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# Effect of Monetary Incentives on Institutional Deliveries: Evidence from the Janani Suraksha Yojna in India\*

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Preliminary

## Abstract

This paper is the first attempt to rigorously evaluate the short term effects of the ‘Janani Suraksha Yojna’ (Safe Motherhood Scheme), a nationwide conditional cash transfer program in India, launched in April 2005. Under the scheme, a woman delivering her child in a medical facility is provided monetary rewards. My difference-in-difference results indicate that in the initial one and a half years of its operation, the scheme did not have any effect on the disparity between the targeted and non-targeted states. In fact, the gap widened in this period, albeit marginally. But beginning from 2007, the targeted states have shown much larger improvements in the institutional deliveries, leading to a dramatic decline in the gap between the targeted and the non-targeted states. I also show that the convergence or differential improvement in access and availability of medical facilities are not driving my results.

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# 1 Introduction

Each year, more than half a million women die from causes related to pregnancy and child-birth (UNICEF (2008)). Further, for every woman who dies from pregnancy-related complications, around 20 more incur injuries, infections and disabilities. The average lifetime risk of a woman in a least developed country dying from pregnancy or child-birth related complications is estimated to be 300 times greater than for a woman living in an industrialized country. The figures for 2005 suggest that more than 99 per cent of overall maternal deaths took place in developing countries. Half of these (around 265,000) took place in Sub-Saharan Africa and another third (187,000) in South Asia. India alone had 22 per cent of the global total.

Most maternal deaths are related to obstetric complications- including post-partum haemorrhage, infections, eclampsia and prolonged or obstructed labor. Most of these direct causes of maternal mortality can be readily addressed if skilled health personnel are on hand and key drugs, equipment and referral facilities are available.

The picture is not too different for neo-natal mortality, i.e. probability of a newborn dying between birth and the first 28 completed days of life. The World Health Organization's figures in 2004 suggest that almost 40 per cent of under-5 deaths, around 3.7 millions, occur in the first 28 days of life. 98 per cent of neo-natal deaths occur in low and middle- income countries. In terms of regions, Western and Central Africa has the highest neo-natal mortality rate, 45 per thousand live births, followed by South Asia, 41 per thousand live births, and Eastern and Southern Africa, 36 per thousand live births.

Some 86 per cent of the newborn deaths are the direct results of the three main causes- severe infections, asphyxia and preterm births. Infections include sepsis/ pneumonia, tetanus and diarrhea. Clean delivery practices, improved care during labor and delivery, presence of skilled health worker who can detect early signs of danger are important in preventing newborn deaths.

The above discussion suggests that delivering a baby in a medical facility, under the supervision of a skilled medical professional can surely make a significant dent in the instances of maternal and neo-natal mortality. This paper evaluates an important scheme in India, whose main objective is to reduce maternal and infant mortality. The scheme tries to achieve this by providing monetary incentives to women to deliver babies in medical facilities. It is targeted towards the poorer sections of the society and the regions where the proportion of women delivering in health facilities is abysmally low.

## 2 Situation in India

Though India has made rapid economic progress in last few years, the human development indicators have not shown similar progress. There has been a steady reduction in the maternal mortality ratio (henceforth, MMR), as seen in Table 1<sup>1</sup>. From a high level of 398 in 1997- 98, it has come down to 254 per 100,000 live births for India as a whole, as per the 2004- 06 RGI-SRS (Registrar General of India- Sample Registration System). The figure is still high compared to the other developing countries. Countries such as China, Philippines, Thailand, Sri Lanka have MMR less than 100(UNICEF (2008)). The table also shows wide disparity among the states. Among the major states, only 8 states have been able to bring the MMR below 200 and only one state (Kerala) has been able to bring the MMR below 100 per 100 thousand live births. For other states, the MMR levels are still unacceptably high. About two- thirds of maternal deaths are concentrated in a handful of states- Bihar and Jharkhand, Orissa,

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<sup>1</sup>Maternal Mortality Ratio (MMR) is derived as the proportion of maternal deaths per 100,000 live births Sample Registration System, Office of Registrar General, India (2009)

Madhya Pradesh and Chattisgarh, Rajasthan, Uttar Pradesh and Uttarakhand, and in Assam.

The states with a high MMR also have a relatively higher fraction of child- deliveries taking place without any help of skilled health professional as indicated in the same table.

It was on this backdrop that the ‘National Rural Health Mission’ (henceforth, NRHM) was launched in April 2005. One of the major objectives of the NRHM has been to reduce the maternal mortality to 100 per 100 thousand and reduce infant mortality to 30 per thousand live births by the year 2012. For details about the goals of the NRHM, approach, administration, funding pattern, please see (Ministry of Health & Family Welfare, Government of India (2009)).

The most ambitious initiative to achieve this objective is the ‘Janani Suraksha Yojna’ (henceforth JSY) i.e. Safe Motherhood Scheme, launched in April 2005.

### 3 Janani Suraksha Yojna (JSY)

The main objective of the JSY is to reduce maternal and neo-natal mortality. It tries to achieve this by promoting institutional delivery, making available quality maternal care during pregnancy, delivery and in the immediate post-delivery period along with appropriate referral and transport assistance. The scheme is sponsored fully by the Central government.

The JSY is a conditional cash transfer scheme- a woman is paid money if she delivers her baby in a medical facility- in government health centres, like subcenters (SCs), Primary Health Centers (PHCs), Community Health Centers (CHCs) or general wards of district or state hospitals, government medical colleges or accredited private institutions<sup>2</sup>.

The NRHM has divided the states into two categories- the Low Performing (or targeted) States (LPS) and the High Performing (non-targeted) States (HPS), depending upon the pre-program level of institutional deliveries. The targeted states are the ones where the proportion of the institutional deliveries is very low.

The initial set of eligibility rules, uniform across the whole country, was issued in April 2005. According to these rules, only those women who were of 19 years of age and above, and belonged to the below poverty line (henceforth, BPL) families, were eligible for the benefit under the JSY. The benefit was restricted to the first two live births. In the targeted states, women were eligible for benefit for third birth as well, provided the beneficiary opts for sterilization immediately after delivery. The monetary incentives are described in table 2.

These eligibility rules were deemed to be too strict, especially in the targeted states, and hence, new guidelines were issued in late 2006<sup>3</sup>. According to these guidelines, in the targeted states-

- 1) All pregnant women, irrespective of age, poverty status and number of births, are eligible for benefit under the JSY if they deliver in a government medical facility.
- 2) The women from the BPL households and all the women (irrespective of poverty status) from the Scheduled Castes (SC) /Scheduled Tribes (ST) households are eligible for the benefit under the JSY if they deliver in an accredited private medical facility<sup>4</sup>.

