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# Maternal Health, Children Education and Women Empowerment: Quasi-Experimental Evidence from India

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**JEL:** D10; I18; I20; I38

## Abstract

The empirical evidence on the inter-generational effects of maternal health interventions is inconclusive, particularly the impact on cognitive ability of children. In this paper, we study one such popular policy from India, viz, the Janani Suraksha Yojana (JSY) which is a flagship health and safe motherhood program. We exploit plausible exogenous variation in exposure to the program generated by the institutional features of the implementation, in a cross-sectional difference-in-difference framework to find evidence of reduction in academic test scores of children whose parents remained unexposed to the policy intervention. We also find that such children spend less time on homework during the week, were less likely to attend and enjoy school. We also find negative effects on women empowerment measures for the unexposed women. The results suggest that the JSY led to increase in women empowerment and improved cognitive outcomes for children.

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# 1 Introduction

Based on WHO data from 1990-2010, the maternal mortality rate of developing countries is fifteen times higher than that of developed countries with sub-Saharan Africa and South Asia accounting for 85% of all global maternal deaths.<sup>1</sup> According to the same report, every third maternal death occurs either in India or Nigeria. As a result, policies to ensure institutional delivery and quality pre- and post-natal care assumes immense importance in these countries. One way to encourage pregnant women to use institutional infrastructure for deliveries is enhancing the supply side of such institutions by providing more nurses, doctors, building more hospitals etc. However, in the absence of well functioning formal health insurance markets in developing economies (Munshi and Rosenzweig 2016), access to these institutions is not universal (Bhatia et al., 2006). With research suggesting that free care can potentially increase the use of formal healthcare (Powell-Jackson et al., 2014), demand-side-financing interventions such as conditional cash transfers (CCTs) have become the popular go-to policy (Glassman et al., 2013).

While the effects of several CCTs on maternal and child health outcomes have been widely studied from the context of a developing country, very little is known about the inter-generational spillover effects of such programs. For instance, some CCTs have been found to increase the incidence of antenatal care in Honduras (Morris et al., 2004), Mexico (Barber and Gertler 2008), Nepal (Powell-Jackson and Hanson 2012), Bangladesh (Ahmed and Khan 2011), El-Salvador (de Brauw and Peterman 2011), other CCTs are known to have spurred on preventive health care behavior such as getting immunizations, infant nutrition and prescriptive medications (Barham and Maluccio 2009; Banerjee et al., 2010; Fernald, Gertler and Neufeld, 2008). However, to the best of our knowledge, the spillover effects of a CCT targeting maternal health on children's cognitive outcomes have not been studied.

In this paper, we attempt to fill this void in the literature by studying one of the biggest CCT programs in this domain from India, viz, the Janani Suraksha Yojana (JSY) or the *safe*

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<sup>1</sup>See [https://apps.who.int/iris/bitstream/handle/10665/44874/9789241503631\\_eng.pdf;jsessionid=2F38A29D8D0D97F69807C8B4BDF8E8B2?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/44874/9789241503631_eng.pdf;jsessionid=2F38A29D8D0D97F69807C8B4BDF8E8B2?sequence=1)

*motherhood* scheme. We find that children in households unlikely to be affected by JSY are worse off compared to the ones more likely to be exposed to the JSY in terms of academic performance and sincerity in attending school and doing homework. Additionally, we find that the JSY led to more empowerment of women in terms of their relative bargaining power over decision making within the household.

Like several other interventions discussed above, the effects of JSY has also been studied to a considerable degree. Some of the early papers provide descriptive evidence on the program (Devadasan et al., 2008; Malini et al., 2008; Verma et al., 2010; Hunter et al., 2014). Among papers that provide causal estimates, Lim et al (2010), Powell-Jackson, Mazumdar and Mills (2015) and Carvalho and Rokicki (2019) find effects of the JSY on the take-up of maternal health care and incidence of neonatal mortality. Joshi and Sivaram (2014) find that the JSY led to an increase in delivery in the presence of medical supervision but do not find effects on pre or post-natal care measures. Rahman and Pallikadavath (2018) use more recent data to find larger effects of the same policy on some of the outcomes mentioned above. Finally, Nandi and Laxminarayan (2015) estimate the causal effects of JSY on fertility. No paper that we know of has estimated the causal effects of this program on children’s educational outcomes and direct measures of women empowerment, leading to the first contribution of our paper to this literature.

