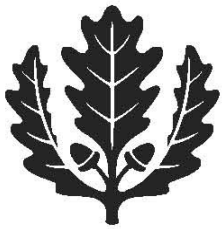

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Political Decentralization, Women's Reservation and Child Health Outcomes: A Case Study of Rural Bihar

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Abstract

In this paper, we investigate the impact of political decentralization and gender quota in local governance on different measures of health outcomes and behaviors. We use multiple waves of District Level Household Survey (DLHS) for two states in India, Bihar and Jharkhand, and employ differences-in-differences (DID) methodology to estimate the impacts. We find that political decentralization is positively associated with higher probabilities of institutional births, safe delivery, and births in public health facilities. We also find increased survival rate of children belonging to richer households. We argue that our results are consistent with local leaders having better information or greater concern for women and child health as argued in the literature (Bhalotra and Figuera, 2012).

JEL Codes: I38, J15, J78.

Keywords: Affirmative Action, Woman, Ante-Natal Care, Institutional Delivery, Child Mortality, India.

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The authors bear sole responsibility for the content of this paper.

1 Introduction

Improving health outcomes, especially among the most economically and socially vulnerable sections of society, is one of the objectives of Millennium Development Goals (MDG) adopted by the United Nations in year 2000. Poor health has been considered as one of the impediments to education and other forms of human capital formation in many developing countries. So any investments made by a country in improving the health outcomes of its large disadvantaged population are expected to have long-run impact on their labor market earnings via improved education and human capital. This may also help the country's vulnerable population to escape out of poverty and participate in the growth process.

One of the mechanisms through which various development outcomes including health outcomes can be affected is decentralization of governance, i.e. decentralization of political, fiscal, and economic systems. Several studies have shown the advantages of decentralized governance, which has also been a center of debate among social scientists, policy makers, and politicians around the world. It is argued that decentralization affects development outcomes, via decentralization of social and physical infrastructures. This corresponds with the diverse demand at the local level of governance and meets the needs of the disadvantaged and politically marginalized groups in the society.

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 is below poverty line. Its per capita income, at purchasing parity, is about $348. 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. Amongst the major Indian states, the Human Development Index for Bihar has been the lowest for the last three decades. The recent District Level Household Survey (DLHS-3, 2007-08)[1] report

[1]Institute for Population Sciences (IIPS), Mumbai under the supervision of The Ministry of Health and

indicates some improvement in immunization coverage, ante-natal care, contraceptive use, institutional deliveries in Bihar. However, it still has a long way to go in improving the overall health of its population as the state average is lower than the national average on many health indicators (see Table 2). Bihar also has the dubious distinction of recording the highest prevalence of certain vector borne diseases, communicable diseases, and water borne diseases in India.

In recent years, Bihar has witnessed steep decline in IMR (according to the Annual Health Survey Reports (AHS)), but the absolute number is far worse as compared to other states in India. The National Family Health Survey-III (2005-06) reports that 50 percent of children in Bihar (compared to an all-India average of 46 percent) are underweight and 42.3 percent of children under 3 are stunted, reflecting widespread chronic under-nutrition during the critical first years of life.

Over the last two decades, political decentralization has emerged as a dominant trend in world politics. According to the World Bank estimates, several developing and transitional countries with populations greater than 5 million started the process of political devolution (Crook and Manor, 1998). India undertook this reform in April 1993. The 73rd and 74th Amendments to the Constitution of India formalized local government institutions and devolved more power from the state to local governments, i.e. Panchayati Raj Institutions (PRIs).[2] According to this reform, one-third of local elected offices will be reserved for women, and the reserved seats for Scheduled Castes (SCs) and Scheduled Tribes (STs) be in proportion to their population share.[3] The government of Bihar implemented 73rd

Family Welfare (MoHFW), Government of India, conducts the District Level Household and facility Survey (DLHS). DLHS is a nationally representative household survey at the district level in India. In DLHS-3, the survey covered 611 districts in India. The total number of households representing a district varies from 1000 to 1500 households. The DLHS-3 is designed to provide information on family planning, maternal and child health, reproductive health of ever married women and adolescent girls, utilization of maternal and child healthcare services at the district level for India.

[2]The 73rd Amendment concerns local governing bodies in rural areas (including the Gram Panchayats), and 74th Amendment concerns local governing bodies in urban areas. We discuss the evolution of PRIs in Section 2.

[3]Scheduled Castes (groups having low social and ritual standing) and Scheduled Tribes (groups distinguished by their tribal culture and physical isolation) have historically been excluded from opportunities and

amendment without women reservation for chairpersons seats and held their first local bodies elections in 2001. In the second panchayat election in 2006, Bihar became the first state that reserved 50% of the panchayat seats for women, which is more than the stipulated 33% in the constitutional amendment. Almost a decade has passed since the first panchayat election in Bihar, therefore, it is of tremendous policy interest to evaluate the impact of political decentralization and women's reservation on developmental outcomes, including health outcomes. This is what this paper aims to do.

In general, regressing measures of health outcomes on the variable of political decentralization and women's reservation will not give the causal effect of the policy change. In this regression, the policy variable is likely to be endogenous. States that devolved and transferred more power to local bodies may differ from states that did not in ways that also affect the outcome variables. First, these states may differ in their level of development, for instance, more progressive voters may be more likely to elect more female leaders or favor political decentralization. It is also possible that, these states are likely to invest more in human capital (both health and education) independently of either political decentralization or female leadership.

To address the above concerns, we use differences-in-differences (DID) method to estimate the causal impact of political decentralization and women's reservation on different measures of health outcomes. Specifically, we compare the difference in outcomes during the pre-decentralization period (1998-99) to post-decentralization period (2007-08) in Bihar and the neighboring state Jharkhand. Using DID approach, we essentially compare the health outcomes in districts of Bihar, the treatment state to districts in Jharkhand, the control state.

In this paper, we investigate the following questions. First, we provide the estimates of the impact of political decentralization on different health outcomes. Second, we esti-

rights that lead to socioeconomic advancement in Indian society. In the British era, these were called the depressed classes, and colloquially they have also been called the untouchables and backward classes though these terms are out of favor.

mate the impact of female leadership or women's reservation on different health outcomes.[4] Specifically, we look at antenatal care, delivery care and child immunization, and under-five mortality.[5] The null hypothesis in this paper is that political decentralization and gender of the elected leader will have an impact on policy variables, and therefore will affect different measures of health outcomes. These are relevant outcomes to study. First, improvements in these outcomes are also major objectives of public policy, especially in developing countries. Second, antenatal care, delivery care and child immunization are tangible and frequently used measures of health. It remains an open question whether political decentralization and women's reservation can effectively improve health outcomes. Our paper connects two streams of the existing literature, one concerned with the impact of political decentralization and the other with the differences in preferences between the two genders.

We implement our empirical strategy using two waves of District Level Household Survey (DLHS) for the two states in India, Bihar and Jharkhand, and estimate the impact of political decentralization and women's reservation on place of child births. We find that political decentralization is positively associated with higher probabilities of institutional births, safe delivery, and births in government health facility. We do not find significant effect on average child mortality though the coefficients have the right sign, i.e. positive. Furthermore, a disaggregated analysis reveals that the policy change has heterogeneous impacts on child survival rate and richer children were more likely to survive. No such significant effects

[4]Previous studies have examined the impact of women's reservation in local governance either on provision of public goods or targeting of anti-poverty public goods. For example, Chattopadhay and Duflo (2004) provides one of the early evidence on the impacts of women reservation on development outcomes. Bardhan et al. (2010) examines the impact of political reservations for women and scheduled castes and tribes (SCs/STs) in local governments in West Bengal, India between 1998-2004 on targeting of publicly provided goods. None of these studies have looked at the impact of women's reservation on outcomes such as income, education, health, inequality etc., except Bhalotra & Figueras (2012). They investigate whether women's political representation in state legislatures improves public provision of antenatal and early childhood health services in the districts from which they are elected. They find that women politicians are more likely to build public health facilities and encourage antenatal care, institutional delivery and immunization.

