Maternal Cash Transfers and Child Nutrition: Evidence from India

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Abstract

The effectiveness of conditional cash transfers (CCTs) on short term nutritional outcomes such as household food intake and dietary diversity is well established globally. However, literature on the effects of CCTs on medium and long term outcomes, which include child wasting and stunting, is ambiguous. Evidence from India, where more than a third of children under the age of 5 are stunted and one-fifth are wasted, is particularly sparse. In 2011, Odisha state in eastern India introduced a universal CCT program named "Mamata Scheme". Intended as a partial wage compensation for pregnant and lactating women, the program also aimed to improve health service utilization and infant and young child feeding (IYCF) practices. This paper provides the first causal estimates of the effect of the Mamata Scheme on the nutritional outcomes of young children in Odisha. Understanding program impacts that go beyond uptake and short-term consumption is important, given increases in national budgetary allocations and implementation of conditional maternity benefit schemes throughout India since 2017. I use two rounds of the nationally representative India National Family Health Survey (n=12,248) to test the effect of the Mamata Scheme on two anthropometric measures of child nutrition: wasting and stunting. Triple difference intention-to-treat (ITT) regression estimates find that being eligible for the Mamata Scheme is associated with an increase of 0.18 S.D. in weight-for-height (WHZ) and 0.10 S.D. on height-for-age (HAZ) for children between 0-5 years of age. Disaggregated analyses show that there is heterogeneity in program effects. Children from poor households have substantially lower WHZ and HAZ than those belonging to non-poor households. Policy implications of the findings relate to the targeting of the Mamata Scheme. Currently a universal program, the Mamata Scheme may need to offer additional incentives for children from poor households to realize program benefits.

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Section 1: Introduction

Globally, around 144 million children under the age of five are stunted, and an estimated 47 million worldwide suffer from wasting (WHO, 2019). In India, child undernutrition in the form of wasting and stunting persists, despite rapid economic growth following economic liberalization in 1991. In 2015-16 (NFHS-4, 2015), 38% of Indian children under the age of 5 were stunted, and 21% suffered wasting, representing over 70 million children (Global Nutrition Report, 2018). To address this large but solvable problem, Central and state governments in India have adopted various policies to improve child well-being, among which cash transfers (CTs) targeted to pregnant and lactating women have gained prominence in recent years. In this paper, I examine the impact of financial incentives provided under a maternal cash transfer program in Odisha, India on child nutrition.

In 2011, the state government of Odisha launched the "*Mamata Scheme*", a conditional cash transfer (CCT) program intended to serve as partial wage compensation for pregnant and nursing mothers. The Mamata Scheme aims to improve the health and nutrition status of pregnant and lactating mothers and their infants, by combining a cash incentive with ante- and postnatal care and counselling towards infant & young child feeding practices. All pregnant and lactating women in the state aged 19 or older receive a cash payment for their first two children upon fulfilling health-related conditionalities. The program operates in all districts in the state and is not means-tested, unlike many other CTs. Between 2011 and 2019, more than USD 242 million was disbursed to around 3.9 million pregnant and lactating women in Odisha through the Mamata Scheme (Pragativadi, 2019).

Exploiting exogenous variation in program eligibility, I investigate the long-run effects of the Mamata Scheme on children's nutrition (standardized weight and height measures for children under 5). The main source of identification comes from program eligibility criteria which stipulate that a) only mothers aged 19 and above are eligible for the cash benefit and b) cash benefits are limited to first and second-born children. Using two repeated cross-sections of nationally representative survey data from the National Family Health Survey (NFHS), I assign each child under the age of 5 to a treatment and comparison group, based on their mother's age, child birth order and state of residence. To account for the non-random nature of the program's rollout, I use a difference-in-differences analysis, which rests on the assumption of common trends between treated and non-treated states, and a triple difference analyses which relaxes this assumption. I estimate the intent-to-treat program effects on wasting and stunting for children under 5 years of age, controlling for birth year and month fixed effects.

Programs that target pregnant and nursing mothers are important, as poor maternal health has adverse consequences on child mortality and nutrition (Black et al., 2013), and women in low and middle-income countries (LMICs) often face barriers to accessing crucial maternity care services (Hunter & Murray, 2017). Further, a large body of evidence in demography, economics, and public health shows that nutritional deficits that both occur in-utero and at the start of life are especially detrimental for human capital outcomes including educational attainment, height and wealth in adulthood (Behrman, 2016; Bleakley, 2010; Case et al., 2005; Currie & Almond, 2011; Glewwe et al., 2001; Cesar G. Victora et al., 2008). Thus, interventions introduced in-utero and during early childhood (first 1000 days of life) are likely to be most effective in reducing cognitive impairments and improving economic productivity in adulthood (Hoddinott et al., 2008).

With this paper, I contribute to the literature on cash transfers and child development in three ways. First, my paper provides novel evidence on the impact of a non means-tested CT targeted at pregnant and lactating mothers on child nutrition. Existing work examining CTs and health and nutrition largely focuses on means-tested programs in Latin America and sub-Saharan Africa, most of which do not restrict recipient status to pregnant and nursing mothers. This raises the issue of the extent to which targeting pregnant and nursing women through non means-tested programs affects children's outcomes.

Second, I contribute to the scant literature on cash transfers and nutrition in the Indian context. Although India has the largest number of undernourished children globally, the impact of cash transfer schemes on child nutrition remains underexplored. To the best of my knowledge, Sinha and Yoong (2009) is the only other study that examines cash transfers and children's anthropometric outcomes in India. However, in the 'Apni Beti Apna Dhan' program that the authors examine, both immediate and deferred cash incentives were offered to parents of girl children born in socially disadvantaged and/or poor families. Unlike the Mamata Scheme, the program did not target the first 1000 days of life or have health-related conditionalities, key for impacts on child nutrition.

Third, my paper furthers evidence on CTs and third-order or final nutritional outcomes. The literature on CTs and health and nutrition largely finds improvements in first-order outcomes such as food and health expenditure, and intermediate outcomes such as household dietary diversity and use of health services (see Bastagli et al., 2016 for a review). However, as a body of work, evidence on third order or "final" outcomes such as child anthropometry remains inconclusive (ibid.), and the pathways of impact are not well-understood.

The results of my study suggest that the Mamata Scheme is associated with small improvements in nutritional outcomes among eligible children. For children of women exposed to the program, there is an increase of 0.14 standard deviations (CI: -0.12 to 0.40) in the weight-for-height z-score (WHZ), a measure of wasting. I estimate an effect of 0.10 S.D. (CI: -0.17 to +0.37) for the height-for-age z-score (HAZ), a measure of stunting. For both WHZ and HAZ, I also find evidence of heterogenous effects by household wealth, an important finding as the Mamata Scheme is universal. For children from poor households, the program effect on WHZ is 0.57 S.D. lower than those belonging to higher wealth quintiles. For HAZ, the program effect is 0.45 S.D. lower for children from poor households. Overall, my findings suggest that conditional cash transfers targeted to pregnant and nursing mothers are a moderately effective policy intervention to reduce child wasting and stunting in the Indian context, however heterogeneities by household wealth suggest that there may be higher returns to targeting these demographics.

