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Does Better Health Seeking Behaviour Ensure Improved Health Outcomes? Evidence from the Muthulakshmi Reddy Maternity Benefit Scheme in India

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ABSTRACT *This paper assesses the effects of the Muthulakshmi Reddy Maternity Benefit Scheme (MRMBS), a conditional cash transfer programme targeted towards pregnant women in Tamil Nadu, India. Using the National Family Health Survey data from 2005-06 and 2015-16, we estimate the impact on health-seeking behaviour and nutritional outcomes among children. Exploiting the exogenous timing of a substantial increase in the programme's financial assistance along with birth order and state of residence, we employ triple difference regression framework to estimate the effects. We find significant improvements in health-seeking behaviours stated as pre-condition of receiving MRMBS transfers, like pregnancy registration, institutional delivery and immunisation. We also observe an improvement in indicators not linked with the programme such as antenatal check-ups, tetanus shots and iron tablets intake by pregnant mothers and immediate breastfeeding after birth. However, the programme failed to improve health outcomes like stunting, wasting and underweight. To investigate the lack of gains, we examine how the cash transfers were likely spent. While we did not observe higher consumption in temptation goods or assets, there is suggestive evidence of increased investments in toilets. Despite these improvements, health outcomes remained unchanged possibly due to no improvement in children's dietary quality and engagement with health workers.*

KEYWORDS: Muthulakshmi Reddy Maternity Benefit Scheme; Tamil Nadu; CCT; health-seeking behaviour; triple difference regression

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1. Introduction

Improving maternal and child health has profound implications for social, economic, and human development. The access to adequate care, nutrition, and medical support during pregnancy and childbirth directly influences both maternal well-being and infant survival. This interdependence is especially critical during the first 1,000 days of life, often referred to as the ‘window of opportunity,’ as this period crucially shapes future welfare outcomes, including educational achievement, financial well-being, and mental and physical health (Case, Fertig, & Paxson, 2005; Glewwe, Jacoby, & King, 2001; Rampal, 2013). The ‘fetal origins’ hypothesis, most prominently advanced by epidemiologist, David J. Barker, posits that intrauterine conditions, particularly poor nutrition can increase the risk of adverse health outcomes later in life, such as obesity, cardiovascular disease, and diabetes (Barker, 1990). A large body of evidence shows that early-life conditions, including maternal health, nutrition, and access to care, have persistent impacts on birth outcomes, physical growth, and cognitive development (Almond, Currie, & Duque, 2018; Almond & Currie, 2011). Nutritional deprivation and adverse health shocks during this period can lead to irreversible deficits, including stunting and lower educational attainment later in life. The Sustainable Development Goal (SDG) 3 on good health and well-being acknowledges this by targeting improvements in maternal and early childhood health by 2030.¹

Over the past two decades, conditional cash transfer (CCT) programmes have emerged as critical instruments in supporting healthcare needs of vulnerable families from the low- and middle-income countries (Bastagli et al., 2019). These transfers, typically directed to pregnant and lactating mothers, are designed to incentivise the uptake of prenatal and postnatal care while helping recipients overcome financial barriers and invest in better nutrition and health. Nevertheless, evidence on the effectiveness of these programmes in improving health-seeking behaviour and outcomes has been mixed. For example, such programmes have demonstrated success in increasing immunisation rates in Honduras (Morris, Olinto, Flores, Nilson, & Figueiró, 2004a), but no effects were found in Brazil or Zimbabwe (Morris, Flores, Olinto, & Medina, 2004b; Robertson et al., 2013). With respect to health outcomes, while the PROGRESA programme in Mexico reported a reduction in disease prevalence, the Red de Protección Social (RPS) from Nicaragua showed no impact on haemoglobin levels or anaemia (Barham, Brenzel, & Maluccio, 2007). Similarly, CCT programmes in Brazil were found to have no significant effect on child health outcomes (Soares, Ribas, & Osório, 2010). In India, the results have been equally inconclusive (Patwardhan, 2023; von Haaren & Klonner, 2021). This paper contributes to the existing literature on CCT programmes by evaluating the impact of expansion of Muthulakshmi Reddy Maternity Benefit Scheme (MRMBS) implemented in the Indian state of Tamil Nadu (TN).

