of a girl birth by at .45 to .50 points. This translates into 2 fewer girl births per 100 male births from a baseline of 92.¹¹

The first-stage results in the bottom panel indicate close elections between women and men strongly predict the female share of legislative victories. The point estimate of the *femaleclose*

¹¹Tighter definitions of close elections yield qualitatively similar results, but the estimated *female* coefficients are larger and much less precise. See Table A2 in the Appendix.

coefficient is robust to the polynomial specification and highly statistically significant and the first-stage *F* exceeds 90 in each case. We also estimate reduced-form effect of close female-male elections on girl births, using non-parametric RD methods outlined in Imbens and Kalyanaraman (2011) (IK) and Calonico et al. (2014) (CCT). These results, which are presented in Table 4, are qualitatively in line with the 2SLS *female* effect in the structural model and statistically significant at the 5-percent level.

4.1.2 Fertility

At first glance, the negative effect of female political representation on the likelihood of female births appears counter-intuitive. A closer examination suggests that this result may arise from an interaction between declining fertility rates, a societal preference for male offspring, and the availability of fetal sex diagnostic technology. Table 5 extends the original sample to include every year a mother could potentially give birth, enlarging our dataset from half a million to over 6.6 million observations. We find that a 10 percentage-point increase in female political representation at the district level is associated with a statistically significant 0.8 percentage-point reduction in fertility rates (Column (1)). This outcome is consistent with the role of district administrations play in executing state and national policies related to family planning and maternal-child health services. This fertility decline is accompanied by an almost equal reduction in the likelihood of a female birth, with no corresponding change in male births (Columns (2) and (3)). The substantial impact on female births, relative to the overall ratio of live female births, suggests that conventional indicators likely underestimate the degree of prenatal selection taking place.

We further disaggregate the data to examine variations between rural and urban populations. Table 6 indicates that urban women experience a more pronounced fertility decline than their rural counterparts – a finding that aligns with existing literature on urban-rural differences in fertility preferences. This divergence is likely due to higher female education and employment in urban areas, which increases the opportunity cost of additional children.

We also explore the rural-urban divide on prenatal selection. Table 7 repeats the analysis in

Table 6 for girl births. The data reveal a robust negative relationship between female political representation and girl births in urban areas, while showing no significant impact in rural regions. These findings corroborate the narrative that the overall decline in female births, as a result of increased female political participation, is predominantly an urban phenomenon. This is likely reinforced by the fact that urban households have greater access to, and can more likely afford, fetal diagnostic technology. Our results resonate with Jayachandran (2014), affirming the crucial role of declining fertility rates as a motivator for prenatal sex-selection in India.

4.1.3 Postnatal survival

While the impact of female political representation appears to reduce girls' prenatal survival rates, it may nevertheless improve their postnatal survival. Using the empirical specification in equation (2), we explore the effects on infant, neonatal, and post-neonatal mortality, differentiated by child gender.¹² Table 8 reports these result, focusing on the interaction term *female* × *isgirl* interaction to identify gender-specific effects.

Both OLS and 2SLS estimates suggest a positive impact on postnatal survival for girls, particularly in the neonatal period. We find that a 10-percentage point increase in female state legislators leads to a 0.8-percentage point decline in female infant mortality, compared to male infants (Column (2)). This is roughly the effect of a one standard deviation (0.093) change in the share of district MLA seats held by women. The positive estimate for boys suggests a decline in male infant survival rates, challenging the cultural narrative that allocates more household resources to sons. This paradox could be explained by a more equitable distribution of resources spurred by the influence of female politicians, which may be detrimental to male infants given their higher biological mortality risk.

Significant urban-rural differences emerge when considering girls' postnatal survival. Table 9 shows that the positive impact of female representation on girls' survival rates is more pronounced

¹²Infant mortality and neonatal mortality refer to death of a newborn within the first 12 months and first 28 days, respectively. Meanwhile, post-neonatal mortality refers to infant death beyond the first 28 days but within 12 months after birth. Each mortality outcome is coded as a binary indicator for whether the child succumbed to mortality within the defined period.

in rural areas. The estimated coefficient of *isgirl* \times *female* for rural children is -0.098 and it is significant at the 5-percent level. The corresponding coefficient for urban children is small and imprecise. This complements our findings in prenatal selection, emphasizing the role of healthcare access in influencing these outcomes.

We find support for the postnatal mortality result in the breastfeeding data provided by the DLHS.¹³Exclusive breastfeeding is considered critical for promoting sensory and cognitive development in infants and protecting them against infectious and chronic diseases. Accordingly, the World Health Organization recommends exclusive breastfeeding of all infants starting at birth and up to the first six months. However, female infants in India are breastfeed for shorter duration than boys (Jayachandran and Kuziemko (2009)). We find that breastfeeding increases for female infants with greater female political representation. Table Table 10 indicates that breastfeeding rates for the first six months improve by 5.2 percentage points for girls in districts with a 10-percentage point increase in female representation (Column (1)). The result for boys is less precisely estimated, which may indicate that early childcare for boys is less dependent on external factors, because they are the more desired children. Female representation also prolongs breastfeeding of daughters beyond the six months (Columns (3) and (5)).

