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Why Healthcare CCTs may not Improve Children's Health: Insights from India's Janani Suraksha Yojana

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Owing to the untimely demise of Harsh Malhotra, this working paper has been published posthumously. Dr. Malhotra completed his M.A. in Economics from the Delhi School of Economics and his Ph.D. from the Toulouse School of Economics.

Why Healthcare CCTs may not Improve Children's Health: Insights from India's *Janani Suraksha Yojana*

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Abstract

This paper evaluates a conditional cash transfer program, *Janani Suraksha Yojana*, which drove a large expansion in the use of public health facilities by mothers and their newborn children in India. The program did not improve children's mortality (as previous research documents and I confirm). I focus on understanding why. Using birth-histories from the Indian Human Development Survey (2011 and 2005), I estimate within-mother effects of the staggered arrival of the program across districts in India. The key finding is that families' preference for sons over daughters has an important bearing on the program's effects, especially in regions where the health system is less developed. A triple difference strategy reveals that families that were more likely to desire a son - those with no sons at baseline - increased fertility under the program (relative to the other families), and, exhibited a worsening of newborn mortality for daughters, but not for sons. This finding holds for under-developed regions where healthcare is of poor quality. This highlights a challenge for demand-side interventions in healthcare: the character of demand may reflect social biases that undermine children's health in the first place. In settings where the quality of healthcare is low, this may have stark consequences. [1]

[1]I am indebted to Matteo Bobba for his guidance and support in this research. I thank Dimple Kukreja, Saaduzzman and Kartik Misra for useful discussions, and participants in workshops in TSE. All errors are mine.

1 Introduction

In low income countries, improving child health remains a major challenge. The unicef estimates that bringing every country's newborn mortality to the developed-country average by 2030 would save 16 million lives (UNICEF 2018). India's experience makes an especially strong case for research into why health institutions underperform in this regard. Maternal and child health in India is especially bad among countries of similar economic size, placing it 12th worst among 52 low/middle income countries. Although, recent years of rapid economic growth have seen significant improvements, progress has been weaker than in its slow-growing neighbours like Sri Lanka and Bangladesh (Dreze and Sen 2013).

Understanding why child health seems difficult to improve in India is the broad motivation for this paper. To this end, I study a major expansion in healthcare for mothers and children in India. In 2005, the government launched the *Janani Suraksha Yojana* (JSY) or Safe Motherhood Program, one of the largest cash transfer programs in the world. The program entitles mothers to cash payments if they deliver in government health facilities or in approved private ones. Alongside this, community health workers are hired to encourage and guide women in using health facilities, and to organise specific health services for them, like ante-natal check ups. The JSY led to a substantial increase in mothers' use of institutional healthcare while the incidence of births taking place in the family's home, risky by their very nature, strongly declined (Jain, Desai and Vanneman 2016, Sivaram and Joshi 2014). However, this improvement in the conditions around birth does not seem to translate into improved *health outcomes*. Using the staggered roll-out of JSY, I relate variation in when it first became available across districts to *within-mother* variation in the health of children. I find no significant impact on newborn mortality, that is, on whether a child dies within one month of birth. Why did the JSY not improve newborn health? It put cash in the hands of women at the time of a child's birth. And since it successfully brought more mothers and

children in a safer environment at birth, newborn mortality is exactly where improvements would be expected.

However, this expectation is based on an intuitive comparison: of a *given* child born and cared-for at home, vs, her being at a health facility and receiving cash. The reasoning is partial when thinking of large changes in a health system in at least two ways. One, the reasoning ignores how health institutions handle the large increase in demand. I find that women who gave birth in JSY district-years report greater use of only the very basic health services than those in control district-years. Moreover, although the *gross* cash transfers under the program are large, there are costs to delivering in public health facilities instead of at home. Public healthcare is free of cost in principle, but available estimates of direct and indirect costs of maternal care in public facilities imply that the *net* transfers under JSY are relatively small (Bonu et al 2009, Leone et al 2013).

Two, more interestingly, it ignores the possibility that families' behaviour may change under the program. I present evidence that, in fact, families' preference for having sons over daughters has a key bearing on how they respond to the program. And in settings where the health system is weak, it makes an important difference to the program's impact on the health of children, especially girls. I find that the JSY is associated with an *increase* in newborn mortality among girls. Revealingly, this increase is driven by families who likely have a stronger preference for sons. In particular, among families who did not have a son by the time the JSY was announced, its subsequent availability significantly increases newborn mortality if a girl is born, but not if a boy is born. The pattern is weak and insignificant among families who already had at least one son at baseline. These patterns seem genuinely related to the JSY in that they do not reflect trends before the program's arrival in a district, and are found in regions where the program offered the largest cash amounts, was available universally to all mothers, and where the use of health facilities therefore saw the strongest increase under it.

It is intuitive that families who desire a son may care less for a child's health if it is a girl. Our findings indicate that the program itself interacts with this gender-bias in a perverse way, wherein it leaves girl children born to these families worse off than in "control" districts. It may be that children's health is more sensitive to a family's behaviour under the program. The JSY resulted in a near 20 percentage points increase in the chance that a child is born in a public health facility. In a setting where the demand on health institutions is much greater in the aggregate, a child's getting medical attention may come to depend more on what parents' do to insist on it. It may also be that JSY was more appealing to and "selected-in" families with a stronger desire for a son. In this case, I find that the families show a significantly greater increase in the probability of having a child under the program, if they do not have a son at baseline than if they do not have a daughter (or if they have both). This suggests that incentives offered by JSY were meaningful at the margin to families with likely stronger desire for a son, which may have changed the composition of births under JSY in favour of families relatively more likely to neglect girl children's health. Lastly, this increase in births may reflect a family's decision to have their next child sooner rather than later because of the program's incentives. In this case, the reduction in the gap between consecutive births among families with stronger son-preference may have directly worsened newborn mortality.

In exploring how son-preference may have effected the JSY's impact, I am guided by previous research on it (Anukriti 2018, Bhalotra and Cochrane 2010). In particular, Jayachandran (2015) illustrates that families in India have a strong preference for having *at least one* son. Her analysis of fertility stopping behaviour shows that families try to have a child till they reach one son (sometimes more). I draw on this, in comparing the impact of the JSY on families without any sons with those who have at least one by the time the program was announced. Jayachandran and Pande (2017) show that son-preferences partly account for under-nourishment among children, especially girls, in India. This paper is closest to the striking findings in Jayachandran and Kuziemko (2011), showing that daughters are breastfed

less in families with less than their desired number of sons. The birth of a girl to a family looking to have a son results in her relative neglect, evidently because the family likely looks to try again for a son and breastfeeding has contraceptive effects. Our findings suggest a similar neglect of girls among families who were likely keen on having a son, but with a focus on how it interacts with the subsidisation of healthcare by the JSY.

More generally, a vast literature documents the relationship between development, welfare programs and gender inequality. In developing countries, gender inequality shows up in stark ways in education and health (reviewed in Duflo 2012). The phenomenon of "missing women" in developing countries, attributed to excess mortality among women due to unequal access to healthcare, is an especially stark case (Sen 1990, Anderson and Ray 2010). An expansion in healthcare focused on mothers and children should be expected to help. But previous research suggests that the relationship between economic and institutional development and gender welfare is not straightforward. On the one hand, Jayachandran and Lleras-muney (2009) report that improvement in healthcare in Sri Lanka that lowered maternal mortality led parents to invest more in girl children, Duflo (2003) finds that girl children benefited especially from an expansion in social security pensions to women (grandmothers) but not from pensions to men. On the other hand, Oster (2008) reports that in India, where vaccination became available, gender inequality worsened because parents seem to disproportionately immunise boys, and as availability increased further the gender-gap gradually closed. Tarozzi (2012) describes how the recent decades of high economic growth have seen larger improvements in mortality for boys than for girls (although the gender gap in nutrition has narrowed). I add to this literature by studying an intervention that brought many children into health clinics, but where it possibly appealed more to families with a stronger son-preference. Among the girls who were born, the program is associated with a worsening newborn mortality.

This paper relates to the literature on demand-side health programs. A number of well-designed studies explore the effectiveness of demand-side incentives in healthcare (Glennerster

et al 2010, Morris et al 2004). Typically, research has found substantial unmet demand for healthcare. Even when small, cash incentives seem to stimulate greater use of health services with high average returns. However, most studies herein concern small scale interventions. An important feature of this setting, is that we can study the consequences of a system-wide change. As it turns out, this can make a crucial difference, because changes in a large health system may alter the behaviours of people using healthcare and the response of health institutions to them (Currie and Rajani 2016). In line with this, our findings point to a fundamental trade off in healthcare. Reducing the cost of care increases desirable use of health services, but may increase/attract behaviours that are 'social bads'. This trade-off besets efforts against Tuberculosis and Malaria in developing countries (Cohen et al 2015, WHO 2017). Making treatment widely available improves health on the one hand but excessive use of antibiotics has led to worries over microbial resistance, which may render medications less effective in the future. And in dealing with Opioid addiction in the US (Hollingsworth et al 2017, Currie et al 2018), where increasing availability of pain medication has run into concerns over abuse and its social consequences. In these instances, social and economic factors shape the character of demand. In the present case, an increase in births specifically among families with a strong preference for sons results in increased newborn mortality when a girl is born.