[5]In our paper we look at similar outcomes as Bhalotra & Figueras (2012), however, our identification strategy is based on the variation in district-level share of female leaders at the local level (panchayat level, which is the lowest tier of policy making), while they exploit the variation in district-level share of state assembly constituencies in which a woman is elected.

were traced for children from bottom three wealth quintiles. We argue that these results are consistent with local leaders having better information or greater concern for women and child health as argued in Bhalotra and Figueras (2012).

The remainder of this paper is organized as follows. Section 2 discusses the related literature and background of the PRIs. Section 3 presents the empirical framework. Section 4 describes the data. Section 5 presents the results on various measures of health outcomes in Bihar. Section 6 concludes.

2 Related Literature & Background

2.1 Provision of Public Goods

The link between political reservation and policy outcomes has been widely documented. There are a large number of papers that have exploited the randomized nature of the 73rd constitutional amendment and have examined its impacts on various policy outcomes. Chattopadhay and Duflo (2004) (C-D) provides one of the early evidence on the impacts of women reservation on developmental outcomes. C-D analyze primary survey data from villages in West Bengal and Rajasthan to explore the impact of women's leadership in village councils on investment in public infrastructure choices. They find evidence that women leaders invest more in infrastructure that benefits their own gender. For example, women leaders in Rajasthan and West Bengal invest more resources on drinking water facilities and roads, suggesting that the gender of policymakers has an impact on policy choices.

Some recent papers report public good investments by female leaders either on non-water related goods (Munshi and Rosenzweig, 2008) or being sensitive to institutional features (Ban and Rao, 2008b). Bardhan et al. (2010) examines the impact of political reservations for women and scheduled castes and tribes (SC/ST) in local governments in West Bengal, India between 1998-2004 on targeting of publicly provided goods. In contrast to the findings of C-D, Bardhan et al. (2010) find no impact of female reservation. Reservation of chief

executive (pradhan) positions in local government for women was associated with a significant worsening of within-village targeting to SC/ST households, and no improvement on any other dimension of targeting of publicly provided goods. The authors claim that these insignificant results are consistent with the complex hypothesis of capture-cum-clientelism which is weakened by election of politically inexperienced women to reserved pradhan seats.

Beaman et al. (2010) extend the analysis in C-D to 11 Indian states and investigate the impact of female leadership on the availability and quality of public goods. They use the all-India Millennial Survey data of the Public Affairs Center to develop a composite index of quality, and employ information on the number of available facilities to construct a measure of service quantity. Beaman et al. (2010) show that female-headed reserved GPs have more public goods, especially in the area of drinking water. There are significantly more public drinking water taps and hand-pumps when the GP is reserved for a woman, and there is also some evidence that the drinking water facilities are in better condition (though this coefficient is not significant at the 5% level). There are no significant coefficients for the other public goods, such as education and roads, in the all-India PAC survey.

In addition, household data from one of India's poorest states- Rajasthan shows that pre-school children are more likely to be immunized and attend government day care centers in villages reserved for women leaders. While, in general, girls are less likely to attend school, they find that women Pradhans significantly reduce the gender gap in school attendance.

Ban and Rao (2008) use information on the GP public good investment activities and compare service delivery in reserved and unreserved female-headed GPs. The results suggest that female- and male-headed GPs provide similar services in the areas of drinking-water supply, health, sanitation, roads, transport, and electricity. Significant differences in the extent of service provision only prevail for education activities: GPs reserved for female presidents pursue significantly more education activities than unreserved constituencies.

In another interesting paper, Rajaraman and Gupta (2008) examine the effects of women Pradhan reservations on GP expenditures on water, on buildings, and on revenue raised,

in a sample of 780 GPs from seventeen districts in four central Indian states (Chattisgarh, Madhya Pradesh, Rajasthan and Uttar Pradesh). Their survey was carried out in 2005-06. They do not find a significant effect on whether the GP carried out any expenditures on water and sanitation, or on own-revenues collected. Expenditures on water were explained by per capita funding, household access to water-pumps and spatial dispersion of villages within the GP. But they do find a positive effect of the reservations on GP spending on the construction of buildings.

2.2 Impact on Outcomes

Most of the previous studies mentioned above have examined the impact of female reservation in local governance either on the provision of public goods or targeting of anti-poverty public goods. None of these studies have looked at the impact of female reservation on the actual outcomes such as income, education, health, inequality etc, except the study by Bhalotra and Figueras-(BF, 2012). While analyzing the impact of female reservation on health outcomes and health behaviors, Bhalotra and Figueras (2012) find that one standard deviation increase in women's political representation in India results in 1.5 percentage points reduction in neonatal mortality. Women politicians are more likely to build public health facilities and encourage antenatal care, institutional delivery, and immunization.

In terms of research hypothesis, our study is similar to the study of Bhalotra and Figueras. We also examine the impact of political decentralization on health outcomes and health behaviors. However, the time span, context and identification in our paper is different from B-F. While B-F examines the data in all the big states in India, we restrict our analysis to the state of Bihar as the contextual construct of region may have differential impacts.

Our study differs from the previous studies as the primary objective of our paper is to estimate the impact of *political decentralization* on health outcomes, whereas previous studies have focussed mainly on the impact of female quota on provision of public goods and targeting of anti-poverty programs. Additionally, we also embark upon estimating the

impacts of *female leadership* on health outcomes. The other notable difference lies in the identification strategy. The present study exploits the variation in district-level share of female leaders at the local level (panchayat level, which is the lowest tier of policy making), while B-G exploits the variation in the district-level share of state assembly constituencies in which a woman is elected. Since, one of the main objectives of 73rd amendment was to decentralize power and to transfer the decision and policy making powers to the lowest tier, i.e. to panchayats. Therefore, we believe that individual and village-levels outcomes are more likely to be affected by policies adopted at panchayat level rather than at state-assembly level, a key difference in our study compared to the B-F study.

2.3 Political Decentralization in India

2.3.1 The National Implementation of the 73rd Amendment Act

While the beginnings of the discourse on the political decentralization in India date back to the last decades of the 19th century colonial era, it was only towards the last decades of the 20th century that the decentralization was given a concrete shape by granting it a constitutional status under Indian law. The most notable among them was the 73rd amendment passed by the Indian parliament in 1993. Its major provisions included: a three-tier Panchayati Raj Institution (PRI) structure with elected bodies at the village, block and district levels; reservations for the SCs and STs proportional to their populations; and, most importantly, a one-third reservation of all the seats for women.

Now, almost two decades later, when most of the states have implemented these provisions (though in greatly varying degrees), it is a good time to look at the implementation and impact of the PRI reservations. The studies carried out during the last decade have dispelled many of the commonly founded myths of the decentralization debate.

Most of the studies undertaken for the different states have shown that the reservations for women have indeed made a difference to their political participation. They have shown

that the reservation has engendered the development process, improved women's perception of their capabilities, and that, despite many social and cultural hindrances, made the political environment more participatory, both qualitatively as well as quantitatively (Singh, 2008). Some of the studies have also disproved the notion of women as the proxy representatives for their husbands (Mohanty 2005; Sen 1999). Chattopadhayay and Duflo (2003) have shown that the reservation had led to women as well as SCs investing more in what their communities wanted.

But, another notable feature of the 73rd amendment has been its inter-state differences in the implementation of various provisions. For example, while the panchayat structure had been active in West Bengal since the 1970s itself, and the elections have been regularly held since 1978, the neighbouring states of Bihar and Uttar Pradesh have lagged far behind. Particularly in Bihar's case, after 1978, the next set of panchyat elections were held only in 2001, after a long gap of 23 years.

2.3.2 The Evolution of PRIs in Bihar

Given that Bihar was the first state in the country to have introduced the panchayati raj in 1948, it is rather unfortunate that until as recently as the early years of the last decade, it was one of the laggard states in its overall structure and implementation of the PRIs.