The methodology of our paper is most closely related to Nandi and Laxminarayan (2015) and Joshi and Sivaram (2014), although not identical. We exploit potential exogenous variation in exposure to the program generated by the institutional features of implementation of the JSY. Using the nationally representative India Human Development Survey (IHDS) -2 (2011-12) database, we find that lack of exposure to JSY leads to poorer test scores, more days absent from school and less time spent on homework for kids in those households. Women not exposed to JSY are also less likely to have a say in fertility decisions and exposure to mass media relative to the ones exposed to JSY, suggesting the empowerment effects of the program.

The findings of our paper are significant primarily because of two reasons. First, from the

socio-political perspective of policy making, any program that leads to potential empowerment of women is much needed in the developing world. The fact that a targeted maternal health CCT program would achieve this objective, even if partially, is policy relevant and of academic interest. Second, our paper is the first paper to provide direct inter-generational causal effects of such a program on children’s cognitive outcomes. It is important to note that in the reduced form setting, this cohort of children may not be the ones directly affected by JSY at birth. It could potentially include other kids of the JSY mothers and/or other kids in the same household that of a mother potentially exposed to JSY. This implies that there are potential general equilibrium effects of the program.

Why is it plausible that kids not directly affected by JSY at birth may still be affected by the program in terms of cognitive outcomes? This is because a CCT effectively changes the household budget constraint. As a result it may be more feasible for the household to engage in productive investments in education inputs, which in turn affects the kids’ performances and attitude towards academics (in terms of attendance and doing homework). Another possibility would be through the women empowerment channel. Since women are more likely to be exposed to mass media (as per our findings), their awareness may have gone up and hence they are more likely to send their kids to schools and supervise their homework. Also, as relative bargaining power has gone up in terms of decision making in the household, mothers may be able to focus their kids to studies more and resist encouragement from others in the household to employ the child as a laborer.

## **2 Background**

### **2.1 The Janani Suraksha Yojana**

Janani Suraksha Yojana (JSY) is a scheme launched by Government of India which aims to reduce maternal and neo-natal mortality rates by incentivising institutional delivery among poor pregnant women. Introduced as a ‘safe motherhood intervention’, the scheme provides financial assistance for expenses related to both pregnancy, delivery and post-delivery care.

Under the scheme, Accredited Social Health Activists (ASHA) and other health workers have been identified to serve as effective intermediaries between the government and the beneficiary women. The success of the scheme as determined by an increase in institutional deliveries among the targeted group, significantly depends on the ability of ASHA workers to counsel and motivate the pregnant women to opt for a health institution for delivery. The ASHA workers will also act as a facilitators and support and accompany the pregnant women in their visits to the health institution which relate to check-ups and delivery. The JSY came into effect in April 2005 after reformulating and revising the National Maternity Benefit Scheme (NMBS) which was introduced way back in August 1995. Under NMBS, every pregnant woman above the age of 19 and belonging to a below poverty line (BPL) household was provided with a cash assistance of Rupees Five Hundred (\$11)<sup>2</sup> for every birth subject to a maximum of two births. However, the scheme lacked a focused approach in addressing all the issues related to pre-natal and post-natal care and further provided only a uniform financial assistance to all the eligible pregnant women. These issues were addressed with the introduction of JSY as the scheme provided an all-inclusive obstetric care package to pregnant women. It also introduced a graded scale of assistance based on classification of states into Low Performing (LPS) and High Performing State (HPS) as well as further classification into a Rural or Urban area. Even the JSY has undergone some revisions in last few years. As per the notifications issued by Government of India (2006, 2009)<sup>34</sup>, JSY completely does away with conditionalities based on age and number of births for a LPS. This means that all expecting mothers opting for institutional delivery in a LPS were now eligible to get the financial incentive. In a HPS, however, the benefits of the scheme were still available for only two live births to pregnant women who were above the age of 19 and belonged to a BPL household. For women belonging to marginalized sections (Scheduled Castes and Scheduled Tribes), the benefit was available regardless of the age.