The rest of my paper is organized as follows. The next section reviews the literature on cash transfers and early-childhood nutrition. Section 3 describes the Mamata Scheme. Section 4 discusses the data. Section 5 and 6 present the identification strategy and results, respectively. Section 7 describes robustness checks, and Section 8 concludes.

Section 2: Nutrition in Early Childhood and Cash Transfer Programs

The first 1000 days from conception to 2 years of age provide a key window of opportunity to shape a child's future health outcomes (Victora et al., 2010; http://www.thousanddays.org). A large body of research in demography, economics and public health shows that nutritional deficits during the first 1000 days negatively affect a range of human capital outcomes in later life, including educational attainment, height, wealth, mental and physical health (Behrman, 2016; Bleakley, 2010; Case et al., 2005; Currie & Almond, 2011; Glewwe et al., 2001; Cesar G. Victora et al., 2008). For nutritional deficits that occur in-utero or at the start of life, the effects on a child's mental (Grantham-McGregor et al., 1999; Pollitt, 1990) and physical growth (Christian & Dillon, 2018) and mortality (Moore et al., 1997) are particularly adverse. Further, these effects may manifest at different stages in the life course, starting from later childhood (Sigman et al., 1991) to adolescence (Mendez & Adair, 1999) and adulthood (Hoddinott et al., 2011). Thus, interventions introduced during pregnancy and the post-natal period are likely to be most effective in reducing cognitive impairments and enhancing economic productivity in adulthood (Dewey, 2016; Hoddinott et al., 2008)

A growing number of low and middle-income countries (LMICs) continue to adopt CTs as part of their social protection strategy to improve children's nutrition and health outcomes. As of 2016 (Bastagli et al., 2016), some 130 LMICs had at least one UCT, and 63 countries had at least one CCT program. CTs may affect children's nutritional outcomes through different pathways. First, by increasing household disposable income, CTs may improve the quality and quantity of household food consumption, either through food purchases and/or investments in food production (Groot et al., 2017). Secondly, additional cash or in the case of CCTs, program conditionalities, may incentivize higher investment in or use of health inputs such as immunization, preventative health care, transportation to health facilities, medicines, safe drinking water and sanitation (ibid.). Cash transfers often target women (The World Bank, 2011), operating under two assumptions: first, that women will spend money differently than men, resulting in better children's outcomes and second, that they will empower women.

Many CTs target women, poor households and/or households with children under 5 years. However, fewer programs specifically target women during pregnancy and the post-natal period. Recent evidence from economics (Chari et al., 2019), and medicine and epidemiology (Cai et al., 2020; Takito et al., 2009) demonstrates that work-related stress during pregnancy is associated with adverse birth outcomes in an LMIC context. Maternal undernutrition is also associated with reduced fetal growth, which increases the risk of neonatal deaths and stunting by 2 years of age (Black et al., 2013). Inadequate breastfeeding increases mortality risk in the first 2 years of life (ibid.). Together, this evidence offers support for providing wage compensation to pregnant and nursing mothers. By means of partial wage compensation, cash transfers targeted to pregnant and nursing mothers may incentivize a reduction in excessive work-related physical activity and exertion during pregnancy, improve diets and incentivize breastfeeding, with implications for children's outcomes.

My paper adds to the literature by providing new evidence on the impact of a maternal cash benefit scheme in India. A large body of work examines the effect of cash transfers on maternity care services (see Hunter & Murray, 2017 for a review). A few studies also examine the effect of broader programs that include a maternal CT component on health service use (Benedetti et al., 2015) or birthweight (Saville et al., 2018). However, to the best of my knowledge, there is no study that investigates the effect of a *non means-tested* CT which only targets pregnant and nursing mothers on child nutrition. I make an important contribution to the literature on the impact of CT program design on long-run effects. Unlike many other programs, the Mamata Scheme is not means-tested in any of the treated districts in Odisha. This raises the issue of the extent to which beneficiary selection based on wealth affects children's outcomes.

Recent evidence on Indian CT programs focuses on the "Janani Suraksha Yojana (JSY)", a national CCT program aimed at increasing institutional delivery and use of reproductive and child-health related services. JSY evaluations have demonstrated positive impacts on institutional births and receipt of antenatal care (Lim et al., 2010; Randive et al., 2013), although evidence also points to poor service quality and targeting and unintended consequences on fertility (Nandi & Laxminarayan, 2016; Powell-Jackson et al., 2015). In 2017, the Central Government of India launched the "Pradhan Mantri Matru Vandana Yojana (PMMVY)", a national CCT program targeted to pregnant women and nursing mothers in all districts in the country. As of 2019-2020, the central government allocation to PMMVY is over USD 300 million (Shukla & Kapur, 2019). Against this backdrop of large annual budgetary allocations to the national CCT program, the question whether CCTs targeted to pregnant and lactating women affect children's nutrition remains underexplored.

Section 3: The Mamata Scheme

3.1: Background

Odisha (formerly Orissa) is a state in eastern India. With a population of over 42 million in 2011 and an estimated poverty rate of 32.6% (Thomas et al., 2015), Odisha is one of the poorest states in India. However, over the last 30 years, Odisha has made significant gains in reducing child undernutrition (stunting) and improving health service delivery, compared to many other economically better off states in the country. Political leadership that enabled policy implementation, combined with financial and technical assistance from several international development partners contributed to strong implementation of different national programs (Kohli et al., 2017). These include the Integrated Child Development Scheme (ICDS) which delivers supplementary nutrition, health education, immunization and health check-ups to pregnant women, lactating mothers, adolescent girls and children under 6 years through community health centres; the multi-pronged National Rural Health Mission (NHRM), which included the introduction of Accredited Social Health Activists (ASHAs) as community health educators and a conditional cash transfer (Janani Suraksha Yojana) to incentivize institutional deliveries and the Public Distribution System (PDS), a national food grain subsidy program.

3.2 Program Description

Launched in September 2011, "Mamata" is a CCT program in Odisha. The program aims to serve as a partial wage compensation to pregnant and nursing mothers, to increase health service utilization, and improve infant & young child feeding practices. As of 2016, the scheme consisted of cash transfers of INR 5000 (USD 70) made in four installments[3] to the beneficiary, starting with the end of the second trimester up to 9 months of age for the infant. Currently, the Mamata Scheme covers 4 million women (Orissa Post, 2020), with the cash benefit of INR 5000 forming about 5% of annual per capita income in the state (Odisha Economic Survey, 2020). Per Odisha government guidelines, all women over the age of 19 years with up to two live births are eligible for receiving the cash transfer[4], upon fulfilment of several accompanying conditions. These vary by installment stage and include pregnancy and childbirth registration, antenatal check-ups, mother and child immunization, counseling towards Infant and Young Child Feeding (IYCF) practices, children's weight checkups, exclusive breastfeeding for 6 months, introduction of age-appropriate complementary foods and receipt of IFA tablets and Vitamin A dose.

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[3] Since 2017, the total amount of INR 5000 is disbursed in two installments with similar accompanying conditionalities (Department of Women & Child Development, Government of Odisha). This change does not affect the present analysis which examines outcomes as of 2015-16.

[4] Starting in 2014, women in Particularly Vulnerable Tribal Groups (PVTG) were exempted from both eligibility criteria, and became universally eligible. While in theory this may bias econometric estimation results downwards, as these women cannot be identified in the data, I do not expect any significant effects given that PVTG women form less than 1% of the sample.

