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IZA DP No. 10780

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ABSTRACT

Effect of Political Decentralization and Female Leadership on Institutional Births and Child Mortality in Rural Bihar, India*

In this paper, we investigate the impacts of political decentralization and women reservation in local governance on institutional births and child mortality in the state of Bihar, India. Using the difference-in-differences methodology, we find a significant positive association between political decentralization and institutional births. We also find that the increased participation of women at local governance led to an increased survival rate of children belonging to richer households. We argue that our results are consistent with female leaders having policy preference for women and child well-being.

JEL Classification: H41, I15, J16, O12

Keywords: gender quota, political decentralization, institutional delivery, child, mortality, Bihar, India

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* We are grateful to the International Growth Center at the London School of Economics for funding this study. We are grateful to Maitreesh Ghatak, Anjan Mukherji, and the participants at Growth Week at LSE and Patna, Bihar for helpful comments and suggestions. We are grateful to Sumant K Rai, Abhishek K. Choudhary and Bhartendu P. Trivedi for excellent research assistance. We are responsible for any errors that may remain. The authors bear sole responsibility for the content of this paper. An earlier version of this paper was circulated as "Political Decentralization, Women's Reservation, and Health Outcomes: A Case Study of Rural Bihar" and this version supersedes all previous versions.

1. Introduction

In the realm of women empowerment at the grassroots level, one of the landmark constitutional amendments the Indian government made, is the 73rd Amendment in 1992 that paved the way to political decentralization and increase participation of women in local governance. The new policy mandates Indian states to hold an election at the *panchayat* level, the lowest tier of governance, every five years and reserve at least one-third of the seats for women.[1] This policy change entailed devolution of powers and responsibilities to the local female leaders and shifted the developmental approach from top-down to bottom-up. Over the years, about 16 Indian states have increased the women's share of reserved seats in rural local bodies to 50% by 2016, with Bihar being the first Indian state to reserve 50% of the panchayat seats for women. In theory, decentralization and increased participation of women is argued to move society's welfare function in an upward direction because decentralization improves the efficiency of public service delivery and female leaders are more likely to influence local policy decisions in favor of women and children than male leaders (Chattopadhay and Duflo 2004; Beaman et al. 2010; Bhalotra and Clots-Figuera 2014). Compared to men, women politicians are more likely to invest in women, children, and favor redistribution (Besley and Case 2003).

More than a million women have been elected in India since 1993 but their impacts on local policy decisions are far from conclusive. The empirical evidence is mixed and mostly focuses on the delivery of public services (Chattopadhay and Duflo, 2004). There has, however, been limited evidence on the relationship between women reservation and health outcomes in India (Bhalotra and Clots-Figuera, 2014) and in low- and middle-

[1] Panchayat is a cluster of villages in rural areas and is the lowest-level of administration.

income countries (Quamruzzaman and Lange, 2016). This paper aims to fill this gap in the literature. The objective of this study is to investigate the impact of political decentralization and women reservation on institutional births and child mortality in rural Bihar, one of the poorest states in the eastern parts of India with 40% of its population on less than $1 a day. We focus on rural sample because 50% quotas for women were applicable in rural local bodies only. In a seminal paper, Chattopadhayay and Duflo (2004) show that women reservation in village council head position in two Indian states (West Bengal and Rajasthan) increased investment in public infrastructure needed by women. In these two states, women leaders had a strict preference to invest in public goods that were mostly used by women such as drinking water.

In contrast, several other studies found no impact of women reservation on the provision of public goods (Besley et al. 2004; Ban and Rao 2008; Bardhan et al. 2012). These results are not consistent with simple citizen candidate models of electoral politics in which political reservations in favor of one group (women in this context) result in the greater allocation of public goods to that group. Bardhan et al. (2012) explain the insignificant results of women reservation is due to coexistence of elite capture and clientelism, which affect the allocation of different benefit programs according to relative preferences of elites and non-elites.[2] They further note that election of politically inexperienced and less educated women may negatively affect policy decisions. Quamruzzaman and Lange (2016) show that female political representation is positively

[2] Elite capture means that powerful and wealthy households are able to capture the benefits of public investments as local politicians and bureaucrats tend to favor them. Clientelism refers to strategic transfers made by political parties and governments to poor and disadvantaged groups as a means of securing their votes, in an effort to consolidate political power.

associated with improved child health in 51 low- and middle-income countries. Bhalotra and Clots-Figuera (2014) show that a 10% increase in women's representation led to increased survival of neonates by 2.1 percentage points in India.

To date, there has been limited evidence on the relationship between women reservation and health outcomes in India (Bhalotra and Clots-Figuera, 2014). In particular, there has been no exploration of whether the greater political representation of women is able to improve health outcomes of women and children. In addition to female leaders being capable of increasing investment in public goods (supply of infrastructure), they can also effectively increase the demand for health services by empowering the women in their village. This paper aims to fill this gap in the literature by investigating whether female leaders are effective in improving health outcomes (institutional births and child mortality) of women and children in the Indian state of Bihar.