In case of the non-targeted states-

- 1) Only those pregnant women who are aged 19 years and above, and belong to the BPL households,

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<sup>2</sup>The conditional cash transfer programs have become quite popular in the developing countries in the last decade. For an in-depth discussion about the nature, type, objectives and effect of various such programs, see Fiszbein et al. (2009).

<sup>3</sup>The exact month needs to be confirmed.

<sup>4</sup>It should be noted that the woman delivering in a private medical facility is not reimbursed the entire cost. She is only given the fixed amount as mentioned in the scheme.

are eligible for cash assistance.

2) In case of the Scheduled Castes (SC) or Scheduled Tribes (ST) households, all women irrespective of their poverty status, are eligible for cash assistance, provided they are above the age of 19. Cash assistance is limited to only two live births, even for the women belonging to the Scheduled Castes (SC) and Scheduled Tribes (ST).

In brief, any pregnant woman in a targeted state is eligible for the benefit under the JSY, while age, poverty status and number of births still matter in the targeted states.

In addition to the eligibility rules, the amount of financial assistance was modified. The beneficiaries in the targeted states are now given Rs. 1400 if the woman lives in rural area, and Rs. 1000 if the woman lives in urban area<sup>5</sup>. For the beneficiaries in the non-targeted states, the corresponding amounts are Rs. 700 and Rs. 600<sup>6</sup>. Table 3 shows the scale of cash assistance in the targeted and non-targeted states.

Table 4 shows year-wise number of beneficiaries in the targeted and the non-targeted states. The table shows that in the initial period, the number of beneficiaries were high in the non-targeted states. But in the later periods, the numbers have increased massively for the targeted states. As on March 31, 2010, the number of beneficiaries in the year 2009-10 stood at 92.29 lakhs (i.e. 9.3 million). These huge numbers make the JSY one of the largest conditional cash transfer programs in the world<sup>7</sup>.

### 3.1 Disbursement of Cash Incentive to the Mothers

According to the guidelines, the financial assistance to the mother should be disbursed at the medical facility itself, in one instalment before her discharge from the medical facility. The amount would be paid only to the mother and not to any other person. The disbursement should be done either by an Auxiliary Nurse Midwife (ANM) or ASHA<sup>8</sup>. In the places that don't yet have an ASHA, any other link worker such as Anganwadi worker can carry out the disbursement. If a woman goes to her mother's place for delivery or to a district / state hospital, the amount of assistance would be based on the place of residency. The expectant mothers are supposed to carry a referral slip from ANM, which would indicate their place of residency.

In order to receive benefits, 'Below Poverty Line' (BPL) certificate or caste Certificate (for SC / ST mothers) are required (wherever applicable). If the BPL certification is not available through a legally constituted process, the beneficiary can still avail the benefit on certification by the local council (such as village council), elected representatives, revenue authorities, provided the delivery takes place in a government institution. But the benefit available under the JSY, when a BPL woman delivers in an accredited private hospital, can be obtained only by producing a regular BPL card whose number etc. has to be quoted in the discharge card issued by the private institution<sup>9</sup>.

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<sup>5</sup>\$31.11 and \$22.22 using Rs. 45/\$ as exchange rate

<sup>6</sup>\$15.55 and \$13.33

<sup>7</sup>Brazil's *Bolsa Familia* benefits around 11 million families or 46 million individuals, covering quarter of the Brazil's population and is the world's largest. The next, Mexico's *Oportunidades* (formerly known as *Progres*a) reaches to 5 million households. Both of these are broad anti-poverty programs and provide cash transfers to the households if the households fulfil requirements regarding children's education, vaccination and nutrition. The JSY on the other hand is much narrower.

<sup>8</sup>The ANM is a key functionary in rural health system. Her main responsibilities include antenatal care, conducting deliveries etc. Over time, other functions, such as family planning, immunization, sanitation, infectious disease prevention etc. were added. ASHA stands for Accredited Social Health Activist, a new category of health workers introduced under the NRHM.

<sup>9</sup>The SC / ST women don't need to show BPL certificate but only the caste certificate.

## 4 Empirical Strategy

The discussion so far reveals that the JSY was introduced throughout the entire country at the same time. Much less stringent eligibility criteria and higher (almost double) monetary assistance suggest that the scheme should have a higher impact in the targeted states. Hence, we hypothesize that, other things being equal, the targeted states should witness a larger increase in the institutional deliveries as compared to the non-targeted states. Thus, our empirical strategy compares the changes in the proportion of the institutional deliveries between the targeted and the non-targeted states.

We consider the following regression specification,

$$Y_{it} = \beta_0 + \beta_1.(LPS_i) + \beta_2.(POST_t) + \beta_3.(LPS_i * POST_t) + \beta_4.(OtherControls_i) + \epsilon_{it}, \quad (1)$$

where the dependent variable  $Y_{it}$  is a dummy variable which equals 1 if the woman has delivered the child in a medical facility, zero otherwise. The baseline is the pre-program level of institutional delivery in the non-targeted states. ‘LPS’ is a dummy variables indicating if the woman is resident of a targeted (low performing) state. It captures the pre-existing differences between the targeted and the non-targeted states. We expect it’s coefficient to be negative. ‘POST’ equals 1 for births that took place after the launch of the program, i.e. after April 2005. It captures the change in the institutional deliveries in the non-targeted states relative to the baseline. The interaction term ‘LPS\*POST’ captures change in the institutional deliveries in the targeted states relative to the changes in the non-targeted states<sup>10</sup>.

### 4.1 Measuring Annual Effects

In addition to the average effects of the JSY, we also estimate the annual effects. It might take some time for the implmentation guidelines to be framed by the concerned departments in the the central and the state governments, for information about the scheme to reach to people. Hence one can expect some delays in the effective implmentation of the scheme. Further, given the differences in the targeted and the non-targeted states, one can also expect that the extent of delays might differ between these two groups of states. Estimating annual effects will give us some idea of such potential delays.