As I indicated above, the JSY program has been studied previously. Most of this research focuses on its effect on the use of health facilities, and of related services like ante-natal and post-natal checkups. There is consensus that the use of health facilities has strongly increased as a result of JSY, but the evidence is mixed for ante-natal and post-natal care (Jain, Desai and Vanneman 2016, Sivaram and Joshi 2014). A few studies consider effects for health outcomes. Lim et al (2010) find that children's mortality falls under the program. But their estimates do not have a causal interpretation, because they compare children whose mothers *received cash under the program* with other women, even though the former self-select into

the program. Like in this paper, Mazumdar, Mills and Powell-jackson (2015) instead focus on the "intention to treat", using a difference-in-difference approach to infer the effect of the program's availability. They conclude that the program does not significantly effect newborn or early newborn mortality. I contribute to earlier assessments of JSY in two ways. First, I provide within-mother estimates of the program, whereas previous research relies on analysis that pools mothers at the district level. As we see below, this makes a non-trivial difference to our analysis. While estimates with district fixed effects are similar to those in previous research, using mother fixed effects leads to a more pessimistic reading of JSY's effects. I show that this is because the profiles of mothers giving birth are systematically different (in ways that better a child's health) in JSY district-years than in "control" district-years. Mother fixed effects absorb such differences across mothers. Second, I closely examine the interaction between the program's incentives, families' fertility behaviour and health inequality between boys and girls. While Mazumdar, Mills and Powell-Jackson (2015) emphasise the role of poor infrastructure in rural health institutions as an explanation for why children's health does not improve, I highlight the role of gender-bias among families in the presence of low quality of healthcare.

2 Context and Data

2.1 The Program

The Janani Suraksha Yojana was launched in 2005, with a focus on poor families, and on regions with particularly bad maternal and child health indicators. Any woman from a below poverty line (BPL) household, above nineteen years of age, and expecting her first or second child was entitled to cash transfers at the time of giving birth, as long as she delivered in government health clinics (or accredited private ones). In regions with worse health indicators,

marked out as "Low Performing States" (LPS), accredited social health workers were hired in each village to inform, encourage and assist women with the use of health clinics, on a pay for performance basis. These states are: Uttar Pradesh, Uttaranchal, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Assam, Rajasthan, Orissa and Jammu and Kashmir. In other regions, termed "High Performing States" (HPS), the program was identical in who was eligible and the cash amounts to be disbursed *initially*, except no health workers were especially recruited from the village to assist beneficiaries.

Within eighteen months, the program was reformed, and considerably expanded. In LPS regions, it was made universal. Any woman irrespective of poverty status, age or number of children was entitled to cash transfers if she gave birth in government health facilities or approved private ones. Moreover cash transfers were nearly doubled from 700 rupees to 1400 rupees in rural areas (the latter being near $31). They were increased from 600 rupees to 1000 rupees in urban areas (the latter is near $22). These are substantial amounts, the rural cash transfer equalling twice the average monthly per capita spending (around 747 rupees as per IHDS 2005). The cash transfer amounts may not be represent an increase in "cash-at-hand" for all families because delivering in health facilities is costly, even when these are public facilities (near 1000 rupees on average, see Bonu et al 2009 and Leone et al 2013). What's clear is these cash amounts are very powerful incentives, they substantially relax financial constraints on families who would like using healthcare. As we see in Figure 1 later, the reformed version of the program, starting 2007, sees a dramatic increase in the share of births taking place at government health centres in LPS. In HPS regions, the program was made more inclusive but not universal. Aside from women in below poverty households, all women from disadvantaged social groups, the Scheduled Castes and Scheduled Tribes, were covered irrespective of poverty status. But program benefits remained limited to mothers who were at least nineteen years old, and to only their first two children. Cash amounts were not increased in rural areas (set at 700 rupees) but were introduced at 600 rupees in urban areas

(these are $16 and $13 respectively).

Table 1: JSY Incentives in Low Performing States and High Performing States

	(1)	(2)
VARIABLES	First phase 2005-2006	Second phase $\geq$ 2007
Low Performing States		
Rural	700	1400
Urban	600	1000
High Performing States		
Rural	700	700
Urban	-	600

Notes: The JSY was announced in April 2005. The program incentive amounts and eligibility rules were altered (second phase) starting December 2006. In the first phase, in LPS and HPS, eligibility required a woman be below poverty line, at least 19 years of age, and have had only one previous live birth. In the second phase, in LPS all women were eligible. In HPS, women could be from below poverty line households or from scheduled caste / scheduled tribe households but meet the other two conditions as before. □

As the program got announced and expanded, the use of health clinics clearly increased on average in both low and high performing regions (see Figure 1 below). The increase was much stronger in LPS regions, being gradual and slight in HPS regions. This is consistent with the differences in JSY's features in the two regions, wherein it is more inclusive and offers larger cash amounts in the low performing regions. I discuss the differences between the two regions in more detail below, and estimate the program rollout's impact on take-up of health facilities and services in the next section. Still, a casual look at how average use of health facilities changes over time sets up the puzzle on which our main results focus: If the use of institutional healthcare expands, why does mortality among children not improve?

2.2 Empirical Setting

In trying to understand how the program affects health, my approach makes use of the staggered introduction of the program across different districts in India (the district-level health bureaucracy implements most welfare programs). I relate *within-mother* variation in children's health with the program's availability in their year of birth, pursuing the "intention-to-treat" effect of the JSY via a difference-in-differences approach. Accordingly, the dataset is a panel of mothers across years 1998 to 2011, going back and forwards seven years from the program's announcement. A mother enters the panel in the year of her marriage (or in 1998, whichever is later), and is included if her marriage was before the program arrived in her district (to ensure within mother variation across pre-vs-post program years).

We know that the program's rollout was not random (Sivaram and Joshi 2014, Mazumdar, Mills and Powell-jackson 2015). So, the validity of my empirical strategy relies on program rollout across districts being unrelated to how the relevant health conditions/outcomes were *changing* before its arrival (i.e. on parallel trends). Accordingly, in addition to estimates of the program's impact, I report the dynamics of key health outcomes across treated and control districts in the years leading up to and after the program. The data come from the Indian Human Development Survey (IHDS), which interviewed a representative sample of households in India in 2005 and re-interviewed them in 2012. It collected retrospective birth histories from one woman (15-49 years of age) in each household, recording basic information about each birth. Aside from this, in each wave, the survey collected details about her last-born child. This includes information about where the child was born, if any money was received from the government for birth in a health facility. It is this detail that allows me to infer the program's presence in a district, directly from beneficiaries rather than relying on government data. Ultimately we are interested in how health outcomes are effected by changes on the ground.

Since I focus on how the program's rollout affects within-mother variation in children's health, it is essential to correctly distinguish between each mother's "treated" vs "untreated" children i.e. born before vs after the program arrived in her district. I infer the program's arrival in a district using the survey question: "Did you receive any money from the government for hospital delivery? If YES, how much". In any district, the earliest year in which any women report receiving program mandated amounts of cash, is defined as the district's program-year. This approach follows Mazumdar et al (2015) with one important difference. The National Family Health Survey (NFHS 2002, 2005-2007) with which they work, does not ask women how much cash transfer they received. In order not to confuse JSY's presence with an earlier National Maternity Benefits Scheme which offered smaller and unconditional cash transfers to women at the time of birth, they look for the earliest year in which the share of women who receive any cash jumps sharply. I use cash amounts available in the IHDS to directly untangle the JSY from earlier schemes.

Knowing which children were born before vs after the program also requires that the general sample of mothers accurately recall dates of birth. This may be more challenging for women with low literacy and numeracy. To minimise this demand on recall, I disregard information about the month of birth, using only year-of-birth data. This means that we may misidentify the program's arrival by upto to a year before or after. Nevertheless, recall issues should be kept in mind through our analysis. They are a difficult to address feature of survey based studies of child health, since they rely on mothers' recall of their birth history. However, in this paper, since we focus on newborn mortality which is a very salient event, recall should be relatively reliable. On the other hand, incorrect recall about the year in which a child was born may remain an issue.