Service delivery in the Mamata Scheme occurs through the over 72,000 Anganwadi Centers (AWCs) in Odisha. Auxiliary Nurse Midwives (ANMs), Anganwadi Workers (AWWs) and Accredited Social Health Activists (ASHAs) are the key frontline workers responsible for service delivery. AWWs are responsible for pregnancy registration at the AWC, maintaining beneficiary documentation related to bank details and conditionalities, maintaining scheme registers, and are supported by the Anganwadi helper. ANMs conduct antenatal checkups, provide vaccination services and IYCF counseling. ICDS Supervisors provide direct management support. The scheme utilizes a Mother-Child Protection (MCP) card (supplied by the Health and Family Welfare Department) as a tracking tool for program conditionalities.

Funds are transferred directly to beneficiary women's bank accounts through an electronic bank transfer. The Mamata Scheme uses the State Bank of India's (SBI) 'Vistaar' platform for these direct benefit transfers (Ministry of Women and Child Development, Odisha). At the district level, the Child Development Project Officer (CDPO) is responsible for these e-transfers. As of 2015-16, 56% of women in Odisha had a bank account they used (NFHS-5). The scheme also involves community participation and monitoring for maintaining transparency in operations. Odisha formed "Jaanch" (Oversight) Committees consisting of multiple stakeholders (one government employee, two self-help group (SHG) Secretaries, a community member with a disability, chairperson of the 'Mothers Committee' and President of the Village Education Committee) to verify Mamata Scheme payment schedules**.**

To date, only one paper (Raghunathan et al., 2017) evaluates the effect of the Mamata Scheme on child and household outcomes. This study uses a single cross-sectional survey that is not representative at the state level, and finds a positive association between the Mamata scheme on health utilization outcomes including pregnancy registration, receipt of antenatal services, receipt of iron and folic acid (IFA) tablets, exposure to counseling during pregnancy, exposure to postnatal counseling, exclusive breastfeeding, full immunization, and household food security. While these results are encouraging, it is not surprising that program enrollment has a positive effect on health utilization, given that these are program conditionalities. My study is the first paper to examine the impact of the Mamata Scheme on wasting and stunting.

Analysis of the Mamata Scheme is of particular interest as several of its program design components may be "enabling" towards achieving longer-term nutrition gains. First, the cash transfer forms a significant amount (5%) of average annual household income in Odisha state (Odisha Economic Survey, 2020). Second, the program is targeted at pregnant and lactating mothers, which covers a period within the first 1000 days of life for children, when cash transfers may have larger potential to improve anthropometric measures. Third, conditionalities include behavior change components such as counselling sessions and micronutrient supplements. These program design features align with related evidence on CT design and implementation that highlights the relevance of transfer size (Manley et al., 2015), timing (Bhatia et al., 2013), recipient gender (Yoong et al., 2012) and complementary actions such as nutritional supplements and behavior change training (Bastagli et al., 2016) for positive impacts on child anthropometry. Table A1 (see appendix) outlines the stage wise conditionalities of the Mamata scheme (as of 2016).

Section 4: Data

4.1: Survey

The data used in this study is from two cross-sections of the National Family Health Survey India (NFHS-3 and NFHS-4). NFHS is a nationally representative, repeated cross-sectional survey of households throughout India conducted in four waves between 1992 and 2016. Following the format of demographic and health surveys conducted worldwide, its main purpose is to provide information on maternal and child health, nutrition, and family welfare in India. The International Institute of Population Studies, Mumbai is the nodal agency coordinating the NFHS, with funding for different rounds provided by the Government of India, USAID, UNICEF, DIFD and the Bill and Melinda Gates Foundation.

The third round of NFHS (NFHS-3), conducted 5-6 years prior to the implementation of the Mamata scheme in Odisha, is considered as the baseline survey in this study. NFHS-3 was carried out in two phases from November 2005 to August 2006 in all 29 Indian states. Nationally, 109,041 households were sampled. The Odisha sample for NFHS-3 consists of 3910 households and is representative at the urban, rural, and state level. 4540 women between 15-49 years and 1592 men aged 15-54 years were interviewed from all the selected households. NFHS-3 includes household-level, women's, and men's questionnaires. The household questionnaire includes details on child anthropometry, the outcome variable of interest in this study. This covers height and weight measurements for all children born after 2001.

NFHS-4, carried out in two phases from January 2015 to December 2016, sampled 601,509 households nationally. Within Odisha state, it covered a representative sample of 30,242 households, interviewing 33,721 women aged 15-49 and 4,634 men aged 15-54. NFHS-4 includes four questionnaires: household, women, men, and a separate module for biomarker measurements. Conducted 4-5 years after Mamata was implemented in Odisha, NFHS-4 is the endline survey for this paper. Figure 1 depicts the timeline of NFHS data collection vis-à-vis the introduction of the Mamata Scheme.

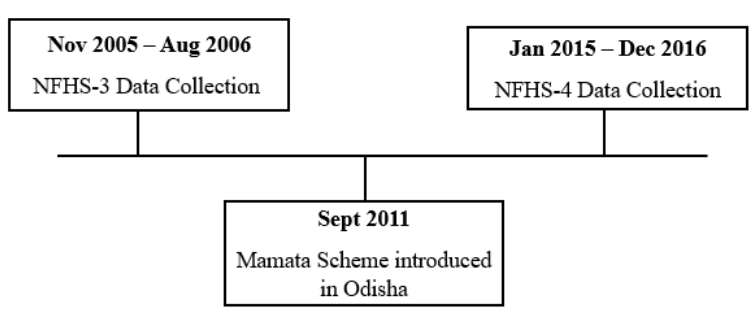

Fig 1: Timeline - Mamata Implementation and NFHS Survey Data Collection

4.2: Sample

The unit of observation in the analysis is an individual child. Mamata eligibility criteria include women who are a) residents of Odisha, b) are 19 years and older and c) have two or fewer children[56] (Table 2, see appendix). Thus, the treatment group comprises of children with birth order 1 or 2, born to women in Odisha who are 19 and older. The analysis covers children from 0 – 4 years 11 months of age, as the NFHS includes height and weight measurements only for children upto 5 years of age. In the present study, the first cohort of eligible children was born in January 2012. As the first installment of Mamata benefits was made available to eligible women at the end of 6 months of pregnancy, the earliest cohort of eligible children would be born 3 months after the program started in September 2011. This assumes a typical gestational length of 9 months. In NFHS-4, 64% of children from the full Odisha sample are eligible for Mamata Scheme benefits.

4.3: Main Variables

The primary outcome of interest in the analysis is child anthropometry. The first indicator of undernutrition is wasting. Per World Health Organization (WHO, 2014) guidelines, a weight-for-height z-score that is two or more standard deviations (S.D) below the WHO Child Growth Standards Median classifies as moderate wasting, while a z-score three or more S.D. below the reference median is considered as severe wasting. The second measure, stunting, is defined as a height-for-age z-score (HAZ) that is two or more S.D below WHO medians for well-nourished populations (ibid.). Both NFHS-3 and NFHS-4 include height and weight measurement for all children under 5 years of age. I calculate child-specific z-scores for both indicators, following WHO's (World Health Organization, 2006) methodology for computation of z-scores. This also includes adjustments for z-scores beyond ± 3 S.D., to better reflect the population distribution. I also use child, mother, and household level characteristics from the survey as covariates.