Finally, we analyze the impact of female political victories on vaccination and immunization records.¹⁴Similarly to breastfeeding, girls are often neglected in immunization. However, we find no significant gender difference in the estimated effect of female political representation on immunization. Although female political representation appears to improve the take-up of some of the vaccinations for girls relative to boys, the effect goes away when the sample is restricted to children with official proof of the administered vaccines. Refer to Appendix section A.2 for details.

¹³The DLHS carries detailed breastfeeding information for infants born in the three years preceding the survey date. It records the duration of breastfeeding and initiation post birth. Within two days of birth, 55 percent of children were being breastfed.

¹⁴Similar to breastfeeding DLHS provides immunization record of children born in the three years preceding the survey date

4.2 The impact of national reforms

While the overall impact of female political representation on girls' prenatal survival is negative, we find it varies significantly based on the policy environment and political regime. We analyze two key national initiatives implemented during our study period: the Pre-Conception and Pre-Natal Diagnostic Techniques (PNDT) Act and political reservations for women. Table 11 reports the results.

The PNDT Act, enacted by the Indian government in 1996, aimed to prevent the sex-selective abortion of female fetuses by banning the use of ultrasound and other diagnostic methods for sex determination. Our empirical analysis, adjusted for reform initiatives, shows that the negative impact associated with female political representation on prenatal survival of girls reverses post-PNDT. The interaction term *reform* × *female* has a statistically significant coefficient estimate of 0.11 at the 5-percent level (Column (1)), indicating that the likelihood of female births increases after the enactment of the PNDT Act, in contrast to the pre-PNDT period.

The 93rd and 94th Constitutional Amendments in 1993 mandated the reservation of one-third of all political seats for women in local governing bodies, both rural and urban. Our analysis shows a coefficient estimate of 0.21 for the *reform* \times *female* interaction (Column (2)), which is statistically significant at the 1-percent level. This indicates that the policy significantly enhances the positive impact of female political representation on the prenatal survival of girls, as compared to the pre-reform era.

We also extend our analysis to the cohorts of children born post-reform. 12 presents these results. We find a robust, positive impact of female political representation on prenatal survival following these reforms. Specifically, a 10-percentage point increase in female political representation correlates with a 1.8 (post-PNDT) and 2.3 (post-reservation) percentage point increase in the likelihood of female births. These shifts equate to an additional 6 (post-PNDT) and 7 (post-reservation) female births per 100 male births, without any significant change in the overall birth rates.

The results indicate that broad-based reforms for women cause a reversal of the qualitative

effect of female political representation on girls' prenatal survival. The analysis of PNDT shows that appropriate policies or legislation protecting girls and supporting their cause can lower their discriminatory treatment and enhance their well being. Such initiatives, however, are better implemented and enforced with greater female representation in the political domain. On the other hand, the borax-based representation of women through political quotas potentially strengthens the overall political agency of women. It enhances the visibility of women in the political domain and increases the political voice of the individual female MLAs in the district, enabling them to improve policy outcomes for girls.

Our findings suggest that broad-based reforms like the PNDT Act and political reservations for women not only have their own distinct effects, but also can magnify the positive impact of female political representation on the welfare of girl children. These initiatives serve as enablers, allowing female political leaders to more effectively translate their governance into improved outcomes for girls. Moreover, the results underscore the importance of creating an empowering policy environment alongside increasing female political representation. It is in such synergistic contexts that female leaders are most effective at combating deeply-entrenched gender biases and improving the survival rates and overall well-being of female children.

5 Possible channels

We have established that female victories in district elections impact fertility rates, the likelihood of female births, and improve girls' postnatal survival and childcare. We also observed that the impact on girls' prenatal survival is particularly sensitive to nationwide reforms for women and girls. Now, we turn our attention to how female electoral success could translate into better outcomes for girl children. We explore this through three potential channels identified in our conceptual framework: public good provision, law enforcement, and perception changes.

5.1 Public good provision

As discussed in the conceptual framework, female politicians, more than their male counterparts, tend to prioritize the provision of public goods that address the needs of women. Female MLA's effect on fertility and girls' improved postnatal survival can be attributed to their influence on the provision of women-friendly public goods.

