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Maternity Support, Child Health and Unintended Gendered Effects

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Abstract

This paper evaluates a maternity support conditional cash transfer (CCT) scheme, launched in October 2011, on short and long-run health outcomes of children in India. We estimate intent-to-treat effects of the program by exploiting a natural experiment arising from select geographical implementation and the eligibility of program benefits for first/second born children using the National Family Health Survey-4 data. We find an increase in birth weight, duration of breastfeeding and long term weight-for-age, with a larger impact on male children. The effects are positive for height-for-age and negative for infant mortality, albeit insignificant, and significantly negative for neonatal mortality but only over a longer time period. These results are in contrast to the existing two studies in the nascent literature that find no positive effect of maternity support CCTs on child health outcomes, thus, showing that institutional factors that ensure supply of healthcare services to meet the conditionalities imposed in a CCT may be important. We show the robustness of our findings to different specifications, test for pre-trends and address the issue of self-reporting of outcomes by households.

JEL Classification: I18, J16, J18
Keywords: child health, conditional cash transfer, maternity support, gender, India

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1 Introduction

Children in developing countries are plagued by low birth weight, stunting and wastage. In India, for instance, the recent National Family Health Survey-4 (NFHS-4) shows that 36% children under age five were underweight, 38% stunted and 21% percent wasted in 2015-16. Evidence suggests that fetal and early childhood health is a vital determinant of adult health, cognitive ability and labor market outcomes (Almond & Currie, 2011; Almond *et al.* , 2018; Bharadwaj *et al.* , 2019; Case & Paxson, 2008). Specifically, higher birth weight has positive impacts on adult height, education, IQ and earnings (Behrman & Rosenzweig, 2004; Bharadwaj *et al.* , 2018; Black *et al.* , 2007).[1]

Subsequently, identifying levers that improve birth outcomes in developing countries have gained attention. These generally include targeting leading causes for poor birth outcomes in these countries, which include mother's low pre-pregnancy weight, poor nutrition intake, limited access to medical care during pregnancy, and in-utero exposure to harmful external factors like pollution, disease and violence (Aizer, 2011; Aizer & Currie, 2014; Coffey & Hathi, 2016; Ramakrishnan, 2004). Among these policy levers, conditional cash transfers (CCTs) are an important tool used across countries. The impacts of general CCTs on child health outcomes, however, remain mixed and as we discuss later may be contingent on institutional factors affecting access to healthcare. This paper evaluates one such instrument - a maternity support scheme called *MAMATA*, launched in the state of Odisha, India in October 2011, which gave cash transfers to rural pregnant women conditional on certain requirements being fulfilled.

The aim of this scheme was to improve maternal and child health by promoting positive-health seeking practices in pregnant and lactating women. The conditions involved uptake of supplements, antenatal and postnatal counseling, full immunization of child up to 9 months

[1] Currie & Almond (2011) summarize the literature on the effect of early childhood (under the age of five) health on adult human capital. These early childhood health outcomes become critically important in the context of developing countries where a poor start to life can have consequences for inter-generational transmission of poverty (Bhalotra & Rawlings, 2013) and adversely affect economic growth (Bhargava *et al.* , 2001).

and regular monitoring of the child's weight from birth up to 9 months of age. To encourage the adoption of above practices, the program offered cash incentives to women. The incentives were offered during the pre-pregnancy period and up to the child attaining nine months of age to decrease the likelihood of the mother working immediately after delivery and thus, promoting breastfeeding. We examine the effects of the scheme on short-run child outcomes like birth weight (BW), infant mortality rate (IMR), neonatal mortality (NNM) and duration of breastfeeding, which were directly intended to be affected. In addition, we also evaluate its effects on long-run health outcomes (at approximately 3-4 years of age) like Weight-for-Age (WAZ) and Height-for-Age (HAZ) z-scores of children.

Using the NFHS-4 data collected in 2015-16 on children born in the last five years and a triple difference-in-differences strategy, we estimate the intent-to-treat impact of the program on the above outcomes. Births in 2011 fall in the pre-treatment period while births in 2012 are assigned to the post-treatment period. Further, we exploit the absence of such a program in the adjoining states of Jharkhand and Chhattisgarh, which like Odisha have been recognized as low performing states on maternal health outcomes by the Government of India and combine it with the program's eligibility criteria of the benefits for first and second-born children. Hence, our estimation strategy allows us to control for factors that are constant over time in a geographical region, differential trends in outcomes in treatment and control states and importantly, for factors that affect overall health outcomes over time in eligible and non-eligible children. We also show the robustness of our results by using data on district-level number of program beneficiaries and estimate the effect of treatment intensity on outcomes since the implementation quality differed across districts within Odisha.[2] Additionally, we also show that the program increased full immunization rates. We also use the NFHS-3 and rule out any pre-trends in outcomes. These findings underscore our claim that the intent-to-treat effects of the program on health outcomes are driven by the program.

We find a positive effect of the program on birth weight (6%), duration of breastfeeding (5

[2]Districts are smaller administrative units within a state in India.

months) and WAZ scores (0.14 standard deviation) but a positive and insignificant effect on HAZ scores (0.10 standard deviation) while there is no effect on infant and neonatal mortality among children exposed to the scheme in the first year of its implementation. Extending the analyses for births upto 2015, we also find a significantly negative effect on NNM. Overall, the program seems to have had a larger effect on short-run outcomes but the effects on long-run outcomes are small, even when significant. Even among the short term outcomes, consistently significant effects are observed for self-reported outcomes like birth weight and breastfeeding and not for mortality outcomes like IMR and NNM. Self-reported outcomes can suffer from measurement error due to recall or due to over-reporting by treated mothers. However, we also observe a positive effect on birth weight of children for whom this data is noted from a health card, where this is recorded by the Aanganwadi Worker (AWW) at the time of birth.[3] Thus, self-reporting cannot be the only factor driving the improvement in birth weight.

The positive program effects are larger for boys than for girls.[4] This is in line with the existing literature on prenatal discrimination against females in India (Bharadwaj & Lakdawala, 2013) as well as male fetuses being more susceptible to in-utero negative shocks (Kraemer, 2000). The support provided under the scheme can potentially mitigate such shocks. The results also show that children in poorer households benefit less in terms of improvement in health outcomes, though, the differences are not statistically significant. The direction of these results is in accordance with previous findings on cash transfers related to institutional deliveries in India (Debnath, 2021) which show a larger effect for relatively wealthier households.[5]

This study fits in the broader literature on policies that improve birth outcomes. There are many instruments within cash transfers which can lead to improved child health outcomes at

[3]Notably, there is no incentive for the AWW to overreport the weight since the cash transfer is only based on recording the weight rather than the child meeting a particular birth weight threshold.

[4]From a very young age girls face discrimination in India (Sen, 1992), on account of a strong cultural preference for sons (Das Gupta, 2005). This leads to a neglect towards the health and nutritional status of the girl child from early childhood. According to NFHS-1, 6 percent more girls than boys under the age of 5 are stunted and 13 percent less vaccinated.

[5]The smaller effects on poorer households could either be because of low access to resources or because the cash transfer was not translated into increased nutritional intake by the mother.

birth - income support through Conditional Cash Transfers (CCTs), unconditional maternity benefits and conditional maternity benefits. CCTs are re-distributive programs which provide cash to households conditional upon certain actions being fulfilled i.e., the government only transfers the money to persons who meet certain criteria and not universally. This is to encourage behaviors which are beneficial for the long term human capital gains of the household. For instance, one of the earliest CCTs was *PROGRESSA* in Mexico, launched in 1997, which provides cash transfers to poor rural households conditional on their children attending school and the household visiting local health centers regularly.

The effect of such general CCTs on poverty, its inter-generational transmission and child health has been well studied. Most studies find a reduction in poverty, an increase in school participation and an improvement in utilization of health and nutrition services while the effects on child health outcomes are generally mixed.[6] However, for general CCTs, it is difficult to disentangle which part of the scheme was effective (if any) since many requirements are bundled together. There are few studies which look at the causal effect of in-utero exposure to these temporary income enhancing CCTs on birth outcomes (Attanasio *et al.* , 2005; Barber & Gertler, 2010). While improved financial resources can increase nutrition and healthcare access, it can also lead to a reduction in labor supply by parents or an increase in consumption of addictive substances.[7]

Direct maternity benefits are another form of cash transfers which have been experimented with. These are either unconditional cash transfers for each birth or conditional on certain

[6]There is mixed evidence for the effect of general CCTs on child health outcomes (weight-for-age, stunting, morbidity and mortality.). Studies have evaluated *PROGRESA* in Mexico, *Familias en Accion* in Colombia, *Bolsa Familia* in Brazil, *Red de Proteccion Social* program in Brazil and *Bono de Desarrollo Humano* program in Ecuador. Some studies also evaluate the effect of exposure to CCTs in childhood to long-term health outcomes. Studies also find positive impacts on maternal health outcomes (de Brauw & Peterman, 2020). A review of this literature is beyond the scope of this paper. Bastagli *et al.* (2016) undertakes a review of CCTs affecting health outcomes and finds limited evidence of such CCTs affecting initial child health outcomes like birth weight (only one study in their review studied the effect on birth weight and found no significant impact).

[7]There is conflicting evidence where some studies find no such adverse behaviour on part of households. Haushofer & Shapiro (2016) finds a positive effect of an unconditional cash transfer in Kenya on consumption of food, medical and education expenses while a negative effect on consumption of temptation goods. Evans & Popova (2014) review 19 studies and find no significant impact or negative impact of cash transfers on temptation goods.

requirements being fulfilled by the household. On unconditional transfers, Currie & Cole (1993) find no effect on birth weight of *Aid to Families with Dependent Children* transfers while Amarante *et al.* (2016) and Aguero *et al.* (2006) find a decrease in the incidence of low birth weight due to a social assistance program in Uruguay called *PANES* and an improvement in HAZ due to South Africa's unconditional *Child Support Grant*, respectively.

On the other hand, conditional maternity benefits programs have been relatively less studied. Soares *et al.* (2010) evaluate one such program in Brazil and finds no effect on immunization because of supply side constraints in medical health centers and hence, no consequent health impacts on children.[8] The impact of conditional maternity support schemes in developing countries is bound by the availability of infrastructure to meet the stated conditions, timeliness of payments and whether families use the transfers to improve maternal nutrition. Another related study by Ghosh & Kochar (2018) on *Indira Gandhi Matritva Sahyog Yojana* (IGMSY), a scheme similar to *MAMATA*, in select districts of Bihar, a state of India, finds positive effects on long-run health outcomes. The scheme was not implemented well and hence the mechanism for their findings is not the scheme but a delay in implementation of the scheme (after announcement) which led the households to postpone their first or next child, thus, increasing birth spacing.

Existing evidence shows that only policies and expenditure cannot bring an improvement in health outcomes unless accompanied by favorable institutional factors (Rajkumar & Swaroop, 2008). Our paper is the first to evaluate the effect of *MAMATA* - a maternity benefits scheme that was implemented relatively well (Ali *et al.* , 2018; Khera, 2015; Raghunathan *et al.* , 2017) - on short-run and long-run health outcomes. It is implemented in the state of Odisha in India, which has a robust public health infrastructure in rural areas (Thomas *et al.* , 2015) and therefore supply side constraints are weaker in our context. A previous study by Raghunathan *et al.* (2017), which collects primary data on access to MAMATA, also

[8]Most conditions of *MAMATA*, except vaccinations for measles, Vitamin A supplements and exclusive breastfeeding, were similar to an already existing all India institutional delivery scheme called Janani Suraksha Yojana (JSY) and hence, the infrastructure like health centers in the village were already set up and functional.

finds a positive effect of this program on uptake of vaccinations and iron supplements by women using a nearest-neighbor matching approach in a cross-sectional setting. However, Raghunathan *et al.* (2017) do not examine the effects of the scheme on infant and neonatal mortality, birth weight, breastfeeding or long term anthropometric measures. Thus, our paper extends the literature by estimating the impacts of the scheme on child health outcomes at birth and in the long term. Further, we report the effects on direct outcomes like mortality, WAZ and HAZ as well as on outcomes like birth weight which is measured through a health card or is self-reported and breastfeeding months which are exclusively self-reported.

Our study contributes to the literature in several ways. First, it exploits in-utero exposure to a conditional maternity support scheme. There were no other accompanying conditions for the household to receive a cash transfer through another component. This furthers our understanding about the exact design of the scheme which can lead to more favorable birth outcomes in developing countries. Soares *et al.* (2010) and Ghosh & Kochar (2018) are few studies evaluating conditional maternity support, which either find no effects due to supply side constraints or positive effects through delayed child birth when the scheme was implemented patchily. An advantage of our study is that the scheme was well implemented. Thus, our paper sheds light on how similarly designed schemes can have differential impacts depending on the institutional factors at play. Additionally, the data allow us to look at the effects on breastfeeding, an outcome which has not been studied in the literature but is often a component of counseling sessions.[9] Second, apart from the targeted outcomes of the program, we also look at the effects on long-run health outcomes of children. Last, and more broadly, it furthers our understanding about the design of maternity benefits that can lead to more tangible health effects. While unconditional cash transfers during maternity have been shown to have little effect, our study shows that conditional cash transfers during maternity

[9]One of the conditions for a cash transfer installment in *MAMATA* was six months of exclusive breastfeeding of the child. This is very difficult to monitor and can be misreported by the mother to the health service provider, who determines her eligibility for benefits. The NFHS surveys, which are independently conducted, ask the mother for number of months the child received *any* breastfeeding and whether or not the child was exclusively breastfed for six months. We use the former variable in our analyses since the latter can be misreported in order to receive the program benefits. This gives more credibility to our estimates.

can positively impact child health outcomes when accompanied by favorable institutional factors i.e., when supply of healthcare is not a constraint.