2.3 Limitations of the Data

I work with a subsample of mothers in the dataset. This is a set of mothers who married before the program arrived in their district and had at least one child during the 1998-2011 period, so that every mother has a corresponding observation in some years before and after the program (in requiring this, we go from 39,523 interviewed women to around 21,000). The focus on the 1998-2011 period is because the data on children born is thin outside of these years and would strain recall. We also exclude some districts where the data is too thin for the program introduction to be reliably inferred (we lose observations to 958 mothers here). In general this thinness in data is related to the fact that only women whose last-born child was born in a given year can confirm / deny the program's presence in that district in that year. The relevant questions are asked only when probing women's experience during the birth of their last-born. In districts where the program ever-arrives, this is not a problem (we simply pick the earliest year), or in districts where women confirm non-receipt of cash for every year. In some districts however, data about receipt/non-receipt of cash transfers is not available for all years. In such cases, the district is included only if there is at least one valid answer about cash transfers for each of the last four years before the survey (2008-2011). I vary this threshold to 2007-2011, and 2006-2011 to see no qualitative differences in how the JSY effects newborn mortality. The final sample for our main analysis has nearly 15,000 mothers across all regions.

2.4 Where to Focus: Low Performing States vs. High Performing States

This paper focuses on the low performing states, for a number of reasons. The LPS and HPS regions differ in important ways. Table 2 tells us that the former are under-developed in general, and have significantly worse health-related conditions. Newborn mortality, the

outcome in which we are most interested, is 3.5 times higher in LPS than in HPS. The scope for improving health outcomes, therefore, is far greater in these states. This is why JSY itself was focused here. Like I discussed before, the program was universally applicable and offered much larger incentives in low performing states (for most of our study period). We see in Figure 1, accordingly, that across the study years, take up of health facilities changes dramatically in LPS but increases in a slim gradual manner in HPS regions, where it was much greater to begin with. The point is that the JSY is likely to be more meaningful to persons in LPS. It is also where the scope for improving newborn health is the largest.

Table 2: Key Differences between "Low Performing States" and "High Performing States"

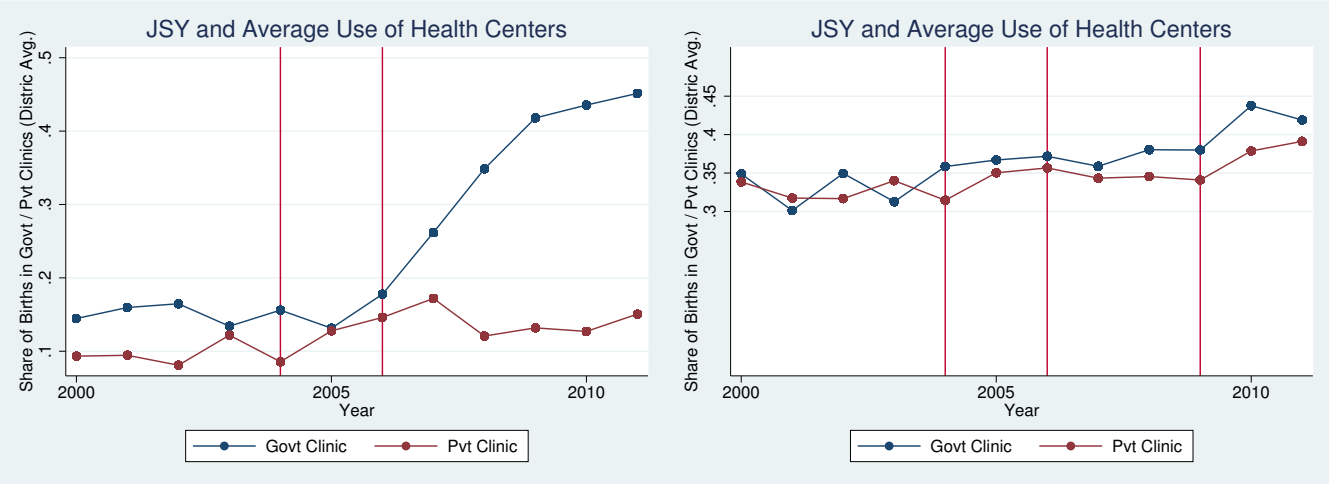
Average Values for Baseline Years (1998-2005)

	(1)	(2)
VARIABLES	LPS Regions	HPS Regions
Average Household Wealth (0-30)	8.9	12.1
Literacy among Mothers	41.1%	65.6%
Average Weight of Women	46.2 kg	48.2 kg
Share of Births at Health Centres	23.9%	65.1%
Share of Births Attended by a Doctor/Nurse	35.4%	79.7%
Newborn Mortality (Death within 1 month)	5.83%	1.67%

Notes: All variables based on averages computed on IHDS 2005 data; except newborn mortality which uses recall of all children born alive to mother in IHDS 2011 (as in our main regression analysis). Household wealth is an index of possessions on a 0-30 scale. Share of births at health centres and attendance by doctor/nurse are based on last-born children to interviewed women. N=19,119 women, 98,069 children. □

In general, I do not uncover meaningful reasons for why newborn mortality did not improve

Figure 1: District Share of Births in Government and Private Health Facilities



Low Performing States

High Performing States

Notes: The figure plots the district level share of women who report their last-born child was born in a government clinic / private clinic; home is the residual category. The data combines IHDS-2005 and IHDS-2011 The left panel pertains to Low performing states, where vertical lines indicate program announcement and program reform. The right panel pertains to High performing states, vertical lines indicate the same announcements. In high performing states, on the right, an additional line marking the year 2009 indicates announcement of incentives for health workers in HPS regions. These were in place in LPS regions from the beginning. □

in high performing states. This is possibly because JSY is has a more complex form in these states, for which our empirical strategy is ill-suited. For one, since narrow set of women are eligible under JSY here, and since cash incentives are low, there is a smaller aggregate increase in use of health facilities. An impact of the program's *availability* is harder to pick up when the number of "compliers" may be low. An alternative strategy, involves looking for changes among eligible mothers (vs. others). This is challenging, since it involves inferring eligibility, that is, who had BPL or Scheduled caste certification at the time of the program. Knowing if a mother was *considered eligible by health facilities on the ground* is even harder, since they would have had to verify the age of a woman or the number of her children. Lastly, at least six of the eleven major states in HPS group announced cash transfer programs to encourage families to have girl children during our study period (Shekhar 2012). These programs might alter family behaviour in ways that bear on children's health. If their availability across districts correlates with JSY's, our analysis would confound their effects. Among low performing states, only two states had similar program (and excluding them has no effect on our findings, except increase standard errors).

It may also simply be, that understanding why JSY did not effect newborn mortality in high performing states requires thinking harder about a different set of reasons and mechanisms. For the present, I direct the reader to section 3 which presents estimates of JSY's overall impact on newborn mortality with district fixed effects, where I present results for LPS and HPS side-by-side. And to the appendix, where tables summarise our results for high performing states, analogous to our main tables for low performing states. Substantively, the main analysis in this paper tells a story about how households responded to JSY in low performing states, and why it did not improve children's health outcomes here.

3 JSY's Impact on Healthcare: Difference-in-Differences with District Fixed Effects

We begin by estimating the impact of JSY availability on the use of health facilities with district fixed effects. The "program" variable in Table 3 takes value 1 for children born in a district and year where the program is available, 0 otherwise. There is detailed data on healthcare services used by mothers around the birth of their *last-born* child. Accordingly, this part of our analysis does not compare children born to the same mother. The difference in difference strategy asks: are children of a district born in years after the program more likely to be born in a government health facility than those born before it, compared to the corresponding change in districts where the program did not arrive then. The coefficients are estimated around district and year fixed effects, which absorb unobserved influences on the use of health services that are invariant to a district and year respectively. I also include state-year fixed effects, and trends for districts according to the share of scheduled castes, scheduled tribes and below poverty line households. This keeps the comparison to children born across similar districts in the same state. And is important because the JSY was not randomised across districts. Lastly, I control for a number of variables that differ across mothers (literacy, household wealth, etc.) and variables that differ across time for the same mother (her age, number of previous children, etc.).

The program's availability increases the chance that a child is born in a government health centre by nearly 21% points (Table 3). This simply confirms what previous research has established before: the program had a causal impact on take-up of health services. These estimates are close to the 19% point increase reported in Mazumdar, Mills and Powell-Jackson (2011) via their instrumental variables approach again using district fixed effects. In columns 2-4, I ask if this translated into better conditions around the birth of the child. The evidence

is mixed. Under the JSY, it is more likely that an expecting mother receives an ante-natal check up. It is also more likely that the child is born in the attendance of a doctor, or nurse. The presence of a nurse increases significantly strongly. However, in contrast to a near 20% points increase in take-up of health clinics, the presence of a doctor increases by only 6% points and is not statistically significant, ante-natal check ups increasing only 7.78% points.

The environment of a health clinic and availability of medical professionals is necessary for preventing mortality among children; they are not sufficient of course. Typically, it requires being better prepared for specific pregnancies, so that unexpected complications can be minimised (Gawande 2009); for instance, women suffering from anaemia are more likely see complications. Of course, checking for anaemia usually requires a blood test. In Table 4, estimate whether the arrival of JSY in a district is associated with specific improvements in the quality of pregnancy related check-ups. There is an increase in the probability of at least 3 ante-natal check ups (the WHO recommended minimum), in a basic but important check for whether an expecting mother is under-weight (Coffey 2015, Currie and Vogl 2013), but not in blood pressure. The clearest reported increase is in ultrasound check ups. Seen together with other check-ups, this is difficult to interpret. On the one hand, ultrasound check ups are medically very useful. On the other hand, they are known to be used for pre-natal sex determination in India (Bhalotra and Cochrane 2010). If ultrasounds were a part of improved care, we would expect other basic improvements as well, unlike what we see in this table. On a related point, motivated by the significant increase in ultrasounds, I test for JSY's effects on the sex-ratio, and find no significant effects (not reported here). This may be because while on the one hand, ultrasound is more accessible under the program, on the other hand, the JSY benefits are received only upon a child's birth.