Literature on the effect of cash transfers in India has extensively studied the Janani Suraksha Yojana (JSY), which is among the largest CCTs targeted towards poor pregnant women. These studies have demonstrated significant improvements in prenatal care, immunisation, and institutional delivery (Debnath, 2021; De & Timilsina, 2020; Powell-Jackson, Mazumdar, & Mills, 2015). However, another study by von Haaren and Klonner (2021) finds that the Indira Gandhi Matritva Sahyog Yojana (IGMSY) implemented since 2011 led to negligible increase in health-seeking behaviour as well as health outcomes. Research on state-specific maternal support through CCTs like the MAMATA in Odisha, also indicates a positive impact on birth weight and duration of breastfeeding while reducing child wasting and stunting (Kekre & Mahajan, 2023; Patwardhan, 2023). Nevertheless, the programme showed insignificant gains in other health outcomes like height-for-age scores, infant and neonatal mortality.

Our study examines the effects of an increase in cash transfer amount under MRMBS, a CCT programme implemented in TN with dual objectives: reducing maternal and infant mortality and providing partial wage protection during and after pregnancy for the first two childbirths of a woman aged 19 years or more. The cash transfer was increased to Rs. 6,000 (\$72) in September 2006,² and later increased to Rs. 12,000 (\$144) in 2011³. By offering conditional financial support at various stages of pregnancy, it seeks to improve prenatal health and preparedness for

childbirth through measures such as antenatal check-ups. Post-childbirth support aims to sustain health-seeking behaviours during the early stages of child development recognising the critical window of opportunity, promoting practices like immediate breastfeeding initiation, immunisation, and positive health behaviours.

This paper assesses the impact on a set of health-seeking behaviour and health outcomes. In particular, we consider behaviours that constitute the pre-conditions for receiving cash like pregnancy registration, institutional delivery and immunisation, and also a set of health indicators that were not explicitly linked to the programme like antenatal check-ups (ANC), consumption of iron tablet during pregnancy, tetanus shot taken by pregnant mothers, and initiating breastfeeding immediately after birth. Additionally, we estimate the effects, if any, on child health outcomes like stunting, wasting, and being underweight. To study the situation before the cash transfer of Rs. 6000 was offered, we used data from National Family Health Survey (NFHS)-3 conducted in 2005–2006. To study the situation, post enhanced transfer under the programme, we use data from NFHS-4 conducted in 2015–2016. We utilise the exogenous timing of a substantial increase in cash transfer from Rs. 500 to Rs. 6000 and then to Rs. 12,000 and apply a triple difference regression framework to assess the programme gains.

The findings indicate a robust and significant improvement in conditional health-seeking indicators, including pregnancy registration, institutional delivery and immunisation. We also find a discernible improvement in other unconditional health-seeking behaviours like initiation of immediate breastfeeding, intake of iron tablets and taking tetanus injection during pregnancy. Despite these positive impacts, we fail to find any evidence of improvement in the likelihood of children being stunted, wasted, and underweight. To explore the observed absence of health effects, we first examine the likely avenues of expenditure. While we find no evidence of increase in consumption of temptation goods or possession of durable assets, we observe a significant jump in access to toilets. Acknowledging that this appears counterintuitive, as improved sanitation practices can effectively enhance children's health outcomes, we propose two potential reasons for the negligible health impact. First, no improvement in diet quality like intake of dairy products, meat, eggs, or dietary diversity and meal frequency is observed among children of beneficiary mothers. Second, the programme did not enhance beneficiaries' engagement with health workers, both of which might be necessary conditions to achieve better health.