The last time when the panchayat elections were held in Bihar before the implementation of the 73rd amendment in 1993, was in 1978. The decades preceding this 1978 election had increasingly seen the planning boards of the state playing a more important role in preparing the developmental plans as compared to the panchayats. While the gram panchayats were given wide powers relating to developmental and financial matters by the Bihar State Panchayati Raj Act of 1948, the division of power between the gram panchayats and other government bodies were often ambiguous. This election was held after the Janata government had come to power in the Centre after the emergency. This government's base in Bihar lied in the traditional landed, wealthy upper class, which had supported it in the recent past,

and them being rewarded was said to be the main motive behind this election. This election had completely failed to resolve any of the problems facing the PRIs. It was later seen that through the decade of the 1980s, almost 90% of the mukhiyas were either landed people, or the ones who had interests in contracts or trade (Bharti, 1988).

The decade of the 1990s saw the further decline of the PRIs in Bihar. The successive governments didn't see PRIs either as a tool for political escalation or a medium for grass-root development. Despite almost all the preparations done by the State Election Commission (SEC) in 1996, the panchayat elections were conspicuously not held before 2001 (mainly due to ongoing court cases regarding the 73rd amendment reservations), which was when the judiciary had to intervene.

In the wake of many of the important recent developments before 2001 - the mandal commission, social changes, and the 73rd amendment - the panchayat elections of 2001 were seen with much curiosity. Reservation of not less than one third of the total seats for women besides reservation for the Scheduled Castes and the Scheduled Tribes were expected to introduce a completely quantitative as well as qualitative change in Bihar.

But a major catch came from the State Government towards the end of the year 2000. The state government informed the SEC that there shall be no reservation of any kind for any of the single posts (ekal pad) of the chairpersons at any of the three tiers (i.e. Mukhiya, Pramukh and Adhyaksha), even as the reservations for the other posts were to be carried out according to the prescribed constitutional norms. The logic was that since there is only one post of Chairperson in a Panchayat, any reservation for such a single post shall amount to 100% reservation. The SEC had resisted this, and had filed a petition before the Supreme Court, which was later dismissed by the supreme court without any grounds.

Therefore, Bihar went to the 2001 panchayat elections without any kind of reservations for the chairpersons at any of the three tiers. Later, the results declared for the chairpersons showed that while other reserved castes had received more or less a fair share of representation proportional to their population (there were almost 59% of non-general mukhiyas;

66% of pramukhs were from non-general category; 57% of adhyaksha were from non-general category), women had received far less representation than their prescribed theoretical share of 33%.

While there were less than 1% of women who had been selected as mukhiyas, the percentage were surprisingly higher for the two higher tiers: 11% of the women were selected as the pramukhs, and 24% of the women were selected as the adhyaksha. For the post of all other members except the chairpersons, however, the women were adequately represented.

It was in 2006 that the new government headed by Mr. Nitish Kumar took the pivotal and unprecedented step of reserving 50% of the panchayat seats for women at all the three tiers. It was the first time that any state had actually exceeded the previously set provisions of 33% reservations for women. The general mechanism followed behind the reservation was that the women's reservation was nested within the caste reservations. On a gram-panchayat level, initially the seats were reserved for different caste groups i.e. SCs, STs and OBCs, based on the proportion of their population, such that the total number of reserved seats for all of them combined together didn't exceed 50%. Next, the women's reservation was further nested within the caste reservations (inside each of the three groups) as well as the non-reserved general categories, such that the total number of reserved seats for women didn't exceed 50%.

Bihar's example was quickly emulated by Sikkim, which increased their reservation for women to 40% and held their elections under this new norm in 2008. Since then, many other states such as Chhattisgarh, Madhya Pradesh, Rajasthan and Uttarakhand have also passed laws increasing the reservation for women in Panchayats to 50%. The panchayat elections were held in Jharkhand towards the end of 2010, after a huge gap of 32 years (and also this is first election after the formation of Jharkhand state), where about 58% of the total numbers of seats were won by women.

2.3.3 Creation of Jharkhand

Jharkhand was carved out from Bihar as an separate state on April 2000. The state was formed with 18 districts, which were formerly part of South Bihar. Some of these districts were reorganised to form 6 new districts, namely, Latehar, Saraikela Kharsawan, Jamtara, Sahebganj, Khunti and Ramgarh. Presently, the state has 24 districts: Ranchi, Lohardaga, Gumla, Simdega, Palamu, Latehar, Garhwa, West Singhbhum, Seraikela Kharsawan, East Singhbhum, Dumka, Jamtara, Sahebganj, Pakur, Godda, Hazaribagh, Chatra, Koderma, Giridih, Dhanbad, Bokaro, Deoghar, Khunti and Ramgarh.

3 Empirical Framework

The empirical strategy in this paper uses difference-in-difference (DID) method where districts in Bihar are treated districts while districts in the neighboring state, Jharkhand, are the control districts. We compare the difference in outcomes in Bihar and Jharkhand in the pre-decentralization period (1998-99) to post-decentralization period (2007-08). Formally, the DID estimator can be written as:

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

where Y_{ist} is the outcome for child i in state s at time t (t=1998-99, 2007-08). *Bihar* is a dummy variable indicating the treatment status[6], *post* is a dummy variable indicating period after policy change (1 for year 2007-08 and 0 for year 1998-99-it captures time effect common to all districts), 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. μ_d is a fixed effect unique to a district that captures the time - invariant differences across districts. Our main coefficient of interest is

[6]Districts in Bihar are coded as 1 whereas, districts in Jharkhand are coded as 0.

β_2 which provides the DID estimate of the impact of political decentralization on outcomes of interest.

Indentifying assumption: The parameter β_2 in equation (1) can be interpreted as 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 same in Bihar and Jharkhand in the absence of policy change. This means there is no differential trend in outcomes in Bihar and Jharkhand until 1998-99. And any deviation in outcomes from common trend is due to the policy change in 2001 and 2006. Since, this is an identifying assumption, it can not be really tested. Conceptually, the validity of this assumption can be assessed by using historical district-level data from Bihar and Jharkhand for years before 1998-99 by performing a *placebo* exercise.

However, due to data limitation, we are unable to perform this *placebo* exercise as district-level data are unavailable for the period before 1998-99. DLHS-1, implemented in 1998-99, is the first household survey that provides district-level estimates of child health outcomes. Although, the earlier health surveys, such as National Family Health Survey (NFHS) collected data in 1992-93, the small sample size and non-representativeness of NFHS data at district-level restrict us from conducting a *placebo* analysis. Although we are unable to test this, the fact that the state of Jharkhand was part of Bihar before 2000 mitigates the concern of differential trend to an extent.

It is plausible to assume that districts in Bihar and Jharkhand would differ on many dimensions, for example, district administration's capacity and efficiency in implementing government programs, general infrastructure, average education level etc. In order to account for such fixed differences across districts, we include district fixed-effect in equation (1). Although DID captures the time invariant factors well, it fails to address biases emanating from time varying factors. However, we believe that inclusion of child and household characteristics take account of most of the time varying factors.

As mentioned before, while Bihar implemented 73rd amendment (political decentraliza-

tion) in 2001, the gender quota was mandated in 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 gender quotas effect. Our preferred interpretation of β_2 is that it presents the overall impact of policy change that includes political decentralization and women reservation.

In order to estimate the impact of women reservation, we exploit the variation in the timing of gender quota in Bihar and estimate the impact of women reservation on the relevant health outcomes.

We examine the impact of gender reservation on child mortality. The first two rounds of DLHS are not suitable for child mortality analysis as the first wave did not collect information on child mortality. The second wave of DLHS (2002-04) is also not suitable to analyze the impact of gender reservation as the gender reservation was implemented in 2006 election in Bihar. That leaves us to use the third wave of DLHS. DLHS-3 collects mortality information on all the births since Jan 1, 2004. About 29,000 children were born during 2004-2008.

Since the women reservation took place in 2006, children born prior to and during 2006 were not exposed to women reservation while children born after 2006 were exposed to this. This variation in the exposure to the policy change is kind of 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 control cohorts are cohorts born in and prior to 2006 (the year of policy change). We take advantage of this variation across cohort in the exposure to the gender quota in Bihar and examine its impact on child mortality.