4.4: Summary Statistics

Mamata eligibility for women in Odisha centered around two main criteria, age of mother (>=19yrs) and number of live births (<2). This allows me to construct two different comparison groups. First, a comparison group consisting of children with birth order 1 and 2, born to mothers older than 19 years from Odisha's

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[5] Starting in 2014, women in Particularly Vulnerable Tribal Groups (PVTG) were exempted from both eligibility criteria, and became universally eligible. While in theory this may bias econometric estimation results downwards, as these women cannot be identified in the data, I do not expect any significant effects given that PVTG women form less than 1% of the sample (Census of Odisha, 2001).

[6] Government employees and their wives are not eligible for Mamata cash benefits. However, the survey instrument does not allow for identification of government employees. While in theory this may bias econometric estimation results downwards, I do not expect any significant effects given that government employees form less than 1% of the Odisha's population (Census of Odisha, 2001).

neighboring state, West Bengal. I also construct a second comparison group with children in Odisha with birth order 3 and higher or born to mothers younger than 19 years, i.e., both conditions which make the mothers ineligible to receive program benefits. Table 3 (see appendix) compares average characteristics and nutrition outcomes for the treatment and two different comparison groups from West Bengal and Odisha.

At the child level, covariates include age and gender. Mother-level characteristics include mother's age, age at marriage, education, and number of live children born. Finally, household-level characteristics that I make use of cover household size and wealth, gender, and education of the household head, whether the household is rural, household religion and caste. I also include measures of distance to health facilities and access to sanitation, electricity, and piped drinking water as these are likely to affect children's nutritional outcomes. While summary statistics for breastfeeding duration, number of vaccines for both women and children, mother's BMI, and household wealth quintile are shown in the summary statistics, I am careful to not include these as covariates in the difference-in-differences specifications, as they are endogenous and likely to be affected by the program.

As Table A3 (see appendix) demonstrates, eligible mothers and children in Odisha have similar observable characteristics to the comparison group in West Bengal. At the household level, the two groups differ on a number of observables, primarily household location (rural/urban), religion, caste, distance to health facility and access to sanitation. Turning to the second comparison group in Odisha, eligible mothers and children now differ from the comparison group in the number of vaccines, maternal education, and age at marriage. Reflective of the definition of this comparison group, there is also a difference in the number of children born to a mother. At the household level, eligible households in Odisha have on average a higher wealth index, more educated household heads, lower distance to health facility, and higher access to piped drinking water, sanitation, and electricity.

4.5: NFHS-2 Data

I also use data from the previous round of the NFHS, which was conducted from 1998-1999 mainly to examine the parallel trends assumption, both in visual and formal tests. NFHS-2 is representative and the national and state levels, and the primary outcome variable of interest from this survey round is child anthropometry, as in consequent rounds.

Section 5: Identification Strategy

Mamata targeted women in Odisha state who were 19 and older and had fewer than 2 live births. Based on these criteria, I estimate the Intent-to-Treat effect of the program on first and second born children of women who are 19 and older. Since program assignment is not strictly "random", merely comparing outcomes for first and second born children of women aged over 19 in Odisha to first and second born children of women aged over 19 in a comparison state (West Bengal) or ineligible children within Odisha (based on mother's age and/or birth order) would not yield accurate estimates of program effects. Hence, I exploit the variation in program eligibility by mother's age, child birth order and state of residence to estimate a difference-in-differences model, using Odisha's neighboring state West Bengal as a comparison group. I then add a comparison group of ineligible children in Odisha for a triple difference estimation.

The comparison group for the difference-in-differences analysis consists of children in Odisha's neighboring state, West Bengal (WB), with birth order 1 or 2, or who were born to women older than 19 years at the time of the child's birth. The choice of West Bengal is justifiable based on shared geographical border, socio-cultural similarities, and no similar state-level CCT program during the same timeframe. This comparison group comprises of children who would qualify for Mamata benefits based on their birth date, birth order, and mother's age, had the program been offered in WB during the same period. Although visually, I find parallel outcome trends between Odisha and West Bengal in the pre-program period, there may have been time-varying unobservables that trended differently between the two states. This includes state-specific factors in the health and nutrition programming landscape that may differ between Odisha and West Bengal and affect the outcome. Thus, I also use a second comparison group consisting of children within Odisha who are ineligible for program benefits, either on account of having a higher birth order (>3) or due to being born to a mother younger than 19 years at the time of the child's birth for a triple difference estimation. I provide more details for the estimation strategy in the next section.

5.1: Difference-in-differences (DID)

Consider child *i*, born to woman *j* at time *t*. I estimate a difference-in-differences specification as below:

$$Y_{ijt} = \beta_0 + \beta_1 \left(Odisha * Post\right)_{jt} + \beta_2 \left(Odisha\right)_{jt} + \beta_3 (Post) + \gamma \mathbf{X}_{ijt} + \eta_t + \varepsilon_{ijt} \qquad (1)$$

Yijt is the outcome (HAZ, WHZ) for child *i*, born to woman *j* at time *t*. β_1 is the DID estimate that indicates the change in nutritional outcomes for eligible children, between the pre- and post-Mamata periods in Odisha, accounting for changes in nutritional outcomes for the comparison group from West Bengal during the same period. $Odisha_{jt}$ indicates whether child *j* belongs to the treatment group (= 1) or the comparison group (= 0) during time *t*. $Post_{jt}$ is a dummy variable which is equal to 1 if child *i* belongs to the dataset after the implementation of the Mamata program (NFHS-4), and zero otherwise. η_t are birth year x birth month fixed effects, which include a dummy for each month and year of birth for child *i*. These control for time-varying unobservables that are common to treatment and comparison groups. ε_{ijt} is the error term and $\mathbf{X}_{ijt}$ is a vector of control variables that are plausibly exogenous to the program: namely, child gender and age; mother's age, age at marriage and education; household size, caste, religion, gender and education of household head, location (rural/urban), distance to health facility, access to electricity and sanitation. Standard errors are clustered at age of woman *j*, as treatment assignment is based on a mother's age. This will account for correlation between outcomes for children born to mothers of similar age. The sample consists of "eligible" children under the age of 5 years in Odisha and West Bengal. The primarily underlying assumption of the difference-in-differences strategy is that nutritional outcomes for children in the treatment and comparison groups would have followed the same trend, in the absence of the program. In Section 7, I perform visual and formal tests of this assumption.