We consider the following regression specification,

$$\begin{aligned} Y_{it} = & \beta_0 + \beta_1.(LPS_i) + \beta_2.(Y2005_t) + \beta_3.(Y2006_t) + \beta_4.(Y2007_t) + \beta_5.(Y2008_t) \\ & + \beta_6.(LPS_i * Y2005_t) + \beta_7.(LPS_i * Y2006_t) + \beta_8.(LPS_i * Y2007_t) + \beta_9.(LPS_i * Y2008_t) \\ & + \beta_{10}.(OtherControls_i) + \epsilon_{it}, \end{aligned} \quad (2)$$

‘Y2005’ to ‘Y2008’ are dummy variables for the births that have taken place in 2005 (after the launch of the JSY), 2006, 2007 and 2008 respectively. They capture increase in the institutional deliveries in the non-targeted states relative to the pre-program level. We expect the coefficients on these variables to be positive. The coefficients on the interaction terms indicate the differential change in the institutional deliveries in the targeted states relative to the changes in the non-targeted states in that particular year, relative to the baseline. If the institutional deliveries have increased more in the targeted states relative to the non-targeted states, these coefficients would be positive. If the scheme has started to have an

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<sup>10</sup>(Change in LPS)-(Change in HPS)

effect after a lag, then the coefficients on the interaction terms involving later years would be higher compared to the ones which involve beginning years.

## 4.2 Pre-Treatment Trends in the Targeted and Non-Targeted States

Even if we find that there is differential increase in the institutional deliveries in the targeted states after the launch of the JSY, it may or may not be attributed to the JSY. The possibility of convergence suggests that even in the absence of the program, the targeted states might have experienced faster increase in institutional deliveries, because the level of institutional deliveries was quite low in these states before the launch of the program. In order to alleviate this concern, we look at the trends in the institutional deliveries before the launch of the JSY, in the targeted and the non-targeted states. If the trends are indeed the same, then the differential trends after the launch of the program can be attributed to the program.

To check whether the trends were similar, we consider the following regression specification, where 1995 is the omitted year (baseline):

$$\begin{aligned}
Y_{it} = & \beta_0 + \beta_1.(LPS_i) + \beta_2.(Y1996_t) + \beta_3.(Y1997_t) + \beta_4.(Y1998_t) + \beta_5.(Y1999_t) \\
& + \beta_6.(Y2000_t) + \beta_7.(Y2001_t) + \beta_8.(Y2002_t) + \beta_9.(Y2003_t) + \beta_{10}(Y2004_t) \\
& + \beta_{11}.(LPS_i * Y1996_t) + \beta_{12}.(LPS_i * Y1997_t) + \beta_{13}.(LPS_i * Y1998_t) \\
& + \beta_{13}.(LPS_i * Y1999_t) + \beta_{14}.(LPS_i * Y2000_t) + \beta_{15}.(LPS_i * Y2001_t) \\
& + \beta_{16}.(LPS_i * Y2002_t) + \beta_{17}.(LPS_i * Y2003_t) + \beta.(LPS_i * Y2004_t) \\
& + \beta.(OtherControls_i) + \epsilon_{it},
\end{aligned} \tag{3}$$

In the above specification, we use data from the surveys conducted before the JSY was launched. We would expect that the coefficients on the interaction terms would be zero if the trends in the institutional deliveries were similar in the targeted and the non-targeted states.

## 5 Data

Our empirical analysis uses 1998-99, 2002-04 and 2007-08 waves of the Reproductive and Child Health-District Level Health Survey (henceforth, RCH- DLHS). These nationwide surveys are conducted on behalf of the Ministry of Health & Family Welfare, Government of India and the International Institute of Population Sciences (I.I.P.S.), Mumbai is the nodal agency<sup>11</sup>.

There are separate questionnaires to obtain relevant information about the households, men, women and the surveyed villages (please see Table 4). The focus of the woman's questionnaire is to obtain information about maternal and child health care- antenatal care, place of delivery of the child, breastfeeding, immunization, prevalence and awareness about diarrhea, family planning and use of contraceptives, and awareness about sexually transmitted diseases and HIV/AIDS. The household questionnaire obtains information about the household such as size of the household, religion, caste, age and education of family members, marriages, deaths and births in the family, water and sanitation facilities, consumer durables and other assets. The village questionnaire obtains information about health, schooling and other facilities in the village<sup>12</sup>.

<sup>11</sup><http://www.rchiips.org/>

<sup>12</sup>The questionnaires are not uniform across the three rounds. The later rounds collect more information. For example,

## 5.1 Sample

We combine all the three rounds to create a pooled sample. We drop the North-Eastern states and the Union Territories<sup>13</sup>. Thus our final sample include the states of Jammu & Kashmir, Himachal Pradesh, Uttaranchal, Uttar Pradesh, Bihar, Orissa, Jharkhand, Madhya Pradesh, Chattisgarh and Rajasthan, classified as the ‘Low Performing States’ (targeted states), and Delhi, Punjab, Haryana, West Bengal, Gujarat, Maharashtra, Goa, Karnataka, Kerala, Andhra Pradesh and Tamil Nadu, classified as the ‘High Performing States’ (map of India (figure 1)).

In all the three rounds, the married women in the age group of 15 to 44 years are asked information about their pregnancies. If the woman respondent has given birth to a child within a period of 3-4 years before the survey, she is also asked detailed information about the receipt of antenatal care, problems during pregnancy, receipt of iron folic acid tablets/ syrup, tetanus injections, place of delivery and role of health workers, pertaining to such birth<sup>14</sup>. If the woman has given birth to more than one child within this time period, these questions pertain to the last pregnancy. Table 5 shows yearwise number of such births in our pooled data. Finally, we exclude those women (and households) who have not given birth to a child in the prescribed time period.

We define a delivery as ‘institutional delivery’ if this delivery has taken place in any medical facility, whether owned by public or private sector or by NGO/ charitable trusts<sup>15</sup>.

## 6 Results

Table 7 presents the average treatment effects. We use DLHS 2 (2002-04) and DLHS 3 (2007-08) rounds, which give us a sample of women who have given birth in the years 1999 to 2008. ‘POST’ equals 0 for the births that took place between January 1, 1999 to April 2005, and 1 thereafter. We present the results for the all India sample in columns 1a and 2a, for the rural sample in columns 1b and 2b, and for the urban sample in columns 1c and 2c. Column 1 always presents the results without any controls other than the variables displayed, while column 2 presents results with additional controls.

The coefficient estimates on the interaction term ‘LPS\*POST’ in columns 2a and 2b indicate that there has been no differential increase in the institutional deliveries in the low performing state in the post-program period. Only the urban areas of the targeted states show some positive impact with the institutional deliveries increasing by 3 percentage points relative to the non-targeted states, as shown in column 2c. But given the huge gap between the two groups and the low levels in the targeted states in the pre-program period, this increase can’t be treated as practically significant.