The paper makes two important contributions. First, it adds to the growing literature on the effects of CCTs on health-seeking behaviour as well as health outcomes. In particular, it underscores the role of transfer size of CCTs in affecting welfare outcomes. Importantly, Powell-Jackson et al. (2015) document that higher amounts of cash transfer under JSY were accompanied with larger impacts on institutional deliveries. Other studies also document improvements in child health indicators such as reductions in wasting and mortality, particularly in contexts where transfer sizes are substantial and accompanied by increased utilisation of healthcare services (Mathur & Sen, 2025; Taneja & Roy Chowdhury, 2025). Our study extends this line of inquiry by showing that a meaningful magnitude of cash transfers can be effective in improving health-seeking behaviour. Second, with respect to the intervention, this study is among the first to explore the effects of the MRMBBS expansion, implemented in the state of TN, which is substantially developed in terms of economic and social well-being, and is considered among the best-performing states in India. To this end, this paper explores the marginal returns from a CCT targeted towards pregnant women in a state that has already made significant progress with respect to child and maternal health outcomes and health-seeking behaviour.

Overall, our study also assumes importance in the context of India, where evidence on the effects of CCTs on child health outcomes remains mixed. Beyond physical health, CCTs like the JSY have also been shown to have a positive effect on psychosocial, gender and demographic outcomes (Javadekar & Saxena, 2025; Nandi & Laxminarayan, 2016). However, a growing body of evidence also highlights important limitations in translating improved service utilisation into

better health outcomes. For example, increases in institutional delivery have not consistently resulted in improved maternal or child health, often due to poor quality of care and persistent out-of-pocket expenditures (Coffey, 2014). More broadly, the effectiveness of income transfers in improving child nutrition appears to depend critically on complementary conditions such as sanitation and public health infrastructure (Weaver, Sukhtankar, Niehaus, & Muralidharan, 2024). Taken together, this literature suggests that while CCTs are effective in shifting health-related behaviours, their impact on final health outcomes is contingent on a broader ecosystem of complementary inputs. This provides a useful lens to interpret our findings, where improvements in health-seeking behaviour do not translate into measurable gains in child nutritional status. In terms of policy implications, this could involve complementary interventions to improve diet quality of children, and incentivising health workers for higher engagement with the people.

The paper is structured as follows. Section 2 provides the description of MRMBs. Section 3 explains the datasets and variables and Section 4 lays down the estimation strategy. Section 5 discusses the results and Section 6 elucidates the possible mechanisms. Section 7 discusses the policy implications and draws conclusions.

2. Programme description

The MRMBs, a CCT scheme implemented in TN, aims to reduce maternal and infant mortality by linking financial assistance to specific health-related conditions. In particular, the disbursement of benefits is tied to (i) registration of pregnancy, (ii) institutional delivery, and (iii) completion of key immunisation requirements for the child, with each payment released in stages upon fulfilment of these conditions, respectively. In addition to these explicit conditionalities, the programme is intended to improve maternal and child health more broadly by relaxing financial constraints, thereby enabling pregnant women to invest in nutrition and devote time to postnatal care without immediate livelihood pressures.

The scheme was started in 1987 with financial assistance of Rs. 200 (\$2.4) for pregnant mothers, which was later raised to Rs. 300 (\$3.6) and Rs. 500 (\$6) in 1992 and 1995 respectively. An independent report highlighted that the uptake of the programme in the initial few years was rather low for reasons that include excessive paperwork, the necessity for multiple visits, delays, transportation costs, and even instances of corruption (Prasad, Swaminathan, Murugan, Shanmugavelayutham, & Nundy, 2015).

In September 2006, the cash transfer was significantly increased to Rs. 6000 (\$72) and the guidelines were formalised. As per the scheme, the cash assistance was provided to pregnant women for the first two live births. These women had to be at least 19 years old at the time of childbirth. It was only after 2006 that a significant shift was observed with Primary Health Centres (PHCs) experiencing a four-fold increase in deliveries in TN (Pandian, Suresh, Desikachari, & Padmanaban, 2013). The enhancement of 24 × 7 services across all PHCs, coupled with improvements in infrastructure, human resources, and women-friendly services, contributed to the positive perception of PHCs. Between 2006 and 2011, over Rs. 14300 million (\$172 million) was disbursed and more than 2.6 million women benefitted from the scheme (Balasubramanian & Ravindran, 2012).