Section 2 discusses the *MAMATA* scheme and Section 3 describes the data. Section 4 details the empirical strategy. Main results are discussed in Section 5 along with robustness checks and heterogeneity in the obtained estimates. Section 6 discusses the mechanisms behind the obtained results and reporting issues. Conclusions are gathered in Section 7.

2 Background

Public health services form the backbone for access to maternal healthcare in rural India. Women rely on these services for prenatal, natal and postnatal care (Shariff *et al.* , 2007).[10] There are broadly three levels at which these services are provided - sub-centers, primary health centers (PHC) and community health centers (CHC). There were 148,124 sub-centers, 23,887 PHCs and 4,809 CHCs as on March 2011 (Ministry of Health and Family Welfare). The sub-centers are the first point of contact between villagers and public healthcare and are primarily responsible for implementation of health and family welfare programs at the grass-root level. Each sub-center has one female and one male healthcare worker. They provide services related to maternal and child health like immunizations, nutrition counseling and treatment of minor ailments. A PHC is staffed with a medical officer and other paramedical staff and offers in-patient services. A CHC is the highest body in the rural healthcare system which provides specialized medical facilities.

A system of community health workers is also well established in rural India and has three cadres. First is the Auxiliary Nurse-Midwife (ANM) who works at a sub-center and visits villages. Next, is the Anganwadi Worker (AWW) who provides services related to pregnant and lactating women, young children and adolescent girls within a village.[11] The last and the

[10]Prenatal services include a set of pregnancy-related checkups, immunizations, provision of nutrition supplements and counseling on nutrition, delivery methods, and post-delivery care. Postnatal services mostly relate to immunizations in the initial few weeks, child weight monitoring and counseling sessions on mother and child health care.

[11]These workers are based in Anganwadi Centers (AWCs), a village-level child care center set up under the

most recent cadre is that of the Accredited Social Health Activist (ASHA) which has been in place since 2005 under the National Rural Health Mission (NRHM). ASHAs work solely in their village and provide services related to mother and child health - immunizations and institutional deliveries.

2.1 Major Maternal and Child Health Schemes

Given the low health status of Indian children, interventions to improve child health outcomes have been a development priority in India. Appendix Table A1 lists the major schemes operational in the country to improve maternal and child health during 2005-15. It also discusses any amendments to existing schemes or additional programs in Odisha and its neighboring states. A Supplementary Nutrition Program (SNP) has been operational in India since 1975, as a part of the ICDS. It provides take home ration to pregnant and lactating mothers, as well as to those households having young kids up to 3 years of age and hot cooked meals at the Anganwadi Centre to children 3-6 years of age.

There are two studies which evaluate the impact of SNP programs launched in India. Kandpal (2011) employs propensity score matching methods and evaluates child health outcomes across villages that had ICDS versus those that did not, using the NFHS-3 data, and finds an increase in HAZ scores by 0.02 standard deviations for treated children. Jain (2015) using rural children in the age group 4-5 yrs as a control and those aged 0-2 yrs as a treated group finds an increase in HAZ by 0.4 standard deviations when daily rations are received for 0-2 year old children versus pre-cooked meals are provided for children aged 4-5. Both studies find no effect of the SNP on WAZ. The SNP in Odisha underwent a change in 2013, when eggs were provided thrice a week to pregnant and lactating women and children up to three years of age.

A nation-wide initiative for safe motherhood called Janani Suraksha Yojna (JSY) was launched in 2005 to combat maternal mortality and neonatal deaths by promoting institutional

Integrated Child Development Services (ICDS) scheme. One center caters to roughly 1000 residents.

deliveries. It gave a one-time cash incentive to pregnant women (INR 1400 - $92 in PPP) to deliver in a government or accredited private health facility. Studies on JSY show that it was successful in increasing the rate of institutional deliveries and vaccinations (De & Timilsina, 2020) but did not reduce overall neonatal or infant mortality (Debnath, 2021; Lim *et al.* , 2010; Powell-Jackson *et al.* , 2015) or increase breastfeeding (Carvalho *et al.* , 2014).

Yashoda program was launched in select states for providing assistance to pregnant women in childbirth, registration of birth and providing pre- and post-delivery care. Varghese *et al.* (2014) find the *Yashoda* program to increase post-natal care and initiation of breastfeeding in the states of Rajasthan and Odisha. The scheme of MAMATA as opposed to SNP or *Yashoda* is a cash-transfer based intervention that seeks to improve health-care practices of pregnant women starting in-utero and continuing throughout the first year of a childâs life. An all-India scheme called Pradhan Mantri Matru Vandana Yojana (PMMVY) was launched in 2016. This was modelled along existing schemes like *MAMATA* launched in September 2011 in the state of Odisha, India.[12]

2.2 MAMATA Scheme

MAMATA is a conditional cash transfer scheme in the state of Odisha which provides monetary incentives to improve maternal nutrition and encourages women to engage in positive health seeking behaviour before and after child birth. These include uptake of nutritional supplements, immunization, antenatal and postnatal check-ups and counseling (similar to JSY), regular monitoring of child's weight up to nine months, uptake of vitamin-A supplements, measles vaccination and full immunization up to nine months of child's age, exclusive breastfeeding for six months and counseling about complementary feeding practices

[12]Another scheme called *Indira Gandhi Matritva Sahyog Yojana* (IGMSY) was rolled out in select backward districts in 2011 but its implementation was very patchy (Ghosh & Kochar, 2018). *MAMATA*, unlike IGMSY was comparatively well implemented with most beneficiaries receiving payment on time. Ali *et al.* (2018) analyse the implementation of *MAMATA* in Odisha and find that cash transfers reached most beneficiaries without any delays. Raghunathan *et al.* (2017) and Khera (2015) also find that 90% of women enrolled under *MAMATA* received payments on time and that 72% eligible women received all four installments in their samples, respectively.

(these conditions were exclusive to *MAMATA*). The cash benefit under *MAMATA* was much higher than JSY and partly disbursed before the child's birth so as to increase maternal nutrition. All pregnant and lactating women in Odisha of at least 19 years of age at child birth are eligible for the scheme benefits for their first two live births.

The scheme was announced in September 2011 and the first instalments were disbursed in October 2011 across Odisha. Women who were pregnant in October 2011 and had reached six months of pregnancy at most and those with less than two children were eligible for the scheme benefits. Thus, all children born to eligible women in Odisha since January 2012 were exposed to the program and were entitled to receive benefits under the scheme.[13]

MAMATA disburses a total amount of INR 5,000 per beneficiary ($328 in PPP) in four instalments spanning the entire course of pregnancy up to the child attaining nine months of age. Cash transfers are disbursed directly into the bank accounts of eligible women conditional on the women fulfilling the requirement for each instalment. The first instalment of INR 1,500 is given at the end of the second trimester (6th month of the pregnancy) if the woman registers her pregnancy with the AWC, receives at least one antenatal check-up, one tetanus injection, iron folic acid tablets, and attends the counseling session at the AWC or a nearby health centre. A Mother-Child Protection (MCP) card, issued under the NRHM, is used to verify whether a pregnant woman meets all the conditions or not. This card informs pregnant women and mothers about best practices in self and child care along with documenting the services taken by the mother during her pregnancy from the public healthcare system. It is an important tool for monitoring the immunizations and the supplements taken during the pregnancy. A scheme register was also maintained specifically for *MAMATA* along with issuance of these cards.

The second instalment of INR 1,500 is given after three months of child birth if the woman

[13]Notably, even though our study exploits the implementation of the scheme only in one state of the country, this is a large and populous state with a population of 47.2 million people, 85% of whom reside in rural areas. Given the large population the state caters to, it would rank as a top 35 country in the world in terms of population, higher than some European and many Asian countries. Thus, we feel, that geographical implementation of the program in one state of India does not limit the external validity of our results.

registers the child's birth, gets the child weighed twice, immunized for BCG, Polio-1 & 2 and DPT-1 & 2 and attends a counseling session. No cash transfer is made at the time of birth of the child as that is covered under JSY. The third instalment of INR 1,000 is given after six months of child birth if the child has been exclusively breastfed for six months, immunized for Polio-3 and DPT-3, introduced to complementary food on completion of six months, weighed at least twice between the age of three and six months and if the mother has attended two counseling sessions during this period. The final instalment of INR 1,000 is paid after the child attains nine months of age if the child has been immunized for measles and given vitamin-A supplements, introduced to age-specific complementary feeding and weighed twice during this period. The above monitoring is also carried out through the MCP card and the scheme register.

Under *MAMATA*, the AWWs are responsible for record-keeping of the above conditionalities, motivating the women to follow all the conditionalities and paying home visits for counseling. The AWWs receive a cash incentive of INR 200 per beneficiary after all the conditions for the four instalments due to the beneficiary have been met by her. A verification committee is formed at the block-level, which reports to the Integrated Child Development Services (ICDS) supervisor who is responsible for making field monitoring visits. Thus, the management of the scheme lies with the ICDS, which reports to the State health department to bring transparency and to ensure effective functioning of the scheme. A recent study conducted in three districts of Odisha shows that the program was successful in increasing the likelihood of women registering their pregnancy, consuming supplements and following immunization schedules (Raghunathan *et al.* , 2017).

Given that there has been an increase in the adoption of positive health practices by pregnant women in Odisha, one may expect to see an improvement in health outcomes of their children. The household cash entitlement under *MAMATA* is large in monetary terms. The average per capita monthly household food consumption expenditure in rural India was INR 756 (National Sample Survey 2011-12) and for Odisha it was even lower at INR 570.

Before a child's birth, at the beginning of the third trimester, a rural household receives almost triple the average per capita household food expenditure. However, it is not certain that households will spend the received money on increasing the food intake of the pregnant woman. They could possibly use the cash for other purposes. Hence, whether or not such schemes have the desired effect on child health needs to be evaluated.

3 Data

This paper uses data from the fourth round of the NFHS conducted in the year 2015-16 to estimate the effect of *MAMATA* on short-run child health outcomes (birth weight, infant mortality, neonatal mortality), long-run health outcomes (weight-for-age, height-for-age) and maternal behavioral changes (breastfeeding). NFHS are large-scale, repeated cross-section surveys conducted on a representative sample of households in India (earlier rounds were conducted in 2005-6, 1998-99 and 1992-93). It provides information on birth histories, health, fertility and child health outcomes of randomly selected women aged 15-49 years and a sub-sample of men aged 15-54 years. NFHS-4 interviewed 601,509 households during the time-span of January 2015 to December 2016. For our main analyses, we use data on births during 2011-2012 for three states - Odisha, Bihar and Chhattisgarh.

Cash transfer, if utilized in providing nutritional meals to the pregnant woman may lead to positive gains in birth weight of the child. The first three instalments of the program can nudge women to breastfeed the child for at least six months by providing multiple mandatory counseling sessions. Through WAZ and HAZ, we analyze whether cash transfers under the maternity support scheme have long lasting impact on health of children exposed to it. The main channels for impact on long-term outcomes can be improved birth weight, increased nutrition during initial months through breastfeeding and mother's better health if her nutritional intake during the first few months after delivery is good due to cash transfer provided under *MAMATA*. Healthy complementary feeding practices after six months can

also improve long-term health outcomes. But the impact on long-term health outcomes can be a lower bound to the extent that other interventions in the childhood can also lead to reducing the initial gains due to the cash transfer. Next, we describe the construction of outcome variables.

3.1 Child Health Outcomes

Data on child health outcomes like birth weight, weight-for-age (WAZ) and height-for-age (HAZ) is collected for all children born after January 2011 up to 2015-16 (depending on the month in which a district was interviewed). Data on birth weight is recorded either from the health card issued to a child or through mother's recall. In our sample 50.51% of the birth weight data comes from a written card. In Odisha, the treated state, 55% women had a health card with birth weight while in the control states 45% women had a health card. We take the log of birth weight (ln(BW)) as the dependent variable in our analysis.

Weight and height at the time of interview for the eligible children are measured by the surveyor and Z-scores created by the NFHS.[14] Birth histories are captured for all children ever born to an ever-married woman aged 15-49. Data on infant mortality rate (IMR) and neonatal mortality (NNM) is thus available for a much longer period. Infant mortality is defined as the probability of death of a child before the age of one year. The constructed variable IMR takes a value one if a child dies before the age of one and zero otherwise. The constructed variable NNM takes a value one if a child dies within the first 28 days of birth and zero otherwise. The requirement to breastfeed children for at least first six months, full immunization and constant weight monitoring through all four instalments could potentially improve the chances of children surviving the first year of life.[15]

[14]The HAZ and WAZ measures have been computed by the NFHS-4 using the new Child Growth Standards released by the World Health Organization in 2006.