Given that women bear the brunt of the costs of childbearing, both in terms of health risks and foregone wages, female politicians may use their influence to enhance birth control programs. To test this proposition, we investigate the impact of female political representation on the outreach of fertility counseling to mothers and women's contraception use. The results in 13 indicate that an increase in female political representation is associated with higher contraception use and more fertility counseling through government sources.¹⁵

The effect of female representation on contraception use and family planning appears more pronounced in rural areas, characterized by higher fertility rates and lower access to contraception. We investigate compare rural and urban responses to contraception use and awareness, family planning counseling, and government health worker visits to mothers under family planning programs. Our empirical results, presented in Table 15, validate this, indicating greater focus on rural areas in the delivery of family planning programs.

We also explore the impact of female political representation on the provision of childcare advice to mothers under the Integrated Child Development Services (ICDS) program. Under the ICDS program, government health workers visit women during pregnancy and after childbirth to provide vital information related to childcare and nutrition. The ICDS is a nationwide service launched in 1975. The outcome variables are indicators for whether the mother received counseling on diet, delivery and newborn care from public health workers before or after the birth of her child. The results presented in Table 14 suggest that the influence of female politicians may contribute to improving girls' survival through better dissemination of healthcare information.

¹⁵Our findings also hint at a complex relationship between policies that benefit women and the well-being of girls, particularly in contexts where son preference exists.

However, we found no evidence to suggest that female politicians directly affect prenatal and postnatal care services or alter maternal behavior around childbirth. Our data show no significant impact on public health worker visits or the provision of vital nutritional supplements. (See Appendix Table A5.)

5.2 Enforcement of laws

Our study reveals that the effectiveness of laws like the PNDT Act is enhanced in areas with higher representation of female politicians. This suggests that having more women in political positions may strengthen the enforcement of laws aimed at improving outcomes for girls. Our results corroborate earlier studies (for example, (Clots-Figueras (2011)) indicating stronger support for women-friendly laws among female politicians.

5.3 Changing perceptions

In addition to impacting public services, female politicians may serve as role models, raising women's aspirations and thereby influencing fertility and childcare choices.¹⁶ Our findings suggest that quotas may have improved the visibility of female politicians, especially in rural areas, thereby affecting social attitudes toward women and girls.¹⁷ Although it is possible to ascribe the positive outcomes largely to better law enforcement, the data suggest otherwise. Since the benefits are more pronounced in rural areas where law violations are less common, it's more likely that changing social attitudes are also playing a significant role.

¹⁶In a society where women typically have limited say in household decisions, increased exposure to female leaders could shift dynamics.

¹⁷While we cannot definitively attribute the positive outcomes for girls in rural areas to increased visibility of female politicians, the impact appears to be more significant there than in urban settings. See Appendix Table A3.

6 Evaluating the Research Design

6.1 RD plot

In plurality voting systems, vote margins exhibit a discontinuity at zero, signifying a threshold where the electoral outcome swings between a female and male winner. As the vote margin nears zero, districts with female winners become increasingly comparable to those with male winners (Angrist and Lavy (1997), Clots-Figueras (2011), Clots-Figueras (2012), Bhalotra and Clots-Figueras (2014)). Figure 7 depicts this relationship, featuring a non-parametric plot contrasting the vote margin in all close male-female elections against the proportion of female politicians in respective districts. The lowess smoothing lines, plotted on either side of the discontinuity, employ 1-percentage point bins as outlined by Imbens and Lemieux (2008). A sharp jump at the discontinuity suggests that close elections won by women substantially increase the overall female representation in the district.

6.2 Randomness of close elections

Our analysis relies on the assumption that the gender outcome of close male-female elections is random. To substantiate this, we conducted a regression analysis using multiple political and demographic variables, including but not limited to, party type, gender ratios, literacy rates, and past election outcomes. The sample comprises districts with at least one close election won by a woman. Table 16 presents the results, revealing no significant coefficients, thereby supporting the validity of our instrument.

6.3 Constituency and candidate characteristics

Additionally, our analysis shows that constituencies with close-election female winners closely resemble those with male winners. Table 18 compares variable means between the two groups, such as the total number of candidates, votes polled, reserved seats, party affiliation, and candidate incumbency. While women from national parties tend to win more frequently, the narrow victory

margins suggest no inherent voter bias favoring female politicians. Moreover, female independent candidates are less likely to win, indicating that independent women are under-represented among close-election winners.

6.4 External validity

To ensure the generalizability of our findings, we compare districts with and without close elections. Table 17 shows no significant differences between the two groups in terms of gender composition, literacy rates, and political variables, thus affirming the external validity of our study.

6.5 Vote margin density

We also examine the continuity of vote margin density around the zero point to rule out manipulation. Figure 8 depicts a kernel density plot of vote margins from all close male-female elections, revealing a continuous distribution around zero. Further substantiation comes from the McCrary's test, the results of which are shown in Figure 9. The test confirms that the density of the vote margin on either side of zero is statistically indistinguishable.

6.6 Placebo Tests

Our primary model focuses on the impact of female politicians during the year immediately preceding birth (t - 1) due to its relevance to neonatal and infant health. However, to rule out lingering effects from previous years, we also run models considering up to t - 3 periods. These results, along with additional placebo tests employing forward lags of the political variable (t + 1, t + 2), are reported in Appendix Table A4 and indicate no significant deviations.