Estimating the impact of political decentralization and women reservation on health outcomes is not straightforward. The key identification challenge in estimating the impact of political decentralization and women reservation is the lack of counterfactual as the decentralization policy was launched across the full state of Bihar. The pre- and post-comparison in the outcome variables could simply reflect broader trends and may not be caused by the policy change. We address this concern by employing the Difference-in-Differences (DID) method using data from the pre-decentralization period (1998-99) and post-decentralization period (2007-08). We compare the change in outcomes before and after the policy change in Bihar (*the treated state*), with the same difference in Jharkhand (*the control state*).[3] This DID estimate would yield causal estimate impact of

[3] We use Jharkhand as the comparison group for Bihar because these two states were part of the unified state of Bihar until November 2000 and were administratively bifurcated into two states in November 2000. Thus, the

the policy change if parallel trend assumptions were not rejected. Political decentralization occurred in 2001, while women reservation policy of reserving 50% of the seats was added to political decentralization in 2006 in Bihar.

Bihar is an interesting setting to study this question. On the one hand, the major health and demographic indicators of the state, like infant mortality rate (IMR), maternal mortality ratio (MMR), and total fertility rate (TFR), are much higher than the all India average, reflecting a poor health status in the state. On the other hand, Bihar was the first state to reserve 50% of the panchayat seats for women. Second, the creation of Jharkhand from Bihar provides a kind of natural experiment and a credible counterfactual to isolate the impacts of the decentralization on health outcomes. Jharkhand was a part of Bihar for over 50 years and got separated administratively in 2001, thus making this a very attractive counterfactual state for employing the DID method.[4] Availability of data in the pre-policy change years and post years for Bihar (right after the women reservation policy) is another attractive feature that allows us to answer this question accurately in this setting. Almost a decade has passed since the first panchayat election in Bihar; therefore, it is of tremendous policy interest to understand the impact of political decentralization and women reservation on health outcomes.

Bihar held its first panchayat election in 2001 after a gap of 22 years, albeit without any kind of reservation, neither caste nor gender, in the leadership positions in panchayats. The 2001 panchayat results showed that less than 1% of women were selected as "Village

governance structure of the two states was identical until 2001, and the quality of governance in the two states was comparable for a few years after the bifurcation.

[4] Bihar, the third most populous state in India, with an estimated population of 103 million and a population density of 880 persons per sq. km., is one of the poorest states in India with 40 percent of its population below poverty line.

sarpanch" in Bihar, which is far less representation than their prescribed theoretical share of 33%. The panchayat election occurs every five years. In the next panchayat election in 2006, the government of Bihar took the pivotal and unprecedented step of reserving 50% of the panchayat seats for women at all three tiers of local administration. It was the first time that any state had actually exceeded the previously set provisions of 33% reservations for women. The panchayat elections were held in Jharkhand towards the end of 2010, after a huge gap of 32 years (and also this is the first election after the formation of Jharkhand state), where women won about 58% of the total numbers of seats (see Table 1 for timing of the policy change).

We use the first and third waves of District Level Household Survey (DLHS) estimate the association between political decentralization and women reservation and health outcomes in Bihar. DLHS-1 was implemented in 1998-99 (pre-decentralization period), while DLHS-3 was implemented in 2007-08 (post decentralization and women reservation period). Our results show that decentralization was positively associated with increased institutional births in Bihar but had negligible impacts on child mortality. Results show some evidence of non-uniform impacts as women reservation policy had affected decline in infant and child mortality in richer households only.

The remainder of the paper is organized as follows. In section 2 we discuss the data used in the analysis. This is followed by empirical strategy in Section 3. In section 4 we discuss the main results and concluding comments and discussion are outlined in Section 5.

2. Data

We use data from the first and third waves of the District Level Household

Surveys (DLHS-1 and DLHS-3), which is a health survey covering family planning, maternal and child health, reproductive health of ever-married women and adolescent girls, and use of maternal and child health-care services at the district level for all states in India.

The DLHS-1 and DLHS-3 were carried out in 1998-99 and 2007-08, respectively. In the first round of DLHS (DLHS-1), 474,463 eligible women (currently married women in the age group of 15-44) were sampled in 1998-99. DLHS-3 was implemented between late 2007 and early 2008, interviewing about 643,944 ever-married women between 15-49 years of age, from 601 districts in 34 states (IIPS, 2010). DLHS-1 gathered information about birth history since January 1, 1995/96, while birth history was collected for children born since January 1, 2004 in DLHS-3. The "place of delivery" information was collected only for the most recent birth.