5.2: Triple Difference (DDD)

Using difference-in-differences analysis with a comparison group from West Bengal raises the concern of state-level unobservables that may be trending differently between the two states, for instance, improvements in the healthcare infrastructure and health and nutrition service delivery. Using difference-in-differences analysis with a comparison group of ineligible children from Odisha accounts for state-level confounders, but raises a concern of birth order effects on nutritional outcomes. These are particularly pertinent in this context, as the literature shows a height advantage for higher birth order children in Indian households (Jayachandran & Pande, 2017). To account for both state-level and birth-order confounding effects, I employ a triple difference specification which takes advantage of the variation in eligibility rules by birth order, mother's age, and state of residence. This expands the sample to include children under 5 years of age from Odisha who are not eligible for the Mamata Scheme. The triple difference is given as below, and is my preferred estimation of program impact on child nutrition.

$$\begin{aligned} Y_{ijt} = \beta_0 + \beta_1 \left(Odisha * Eligible * Post\right)_{ijt} + \beta_2 \left(Odisha * Eligible\right)_{ijt} + \beta_3 (Odisha * Post)_{ijt} \\ + \beta_4 (Eligible * Post)_{ijt} + \beta_5 (Odisha)_{ijt} + \beta_6 (Eligible)_{ijt} + \beta_7 (Post)_{ijt} + \gamma \mathbf{X}_{ijt} + \eta_t + \varepsilon_{ijt} \end{aligned} \quad (2)$$

Section 6: Results

In this section, I present the results for the impact of the Mamata Scheme on height-for-age and weight-for-height z-scores (HAZ and WHZ). The estimations control for observed child, mother and household characteristics and include child birth year and birth month fixed effects, with clustering at the level of mother's age. In addition, I evaluate the heterogenous impacts of the Mamata Scheme by household wealth, location, caste, and child gender.

Although the Mamata Scheme is not a means-tested program, program participation may be higher among poorer households in the state, given the size of the monetary incentive (INR 5000 = ~ USD 70). Hence, I interact "Poor" with the DID estimate in models for both stunting and wasting. This includes households in the bottom three quintiles of a national level classification of "Poor" or "Poorest", and covers around 75% of all sample households in Odisha in 2015. A data limitation here is that the NFHS does not ask for household income, which may be a better instrument to understand program effects on poor households. Son preference is well documented in the Indian context. Hence, I also interact child gender with the DID estimates to examine whether program effects are concentrated by child gender. The Mamata Scheme is not geographically targeted, and covers both urban and rural areas in the state. However, the majority of the beneficiaries are in rural areas (Women and Child Development Department, Govt. of Odisha). Hence, I disaggregate results by a household's geographical location.

6.1: Main Results

Difference-in-Differences: Table 1 presents results from the DID specification for weight-for-height (WHZ) and height-for-age (HAZ), with West Bengal as the comparison group. The dependent variables are the z-scores of weight-for-height, a measure of wasting and height-for-age, a measure of stunting. Results from the DID specification for WHZ find a large positive and statistically significant effect size of 0.99, indicating that being eligible for the Mamata Scheme is associated with an improvement of 0.99 S.D. in children's weight-for-height. In a similar vein, the results for HAZ indicate a large positive and statistically significant effect size of 0.91, suggesting that Mamata Scheme eligibility is associated with an increase of 0.91 S.D. in children's height-for-age in Odisha.

Table 1: Mamata and Child Nutrition: DID Regression of Treatment (Odisha) vs. Comparison Group (West Bengal)

Dependent Variables: Weight-for-height and height-for-age z-score for children under 5 years of age

VARIABLES	WHZ	HAZ
Odisha x Post	0.99***	0.91***
	(0.16)	(0.20)
Odisha	0.07	0.01
	(0.08)	(0.09)
Post	-6.81***	-2.20***
	(1.04)	(1.01)
Observations	7,299	7,299
R-squared	0.10	0.21
Mean of the dep. var	-0.98	-1.23

Notes: The table presents estimates of β_3 from equation (1)

The regression controls for child, mother, and household level characteristics, and includes fixed effects for child birth year and month. The sample includes 1st and 2nd born children under the age of 5 years from Odisha and West Bengal, born to mothers older than 19 years. Standard errors clustered at level of mother's age in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Triple Difference: Table 2 presents results from the triple difference specification for WHZ. The results in Model 1 suggest that the Mamata Scheme had a positive impact on children's weight-for-height, however the magnitude of the point estimate shrinks from 0.99 to 0.18 and is no longer statistically significant. The standard errors in the DDD specification are smaller than in the DID, suggesting that the DDD is more well-measured. Since DDD accounts for more confounding factors than the DID, this is suggestive of an upward bias in the DID specification. In Model 2, there is a negative and statistically significant ($p<0.1$) co-efficient of 0.57 on the interaction term for poor households (defined as the bottom three quintiles of a national wealth classification). This suggests that there is wealth heterogeneity in the program effects. In other words, children in poor households experience lower gains in WHZ than those in the upper wealth quintiles. The co-efficient on child gender (female=1) in Model 3 is -0.08 (CI: - 0.59 to + 0.42). Given the width of the confidence interval, I cannot make a precise statement about heterogenous effects by gender.

The point estimate in Model 4, which adds an interaction for household location (rural/urban) is negative (-0.15), but not statistically significant. Here too, the wide confidence interval means that it is difficult to comment on heterogeneity (CI: -0.77 to +0.47) for children in rural households. Model 5 adds an interaction term for scheduled caste households. Children in scheduled caste (socially disadvantaged) households have a WHZ that is 0.39 S.D. lower than in upper-caste households (CI: -0.96 to +0.18). Overall, this suggests that although the Mamata Scheme improves weight-for-height among young children in Odisha on average, children in poor and scheduled caste households may not be seeing improvements.

Table 2: Mamata and Child Wasting: DDD Regression of Treatment (Odisha) vs. Comparison Groups (West Bengal & Odisha)
Dependent Variable: Weight-for-height z-score for children under 5 years of age

	WHZ				
VARIABLES	(1)	(2)	(3)	(4)	(5)
Odisha x Eligible x Post	0.18	0.64**	0.21	0.30	0.39*
	(0.12)	(0.31)	(0.19)	(0.27)	(0.22)
Poor x Eligible x Odisha x Post		-0.57*			
		(0.33)			
Female x Eligible x Odisha x Post			-0.08		
			(0.26)		
Rural x Eligible x Odisha x Post				-0.15	
				(0.32)	
Scheduled Caste x Eligible x Odisha x Post					-0.39
					(0.29)
Observations	12,248	12,248	12,248	12,248	12,248
R-squared	0.09	0.09	0.09	0.09	0.09
Mean of the dep. var	-0.98	-0.98	-0.98	-0.98	-0.98

Notes: The table presents estimates of β_3 from equation (2). Columns 2, 3, 4 and 5 present results for children belonging to households in the bottom three wealth quintiles, girls, children in rural and scheduled caste households, respectively. The sample includes children under the age of 5 years from Odisha and West Bengal. The regression controls for child, mother, and household level characteristics, and includes fixed effects for child birth year and month. Standard errors clustered at level of mother's age in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Results in Table 3 find a positive co-efficient of 0.10 for HAZ (CI: -0.17 to +0.37). In Model 2, the point estimate for poor households is -0.45 (CI: -1.21 to + 0.31). In Models 3 and 5, the co-efficients are small in magnitude (close to zero), but the large standard error precludes drawing a conclusion about heterogenous effects by child gender and household caste. Similarly, it is difficult to precisely comment about the point estimate in Model 4 (rural). Although the co-efficient is positive (0.12), there is a large standard error (CI: -0.59 to +0.82). Overall, the DID results for HAZ suggest that the Mamata Scheme may be associated with small improvements in height-for-age among young children in Odisha on average, and that these gains are lower among poor households.