7 Conclusion

India's deeply rooted cultural bias towards sons that is manifested in highly skewed sex ratios and high rates of postnatal female mortality. In this paper, we have examined whether increasing female representation in state-level political roles positively affects the survival prospects of girls, touching upon both prenatal and postnatal indicators. Our results are mixed. While an increase in female representation leads to a statistically significant decline in the likelihood of female births, it enhances postnatal survival rates for girls. This paradox suggests a complex relationship shaped by both societal norms and policy interventions.

Nationwide policies such as seat reservations in local governments (Panchayati Raj system) and bans on prenatal sex determination interact with female representation in state assemblies to amplify positive outcomes for girls. Since these interventions, increased female representation reverses its initial negative effect on the likelihood of female births. This suggests that broad-based representation at local levels strengthens the political voice of women at higher tiers, consequently fostering a more enabling environment for girls.

Our findings lend empirical weight to the call for enhanced female representation in India's political landscape, not just at local levels but extending to state and national governments. The results indicate that even in competitive electoral environments, without mandated quotas, female legislators can effect change for women and girls, albeit within the constraints of societal norms and their own policy focus. Thus, our research bolsters the argument for comprehensive political agency for women, including the reservation of state assembly seats, to fully leverage their potential in improving the status and well-being of girls in India.

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	Mean	SD
Unit of observation: mother		
No. of live births	3.02	1.76
Girl	0.48	0.50
Birth order	2.51	1.63
Rural	0.68	0.47
Household standard of living index	1.82	0.81
Mother's age	30.6	7.12
Father's age	36.6	8.15
Mother's years of schooling	8.42	3.60
Father's years of schooling	9.07	3.86
Mother literate	0.50	0.50
Father literate	0.72	0.45
Age at consummation of marriage	17.3	3.11
Hindu	0.82	0.38
Muslim	0.12	0.33
Christian	0.024	0.15
Sikh	0.018	0.13
Buddhist	0.0074	0.086
Scheduled caste(ST)	0.19	0.39
Scheduled tribe(SC)	0.088	0.28
Other backward classes(OBC)	0.41	0.49
Observations	443111	

Table 1: Household variables summary

The sample consists of 1,427,714 births to these 443,111 mothers between 1977-2004 spanning 585 districts in all 29 states and one union territory(Pondicherry) of India.

	Mean	SD
Unit of observation: district-year		
Share of female winners	0.043	0.093
Share of female candidates	0.036	0.038
Fraction of votes won by female candidates	0.041	0.060
Proportion of district-years with at least one female candidate	0.71	0.45
Proportion of district-years with at least one female politician	0.25	0.43
Proportion of district-years with at least one man-woman election	0.39	0.49
Proportion of district-years with at least one close man-woman election	0.099	0.30
Proportion of district-years with at least one female winner in a close man-woman election	0.053	0.22
Observations	3949	

 Table 2: Election variables summary

	isgirl (1)	isgirl (2)	isgirl (3)	isgirl (4)
	OLS	2SLS	2SLS	2SLS
female	-0.019	-0.050*	-0.046*	-0.045***
	(0.017)	(0.029)	(0.029)	(0.016)
Control	x	x	X	х
Mother FE	Х	Х	Х	Х
Year FE	Х	Х	Х	Х
Vote margin polynomial		1st order	2nd order	3rd order
, oto margin porynomia		157 51401	2.0.01001	

Table 3: Estimated effect of female district election victories on prenatal survival, 1977-2004

		Firs	t stage	
femaleclose		0.945*** (0.089)	1.051*** (0.108)	1.050*** (0.105)
shareclose		-0.409*** (0.059)	-0.528*** (0.074)	0.515*** (0.041)
F-statistic Observation	516971	112.86 516971	94.11 516971	99.33 516971

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: The richness of specification increases from (1)-(2). (1) is the OLS specification and (2) - (4) is the 2SLS model with varying degrees of polynomial on the vote margin. All specifications include mother fixed effect and time dummies. Controls include mother's age at birth, an indicator for twins or triplets, daughters born previously, district-level population sex ratio, male-female literacy and labor force participation. Dummies are added for female head of state, the onset of political reservations for women at sub-district level and the 1996 legislation banning on sex-diagnostics. Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

	isgirl	isgirl
	(1)	(2)
	RD(CCT)	RD(IK)
female	-0.021**	-0.027**
	(0.009)	(0.012)
Controls	Х	
Mother FE	Х	
Time FE	Х	
Polynomial on vote margin	Х	
Observations	516971	516971
Standard arrors in paranthasas		

Table 4: Reduced-form effect of female district election victories on prenatal survival, 1977-2004

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: Column (1) and (2) are RD procedure outlined by Imbens and Kalyanaraman (IK) and Calonico, Cattaneo, and Titiunik (CCT), respectively. Controls include mother's age at birth, an indicator for twins or triplets, daughters born previously, district-level population sex ratio, male-female literacy and labor force participation. Standard errors are clustered at the district-level and the error variancecovariance matrix is calculated using bootstrapping with 1000 draws.