[15]Immunization rates are already high given the existence of the JSY program across states in India. Vaccinations (except for Measles and Vitamin A supplements) are covered by JSY as well and thus, an improvement in JSY implementation in the neighboring states of Odisha could lead to an underestimation of *MAMATA*'s effect on vaccinations. Our estimates, show a significant positive effect on Polio 3 vaccine and Vitamin A intake. The effect on Measles, BCG and Polio 1,2 is positive but not significant while effect on

3.2 Breastfeeding

The survey also provides data on the number of months a child was breastfed for the last birth of a woman after January 2011, which is self-reported by the mother. Importantly, this variable does not capture exclusive breastfeeding, but rather the total number of months till which the child received *any* breastfeeding. While this measure is unlikely to be completely devoid of any reporting bias, it is better than using a self-reported measure on whether a child was exclusively breastfed for six months, given the conditionalities involved for receiving the cash transfer. This is because, if a mother exclusively breastfeeds a child for the first 6 months, then on an average the time duration till the child is weaned off also increases (Hoyer & Horvat, 2000). A child who has not been exclusively breastfed can be weaned off earlier more easily. Thus, given the lower social desirability associated with this variable, it is more likely to reflect the true duration of any breastfeeding received by a child. Table 1 shows the mean of the outcome variables in our data. On average, a child weighs 2.8 kg and receives any breast milk for 26 months after birth. Both WAZ and HAZ are lower than the world standards while IMR and NNM stand at 45 and 35, respectively, per 1000 births.

3.3 Control Variables

We control for age and sex of the child where applicable. Mother's characteristics include her age when the child was born, her age at first marriage, number of previous births and education level. Father's characteristics include his age and education. Other household characteristics like ownership of agricultural land, wealth, caste and religion are also controlled for. We choose the control states such that they are similar to the treatment state and also geographically more proximate so that trends in outcomes are likely to be similar. The control states (Jharkhand and Chhattisgarh) are also classified as low-performing states in maternal healthcare by the Government of India, a status given to Odisha, the treatment state as well.

DPT is negative.

Table A2 shows the descriptive statistics for each of the above variables used in the analyses for the treatment state and the control states for the period 2011-2012. Comparing the demographic variables across treatment and control states, it can be seen that while levels are broadly similar, on some variables like wealth and mother's education, control states fare slightly worse. This is also reflected in caste composition which shows that control states have larger scheduled tribes and other backward classes. However, for a triple difference-in-differences analyses what is crucial are similar trends in outcomes in the absence of the scheme. This assumption cannot be tested. At best we can test for pre-trends in outcome variables when the scheme was not implemented. To check for pre-trends, we use the birth histories from NFHS-4 for infant and neonatal mortality but for other child health outcomes we use data from the third round of NFHS conducted in 2005-06 (which records the variables under study in exactly the same way as in NFHS-4, 2015-16). We also use the NFHS-4 data from urban areas to conduct placebo tests since this scheme was applicable in rural Odisha only.

4 Empirical Strategy

We estimate intent-to-treat effects of the maternity support program using a triple difference-in-differences strategy. Our main estimation strategy exploits three sources of variation - treatment region (state of birth), eligibility for benefits (birth order) and time of birth (month-year of birth). The estimation equation is given by:

$$Y_{ihdst} = \beta_0 + \beta_1 Bord_i \times State_s \times Post_t + \beta_2 Bord_i \times State_s + \beta_3 Bord_i \times Post_t + \beta_4 State_s \times Post_t + \beta_5 Bord_i + \beta_6 X_{ihdst} + \gamma_d + \delta_t + \epsilon_{ihdst} \quad (1)$$

where Y is the outcome for child i in household h, born in district d of state s in time period (month-year) t. $Bord$ is an indicator variable for birth order (it takes the value one if the

child i is of birth order one or two and zero otherwise), *State* is an indicator variable for the treated state (it takes the value one if the child is born in Odisha and zero otherwise), *Post* is an indicator variable for treatment time period (it takes the value one if the child is born in the treated time period 2012 and zero otherwise), and X captures child-level controls (age and sex of the child), mother-level controls (age at childbirth, age at first marriage, number of previous births and education level), household-level controls (caste, religion, wealth index and land ownership) and father-level controls (age and education). γ and δ capture district and month-year of birth fixed effects respectively. Notably, the triple difference strategy allows us to control for the effect of any changes in quantity or quality of health administration in Odisha on health outcomes of children, since we control for $State_s \times Post_t$ in equation 1.

The coefficient β_1 gives the causal impact of the maternity support scheme on the outcomes. It shows the difference between the change in child outcomes between 2012 and 2011 for children whose mothers were eligible for receipt of benefits (first and second birth order children) and children whose mothers were not eligible (third or higher birth order) in treated state of Odisha, and the change in child outcomes for first-second birth order children vis-a-vis third or higher birth order children in the control states during the same time period. Standard errors are clustered at state-birth cohort level.[16] Since the number of clusters are small, we also report wild cluster bootstrap p-values in braces (Cameron *et al.* , 2008).

The control states are the neighboring states of Chhattisgarh and Jharkhand, which like Odisha have been classified as low-performing states in maternal healthcare by the Government of India on the basis of a low rate of institutional deliveries (below 25% in 2005).[17] These states are geographically proximate to the treated state and are also given similar incentives under various central assistance programs due to similar maternal and child health outcomes. Figure 1 shows the geographic boundaries of these states in India.

[16]Since the first and second born children were eligible for the scheme they are treated as one cluster and all higher birth orders are treated as another cluster. This leads to six clusters, two for each state.

[17]From both the control and the treated states we drop the districts (6 districts, two from each state) which were eligible for the IGMSY scheme, which was also launched in 2011. These are, in general, more backward districts. We control for districts fixed effects and district specific time trends in our estimation strategy to control for any spillover effects due to the selective nature of the districts.

The main child outcomes are birth weight, breastfeeding months, WAZ, HAZ, IMR and NNM. In our main results, these outcomes are considered for the sample of births between January 2011 and December 2012 in rural areas of the treated and control regions (97% of the beneficiaries were rural). The treatment period is births during January 2012 - December 2012 while the control period is births during January 2011 - December 2011, given that the first installment covered women who were six months pregnant in October 2011. The program was announced in September 2011, thus, it could not have changed any decisions by households for births in 2011 since for a birth in December 2011, the woman would have to conceive by April 2011. Thus, our choice of using births up to December 2011 in the pre-treatment period is not contaminated by any anticipated effects of the program.

We maintain one year of data for both treated and control periods with similar months to avoid any seasonal effects arising due to differential composition of months in treated and control time periods. In our main specification, we use data for only one year post the program implementation since other programs were implemented in Odisha in mid-2013 affecting nutrition intake of pregnant and lactating mothers and young children. These could potentially contaminate our results. However, later, we extend the time period to include data available till 2015, to check for robustness of our results.

Identification in Triple DID:

The identifying assumption here is that in the absence of the treatment, the change in health outcomes between first & second born children and third & higher born children would have been the same across the two regions (the treated and the control).[18] Using data from the birth histories in NFHS-4, it is feasible to conduct a pre-trends test for IMR and NNM. In the absence of the program, it is expected that the IMR and NNM will follow the same trend within the two cohorts of children across the two regions. Since the data on other

[18]Our data precludes us from identifying the effects using within mother variation since the number of mothers having eligible children both in the treatment and the control period during 2011-12 are 91 in Odisha. Exploiting within household variation is also not feasible since only 114 households have eligible children both in the treatment and the control period.

health outcomes (birth weight, breastfeeding, WAZ and HAZ) in NFHS-4 is available only for children born since January 2011, we cannot check the pre-trend assumption in the year immediately preceding the implementation of MAMATA for these variables. Hence, for these variables we use the NFHS-3 data from 2005-06 to check for existence of trends between the health outcomes captured in NFHS-3 and those reported in the year 2011 of NFHS-4.

Triple DID versus Double DID:

An alternative estimation strategy could have been a difference-in-differences estimation which compared differences in child outcomes between first & second born children and third & higher order born children within Odisha, before and after the program was implemented. Here, the identifying assumption would be that the difference in health outcomes between children of birth order one/two and birth order three or above would have been the same across birth cohorts in the absence of treatment. This assumption can be violated if there are economic shocks over time which affect birth orders differently. Existing evidence shows larger effects of economic shocks on children born at higher birth orders (Baird *et al.* , 2011). A triple difference strategy, which exploits geographic variation in implementation of the scheme, can allow one to control for cohort-specific economic shocks. Thus, we take the neighboring states of Jharkhand and Chhattisgarh as a control region and estimate the preferred triple difference specification. Moreover, recent research shows that higher order or later born children have smaller neonatal mortality as mother is likely to be underweight and older (Coffey & Spears, 2021). Thus, using a double difference strategy can confound the results if mother's age at birth falls over time. Nonetheless, we control for mother's age at child birth in all specifications to allow for any differences in fertility patterns across regions over time.[19] For comparability, the results for the double difference estimator are also reported in the Appendix. As discussed later, both difference-in-differences and the triple difference estimator give similar results.[20]

[19]The rural Total Fertility Rate (TFR) was 2.5 in Odisha, and 2.8 in the control states in 2005-06 (NFHS-3).

[20]The placebo and pre-trend tests in the triple differences estimation strategy are however much tighter due to larger sample size.

Triple DID with Treatment Intensity:

To establish that our results are indeed driven by the implementation of the scheme and not by other incidental reasons, we also use the spatial intensity of program implementation within the districts of Odisha. The following triple difference specification is estimated:

$$Y_{ihdst} = \beta_0 + \beta_1 Bord_i \times TI_{ds} \times Post_t + \beta_2 Bord_i \times TI_{ds} + \beta_3 Bord_i \times Post_t + \beta_4 TI_{ds} \times Post_t + \beta_5 Bord_i + \beta_6 X_{ihdst} + \gamma_d + \delta_t + \epsilon_{ihdst} \quad (2)$$

where TI denotes the treatment intensity in district d in state s. It is defined as the number of beneficiaries of the scheme during the financial year 2011-12 and 2012-13 per total women in the age group 19-33 in that district for treatment districts and zero otherwise.[21]

5 Results

5.1 Main Results

Table 2 shows the estimation results for the five main outcomes of interest using the triple difference strategy and controlling for child, mother and household characteristics. The results show that the scheme improved the birth weight of children exposed to it by 5%.[22]. The number of months a child is breastfed also increased by 5 months which is about 19% increase from the baseline mean of 26.7 months. It must be noted that the number of months breastfed does not refer to exclusive breastfeeding but till the child was weaned off. There is a significant improvement in WAZ score by 0.149 standard deviation (about 10% increase from the baseline mean of -1.56). The effect on height-for-age scores is positive but insignificant

[21]The data on district-wise number of beneficiaries was provided by the Department of Women and Child Development, Government of Odisha, and the total number of women in the district were obtained from Census, 2011. We take 33 as the upper limit of age for women in the denominator since NFHS shows that 90% of rural women are under age 33 when giving birth to a child.

[22]Since mean birth weight is about 2700 grams, that means an increase of about 135 grams. Most of the studies even for the effects of cash transfers do not examine the effects on birth weight (Bastagli *et al.* , 2016). One study that does for Mexico finds no effect of general cash transfers on birth weight for children.

(with a magnitude of 9% from the baseline mean of -1.5). The effects are smaller than that obtained in intent-to-treat estimates for maternal cash transfers by Ghosh & Kochar (2018), even though the mechanism for effects in their study was increased birth spacing caused by the delayed implementation of the program and not the cash transfers per se. We find no significant reduction in either IMR or NNM, even though the sign of the coefficient on both these outcomes is negative.

Table 3 shows the results with additional controls for the father, our preferred specification. The sample size for this specification drops as fewer men than women were surveyed in the NFHS-4. The effect on birth weight, breastfeeding duration and WAZ scores are significantly positive in this stricter specification as well. We also estimate the wild cluster bootstrap p-value for this specification and find that our results are robust to the bootstrapped standard errors, though the level of significance falls to 10% for birth weight and WAZ, and 5% for breastfeeding. The effect on HAZ, IMR, and NNM rate continues to be insignificant, with a positive direction on HAZ and negative on IMR and NNM.[23]

5.1.1 Comparison to Double Difference Estimates

We also decompose the impact on outcomes in the triple difference strategy into its two double difference components - the change in outcomes over time within Odisha between the first/second-order born children and higher-order birth children (*DD Treatment*) and the change in outcomes in the control states of Jharkhand and Chhattisgarh (*DD Control*). These are given in the additional rows below each specification in Table 3. The results show that the double difference estimator is positive and significant for birth weight (3%), breastfeeding (4 months), WAZ (0.15) and also for HAZ (0.12). Thus, the double difference effects for the treated areas are very similar to the triple difference effects, except for birth weight which almost halves in the double difference specification.[24]

[23]The difference-in-differences estimates in Table A3 are in the same direction as the triple difference estimator (Table 3).

[24]Double difference estimates can be biased if macroeconomic shocks have differential effects by birth order with higher birth orders gaining more during a positive shock and losing more during a negative shock. For

5.1.2 Treatment Intensity

Next we look at the treatment effects using the variation in treatment intensity across districts within Odisha. Table 4 shows the estimation results. We find that districts having a larger number of program beneficiaries show greater improvement in birth weight, breastfeeding duration and weight-for-age scores. As the beneficiary increases by one person for every 10 women in the childbearing age, birth weight increases by 4%, breastfeeding months increase by 3 months and weight-for-age increases by 0.081 standard deviation. Height-for-age increases while IMR and NNM decline but these changes are not statistically significant. Again, the birth weight results and breastfeeding results are significant even with wild clustered bootstrapped standard errors, but long-term weight-for-age is now marginally significant at 11% level of significance.