Subject to meeting of above conditions, the scheme provides Rupees 1400 (\$31) and

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<sup>2</sup>All dollar values as on 31st October, 2006. See <https://www.xe.com/currencytables/>

<sup>3</sup>See [http://www.nhm.gov.in/images/pdf/programmes/jsy/imp-govt-orders/bpl\\_certificate\\_for\\_phf\\_home\\_del.PDF](http://www.nhm.gov.in/images/pdf/programmes/jsy/imp-govt-orders/bpl_certificate_for_phf_home_del.PDF)

<sup>4</sup>See <http://pbhealth.gov.in/jsy.pdf>

Rupees 600 (\$13) to the Mother and the ASHA worker respectively if they are located in a rural area of a LPS. If located in an urban area of LPS, the incentive amount is Rupees 1000 (\$22) and Rupees 200 (\$4) respectively. For a rural area in a HPS, the incentive amount is Rupees 700 (\$16) and Rupees 200 (\$4) for the Mother and the ASHA worker respectively. In case of an urban area in HPS, the incentive amount is lower at Rupees 600(\$13) and Rupees 200 (\$4) respectively. It is clear that government seeks to improve institutional delivery specially in the rural areas by providing a higher incentive amount as compared to urban areas. For the purpose of the scheme, states where institutional delivery rate were lower than or equal to 25 percent were categorized as LPS. Similarly, states where the institutional delivery rate was above 25 percent were categorized as HPS. Contrary to what its stated mission of promoting institutional delivery may suggest, the scheme also provides a uniform incentive of Rupees 500 for up to two live births to BPL women who are above the age of 19 and who prefer to deliver at home. This was introduced on the direction of the Supreme Court of India who made it mandatory to provide financial assistance from the government even for home delivery. Although, since the ASHA workers don't get any compensation in this setting it provides them a further incentive to encourage women for institutional delivery.

## **2.2 Related Literature**

Health and Safe motherhood interventions have been made in several parts of the world with developing countries being at the forefront of implementation due to much higher rates of maternal and neo-natal mortality. Researchers have tried to assess and analyze the impact of these schemes on several individual and household outcomes. However, most of the studies conducted are qualitative and descriptive in nature with only a few delving deeper into the economic analysis of the same. One of the first studies in this direction was instituted in 1995 by the government of South Africa to study the impact of its 'Maternal Healthcare Policy' which provided free public health services to expecting mothers from the time of pregnancy to 42 days after child birth, along with the children below 6 years of age (Schneider and

Gilson, 1999). The results of the study showed that the intervention improved the access to antenatal services. However, the scheme had created a feeling of resentment in service providers resulting in lack of support during implementation. Morris et al. (2004) analyzed the impact of conditional cash transfer program, 'Programa de Asignacion Familiar' (PRAF), on preventive healthcare outcomes in rural Honduras. The program provided health vouchers to poor households with expecting or nursing mothers, or having children not older than 3 years. Using clustered randomized trial the researchers found significant improvements in coverage rates for antenatal child care check-ups. Another study conducted by Barham and Maluccio (2009) in Nicaragua found positive impact of conditional cash incentive program on vaccination coverage rates. Brauw and Peterman (2010) studied conditional cash transfer program 'Comunidades Solidarias Rurales' implemented by El Salvador and analyzed its impact on outcomes for maternal health and child birth. The program provided financial incentive for health to a household either on presence of a pregnant woman or of a child who must not be older than 5 years of age. Using a regression discontinuity design the researchers found positive impact of the program on institutional delivery, while no impact was found on pre and post-natal care outcomes. Mexico's famous conditional cash transfer scheme, 'Oportunidades', was analyzed by Barber and Gertler (2010) to understand its impact on prenatal care and birth outcomes. The scheme was modeled by the government as an anti-poverty measure aimed at improving household investments in human capital, especially in the components of education, health and nutrition. The analysis of the program by the researchers showed significant positive impacts in all the three domains. The intervention improved the quality of prenatal care represented by improvement in birth weights and lower incidence of illness among children. In contrast to a demand side intervention, Basinga et al. (2011) analyzed the impact of a supply side intervention, 'Payment for Performance' (P4P), in Rwanda. The program provided financial incentive to health workers for their performance rather than on rank or seniority basis. The scheme was found to have significant positive impacts on the number of institutional deliveries. The program also resulted in an improvement in quality of pre-natal care with more mothers receiving vaccinations during