Our analytical sample for institutional births analysis include women who reported pregnancy in the survey recall period and also reported place of delivery for the most recent births in first and third waves of DLHS. Our analysis is restricted to Bihar and Jharkhand sample. This restriction yielded an analytical sample of 19,272 in DLHS-1 and 30,393 observations in DLHS-3 (IIPS 2001, IIPS 2010). The final analysis was based on this combined sample of 49,664 observations spread across the first and third waves of DLHS.

The mortality analysis is based on data from DLHS-3 only. The goal of this analysis is to separate out the effect of women reservation (implemented in 2006) from political decentralization (implemented in 2001) in Bihar. The institutional birth analysis captures the combined effect of political decentralization as well as women reservation

while mortality analysis captures the pure effect of women reservation only. The DLHS-3 gathered birth history of children born since January 1, 2004. Birth history for these children includes information on birth order, gender, year and month of birth, whether birth was single/multiple, mortality status, year and month of when the child died. Birth order has been found to be an important determinant of children well-being in India (Kumar, 2016). The mortality data was available for 40,453 children and year of birth ranged from 2004 to 2008. It should be noted that the sample for mortality analysis is larger than the sample for institutional births because place of delivery was gathered for only the last birth while mortality data was collected for all births in the survey recall period.

In terms of outcomes, we are looking at indicators of women's health (place of delivery) and children's health (child mortality). Place of delivery is classified as being either home or at a health facility and facilities are further classified as public or private. We construct four outcome measures corresponding to these place alternatives. The first measure is *probability of institutional delivery*, which includes births either at public or at private health facilities. The second measure indicates the *probability of birth at public health facility* and the third measure is the *probability of birth at private health facility*. Our final outcome measure is the *probability of safe delivery*. Safe delivery includes institutional births plus home births assisted by skilled health personnel.

Three outcomes were examined: neonatal mortality (death within 30 days), infant mortality (death within 12 months) and child mortality (whether child is dead at the time of the survey). Other explanatory variables included as covariates in the analysis were mother's education, mother's age, household caste, household religion, gender of the

child, and household wealth. Gender and household wealth were included in the mortality analysis only because they were not collected in DLHS-1. The descriptive information on the outcomes and key dependent variables are presented in Table 1.

3. Method

We use the DID method and compare the difference in health outcomes in districts in Bihar, the treated state, to districts in Jharkhand, the control state. In particular, we compare the difference in outcomes in Bihar and Jharkhand in the pre-decentralization period (1998-99) to the post-decentralization period (2007-08). Formally, the DID estimator can be written as:

$$Y_{ist} = \alpha + \beta_1 * Post_t + \beta_2(Bihar * Post)_{st} + \beta_3 * Bihar + \beta_4 * X_{ist} + \mu_d + \epsilon_{ist} \quad (1)$$

where Y_{ist} is the outcome for women *i* in state *s* at time *t* (*t*=1998-99, 2007-08). *Bihar* is a dummy variable indicating the treatment state[5], *Post* is a dummy variable indicating the period after policy change (this is coded as one for 2007-08 data and 0 for 1998-99 data). This variable captures time effect common to all districts). Since the changes in the outcome variables may vary by household characteristics (caste, religion, mother's age, and mother's education), we augment eq (1) with controls for these variables. X_{ist} is a vector of child and household-level control variables, and finally ϵ_{ist} is the error term that captures the impact of all other unobserved variables that vary across individuals, districts, and over time.

We account for time invariant differences, for example, differential district administration's capacity and efficiency in implementing government programs, general

[5] Districts in Bihar are coded as one, whereas districts in Jharkhand are coded as zero.

infrastructure, average education level etc. by including district fixed-effect in equation (1) as μ_d. The remaining biases emanating from time varying factors is absorbed by the inclusion of child and household characteristics.

Our main coefficient of interest is β_2 which provides the DID estimate of the combined impact of political decentralization and women reservation on health outcomes in Bihar. Robust standard errors are clustered at the district level to account for the fact that observations are nested within district and individual error terms in the same district are not independent.

Identifying Assumption: The parameter β_2 in eq (1) can be interpreted as the causal impact of the policy change under the assumption that the difference in outcomes in the pre-policy and post-policy period would have been the same in Bihar and Jharkhand in the absence of policy change. This means there is a "parallel trend" in outcomes in Bihar and Jharkhand until 2001 and any deviation in outcomes from the common trend is due to the policy change in 2001 and 2006. The validity of this assumption can be assessed by using historical data from Bihar and Jharkhand for years before 1998-99 by performing a *placebo* or *falsification test*.

We test the "parallel trend" assumption in two different ways. Both methods use data from the years prior to the policy change in 2001 (DLHS-1). DLHS 1 data has information on year of birth and place of delivery of children born during 1996-1999. All births prior to 1996 reported 1995 as year of birth but for these births no information was available on "place of delivery". We use this data to set up two falsification tests to test the "parallel trend" assumption.