This evidence suggests, overall, that the program is associated with improvements in only very basic aspects of health services. It is important that these results be interpreted as indicative only, for at least two reasons. One, women's recall about the health services they

Table 3: Improvements in Health Services under JSY: District level DID

Low Performing States

	(1)	(2)	(3)	(4)
VARIABLES	Birth in Govt. Clinic	Presence of Doctor	Presence of Nurse	Ante-natal check-up (atleast 1)
Program	0.209***	0.0629	0.110***	0.0778*
	(0.0444)	(0.0462)	(0.0396)	(0.0416)
Baseline care at Govt clinic	0.176***	0.0628	0.100*	0.0310
	(0.0517)	(0.0578)	(0.0602)	(0.0609)
Baseline care at Pvt clinic	0.0113	0.0641	0.0897	0.00693
	(0.0656)	(0.0750)	(0.0736)	(0.0718)
Doctor Present		0.159***	0.0423	0.0100
		(0.0528)	(0.0537)	(0.0427)
Nurse Present		-0.0668*	0.0811*	0.00450
		(0.0387)	(0.0412)	(0.0326)
Baseline: Ante-natal check-up (at least 1)				0.0704**
				(0.0317)
Wealth (2005)	-0.000414	0.0111***	0.00852**	0.00618*
	(0.00352)	(0.00373)	(0.00390)	(0.00355)
Number of children	0.134***	0.178*	0.160**	0.0784
	(0.0562)	(0.101)	(0.0629)	(0.0812)
Mother's Age	0.00287	0.00900**	0.000478	0.00379
	(0.00477)	(0.00445)	(0.00507)	(0.00453)
Observations	2302	2,263	2,262	2,246
Number of Districts	205	205	205	205
District FE, Year FE, State-Year FE	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES

Notes: This outcome is an indicator of the use of health services. In column 1, it takes value 1 if the child was delivered in a government clinic. In column 2, if a doctor was present during birth; In column 2, if an accredited nurse was present; In column 3, if at least one ante-natal check-up was conducted. Outcomes are explained with variation in timing in JSY introduction across districts starting 2005. We are especially interested in families with varied use of healthcare services at baseline. Accordingly the sample is narrow: only mothers who were interviewed about their use of child-maternal health services in both IHDS-2005 and IHDS-2011 i.e. who gave birth both during 2000-2005 and 2005-2011 periods. All standard errors are clustered at district level. □

Table 4: The Quality of Care under JSY

Low Performing States

	(1)	(2)	(3)	(4)
VARIABLES	3 ante-natal checks	Weight checked	Blood Pressure checked	Ultrasound
Program	0.0332	0.0697*	-0.00175	0.0919***
	(0.0432)	(0.0384)	(0.0487)	(0.0334)
Baseline care at Govt clinic	0.160***	0.0190	0.0959**	0.0483
	(0.0519)	(0.0414)	(0.0395)	(0.0318)
Baseline care at Pvt clinic	0.0364	0.109***	0.166***	0.0382
	(0.0465)	(0.0414)	(0.0564)	(0.0378)
Baseline: Ante-natal checks (at least 3)	0.0554*			
	(0.0303)			
Baseline: Weight checked		0.0936***		
		(0.0311)		
Baseline: Blood Pressure checked			0.0669**	
			(0.0286)	
Baseline: Ultrasound				0.101**
				(0.0422)
Wealth (2005)	0.0140***	0.00982***	0.00737*	0.0168***
	(0.00334)	(0.00346)	(0.00423)	(0.00317)
Number of children	0.0262	-0.0476	-0.0538	-0.0408
	(0.0705)	(0.0662)	(0.0709)	(0.0351)
Mother's Age	0.00956**	0.0105*	0.00681	0.00498
	(0.00442)	(0.00535)	(0.00492)	(0.00406)
Observations	2,242	2,003	2,003	1,985
Number of Districts	205	205	205	205
District FE, Year FE, State-Year FE	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES

Notes: The outcome is an indicator of the quality of health services. In column 1, if the WHO recommended minimum 3 ante-natal checks are done; In columns 2, 3, 4, if in ante-natal period the mother's weight, blood pressure, or ultrasound were checked respectively. Outcomes are explained with variation in timing in JSY introduction across districts starting 2005. We are especially interested in families with varied use of healthcare services at baseline. Accordingly the sample is narrow: only mothers who were interviewed about their use of child-maternal health services in both IHDS-2005 and IHDS-2011 i.e. who gave birth both during 2000-2005 and 2005-2011 periods. All standard errors are clustered at district level. □

received is likely to vary depending on what they are asked. Ultrasound check-ups are more salient than blood pressure checks, for instance. Recall biases should be kept in mind through our analysis. As I discussed in section 2, they are a difficult to address feature of survey based studies of child health, since they rely on mothers' recall of their birth history, and of details of her experience with her last-born child. Even when questions pertain to salient events or experiences, it is easy to mix up years of birth or experiences with earlier births with the last-born's. Two, it matters that the above analysis is based only on last-born children, not all children born to a mother. Since the choice of having a child is endogenous, families whose last-born was born before the program may be systematically different to those who "select-into" fertility under the program's promise of subsidised healthcare.

The JSY's impact on newborn mortality is close to zero. This refers to a child dying within one month of birth. If the motivation of JSY was to improve health by ensuring that children are born in a safer medical environment, mortality soon after birth is exactly where we would expect an impact. One month is the shortest period for which information is available in our data. The results are no different if we consider the program's impact on one-year mortality. In Table 5, we see that high performing states show a fall in the chance that a child dies within 1 month, but the effect is not significantly different from zero. Although I report effects on both HPS and LPS regions in this Table, as I explained before I keep focus on low performing states. I do not find a meaningful explanation for why mortality does not improve more in high performing states. There is a program-related *increase* in mortality in the under-developed low-performing-states; this too is a null effect. I note that the standard errors are quite large compared to the coefficient, especially in low performing states. This evident heterogeneity partly motivates our main analysis, in the next section.

Of course the above results come from relating the arrival of JSY to variation in the health of children born across program years in the *same district*, net of similar variation elsewhere. Children born in "treated" and "control" years may be born to different mothers,

Table 5: JSY Impact on Newborn Mortality with District Fixed Effects

	Newborn Mortality in Low and High Performing States		
	(1)	(2)	(3)
VARIABLES	Overall	Low Performing States	High Performing States
Program	-0.000656	0.000616	-0.00130
	(0.00740)	(0.0113)	(0.00762)
Boy	0.00642*	0.00750	0.00449
	(0.00362)	(0.00525)	(0.00288)
Mother's Age	0.000398	0.000673	3.70e-05
	(0.000594)	(0.000904)	(0.000460)
Number of sons	-0.00287	-0.00439	7.95e-05
	(0.00275)	(0.00342)	(0.00317)
Number of children	0.00210	0.00216	0.00277
	(0.00266)	(0.00322)	(0.00435)
Observations	33,764	19,617	14,147
Number of Districts	406	211	195
District FE, Year FE, State-Year FE	YES	YES	YES
Clustered SE	YES	YES	YES