Now, we analyze the annual treatment effects. In the figures 1, 2 and 3, we present the evolution of the gap in the institutional deliveries between the targeted and the non-targeted states- for the entire sample (figure 1), for the rural sample (figure 2), and for the urban sample (figure 3)<sup>16</sup>. We have also

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in DLHS 1, there is no separate village questionnaire. The Household questionnaire asks very few questions about the possession of assets compared to the later rounds

<sup>13</sup>The North-Eastern states are Assam, Sikkim, Arunachal Pradesh, Manipur, Mizoram, Tripura and Meghalaya. The Union Territories include Lakshadweep, Andaman & Nikobar Islands, Pondicherry, Daman & Diu, Dadra & Nagar Haveli and Chandigarh.

<sup>14</sup>For DLHS 3, time period is from January 1, 2004 to the date of survey. For DLHS 2, time period is from January 1, 1999 to the date of survey for phase 1, and from January 1, 2002 to the date of survey for phase 2. For DLHS 1, time period is from January 1, 1995 to the date of survey for phase 1, and from January 1, 1996 to the date of survey for phase 2

<sup>15</sup>The public / government medical facilities include sub centers, primary health centers, community health centers, rural hospitals, district hospitals, AYUSH hospitals or clinics, government dispensarie or clinics, municipal/ state hospitals etc.

<sup>16</sup>The figures are based on the regression of the dummy variable for the institutional delivery on the year dummies from 1996 to 2008, a dummy for the targeted state, the interactions between each of the year dummies and the dummy

shown the 95% confidence intervals. All the figures indicate existence of a huge gap between the targeted and the non-targeted states at the beginning of the sample, i.e. 1995 (around 14% for the entire sample, 12.5% for the rural sample, and slightly above 15% for the urban sample). The gap seemed to have increased for the entire sample and for the rural sample upto the year 2004. For the urban sample, the gap has shown some fluctuations. It's level in 2004 is marginally higher than the level in 1995. After 2005, the gap seems to have widened. But it declines rapidly in the years 2007 and 2008.

Table 8, based on specification 2, quantifies these trends. The negative and significant coefficient estimates on 'LPS\*2005' and 'LPS\*2006' in the all India sample (column 2a) and the rural sample (column 2b) indicate that the increase in the institutional deliveries was greater in the non-targeted states, i.e. the gap widened marginally in 2005 and 2006<sup>17</sup>. For the urban sample, the corresponding estimates are zero, implying no change in the gap between the two groups of states. Hence, it seems that in the initial year and a half of the operation of the JSY, the scheme did not have the desired impact<sup>18</sup>. But the signs of the coefficient estimates change for the interaction terms 'LPS\*2007' and 'LPS\*2008'. They are positive, significant and large in magnitude in all the specifications. This suggests that the gap between the two groups is declining. For example, the estimates of 'LPS\*2007' and 'LPS\*2008' in column 2a (all India sample) imply that the increase in the proportion of the institutional deliveries was higher in the targeted states by 3.7 and 6.9 percentage points respectively, relative to the non-targeted states. The similar pattern also hold for the rural and the urban sample. In fact, the extent of increase in the institutional deliveries is much higher in the urban areas compared to the rural areas of the targeted states.

The key question is: Can these trends be attributed to the JSY? This question can be answered by analyzing the pre-treatment trends in the institutional deliveries in the targeted and the non-targeted states. We use DLHS rounds 1 (1998-99) and 2 (2002-04), which give us a sample of women who have given birth in the years 1995 to 2004. Thus, all the births in these two rounds have occurred before the JSY was launched. We use this sample to estimate the specification 3. As mentioned earlier, we are interested in the signs and magnitudes of the coefficients on the interaction terms. If these estimates are zero then it implies that the trends in the targeted and the non-targeted states were similar in the pre-treatment period. The results are presented in the figure 4, and in table 9, with year 1995 as the base period. Note that we only present the coefficients corresponding to the interaction terms in table 9<sup>19,20</sup>.

In the figure, it can be easily seen that for the all India sample, the trends are almost identical upto the year 1999. In 2000, the low performing states lag behind. But from 2000 onwards, the trends are almost parallel, except for 2004, where the trends diverge. The coefficients in table 9 tell the same story. Except for the coefficients on 'LPS\*2000' and 'LPS\*2004', none of the coefficients are significant, even at the 10% level, suggesting that the trends are broadly similar. Similar pattern holds for the rural sample as well (column 2b). But here the coefficients estimates are larger and significant as well. On the other hand, for the urban sample, the low performing states seem to be doing better in some years and in some years, the trend is similar (column 2c).

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for the targeted state, and other individual and household level controls. The baseline is the year 1995. The addition of the coefficient on the targeted states and the coefficients on the interaction terms give us the gap in the proportion of institutional delivery between the targeted and the non-targeted states.

<sup>17</sup>The baseline is the proportion of institutional deliveries in the period 1999- 2004.

<sup>18</sup>The program was launched in April 2005.

<sup>19</sup>In the figure, the coefficients for the non-targeted states are obtained as coefficients on the year dummies, while the coefficients on the low performing states are obtained as the sum of the coefficients on year dummies and corresponding interaction dummies.

<sup>20</sup>Complete results are available with the author upon request.

Thus, we can not assert that the trends in the institutional deliveries are exactly identical in the pre-treatment period. But these results clearly indicate that our annual treatment effects, especially for the all India sample and the rural sample, are very unlikely to be driven by convergence, which is reassuring.

## 7 Availability and Access to Medical Facilities

Another possibility is that the availability and the access to the medical facilities might have changed over the period under consideration. The NRHM is very broad scheme, which has within its ambit, various dimensions of the health care system, such as building new health care facilities, improving the existing ones etc. Given the preferential treatment for the low performing states, it might be possible that the low performing states experience differential trends.

We have village level data from the two separate rounds of the DLHS, DLHS II (2002-04) and DLHS III (2007-08)<sup>21</sup>. The village questionnaire in both the surveys seeks information about the availability and the access to various medical facilities. We run a simple difference-in-difference regression, where the dependent variables are- 1) whether the village has a particular medical facility (child development centre (Anganwadi), subcentre, primary health centre, Government dispensary, AYUSH clinic and finally, mobile health clinic.), and 2) whether the village has access to a particular medical facility (child development centre, subcentre, primary health centre, community hospital, district hospital and finally, private hospital.). The results are presented tables 10 and 11<sup>22</sup>.

The variable of interest is the interaction term 'LPS \* POST', which captures differential trends in the dependent variable in the low performing states. The results indicate that except for the child development centre (anganwadi), there has been no differential change in the availability and the access of any other medical facility. This suggests that the differential increase in the proportion of institutional deliveries is unlikely to be driven by increased availability and access of medical facilities.