First, we use the same specification as in eq (1) except that the "post" dummy is replaced by a continuous indicator of the year (with 1996 coded as 1 and 1999 as 4). Muralidharan and Prakash (2017) used a similar method to evaluate the impact of cycle program in Bihar. The second method is akin to a falsification exercise wherein eq (1) is estimated with a "fake" treatment. Neither Bihar nor Jharkhand had any policy change with regard to either political decentralization or women reservation before 2000-01. In fact, Jharkhand was a part of Bihar for over 50 years and was separated administratively in 2001. We falsified the treatment by assuming that policy change occurred in Bihar in 1997. In this set up, "post" years would be 1998 and 1999, while 1996 and 1997 would be "pre-policy" years. We estimate eq (1) with this fake treatment and if the "parallel trend" assumption is satisfied, then we should expect the "fake DID" coefficient to be not different from zero.

As mentioned before, while Bihar held first panchayat election in 2001, the women reservation was mandated only in the second panchayat election in 2006. In contrast, the counterfactual state, Jharkhand, held the first panchayat election in 2010 with 50% seats reserved for women. The implementation of two different policies in Bihar, one in 2001 and the other one in 2006, makes the interpretation of β_2 a bit complicated- as it does not separate out the effect of political decentralization from pure women reservation effect. Thus, β_2 in eq (1) presents the composite impact of overall policy changes that includes political decentralization and women reservation.

In order to estimate the impact of women reservation only, we exploit the variation in the timing of this policy in Bihar and compare this with Jharkhand to estimate its impact on child mortality. The mortality analysis uses data from DLHS-3 for the states of Bihar and Jharkhand. We use DLHS-3 round because it collects mortality information on all the

births since Jan 1, 2004.[6]

Since the women reservation took place in 2006 in Bihar, children born prior to and during 2006 were exposed to political decentralization only but were not exposed to women reservation, but children born after 2006 were exposed to decentralization as well as women reservation. This variation in the exposure to the policy change is akin to a natural experiment created by the state-level mandate of reserving 50% of panchayat seats for women. The identifying assumption is that the timing of policy change is not correlated with the trend in child mortality. Treated cohorts are cohorts born after 2006, while the control cohorts are cohorts born in and prior to 2006 (the year of policy change). We take advantage of this variation across cohorts and states in the exposure to the women reservation policy and examine its impact on child mortality. The empirical method is similar to DID in eq (1), where the first difference is across cohorts and the second difference is across states.

To investigate whether gender reservation has reduced child mortality, we estimate the following equation:

$$Y_{ist} = \alpha + \beta_1 * Post_t + \beta_2 (Bihar * Post)_{st} + \beta_3 * Bihar + \beta_4 * X_{ist} + \mu_d + \epsilon_{ist} \quad (2)$$

The dependent variable Y_{ist} represents mortality outcome of child *i* in state *s* in year *t*. $Post_t$ is a binary variable that equals 1 if the child is born in 2007 and 2008, whereas births in 2004- 2006 were coded as 0. μ_d represents district fixed-effect that

[6] The first two rounds of DLHS are not suitable for child mortality analysis, for e.g., DLHS-1 (1998-99) did not collect information on child mortality. Similarly, DLHS-2 (2002-04) is also not suitable to analyze the impact of women reservation as the women reservation was implemented in 2006 election in Bihar.

controls for time-invariant characteristics across districts. Our specification also controls for mother's age, mother's education, Scheduled Castes (SC), Scheduled Tribes (ST), gender of the child, household religion, and socio- economic status captured by wealth index in X_{ist}.

However, estimation of eq (2) is not free from identification concerns. An important limitation of equation (2) is the likely bias from the temporal trends in the outcome variables. It is quite plausible that the estimated coefficient may only be picking up the time trend in the mortality outcomes and has nothing to do with the actual policy. A whole set of things could have changed over time, for example, increased investment in health infrastructure, institutional change, thereby overestimating the effect of political decentralization.

We do our best to address these concerns by including a rich set of child and household controls. We further add district-specific dummies to control for time-invariant fixed characteristics of the district. Nonetheless, even after controlling for these observed characteristics, there could still be bias in our estimates of the effect of women reservation.

These identification concerns can be overcome only with a random assignment of sarpanch seats for women (Chattopadhyay and Duflo 2004) or with a valid instrumental variable (Bhalotra and Clots- Figueras 2014). Since our dataset does not identify the villages as in Chattopadhyay and Duflo (2004), we are unable to take advantage of random assignment of the women reservation policy. However, we believe that even if our estimated impacts of women reservation do not have a causal interpretation in the strict sense, they are still important and add to the scant literature on the impacts of women reservation in local governance. Till date, very little information exists on the association between

women reservation and health outcomes; most of the previous research on this topic has been confined to the provision of public goods but whether this led to better social and economic outcomes is still an open question. Therefore, our estimates are still important from a policy perspective, especially, given the concern about the elite capture and proxy leadership.