 Table 5: Estimated effect of female district election victories on fertility,

 male and female birth 1977-2004

	Fertility	Female birth	Male birth					
	(1)	(2)	(3)					
female	-0.080**	-0.062***	-0.018					
-	(0.034)	(0.015)	(0.012)					
Observations	6605781	6605781	6605781					
Standard amore in normathagae								

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. The observations includes all reproductive years of the sampled mothers or each year in which the woman could have given birth. Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

	fertility (1)	fertility (2)	fertility (3)
	Overall	Rural	Urban
female	-0.080** (0.034)	-0.072*** (0.023)	-0.096*** (0.033)
Observations	6605781	1755711	897457

Table 6: Estimated effect of female district election victories on fertility by rural-urban

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. Column (1) is for the full sample while columns (2) and (3) separate the effect by rural and urban, respectively. All standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

Table 7: Estimated effect of female district election victories

 on prenatal survival by rural-urban

isgirl	isgirl	isgirl
(1)	(2)	(3)
Overall	Rural	Urban
-0.046*	-0.038	-0.064* (0.035)
(0.020)	(0.031)	(0.033)
	isgirl (1) Overall -0.046* (0.026) 516971	isgirl isgirl (1) (2) Overall Rural -0.046* -0.038 (0.026) (0.031) 516971 355240

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

	Infant mortality		Neonatal	mortality	Postneonat	Postneonatal mortality		
	(1)	(2)	(3)	(4)	(5)	(6)		
	OLS	2SLS	OLS	2SLS	OLS	2SLS		
female	-0.002 (0.011)	0.057*** (0.009)	0.007 (0.005)	0.059*** (0.021)	0.003 (0.004)	-0.002 (0.006)		
isgirl	-0.007*** (0.002)	-0.007*** (0.003)	-0.016*** (0.001)	-0.011*** (0.004)	0.004*** (0.001)	0.004** (0.001)		
isgirl imes female	-0.014** (0.009)	-0.079*** (0.026)	-0.006 (0.005)	-0.060** (0.032)	-0.007 (0.005)	-0.019 (0.019)		
Observations	1334327	516971	1334327	516971	1334327	516971		

Table 8: Estimated effect of female district election victories on postnatal survival by child gender 1977-2004

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: Columns (1), (3) and (5) report OLS coefficient estimates for infant, neonatal and post neonatal mortality using the specification in column (1) of Table 3. Columns (2), (4) and (6) report 2SLS coefficient estimates for infant, neonatal and post neonatal mortality using the specification in column (3) of Table 3. The sample size drops in moving from OLS to 2SLS as the latter only focuses on district-years that saw a close man-woman election. Standard errors are clustered at the district level and bootstrapping with 1000 draws is used to calculate the error variance-covariance matrix.

	Overall	Rural	Urban
	(1)	(2)	(3)
female	0.057***	-0.064**	-0.043
	(0.009)	(0.030)	(0.041)
isgirl	-0.007***	-0.003	-0.015**
	(0.003)	(0.004)	(0.008)
isgirl \times female	-0.079***	-0.098**	-0.033
0 9	(0.026)	(0.041)	(0.075)
	516071	255240	161721
Observations	516971	355240	101/31

Table 9: Estimated effect of female district election victories on infant

 mortality by rural-urban 1977-2004

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

Table 10:	Estimated	effect of	female	district	election	victories	on l	breastfeedin	g by o	child
gender										

	first six months		at least	one year	at least two years		
	(1)	(2)	(3)	(4)	(5)	(6)	
	Girl	Boy	Girl	Boy	Girl	Boy	
female	0.524* (0.308)	0.768 (0.488)	1.921** (0.950)	1.727* (0.909)	1.973** (0.974)	1.762* (0.920)	
Year FE	Х	Х	X	Х	X	X	
District FE	Х	Х	Х	Х	Х	Х	
Observations	41020	46274	41020	46274	41020	46274	

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. The sample consists of only last births to mothers who have eight or less children and whose last birth was between 1999-2004. The censoring is done to lower composition bias from mothers with significantly large family size. The sample also excludes children who died as nursing duration for those children would not precisely reflect mother's breastfeeding preference, especially if they died within the first three years after birth. Both columns control for birth order, mother's education and mother's age at birth.

	isgirl	isgirl
	(1)	(2)
female	-0.072*	-0.093***
	(0.041)	(0.014)
reform	0.010	-0.017*
	(0.008)	(0.010)
reform imes female	0.108**	0.205***
	(0.053)	(0.077)
Dummy	PNDT	Reservation
Observations	516971	516971