## 8 Possible Explanation of the Results

So far, we have shown that after the launch of the JSY, the gap between the low and the high performing states widened to a small extent. But after the initial one and a half years, the trend reversed with the low performing states showing much higher increase in the institutional deliveries than the high performing states, which is the key objective of this scheme. What can be explanation for this?

The JSY was initiated throughout the entire country at the same time- in April 2005. Further, the scale of financial assistance and eligibility criteria were identical in the rural areas for the states in both the groups. Given the pre-existing differences in the low and the high performing states- in terms of existence of public health facilities, their reach in the rural areas, one can argue that the women in the high performing states were in a better position to utilize the scheme, which might explain increasing gap in the initial year of the JSY. But major changes took place in the scale of assistance and the eligibility criteria in the later half of 2006, as discussed previously in the paper. These changes made almost every women eligible in the low performing states, along with the enhanced level of financial assistance in the rural areas. Given the time lag involved in information reaching to the grassroot level, it is reasonable to expect that the effect of these changes would start showing up from 2007 onwards.

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<sup>21</sup>The village data is not available for the DLHS I, 1998-99.

<sup>22</sup>The village survey is conducted only for the rural areas, hence the results are applicable only for the rural sample.

## 9 Conclusion

This paper is a first attempt to rigorously evaluate the ‘Janani Suraksha Yojna’, an ambitious scheme launched by the Government of India to reduce maternal and neo-natal mortality. The scheme pays monetary rewards to the women who deliver their child in medical facilities. The eligibility rules and the scale of rewards are designed to target those sections of the population and regions of the country, which have very low levels of institutional delivery. There have been some qualitative studies which have looked at the specific states in the post-program period (Center for Operations Research & Training (CORT), UNFPA (2009), ILO Subregional Office, South Asia, New Delhi (2008). But to our knowledge, no attempt has been made to provide cleaner estimates of the short term effects of the scheme.

We combine the pre-program and the post-program survey data and compare the increase in institutional deliveries between the low and the high performing states. We show that the scheme led to a marginal increase in the gap between the two groups in the initial period. But in the later period, the gap has started declining with the low performing states witnessing much larger increase in the institutional deliveries, as compared to the high performing states. We analyze the pre-treatment trends and show that convergence can not be an explanation for our results. Further, we also show that there has not been any differential change in the availability and the access to the medical facilities in the targeted states after the scheme was launched, with the exception of the ICDS. This increases our confidence that the monetary incentives seem to be having an effect on the institutional deliveries.

The scheme has been in operation only for 5 years and the sample covers only the first three of these years. Hence, the paper captures only the short-run impact of the scheme. These short-term results indicate that the JSY is indeed making a difference.

Even though the JSY seems to have a positive impact on the institutional deliveries, its impact on maternal and neo-natal mortality, the variables of interest, remains to be analyzed. The NRHM has introduced a new category of health workers, ASHA (Accredited Social Health Activist), who are supposed to play a very important role in promoting not just institutional deliveries but also antenatal care, immunization etc. This scheme was initially introduced in the low performing states, and later extended to the high performing states. The impact of ASHA also needs to be analyzed carefully<sup>23</sup>.

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<sup>23</sup>The ASHAs are to be appointed in the rural areas, in the villages with the population of at least 1000. Hence, the the results from the urban sample won't be affected.

## References

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Table 1: Institutional Deliveries and Maternal Mortality Ratio in Major States of India

	(1)	(2)	(3)	(4)
	Institutional	Institutional	MMR	MMR
	Delivery	Delivery		
	1998-99	2002-04	2001-03	2004-06
India	34	40.5	301	254
Low Performing States				
Assam	23.8	26.8	490	480
Bihar	14.9	23	371	312
Madhya Pradesh	21.5	28.2	379	335
Orissa	23.4	34.4	358	303
Rajasthan	22.5	31.4	445	388
Uttar Pradesh	16.2	22.4	517	440
High Performing States				
Andhra Pradesh	50.6	60.9	195	154
Gujarat	46.1	52.2	172	160
Haryana	25.7	35.1	162	186
Karnataka	50	58	228	213
Kerala	97	97.8	110	95
Maharashtra	57.1	57.9	149	130
Punjab	40.5	48.9	178	192
Tamil Nadu	78.8	86.1	134	111
West Bengal	38.9	46.3	194	141

Institutional deliveries are from the District Level Household Survey, 1998-99 & 2002-04.

The Maternal Mortality Ratios are from the publications of the Sample Registration System, the Registrar General of India.

Table 2: Original Monetary Incentives under the JSY

	(1) Rural	(2) Urban
Low Performing State	Rs. 700	Rs. 600
High Performing State	Rs. 700	NIL

Rs. 700 = \$15.55, Rs. 600 = \$13.33 using Rs. 45/\$ exchange rate

Eligibility-1) women above 19 years of age, 2) upto two live births, 3) BPL

Table 3: Modified Monetary Incentives under the JSY

	(1) Rural	(2) Urban
Low Performing State	Rs. 1400	Rs. 1000
High Performing State	Rs. 700	Rs. 600

Rs. 700 = \$15.55, Rs. 600 = \$13.33 using Rs. 45/\$ exchange rate

Rs. 1400 = \$31.11, Rs. 1000 = \$22.22 using Rs. 45/\$ exchange rate

LPS = No restriction regarding age, poverty status, number of births

HPS = 1) women above 19 years of age, 2) upto two live births. 3) BPL

Table 4: The Number of JSY Beneficiaries

States	2005-06	2006-07	2007-08	2008-09	2009-10
<b>High Focus States</b>					
Bihar	0.00	1.14	8.38	11.47	12.46
Chattisgarh	0.25	0.75	1.76	1.41	1.52
Himachal Pradesh	0.02	0.06	0.10	0.13	0.16
Jammu & Kashmir	0.02	0.13	0.11	0.08	0.92
Jharkhand	0.00	1.23	2.52	6.19	6.55
Madhya Pradesh	1.00	4.00	11.00	11.38	10.99
Orissa	0.26	2.27	4.90	3.09	5.36
Rajasthan	0.05	3.88	7.75	9.17	9.78
Uttar Pradesh	0.12	1.69	8.64	15.64	20.22
Uttarakhand	0.02	0.21	0.59	0.71	0.74
Total	1.74	15.36	45.75	59.27	68.70
<b>Non High Focus States</b>					
Andhra Pradesh	0.00	0.00	4.35	4.50	2.41
Goa	0.00	0.00	0.01	0.01	0.01
Gujarat	0.42	1.21	1.86	2.13	3.50
Haryana	0.03	0.23	0.57	0.48	0.68
Karnataka	0.38	2.33	2.83	3.31	3.34
Kerala	0.20	0.59	1.48	1.36	0.94
Maharashtra	2.00	1.81	2.19	2.24	3.17
Punjab	0.78	0.17	0.29	0.68	0.97
Tamil Nadu	0.87	2.88	2.30	3.87	3.89
West Bengal	0.31	2.25	5.73	3.17	
Total	5.00	11.47	21.60	21.74	18.91
All India	7.04	29.31	71.19	85.42	92.29

The High Focus States in the table excludes the states in the North-East India.