Table 3: Mamata and Child Stunting: DDD Regression of Treatment (Odisha) vs. Comparison Groups (West Bengal & Odisha)
Dependent Variable: Height-for-age z-score for children under 5 years of age

	HAZ				
VARIABLES	(1)	(2)	(3)	(4)	(5)
Odisha x Eligible x Post	0.10	0.48	0.14	-0.01	0.11
	(0.14)	(0.35)	(0.21)	(0.31)	(0.26)
Poor x Eligible x Odisha x Post		-0.45			
		(0.39)			
Female x Eligible x Odisha x Post			-0.06		
			(0.28)		
Rural x Eligible x Odisha x Post				0.12	
				(0.36)	
Scheduled Caste x Eligible x Odisha x Post					-0.05
					(0.34)
Observations	12,248	12,248	12,248	12,248	12,248
R-squared	0.18	0.19	0.18	0.18	0.19
Mean of the dep. var	-1.23	1.23	1.23	1.23	1.23

Notes: The table presents estimates of β_3 from equation (2). Columns 2, 3, 4 and 5 present results for children belonging to households in the bottom three wealth quintiles, girls, children in rural and scheduled caste households, respectively. The sample includes children under the age of 5 years from Odisha and West Bengal. The regression controls for child, mother, and household level characteristics, and includes fixed effects for child birth year and month. Standard errors clustered at level of mother's age in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 4 presents DDD results broken down by age group. Previous research highlights the importance of early life (first 1000 days) for preventing stunting. Hence, we may expect to see larger improvements in HAZ for the 0-2 age group. Examining effects on HAZ in the full sample, which combines children between 0 and 5 years may underestimate effects on stunting for younger children (Attanasio et al., 2015.; Ferré & Sharif, 2014). As Table 4 shows, improvements in HAZ are higher in the 0-2 age group, with eligible children seeing a rise of 0.19 S.D, while effects in the older age group are smaller in magnitude (0.12 S.D.). Similarly, increases in WHZ attenuate with age. There is a 0.23 S.D. increase in WHZ for the 0 -2 year age group versus a 0.10 S.D. rise for older children. While these estimates are not statistically significant, the magnitude of the co-efficients is suggestive of an age specific trend in both nutritional outcomes.

Table 4: Mamata and Child Nutrition: DDD Regression of Treatment (Odisha) vs. Comparison Group (West Bengal) split by child age
Dependent Variables: Weight-for-height and height-for-age z-score for children under 5 years of age

	Child Age 0 -2 years		Child Age 2-5 years	
VARIABLES	WHZ	HAZ	WHZ	HAZ
Odisha x Eligible x Post	0.23	0.19	0.10	0.12
	(0.22)	(0.23)	(0.15)	(0.17)
Observations	5,109	5,109	7,139	7,139
R-squared	0.10	0.27	0.08	0.10
Mean of the dep. var	-1.19	-1.15	-0.98	-1.58

Notes: The table presents estimates of β_3 from equation (2). The sample includes children under the age of 5 years from Odisha and West Bengal. The regression controls for child, mother, and household level characteristics, and includes fixed effects for child birth year and month. Standard errors clustered at level of mother's age in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

6.2: Health Inputs

Table 6 presents results for the impact of the Mamata Scheme on a number of health inputs. Cash receipt in the Mamata Scheme is contingent upon the woman meeting a set of health-related conditionalities. Prior to childbirth, this involves pregnancy registration at the Anganwadi Center, receipt of iron and folic acid tablets, and at least one antenatal checkup, tetanus vaccine and prenatal counseling session. Post-delivery, conditionalities for continued receipt of the cash benefit include birth registration, polio, DPT and measles vaccination for the child, continued IYCF counseling sessions for the mother, a Vitamin A dose before 1 year of age, exclusive breastfeeding for 6 months (self-reported by mother), weight checkups for the child and the introduction of age-appropriate complementary feeding. The results indicate that Mamata Scheme eligibility is associated with a significant increase of 0.63 (p<0.01) in the number of vaccines received by a child. The program also increases the odds of a child receiving a Vitamin A dose by 88% (p<0.05). This suggests that higher immunization and Vitamin A may act as the mediating pathways for the effects on child anthropometry.

Table 6: Mamata and Health Inputs: DDD Regression of Treatment (Odisha) vs. Comparison Groups (West Bengal & Odisha)

VARIABLES	ANC (1)	Breastfd. (2)	Vaccine (3)	Counsel. (4)	Vit A (5)	IFA (6)
Odisha x Eligible x Post	-0.31	-0.94	0.63***	0.03	0.63**	0.07
	(0.33)	(1.09)	(0.24)	(0.35)	(0.27)	(0.36)
Observations	12,248	12,248	12,248	8,540	12,218	10,267
R-squared	0.17	0.19	0.09	0.07	0.13	0.06
Mean of the dep. var	3.20	20.08	6.96	0.68	0.81	0.90

Notes: The sample includes children under the age of 5 years from Odisha and West Bengal. The regression controls for child, mother, and household level characteristics, and includes fixed effects for child birth year and month. ANC is the number of antenatal care visits during pregnancy. Breastfd. is the number of months of breastfeeding. Vaccine indicates the number of vaccines received by a child. Couns., Vit A. and IFA are dummy variables for whether a mother received counseling after her child was weighed, whether a child ever received a Vitamin A dose, and whether a mother received IFA tablets during pregnancy, respectively.
Standard errors clustered at level of mother's age in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Section 7: Robustness Checks

Given the long time gap between the pre and post survey rounds of NFHS, I conduct following robustness checks to support the validity of the DID findings.

7.1: Testing Parallel Trends

DID is based on the common trends assumption between the treatment and comparison groups. Figure 2 depicts median nutritional outcome trends for the treatment group and comparison groups using NFHS-2, 3 and 4. As annual data are not available for nutritional measures, I rely on two previous NFHS rounds to validate this assumption. A visual inspection of these trends supports the parallel trends assumption in the pre-Mamata period (prior to 2011). For a formal test of the parallel trends assumption, I estimate leads and lags of program effects, following the methodology in (Chari et al., 2019). NFHS-2 data are used to calculate the lead effects while NFHS-4 serves to estimate the lag effect of Mamata Scheme on child nutritional outcomes. The DID specification with "West Bengal" as the comparison group is shown below:

$$Y_{ijt} = \beta_0 + \beta_{+1}\left(Odisha*2015\right)_{jt} + \beta_{-1}\left(Odisha*1998\right)_{jt} + \gamma\mathbf{X}_{ijt} + \eta_t + \varepsilon_{ijt} \tag{3}$$

Odisha is the treatment indicator, equal to 1 for children in Odisha. β_{-1} is the lead program effect and β_{+1} is the lag effect, relative to the omitted lag of NFHS-3 (2005). If outcome trends are similar between the treatment and comparison groups in the pre-Mamata period, and there are no changes in the outcome variables that anticipate the program implementation, the lead effect will be small and statistically insignificant. Table 7 (see appendix) shows that the point estimate for the lead program effect (β_{-1}) is small in magnitude and statistically insignificant for both nutritional outcomes. This result lends support to the parallel trends assumption for the comparison group. The point estimates for the lag program effect (β_{+1}) are larger and statistically significant, as expected. The triple difference specification is shown below:

$$Y_{ijt} = \beta_0 + \beta_{+1}\left(Odisha * Eligible * 2015\right)_{jt} + \beta_{-1}\left(Odisha * Eligible * 1998\right)_{jt} + \gamma \mathbf{X}_{ijt} + \eta_t + \varepsilon_{ijt} \qquad (4)$$

Here Odisha*Eligible is the treatment indicator, equal to 1 for eligible children in Odisha. As with the DID specification, β_{-1} is the lead program effect and β_{+1} is the lag effect, relative to the omitted lag of NFHS-3 (2005). Table 8 (see appendix) shows that the point estimate for the lead program effect (β_{-1}) is small in magnitude and statistically insignificant for both8 nutritional outcomes. The point estimates for the lag program effect (β_{+1}) are larger and statistically significant, as expected. These results aid in ruling out pre-program trends and lend credibility to the identification.