these visits. Jackson and Hansen (2012) studied the impact of financial incentives provided under the 'Safe Delivery Incentive program' (SDIP) in Nepal. The primary feature of the scheme was the provision of cash transfer to women for delivery in a public health institution. In addition, the scheme also provided monetary incentives to public health workers for rendering their services. These two provisions of the scheme very closely resemble the primary elements of JSY. The researchers found that the provision of cash incentive impacted institutional delivery positively and that the impact was positively related to the amount of incentive. Another important contribution in the field was made by Amarante et al. (2016) who studied the impact of unconditional cash transfer program, 'Plan de Atencion Nacional a la Emergencia Social' (PANES), on birth outcomes in Uruguay. The program aimed at providing a safety net to the households who fell among the poorest 10% in the country. The aid provided, however, was not tied to instances of prenatal visits or institutional delivery. The analysis of the program showed that the intervention resulted in a significant decline in the occurrence of lower birth weights. Improved maternal nutrition as a result of cash transfers served as the most important channel affecting birth weight of the child at the time of delivery. A recent study by Kliem et al. (2018) analyzed the impact of Germany's 'Pro Kind', a targeted home visiting program. The program did not provide any financial incentives but sought to improve maternal and child health outcomes through home visits by the health workers (midwives) from the time of pregnancy to up to two years after child birth. The provision of home visits to provide information and support services can serve as an alternate model to cash incentives for government health interventions and thus deserves due attention. However, the results of the study showed that the program had only marginal impact on physical health but strong positive impact on maternal mental health. Coming to the Indian case, Malini et al. (2008) conducted a descriptive study to understand the issues related to operational mechanism, awareness, and infrastructure that affected the implementation of JSY. The study found lack of awareness on part of expecting mothers about several aspects of the scheme. The provision of financial incentive was viewed very favorably by the beneficiaries, however delays in providing this assistance adversely affected the motivation of

the beneficiaries. Issues related to transportation arrangement for pre-natal visits and non-involvement of community leaders also affected the success of the scheme negatively. Varma et al. (2010) conducted in-depth interviews to understand the factors acting as facilitators or barriers for institutional delivery in the state of Uttar Pradesh. The insights from the interview showed that JSY acted as the major facilitator for improving the rate of institutional delivery. Nearly 74% of the interviewed women reported that the financial incentive provided by the program served as the major factor influencing their institutional delivery decision as it reduced their burden of out-of-pocket expenses. A review of several studies was conducted by Hunter et al. (2014) to analyze the impact of demand side financing policies on either maternal health or factors affecting it such as institutional delivery. Relying on the evidences from past literature (Dasgupta 2007; Devadasan 2008; Nandan 2008a; Lim et al., 2010; Santhya et al., 2011; Jackson et al., 2011; Murray et al., 2012) the authors state that JSY had resulted in uptake of pre and post-natal care and institutional deliveries. The causal impact on maternal mortality and other health indicators, however, remained unclear due to systemic limitations in monitoring JSY. One of the important quantitative studies detailing the impact of JSY on institutional delivery uptake and neo-natal mortality was conducted by Jackson et al. (2011). The authors made use of supply side variation in implementation of JSY to study these impacts. Using difference-in-difference methodology, the researchers showed that the program resulted in increase in institutional deliveries along with usage of other formal maternity care facilities. The utilization of these facilities was positively affected by the size of cash transfer. The program, however, did not result in decline in incidences of neo-natal mortality. The study also brought the role of unintended consequences of financial incentive programs into picture with the results showing reduction in the usage of private maternity care services and increased likelihood of pregnancy among women. Joshi and Sivaram (2014) in their study to evaluate program's impact found that the program effect was limited, with relatively low increase in medically supervised births for the targeted population. They find no evidence for a rise in ante-natal or post-natal care. Another study conducted by Nandi and Laxminarayan (2015) dealt with the question

of unintended effects of JSY on fertility and found that the policy resulted in an increase in the probability of child birth. Rahman and Pallikadavath (2018) studied the magnitude of improvement in the maternal and child health care services utilization as a result of JSY. Using a fuzzy regression discontinuity design, the authors find that their estimates for the effect were much larger when compared to previous studies. In a latest attempt to understand the impact of JSY, Carvalho and Rokicki (2019) conduct a replication analysis for an earlier study conducted by Lim et al. (2010) where they found positive impacts of the program on perinatal and neonatal deaths. The authors found that the results of the earlier study were robust to changes in model specifications. They also find evidence of heterogeneity in the effects of JSY across regions.