5.2 Testing for Pre-intervention Trends and Placebo Tests

The triple difference strategy assumes parallel trends between first/second-order and higher-order born children between treated and control states in the absence of the program. This assumption is not testable but presence of trends in outcome variables before the maternity support scheme was implemented can be tested. Therefore, to discern whether the above results are driven by pre-existing trends or other factors within Odisha not related to the maternity support scheme during the treatment period, we estimate two specifications. First, we estimate the pre-trends in the outcomes of interest by using data from NFHS-3 on child outcomes for the cohort of children born between 2001-05 and compare them to the outcomes for children born in 2011 using the same estimation strategy as in our main specification. The

instance, if a negative (positive) macroeconomic shock occurs, and it makes outcomes worse (better) for higher birth order children then the bias will be positive (negative), so we overestimate (underestimate) the effect of MAMATA on child birth outcomes. This is likely to affect outcomes at birth like birth weight rather than longer term outcomes since over longer term shocks can get smoothened. It is well known that 2011-12 was a good rainfall year in India in comparison to the two years before. This was also true for Odisha and its neighboring states (See: IMD Report). Thus, it is possible that the positive macroeconomic shock contributes to the lower effect seen in the double difference estimates but this bias is canceled in the triple difference estimation.

results are shown in Table 5. Using a triple difference approach, none of the outcome variables are significantly affected during the time period 2001-2011. The number of observations fall for birth weight in the previous round of NFHS-3 due to a large number of missing observations on this variable as this is only reported for 25% of the eligible children in NFHS-3. There was no change in methodology for capturing birth weight between NFHS-3 and NFHS-4, however a much larger number of women reported that their children were not weighed at birth, resulting in missing birth weight data in NFHS-3. The results for birth weight hence must be interpreted with caution. However, the other outcomes have comparable data points even in the previous survey and show no pre-trends.

Further, NFHS-4 provides retrospective birth histories of all women interviewed, enabling a longer period analysis of IMR and NNM for each year before the program. Again, using a triple difference approach, we compare the IMR and NNM across treatment and control states, between eligible and non-eligible children born in each year starting 2005 up to 2012, treating 2011 as the base year. None of the estimates are significantly different from zero (Figure 2), including that for the treatment year. These results show that our main results are unlikely to be confounded by the presence of differential trends in outcome variables between cohorts, across treated and control areas.[25]

5.3 Robustness

We examine the robustness of the above results to a number of alternative specifications. First, we include district-specific monthly time trends in the main specification of Table 3 and Table 4 to control for any changes in district level attributes like health infrastructure

[25] We also estimate a placebo specification for urban children and report the results in Appendix Table A4. Since *MAMATA* was not implemented in urban areas, any effects on outcomes which can be attributed to the scheme must be absent in this specification. Notably, the sample drops for the urban areas due to smaller sample size in urban areas. The only outcome significantly affected is HAZ score, which has a negative sign i.e. a reduction in HAZ score in urban areas. The coefficient on breastfeeding is positive and large, though insignificant. In the latter half of 2000's many states in India adopted programs to improve breastfeeding practices (Avula *et al.* , 2017). A differential impact in urban Odisha due to such a thrust in public policy cannot be ruled out completely - it is possible that the overall importance given by the Odisha state government towards maternity support also led to implementation of the breastfeeding initiative with greater vigor. However, nothing can be said conclusively since the coefficient is insignificant for urban areas.

or other policies that affect health outcomes. The results are shown in Appendix Table A5 and A6. Clearly, all our previous results continue to hold. As a second check we extend the time period of our analyses to include all births upto 2015. In the main analysis, we define the treatment period as the year 2012, which is within one year of the program's launch to prevent any spillover effects of new additions to food under SNP in Odisha from 2013 onwards. Nonetheless, as a check, we extend the treatment period from 2012 to 2012-15, the latest year for which the data is available and control for State $\times$ Year fixed effects to account for any differential implementation of programs across states over time. Appendix Table A7 reports the results. The positive impact of the maternity support program on birth weight, breastfeeding and weight-for-age scores is robust to this extension of the treatment period. At the same time, the effect on NNM is now significantly negative. We also conduct event study analyses for each year upto 2015 for the mortality outcomes, which have a longer series available since 2006. We find no effect on IMR but NNM reduces significantly during 2013-14. These results are omitted for brevity but are available on request.

As a third check, we control for the improved implementation of the JSY scheme. This scheme was in operation since 2005, however, over time the adoption across states was changing with lagging states pulling themselves up later. This was the largest scheme related to maternity health in the country that ran parallel to the *MAMATA* scheme in Odisha. The number of JSY beneficiaries in Odisha increased from 0.533 million in 2011 to 0.63 million in 2012. But a larger increase from 0.68 million to 0.89 million was observed for the control states (Appendix Table A8).[26] Our results are then unlikely to be contaminated by improving JSY implementation in Odisha during this period. Our identification strategy also precludes any spillover effects from JSY contaminating our findings since JSY was applicable to all pregnant women for all births in the three states under consideration. Nevertheless, to check the robustness of our results we control for the number of state level JSY beneficiaries. We

[26] In fact, Table 3 shows that for higher birth order children there is a relative decline in health outcomes in Odisha during this period. This could partly be due to increasing adoption of JSY in the control states. Controlling for JSY beneficiaries, this relative decline is smaller for higher birth order children and in fact vanishes when we account for district specific time trends (Appendix Table A5).

continue to find robust positive effects on birth weight, breastfeeding and weight-for-age outcomes in this alternative specification as well (Appendix Table A9). There could be another concern that the results may be driven by overall increase in healthcare services supply in Odisha. The triple difference strategy precludes this concern since this is likely to affect both first/second-order and higher-order births within Odisha.

5.4 Heterogeneity

The scheme could have had a differential effect across girls and boys, especially for long term birth outcomes, if there was a difference in spending on maternal care based on sex of the child and also across first-born and second-born children. As discussed earlier, girl children face discrimination in India due to a strong cultural preference for sons. Table 6 shows the heterogeneity by child's gender.[27] The estimates show that the gain in birth weight, breastfeeding, WAZ and HAZ are larger for boys. These larger effects for boys are significantly different from that for girls for birth weight and weight-for-age. Overall, the program effects on these outcomes for girls are insignificant ($Bord \times State \times Post$). We sum up the two coefficients on the triple difference and the interaction of the triple difference with the male indicator to get the impact of the program on male children ($DDD\ Males$). The effects on male children are significant for all outcomes.

Interestingly, these results show gender-based heterogeneous effects on birth weight. There are two possible channels that can explain this. One, prevalence of prenatal sex determination despite being illegal which may lead to in-utero discrimination against girls in India (Bharadwaj & Lakdawala, 2013).[28] Another alternative channel for these findings could be that male fetuses are more susceptible to negative in-utero shocks (Kraemer, 2000).

[27] IMR and NNM are dropped from these specifications since no significant effects of the program are estimated for these outcome variables. All the triple order interactions are also controlled for in the specification.

[28] The Prenatal Diagnostic Techniques (PNDT) - Regulation and Prevention of Misuse Act in 1994 has failed to arrest the widespread practice of using ultrasonography for determining the sex of the fetus. India's sex ratio at birth (defined as number of girl children born per 1000 boys born) has increased from 914 in 2004-05 to 919 in 2015-16 (NFHS-4) but it is still far below the biological expected sex ratio at birth of 1050. One of the reasons for this skewed sex ratio is female foeticide in India.

Provision of cash transfers can mitigate negative in-utero shocks and hence increase the health of the male fetus.

Appendix Table A10 shows the differential estimates for the first and second birth order child. There are no consistent differences in the impacts across birth orders. One could have expected the effects on birth weight and long-run health outcomes to be larger for the first born children since less resources need to be shared with siblings. On the other hand, a relaxation of the resource constraint when the second child is born can also lead to larger effects for the second born children. The estimates show that while birth weight is similarly affected for both birth orders, breastfeeding, WAZ and HAZ have larger effects for second born children, though the differences are insignificant.

We also look at the heterogeneity in program effects by wealth-level of the household. NFHS generates an asset index using information collected in their survey and classifies households as poorest, poor, middle, rich and richest within both rural and urban areas. We construct a variable *Poor Household* which indicates whether a household is either poor or poorest according to the asset index. To check for wealth heterogeneity, the triple difference estimator is interacted with *Poor Household*. The results in Table A11 show that while both poor and non-poor households show improvement in outcomes like birth weight, breastfeeding, WAZ and HAZ, children born in wealthier households gain more. While the direction is in line with existing literature that finds larger impacts on wealthier households, we find none of the outcomes are affected significantly differently by wealth except breastfeeding. It is likely that wealthier households gain more since they are more likely to meet the cash receipt conditionalities under the program or they spend the received monetary receipt exclusively on the pregnant and lactating woman's nutrition. Mothers from poorer households are also likely to keep working till the end or join work sooner than mothers from richer households, hindering their ability to breastfeed their children.

6 Discussion

The above results show that the maternity support scheme improved birth weight, breastfeeding as well as long-run health outcomes like weight-for-age, but largely for male children. The effect on breastfeeding was a direct outcome intended to be affected by the program. Improvement in birth weight is likely due to improved maternal nutrition or rest during pregnancy as money was made available to households before child birth (Ali *et al.* , 2018). If the money was not used for either of the purposes and simply frittered away by the household, then we would not have observed any improvement in birth weight of treated children. However, there is no way to directly test for this mechanism since no data is collected on maternal nutrition at the time of pregnancy by any survey in India but we provide suggestive evidence below. First, we evaluate the first order effects of the program on full immunization and rule out the possibility that only measurement error due to self-reporting drives our results. We then examine the mechanism by directly incorporating the mediation of birth weight in affecting long term health outcomes. Lastly, we discuss the plausibility of our estimates given the cash transfer size and wealth effects in India.

6.1 Impact on Immunization

We examine if the effects discerned above are indeed driven by the program and not due to other factors (these concerns are also allayed in the treatment intensity specification). For this, we examine if the program led to an increased likelihood of a child being fully immunized and receiving vitamin A supplement and measles vaccination. The latter two were exclusively a part of MAMATA and not targeted by any other scheme. Appendix Table A12 shows the results for vitamin A supplement in column (1), measles vaccination in column (2) and full immunization up to age one of the child in column (3). The program led to a significant increase in uptake of vitamin A supplements for children by 3% but had an insignificant effect on measles vaccination. The probability of full immunization however improves by 6%

as a result of the conditional transfer program. These results show that the program had direct effects on child immunizations which were an important component of the program. Therefore, the positive effects on child health outcomes are likely to be driven by the program.

6.2 Measurement Error in Self-Reported Outcomes

Of all the dependent variables, birth weight is partly self-reported and breastfeeding is completely self-reported. There is a possibility that recall error in birth weight can vary across birth cohorts, with birth weight of younger children likely to be recalled more accurately. Since we restrict ourselves to two years around policy implementation in our base specification, the younger birth cohort differs from the older birth cohort only by an year. Hence, differential measurement error across cohorts is unlikely to drive our results. However, our triple difference estimation strategy, could be confounded by different recall errors across birth cohorts, across treatment and control regions. Our analyses below allays the concern that such recall differences would lead to upwards biased estimates for the impact of MAMATA since as shown below, the effect size of the impact is smaller for children whose birth weight and immunization details are recalled by households.

Relatedly, another concern may be that the program had a significantly positive impact only on self-reported outcomes of birth weight and breastfeeding due to the treated households over-reporting these outcomes. To check this, we also estimate the effect of the program on birth weight for the sub-sample of children for whom the child's birth weight is recorded from the health card by surveyors vs those for whom parents recall it. The results are reported in Appendix Table A13. We find that the program leads to an increase in birth weight by 6.2% for households having a child health card containing birth weight details. This should alleviate any concerns that our findings for birth weight are driven only by misreporting.[29]

Further, since data on immunization comes partly from vaccination cards and partly from

[29]Notably, the cash transfer was only conditional on whether the child's birth weight was monitored and recorded. It did not depend on the actual weight of the child or the child meeting some benchmark weight. Hence, there exists no incentive for the household or the health worker (ANM) to record a higher value to obtain the cash transfer.

mother's recall where the former is not available, we conduct a similar exercise where we estimate the effects on immunization outcomes for the sub-sample of children for whom this is recorded through a vaccination card. We continue to find positive and significant effects for Vitamin A and probability of full immunization and additionally, probability of receiving a measles vaccine also becomes positive (Appendix Table A14).

6.3 Mechanisms

Lastly, we look at what could lead to improved long-term health outcomes. The effect on long-term WAZ scores could be a direct result of improved birth weight or better nutrition during the initial few months as breastfeeding duration improved. Therefore, in another specification we control for birth weight, when evaluating the effect of the program on WAZ and HAZ scores. Table 7 shows that after controlling for birth weight in columns (2) and (4), the effects on WAZ is still positive but reduces by half and is no longer statistically significant while that on HAZ score turns negative. This shows that improvement in birth weight is one of the major driving factors behind improvement in long-run WAZ and HAZ scores. Increased birth weight could be due to improved maternal nutrition. Full immunization, increased breastfeeding and better complementary feeding practices (if any) could have led to the residual positive effect on long-term WAZ score. We find no evidence for spillover effects from change in fertility post the program on child health outcomes (see Appendix A.1 for details).[30]

[30]Impacts on fertility can also influence child health outcomes. We estimate the impact of MAMATA on probability of birth, probability of birth in birth order greater than 2 as well as spacing between two successive pregnancies and report the results in Appendix Table A15. While we find an insignificant effect on overall probability of birth, there is a decline in probability of birth beyond birth order two. This shows that households may be having children at a younger age than before, thus, not affecting overall births despite a decline in birth at higher orders. This can also lead to smaller reductions in IMR and NNM since these mortality outcomes are extremely sensitive to the age of mother at birth (Neal *et al.* , 2018). Lastly, we do not find a significant change in probability of female birth due to the program. It is plausible that with a decline in fertility, preference for male children increases. Given that we do not discern any significant declines in fertility, this is not surprising.