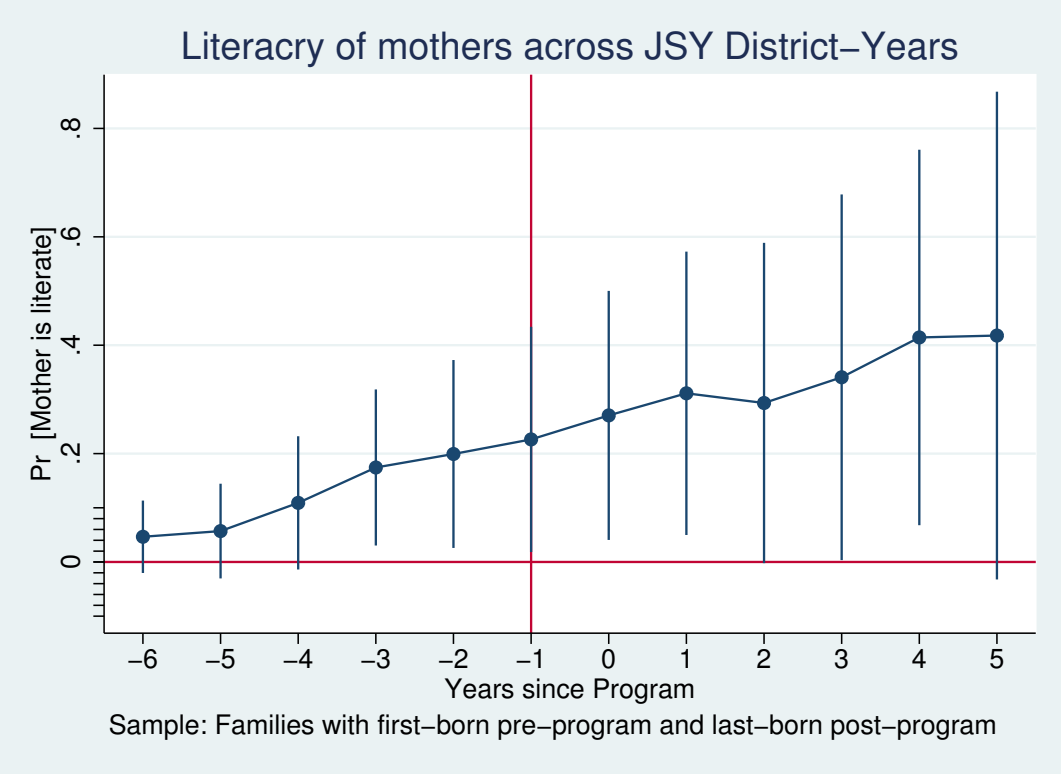
Notes: This outcome is an indicator of newborn mortality, taking value 1 if the child died within one month of birth. In column 1, we pool observations from all regions. In columns 2 and 3 we separately consider observations from low performing and high performing regions respectively. Outcomes are explained with variation in timing in JSY introduction across districts starting 2005. The dataset is a panel of all children born alive across different years to each mother. Aside from the fixed effects indicated in the table, we include interactions in year fixed effects with a district's share of SC, ST and BPL households. All standard errors are clustered at district level. □

whose profile may be changing over time. For eg. women giving birth in later and later years may be more educated; if such progress is stronger in some districts compared to others in a way that correlates with the program's arrival, our estimates would be biased. The effect of the rollout of JSY on health would be confounded by the effect of mothers being a more educated cohort in "treatment" district years than in "control". I illustrate below that this is a non-trivial concern. Figure 2 is based on regressions with district fixed effects, done exactly as the ones I have discussed so far. I regress the literacy of a mother on the timing of her children's births relative to the arrival of the program in her district. Mothers in treatment district-years are more likely to be literate than those in control. A difference-in-difference strategy that looks for effects around district fixed effects would compare the health of children born to systematically different mothers. This shows that the use of mother fixed effects is important here. Figure 2 in fact refers to a sub-sample of women who would be key to identification in analysis with mother fixed effects (a figure with all women looks similar in slope, with coefficients closer to zero). These are mothers who gave birth at least once in both pre-program and post-program years, and therefore provide useful within-mother variation. The typical mother giving birth two years post the program's arrival would effectively get compared to her own previous birth before the program; whereas without mother fixed effects we could compare her to the typical - less likely literate - mother from before the program.

4 JSY's Impact on Newborn Mortality: Difference-in-Differences with Mother Fixed Effects

This section presents the main results. I relate within-mother variation in the health of children to the rollout of the program in her district. In most regressions, I estimate an equation of the kind given below. Our main coefficient of interest would be β_1 which would

Figure 2: Literacy of Mothers of Children born across JSY District-Years



Notes: Plots coefficients from a regression of mother's literacy on timing of her child's birth relative to the availability of JSY in her district. This is exactly like previous regressions with district fixed effects, but with outcome variable changed, and explanatory variable an indicator of timing rather than presence of JSY. The sample is all mothers who have an observation both in pre-program years and post-program years (therefore those are key to identifying effects in regressions with mother fixed effects). The plot shows that mothers in treatment are systematically different from mothers in control. □

give the program's impact on girl children and β_2 indicating any gender-related differences. When I explore the heterogeneity in the effects of JSY, I interact another variable with the presence of the program, and with the gender of the child born. In some instances, the indicator for the presence of the program in a child's district and year-of-birth is replaced with indicators for years around the program's arrival in the child' district (i.e. with leads and lags) going seven years back and five years ahead.

$$\begin{aligned} \mathrm{Y}_{mtd} \;=\; & \beta_0 + \beta_1 \mathrm{Program}_{td} + \beta_2\big(\mathrm{Program}_{td} * \mathrm{Boy}_{tmd}\big) + \beta_3 \mathrm{Boy}_{tmd} \\ & + \beta_4 \mathrm{X}_{mtd} + \mathrm{Mother}_{md} + \mathrm{Year}_{td} + \text{Specific Trends}_{tmd} + e_{tmd} \end{aligned} \tag{1}$$

In what follows, I first evaluate the overall effect of JSY on newborn mortality with mother fixed effects, focusing on differences in what we find for girls and boys. Then, pursue the question of why newborn mortality seems to worsen for girl children in particular.

4.1 Overall Program Impact

In Table 6, we see that newborn mortality is positively associated with the program's rollout. The overall effect is larger than what we see with district fixed effects. This is possibly for two reasons. First, as discussed above, mothers in "treated" district-years may have attributes that correlate with healthier children (like mother's literacy). Fixed effects for mothers absorb these. Second, the health of children born to the same mother is likely to vary less overall, so intuitively, small changes related to the program may possibly explain more of it. More importantly, when we allow the program's effect to vary by the gender of the child (columns 2 and 3), we see an increase in newborn mortality for girls that is significantly differently from zero, especially in rural areas. The effect in mortality is net of at least some factors that vary for the same mother across time, for which I control. Specifically, these include the age

of the mother (at the time of this child's birth), years since she got married, the number of children she has had up to then, and the number of sons among them.

In Figure 3, we can see how newborn mortality is changing in years across the program, on average. These plot the coefficients that convey the relation between the timing of a child's birth around the program. Looking at coefficients for years before the program, we see that newborn mortality in treatment districts (relative to control) does not significantly predict the arrival of the program. This suggests that the average difference-in-differences are not picking up the consequences of systematically different pre-program trends in mortality. In the plot for girls, we see a faint downward trend before the program, which gets displaced upwards when the program arrives, beginning with an evident spike.

Why would newborn mortality, while not improving for boys, *worsen* for girl children? The JSY is a conditional cash transfer program. It successfully brought more women to health facilities. It also put cash in the hands of women at time of a child's birth. We should expect that health outcomes would possibly improve; certainly not worsen. However, this view is based on an intuitive comparison: of a given child born and cared-for at home, vs, her being at a health facility. This reasoning is partial when thinking of large changes in a health system; in at least two ways. The reasoning ignores how health institutions handle the large increase in demand. As we saw in section one, women living in JSY districts report improvements in only very basic health services. More importantly, it ignores the possibility that families' behaviour may change under the program (for eg. they may reduce the gap between consecutive births). If behaviours change in a way that undermines children's health in general, health outcomes could worsen unless health institutions make up for it in some way.

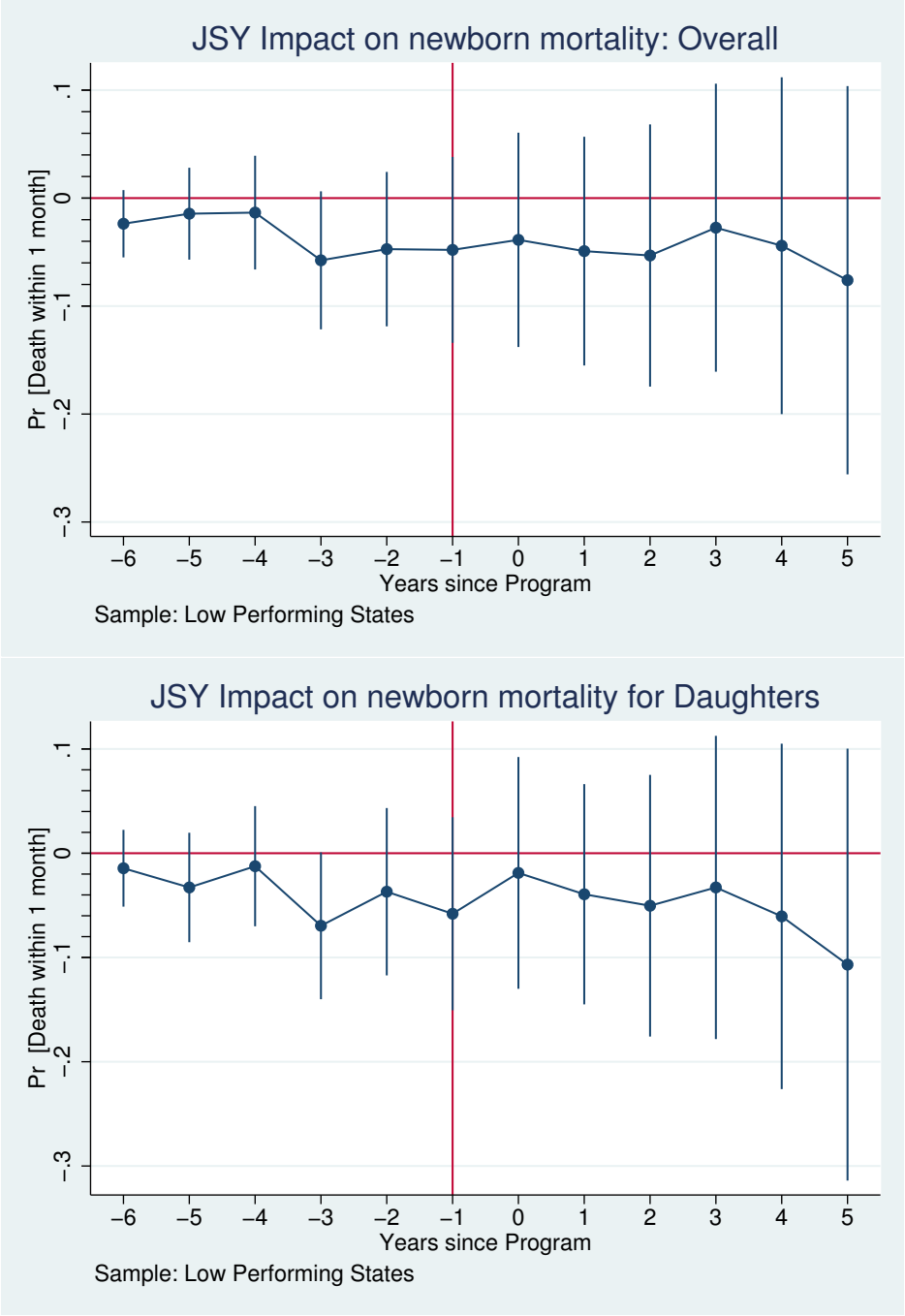
I explore these possibilities in below, motivated by the observation that the program is associated with a worsening specifically among girls. It is possible that the program was especially appealing to families who desired having a son, in which case daughters born to