4. Results

The characteristics of the sample and the incidence of institutional deliveries and child mortalities are in Bihar and Jharkhand for pre- and post-policy years are shown in Table 2. The prevalence of institutional births in 1998-99 data was 14.22%, whereas it was almost 10 percentage points higher in 2007-08. Conditional on institutional births, births in public facilities were higher than private facilities in the first round of DLHS, whereas in the third round of DLHS, the prevalence of births in private facilities was higher than public facilities. Mortality risks were higher in Bihar than Jharkhand. Overall under-5 mortality rate was 4.3% or 43 per 1,000 live births. Disaggregation of under-5 mortality showed that a significant proportion of deaths were occurring before 12 months. The neonatal and infant mortality rates were 26 and 37 per 1,000 live births. A majority of the women were young (less than 30 years in both rounds). The average years of schooling were 1.86 years in 1998-99 and 2.09 years in 2007-08. The proportion of scheduled caste and tribe was higher in Jharkhand than Bihar.

4.1 Place of delivery

Table 3 presents the estimates of the effect of political decentralization on outcomes related to delivery care, i.e. place of delivery (institutional and safe delivery). The dependent variables are institutional deliveries, deliveries in public health facility,

deliveries in private health facility, and safe deliveries. The main independent variable is the interaction of *Treat*Post*, which is the DID estimate of political decentralization and women reservation on these outcomes. The dependent variables are binary variables where 1 indicates yes and 0 otherwise. We employ linear probability model to estimate the impacts. All models control for standard confounders such as mother's age & education, household religion, and social group of the household.

The results in Table 3 suggest that decentralization and gender quotas in local governance in Bihar have resulted in a positive impact on the place of delivery. Column (1) shows that these policies were associated with an increase in the institutional births in Bihar. Compared to the control state, women in Bihar were 6.5 percentage points more likely to deliver in a health facility. This translates to 44% increase in institutional delivery at the baseline institutional delivery rate of 14.9% in Bihar in 1998-99.

In columns 2 and 3, we further disaggregate the institutional delivery by places of delivery. Whether women were giving births in the public or private health facility is informative and important for policy-making. As the public sector is the main provider of health services in Bihar and women leaders are more likely to influence care at public health facility, it is important to examine whether the shift in the delivery care is towards the public or private facility. In columns 2 and 3, we find that due to this policy change the probability of giving birth in a public facility increases, while the probability of giving birth in a private facility decreases. The coefficient for delivery in a public facility is statistically significant and positive. The likelihood of giving birth in public health facilities was 15.9 percentage points higher in Bihar compared to Jharkhand. We further find that the policy change had a negative impact on births in private facilities (4.7

percentage points). These results imply that the impact of political decentralization and women reservation on institutional delivery was driven largely by an increase in births at public facilities. These findings suggest that devolution of power to panchayat and women reservation may have been instrumental in relaxing the supply constraints by improving the quality of care at public health facilities. In addition, these women leaders may have helped increase the demand for in-facility births by shifting the preference from home births to institutional births.

Column (4) shows that these policy changes had a positive effect on the probability of safe delivery. Safe delivery includes institutional delivery and home delivery assisted by skilled health personnel. The point estimates for safe delivery is 0.036 and statistically significant. Women in the treated state were 3.6 percentage points more likely to have safe delivery compared to women in the control state. At the baseline mean of 22% in Bihar, this implies an increase in safe delivery by 16 percent due to these policy changes.

In Table (4), we provide evidence on whether our pre-policy data support "parallel trend" assumption. Panel A of Table 4 reports the results of the analysis where "Post" dummy is replaced by a continuous indicator of the year, while Panel B shows the results of the falsification exercise with the "fake" treatment. In both panels, we do not find any evidence of differential trend as the *Bihar x Year* coefficients for all outcome variables are not significantly different from zero. Similarly, in panel B, *the fake_treat x Post* coefficients are statistically insignificant. And these results strongly support the "parallel trend" assumption.

Finally, a concurrent policy that may influence health outcomes in Bihar may confound our main results. The Government of India launched a conditional cash transfer

scheme, Janani Suraksha Yojana (JSY or Safe Motherhood Scheme) in 2005 to improve maternal and neonatal health by promoting institutional delivery. However, several studies have shown that the JSY's implementation in many low-performing states such as Bihar was very weak and ineffective in improving health outcomes. A number of studies have found that the impact of JSY on institutional delivery and child mortality was either insignificant or at best modest (Lim et al., 2010; Powell-Jackson, Majumdar, and Mills, 2015, Debnath, 2014). The state wide data of JSY program shows that the number of program beneficiaries was 38% higher in Jharkhand compared to Bihar in 2006-07 (Debnath, 2014). This means that our estimated effects are underestimated and true effects may be larger than the estimated coefficients in our paper. Similarly, Powell-Jackson et al. (2015) show that association of JSY with health service utilization was statistically insignificant in states with low JSY coverage and Bihar was clearly one of the states with the lowest coverage of JSY. Results from these studies are suggestive enough to indicate that JSY did not have large impacts on institutional delivery or child mortality to overturn our findings. Apart from JSY, to the best of our knowledge, no other health programs were implemented at the same time, thus less likely to confound our DID estimates. Taken together, we find little evidence to suggest that the parallel trend assumption is not fulfilled and any contemporaneous programs would overturn our main findings.