Later, in 2011 the cash amount transferred to the beneficiaries was doubled to Rs. 12,000 (\$144). The money was disbursed in three equal instalments subject to beneficiaries meeting the requisite conditions. The beneficiary received the first instalment after registration of the pregnancy within 16 weeks of pregnancy upon registration of the pregnancy; the second instalment was released after delivery provided the delivery was in a government hospital or private medical facility. The final instalment was released to the mother, conditional on the immunisation status of the child. The beneficiaries need to provide proof of completion of the third dose of DPT, Hepatitis B, and Polio vaccines for the newborn.⁴

Table 1. Amount allotted and number of beneficiaries in MRMBS

Year	Amount allotted (Rs. Millions)	Number of beneficiaries
2006–2007	1000.0	2,41,095
2007–2008	3000.0	6,79,831
2008–2009	3500.0	5,79,821
2009–2010	3600.0	5,99,126
2010–2011	3600.0	5,81,790
2011–2012	6600.0	6,73,093
2012–2013	7167.7	6,70,313
2013–2014	7167.7	6,63,623
2014–2015	6670.0	6,65,240
2015–2016	6670.0	6,35,225
2016–2017	6670.0	6,49,904
2017–2018	6750.0	7,14,718
2018–2019	9578.7	7,06,792
2019–2020	9578.7	7,65,822
2020–2021	9578.7	8,59,117
2021–2022	9578.7	7,94,779
2022–2023	8156.6	7,69,473
2023 – 2024	9910.0	8,00,146

Source: Policy note of Health and Family Welfare Department, Government of Tamil Nadu, various years (2014–15 to 2023–24).

Available at: https://www.tn.gov.in/document.php?dep_id=MTE=&year=MjAyMy0yMDI0&cate_name=YWxs

Table 1 gives an overview of the amount allotted by the government under this scheme over years, along with the number of beneficiaries. Expectedly, we see a considerable jump in the allotted amount in 2011–2012, after which the number of beneficiaries remained stable at around 800,000. Existing studies based on primary survey data have documented that the MRMBS led to an increase in healthcare utilisation by pregnant women as well as an improvement in health-seeking behaviour (Balasubramanian & Ravindran, 2012; Srinivasan, Ganesan, Premkumar, & Kang, 2020). To the best of our knowledge, this study is the first attempt to rigorously evaluate the impact of the expansion of programme benefits on health.

3. Data and variables

We consider the two rounds of the NFHS conducted in 2005–2006 (NFHS-3) and 2015–2016 (NFHS-4) for the purpose of the analysis. These surveys are representative at the national and state levels and are analogous to the demographic and health surveys administered in several countries. The surveys are conducted by the International Institute for Population Sciences (IIPS), under the supervision of the Ministry of Health and Family Welfare of the Government of India. These are cross-sectional surveys and provide information related to health status, assets, and other characteristics of households.

NFHS separately interviews women in the age group of 15–49 years and collects information related to their birth histories. Specifically, it collects detailed information related to ANC, place of birth, birth order, weight, height, and immunisation of children below the age of 5 years at the time of the survey. The NFHS-3 and NFHS-4 surveys collected information on height, weight, and other details of children born during the 5 years preceding the survey date. The NFHS-3 survey corresponds to the time before the expansion of MRMBS benefits in TN to Rs. 6000 and Rs. 12,000 in September 2006 and 2011, respectively. Hence, this corresponds to the pre-expansion period, whereas NFHS-4 was conducted almost 4 years after cash benefits were doubled under the scheme, which is considered the post-expansion period in our study.

Therefore, all children under 5 years from NFHS-4 constitute the post-expansion cohort, whereas all under-5 children recorded in NFHS-3 form the pre-expansion cohort.

Further, using the information related to the mother's age at the time of childbirth and birth order of the child, we identify the eligible group. A birth is considered eligible if the mother is at least 19 years old at the time of childbirth and the child is among the first two births of the woman, i.e. birth order is either 1 or 2. In other words, any child born during the last 5 years from the date of the survey who is among the first two births of a mother aged 19 or more is considered eligible for transfer. On the other hand, any child born during the last 5 years preceding the survey date, but having a birth order of 3 or more, forms our ineligible group. Also, children born to mothers who are younger than 19 years are in the ineligible group, irrespective of their birth order.