Table 11: Estimated effect of female district election victories on girls' prenatal survival pre-post reforms

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. Column (1) examines the effect pre/post the 1996 nationwide ban on fetal sex-determination. Column (2) measures the effect pre-post the 1993 political reservation for women at the sub-district level. Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

	isgirl	isgirl	isgirl
	(1)	(2)	(2)
	Overall	Post PNDT	Post Res
female	-0.046*	0.176 *	0.231***
	(0.026)	(0.102)	(0.049)
Observations	516971	516971	516971
	Fertility	Fertility	Fertility
female	-0.080**	-0.009	-0.016
	(0.034)	(0.050)	(0.035)
Observations	2653168	1487491	1297852

 Table 12: Estimated effect of female district election victories

 on fertility and girls' prenatal survival post reforms

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. Column (1) are estimates from the full sample, (2) and (3) reports post-PNDT and post-reservation effect of *female*. The sample consists of the cohort of children born after each of these reforms. Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

	Use contraception	FP advice
female	0.338***	0.203**
	(0.110)	(0.085)
Observations	79202	79202

Table 13: Estimated effect of female district election victories on contraception use and family planning programs

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. The sample consists of mothers whose last birth was between 1999-2004. Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

	Diet	Newborncare	Delivcare
	(1)	(2)	(3)
female	0.239**	0.201**	0.219**
	(0.12)	(0.09)	(0.10)
Observations	86363	86349	86362

Table 14: Estimated effect of female district election victories on

 the delivery of health information to mothers

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. The sample consists of mothers whose last birth was between 1999-2004. Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

	useCONTR (1)	advFP (2)	visitFPworker (3)
female	0.184 (0.123)	0.200** (0.094)	0.164* (0.083)
urban	-0.118^{***}	-0.702^{***}	-0.264***
urban x fem	(0.022) 0.446** (0.197)	0.013	-0.035*** (0.018)
Observations	79202	79202	79202

 Table 15: Estimated effect of female district election victories on birth control by rural-urban

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. Column (1) reports results for contraception use. Columns (3) and (4) measure the effect of the political variable on the delivery of family planning advice by public health workers and visits made by these worker, respectively. Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

	(1)
Proportion of seats contesting close election National	0.0606
	(0.132)
	 .
Proportion of seats contesting close election Regional	0.0379
	(0.0809)
Droportion of south contacting class election Independent	0.0719
Proportion of seats contesting close election independent	(0.112)
	(0.113)
If the district never saw a close election in the past	-0.0554
in the district never surv a close election in the pust	(0.0570)
	(0.0570)
Number of female winners in the past in the district	0.00406
	(0.00906)
	()
Onset of political quotas for women	0.134
	(0.945)
Share of district population that is female	-1.397
	(3.152)
Share of district male population that are literate	-1.368
	(1.579)
Share of district female population that are literate	1.125
	(1.191)
Observations	211

 Table 16: Proportion of district seats won by women in close election against men

Standard errors clustered in parentheses.

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws. The sample consists of district-years that has at least one female winner in close man-woman elections.

	Non-close election	Close election
Share of district population that is female	0.485	0.482
	(0.129)	(0.0153)
Share of district male population that are literate	0.535	0.504
	(0.139)	(0.157)
	0.226	0.211
Share of district female population that are literate	0.336	0.311
	(0.218)	(0.173)
Share of district male population that are working	0.520	0.515
	(0.210)	(0.0531)
	(0.210)	(010001)
Share of district female population that are working	0.210	0.182
	(0.146)	(0.135)
	<	_ /
Total dist-level seats in an election year	6.882	7.677
	(4.378)	(4.126)
Total votes cast in a district election year	517196.5	645106.4
	(462258.0)	(483548.6)
Voter turnout	0.617	0.639
	(0.140)	(0.113)
	0.470	0.477
Female voter share	0.479	0.477
	(0.034)	(0.028)
Female elector share	0.436	0 477
	(0.056)	(0.47)
Observations	3558	301
	5556	371