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

$$Y_{idt} = \alpha + \beta_1 * (post)_t + \beta_2 * X_{idt} + \mu_d + \epsilon_{idt} \quad (2)$$

The dependent variable Y_{idt} represents mortality outcome of child i in year t. $post_t$ is a binary variable that equal 1 if the child is born 2007 and 2008 whereas, births in 2004-2006 were coded as 0. μ_d represents district fixed-effect that controls for time-invariant characteristics across districts. Our specification also controls for mother's age, mother's education, SCST, gender of the child,and socio-economic status and are captured in X_{idt}.[7]

However, estimation of equation (2) is not free from identification concerns. An important limitation of equation(2) is the likely bias from temporal trend 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 to some extent by including a rich set of child and household controls. There are 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 gender reservation. These identification concerns can be overcome only with a random assignment of sarpanch seats for women (as done in C-D) or with a valid instrumental variable (see, B-F). Since our dataset does not identify the villages, we are unable to take advantage of random as-

[7]We also tried another specification, which exploits the variation in the intensity of the gender quota across districts in Bihar to estimate the causal impact of women reservation on the relevant health outcomes. The Government of Bihar (GOB) mandated a flat 50% reservation of seats in panchayats for women. This generates a policy variation in the sense that districts having more number of panchayats will have more number of women as policymakers. For example, a district that has 1000 panchyats has 500 women policymakers while a district with fewer number of panchayats, say 500, has 250 women policymakers (50% seats are reserved for women). Using this variation in the share of women sarpanch across districts, we wanted to explore if outcomes are different in districts with fewer female leaders compared to districts with more female leaders in Bihar. We define the *policy intensity* as the number of women panchayat head in district d per 100,000 women aged 15-44 according to 2001 census. However, there is not considerable variation in the policy intensity variable as reported in Table 9, we did not pursue this specification further.

signment of gender reservation. However, we believe that even our estimated impacts of gender reservation do not have causal interpretation, they are still important and add to the scant literature on the impacts of gender reservation as very little information is available on this to date. Also, only a handful of studies have looked beyond public goods provision and targeting of social programs. Very little information exists on the association between gender quota and health outcomes, so even if our estimates are not causal, they would still be very important from policy perspective, more importantly, given the concern about elite capture and proxy leadership.

4 Data

We use data from 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 was carried out in 504 districts of India which existed in 1995. A total of 529,817 households were contacted during the survey. From these surveyed households, 474,463 eligible women (currently married women in the age group 15-44 who are usual residents of the surveyed households) and 198,566 men in the age group 20-54 were interviewed. The survey collected data on utilization of antenatal care (ANC) services from the women who had their last live/ still birth since 1st January 1995/ 1996. The survey collected information on immunization status and place of delivery for the last two living children born since 1st January 1995 / 1996. Unlike National Family Health Surveys, information on fertility histories of women were not collected in this round.

DLHS-3 was implemented during 2007-2008 in all districts of India, interviewing about 643,944 women between 15-49 years of age, from 611 districts in 34 states. Unlike first round, this round asked every eligible woman about their fertility histories in the last 5 years

preceding the survey, that is since January 1, 2004. Finally, information on immunization and child care were collected for the two most recent births. The DLHS-3 has interviewed about 643,944 women, out of which 504,272 (78%) resided in rural areas. Each woman was asked detailed questions on the births that took place since January 1, 2004. Furthermore, the child health outcomes such as vaccination, diarrheal episodes, fever, cough etc. were asked about the two recent births.

The combined sample of Bihar and Jharkhand in DLHS-1 was about 51,033 women (Bihar- 35,639; Jharkhand- 15,394). Out of 51,033, place of last delivery information was missing for 31 women, rendering our sample to be 51,002. Every women were asked about the single pregnancy question, but details of pregnancy were asked only for birth that took place since January 1, 1995/1996. About 46% of women delivered babies in 1995 or before. After dropping these women, there are 25,763 women left in the DLHS-1 sample which has the place of delivery information.

In DLHS-3, the combined sample of Bihar and Jharkhand was 73,726. Out of which, information was missing on 2,586 women, giving us a sample of 71,140. Out of 71,140, 36,962 women did not have birth after January 1, 2004. Pregnancy details were collected for births that took place since January 1, 2004 in DLHS-3. About 33% of women (n=23,166) reported to have pregnant once since 2004, while 14% of women were pregnant twice (n=10,157). Therefore, dropping the women with missing information, the DLHS-3 provided an analytical sample of 33,107 women. So, the combine sample for institutional delivery outcomes was 58,870.

In terms of outcomes, we are looking at range of health measures, such as, immunization status of children, antenatal care, and under-five mortality. Additionally, we also look at different indicators of place of delivery. Place of delivery is classified as being either home or at a facility and facilities are further classified as government vs private. We construct four indicators corresponding to these place alternatives and types of services received during child births. The first measure is *probability of institutional delivery*, which includes

births at public and private health facilities. The second indicates the *probability of birth at government 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 home births assisted by skilled health personnel.

5 Results

5.1 Summary of Key Health Indicators in Bihar

Before presenting the naive DID estimates and regression-based results, we first report some of the key health indicators for Bihar and how they have evolved over time since 1998-99. Table 1 reports the indicators related to ante-natal care, delivery care, and child care from 1998-99 to 2007-08. While comparing the key health indicators in Bihar over time, results suggest that in relative terms, the state of Bihar has made substantial progress in improving the health status of its population. Majority of the antenatal care indicators have increased compared to the baseline status in 1998-99, except full ante-natal checkup.

For timely identification of and treatment for pregnancy complications and reduced risk of neo-natal mortality, it is necessary to have a complete monitoring of pregnancy, for which a minimum of 3 ANC visits are required and the first visit has to be in the first trimester of pregnancy. The top panel in Table 1 presents the coverage of antenatal care (ANC) in Bihar during 1998-2008. The coverage of *any antenatal* check-up has increased by almost 30 percentage points (29.7 to 59.3) during 1998-2008. However, for indicators like, ANC in the first trimester, atleast 3 ANCs, the increase has been less impressive. At least three check-ups are expected to complete the course of ANC to safeguard women from pregnancy related complications. The coverage of atleast 3 ANCs has increased merely by 9 percentage points in the same time period. The proportion of women who received at least three ANC in 2007-08 is 26.4 percent and 24.1 percent of women had received first ANC in the first

trimester of the pregnancy.[8]

Full ante-natal is defined as at least three visits for antenatal check-up, at least one TT injection received and 100+ IFA tablets/syrup consumed. The coverage of full ante-natal among women aged 15-49 years have decreased considerably from 10.1 to 4.6 percent during 1998-2008- this is matter of grave concern. There is also wide variation in receiving ANC utilizations across districts, which ranges from 1 percent in Supaul to 12.2 percent in Munger. The district-wise variation in coverage of full ante-natal is depicted in figure 2. The proportions of women who consumed 100 IFA tablets and received at least one TT injections are 46.5 & 58.4 percents respectively.

One of the important thrusts of the Government of Bihar (GOB) has been to encourage delivery under proper hygienic condition and under the supervision of skilled health professionals. The provision of delivery services in the government health institutions is one of the components of the maternal care. In Bihar, the institutional delivery had increased from 14.9 percent in DLHS-1 (1998-99) to 23 percent in DLHS-2 (2002-04) and 27.7 percent in DLHS-3 (2007-08), the progress of institutional delivery in Bihar is presented in the middle panel of Table 1.