Table 6: JSY Impact on Newborn Mortality with Mother Fixed Effects

	Newborn Mortality in Low Performing States		
	(1)	(2)	(3)
	Overall Effect	By Gender of Child	By Gender of Child (rural)
VARIABLES		(Base group: Girls)	(Base group: Girls)
Program	0.0155	0.0232*	0.0298**
	(0.0109)	(0.0131)	(0.0149)
Boy	0.00766	0.0119	0.00972
	(0.00764)	(0.00859)	(0.00949)
Program × Boy		-0.0147	-0.0155
		(0.0108)	(0.0118)
Mother's Age	-0.00133	-0.00135	-0.000709
	(0.00233)	(0.00233)	(0.00260)
Number of sons	-0.0264**	-0.0243*	-0.0271*
	(0.0128)	(0.0128)	(0.0139)
Number of children	-0.0528***	-0.0539***	-0.0555***
	(0.00956)	(0.00970)	(0.0105)
Observations	19,617	19,617	15,811
Number of Mothers	7,905	7,905	6,196
Mother FE, Year FE, State-Year FE	YES	YES	YES
Clustered SE	YES	YES	YES

Notes: The outcome is an indicator of newborn mortality, taking value 1 if the child died within one month of birth. Column 1 gives the overall effect. In columns 2-3 program effects are allowed to vary by gender of the child. Column 3 only considers rural areas. Aside from the listed fixed effects, we include interactions in year fixed effects with a district's share of SC, ST and BPL households. All regressions control for mother-specific time-varying factors including: mother's age, years since marriage, the number of previous children, number of previous sons, years since marriage. □

Figure 3: JSY and The Dynamics in Newborn Mortality



Notes: These are plots of coefficients from regressions of newborn mortality over a child's birth relative to the timing of the program's availability in its districts. These figures correspond exactly to columns 1 and 2 of Table 6 above, except in how program availability is formulated. The top panel depicts overall pre and post program dynamics. The bottom panel comes from a model where program effect is allowed to vary by the gender of the child; we plot coefficients for girl children. □

them may receive less care. It is possible that this interacted with the generally low quality of healthcare available to generate a perverse outcome.

4.2 Among Whom Does Newborn Mortality Increase?

The increase in mortality for girl children is concentrated in families who do not have a son at baseline. I allow the program's effects to vary by the composition of the family as of 2005, when the program was announced. Among families without sons at baseline, the program's arrival significantly increases the mortality of girls born to them (by 3.4% points); but not of boys. We see this in Table 7 (column 1). The interaction terms tell us that girls in families that have at least one son, fare relatively better under the program. Although the relevant interaction term is not significant, it is strong enough to drive the effect on girls in families-with-sons to a statistical zero. In column 2, we consider a subset of families. Those who already have one daughter by the time the program is announced. The desire for a son is likely even stronger among families if they have one or more daughters. If the reason why girl children's health worsens under JSY has to do with its appeal to parents who desire having a son, and their subsequent behaviour towards daughters, we should expect stronger effects in this sub-sample. This is what we see. JSY significantly increases newborn deaths of girls among those families without a son. As the interaction with "boy" indicates, this is starkly different from what happens when a son is born under the program.

The idea is to consider families who are likely to vary in how strongly they prefer having a son over daughters. It is intuitive that a desire for a son would be stronger among families without any. It is also backed by previous research (Anukriti 2018, Jayachandran 2017). In particular, Jayachandran (2017) argues that families in India exhibit behaviours that suggest a strong desire for *at least one son*, the heterogeneity we exploit here. This may be grounded in social institutions like patrilocal customs, where parents expect to be cared for by their

sons. Or in considerations around dowry, having at least son increases a family's lifetime wealth. Or in religious customs in India that give primacy to sons. There is already some evidence that a preference for sons may result in the neglect of health of daughters. For instance, Jayachandran and Kuziemko (2011) show that parents with less than their desired number of sons breastfeed daughters less, in looking to become pregnant again.

It is possible that families with-vs-without a son by baseline, vary in many ways, not merely in their son-preference. In this regard, two things are worth noting. The first is that our estimates have a triple difference flavour. Although these families may be different from each other in a number of ways, there is no obvious reason for this difference to be large in treatment than in control districts. Again while the difference between the groups is not statistically significant, the magnitude of the difference is sizeable enough to drive JSY's effect on families without-sons-by-baseline statistically close to zero. The point is, we see that the program interacts with family composition at baseline worsening the newborn mortality strongly in one group. Two, an explanation for why increased mortality is concentrated among families with no sons at baseline, must explain why this is so only for girl children. The specific worsening among girls suggests that son-preference may be responsible.

I confirm that our results are not driven by non-parallel trends. In Figure 4 below, we see plots of coefficients that relate a child's health to the timing of its birth around the program. The top panel shows the dynamics for girl children in families without sons at baseline, in the full sample. The bottom panel shows effects on newborn mortality for girls among a sub-sample of families: those with at least one daughter at baseline. The two curves represent families with sons vs. without sons at baseline, if they already had at least some daughters by then. We see a divergence between the two under the JSY, implying that mortality of girls born to families without sons diverges from their mortality in families that already had a son. This accounts for strong interaction terms in column 2 of table 7. We may also compare the blue curves in the top panel and the bottom panel. The top panel analyses girls' mortality in