### **3 Empirical Framework**

#### **3.1 Data**

For the purpose of our research, we make use of India Human Development Survey - II (IHDS II) - 2011-2012. The survey is nationally representative in nature and covers 42,152 households across 1,503 villages and 971 urban neighborhoods in India. We make use of the both the household and individual survey files with the latter containing responses from 204,569 subjects on our outcomes of interest. Our data contains responses on several questions related to child education such as their competency in mathematics, reading and writing as given out by categorical variable for math, reading and writing scores. The IHDS II dataset also contains a binary variable for understanding whether the child enjoys his/ her time at school. Responses on other questions such as child's homework hours per week, highest class the child has reached or the number of days he/she is absent from school are also available in the form of continuous variables.

With respect to variables related to women empowerment, we have responses for the time women spent watching television along with the frequency. We also have responses to find out if the women have a say in fertility decisions. We code the answer to this question into a

binary variable. The mean values for variables related to above responses are given in Table 1. We also make use of several other variables which may potentially bias our estimates as controls such as, age of household head, education of household head and number of persons in the household.

Table 1: Summary Statistics

	Mean (1)	Standard Deviation (2)
Highest Class	3.49	1.61
Enjoys School (No=0, Yes=1)	0.97	0.16
Absent Days/Month	3.67	5.18
Homework Hours/Week	8.51	6.47
Reading Score (Cannot read=0, Letter=1, Words=2, Paragraph=3, Story=4)	2.54	1.38
Writing Score (Cannot write=0, 1-2 mistakes=1)	0.75	0.43
Math Score (Cannot recognize=0, Numbers=1, Subtraction=2, Division=3)	1.51	0.96
Women: How often TV? (Never=1, Sometimes=2, Regularly=3)	2.34	0.81
Women: TV Hours/Day	2.34	1.44
Women decide no. of children (No=0, Yes=1)	0.25	0.43

Notes: All data based on the sample used for the main analysis from the IHDS-II dataset.

### 3.2 Identification Strategy

To understand the impact of maternal health interventions on the outcomes of interest as described above, we need to look at the following functional relation:

$$Y = f(\text{Maternal\_Health\_Intervention}, X)$$

However, empirically estimating the effect of maternal health interventions on the outcomes related to child education and women empowerment using OLS is problematic due to several reasons. The most important one is that of potential selection bias. The individuals opting for institutional delivery and conditional cash transfers under JSY might be characteristically different from those who don't opt for the scheme, leading to one selected sub-sample of the population being compared to another. As a result, any statistical prediction coming out of such a comparison is likely to be biased. Second, the presence of unobservables might also give rise to omitted variable bias. For instance, the individuals opting for the program might be the ones who are better informed which might be causing better educational outcomes for children. Therefore a simple OLS model will not give us the true causal estimate of this maternal health intervention on potential outcomes. The ideal way to estimate such an effect would be a random assignment of maternal interventions to some individuals. This is because a means comparison of outcomes for these individuals would then provide a reliable causal estimate of maternal health intervention on outcomes. However, public policies do not work in this way and so in the absence of a randomized control trial, we make use of quasi-experimental variation to understand the same phenomenon using observational data. The JSY conditional cash transfer to eligible households for institutional delivery and pre and post-natal care provides a source of plausible exogenous variation for assignment of households to the maternal health intervention. Following the discussion above, we use a difference-in-difference (DID) design to estimate the causal effect of maternal health intervention on child education and women empowerment measures, using the institutional features of implementation of the program. Specifically, we make use of the Cross Sectional DID framework as opposed to the generic time based DID framework because the former allows us to exploit key features of the policy for identification. We compare the caste based differences in outcomes of 'General' and 'Scheduled' categories for Low Performing States (LPS) to caste based differences in outcomes of 'General' and 'Scheduled' categories for High Performing States (HPS). The usage of such a framework becomes appealing as the JSY policy intervention provides for differential financial benefits depending on whether the