We consider the observations from the neighbouring state of Karnataka as the control group for the analysis. In the absence of a generous maternity benefit scheme like the MRMB and given the geographical proximity to TN, all births from Karnataka constitute the control group. Our final analytical sample consists of children below the age of 5 years from NFHS-3 and NFHS-4 residing in the states of TN and Karnataka. Apart from its geographical proximity, Karnataka serves as an ideal control state for TN owing to other similar economic structures. For instance, Majumder, Kayal, Chowdhury, and Das (2022) examine the spatial variation in regional indicators across Indian states and find that TN and Karnataka are comparable in terms of the Sustainable Regional Development Index. Along similar lines, Aggarwal (2021) shows that the Inclusive Development Index, created following the OECD guidelines, is also comparable across Karnataka, TN, and Kerala. Reddy, Rani, and Reddy (2014) further show that TN and Karnataka follow similar trajectories in the agricultural sector in terms of labour productivity, share of casual labour, and share of family labour. Likewise, Das, Daniels, Ashok, Shim, and Muralidharan (2022) found that the quality of healthcare, including average cost per patient and medical knowledge among healthcare providers in rural parts of TN is comparable with Karnataka and Kerala.

Even though it may appear that TN is also comparable with Kerala, in our main analysis, we do not consider it as a comparison group given its unique historical narrative and political framework. Kerala was the first state to witness the rise of social egalitarianism and left-wing politics in India, with the influence of post-independence socialist movements affecting its governance and policy decisions (Bhat & Rajan, 1990; Rathore & Das, 2019). However, we include Kerala as a part of our control group in the robustness analysis section.

To assess the impact on indicators pertaining to health-seeking behaviour, we consider indicators that capture the direct as well as indirect effects of the programme. The former constitutes indicators that were directly affected by the programme due to the stated pre-conditions that the beneficiaries were required to satisfy to be eligible for receiving cash. The latter set of indicators comprises health-seeking behaviour indicators that were not necessary for receiving the cash transfer.

We use pregnancy registration, institutional delivery and immunisation status as conditional indicators. Registered pregnancy is defined as 1 if the pregnancy was registered at the health-care centre and 0 otherwise.⁵ Similarly, institutional delivery is a binary indicator taking the value of 1 if the child was delivered at a healthcare facility and 0 otherwise. Additionally, the final instalment of Rs. 4000 was to be disbursed to the beneficiaries if the child was administered all three doses of DPT, polio, and Hepatitis B. Therefore, we also consider the immunisation status of each individual vaccine as our outcome variable. We define DPT dummy as 1 if the child was given all three doses of DPT vaccine and 0 otherwise. Polio dummy is defined as 1 if the child was given three doses of polio and 0 otherwise.⁶

The next set of indicators pertains to the health-seeking behaviours that are not included as pre-stated conditions to avail programme benefits. It is possible that the beneficiaries availing the benefits of the MRMB can exhibit improvements in other behaviours that are unrelated to

the programme for at least two reasons. First, because of the conditionalities, the beneficiaries may interact with community healthcare workers more frequently. Such interactions may improve their health awareness which in turn may improve their health-seeking behaviour. Second, cash received from the programme may directly increase the disposable income of the households and thereby increase health investments. In line with the literature, we consider several indicators to capture the health-seeking behaviour of the beneficiaries and their children, like pregnant mothers availing at least four ANC visits, consumption of iron tablets during pregnancy, tetanus shots taken by pregnant mothers, and whether the child was breastfed immediately after the birth (Carvalho, Thacker, Gupta, & Salomon, 2014; Lim et al., 2010). We also use other unconditional indicators like mother's blood pressure being monitored during pregnancy, postnatal check-up, full ANC (at least four ANCs, along with intake of iron tablets, and getting tetanus shot during pregnancy), and child having a health card.