The percentage of institutional delivery ranges from 12.0 percent in Sheohar to 58.3 percent in Patna. In Bihar, 31.7 percent deliveries were either institutional or home deliveries assisted by skilled person. As per DLHS-3 report, more than half of the districts in Bihar are below the state average of safe delivery. The districts are Sheohar (15.2 percent), Katihar (16.7 percent), Darbhanga (18.3 percent), Araria (19.0 percent), Madhubani (19.0 percent), Sitamarhi (20.2 percent), Madhepura (21.1), percent), Kishanganj (21.3 percent), Purnia (23.8 percent), Jamui (24.4 percent), Supaul(24.8 percent), Gaya (25.9 percent), Muzaffarpur (26.2 percent), Pashchim Champaran (27.2 percent), Saharsa (27.4 percent), Saran (27.4 percent), Purba Champaran (28.6 percent), Samastipur (29.9 percent), Khagaria (30.7 percent) and Begusarai (30.8 percent). In the rest of the seventeen districts in Bihar safe de-

[8]This subsection is heavily borrowed from various DLHS reports.

livery is above the state average, district wise variation in institutional delivery is presented in the figure 3.

The last panel in Table 1 reports the coverage of BCG, DPT, Polio, measles in Bihar in three time periods. The percentage of children who received complete vaccination (BCG+3 doses of DPT + 3 doses of Polio (excluding polio 0) + measles) increased marginally from 22.4% in 1998-99 to 23% in 2002-04 but it had increased considerably to 41.4% in 2007-08. However, it still fares below than the national average of 63.1%. A further disaggregated analysis of the different vaccination doses shows that the most important reason for less than 50% of complete vaccination is the high drop-out rate at later stage of vaccination. For example, DPT vaccination dropped down from 77.8 to 54.4 percents for first and third doses and polio vaccination dropped from 95 to 53 percents for first and third dose. The key to increase the full immunization rate is to carefully monitor the drop-out at the later doses of DPT and polio. The coverage of child immunization from 1998-99 to 2007-08 is also depicted in figure 1.

District-wise variations in the coverage of complete immunization of children aged 12-23 months are spatially depicted in figure 4. Out of thirty seven districts in Bihar, only in two districts, Aurangabad and Saran, the coverage of full immunization of children is more than 60 percent. In sixteen districts out of thirty seven districts in Bihar, coverage of full immunization of children is under 40 percent. These districts are Jamui (19.1 percent), Kishanganj (23.6 percent), Kaimur (Bhabua) (24.9‘ percent), Pashchim Champaran (27.1 percent), Sheohar (27.4 percent), Araria (33.3 percent), Bhojpur (33.3 percent), Buxar (33.3 percent), Katihar (34.8 percent), Gaya (35.7 percent), Lakhisarai (36.6 percent), Sitamahi (36.8 percent), Purba Champaran (37.3 percent), Banka (37.6 percent), Patna (39.1 percent) and Purnia (39.4 percent).[9]

[9]Source: DLHS-3 report.

5.2 Bihar vs National Average

In the previous table, the magnitude of indictors of maternal and child care, with the exception of full ante-natal check-up and TT injections, reflect an improvement from 1998-99 to 2007-08. However, despite this increase, the coverage rate of most of these indicators are below the national average in 2007-08. Bihar has one of the lowest proportion of institutional and safe deliveries even among the backward states. For all the 14 indicators in Table 3, the coverage proportion in Bihar is less than the national average. The all-India average of full ante-natal utilization is 18.8 percent, while the average of full ante-natal check-up in Bihar is a low 4.6 percent. With regards to institutional and safe deliveries, the story is not different and numbers portray a glooming picture in Bihar. Only 28 percent of women delivered their babies in either government of private health facilities, while the national average stands at close to 50 percent (47 percent).

The immunization status if children in Bihar in 2007-08 presents a dismal picture as well. According to data from DLHS-3, Bihar contributes to 13 percent of 9.3 million children un-immunized in India (DLHS-3 report). The proportion of fully-immunized children is 41.4 percent for Bihar when compared with that of India at 53.5 percent (Table 3). The coverage of BCG vaccines is quite high, close to 80 percent. Overall, the gap in Bihar and national average for child immunization rate is not as stark as the gap in ANC and delivery care indicators. In general, there is a wide gap between the coverage rate at the first dose of DPT and polio vaccines and the third dose (DLHS-3 report). Many children do not complete the third dose of vaccines, thereby lowering the percentage of fully immunized children.

5.3 Naive Differences in Differences

Table 4 an 5 report the levels and changes in various health utilization outcomes for Bihar and Jharkhand in the pre and post-policy period. Results in Table 4 are unadjusted DID. The unadjusted DID method, however, does not control for individual, household, and district-

level characteristics that may affect the outcomes of interest. Nonetheless, unadjusted DID were reported largely to serve as a comparison to the regression-based DID estimates.

Column 3 of the Table 4 and 5 presents the changes in average outcomes between 1998-99 and 2007-08. These figures are simply the differences between the averages for the two time-period(i.e., column 2 minus column 1). Row 3 in each panel in Table 4 presents the changes in average outcomes between Bihar and Jharkhand (i.e., row 1 minus row 2). Results in Table 4 suggest that, in terms of delivery care, the changes in institutional and safe delivery are higher in Bihar relative to Jharkhand. The simple DID estimates for institutional and safe delivery are 6.51 and 3.94 percents respectively. These differences are statistically significant at 99% level of confidence.

Similar pattern emerges for BCG, DPT-3, POLIO 3, and full vaccination outcomes.[10] The relative improvement in these three outcomes have been greater in Bihar than Jharkhand and the differences are statistically and economically significant. Although, the differences are statistically significant, the magnitude of DID estimates are not huge except for BCG. Bihar has fared slightly better than Jharkhand. For example, the DID estimate of the policy change on DPT-3 is 1.94%, while for full vaccination, the difference in differences is 1.65 percent.

The results on coverage of measles and full antenatal care are little unexpected.[11] The simple DID estimates for these two outcomes are negative, suggesting that outcomes grew at lower rate in Bihar relative to Jharkhand. Measles shots are given to children at 9 months, and slower increase in measle coverage in Bihar suggest that the drop-outs at later ages remain a major challenge in Bihar.

[10]Children (12-23 months) are fully immunized if they receive one dose of BCG, 3 doses each of DPT & Polio, and Measles.

[11]The DLHS-3 defines full ANC as "at least three visits for ANC check up, at least one TT injection received and 100 IFA tablets/syrup consumed".

5.4 Regression Results

In this section, we move on to regression-based estimation and provide evidence on whether decentralization of local governance after the implementation of 73rd amendment in Bihar has contributed to the increased utilization of health services in Bihar. As outlined in the empirical methodology section, we employ difference-in-differences method to tease out the contribution of political decentralization on utilization of health services in Bihar. Observations in the state of Jharkhand, which was part of Bihar before 2000, forms the control state.[12] We compare outcomes in Bihar (treated state) and Jharkhand (control state) in pre-decentralization period (1998-99) and post-decentralization period (2007-08).[13]

We present the results in Table 6. In this table, we report the results on outcomes related to delivery care, i.e. place of delivery (institutional and safe delivery). The dependent variables are further categorized as institutional deliveries, safe deliveries, deliveries in government facility, and deliveries in private facility. The main independent variable is the interaction of treat*post, which is the DID estimate of political decentralization on the above-mentioned outcomes. All the dependent variables are binary variable where 1 indicates yes and 0 otherwise. Columns 1 and 4 models the data by implementing a linear probability model, while columns 2 and 3 estimate multinomial logit model. All models control for standard confounders such as, mother's age & education, wealth status of the household, and social group of the household. Standard errors are clustered at district level to account for the fact that error terms are not identically and independently distributed (iid) as the explanatory variable X is measured at higher level (district-level) while the outcomes are measured at individual-level (Bertrand, Duflo, and Mullainathan, 2004).

The results in Table 6 suggest that political decentralization in local governance in Bihar has resulted in positive impact on place of delivery. These results are important from policy viewpoint as they are also the mechanism through which decline in child mortality can be

[12]The state of Jharkhand was carved out of the southern part of Bihar on 15 November 2000.

[13]Though 73rd amendment was legislated in 1993 by the national government, Bihar implemented this legislation in 2001 while Jharkhand implemented it in 2010.

observed. We find that with devolution of powers to local bodies, the probability of giving birth at health facilities goes up 6.5 percentage points. Since the mean of institutional delivery is 23%, the 6.5 percentage point effect results into 28 percent increase in institutional delivery. We also find a significant positive impact on probability of safe delivery.[14] Safe delivery increased by 3.6 percentage points. At the mean of 29%, this means an increase in safe delivery by 12 percent due to the policy change.