beneficiary resides in a LPS or HPS and whether she belongs to ‘General’ or ‘Scheduled’ category. The identifying assumption for our Cross-Sectional double difference framework is that the difference in the means of outcomes for ‘General’ category in a LPS and HPS would be no different from the mean of outcomes for ‘Scheduled’ category in a LPS and HPS, in the absence of JSY. This is after controlling for all the other differences contained within the meaning of ‘General’ and ‘Scheduled’ category. With ‘General’ category getting exposed to JSY only in a LPS unlike ‘Scheduled’ category who are eligible for the program in both a LPS and a HPS. Hence, we study the effect of not being exposed to JSY for ‘General’ category in a HPS. To study this effect we employ an intent-to-treat(ITT) analysis under which all the ‘General’ category households in the HPS areas are considered as untreated. By taking care of issues related to noncompliance, ITT would give us a conservative estimate of the effects. Table 2 summarizes our identification strategy:

Table 2: Identification Strategy

	LPS	HPS
Scheduled Category	Eligible	Eligible
General Category	Eligible	Not Eligible

Keeping in line with the above discussion we estimate the following regression equation:

$$Y_{i,h,s} = \alpha + \beta_1 \cdot JSY + \beta_2 \cdot (General_i) + \beta_3 \cdot (HPS_s) + \gamma_1 \cdot X_{i,s} + \gamma_2 \cdot X_{h,s} + \epsilon \quad (1)$$

where,  $\alpha$  represents a constant,  $General$  is a dummy variable taking value 1 for General category and  $HPS$  is also a dummy variable taking value 1 for a High Performing State. The interaction of these 2 cross-sectional dummy variables here, captured by JSY generates potentially exogenous variation in access under the assumption that the difference-in-differences of means of outcome  $Y$  along the 2 cross-sections is statistically indistinguishable from zero in the presence of the intervention. The controls for age, size of the household, number of married men and women in the household, number of male and female children in the household, age of the household head, education of the household head, education of male and

female household heads and household income are represented by  $X$ . The subscripts  $i, h$  and  $s$  represent variation at individual, household and state level respectively.

Under the identifying assumptions, as specified above,  $\beta_1$  captures the effect of absence of JSY on  $Y$ . Furthermore, for the purpose of our analysis we use robust standard errors clustered at the state level.

## 4 Results

In this section, we present the findings from our regressions. Following the empirical framework described above, we try to estimate the robust causal estimate of not being exposed to JSY on our outcome variables. We first report the findings from the main regressions using education outcomes of children and women empowerment as our outcomes of interest. We then proceed towards the falsification exercise, in order to strengthen confidence in our findings.

### 4.1 Main Findings

Table 3 reports the results for child education outcomes from the estimation of our regression equation. Column 1 presents the estimates for effect of not being exposed to JSY on highest class level reached. It appears that on average, children were less likely to reach higher standards (class) for cohorts potentially not exposed to JSY. From column 2 we also see that such children were less likely to enjoy school. The absenteeism rate for such children, according to column 3, was also higher by 0.58 days per month which comes up to an increase of nearly 16 percent compared to the average rate of 3.67 absent days per month. Finally we also notice that such children spent 0.80 lesser hours per week on homework which again is a reduction of 9 percent over average homework hours per week of 8.51. Given this analytical framework, the counter-factual implies that these statistically significant differences would not have existed in the absence of JSY. So it must mean that in the presence of JSY the comparison group has fared much better along these dimensions and hence JSY had some

positive impact on the outcomes such as lower absenteeism rate, higher levels of enjoyment, and higher standards (class) while attending school.