These results are important from a policy perspective, as improvement in in-facility births is also the mechanism through which a decline in child mortality can be observed. Medical and epidemiological literature show that children born in hospitals are more likely to survive compared to home-born children. It is well established that giving

birth in a medical institution under the care and supervision of trained health-care providers promotes child survival and reduces the risk of maternal mortality. In this context, we also explore if the increase in institutional deliveries in Bihar led to increased survival of children. We examine the impact of the women reservation on child mortality and estimate eq (2). Results are reported in Table 5 and 6.

4.2 Child mortality

Columns (1) and (2) in Table 4 reports the results for neonatal and infant mortality, respectively. The results on under-5 mortality are reported in column (3). Results in Table 5 show that the policy change has no significant effect on child mortality. Although the coefficient is negative in the third column, it is statistically insignificant at the conventional level of significance. In all the regression models in Table 5, the signs of the control variables are as expected.[7] Mother's age and mother's education have a positive and significant effect on child mortality. Poor and disadvantaged minority children (those belonging to SCs and STs) are less likely to survive. For Hindu children, the estimates are positive and significant, meaning that children belonging to the Hindu religion have a higher probability of survival.

However, results in Table 5 mask the heterogeneous impacts of the policy change. It is plausible that the effect may vary by characteristics of households. For example, richer households may benefit more compared to poor households as richer households are better positioned to process information quickly and change their health behavior. This behavior is consistent with elite capture-cum-clientelism hypothesis, which states that wealthier and powerful households are able to capture the benefits of public resources.

[7] Results are available upon request.

To test the differential impact of the policy change, we vary eq (2) by wealth groups. The DLHS-3 data categorize households into five quintiles based on the asset score. Households are categorized from the poorest to the richest groups corresponding to the lowest to the highest quintiles at the national level and not at the state level. Due to fewer observations in the top quintile, we group the top two quintiles as rich and bottom two quintiles as poor households.[8] Table 6 reports the heterogeneous results by wealth groups. .

The results in Table 6 indicate that, after controlling for child and household control variables, women reservation had a negative and significant effect on infant and under-5 mortality for the children belonging to the rich groups. Children from richer households are 2.7 percentage points less likely to die before 12 months of their birth (column 6). The incidence of under-5 mortality is also reduced by 2.8 percentage points due to this policy change in Bihar. There is no such increase in survival probability for children belonging to poor and middle wealth groups. To sum up, it appears that children from top wealth quintile gained more from this policy change in terms of their survival rate.

5. Discussion

This study exploits the variation in the timing of implementation of 73rd Amendment (political decentralization and gender quotas in local governance) in the

[8]Combining household amenities, assets and durables, the DLHS-3 computes a wealth index at the national level and divides households into quintiles. The principle of factor loading to amenities, assets and durables derived by factor analysis is used for the computation of the wealth index. Households are categorized from the poorest to the richest groups corresponding to the lowest to the highest quintiles at the national level and not at the state level. Therefore, the number of households in each quintile is not same. For example, percentage of households according to wealth index in Bihar ranges from 33.7% (lowest wealth index group) to 5% (highest wealth index group) (IIPS, 2010). The five quintiles are lowest, second lowest, middle, fourth, and highest.

states of Bihar and Jharkhand in India to estimate its impact on health behaviors of women and child survival. Using DID methodology, we show that political decentralization and gender quotas in Bihar led to an increase in the probability of births in health facilities and the probability of safe delivery. It is worthwhile to mention that our findings are not contaminated by the differential trend in outcomes across the treatment and control states. Our results satisfy parallel or common trend assumption, however in the absence of clean natural or random experiment we are unable to rule out the existence of unobserved heterogeneity between the two states. The inclusion of a rich set of controls and district fixed effect would to a large extent mitigate this concern.

Our analysis has focused on estimating the impacts the combined effect of political decentralization and women reservation as well as the pure effect of women reservation on health outcomes. Identifying the specific channels through which political decentralization may influence health outcomes is difficult. We speculate that political decentralization may affect the supply (access) to health services as well as the demand for health services through role-model effect. Female politicians may spend more funds on increasing the access, and at the same time, they may be effective in increasing the demand through a change in attitudes and awareness level. A role-model effect implies that female leaders are effective in motivating women, changing their attitudes, perceptions, and demand for social services. (Beaman et al., 2012). It is quite possible that improved access, as well as increased demand for health services may have been influenced by this policy change.