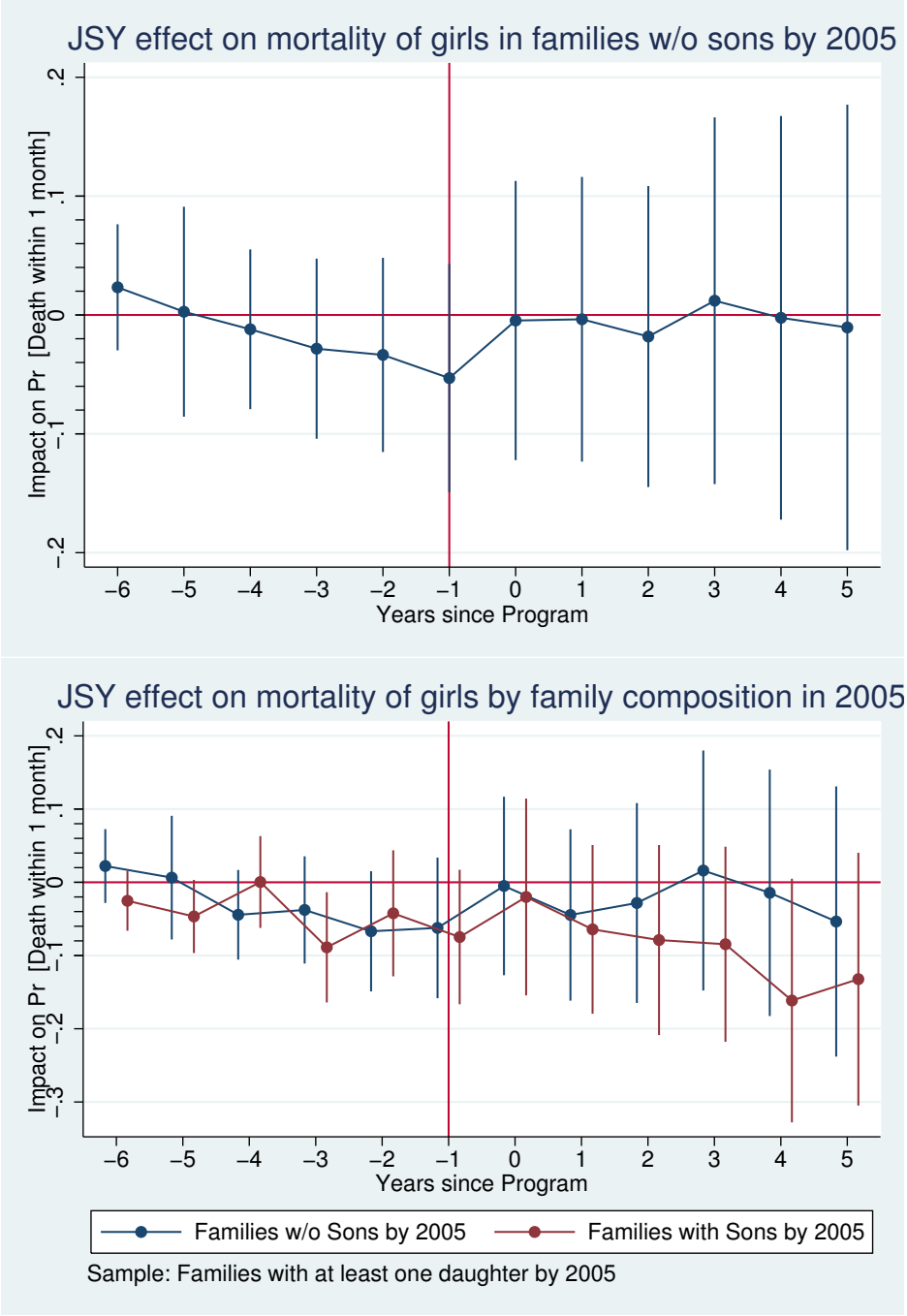
the full sample. The bottom panel is a subsample: families who already have a daughter at baseline. A family that has no sons at baseline should have a stronger desire for having a son subsequently in this subsample than the full sample. Consequently we may expect newborn mortality among girls born to families without sons to worsen more starkly under the JSY, in the bottom panel than in the top panel. This is exactly what we see.

What explains these findings? Specifically, while families with stronger son-preference may exhibit greater specific mortality for girls, why is it accentuated under the JSY? We cannot identify one specific reason. One reason may be that the large increase in demand at health facilities may make it more important for a child's health that its parents ensure it gets medical attention. This, because there are more claims on doctors and nurses in JSY district-years, or even because crowded health centres may be places where infections spread easily unless specific steps are taken to avoid this. Essentially the neglect of girl children may have worse consequences under the JSY related crowding of health centres. Two, it may also be that JSY was more appealing to families with a stronger desire for a son, who account for more births under the JSY. Throughout our main analysis, we use mother fixed effects, these absorb unobservable variation across families. Nevertheless, if families who desire a son are over-represented among JSY-births, because they are more likely to respond to JSY's availability by having a child, this may effect the average effect on newborn mortality. In the next section, we probe this possibility.

4.3 The JSY and Fertility

In this subsection, I consider the fertility response to the JSY. We are especially interested in the response of families that were differently composed at baseline. And in what varied responses may reveal about why girls' health worsens under the program. The main takeaway is that as the program rolls-out, births increase differentially among families that have no

Figure 4: JSY and Dynamics in Newborn Mortality: The Roel of Son Preference



Notes: Both panels plot coefficients from a regression of newborn mortality on a child's birth relative to the timing of the program's availability in its districts. From regressions with a triple interaction: the program's effect × gender of the child born × indicator for family having at least 1 son by baseline. The plots give coefficients representing the effect for girl children. In the top panel, we see newborn mortality for girl children among families with no sons at baseline. The bottom panel corresponds to a subsample of families: those with at least 1 daughter at baseline. The blue curve has the same interpretation as in the top panel, but for this subsample. The red curve pertains to girls' mortality among families with at least 1 son at baseline (in the subsample again). □

Table 7: JSY Impact On Newborn Mortality: The Role Of Son Preference

Low Performing States: JSY Impact Heterogeneity Across Families With vs W/o Sons at Baseline (by 2005)

	(1)	(2)	(3)
	All families	Family With	(Rural) Family With
VARIABLES		At least 1 Daughter at Baseline	At least 1 Daughter at Baseline
Program (Base Group: Girl Born to Family w/o any Sons)	0.0346**	0.0528**	0.0595**
	(0.0164)	(0.0210)	(0.0229)
Program × Boy Born	-0.0283	-0.0908**	-0.0975**
	(0.0195)	(0.0351)	(0.0384)
Program × At least 1 Son at Baseline	-0.0177	-0.0309	-0.0304
	(0.0219)	(0.0286)	(0.0312)
Observations	19,608	14,134	11,489
Number of Mothers	7,899	5,494	4,348
Mother FE, Year FE, State-Year FE	YES	YES	YES
Clustered SE	YES	YES	YES

Notes: The outcome is an indicator of newborn mortality, taking value 1 if the child died within one month of birth. All regressions interacts the program's presence, the gender of the child, and an indicator for whether the family had at least one son. Column 2 considers the sub-sample of families that have at least 1 daughter. Column 3 additionally keeps to rural areas. Aside from the listed fixed effects, we include interactions in year fixed effects with a district's share of SC, ST and BPL households. All regressions control for mother-specific time-varying factors including: mother's age, years since marriage, the number of previous children, number of previous sons, years since marriage. □

sons at baseline, than those who have no daughters (or those who have both). This indicates a stronger response to the program among families who more likely desire a son. I emphasise that we are interested not so much in overall fertility, as in fertility among one set of families relative to others, because of what we learn about how the JSY interacts with gender-bias.

I allow the program's effect on fertility to vary by the number of boys and girls it has already had by 2005. I summarise in Table 8, estimates of the program's impact on fertility (as defined before), allowing it to vary by the children it has already had by 2005. Before interpreting these results, two things must be kept in mind. First, I restrict the analysis here to the 2005-2011 years, to avoid obtaining mechanical results. A mother enters our dataset only if she has at least one child during 1998-2011. Therefore, a family without any sons or daughters by 2005, is mechanically more likely to have a child under the program because all years before 2005 are "control" years, while some years afterwards are "treatment" years (depending on the district). The results I present, based on 2005-2011, thus exploit the timing of JSY availability after its nationwide announcement. Second, we are interested less in how JSY affects fertility behaviour for families with more vs fewer children in total, but rather in similar families with a *different gender-composition* of their children. This may tell us something about the gender-preferences of families that tend to select-into the JSY (or into giving birth under the JSY).

In Table 8, the program's effect is estimated on the base group of families with at least one daughter and one son by 2005. This set of families show a decline in fertility associated with the arrival of JSY. The main coefficients of interest are in columns 2 and 3: the interaction terms with no-sons and no-daughters. Relative to the base group of families, JSY related fertility falls among those who have no sons, but more importantly this fall is much more pronounced among those who have no daughters. In particular, JSY increases the chance that a family without any daughters would have a child by 8.6% points more it does for the base group (where JSY decreases births), but among the corresponding increase is 20% points

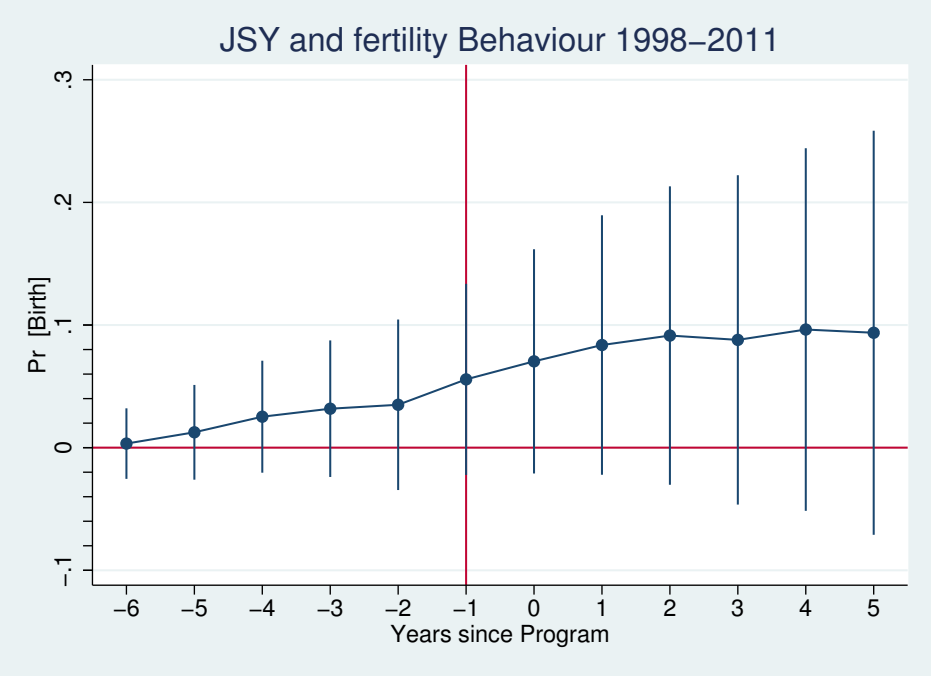
Table 8: JSY Impact On Fertility Behaviour: The Role Of Son Preference