Further, we also assess the programme effects on health outcomes of children. The NFHS survey collects child anthropometric measures like height for age (HAZ) z-scores, weight for age z-scores (WAZ) and weight for height z-score (WHZ). We consider stunting, wasting, and underweight as the child health indicators, which are prescribed by the WHO and are widely used in the literature (von Haaren & Klonner, 2021). While data on self-reported health is not gathered by the NFHS, we additionally look at the effects on other health outcomes that include anaemia along with short-term morbidity indicators such as diarrhoea, fever and cough. [Supplementary Appendix Table A1](#) outlines the definitions of the relevant variables, and [Supplementary Appendix Table A2](#) presents the descriptive statistics for these variables.

4. Identification strategy

We rely on a triple difference (DDD) estimation framework to obtain the Intent to Treat (ITT) estimate of the causal effect of the MRMBS expansion. The variation in survey year, birth order, and the state of residence is exploited to obtain estimates similar to Patwardhan (2023) and Kekre and Mahajan (2023). The baseline equation is given below:

$$y_{ist} = \beta_0 + \beta_1 Eligible_i * TN_s * Post_t + \beta_2 Eligible_i * TN_s + \beta_3 Eligible_i * Post_t + \beta_4 TN_s * Post_t + \beta_5 Eligible_i + \beta_6 TN_s + X'_{ist}\gamma + \delta_t + u_{ist} \quad (1)$$

Where y_{ist} is the outcome corresponding to birth of child i in state s born in month-year t . $Eligible_i$ takes the value of 1 if the child is among the first two births of a mother, provided the mother was at least 19 years old at the time of delivery and 0 if either mother's age at the time of childbirth is less than 19 years, or birth order of the child is 3 or higher. $Post_t$ takes the value of 1 for all births covered in NFHS-4 who were eligible to receive enhanced cash transfer under MRMBS and 0 for those from NFHS-3.⁷ X'_{ist} are the set of child and mother level characteristics along with household level factors that can potentially affect the outcomes (refer [Supplementary Appendix Table A1](#)). We include childbirth month-year fixed effects given by δ_t to account for cohort-specific shocks and seasonal variation that may affect child health outcomes. We include the state fixed effect as TN_s , which takes the value of 1 if the child comes from TN and 0 otherwise. This captures the differences between Karnataka and TN in state-specific factors such as quality of institutions, budgetary allocation, socio-economic conditions, quality of healthcare facilities or any other factors that may influence health outcomes⁸. Moreover, this dummy will also account for differential implementation of other interventions like sanitation programmes or CCTs like JSY in TN and neighbouring Karnataka. u_{ist} captures the individual level idiosyncratic shock. We cluster the standard errors at the Primary Sampling Unit (PSU) level. β_1 gives the effect of the programme expansion on the outcomes of children

in TN who were surveyed in NFHS-4 (exposed to the enhanced cash benefits under MRMBS) relative to the outcomes of all children who were born in Karnataka or children born in TN, but before the increase in cash transfer component of the programme (unexposed) and those who are not eligible because of either higher birth order (birth order of 3 or higher) or mother being under-age at the time of the childbirth (below 19 years). Since the NFHS does not collect information on actual receipt of transfers at the individual-level, the estimates should be interpreted as ITT effects based on programme eligibility. Therefore, the estimated impacts reflect the average effects of exposure to the monetary transfer expansion in the MRMBS programme.

An alternative estimation strategy can be a difference-in-differences (DD) regression approach that compares changes in outcomes between first and second-born children (eligible) and those of third or higher birth order (ineligible) within TN, before and after the increase in size of cash transfer under MRMBS. In this case, the identifying assumption is that, in the absence of higher cash transfer component, the difference in health outcomes between the eligible and ineligible children would have remained constant across birth cohorts. This assumption may be violated if there are other changes/interventions/shocks over time that would have disproportionately affected children of different birth orders. In fact, existing evidence suggests that such shocks tend to have larger effects on children of higher birth orders (Baird, Friedman, & Schady, 2011; Sun & Yao, 2010). Research has also documented that children of higher birth order could have better health outcomes because mothers are more likely to be older and experienced and less likely to be underweight (Coffey & Spears, 2021). A DDD strategy that exploits state-specific variation in the implementation of the programme along with eligibility conditions can address this concern. Additional interventions or changes that can differentially affect eligible and ineligible children in TN would be controlled for in the DDD framework with the introduction of eligible and ineligible children comparison in Karnataka during the same period.