6.4 Effect Size

One way to reconcile the magnitude of the impacts in this study is to look at the existing literature on income effects on birth weight, since we observe a large, positively significant impact of the cash transfer on birth weight. In a developed country context, Hoynes *et al.* (2015) study the impact of Earned Income Tax Credit (EITC) on birth weight to find that an increase in income by $1000 (measured in 2009-10 real income) is associated with an increase in mean birth weight of 6.5 grams. We find an effect size that is four times this effect size for the US.[31] However, there are two crucial differences given the disparate country context. One, the average child birth weight in the US is 3200 gms while in the Indian state of Odisha it is 2700 gms. Second, the base income to begin with in India is very low, therefore even a comparable percentage change in income can potentially yield larger effects.

In a developing country context, there are two studies that look at general CCT impacts on birth weight for children born in the recipient households. Barber & Gertler (2010) evaluate the impact of Mexico's general CCT program called *Oportunidades* on child birth weight in rural families. They find an increase of 127 gms, a magnitude comparable to the estimate in our paper (135 gms). In another context, Attanasio *et al.* (2005) find that birth weight increased in the range of 176-578 gms due to *Familias en Accion (FA)*, a CCT program in Colombia. Again, our estimate falls close to this range as well.

Notably, in our context the first installment of INR 1500 is the only one received before the child's birth and could affect child's birth weight. As discussed above, this amount is triple the average per capita monthly household food expenditure in the state. The mother has thrice the amount of money that would usually be spent on a person in the household in a given month. Spread over remaining three months of the pregnancy this is equivalent to

[31] The per capita expenditure of an average US household in 2009-10 was $1600. Therefore, a transfer of 60% monthly per capita expenditure increased birth weight by 6.5 gms. In our study, the equivalent number is 263% increase in monthly income (taking only the first installment of INR 1500 received before the birth) which increased birth weight by 135 gms. Using the marginal effect for the US, the increase in birth weight should have been 32 gms. Thus, the effect on birth weight is larger in our study than in a comparable study in the US for the same cash transfer.

providing double the usual expenditure per month per person for the mother.[32]

Another way to reconcile the magnitude of the impact on birth weight is by examining the impact of household wealth on child's birth weight in India. Table A16 shows the effect of household wealth quintile on child's birth weight, WAZ and HAZ scores using rural data from all states of India in NFHS-4, excluding Odisha. Here the base category is the poorest and poor households (the first two quintiles). We show results from two specifications for each outcome - controlling for child and mother control and the more strict specification controlling for other household and father controls (wealth is likely to be highly correlated with parent's education). We find that children from the richest households have 4.2% higher birth weight than the poor children - magnitude that is comparable to our estimates for cash transfer provision. Therefore, the impact of maternal cash transfer on birth weight seems within reasonable bounds for a developing country context.

The effect of wealth is much higher for WAZ and HAZ scores, but we do not observe equivalent large magnitude for the effect of maternal cash transfers on these outcomes. One reason for this could be that these outcomes can be affected by other interventions that provide better nutrition to children (e.g. Odisha revised its supplementary nutrition program in mid-2013 to include eggs and other protein rich items as take home rations for children aged 6 months-3 years and hot-cooked meals for children aged 3-6 years at the Anganwadi centres). Kandpal (2011) and Jain (2015) show that SNP affects only HAZ positively. Thus, the insignificant effect on HAZ scores could be driven by the introduction of additional nutrition items under the scheme in Odisha. Lastly, the estimated effects in our study are intent to treat effects and are likely to be a lower bound on the true positive impacts since not all women received benefits. But as discussed earlier, the scheme was well implemented according to studies that looked at its implementation using primary surveys and most beneficiaries (almost 90%) received money without delays (Ali *et al.* , 2018; Raghunathan *et al.* , 2017). Khera (2015), using household survey data from four districts in Odisha, also finds that 72%

[32]While this is a direct channel, cash constrained households can also take credit against future expected receipts from cash transfers to improve maternal health before the child is born.

of eligible women reported receiving all four installments under the program.[33] This is also in line with child health outcomes in Odisha being near all-India average despite the state ranking 24 out 33 in GDP per capita across Indian states (NHFS-4).

At the same time, the null results on NNM and IMR point at the program's inability to affect extreme mortality outcomes. One reason for these findings could be that mortality outcomes are severe outcomes, largely afflicting births in the poorest households. The positive impacts on health outcomes due to JSY have been shown to be higher for households who are relatively non-poor due to better access to healthcare (Debnath, 2021) as well as a greater likelihood in the context of *MAMATA* that transfers directly translate into increased nutrition for mothers among the non-poorest households. Our results show the birth spacing did not change post the program. Thus, the insignificance of our results for NNM and IMR may be driven by the lower impact of the CCT for the poorest households, as discussed in Section 5.4.

7 Conclusion

This paper examines short-run and long-run health impacts of a conditional cash transfer program which was specifically designed as a maternity support scheme in a developing country context. The results show that the program was successful in improving health outcomes like birth weight, duration of breastfeeding and weight-for-age of targeted children, with insignificant gains in height-for-age scores, infant and neonatal mortality. The heterogeneity results indicate that most of these gains were for male children in the household, reinforcing the discrimination against girls in Indian households not only after birth but even in-utero. The results are obtained in a context where the program implementation was done well. Also, access to healthcare services to fulfill the program requirements were not a major hurdle in

[33] If the scheme was not well implemented,the effects on immunization and child health outcomes would be null. In fact, in a recent survey Odisha was rated as one of the states having the most well functioning maternity cash transfer program in India and also as having better health access in rural areas (Economic Times).

the program implementing state.

Thus, our results show that institutional factors matter and that maternal conditional cash transfer programs unaccompanied by supply side constraints can lead to improved child health outcomes. A caveat with our findings is that self-reported outcomes like child's birth weight and breastfeeding undergo maximum positive impact. While we also find a positive impact for children whose birth weight is recorded from the health card, nevertheless, no impact on mortality outcomes of the program show limited effects of such schemes in reducing IMR and NNM.

References

Aguero, Jorge, Carter, Michael, & Woolard, Ingrid. 2006. The impact of unconditional cash transfers on nutrition: The South African Child Support Grant. *Working paper 39, International Policy Centre for Inclusive Growth.*

Aizer, Anna. 2011. Poverty, violence, and health the impact of domestic violence during pregnancy on newborn health. *Journal of Human resources*, **46**(3), 518–538.

Aizer, Anna, & Currie, Janet. 2014. The Intergenerational Transmission of Inequality: Maternal Disadvantage and Health at Birth. *Science*, **344**(6186), 856–861.

Ali, Syed Irfan, Begum, Jarina, & Panda, Manasee. 2018. Impact of conditional cash transfer scheme (MAMATA) on the prevalent MCH care practices in rural areas of Ganjam district, Orissa: a descriptive study. *International Journal Of Community Medicine And Public Health*, **5**(8), 3537–3543.

Almond, Douglas, & Currie, Janet. 2011. Killing me softly: The fetal origins hypothesis. *Journal of Economic Perspectives*, **25**(3), 153–72.

Almond, Douglas, Currie, Janet, & Duque, Valentina. 2018. Childhood circumstances and adult outcomes: Act II. *Journal of Economic Literature*, **56**(4), 1360–1446.

Amarante, Verónica, Manacorda, Marco, Miguel, Edward, & Vigorito, Andrea. 2016. Do cash transfers improve birth outcomes? Evidence from matched vital statistics, program, and social security data. *American Economic Journal: Economic Policy*, **8**(2), 1–43.

Attanasio, Orazio, Gómez, Luis Carlos, Heredia, Patricia, & Vera-Hernández, Marcos. 2005. The short-term impact of a conditional cash subsidy on child health and nutrition in Colombia. *Working Paper, The Institute for Fiscal Studies*.

Avula, Rasmi, Oddo, Vanessa M, Kadiyala, Suneetha, & Menon, Purnima. 2017. Scaling-up interventions to improve infant and young child feeding in India: What will it take? *Maternal & Child Nutrition*, **13**, e12414.

Baird, Sarah, Friedman, Jed, & Schady, Norbert. 2011. Aggregate income shocks and infant mortality in the developing world. *Review of Economics and Statistics*, **93**(3), 847–856.

Barber, Sarah L, & Gertler, Paul J. 2010. Empowering women: how Mexico's conditional cash transfer programme raised prenatal care quality and birth weight. *Journal of Development Effectiveness*, **2**(1), 51–73.

Bastagli, Francesca, Hagen-Zanker, Jessica, Harman, Luke, Barca, Valentina, Sturge, Georgina, Schmidt, Tanja, & Pellerano, Lucca. 2016. Cash transfers: what does the evidence say. *A rigorous review of programme impact and the role of design and implementation features. London: ODI*.

Behrman, Jere R, & Rosenzweig, Mark R. 2004. Returns to birthweight. *Review of Economics and Statistics*, **86**(2), 586–601.

Bhalotra, Sonia, & Rawlings, Samantha. 2013. Gradients of the intergenerational transmission of health in developing countries. *Review of Economics and Statistics*, **95**(02), 660–672.

Bharadwaj, Prashant, & Lakdawala, Leah K. 2013. Discrimination begins in the womb: evidence of sex-selective prenatal investments. *Journal of Human Resources*, **48**(1), 71–113.

Bharadwaj, Prashant, Lundborg, Petter, & Rooth, Dan-Olof. 2018. Birth weight in the long run. *Journal of Human Resources*, **53**(1), 189–231.

Bharadwaj, Prashant, Bietenbeck, Jan, Lundborg, Petter, & Rooth, Dan-Olof. 2019. Birth weight and vulnerability to a macroeconomic crisis. *Journal of Health Economics*, **66**, 136–144.

Bhargava, Alok, Jamison, Dean T, Lau, Lawrence J, & Murray, Christopher JL. 2001. Modeling the effects of health on economic growth. *Journal of health economics*, **20**(3), 423–440.

Black, Sandra E, Devereux, Paul J, & Salvanes, Kjell G. 2007. From the cradle to the labor market? The effect of birthweight on adult outcomes. *The Quarterly Journal of Economics*, **122**(1), 409–439.

Cameron, A Colin, Gelbach, Jonah B, & Miller, Douglas L. 2008. Bootstrap-based improvements for inference with clustered errors. *The Review of Economics and Statistics*, **90**(3), 414–427.

Carvalho, Natalie, Thacker, Naveen, Gupta, Subodh S, & Salomon, Joshua A. 2014. More evidence on the impact of India's conditional cash transfer program, Janani Suraksha Yojana: quasi-experimental evaluation of the effects on childhood immunization and other reproductive and child health outcomes. *PLOS One*, **9**(10), e109311.

Case, Anne, & Paxson, Christina. 2008. Stature and status: Height, ability, and labor market outcomes. *Journal of Political Economy*, **116**(3), 499–532.

Coffey, Diane, & Hathi, Payal. 2016. Underweight and Pregnant: Designing universal maternity entitlements to improve health. *Indian Journal of Human Development*, **10**(2), 176–190.

Coffey, Diane, & Spears, Dean. 2021. Neonatal death in India: birth order in a context of maternal undernutrition. *The Economic Journal*, **131**(638), 2478–2507.

Currie, Janet, & Almond, Douglas. 2011. Human capital development before age five. *Pages 1315–1486 of: Handbook of Labor Economics*, vol. 4. Elsevier.

Currie, Janet, & Cole, Nancy. 1993. Welfare and child health: the link between AFDC participation and birth weight. *The American Economic Review*, **83**(4), 971–985.

Das Gupta, Monica. 2005. Explaining Asia's" missing women": a new look at the data. *Population and Development Review*, **31**(3), 529–535.

De, Prabal K, & Timilsina, Laxman. 2020. Cash-based maternal health interventions can improve childhood vaccinationâEvidence from India. *Health Economics*.

de Brauw, Alan, & Peterman, Amber. 2020. Can conditional cash transfers improve maternal health care? Evidence from El Salvador's Comunidades Solidarias Rurales program. *Health Economics*, **29**(6), 700–715.

Debnath, Sisir. 2021. Improving maternal health using incentives for mothers and health care workers: Evidence from India. *Economic Development and Cultural Change*, **69**(2), 685–725.

Evans, David, & Popova, Anna. 2014. Cash Transfers and Temptation Goods: A Review of Global Evidence. *World Bank Policy Research Working Paper*.

Ghosh, Prabhat, & Kochar, Anjini. 2018. Do welfare programs work in weak states? Why? Evidence from a maternity support program in India. *Journal of Development Economics*, **134**(C), 191–208.

Haushofer, Johannes, & Shapiro, Jeremy. 2016. The short-term impact of unconditional cash transfers to the poor: experimental evidence from Kenya. *The Quarterly Journal of Economics*, **131**(4), 1973–2042.

Hoyer, Silvestra, & Horvat, Ludvik. 2000. Successful breast-feeding as a result of a health education programme for mothers. *Journal of Advanced Nursing*, **32**(5), 1158–1167.

Hoynes, Hilary, Miller, Doug, & Simon, David. 2015. Income, the earned income tax credit, and infant health. *American Economic Journal: Economic Policy*, **7**(1), 172–211.

Jain, Monica. 2015. Indiaâs struggle against malnutritionâis the ICDS program the answer? *World Development*, **67**, 72–89.

Kandpal, Eeshani. 2011. Beyond average treatment effects: distribution of child nutrition outcomes and program placement in Indiaâs ICDS. *World Development*, **39**(8), 1410–1421.

Khera, Reetika. 2015. Children's Development: Baby Steps in Odisha. *Economic and Political Weekly*, 44–49.