We do not have suitable data to pin down the demand channel. The data on access to sub-centers and primary health centers indicate that access to health facilities have improved in Bihar compared to Jharkhand. According to 2002 facility report, about

66.4% villages had access to a sub-center within 6 km, while only 46% of villages had access to a sub-center within 6km. The 2007-08-facility survey reports that 74.2% of villages had access to a sub-center within 3 km in Bihar while it is 60.8% in Jharkhand. Similarly, 70.6% of villages in Bihar had a PHC within 10 km, while only 52.9% of villages had access to a PHC within 10 km in Jharkhand. Thus, it seems that access to health infrastructure is better in Bihar than Jharkhand and this increased access may have been due to political decentralization and women reservation. However, we would like to note that this link is purely suggestive and due to data limitation, pinning down the exact channel is very difficult and also beyond the scope of this paper.

Given that the child and infant mortality rates are one of highest in the state of Bihar, encouraging women to deliver babies either at health centers or under the supervision of skilled birth attendant are a key intervention to reduce the burden of the high level of child mortality and morbidity. We also test the effect of this policy change on child mortality by exploiting the timing of the women reservation policy in panchayat seats in Bihar.

We do not find a statistically significant effect of this policy change on overall child mortality. However, disaggregated analysis uncovers the differential policy impact. The women reservation has a positive and statistically significant effect on survival of children from top wealth quintiles, but not for the children from middle and poor wealth quintiles. We believe this result provides suggestive evidence on elite-capturing in Bihar.

With an exception of Bhalotra and Clots-Figuera (2014), this study provides the first estimates of the overall impact of political decentralization and gender quotas on health outcomes in Bihar. Improving health outcomes is a top priority of the Government of

Bihar as the infant and child mortality are very high in Bihar compared to other northern and central states of India. Our results suggest that empowering local bodies may improve health outcomes by improving the functioning of public facilities, greater monitoring of local health workers, and by undertaking awareness campaigns in their areas.

However, we must recognize that local bodies when empowered can only facilitate the improved functioning of a public facility or can help increasing health awareness but it cannot be a substitute for the supply-and demand-side interventions in the health sector. Policies aimed at increasing the quantity and quality of public health facilities in Bihar would improve the health status of its population in future years. Bihar still has the lowest number of health personnel per capita and additional availability of doctors and nurses could improve utilization of health services in Bihar. Contract hiring of nurses, doctors, and making rural service an integral part of the medical curriculum are steps in the right direction.

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Table 1

Time of policy change in Bihar and Jharkhand

1998	Bihar and Jharkhand were one state
1998-99	DLHS-1 was implemented
15 November 2000	Jharkhand was created from south parts of Bihar
2001	• First Panchayat elections were held in Bihar. • No Gram sarpanch seats were reserved for women • Gram sarpanch seats were reserved for disadvantaged communities
2002-04	DLHS-2 was implemented
2006	• Second panchayat election was held in Bihar • 50% gram panchayat seats were reserved for women in Bihar
2007-08	DLHS-3 was implemented
2010	First panchayat election with 50% gender quota was held in Jharkhand April
2011	Third panchayat election with 50% gender quota was held in Bihar

Table 2
Descriptive statistics

	DLHS 1 (1998-99)			DLHS 3 (2007-08)		
	Bihar	Jharkhand	All	Bihar	Jharkhand	All
Panel A: Dependent variables						
Institutional delivery (%)	14.9	12.7	14.22	27.62	17.65	24.16
Births in public health facility (%)	9.09	7.07	8.47	12.74	5.85	10.34
Births in private health facility (%)	5.81	5.63	5.75	14.88	11.80	13.81
Safe delivery (%)	21.53	18.72	20.71	32.01	24.97	29.57
Neonatal mortality (%)	-	-	-	2.91	1.94	2.59
Infant mortality (%)	-	-	-	4.11	2.79	3.68
Under-5 mortality (%)	-	-	-	4.81	3.26	4.30
Panel B: Explanatory variables						
Mother's age	28.01	27.78	27.94	26.61	26.68	26.64
Mother's years of schooling	1.84	1.93	1.86	2.03	2.21	2.09
Caste (SC/ST)	0.19	0.46	0.27	0.26	0.53	0.35
Religion (Hindu)	0.81	0.80	0.81	0.84	0.64	0.77
Wealth (Poor)	-	-	-	0.71	0.74	0.72
Wealth (Medium)	-	-	-	0.16	0.13	0.15
Wealth (Rich)	-	-	-	0.12	0.13	0.13
Observations	13,737	5,535	19,272	20,016	10,377	30,393

Notes: Summary statistics are based on data from DLHS1 and DLHS 3. Mortality analysis was based on DLHS 3 data only and DLHS 1 data did not collect wealth information.