Table 17: Comparing districts with and without man-woman close elections

mean coefficients, sd in parentheses

Group	Obs	Mean	SE
Total votes polled in an ac year			
Man won	213	87514.59	37120.2
Woman won	219	83028.00	37421.3
Difference		4486.591	3586.557
Total candidates			
Man won	213	9.769953	5.617
Woman won	219	9.876712	6.249
Difference		-0.1067593	0.5713033
Other female participants			
Man won	213	.3568075	0.804
Woman won	219	.4657534	0.808
Difference		1089459	.0775627
Winner is incumbent			
Man won	213	.2300469	0.28905
Woman won	219	.196347	0.0269041
Difference		.0336999	.0394566
Winner affiliated to a national narty			
Man won	213	6338028	0.483
Woman won	219	7945205	0.405
Difference	217	1607177***	.0429381
Winner affiliated to a regional party			
Man won	213	.2159624	0.412
Woman won	219	.1689498	0.376
Difference		.0470127	.0379836
Winner is an independent candidate			
Man won	213	084507	0.279
Woman won	219	.0228311	0.150
Difference		.061676**	.0216164
Constituency seat reserved for General			
Man won	213	.713615	0.453
Woman won	219	.7214612	0.449
Difference		0078462	.043426
Constituency seat reserved for SC			
Man won	213	.1830986	0.388
Woman won	219	.1643836	0.371
Difference		.018715	.0365463
Constituency seat recorved for ST			
Man won	213	1032864	0 305
Woman won	219	1141553	0.319
Difference	21/	0108689	.0300125
· · · · ·			

 Table 18: Constituency and Candidate Characteristics: Man-woman close elections (vote margin cutoff 3.5 percent)

* *p* < 0.10, ** *p* < 0.05, *** *p* < 0.01



Figure 1: State-level child sex ratios, 1981-2011



Figure 2: Districts covered in the study



Figure 6: Share of district seats won by women 1981-2005



Figure 3: Political and administrative divisions of the state



Figure 4: Women candidates in state elections:1977-2004



Figure 5: Women state legislators:1977-2004



Figure 6b: Sex ratio at birth and district-level share of female winners: group of states II



Figure 7: RD plot of the share of female politicians on vote margin



Figure 8: Kernel plot for continuity of density around the point of discontinuity



Figure 9: McCrary's plot for continuity of density of vote margin

A Appendix

A.1 Mapping electoral constituencies

All assembly constituencies (AC) over the sample period are mapped to 2001 census districts using the State Assembly Constituency Delimitation Act of 1976. The new districts, that were formed after 1976, are incorporated using the 2008 AC Delimitation Act. Potential mapping errors owing to changes in AC boundaries over the sample period are ruled out because constituency boundaries remain unchanged in between the two delimitation orders. However, district boundary changes between 1977-2004 can also lead to erroneous mapping of constituencies to districts. Since constituencies do not overlap across districts, district boundary changes mostly involve transfer of AC from one district to another. New districts are either clean or complex (carved out from more than one parent district) partitions of previous district-level than their 1976 counterparts. Kumar and Somanathan (2009) provides a complete account of district boundary changes between 1971-2001 while Election Commission of India's Delimitation Acts of 1976 and 2008 map the constituencies to their parent districts.

Unlike previous studies, we include the relatively newer states of Uttaranchal, Jharkhand and Chhattisgarh that were formed in 2001. These were carved out of the bigger states of Uttar Pradesh, Bihar and Madhya Pradesh, respectively. Of these, the partition of Bihar into Jharkhand and Madhya Pradesh into Chhattisgarh simply involved a transfer of several districts from the parent state to the newly formed ones, keeping district boundaries intact. Consequently, mapping these transferred districts retrospectively to their new states for the entire sample period does not affect our analysis, which is primarily at the district-level.

One may argue that the creation of new states throw up challenges for assigning state controls to the districts within, considering that the states did not exist prior to 2001. However, the only state controls used in the analysis are indicators for women's political reservation at state or sub-district levels and we assign these correctly to the individual districts using information from parent(child) states before(after) 2001. This removes any potential threat to the validity of our result arising from an erroneous assignment of state characteristics to these districts. On the other hand, the inclusion of Uttaranchal compromises the accuracy of our analysis because the creation of this state involved complex changes to district boundaries. Therefore, as a robustness check, we carry out the estimation with and without Uttar Pradesh and Uttaranchal.

The mapping of 1976 constituencies to their parent districts as of 2001 throughout the study period can potentially overestimate or underestimate the district-level political participation of women. However, since constituencies represent a higher level of disaggregation than districts in India's political structure the gender of constituency head is likely to have a more direct and immediate impact on household-level outcomes than the overall gender composition of politicians in the district.

We also control for district boundary changes over the sample period, assigning each district into one out of three categories: 1) unchanged; 2) clean partition (single parent district) and; 3) complex partition (more than one parent district). The overall sample consists of all three district division categories and for robustness checks we limit the sample to only unchanged districts.

A.2 Immunization outcomes

Table A1 reports the results from a regression of the vaccination outcomes on politician gender. The coefficient of interest is that associated with the interaction term *isgirl* \times *female*. For majority of the outcomes, the coefficient estimate is imprecise suggesting that there are no larger immunization gains for girls relative to boys with an increase in female political representation. The positive coefficient estimates in columns (4) and (9) suggest a positive difference for girls in the receipt of tuberculosis vaccine BCG and folic acid supplements. Unfortunately, the results are sensitive to how vaccination is measured, based on mother's report or from the information recorded on vaccination cards. Investigation of the health effects for the subset of children with official documentation of immunization records, reveals poorer outcomes for girls than boys with female representation in the receipt of BCG and polio. Although it covers births to 108,127 children or roughly 56% of the

sample the sensitivity of results to a potential measurement error introduces concerns of sample selection bias (Barcellos et al. (2014)).