Kraemer, Sebastian. 2000. The fragile male. *Bmj*, **321**(7276), 1609–1612.

Lim, Stephen S, Dandona, Lalit, Hoisington, Joseph A, James, Spencer L, Hogan, Margaret C, & Gakidou, Emmanuela. 2010. India's Janani Suraksha Yojana, a conditional cash transfer programme to increase births in health facilities: an impact evaluation. *The Lancet*, **375**(9730), 2009–2023.

Neal, Sarah, Channon, Andrew Amos, & Chintsanya, Jesman. 2018. The impact of young maternal age at birth on neonatal mortality: Evidence from 45 low and middle income countries. *PloS one*, **13**(5), e0195731.

Powell-Jackson, Timothy, Mazumdar, Sumit, & Mills, Anne. 2015. Financial incentives in health: New evidence from India's Janani Suraksha Yojana. *Journal of Health Economics*, **43**, 154–169.

Raghunathan, Kalyani, Chakrabarti, Suman, Avula, Rasmi, & Kim, Sunny S. 2017. Can conditional cash transfers improve the uptake of nutrition interventions and household food security? Evidence from Odisha's Mamata scheme. *PLOS One*, **12**(12), e0188952.

Rajkumar, Andrew Sunil, & Swaroop, Vinaya. 2008. Public spending and outcomes: Does governance matter? *Journal of development economics*, **86**(1), 96–111.

Ramakrishnan, Usha. 2004. Nutrition and low birth weight: from research to practice. *The American Journal of Clinical Nutrition*, **79**(1), 17–21.

Sen, Amartya. 1992. Missing women. *BMJ: British Medical Journal*, **304**(6827), 587.

Shariff, Abusaleh, Singh, Geeta, *et al.* . 2007. Determinants of Maternal Health Care Utilisation in India: Evidence from a Recent Household Survey. *Working Paper*.

Soares, Fábio Veras, Ribas, Rafael Perez, & Osório, Rafael Guerreiro. 2010. Evaluating the impact of Brazil's Bolsa Familia: Cash transfer programs in comparative perspective. *Latin American Research Review*, 173–190.

Thomas, Deborah, Sarangi, Biraj Laxmi, Garg, Anu, Ahuja, Arti, Meherda, Pramod, Karthikeyan, Sujata R, Joddar, Pinaki, Kar, Rajendra, Pattnaik, Jeetendra, Druvasula, Ramesh, *et al.* . 2015. Closing the health and nutrition gap in Odisha, India: A case study of how transforming the health system is achieving greater equity. *Social Science & Medicine*, **145**, 154–162.

Varghese, Beena, Roy, Reetabrata, Saha, Somen, & Roalkvam, Sidsel. 2014. Fostering maternal and newborn care in India the Yashoda way: does this improve maternal and newborn care practices during institutional delivery? *PLoS One*, **9**(1), e84145.

Figure 1: Odisha and Neighboring States

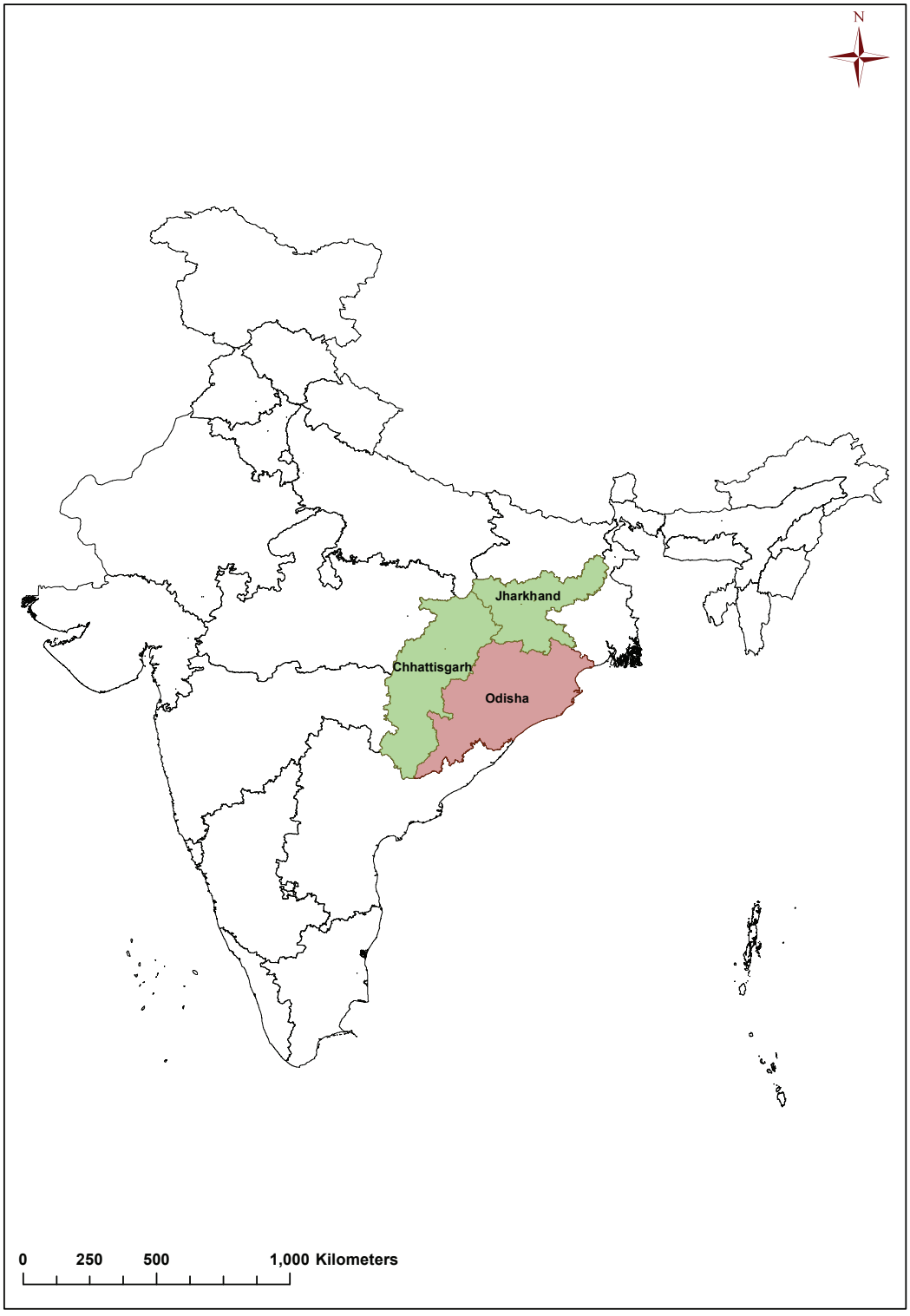
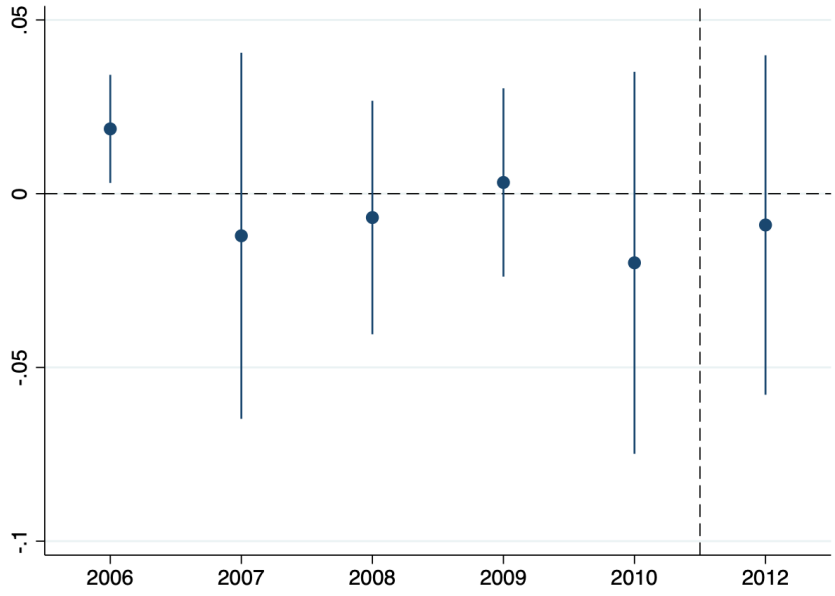
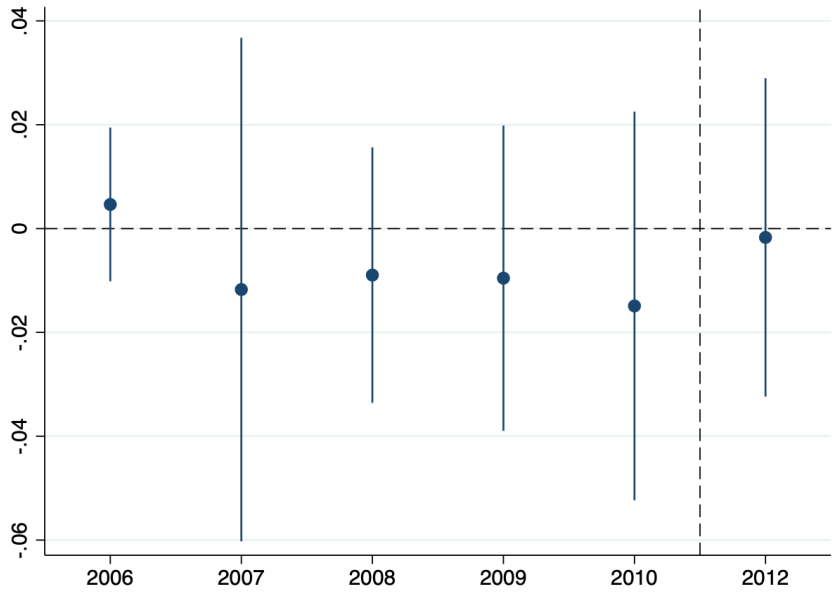


Figure 2: Event Study for IMR and NNM: 2006-12
(Base Year: 2011)

(a) IMR



(b) NNM



Notes: Panel (a) plots the coefficients for each year with 2011 as the base year and Infant Mortality Rate (IMR) as the outcome variables in a triple difference specification using NFHS-4 data from 2006-2012. Panel (b) plots the coefficients for each year with 2011 as the base year and Neonatal Mortality Rate (NNM) as the outcome variables in a triple difference specification using NFHS-4 data from 2006-2012. *Source: NFHS-4*

Table 1: Summary Statistics - Key Outcome Variables

Variable	Mean	S.D.	Definition
	(1)	(2)	(3)
Birth Weight	2.813	0.017	Weight of the child at birth (in kilograms).
Breastfeeding	26.489	0.634	Duration for which the child received any breastfeeding (in months)
Weight-for-Age (WAZ)	-1.682	0.026	z-score of the deviation of weight of child from growth standard for its age
Height-for-Age (HAZ)	-1.611	0.028	z-score of the deviation of height of child from growth standard for its age
Infant Mortality (IMR)	0.045	0.004	=1, if child dies within the first year of birth; 0, otherwise
Neonatal Mortality (NNM)	0.035	0.003	=1, if child dies with the first 28 days of birth; 0 otherwise

Source: NFHS-4, data for births during 2011-12 for three states - Odisha, Bihar and Chhattisgarh.
Notes: Duration of breastfeeding does not refer to exclusive breastfeeding. Weight-for-age and Height-for-Age z-scores are computed in the NFHS-4 using the the new Child Growth Standards released by the World Health Organization (WHO) in 2006. The z-scores are standard deviations from the WHO Child Growth Standards.