The Non High Focus States in the table excludes the Union Territories.

The All India total is greater than the sum of the High Focus and the Non High Focus states due to the above-mentioned exclusions.

Table 5: District Level Household Surveys

	(1) Year	(2) Questionnaires
DLHS 1	May- November 1998 (Phase 1) October 1999 (Phase 2)	Household, Currently Married Women (age 15- 44 years)
DLHS 2	March- December 2002 (Phase 1) January- October 2004 (Phase 2)	Household, Currently Married Women (age 15- 44 years), Husband, Village
DLHS 3	November 2007- May 2008	Household, Ever Married Women (age 15-44 years), Never Married Women (age 15-24 years), Village

Table 6: Number of Live/ Still Births (DLHS 1,2 &amp; 3)

	DLHS 1		DLHS 2		DLHS 3	
1995	12,655	1999	15,162	2004	22,089	
1996	35,556	2000	21,723	2005	36,037	
1997	50,880	2001	46,043	2006	51,133	
1998	49,539	2002	41,695	2007	63,519	
1999	14,725	2003	29,440	2008	14,823	
-	-	2004	14,407	-	-	
Total	163355	Total	168,470	Total	187,601	

Table 7: Effect of the JSY on Institutional Deliveries-Average Treatment Effect

	All India		Rural		Urban	
	(1a)	(2a)	(1b)	(2b)	(3a)	(3b)
LPS	-0.336 (0.004)***	-0.163 (0.003)***	-0.313 (0.004)***	-0.162 (0.004)***	-0.289 (0.007)***	-0.159 (0.005)***
POST	0.064 (0.005)***	0.043 (0.004)***	0.093 (0.006)***	0.058 (0.005)***	0.041 (0.006)***	0.013 (0.005)***
LPS * POST	0.011 (0.006)*	0.006 (0.004)	0.016 (0.006)**	-0.004 (0.005)	0.04 (0.011)***	0.025 (0.008)***
Constant	0.598 (0.003)***	0.448 (0.006)***	0.504 (0.004)***	0.361 (0.007)***	0.782 (0.004)***	0.294 (0.013)***
Observations	356071	352251	273033	270027	83038	82224
R-squared	0.11	0.3	0.1	0.24	0.09	0.3
Individual Controls	N	Y	N	Y	N	Y
Household Controls	N	Y	N	Y	N	Y
Village Controls	N	N	N	N	N	N

All columns estimated using OLS; Robust standard errors in brackets (clustered at village level); Columns 1 & 2 use the entire sample; Columns 3 & 4 use the rural sample. Columns 5 & 6 use the urban sample.

Dependent Variable:- whether the child was been delivered at a medical facility?

Individual controls:- whether the woman and her husband are literate, total pregnancies, age of the woman at the time of the last birth, whether she went for antenatal care, and if she had any problems during pregnancy.

Household controls:- caste, religion of the household, standard of living index, and whether the household stays in the rural area.

Table 8: Effect of the JSY on Institutional Deliveries- Annual Treatment Effect

	All India		Rural		Urban	
	(1a)	(2a)	(1b)	(2b)	(3a)	(3b)
LPS	-0.336 (0.004)***	-0.164 (0.003)***	-0.313 (0.004)***	-0.164 (0.004)***	-0.289 (0.007)***	-0.159 (0.005)***
Y 2005	0.04 (0.007)***	0.011 (0.006)**	0.054 (0.008)***	0.018 (0.007)**	0.034 (0.010)***	0.002 (0.008)
Y 2006	0.061 (0.006)***	0.04 (0.004)***	0.087 (0.007)***	0.054 (0.006)***	0.041 (0.008)***	0.013 (0.006)**
Y 2007	0.077 (0.005)***	0.057 (0.004)***	0.112 (0.007)***	0.074 (0.005)***	0.048 (0.007)***	0.021 (0.006)***
Y 2008	0.061 (0.008)***	0.052 (0.006)***	0.097 (0.010)***	0.073 (0.008)***	0.026 (0.011)**	0.007 (0.010)
LPS * Y 2005	-0.036 (0.008)***	-0.019 (0.007)***	-0.025 (0.009)***	-0.025 (0.008)***	0.007 (0.016)	0.001 (0.013)
LPS * Y 2006	-0.033 (0.007)***	-0.034 (0.005)***	-0.027 (0.008)***	-0.045 (0.007)***	0.003 (0.013)	-0.007 (0.010)
LPS * Y 2007	0.044 (0.007)***	0.037 (0.005)***	0.047 (0.008)***	0.027 (0.006)***	0.063 (0.013)***	0.047 (0.010)***
LPS * Y 2008	0.109 (0.010)***	0.069 (0.009)***	0.108 (0.012)***	0.054 (0.010)***	0.144 (0.020)***	0.095 (0.017)***
Constant	0.598 (0.003)***	0.45 (0.006)***	0.504 (0.004)***	0.363 (0.007)***	0.782 (0.004)***	0.295 (0.013)***
Observations	356071	352251	273033	270027	83038	82224
R-squared	0.11	0.31	0.1	0.24	0.09	0.3
Individual Controls	N	Y	N	Y	N	Y
Household Controls	N	Y	N	Y	N	Y
Village Controls	N	N	N	N	N	N

All columns estimated using OLS; Robust standard errors in brackets (clustered at village level); Columns 1 & 2 use the entire sample; Columns 3 & 4 use the rural sample. Columns 5 & 6 use the urban sample.

Dependent Variable:- whether the child was been delivered at a medical facility?

Individual controls:- whether the woman and her husband are literate, total pregnancies, age of the woman at the time of the last birth, whether she went for antenatal care, and if she had any problems during pregnancy.

Household controls:- caste, religion of the household, standard of living index, and whether the household stays in the rural area.