In columns 2 and 3, we further disaggregate the institutional delivery by place of delivery. Whether women are giving births at government or private facility is very informative and important for policy-making. As the public sector is the main provider of health services in Bihar, it is important to examine whether the shift in delivery care is towards government or private facility. In columns 2 and 3, we find that due to this policy change, the probability of giving birth in a government facility goes up, while the probability of giving birth in a private facility goes down, which is consistent with the impact of political decentralization in improving public facilities. The coefficient for delivery in government facility is statistically significant while the private facility coefficient is statistically insignificant at any level of significance.

In table 7, we report the results on child mortality.

5.5 Mortality Results

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. It is also interesting to see if the increase in institutional deliveries in Bihar has led to increased survival of children. We examine the impact of the policy change on child mortality and estimate equation (2). Results are reported in Table 7 and 8.

Column (1) in Table 7 reports the results without household's controls and district fixed effects. Column (2) includes household confounders, such as mother's age & education,

[14]Safe delivery includes institutional delivery and delivery at home assisted by skilled health personnel.

religion of the household, social groups affiliation, and wealth quintile. We include these variables because the probability of child mortality is influenced by these potentially confounding factors. Therefore, it is essential to statistically control for these variables while estimating the effects of gender quota on child mortality. Finally, column (3) includes district fixed-effects in addition to child and households-level control variables. The dependent variable "alive" is coded as 1 and 0 otherwise.

Results in Table 7 show that the policy change has no significant effect on child mortality. Although coefficients are positive in all the three columns, they are statistically insignificant at the conventional level of significance. In all the regression models in Table 7, the signs of the control variables are as expected (Results not shown here but available upon request). MotherŠs age and motherŠs education have positive and significant effect on child mortality. Poor and disadvantaged minority children(ST and SC) are less likely to survive. For Hindu children, the estimates are positive and significant, meaning that children belonging to Hindu religion have higher probability of survival.

However, results in Table 7 mask the heterogeneous impacts of the policy change. It is very likely 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. To test the differential program effects, we vary equation (2) by wealth quintile. The DLHS-3 data divide households into five quintile based on the asset score. Table 8 reports the results from this estimation.

The results in Table 8 indicate that, after controlling for child and household variables, policy change has a positive and significant effect on children from richest two quintile. Children from rich households are 1.9 percentage points more likely to survive (col 4). Children from top wealth quintile (richest) are also less likely to die- the probability of surviving is 1.7 percentage points more for these children. There is no such increase in survival probability for children belonging to poor and middle households. Though the coefficients for poorest

and middle-wealth quintile children are positive, they are statistically insignificant. To sum up, it appears that children from top two wealth quintiles gained more from this policy change in terms of their survival rate.

6 Conclusions and Policy Implications

This study exploits the variation in the timing of implementation of 73rd amendment in the states of Bihar and Jharkhand in India and estimates the impact of this policy change on health behaviors of women and child survival in these two states. Using differences-in-differences methodology, we show that political decentralization in Bihar led to increase in the probability of births in health facilities. The policy change also positively affected the probability of safe delivery. A further disaggregated analysis shows that the probability of giving births in government facilities has gone up while the probability of giving births in private facilities has gone down due to this policy change.

Given that the child and infant mortality rate are one of highest in the state of Bihar, encouraging women to deliver babies either at health centers or under supervision of skilled birth attendant will be a key intervention to reduce the burden of high level of child mortality and morbidity. We also test the effect of this policy change on child mortality by exploiting the timing of gender quota implemented in 2006 in Bihar.

We do not find statistically significant effect of this policy change on overall child mortality. However, disaggregated analysis shows differential policy impact. The gender quota has positive and statistically significant effect on survival of children from top two wealth quintiles. No such significant effects were found for children from bottom three wealth quintiles.

Digressing from the previous literature that has mainly exploited the gender quota in 73rd amendment, we provide the first estimates of overall impact of political decentralization on probability of institutional deliveries and child mortality in Bihar. Improving health outcomes is top priority of the Government of Bihar (GOB) 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 the health outcomes by improving 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 public facility or can help increasing health awareness but it can not be a substitute to supply- and demand-side interventions in 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 doctors/ANM 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

Key Health Indicators in Bihar

Variables	1998-99	2002-04	2007-08
	(1)	(2)	(3)
Antenatal Care			
Mothers who received any antenatal check-up (%)	29.7	31.3	59.3
Mothers who had antenatal check-up in first trimester (%)	14.4	16.3	24.2
Mothers who had three or more ANCs (%)	17.1	13.8	26.4
Mothers who had at least one TT injection (%)	64.6	28.3	58.4
Mothers whose blood pressure (BP) taken (%)	16.2	17.8	17.2
Mothers who consumed 100 IFA tablets (%)	16.9	5.3	46.5
Mothers who had full antenatal check-up (%)	10.1	3.4	4.6
Delivery Care			
Institutional delivery (%)	14.9	23	27.7
Delivery at home (%)	84.9	76.8	71.5
Child Immunization			
Children 12-23 months fully immunized (%)	22.4	23	41.4
Children 12-23 months who have received BCG vaccines (%)	40.8	42.6	81.5
Children 12-23 months who have received 3 doses of DPT vaccines	34.9	29.0	54.4
Children 12-23 months who have received 3 doses of Polio vaccines	37.4	28.5	53.1
Children 12-23 months who have received measles vaccines	25.6	22.7	54.2

Notes: Sources: Various DLHS reports

Figure 1
Improvement in Key Health Indicators (1998-2008)

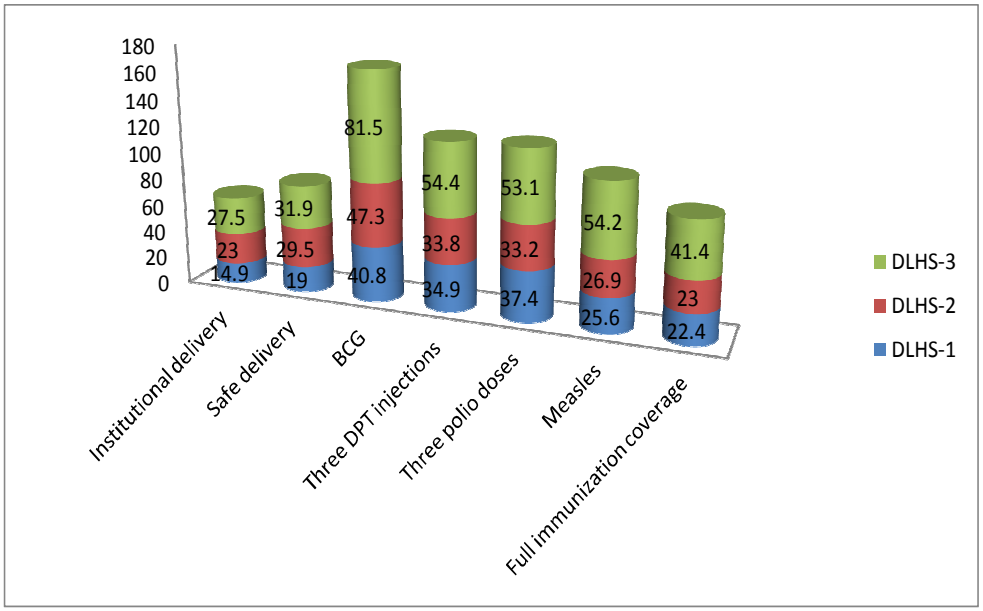


TABLE 2

Time of policy change

(1)	(2)
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 was 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 sarpanch seats were reserved for women
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 3

Bihar vs National Average (2007-08)