Table 2: Effects on Child Outcomes: Child, Mother and Household controls

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(BW)	Breastfeeding	WAZ	HAZ	IMR	NNM
$Bord \times State \times Post$	0.051***	5.254***	0.149***	0.129	-0.008	-0.007
	(0.009)	(0.588)	(0.022)	(0.096)	(0.015)	(0.007)
$Bord \times State$	-0.034**	-0.526**	0.091	0.057	-0.006	0.005
	(0.009)	(0.186)	(0.074)	(0.110)	(0.011)	(0.006)
$Bord \times Post$	-0.033***	-0.633	-0.004	-0.007	0.007	0.010
	(0.008)	(0.551)	(0.019)	(0.092)	(0.015)	(0.007)
$State \times Post$	-0.017*	-4.177***	0.000	0.107	-0.003	-0.001
	(0.008)	(0.520)	(0.024)	(0.094)	(0.015)	(0.007)
Observations	5,350	4,022	6,226	6,226	8,979	8,979
Baseline Mean:	0.993	26.787	-1.564	-1.500	0.041	0.030
Other Controls :						
District Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Father Controls	-	-	-	-	-	-

Source: NFHS-4

Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. Wild-State-Birth order-Clustered Bootstrap p-values are reported in braces. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table 3: Effects on Child Outcomes: All controls

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(BW)	Breastfeeding	WAZ	HAZ	IMR	NNM
Bord × *State* × *Post*	0.069***	5.327***	0.141***	0.107	-0.009	-0.002
	(0.006)	(0.600)	(0.029)	(0.086)	(0.019)	(0.012)
	{0.065}	{0.025}	{0.099}	{0.413}	{0.584}	{0.849}
Bord × *State*	-0.054***	-1.111*	0.115	0.067	-0.004	0.001
	(0.007)	(0.448)	(0.073)	(0.095)	(0.012)	(0.007)
Bord × *Post*	-0.037***	-0.385	-0.009	0.021	0.010	0.011
	(0.003)	(0.525)	(0.025)	(0.081)	(0.019)	(0.012)
State × *Post*	-0.034***	-5.088***	0.025	0.172*	0.003	0.001
	(0.005)	(0.495)	(0.029)	(0.081)	(0.020)	(0.012)
Observations	4,747	3,550	5,525	5,525	7,939	7,939
Baseline Mean:	0.993	26.787	-1.564	-1.500	0.041	0.030
DD Treatment	0.031***	4.943***	0.132***	0.128***	0.000	0.009***
	(0.003)	(0.362)	(0.012)	(0.017)	(0.003)	(0.002)
DD Control	-0.037***	-0.385	-0.009	0.021	0.010	0.011
	(0.003)	(0.525)	(0.025)	(0.081)	(0.019)	(0.012)
Other Controls :						
District Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓	✓	✓

Source: NFHS-4

Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. Wild-State-Birth order-Clustered Bootstrap p-values are reported in braces. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table 4: Effects on Child Outcomes: Treatment Intensity

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(BW)	Breastfeeding	WAZ	HAZ	IMR	NNM
$Bord \times TI \times Post$	0.367***	31.655***	0.810***	0.494	-0.067	-0.025
	(0.034)	(3.028)	(0.173)	(0.467)	(0.106)	(0.066)
	{0.072}	{0.035}	{0.102}	{0.495}	{0.582}	{0.732}
$Bord \times TI$	-0.295***	-8.113**	0.581	0.425	-0.014	0.009
	(0.038)	(2.016)	(0.414)	(0.512)	(0.066)	(0.041)
$Bord \times Post$	-0.036***	-0.593	-0.013	0.027	0.011	0.012
	(0.004)	(0.570)	(0.027)	(0.080)	(0.019)	(0.012)
$TI \times Post$	-0.177***	-28.735***	0.195	1.056*	0.018	0.007
	(0.030)	(2.773)	(0.158)	(0.440)	(0.109)	(0.063)
Observations	4,747	3,550	5,525	5,525	7,939	7,939
Baseline Mean:	0.993	26.787	-1.564	-1.500	0.041	0.030
Other Controls :						
District Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓	✓	✓

Source: NFHS-4

Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *TI* or *Treatment Intensity* is defined as the number of beneficiaries of the scheme during the financial year 2011-12 and 2012-13 per total women in the age group 19-33 in that district according to Census 2011. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. Wild-State-Birth order-Clustered Bootstrap p-values are reported in braces. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table 5: Effects on Child Outcomes - Testing for Pre-Trends

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(BW)	Breastfeeding	WAZ	HAZ	IMR	NNM
$Bord \times State \times Post$	-0.064	-0.690	0.071	-0.056	0.004	0.009
	(0.042)	(0.824)	(0.085)	(0.111)	(0.030)	(0.021)
	{0.388}	{0.446}	{0.685}	{0.608}	{0.919}	{0.700}
$Bord \times State$	0.027	0.498	0.105**	0.182***	-0.012	-0.011
	(0.037)	(1.032)	(0.033)	(0.039)	(0.020)	(0.015)
$Bord \times Post$	0.034	-3.088**	-0.182*	-0.116	-0.023	-0.020
	(0.040)	(0.816)	(0.089)	(0.107)	(0.029)	(0.020)
$State \times Post$	0.011	2.926***	-0.213***	-0.164	0.003	-0.003
	(0.040)	(0.314)	(0.048)	(0.088)	(0.026)	(0.020)
Observations	2,365	4,135	4,497	4,497	7,007	7,007
Other Controls :						
State Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓	✓	✓

Source: NFHS-3 and 4

Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2010; 0 otherwise. State Fixed Effects have been controlled for instead of District Fixed Effects as District identifiers are unavailable in NFHS-3. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2001-05 & 2010 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. Wild-State-Birth order-Clustered Bootstrap p-values are reported in braces. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table 6: Effects on Child Outcomes - Heterogeneity by Sex of the Child

	(1)	(2)	(3)	(4)
	ln(BW)	Breastfeeding	WAZ	HAZ
$Bord \times State \times Post \times Male$	0.163***	2.212	0.215**	0.203
	(0.031)	(3.844)	(0.070)	(0.170)
$Bord \times State \times Post$	-0.015	4.314	0.023	-0.008
	(0.019)	(2.171)	(0.045)	(0.161)
Observations	4,747	3,550	5,525	5,525
DDD Males	0.148***	6.526**	0.238***	0.195***
	(0.015)	(1.857)	(0.045)	(0.046)
	{0.026}	{0.043}	{0.092}	{0.033}
Other Controls :				
District Fixed Effects	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓

Source: NFHS-4

Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. *Male* is an indicator variable that equals 1 if child is male; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors clustered at the state-birth order level are reported in parentheses. Wild-State-Birth order-Clustered Bootstrap p-values are reported in braces. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table 7: Mechanism: Effects on WAZ and HAZ scores through Birth Weight

	WAZ		HAZ	
	(1)	(2)	(3)	(4)
$Bord \times State \times Post$	0.141***	0.061	0.107	-0.057
	(0.029)	(0.065)	(0.086)	(0.057)
	{0.099}	{0.414}	{0.413}	{0.287}
$Bord \times State$	0.115	0.193***	0.067	0.157***
	(0.073)	(0.021)	(0.095)	(0.030)
$Bord \times Post$	-0.009	0.030	0.021	0.099
	(0.025)	(0.065)	(0.081)	(0.063)
$State \times Post$	0.025	0.075	0.172*	0.270***
	(0.029)	(0.053)	(0.081)	(0.057)
$Birth\,Weight$	-	0.308***	-	0.205***
		(0.031)		(0.022)
Observations	5,525	4,296	5,525	4,296
$Other\,Controls$:				
District Fixed Effects	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓
Birth Weight	-	✓	-	✓

Source: NFHS-4

Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. Wild-State-Birth order-Clustered Bootstrap p-values are reported in braces. ***, **, * show significance at 1%, 5% and 10%, respectively.

A Online Appendix

A.1 Additional Results on Fertility

In this section, we discuss the estimation strategy and results for the effect of MAMATA on fertility and related outcomes like probability of birth, probability of birth in birth order greater than 2 as well as spacing between two successive pregnancies. For the analysis of probability of any birth, we construct an indicator variable "Birth" which takes the value one if a woman gives birth in that year and zero otherwise. For probability of birth in birth order greater than two, we construct an indicator variable that takes the value one if the birth was of order 3 or above, i.e., if it was a woman's third or higher child, and zero otherwise. For successive pregnancy gap, we compute the difference (in years) between successive births of a woman.

To estimate the effects on these outcomes, we create a 10-year woman-year panel for the period 2006-15 using the birth history available in NFHS-4. A triple difference strategy is used to ascertain the effect on fertility outcomes where the treatment state post the program is interacted with an eligibility indicator for a woman. As the program benefits are available only for the first two live births of a woman, a woman is considered "eligible" for the program if she has had a total of at most two children by that year. Standard errors are clustered at the state-eligible woman level.

We do not find any significant effects on birth probability but find that birth probability beyond birth order two falls due to the program. We do not find any significant effect on birth spacing either (Table A15). These results show that households may have advanced the birth of children and at the same time reduced total fertility by reducing children beyond two (a number often emphasized in public health programs in India).

Table A1: Main Child Health Programs at National Level and Additional Programs in Odisha and the Control States (2005-15)

	Program	Launched	Eligibility	Key Features
	National			
1	Integrated Child Development Scheme (ICDS) - Supplementary Nutrition Program (SNP)	1975- till date	Pregnant and lactating mothers; Children between the age of 0-6 years	- Pregnant & Lactating Women and 0-3 years old children: Receive take home ration on a daily basis; - Children in the age 3-6 years: Receive hot cooked meals at the Anganwadi Centre
2	Janani Suraksha Yojana (JSY)	2005	Low-performing states: All pregnant women; High-performing states: All pregnant women of age 19 years and above from below poverty line households for first two live births;	Conditional cash transfer with a support of INR 1400 (during 2011-12) with below conditionalities: - Institutional child birth; - Pre- and post-natal care and counseling; - Consumes recommended supplements and vaccinations before pregnancy; - Immunization of children up to 14 weeks of age; - Incentives for the ASHA workers to assist in the above
3	Janani Shishu Suraksha Karyakram (JSSK)	2011	Pregnant women; Sick newborns (under 30 days)	Supplements JSY by providing free entitlements and out-of-pocket expenses support; Pregnant Women: - Diet support in hospital for 3-7 days on need basis; - Drugs and diagnosis support; - Drop back service from hospital after 48 hours of stay Sick Newborn: - Drugs and diagnosis support; - Free transport to and from hospital for treatments
4	Indira Gandhi Matritva Sahyog Yojana (IGMSY)	2010	First two live births of women at least 19 years of age	- Pilot of the now Pradhan Mantri Matru Vandana Yojana (PMMVY); - Conditional maternity benefit scheme (similar) to MAMATA; - Provides financial assistance of INR 4000 over three installments
5	Mission Indradhanush	2014	Children up to 2 years of age	- Complete immunization of children up to 2 years of age with all available vaccines; - Conduct a special 7-days immunization drive in 216 select districts; - This immunization drive is in addition to the general immunization activities conducted by health care workers
	Odisha			
6	Yashoda Program	2008	Pregnant women	Yashodas are volunteers in district hospitals who are given a cash incentive to provide the following services to pregnant women: - Ensure cleanliness of ward where woman delivers; - Retain woman in hospital for 48 hours post-delivery; - Initiate breastfeeding within 1 hour; - Counsel on immunization
7	MAMATA	2011	Pregnant women of age at least 19 years from rural households for first two live births	Conditional cash transfer with a support of INR 5000 in four installments (during 2011-12) if the below conditionalities are met: - Attends Pre- and post-natal care counseling; - Registers pregnancy with the AWC; - Consumes recommended supplements and vaccinations before pregnancy; - Monitors weight of the child at the health facility; - Immunization of children up to 9 months of age
8	SNP Revision	2013	Pregnant and lactating mothers; Children between the age of 0-6 years	Introduction of eggs as a part of the Take Home Ration & Hot Cooked Meals thrice a week
	Chhattisgarh	*No new programs during 2005-2015*		
	Jharkhand	*No new programs during 2005-2015*		

Table A2: Summary Statistics

	Odisha	Control States
	(1)	(2)
Child Characteristics		
Age (in months)	50.572	53.113
Sex (Female)	0.486	0.494
Mother Characteristics		
Age at child birth	25.517	24.721
Age at 1^{st} marriage	19.775	18.158
Previous births	1.110	1.416
Education Level:		
No Education	0.347	0.427
Primary	0.153	0.186
Secondary	0.467	0.359
Higher	0.033	0.028
Father Characteristics		
Age	35.084	33.178
Education Level:		
No Education	0.203	0.201
Primary	0.178	0.167
Secondary	0.435	0.456
Higher	0.058	0.053
Household Characteristics		
Ownership of agricultural land	0.536	0.639
Caste:		
Scheduled Castes	0.234	0.163
Scheduled Tribes	0.279	0.319
Other Backward Classes	0.324	0.470
General	0.137	0.043
Religion:		
Hindu	0.950	0.834
Muslim	0.017	0.085
Christian	0.030	0.022
Others	0.001	0.058
Wealth Level:		
Poorest	0.366	0.395
Poor	0.216	0.260
Middle	0.190	0.160
Rich	0.147	0.110
Richest	0.080	0.075
Observations	3330	5848

Source: NFHS-4

Table A3: Effects on Child Outcomes: Difference-in-Differences Estimation within Odisha

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(BW)	Breastfeeding	WAZ	HAZ	IMR	NNM
$Bord \times Post$	0.027*	4.079*	0.149**	0.124**	0.001	0.008
	(0.003)	(0.367)	(0.002)	(0.002)	(0.005)	(0.003)
Observations	2,171	1,589	2,199	2,199	2,856	2,856
Other Controls :						
District Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓	✓	✓

Source: NFHS-4
Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha during 2011-12 for whom the outcome variables are reported. Standard errors for double difference estimation are clustered at the birth order level and are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A4: Effects on Child Outcomes - Placebo Test on Urban Sample

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(BW)	Breastfeeding	WAZ	HAZ	IMR	NNM
Bord × *State* × *Post*	-0.057	7.243	0.045	-0.873***	0.015	-0.015*
	(0.067)	(4.078)	(0.137)	(0.192)	(0.007)	(0.007)
Bord × *State*	0.010	-5.561	0.263*	0.771**	-0.001	-0.008
	(0.036)	(4.243)	(0.122)	(0.213)	(0.012)	(0.010)
Bord × *Post*	0.057	2.981**	0.198*	0.279	-0.084***	-0.039**
	(0.057)	(0.753)	(0.084)	(0.180)	(0.012)	(0.010)
State × *Post*	0.069	-8.045*	0.162	0.928***	0.001	0.038***
	(0.064)	(3.592)	(0.115)	(0.178)	(0.014)	(0.008)
Observations	1,323	998	1,322	1,322	1,901	1,901
Other Controls :						
District Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓	✓	✓

Source: NFHS-4
Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in urban areas of Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. Wild-State-Birth order-Clustered Bootstrap p-value are reported in braces. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A5: Effects on Child Outcomes: Robustness to Controlling for District-Specific Time Trends