7.2: Placebo Program Implementation

As another robustness test for the parallel trends assumption, I run placebo DID and DDD regressions using data from the previous NFHS rounds (2 and 3). Since the Mamata Scheme did not exist during these periods, I expect that the point estimates will not be statistically significant if there are no confounding trends that differ between the treatment and comparison groups in the pre-Mamata periods. Table 9 (see appendix) presents results from the placebo DID specification. While the coefficients on WHZ and HAZ are not statistically significant, I cannot rule out the existence of pre-trends based on the magnitude of the point estimate and standard errors. Table 10 (see appendix) shows results from the placebo DDD specification. Here, the placebo effects are small and not statistically significant for both nutritional outcomes, lending credence to the empirical strategy.

Section 8: Discussion

In this paper, I use nationally representative survey data to examine the effect of a CCT program intended as partial wage compensation for women during pregnancy and lactation on children's nutrition. Using a triple difference intent-to-treat (ITT) estimation, I analyze the impact of "Mamata Scheme", a conditional cash transfer program in Odisha, India on children's stunting and wasting. I find that being eligible for the Mamata Scheme is associated with an improvement in children's weight-for-height (lower wasting) and height-for-age (lower stunting) for children aged 0-5 years. The results build on previous literature on cash transfers and nutrition (see Bastagli et al. 2016 for a review), which has hitherto found mixed results for program effects on child anthropometry.

Since the Mamata Scheme is not means-tested, I further examine heterogenous effects by household wealth. Given the existence of son preference in Indian families, I also disaggregate my results by child gender. Further, since program beneficiaries primarily reside in rural areas, I break down the results by a household's geographical location. In light of existing evidence on caste-based nutritional disparities in India, I also investigate heterogenous program effects by household caste.

For both weight-for-height (WHZ) and height-for-age (HAZ), I find evidence of heterogeneity in program effects by household wealth. Children in poorer households have a lower WHZ and HAZ than those in non-poor households. This suggests that the Mamata Scheme, which is currently universal, may need to target poorer areas for these children to realize program benefits. Although there is a negative sign on the co-efficient for girls for both nutritional outcomes, large standard errors preclude drawing a conclusion in this regard. The broader literature on cash transfers and height-for-age finds that girls benefit more from cash transfers than boys (Manley et al., 2013). Future work would do well to investigate this relationship in the Indian context, especially as existing evidence from India suggests that there is a female nutritional disadvantage during early childhood due to son preference and parental underinvestment in girls (Jayachandran & Pande, 2017).

Further, I find evidence of caste heterogeneity in the Mamata Scheme's impact on WHZ. Children from scheduled caste households have substantially lower weight-for-height z-scores than those belonging to upper caste families. In case of HAZ, there is small negative co-efficient of -0.05, but the large standard error makes it difficult to make a precise statement about the direction of the effect.

Since changes in stunting usually take longer to manifest, studies that examine anthropometry measures for shorter durations often fail to find reduction in stunting. With data that spans a decade, I am able to overcome this limitation and include children upto 5 years of age in my sample. Since including older children may underestimate the effects on HAZ for younger age groups, I separately analyze program effects for children younger and older than 2 years, and find that improvements are concentrated in the 0-2 age group. Similarly, the heterogeneous effect estimates for rural households suffer from a large standard error.

CCTs continue to gain in popularity in India, as evidenced by the introduction of the national maternity benefit scheme in 2017. Overall, the results of this paper suggest that maternal cash transfers are associated with modest improvements in child anthropometry. In the Indian context, the government would do well to make investments in complementary factors such as maternal education, access to clean water and sanitation, care practices and health care, in addition to budgetary allocations in maternal cash benefit programs.

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Appendix

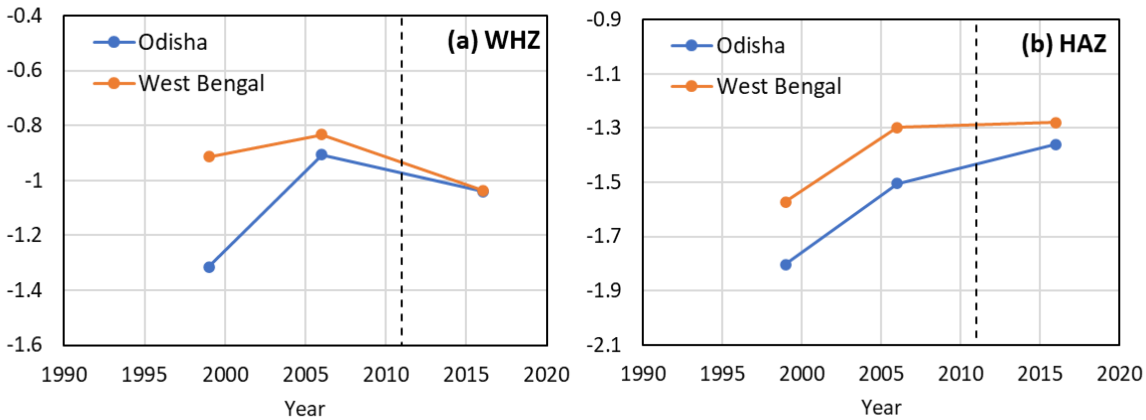

Fig A1: Child Nutrition Outcomes for Treatment and Comparison Groups (West Bengal) across NFHS 2, 3 and 4. Dotted black line highlights 2011, the start of the Mamata Scheme.

Table A1: Mamata Scheme Conditionalities

<table>
<tr>
<td>Installment 1 (end of second trimester: INR 1500)
• Register pregnancy at AWC
• Receive at least one ANC (optimal 3)
• Receive IFA tablets
• Receive at least one TT vaccination (optimal 2)
• Receive at least one counseling session at the AWC/Village Health and Nutrition Day (VHND)

Verification
• MCP Card
• Scheme Register</td>
<td>Installment 2 (3 months after delivery: INR 1500)
• Register child’s birth
• Child has received BCG vaccination
• Child has received Polio 1 and DPT-1 vaccination
• Child has received Polio 2 and DPT-2 vaccination
• Child has been weighed at least 2 times since birth (optimal 4)
• Mother has attended at least two IYCF counseling sessions at the AWC/ VHND/ Home visit (optimal 3)

Verification
• MCP Card
• Scheme Register</td>
</tr>
<tr>
<td>Installment 3 (6 months after delivery: INR 1500)
• Child has been exclusively breastfed for first 6 months (self-reported by mother)
• Child has been introduced to complementary foods upon completing 6 months
• Child has received Polio 3 and DPT-3 vaccination
• Child has been weighed at least 2 times between 3 and 6 months (optimal 3)
• Mother has attended at least two IYCF counseling sessions between 3 and 6 months of lactation at the AWC/ VHND/ Home visit (optimal 3)