Table 9: Pre-Treatment Trends in the Institutional Deliveries

	All India		Rural		Urban	
	(1a)	(2a)	(1b)	(2b)	(3a)	(3b)
LPS * Y 1996	0 (0.008)	-0.001 (0.007)	-0.01 (0.009)	-0.008 (0.008)	0.035 (0.018)**	0.027 (0.016)*
LPS * Y 1997	-0.001 (0.008)	-0.003 (0.007)	-0.01 (0.008)	-0.01 (0.008)	0.01 (0.017)	0.007 (0.015)
LPS * Y 1998	-0.002 (0.008)	-0.001 (0.007)	-0.009 (0.009)	-0.006 (0.008)	0.01 (0.018)	0 (0.015)
LPS * Y 1999	0.009 (0.012)	0.002 (0.010)	-0.027 (0.014)**	-0.017 (0.012)	0.107 (0.023)***	0.053 (0.019)***
LPS * Y 2000	-0.017 (0.011)	-0.018 (0.009)*	-0.049 (0.013)***	-0.038 (0.011)***	0.076 (0.021)***	0.036 (0.017)**
LPS * Y 2001	-0.007 (0.010)	-0.01 (0.008)	-0.035 (0.011)***	-0.025 (0.009)***	0.065 (0.019)***	0.03 (0.015)**
LPS * Y 2002	-0.006 (0.010)	-0.009 (0.008)	-0.032 (0.011)***	-0.021 (0.009)**	0.045 (0.019)**	0.012 (0.015)
LPS * Y 2003	-0.008 (0.011)	-0.011 (0.009)	-0.033 (0.012)***	-0.02 (0.010)**	0.028 (0.020)	0.008 (0.017)
LPS * Y 2004	-0.029 (0.013)**	-0.018 (0.010)*	-0.055 (0.014)***	-0.034 (0.013)***	-0.002 (0.023)	0.003 (0.019)
Observations	331831	327720	256431	253220	75400	74500
R-squared	0.11	0.29	0.1	0.22	0.1	0.3
Individual Controls	N	Y	N	Y	N	Y
Household Controls	N	Y	N	Y	N	Y
Village Controls	N	N	N	N	N	N

All columns estimated using OLS; Robust standard errors in brackets (clustered at village level); Columns 1 & 2 use the entire sample; Columns 3 & 4 use the rural sample. Columns 5 & 6 use the urban sample.

Dependent Variable:- whether the child was been delivered at a medical facility?

Individual controls:- whether the woman and her husband are literate, total pregnancies, age of the woman at the time of the last birth, whether she went for antenatal care, and if she had any problems during pregnancy.

Household controls:- caste, religion of the household, standard of living index, and whether the household stays in the rural area.

Table 10: Availability of Medical Facilities in the Village

	ICDS	Subcentre	Primary Health Centre	Government Dispensary	Private Clinic	AYUSH	Mobile Health Clinic
LPS	-0.192 (0.046)***	-0.13 (0.046)**	-0.071 (0.044)	-0.029 (0.053)	-0.103 (0.057)*	0.011 (0.044)	-0.03 (0.028)
POST	0.004 (0.010)	-0.019 (0.028)	-0.054 (0.015)***	-0.072 (0.035)*	-0.061 (0.028)**	0.008 (0.026)	0.007 (0.014)
LPS * POST	0.145 (0.042)***	0.015 (0.043)	0.008 (0.048)	0.038 (0.055)	-0.035 (0.062)	-0.05 (0.057)	-0.049 (0.024)*
Constant	0.953 (0.011)***	0.49 (0.032)***	0.219 (0.040)***	0.141 (0.043)***	0.351 (0.043)***	0.131 (0.041)***	0.127 (0.022)***
Observations	33103	32974	33104	33103	33077	33050	33101
R-squared	0.06	0.01	0.01	0.01	0.03	0	0.01

Table 11: Access to the Medical Facilities in the Village

	ICDS	Subcentre	Primary Health Centre	Community Hospital	District Hospital	Private Hospital
LPS	-0.105 (0.034)***	-0.065 (0.032)*	-0.046 (0.037)	-0.018 (0.043)	-0.029 (0.043)	-0.037 (0.044)
POST	0.003 (0.002)	0.017 (0.016)	0.012 (0.030)	0.025 (0.033)	-0.025 (0.042)	0.023 (0.025)
LPS * POST	0.089 (0.034)**	0.007 (0.034)	-0.009 (0.045)	-0.032 (0.054)	0.014 (0.061)	-0.024 (0.038)
Constant	0.989 (0.002)***	0.903 (0.020)***	0.866 (0.026)***	0.807 (0.028)***	0.823 (0.032)***	0.84 (0.033)***
Observations	33102	32933	32784	32693	32736	32729
R-squared	0.05	0.01	0	0	0	0

Figure 1: Gap in the Low and High Performing States (All India Sample)

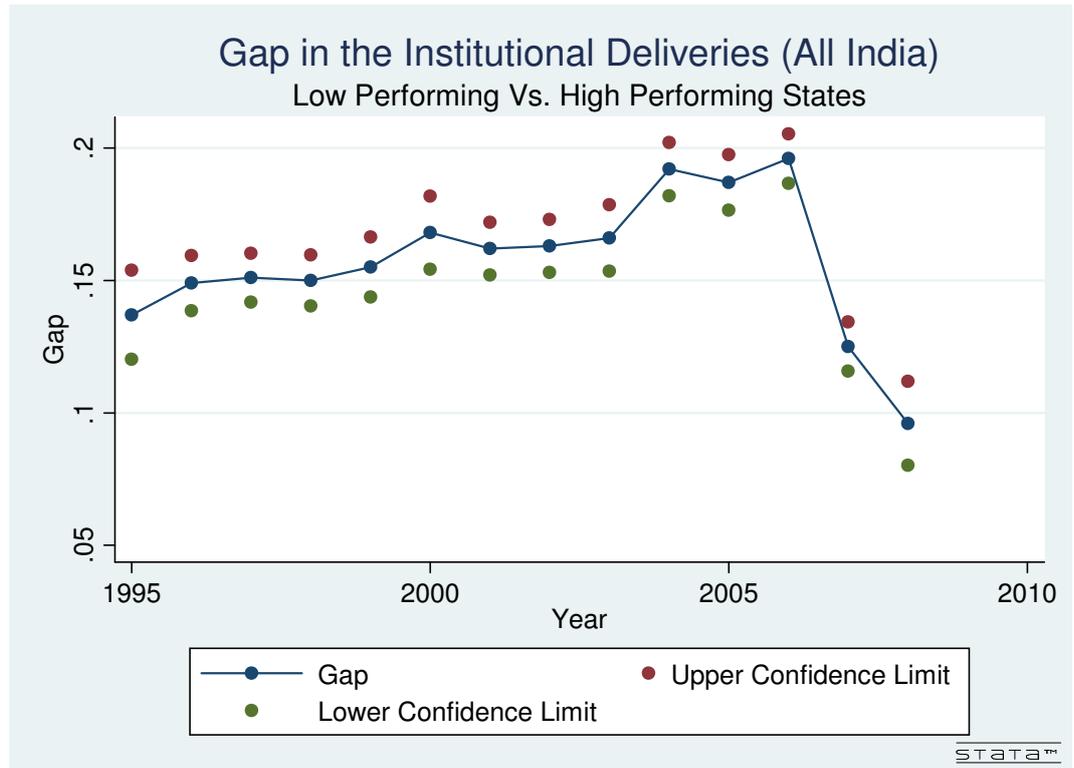


Figure 2: Gap in the Low and High Performing States (The Rural Sample)