Table 3

Impact of political decentralization and women reservation on place of births

	Institutional deliveries	Deliveries at public facilities	Deliveries at private facilities	Safe delivery
	(1)	(2)	(3)	(4)
Treat*post	0.065***	0.159***	-0.0469**	0.036*
	(0.014)	(0.018)	(0.019)	(0.020)
Post (2007,2008)	0.016*	0.129***	-0.085***	-0.0002
	(0.010)	(0.009)	(0.013)	(0.017)
Treat (Bihar)	0.052***	-0.003	0.038***	-0.024**
	(0.007)	(0.008)	(0.009)	(0.010)
District FE	Yes	Yes	Yes	Yes
Observations	49,664	49,664	49,664	49,664
R-squared	0.16	0.19	0.12	0.15

Notes: Robust (clustered by district) standard errors in parentheses. All columns present coefficient from linear probability models. All the models are adjusted for mother's age and mother's education, SCST, religion, and wealth. Safe deliveries include institutional deliveries and home deliveries assisted by trained medical personnel. District FE indicates district fixed-effects. Rural sample only. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 4
Testing the parallel trend assumption and falsification test

Panel A: Parallel trend assumption				
	Institutional deliveries	Deliveries at public facilities	Deliveries at private facilities	Safe delivery
Bihar x Year	0.002	0.006	-0.003	0.003
	(0.004)	(0.004)	(0.002)	(0.006)
Bihar	-5.59	-12.95	7.06	-7.78
	(9.43)	(7.75)	(5.003)	(12.87)
Year (1996-99)	-0.003	-0.004	0.0008	-0.004
	(0.003)	(0.002)	(0.001)	(0.005)
District FE	Yes	Yes	Yes	Yes
Observations	20,806	20,806	20,806	20,806
R-Squared	0.15	0.10	0.12	0.16
Panel B: Falsification test				
	Institutional deliveries	Deliveries at public facilities	Deliveries at private facilities	Safe delivery
Fake_treat x Post	0.007	0.008	-0.0002	-0.001
	(0.010)	(0.007)	(0.006)	(0.011)
Treat (Bihar)	-0.008**	0.004	-0.013***	-0.0007
	(0.004)	(0.004)	(0.003)	(0.008)
Post (1998, 1999)	-0.0004	-0.003	0.002	0.006
	(0.006)	(0.004)	(0.004)	(0.008)
District FE	Yes	Yes	Yes	Yes
Observations	20,806	20,806	20,806	20,806
R-Squared	0.15	0.11	0.12	0.16

Notes: All analyses are based on DLHS-1 data. Robust (clustered by district) standard errors in parentheses. All models are adjusted for mother's age and mother's education, household caste, and religion. Safe deliveries include institutional deliveries and home deliveries assisted by trained medical personnel. District FE indicates district fixed-effects. Panel A uses the yearly data on place of delivery from 1996-1999. Panel B uses fake treatment in Bihar in 1998. Rural sample only. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 5

Impact of women reservation on child survival

	Neonatal mortality	Infant mortality	Under-5 mortality
	(1)	(2)	(3)
Treat x Post	0.001	0.004	-0.002
	(0.004)	(0.005)	(0.005)
Children's control	Yes	Yes	Yes
Mother's control	Yes	Yes	Yes
District FE	Yes	Yes	Yes
Observations	40,453	40,453	40,453
R-Squared	0.007	0.007	0.008

Notes: Robust (clustered by district) standard errors in parentheses. All columns present LPM coefficients. All the models are adjusted for mother's age, and mother's education, SES, caste, wealth, religion, and child gender. Mortality analysis is based on Bihar and Jharkhand data from 2004-2008. District FE indicates district fixed-effects. Neonatal mortality refers to deaths within 30 days of birth, while infant mortality is death within 12 months of births. Data source: DLHS 3, rural sample only. DLHS-3 collects mortality

Table 6

Heterogeneous impact of women reservation on child survival

	Neonatal mortality			Infant mortality			Under-5 mortality		
	Poor	Middle	Rich	Poor	Middle	Rich	Poor	Middle	Rich
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treat x Post	0.002	0.010	-0.020	0.006	0.006	-0.027*	0.004	0.004	-0.028*
	(0.004)	(0.010)	(0.012)	(0.005)	(0.012)	(0.016)	(0.006)	(0.012)	(0.016)
Children's	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mother's control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30,884	6,114	3455	30,884	6,114	3,455	30,884	6,114	3,455
R-squared	0.007	0.02	0.03	0.008	0.02	0.04	0.008	0.02	0.04

Notes: Robust (clustered by district) standard errors in parentheses. All columns present LPM coefficients. All the models are adjusted for mother's age, and mother's education, SES, caste, wealth, religion, and child gender. Mortality analysis is based on Bihar and Jharkhand data from 2007-2008. District FE indicates district fixed-effects. Data source: DLHS 3, rural sample only. Neonatal mortality refers to deaths within 30 days of birth, while infant mortality is death within 12 months of births DLHS-3 collects mortality information of all children born since January 2004. *** p<0.01, ** p<0.05, * p<0.10