	Bihar	India
	(1)	(2)
Antenatal Care		
Mothers who received any antenatal check-up (%)	59.3	75
Mothers who had antenatal check-up in first trimester (%)	24.2	45
Mothers who had three or more ANCs (%)	26.4	49.8
Mothers who had at least one TT injection (%)	58.4	73.4
Mothers whose blood pressure (BP) taken (%)	17.2	45.7
Mothers who consumed 100 IFA tablets (%)	46.5	46.6
Mothers who had full antenatal check-up (%)	4.6	18.8
Delivery Care		
Institutional delivery (%)	27.7	47
Delivery at home (%)	71.5	52.3
Child Immunization		
Children 12-23 months fully immunized (%)	41.4	53.5
Children 12-23 months who have received BCG vaccines (%)	81.5	86.7
Children 12-23 months who have received 3 doses of DPT vaccines	54.4	63.4
Children 12-23 months who have received 3 doses of Polio vaccines	53.1	65.6
Children 12-23 months who have received measles vaccines	54.2	69.1

Notes: DLHS-3 report

TABLE 4

Unadjusted Difference-in-Difference (Naive)

	Pre-policy (1998-99)	Post-policy (2007-08)	Difference (Post-pre)
	(1)	(2)	(3)
Institutional births			
Bihar (T)	13.91	27.62	13.71
	(0.004)	(0.003)	(0.005)
Jharkhand (C)	10.45	17.65	7.20
	(0.005)	(0.004)	(0.006)
Difference (T-C)	3.46	9.97	**6.51*****
	(0.006)	(0.005)	(0.008)
Safe Delivery			
Bihar (T)	16.71	31.7	14.99
	(0.003)	(0.004)	(0.005)
Jharkhand (C)	13.85	24.9	11.05
	(0.005)	(0.003)	(0.006)
Difference (T-C)	2.86	6.80	**3.94*****
	(0.006)	(0.005)	(0.008)
BCG			
Bihar (T)	39.46	81.5	42.04
	(0.007)	(0.006)	(0.009)
Jharkhand (C)	51.14	85.00	33.86
	(0.008)	(0.006)	(0.01)
Difference (T-C)	-11.74	-3.5	**8.18*****
	(0.011)	(0.009)	(0.014)
DPT 3			
Bihar (T)	34.13	54.4	20.27
	(0.008)	(0.007)	(0.011)
Jharkhand (C)	44.17	62.5	18.33
	(0.010)	(0.009)	(0.014)
Difference (T-C)	-10.04	-8.1	**1.94*****
	(0.013)	(0.011)	(0.018)
Measles			
Bihar (T)	23.82	54.1	30.28
	(0.010)	(0.006)	(0.012)
Jharkhand (C)	36.05	70.6	34.55
	(0.009)	(0.008)	(0.012)
Difference (T-C)	-12.23	-16.5	**-4.27*****
	(0.014)	(0.005)	(0.017)

TABLE 5

Unadjusted Difference-in-Difference (Naive- CONTD.)

	Pre-policy (1998-99)	Post-policy (2007-08)	Difference (Post-pre)
	(1)	(2)	(3)
Polio 3			
Bihar (T)	35.61	53.0	17.39
	(0.003)	(0.006)	(0.007)
Jharkhand (C)	48.5	64.3	15.8
	(0.005)	(0.008)	(0.009)
Difference (T-C)	-12.89	-11.3	**1.59*****
	(0.006)	(0.010)	(0.012)
Full Vaccination			
Bihar (T)	19.23	41.4	22.17
	(0.008)	(0.006)	(0.01)
Jharkhand (C)	33.48	54	20.52
	(0.009)	(0.009)	(0.013)
Difference (T-C)	-14.25	-12.6	**1.65*****
	(0.012)	(0.011)	(0.016)
Full Antenatal Care			
Bihar (T)	8.90	4.6	-4.3
	(0.003)	(0.002)	(0.004)
Jharkhand (C)	12.80	9.0	-3.8
	(0.005)	(0.004)	(0.006)
Difference (T-C)	-3.90	-4.4	**-0.5*****
	(0.006)	(0.004)	(0.007)

Notes: Percentage of women who had institutional and home delivery may not add to 100.0,as some deliveries took place on the way to the facility, working place, other place etc. Complete vaccination implies BCG, three injections of DPT, three doses of Polio (excluding Polio 0) and measles. Children aged 12 months and over.

TABLE 6

Impact of Political Decentralization on Place of Births

	Institutional Deliveries	Deliveries at Govt Facilities	Deliveries at Private Facilities	Safe delivery
	(1)	(2)	(3)	(4)
Treat*post	0.065***	0.669***	−0.355	0.036*
	(0.014)	(0.231)	(0.360)	(0.020)
Post	0.016	1.71***	−20.59***	-0.0002
	(0.010)	(0.159)	(0.300)	0.117
District fixed-effect	Yes	Yes	Yes	Yes
Observations	49,664	49,766	49,766	49,807
R^2	0.16	0.26	0.26	0.10

Notes: Clustered standard errors by district are presented in parentheses. Col 1 presents LPM coefficients, while col 2 and 3 presents coefficients from multinomial logit. All the models are adjusted for mother's age and mother's education, SCST, religion, and wealth.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$,

TABLE 7

Impact of Political Decentralization on Child Mortality

	Child Mortality (alive=1)		
	(1)	(2)	(3)
Treat	0.0002	0.010	0.009
	(0.003)	(0.006)	(0.006)
Child control	yes	yes	yes
Mother's control	no	yes	yes
District fixed effect	no	no	yes
Observations	27,396	27,396	29,463
R^2	0.03	0.03	0.03

Notes: Robust standard errors by district are presented 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. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$,

TABLE 8

Heterogeneous Impacts of Political Decentralization on Child Mortality (alive=1)

	Poorest	Poor	Middle	Rich	Richest
	(1)	(2)	(3)	(4)	(5)
Treat	0.004	−0.007	0.001	0.019**	0.017**
	(0.004)	(0.006)	(0.006)	(0.008)	(0.008)
Child control	yes	yes	yes	yes	yes
Mother's control	yes	yes	yes	yes	yes
District fixed effect	yes	yes	yes	yes	yes
Observations	9,997	11,031	4,875	2,584	976
R^2	0.02	0.02	0.02	0.03	0.06

Notes: Robust standard errors by district are presented 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.