Table 3: Education Indicators : IHDS II

	Class (1)	Enjoys School (2)	Absent Days/Months (3)	Homework Hrs/Week (4)
<i>Coefficient</i>	-0.2754*** (0.0892)	-0.0201* (0.0103)	0.5801*** (0.2048)	-0.7972*** (0.2867)
$R^2$	0.39	0.25	0.30	0.41
Observations	10,223	10,211	39,424	39,766

Notes: Robust standard errors clustered at the state level are reported in parentheses. \*\*\*  $p < 0.01$  \*\*  $p < 0.05$  \*  $p < 0.1$

We now move on to Table 4 which reports the effect on test scores of the students. Column 1, here, presents the effect of not being exposed to JSY on Reading test scores of children. We see that such children experience a drop of 0.28 points in their reading scores which is a 11 percent reduction from the average reading score of 2.54. From column 2 we also see that such children score 0.08 points lower on writing tests, which again translates into a 11 percent drop from average reading score of 0.75. The math score of such students are also 9 percent lower than the average as can be interpreted from column 3.

Table 4: Test Scores : IHDS II

	Reading Score (1)	Writing Score (2)	Math Score (3)
<i>Coefficient</i>	-0.2801*** (0.0863)	-0.0817*** (0.0232)	-0.1291* (0.0671)
$R^2$	0.43	0.40	0.46
Observations	10,122	10,017	10,079

Notes: Robust standard errors clustered at the state level are reported in parentheses. \*\*\*  $p < 0.01$  \*\*  $p < 0.05$  \*  $p < 0.1$



## 4.2 Falsification Exercise

One of the possible concerns about the above estimation procedure is that the effect picked up by our regressions is not necessarily that of non-exposure to JSY. In other words, we are claiming that in case of absence of JSY from all the other areas and for all the other individuals, the estimated coefficient  $\beta_1$  would be statistically indistinguishable from zero. However, such an assumption is not testable as the counterfactual never occurs. So as a second best solution, we use the falsification test to generate confidence in our identification strategy. Here, we estimate our regression equation using data from IHDS-I which was conducted during 2004-05( (Desai and Vanneman 2005). Since, the major part of data collection for this round of survey was completed prior to the announcement and implementation of JSY, if our identification strategy works then we will expect that prior to the implementation of JSY  $\beta_1$  is actually zero. We report the results for falsification exercise in Table 5.

Table 5: Falsification Test: IHDS 1

	Class (1)	Enjoys School (2)	Absent Days/Month (3)	Homework Hrs/Week (4)	Reading (5)	Writing (6)	Math (7)
<i>Coefficient</i>	0.0325 (0.1375)	0.0079 (0.0109)	0.1023 (0.2516)	-0.1307 (0.2635)	-0.1320* (0.0692)	-0.0342 (0.0354)	-0.0682 (0.0606)
<i>R</i> <sup>2</sup>	0.44	0.23	0.46	0.42	0.43	0.39	0.45
Observations	12,431	12,324	48,203	47,534	12,133	12,029	12,086

Notes: Robust standard errors clustered at the state level are reported in parentheses. \*\*\* p<0.01 \*\*p<0.05 \*p<0.1

From the results of Table 5, we see that the falsification exercise holds for our outcomes of interest implying that the effects were not statistically significant prior to the policy year. We see that only the effect on reading test scores come out to be significant at a 10 percent level. However, the point estimate is much smaller in this case numerically and is also close to other coefficients in the falsification exercise. The effect is much more robust and strong post policy year at 1 percent significance level. The point estimate is also larger in the latter case. Overall, the falsification exercise lends support to our identification technique and

strengthens confidence in our empirical specification.

### 4.3 Effects on Women Empowerment

Table 6 reports the results for women empowerment outcomes from the estimation of our regression equation. It also reports the falsification exercise for the same using data from IHDS-I . Column 1 presents the estimates for effect of not being exposed to JSY on frequency of women watching television. Here gain we see that on average, women were less likely to watch television in HPS areas where General category was not exposed to JSY. As given by column 3,they also experienced a reduction in viewing time of 0.15 hours per day which translates to a reduction of 6 percent when compared to mean viewing hours of 2.34 per day. Coupled with above findings, the results in column 5 tell us that such women were also less likely to have the decision making authority in terms of number of children they would want to have implying that women in these scenarios are less empowered. The falsification tests for all the mentioned outcomes of interest hold and are reported in columns to the right of the main result. All the falsification results are insignificant coupled with a very small point estimate.