Low Performing States: Heterogeneity in Impact By Family Composition At Basline (By 2005)
Outcome: Probability Of A Birth In a Given Year During 2005-2011

	(1)	(2)	(3)
VARIABLES	Overall	By Family Composition	By Family Composition (Rural)
Program (Base Group: At least 1 Son & Daughter at Baseline)	0.0256***	-0.0683***	-0.0706***
	(0.00687)	(0.00794)	(0.00880)
Program × No Sons at Baseline		0.203***	0.208***
		(0.0184)	(0.0209)
Program × No Daughters at Baseline		0.0861***	0.0918***
		(0.0160)	(0.0181)
Program × No Sons × No Daughters at Baseline		0.0713**	0.0627*
		(0.0284)	(0.0319)
Observations	48,830	48,830	38,365
Number of Mothers	7,228	7,228	5,676
Mother FE, Year FE, State-Year FE	YES	YES	YES
Clustered SE	YES	YES	YES

Notes: The dataset consists of all years 2005-2011 for each mother in our sample. The outcome is an indicator of whether a given mother had a child in a given year. Column 1 gives the overall DID program impact with mother fixed effects. I note that the corresponding figure shows that pre-program trends across treatment-vs-control areas simply continued (see Figure 5). In columns 2-3 involves a three-way interaction: program × indicator for no sons by 2005 × indicator for no daughters by 2005. The coefficient on program gives effect on the base group, which is families with at least 1 son and 1 daughter. Aside from the listed fixed effects, we include interactions in year fixed effects with a district's share of SC, ST and BPL households. All regressions control for mother-specific time-varying factors including: mother's age, years since marriage, the number of previous children, number of previous sons, years since marriage. □

Figure 5: JSY Impact On Probability Of A Birth in Given Year



Notes: On a panel where each woman has an observation for every year 1998-2011, the figure plots coefficients from a regression of whether the woman had a child in a given year, on that years distance from the program's arrival in her district. Defined in this way, fertility increase is greater on average in JSY district-years than others, but the figure illustrates that this is simply a continuation of the pre-program trend. □

more than the base group if the family has no sons. It is worth noting as it is, we control for the number of children a mother has had by a particular year, in estimating the probability that she gives birth in that year (in all our regressions). And so, differences between the probability of birth across families without sons vs. without daughters cannot be attributed to the fact that these families may be of different overall size.

It is worth noting that we have used the term "fertility" to refer to the probability that a mother gives birth in a given year. This notion of fertility is not the same as total *final* number of children. Since we are studying only a five-six year period after the program

was first announced, increases in births after the program arrives in a district may reflect a decision to have the next child sooner rather than having more children. In this sense, our results may reflect both: an increase in the share of JSY-births among families with a likely stronger preference for sons, and/or, a differential fall in birth-spacing which may compromise the health of the subsequent child.

In either case, this indicates that JSY meaningfully interacts with son-preference among the families. It is consistent with the idea that the appeal of cash incentives is heterogenous, possibly persuading those who wanted to have a son to try sooner. This illustrates one reason for why, when daughters are born in families without any sons at baseline they exhibit increased mortality.

The program is correlated with an increase in overall fertility-behaviour as well (as column 1 in Table 8 shows). However, it is not clear that this effect is causal. Figure 5 shows that the program years see an increase in the probability that a child is born in a given year, for "treatment" districts relative to "control" districts. But the uptick seems to begin a year before the program's arrival relative to the period before it. It may be that we have misidentified the program's arrival by a year by using only year-of-birth and not also month-of-birth information. Or, taking the figure at face value, fertility simply increases across the program's arrival only in line with its prior trend.

5 Conclusion

This paper evaluates a large conditional cash transfer program introduced with a view to improve maternal and child health. The case of the JSY throws up a puzzle, because as I show, although it substantially increases the use of institutional healthcare, newborn mortality does not improve. In confirming that this is the case, we see that increase in the share of births at health facilities does not translate into increased health services per se. Only very basic

aspects of healthcare around an expecting mother seem to improve. Many aspects that seem necessary to prevent newborn mortality like identifying mothers with high blood pressure do not improve. This is natural in light of the large aggregate increase in the people using health facilities; but it makes clear that the health system did not correspondingly increase it capacity to provide health services.

In exploring the consequence of JSY on health outcomes, this paper moves beyond estimating changes around district fixed effects. As we see, it is in fact important to do so. The profile of mothers is changing over time. Since it appears to be correlated with the program's rollout across districts in India, mothers in "JSY districts and years" are systematically different from mothers in "control districts and years". Analysis using mother fixed effects shows that the JSY does not improve newborn mortality significantly; in fact it worsens it among girl children. It also reveals that the program's effects are highly heterogenous.

In the main analysis, I propose a possible explanation for why the program increases newborn mortality for girl children. The JSY interacts in a perverse way with families' preferences for having sons over daughters. Families who did not have a son by the time the program was announced, and are therefore more likely to desire one (relative to a daughter) have more children in program district-years. These families exhibit an especially high newborn mortality for daughters subsequently born to them but not for sons. What this says about health programs is important. In supporting the demand for healthcare, it is important to understand that demand may be coloured by social-biases. These affect who selects-in to the program and people's behaviour in a way that undermines the health in itself. In settings where health institutions do not provide good quality care to everybody, therefore making up for the negative effects of these biases, health outcomes may be difficult to improve via such programs.

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7 Appendix

7.1 Main Results for High Performing States

Table A6: Program Impact on Newborn Mortality with Mother Fixed Effects (HPS)

High Performing States

	(1)	(2)	(3)
	Overall effect	By Gender of Child	By Gender of Child
VARIABLES	All Children	All Children	Rural Areas
Program	0.00826	0.00780	0.0135
	(0.00825)	(0.0123)	(0.0193)
Boy	-0.000756	-0.000952	-0.000359
	(0.00720)	(0.00773)	(0.00992)
Program × Boy		0.000831	0.00586
		(0.0130)	(0.0174)
Mother's Age	0.00102	0.00102	0.000377
	(0.00178)	(0.00177)	(0.00233)
Number of sons	-0.0170	-0.0171	-0.0223
	(0.0137)	(0.0141)	(0.0185)
Number of children	-0.0197	-0.0197	-0.0231
	(0.0136)	(0.0135)	(0.0171)
Observations	14,147	14,147	10,287
Number of Mothers	7,153	7,153	5,032
Mother FE, Year FE, State-Year FE	YES	YES	YES
Clustered SE	YES	YES	YES

Notes: The outcome is an indicator of newborn mortality, taking value 1 if the child died within one month of birth. Column 1 gives the overall effect. In columns 2-3 program effects are allowed to vary by gender of the child. Column 3 only consider rural areas. Aside from the listed fixed effects, we include interactions in year fixed effects with a district's share of SC, ST and BPL households. All regressions control for mother-specific time-varying factors including: mother's age, years since marriage, the number of previous children, number of previous sons, years since marriage. □

Table A7: JSY Impact On Newborn Mortality in HPS - The Role of Son Preference

High Performing States: JSY Impact Heterogeneity Across Families With vs. W/o Sons by 2005

	(1)	(2)	(3)
	All families	Family With	(Rural) Family With
VARIABLES		At least 1 Daughter at Baseline	At least 1 Daughter at Baseline
Program (Base Group: Girl Born to Family w/o any Sons)	0.0113	-0.00422	0.000919
	(0.00870)	(0.0121)	(0.0148)
Program × Boy Born	-0.00545	0.0171	0.0286
	(0.0120)	(0.0156)	(0.0200)
Program × Family with At least 1 Son at Baseline	-0.00109	0.0496	0.0666
	(0.0382)	(0.0490)	(0.0641)
Observations	14,099	9,126	6,675
Number of Mothers	7,125	4,458	3,163
Mother FE, Year FE, State-Year FE	YES	YES	YES
Clustered SE	YES	YES	YES

Notes: The outcome is an indicator of newborn mortality, taking value 1 if the child died within one month of birth. All regressions interacts the program's presence, the gender of the child, and an indicator for whether the family had at least one son. Column 2 considers the sub-sample of families that have at least 1 daughter. Column 3 additionally keeps to rural areas. Aside from the listed fixed effects, we include interactions in year fixed effects with a district's share of SC, ST and BPL households. All regressions control for mother-specific time-varying factors including: mother's age, years since marriage, the number of previous children, number of previous sons, years since marriage. □