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(BW)	Breastfeeding	WAZ	HAZ	IMR	NNM
Bord × *State* × *Post*	0.065***	5.762***	0.149**	0.131	-0.015	-0.007
	(0.008)	(0.427)	(0.042)	(0.100)	(0.013)	(0.005)
Bord × *State*	-0.051***	-1.747*	0.105	0.035	-0.001	0.004
	(0.011)	(0.685)	(0.078)	(0.106)	(0.009)	(0.004)
Bord × *Post*	-0.032***	-0.441	0.003	0.034	0.011	0.011*
	(0.005)	(0.357)	(0.029)	(0.085)	(0.014)	(0.005)
State × *Post*	-0.119	5.868	0.374	3.212**	0.074	0.065
	(0.151)	(20.081)	(0.443)	(0.984)	(0.077)	(0.127)
Observations	4,747	3,550	5,525	5,525	7,939	7,939
Other Controls :						
District Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓	✓	✓

Source: NFHS-4

Notes: This specification controls for district-level time trends by months. *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A6: Effects on Child Outcomes - Treatment Intensity with District-Time Trends

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(BW)	Breastfeeding	WAZ	HAZ	IMR	NNM
$Bord \times TI \times Post$	0.346***	33.922***	0.833**	0.629	-0.092	-0.045
	(0.041)	(2.207)	(0.223)	(0.542)	(0.073)	(0.029)
$Bord \times TI$	-0.279***	-11.703**	0.530	0.249	0.004	0.023
	(0.060)	(3.691)	(0.433)	(0.577)	(0.051)	(0.022)
$Bord \times Post$	-0.031***	-0.629	0.002	0.040	0.011	0.012*
	(0.005)	(0.381)	(0.030)	(0.084)	(0.014)	(0.005)
$TI \times Post$	-0.501	38.596	1.584	16.846**	0.434	0.373
	(0.845)	(108.566)	(2.394)	(5.395)	(0.382)	(0.663)
Observations	4,747	3,550	5,525	5,525	7,939	7,939
Other Controls :						
District Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓	✓	✓

Source: NFHS-4

Notes: This specification controls for district-level time trends by months. *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *TI* or *Treatment Intensity* is defined as the number of beneficiaries of the scheme during the financial year 2011-12 and 2012-13 per total women in the age group 19-33 in that district according to Census 2011. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A7: Effects on Child Outcomes - Live Births upto 2015

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(BW)	Breastfeeding	WAZ	HAZ	IMR	NNM
Bord × *State* × *Post*	0.058***	1.622***	0.060***	0.015	-0.011	-0.013**
	(0.008)	(0.211)	(0.014)	(0.077)	(0.011)	(0.005)
Bord × *State*	-0.055***	-0.578	0.090	0.078	-0.002	0.005
	(0.006)	(0.370)	(0.070)	(0.080)	(0.010)	(0.005)
Bord × *Post*	-0.030**	3.113***	0.092***	0.103	0.011	0.010*
	(0.008)	(0.136)	(0.020)	(0.075)	(0.011)	(0.005)
Observations	14,125	13,556	15,753	15,753	19,561	19,560
Baseline Mean:	0.993	26.787	-1.564	-1.500	0.041	0.030
Other Controls :						
District Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
State × Year FE	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓	✓	✓

Source: NFHS-4
Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born between 2012-15; 0 otherwise. State-Year Fixed Effects have been controlled for. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-15 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A8: JSY Beneficiaries

	Beneficiaries		
	2010-11	2011-12	Change (%)
Odisha	533,372	634,468	18.95
Control States	689,430	893,605	29.62

Table A9: Effects on Child Outcomes - Robustness to Controlling for JSY Beneficiaries

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(BW)	Breastfeeding	WAZ	HAZ	IMR	NNM
$Bord \times State \times Post$	0.068***	5.215***	0.138***	0.100	-0.011	-0.004
	(0.006)	(0.582)	(0.018)	(0.065)	(0.013)	(0.005)
$Bord \times State$	-0.054***	-1.052*	0.116	0.070	-0.003	0.002
	(0.007)	(0.480)	(0.071)	(0.088)	(0.009)	(0.004)
$Bord \times Post$	-0.037***	-0.301	-0.007	0.025	0.012	0.013**
	(0.003)	(0.542)	(0.015)	(0.055)	(0.013)	(0.005)
$State \times Post$	-0.033***	-4.874***	0.033	0.193**	0.012	0.009
	(0.005)	(0.636)	(0.018)	(0.053)	(0.013)	(0.005)
Observations	4,747	3,550	5,525	5,525	7,939	7,939
Other Controls :						
District Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓	✓	✓

Source: NFHS-4

Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Number of district-level JSY beneficiaries have been controlled for. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A10: Effects on Child Outcomes - Heterogeneity by Birth Order of the Child

	(1)	(2)	(3)	(4)
	ln(BW)	Breastfeeding	WAZ	HAZ
1^{st} *Child* × *State* × *Post*	0.082***	1.301	0.069	0.086
	(0.006)	(0.697)	(0.065)	(0.137)
2^{nd} *Child* × *State* × *Post*	0.053***	6.517***	0.233***	0.158
	(0.004)	(0.507)	(0.057)	(0.126)
State × *Post*	-0.034***	-5.372***	0.021	0.167
	(0.005)	(0.379)	(0.030)	(0.084)
Observations	4,747	3,550	5,525	5,525
Other Controls :				
District Fixed Effects	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓

Source: NFHS-4
Notes: 1^{st} *Child* is an indicator variable that equals 1 if the birth order of a child is 1; 0 otherwise. 2^{nd} *Child* is an indicator variable that equals 1 if the birth order of a child is 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A11: Effects on Child Outcomes - Heterogeneity by Wealth-level of Households

	(1)	(2)	(3)	(4)
	ln(BW)	Breastfeeding	WAZ	HAZ
$Bord \times State \times Post \times Poor\ Household$	-0.021	-7.758**	-0.102	-0.054
	(0.039)	(2.021)	(0.108)	(0.226)
$Bord \times State \times Post$	0.072**	10.346***	0.226***	0.179*
	(0.025)	(1.484)	(0.054)	(0.077)
Observations	4,747	3,550	5,525	5,525
Other Controls :				
District Fixed Effects	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓

Source: NFHS-4

Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. *Poor Household* is an indicator variable that equals 1 if the household is categorized as poor/poorest in the data; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors clustered at the state-birth order level are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A12: Effects on Vaccinations & Full Immunization

	(1)	(2)	(3)
	Vitamin A	Measles	Full Immunization
$Bord \times State \times Post$	0.029**	0.009	0.064*
	(0.008)	(0.012)	(0.028)
$Bord \times State$	-0.015	0.017	-0.013
	(0.010)	(0.009)	(0.016)
$Bord \times Post$	0.006	0.016	0.002
	(0.011)	(0.012)	(0.027)
$State \times Post$	-0.032***	0.034**	0.047*
	(0.004)	(0.009)	(0.023)
Observations	5,832	5,866	5,847
Other Controls :			
District Fixed Effects	✓	✓	✓
Month Fixed Effects	✓	✓	✓
Child Controls	✓	✓	✓
Mother Controls	✓	✓	✓
Household Controls	✓	✓	✓
Father Controls	✓	✓	✓

Source: NFHS-4

Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. *Vitamin A* is an indicator variable that equals 1 if the child receives Vitamin A supplement at 9 months of age; 0 otherwise. *Measles* is an indicator variable that equals 1 if the child receives the measles vaccination at 9 months of age; 0 otherwise. *Full Immunization* is an indicator variable that equals 1 if the child receives all due vaccinations by 1 year of age; 0 otherwise. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A13: Effect on Birth Weight - Self-Reported versus Health Card

	(1)	(2)
	ln(BW) (from Health Card)	ln(BW) (from Recall)
$Bord \times State \times Post$	0.062**	0.034***
	(0.024)	(0.008)
$Bord \times State$	-0.017	-0.089***
	(0.020)	(0.006)
$Bord \times Post$	-0.002	-0.062***
	(0.022)	(0.008)
$State \times Post$	-0.032	-0.006
	(0.021)	(0.008)
Observations	2,281	2,466
Other Controls :		
District Fixed Effects	✓	✓
Month Fixed Effects	✓	✓
Child Controls	✓	✓
Mother Controls	✓	✓
Household Controls	✓	✓
Father Controls	✓	✓

Source: NFHS-4
Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Column (1) presents results for log of birth weight where data was collected from a Health Card. Column (2) presents results on birth weight data from recall. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors for triple difference estimation are clustered at the state-birth order level and are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A14: Effects on Vaccinations - Vaccination Card versus Self-Reported

	Panel A: Vaccination Card			Panel B: Recall		
	Vitamin A	Measles	Full Immunization	Vitamin A	Measles	Full Immunization
	(1)	(2)	(3)	(4)	(5)	(6)
Bord × *State* × *Post*	0.037***	0.043***	0.085**	-0.429**	-0.327	0.146
	(0.003)	(0.010)	(0.032)	(0.138)	(0.193)	(0.160)
Bord × *State*	-0.016	0.013	-0.011	0.441***	0.215	-0.371***
	(0.016)	(0.008)	(0.017)	(0.105)	(0.192)	(0.092)
Bord × *Post*	-0.007	-0.008	-0.009	0.163	0.164	0.045
	(0.006)	(0.012)	(0.030)	(0.139)	(0.143)	(0.170)
State × *Post*	-0.031***	-0.010	0.013	0.096	0.260	0.330**
	(0.004)	(0.010)	(0.027)	(0.153)	(0.147)	(0.098)
Observations	5,433	5,455	5,457	399	411	412
Other Controls :						
District Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	✓	✓	✓	✓	✓	✓
Father Controls	✓	✓	✓	✓	✓	✓

Source: NFHS-4

Notes: *Bord* is an indicator variable that equals 1 if the birth order of a child is 1 or 2; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. Panel A presents results for vaccinations where the data comes from a vaccination card and Panel B presents results from a mother's recall. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. We use data for all births in Odisha and the control states of Jharkhand and Chhattisgarh during 2011-12 for whom the outcome variables are reported. Standard errors clustered at the state-birth order level are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A15: Effects on Fertility, Probability of Higher Order Birth and Pregnancy Gap

	(1) Birth Probability	(2) Birth Probability (>2 order)	(3) Successive Pregnancy Gap
Eligible Women × *State* × *Post*	-0.005	-0.013**	0.031
	(0.007)	(0.004)	(0.132)
Eligible Women × *State*	-0.014	0.027***	-0.009
	(0.007)	(0.002)	(0.064)
Eligible Women × *Post*	0.004	0.004	-0.026
	(0.007)	(0.004)	(0.129)
State × *Post*	0.016***	0.014**	0.109*
	(0.003)	(0.004)	(0.050)
Observations	66,416	66,416	4,508
Other Controls :			
District Fixed Effects	✓	✓	✓
Year Fixed Effects	✓	✓	✓
Mother Controls	✓	✓	✓
Household Controls	✓	✓	✓
Father Controls	✓	✓	✓

Source: NFHS-4

Notes: We construct a Woman-Year panel dataset for the period 2006-2015 to capture the years in which a woman gave birth during that period. *Eligible Women* is an indicator variable that equals 1 for a woman in a given year if by that year she has had a total of 0-2 children; 0 otherwise. *State* is an indicator variable that equals 1 if state of residence is Odisha; 0 otherwise. *Post* is an indicator variable that equals 1 if a child is born in 2012; 0 otherwise. *Birth Probability* is an indicator variable that equals 1 if a woman gave birth in that year; 0 otherwise. *Birth Probability (>2 order)* is an indicator variable that equals 1 if a woman gave birth to a child of birth order 3 or more in that year; 0 otherwise. *Successive Pregnancy Gap* measures the interval between consecutive pregnancies in years. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion, wealth-level and ownership of land. Father controls include present age and education level. Standard errors for triple difference estimation are clustered at the state-eligible women level and are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.

Table A16: Child Health Outcomes and Household Wealth

	ln(BW)		WAZ		HAZ	
	(1)	(2)	(3)	(4)	(5)	(6)
Middle Household	0.014***	0.013***	0.144***	0.111***	0.146***	0.109***
	(0.003)	(0.003)	(0.011)	(0.013)	(0.016)	(0.018)
Rich Households	0.025***	0.023***	0.258***	0.197***	0.284***	0.224***
	(0.003)	(0.003)	(0.013)	(0.015)	(0.017)	(0.020)
Richest Households	0.042***	0.036***	0.461***	0.365***	0.479***	0.380***
	(0.003)	(0.004)	(0.015)	(0.018)	(0.021)	(0.025)
Observations	116,588	92,386	143,776	113,782	143,776	113,782
Other Controls :						
District Fixed Effects	✓	✓	✓	✓	✓	✓
Month Fixed Effects	✓	✓	✓	✓	✓	✓
Child Controls	✓	✓	✓	✓	✓	✓
Mother Controls	✓	✓	✓	✓	✓	✓
Household Controls	-	✓	-	✓	-	✓
Father Controls	-	✓	-	✓	-	✓

Source: NFHS-4

Notes: Households in the data are categorized as *Richest, Rich, Middle and Poor/Poorest* on a wealth index based on the assets owned by the household. *Middle Household* is an indicator variable that equals 1 if the household is categorized as middle-wealth household; 0 otherwise. *Rich Household* is an indicator variable that equals 1 if the household is categorized as rich; 0 otherwise. *Richest Household* is an indicator variable that equals 1 if the household is categorized as richest; 0 otherwise. Month Fixed Effects refer to the month of birth of the child. Child controls include age (in months) and sex. Mother controls include age at childbirth, age at first marriage, number of previous births and education level. Household controls include caste, religion and ownership of land. Father controls include present age and education level. We use data for all births in all states of India except Odisha during 2011-16 for whom the outcome variables are reported. Robust standard errors are reported in parentheses. ***, **, * show significance at 1%, 5% and 10%, respectively.