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

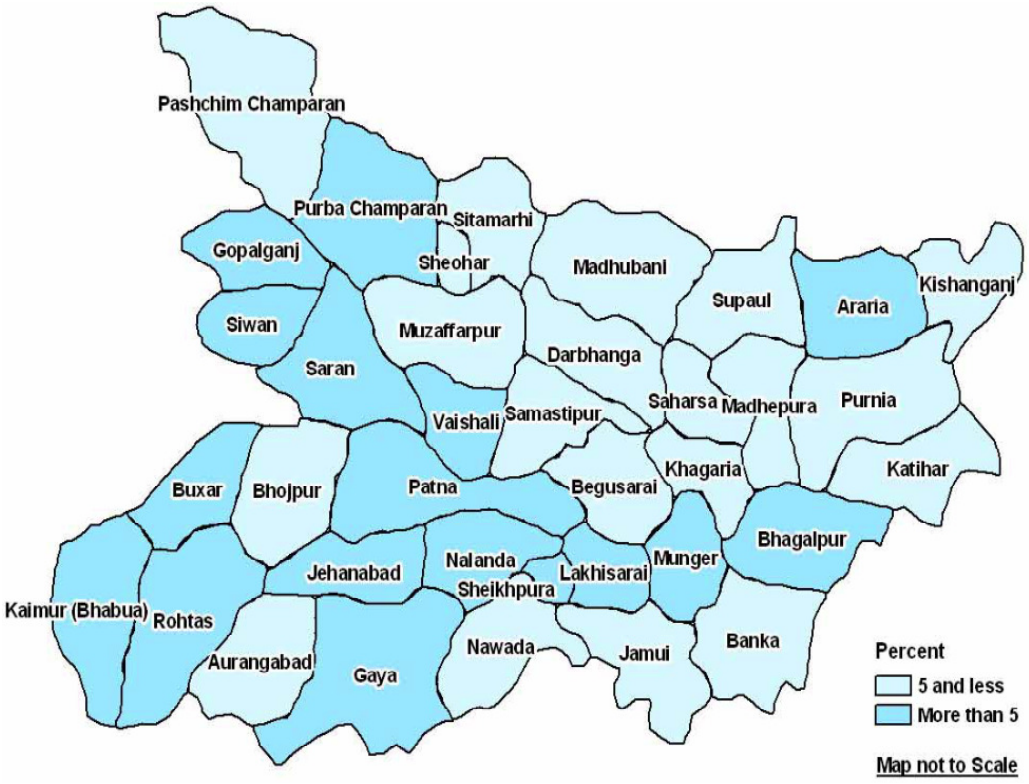
TABLE 9

Policy Intensity by Districts- 2006

District name	Total No. of Gram Panchayat	Total no of women	Percent women	Policy intensity
	(1)	(2)	(3)	(4)
Araria	218	103	47	22.09
Aurangabad	203	94	46	20.79
Banka	185	85	46	**24.26**
Begusarai	257	113	44	21.95
Bhagalpur	242	108	45	21.10
Bhojpur	228	104	46	21.15
Buxar	142	63	44	20.63
Darbhanga	330	151	46	20.82
Gaya	332	145	44	18.54
Gopalganj	234	108	46	22.27
Jamui	153	68	44	21.70
Jehanabad	93	42	45	**12.19**
Kaimur	151	66	44	24.21
Katihar	238	102	43	20.02
Khagaria	129	59	46	21.85
Kishanganj	126	56	44	19.76
Lakhisarai	80	36	45	20.68
Madhepura	170	76	45	22.57
Madhubani	399	183	46	22.66
Munger	101	42	42	16.97
Muzaffarpur	387	182	47	21.95
Nalanda	249	108	43	20.38
Nawada	187	82	44	20.18
Pashchim Champaran	315	139	44	21.02
Patna	331	147	44	13.65
Purba Champaran	410	184	45	21.48
Purnia	251	112	45	20.31
Rohtas	246	110	45	20.31
Saharsa	153	71	46	21.15
Samastipur	381	176	46	23.71
Saran	330	149	45	21.16
Sheikhpura	54	20	37	17.51
Sheohar	53	23	43	20.88
Sitamarhi	273	123	45	21.11
Siwan	293	139	47	22.56
Supaul	181	81	45	20.99
Vaishali	290	133	46	22.54

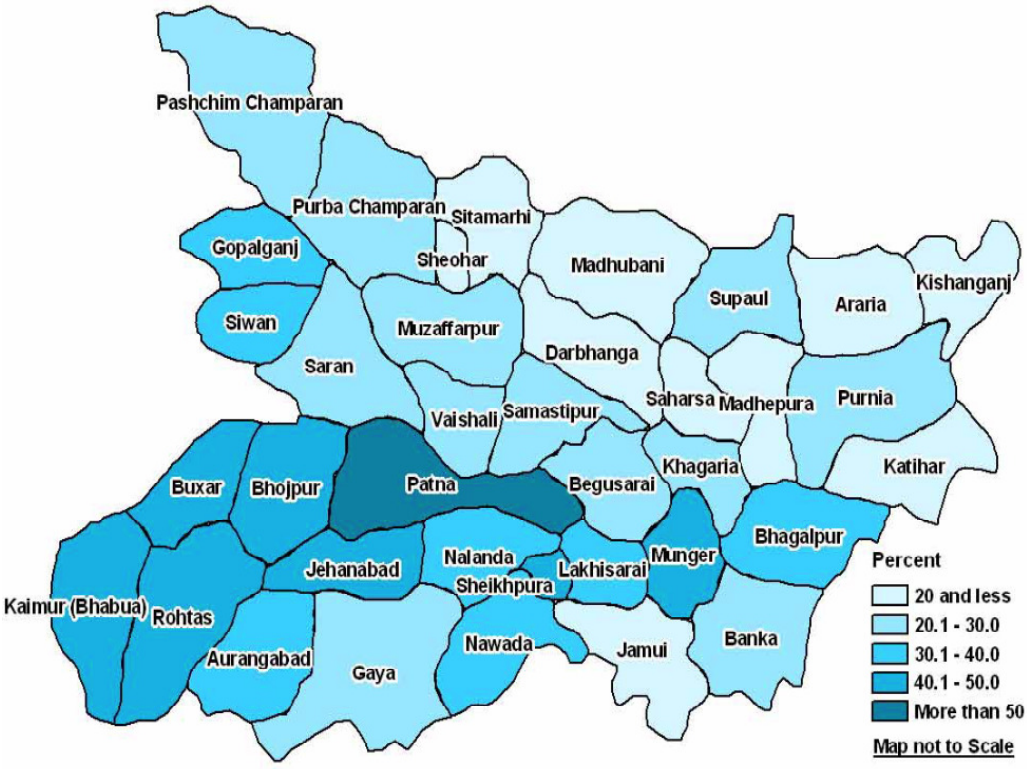
Notes: Policy intensity is number of women sarpanch per 100,000 women aged 15-44 according to 2001 census.

Figure 2
FULL ANTE-NATAL CHECK-UP BY DISTRICTS,DLHS-3 (2007-08)



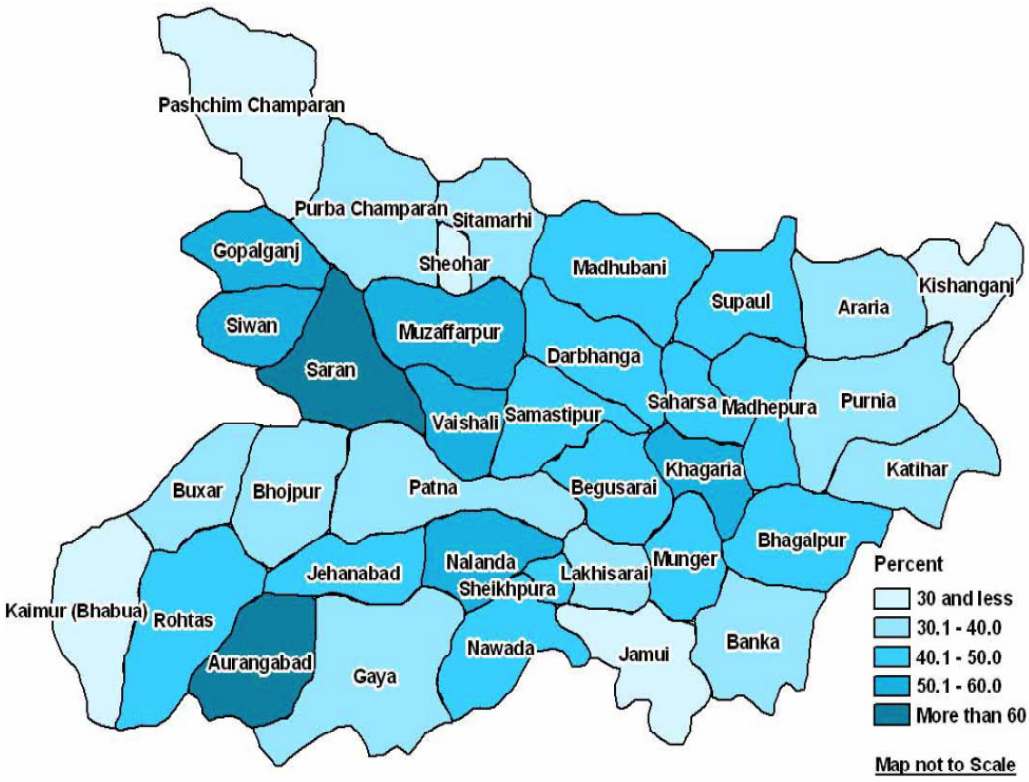
Source: DLHS 3 report

Figure 3
DISTRICT-WISE % OF INSTITUTIONAL DELIVERY, DLHS-3 (2007-08)



Source: DLHS 3 report

Figure 4
FULL IMMUNIZATION COVERAGE OF CHILDREN AGED 12-23 MONTHS BY DISTRICTS, DLHS-3 (2007-08)



Source: DLHS 3 report