Table 6: Women Questionnaire: Empowerment

	Women: How Often TV?		Women: TV Hrs/Day		Women Decides No. of Children	
	IHDS 2 (1)	IHDS 1 (2)	IHDS 2 (3)	IHDS 1 (4)	IHDS 2 (5)	IHDS 1 (6)
<i>Coefficient</i>	-0.0954*** (0.0321)	-0.0297 (0.0374)	-0.1469*** (0.0370)	0.00004 (0.0743)	-0.0335** (0.0135)	-0.0033 (0.0113)
<i>R</i> <sup>2</sup>	0.48	0.51	0.40	0.46	0.25	0.30
Observations	33,614	39,631	27,882	34,895	32,083	31,841

Notes: Robust standard errors clustered at the state level are reported in parentheses. \*\*\* p<0.01 \*\*p<0.05 \*p<0.1

## 5 Robustness Check

A potential concern with the identification strategy above could be an additional dimension of the program which provides benefits of JSY to Below Poverty Line (BPL) households even in HPS areas irrespective of their caste. So it is possible that some general caste households in HPS areas may still be exposed to the JSY even though we consider them ineligible as per Table 2. Although these households would constitute a very small fraction of the overall sample, it is not possible to rule out that these confound our estimates. As a result, we perform an additional robustness check to see whether this dimension of the scheme biases our estimates.

The results from Table 7 tell us that the estimates are driven by Above Poverty Line (APL) households. This also means that the negative impact on the cohorts potentially not exposed to JSY is not observed for the BPL households, as they could potentially have been affected by the program. The point estimates for the full sample are very similar to the ones above the poverty line. This is consistent with the fact that the identification strategy used above is not confounded by the potential presence of BPL families and the effects picked up are true estimates of JSY (non-)exposure.

## 6 Conclusion

In this paper, we study Janani Suraksha Yojana which, a maternal health intervention scheme introduced by Government of India in 2005 which sought to provide conditional cash transfers in order to promote institutional delivery and pre and post natal care. Using a Cross Sectional DID framework, we try to identify the impact on cohorts who were potentially not exposed to JSY. We find that in the absence of JSY, the education indicators as well as the test scores of the children whose parents whose were potentially unexposed to the policy intervention were adversely affected. We also find out that potentially as a result of non-exposure to the policy women experienced a lower level of empowerment. To the best of our knowledge, this paper presents the first empirical estimates of the impact of a maternal health intervention on

Table 7: Heterogeneous Treatment Effects: IHDS 2

	Full Sample (1)	Above Poverty Line (2)	Below Poverty Line (3)
Highest Class	-0.2754*** (0.0892)	-0.2921*** (0.1041)	-0.1571 (0.2820)
Enjoys School	-0.0201* (0.0103)	-0.0130 (0.0122)	-0.0558 (0.0389)
Absent Days/Month	0.5801*** (0.2048)	0.6456*** (0.2192)	0.8444 (0.7384)
Homework Hours/Week	-0.7972*** (0.2867)	-0.7523** (0.3056)	-0.5497 (0.4984)
Reading Score	-0.2801*** (0.0863)	-0.1515 (0.0991)	-0.3186 (0.2166)
Writing Score	-0.0817*** (0.0232)	-0.0608** (0.0297)	-0.1061** (0.0499)
Math Score	-0.1291* (0.0671)	-0.0885 (0.0841)	-0.2165* (0.1169)
Women: How often TV?	-0.0954*** (0.0321)	-0.0876** (0.0377)	-0.0560 (0.0691)
Women: TV Hours/Day	-0.1469*** (0.0370)	-0.1354*** (0.0431)	-0.1508 (0.0971)
Women decide no. of children	-0.0335** (0.0113)	-0.0252 (0.0196)	-0.0398 (0.0404)

Notes: All data based on the sample used for the main analysis from the IHDS-II dataset.

education outcomes of children. The earlier studies related to maternal health interventions or JSY generally studies the impact of such scheme(s) on health indicators of the mother or the child. This study, therefore, contributes to the literature by showing how positive effects of a maternal health intervention can spillover in other domains as well. By having a positive impact on cognitive ability of the children, the intervention helps in providing inter-generational benefits to the households. The intervention also has a positive impact on women empowerment which is often an important policy issue in a developing country context.

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