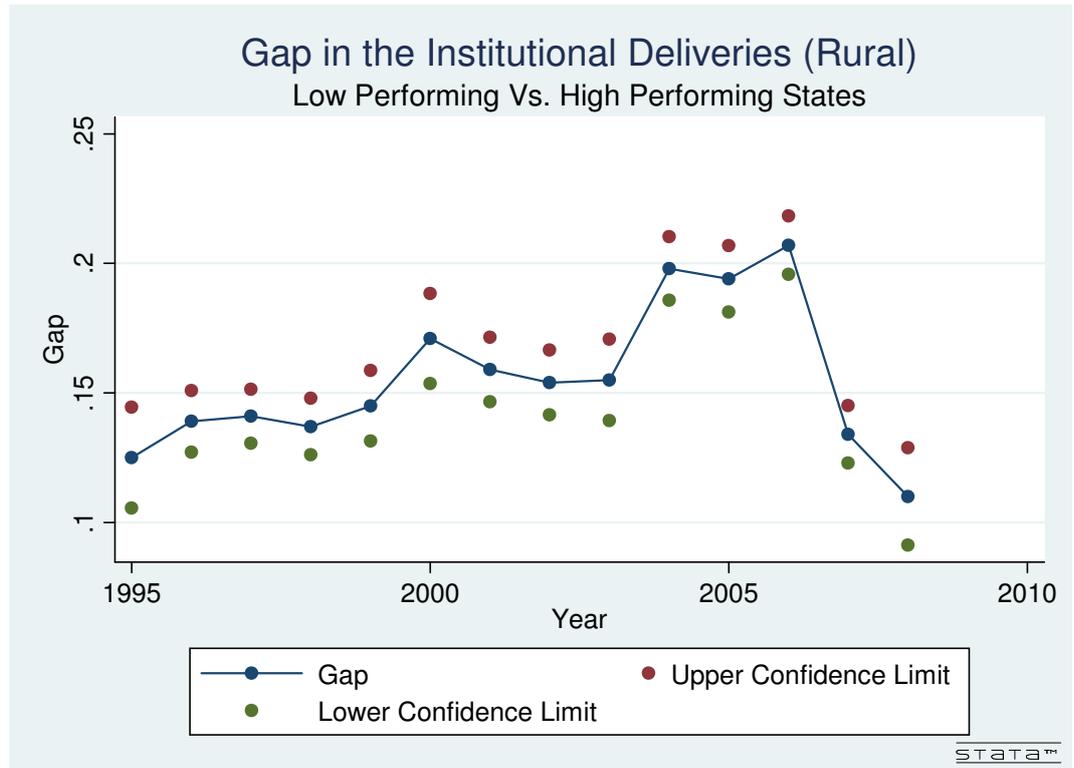


Figure 3: Gap in the Low and High Performing States (The Urban Sample)

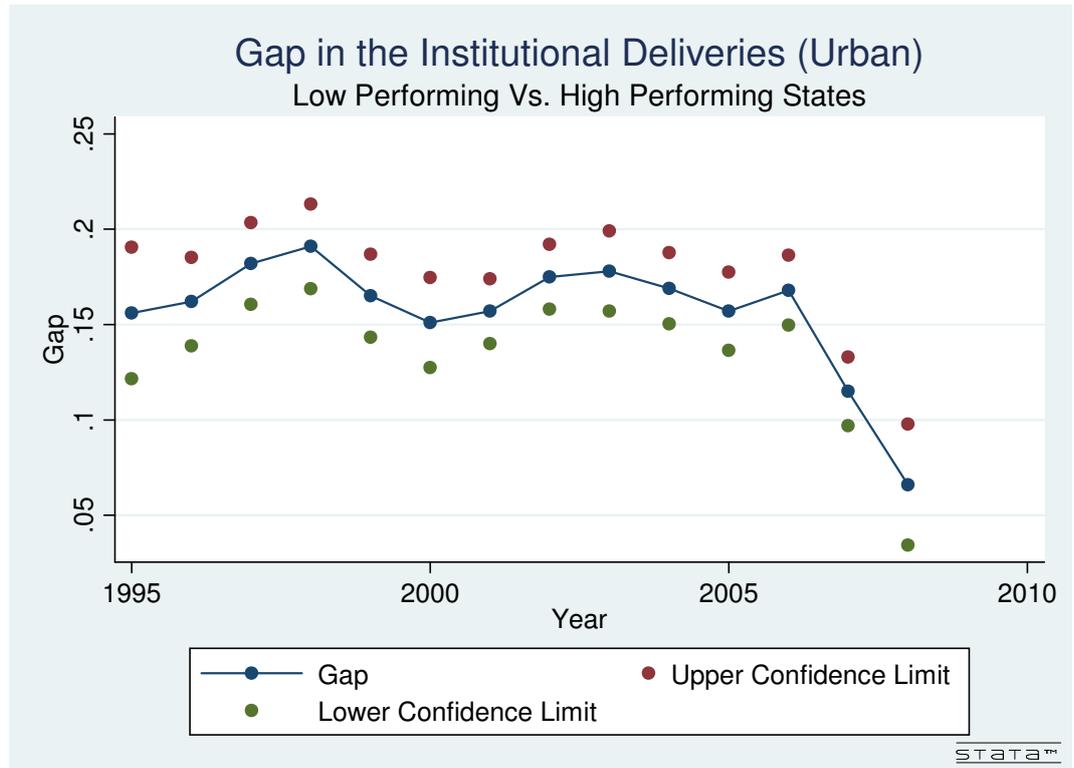


Figure 4: Pre-Treatment Trends in the Institutional Deliveries (All India)