	Health card (1)	Polio 0 (2)	Polio 1 (3)	BCG (4)	DPT (5)	Measles (6)	Hepatitis B (7)	Vitamin A (8)	Folic acid (9)
female	-0.007 (0.12)	0.020 (0.07)	-0.144 (0.22)	-0.223 (0.14)	-0.238 (0.42)	-0.234 (0.37)	-0.074 (0.20)	-0.004 (0.24)	-0.081** (0.03)
isgirl	-0.021^{***} (0.00)	-0.017*** (0.00)	-0.062*** (0.00)	-0.062*** (0.00)	-0.072*** (0.00)	-0.138*** (0.01)	-0.035*** (0.00)	-0.069*** (0.00)	-0.003*** (0.00)
isgirl x female	0.039 (0.03)	0.009 (0.02)	0.029 (0.04)	0.071** (0.03)	0.049 (0.06)	0.022 (0.10)	0.029 (0.03)	0.025 (0.05)	0.020^{**} (0.01)
Controls	х	x	Х	x	х	х	x	x	Х
Mother FE	Х	X	Х	Х	х	Х	Х	X	Х
Time FE	x	x	х	×	x	×	x	х	х
Observations	226007	226001	225801	225992	225978	225825	225864	217859	218936
Standard errors i * $p < 0.10, ** p$	n parentheses $< 0.05, *** p < 0.05$	0.01		-			-		

Table A1: Estimated effect of female district election victories on child vaccination

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. Standard errors are clustered at the districtlevel and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws. The sample consists of births to 108,127 mothers. Health card is a government issued card that maintains official record of vaccinations.

Polio 0 and Polio 1 record the administering of initial and higher doses of polio, respectively. BCG or Bacillus Calmette-Guerin is the tuberculosis vaccine.

DPT is the Diphtheria, pertussis and tetanus vaccine.

Vitamin A and Folic acid are indicators for whether the child was administered these post-birth.

	isgirl (1)	isgirl (2)	isgirl (3)	isgirl (3)
female	-0.172 (0.145)	-0.226 (25.72)	-0.172 (1.629)	-0.041** (0.021)
Control	x	X	х	Х
Mother FE	х	Х	Х	Х
Year FE	х	Х	Х	Х
Vote margin cutoff	2%	2.5%	3%	4%
Observation	472566	472566	472566	472566

Table A2: Varying definition of vote margin cutoff

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

	isgirl	isgirl	isgirl
	(1)	(2)	(3)
	Overall	Rural	Urban
female	-0.093***	-0.110**	-0.053
	(0.014)	(0.02)	(0.090)
reform	0.017*	0.028***	0.010
	(0.010)	(0.00)	(0.018)
$reform \times female$	0.205***	0.300***	-0.057
	(0.077)	(0.020)	(0.205)
Observations	516971	355240	161731

Table A3: Estimated effect of female district election victories on girls'

 prenatal survival pre/post reservation by rural-urban

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. *Reform* is a binary indicator for all years following the onset of women's reservation. Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 draws.

	isgirl	
t-3	-0.014	
	(0.028)	
t-2	-0.011	
	(0.025)	
t-1	-0.046*	
	(0.026)	
t+1	0.051	
	(0.036))	
t+2	0.114	
	(0.078)	
t+3	-0.024	
	(0.068)	

Table A4: Estimated effect of female district election victories on girls' prenatal survival using leads and lags of the political variable

Standard errors are clustered at the district-level and the error variance-covariance matrix is calculated using bootstrapping with 1000 * p < 0.10, ** p < 0.05, *** p < 0.01

	Prenatal ANM visit	Antenatal checkup	Postnatal ANM visit	Folic acid	Tetanus
	(1)	(2)	(3)	(4)	(5)
femle	-0.0807	0.119	0.117	0.174	0.076
	(0.140)	(0.0948)	(0.130)	(0.168)	(0.107)
Controls	Х	X	Х	x	Х
Year FE	X	X	Х	Х	Х
District FE	Х	Х	Х	Х	X
Observations	83598	83598	83598	83598	83598

Table A5: Estimated effect of female district election victories on Public Health Provision

Robust SE clustered at the district level in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Notes: All columns report 2SLS coefficient estimates using the specification in column (3) of Table 3. The sample consists of mothers whose last birth was between 1999-2005. Column (1) and (3) capture the effect of *female* on prenatal and postnatal visits by public health workers, also known as Auxiliary nurse midwife (ANM). Column (2) refers to antenatal checkup performed by ANM. Columns (4) and (5) record whether the ANM administered folic acid and tetanus injection to the mother in the prenatal stage.