Verification
• MCP Card
• Scheme Register
• Self-certification on MCP card</td>
<td>Installment 4 (9 months after delivery: INR 1000)
• Child has received measles vaccine before one year
• Child has received first dose of Vitamin A before one year
• Age appropriate complementary feeding is introduced and continuing
• Child has been weighed at least two times between 6 and 9 months

Verification
• MCP Card
• Scheme Register
• Self-certification on MCP card</td>
</tr>
</table>

Reproduced from (Aswathy et al., 2014)

Notes - MCP: Mother Child Protection; AWC: Anganwadi Center; AWW: Anganwadi Worker; IFA: Iron Folic Acid; ANC: Antenatal Care; TT: Tetanus Toxoid; DPT: Diptheria, Pertusis (Whooping Cough); BCG: Bacillus, Calmette and Guerin; IYCF: Infant and Young Child Feeding

Table A2: Mamata Scheme Eligibility (Odisha Residents)

Eligible	Ineligible
Age of mother: 19 – 49 years AND Child's Birth Order: 1, 2	Age of mother: 15 – 18 years OR Child's Birth Order: 3 and higher

Table A3: Summary Statistics for Treatment and Comparison Groups
(sample limited to households with children under 5 years)

	Treatment Group (Odisha Eligible) mean/sd	Comparison Group 1 (West Bengal Eligible) mean/sd	Comparison Group 2 (Odisha Ineligible) mean/sd
Child-Level Characteristics			
Gender of child (Girl=1)	0.49	0.49	0.48
	(0.50)	(0.50)	(0.50)
Child age in years	2.42	2.10	2.53
	(1.13)	(1.00)	(1.11)
No. of vaccines received	7.07	7.29	6.63
	(2.12)	(1.67)	(2.51)
Months of breastfeeding	18.81	19.07	19.41
	(13.87)	(12.00)	(13.98)
Child been breastfed at least 24 months	0.74	0.80	0.73
	(0.44)	(0.40)	(0.44)
Mother-Level Characteristics			
Mother's age in years	26.70	25.60	27.85
	(3.96)	(3.80)	(6.45)
Mother completed secondary education	0.65	0.64	0.34
	(0.48)	(0.48)	(0.47)
No. of tetanus injections mother received	2.00	2.04	1.93
during pregnancy	(0.62)	(0.62)	(0.70)
Age of Mother at marriage (yrs)	20.21	19.06	17.35
	(3.36)	(3.36)	(3.16)
Body mass index (BMI) of Mother	20.96	21.01	19.89
	(3.79)	(3.75)	(3.18)
No. of children born to Mother	1.62	1.60	2.88
	(0.60)	(0.57)	(1.35)
Household-Level Characteristics			
Household size	5.31	5.83	5.92
	(2.20)	(2.82)	(1.94)
Household Wealth Index (1-Poorest to 5-	2.42	2.81	1.77
Richest)	(1.29)	(1.32)	(1.03)
Rural	0.81	0.66	0.85
	(0.40)	(0.48)	(0.35)
Household head is female	0.10	0.10	0.08
	(0.30)	(0.30)	(0.27)

Household head completed secondary education	0.52	0.48	0.33
	(0.50)	(0.50)	(0.47)
Scheduled Caste/Tribe	0.80	0.50	0.89
	(0.40)	(0.50)	(0.31)
Hindu	0.94	0.72	0.91
	(0.24)	(0.45)	(0.28)
Health facility is too far	0.36	0.28	0.45
	(0.48)	(0.45)	(0.50)
In-house access to piped drinking water	0.09	0.12	0.04
	(0.29)	(0.33)	(0.19)
Household has electricity	0.86	0.86	0.73
	(0.35)	(0.35)	(0.44)
Fraction of households with own toilet	0.31	0.47	0.17
	(0.46)	(0.50)	(0.37)
Nutrition Outcomes			
WHZ	-0.98	-0.98	-1.26
	(1.34)	(1.32)	(1.29)
HAZ	-1.25	-1.18	-1.69
	(1.59)	(1.52)	(1.56)
Observations	5495	2352	3359

Table A4: Testing Parallel Trends - DID regression using leads and lags.

	(1)	(2)
VARIABLES	WHZ	HAZ
Odisha x 1998	0.11	0.16
	(0.10)	(0.11)
Odisha x 2015	0.92***	0.90***
	(0.15)	(0.17)
Observations	8,175	8,175
R-squared	0.11	0.22

Notes: The table presents estimated leads and lags of the Intent-to-Treat (ITT) effects of the Mamata Scheme on child nutrition. All effects are relative to 2005-6, which is the period before program implementation. The sample includes 1st and 2nd born children under the age of 5 years from Odisha and West Bengal, born to mothers older than 19 years. The regression includes controls for child, mother and household level characteristics and fixed effects for child birth year and month. Standard errors clustered at level of mother's age in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A5: Testing Parallel Trends - DDD regression using leads and lags.

VARIABLES	(1) WHZ	(2) HAZ
Odisha x Eligible x 1998	-0.06 (0.06)	-0.02 (0.08)
Odisha x Eligible x 2015	0.17*** (0.04)	0.12*** (0.04)
Observations	14,116	14,116
R-squared	0.09	0.21

Notes: The table presents estimated leads and lags of the Intent-to-Treat (ITT) effects of the Mamata Scheme on child nutrition. All effects are relative to 2005-6, which is the period before program implementation. The sample includes children under the age of 5 years from Odisha and West Bengal. The regression includes controls for child, mother and household level characteristics and fixed effects for child birth year and month. Standard errors clustered at level of mother's age in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A6: Testing Parallel Trends - DID placebo regression (NFHS 2 & 3)

VARIABLES	(1) WHZ	(2) HAZ
Odisha x 2005	0.18	-0.12
	(0.15)	(0.15)
Odisha	-0.12	0.07
	(0.13)	(0.13)
2005	-1.22	2.66**
	(1.14)	(1.10)
Observations	2,082	2,082
R-squared	0.15	0.33

Notes: The table presents estimated Intent-to-Treat (ITT) effects of a placebo implementation of the Mamata Scheme on child nutrition. Placebo implementation is assumed to start between 1999 and 2005. The sample includes 1st and 2nd born children under the age of 5 years from Odisha and West Bengal, born to mothers older than 19 years. The regression includes controls for child, mother and household level characteristics and fixed effects for child birth year and month. Standard errors clustered at level of mother's age in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A7: Testing Parallel Trends - DDD placebo regression (NFHS 2 & 3)

	(1)	(2)
VARIABLES	WHZ	HAZ
Odisha x Eligible x	0.02	-0.07
2005	(0.15)	(0.16)
Odisha x Eligible	-0.07	0.03
	(0.11)	(0.11)
Odisha x 2005	0.09	-0.04
	(0.08)	(0.09)
Observations	4,422	4,422
R-squared	0.11	0.28

Notes: The table presents estimated Intent-to-Treat (ITT) effects of a placebo implementation of the Mamata Scheme on child nutrition. Placebo implementation is assumed to start between 1999 and 2005. The sample includes children under the age of 5 years from Odisha and West Bengal. The regression includes controls for child, mother and household level characteristics and fixed effects for child birth year and month. Standard errors clustered at level of mother's age in parentheses.

*** p<0.01, ** p<0.05, * p<0.1