Notwithstanding the above, it is possible to argue that any observed change in outcome captured by β_1 is not due to the increased programme benefits, but because of existing trends observed in TN. In order to ensure that Equation (1) captures the causal effect, we need to ascertain that the pre-existing trends assumption is not violated. Since in our model, we only have one pre-period, that is, children surveyed in NFHS-3, it is not possible to test the pre-existing trends. To test this formally, we include the second round of the NFHS conducted in 1998–1999 (NFHS-2). However, NFHS-2 collected detailed information on births from the eligible mothers (15–49 years) only during the last 3 years preceding the year of survey, i.e. only for children below 3 years. As a result, we test the pre-existing parallel trends assumption by considering all births in TN and Karnataka during the 3 years preceding the survey date covered by NFHS-2 and all under 5 children surveyed in NFHS-3. Thereafter, we introduce pseudo-treatment for NFHS-3 births, who were otherwise unexposed to enhanced cash transfer under MRMBS. We estimate the following equation to test the parallel trends assumption:

$$y_{ist} = \beta_0 + \beta_1 \text{Eligible}_i * TN_s * NFHS - 3_t + \beta_2 \text{Eligible}_i * TN_s + \beta_3 \text{Eligible}_i * NFHS - 3_t + \beta_4 TN_s * NFHS - 3_t + \beta_5 \text{Eligible}_i + \beta_6 TN_s + X'_{ist} \gamma + \delta_t + u_{ist} \quad (2)$$

The variable, $NFHS - 3_t$ is the pseudo-exposure variable and takes the value 1 for births in NFHS-3 and 0 for those from NFHS-2. The rest of the variables are the same as those in equation (1) above. In the absence of pre-trends, the estimated β_1 should be statistically indistinguishable from zero.

Table 2. Effects on conditional health-seeking behaviour

	Registered pregnancy (1)	Institutional delivery (2)	DPT (3)	Polio (4)	DPT and polio (5)
<i>TN x Post x Eligible</i>	0.119** (0.051)	0.101*** (0.033)	0.111*** (0.036)	0.075** (0.032)	0.087** (0.038)
Observations	12911	17680	17642	17661	17697
Mean (Pre-treatment)	0.636	0.762	0.752	0.755	0.657

Notes: The marginal effects from OLS regressions are presented above. The sample comprises eligible and ineligible children from TN and Karnataka covered in NFHS 3 and 4. Controls for columns 1 and 2 include mother's age at birth, mother's education, distance to health facility, caste, religion, sector and household size. Columns 3–5 additionally control for birth order of the child, and child's gender. All regressions include state fixed effects, birth month-year fixed effects and the three double interaction terms. Standard errors clustered at the PSU level are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3. Effects on unconditional health-seeking behaviour

	ANC visits (1)	Iron tablet (2)	Tetanus (3)	Immediate breastfeeding (4)
<i>TN x Post x Eligible</i>	0.107*** (0.037)	0.100*** (0.032)	0.072*** (0.027)	0.099** (0.047)
Observations	13558	13642	13479	16471
Mean (Pre-treatment)	0.783	0.831	0.930	0.452

Notes: The marginal effects from OLS regressions are presented above. The sample comprises eligible and ineligible children from TN and Karnataka covered in NFHS 3 and 4. Controls for columns 1–3 include mother's age at birth, mother's education, distance to health facility, caste, religion, sector and household size. Column 4 additionally controls for birth order of the child, and child's gender. All regressions include state fixed effects, birth month year fixed effects and the three double interaction terms. Standard errors clustered at the PSU level are in parentheses^a. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

^aAppendix Table A4 suggest that the effect on conditional and unconditional pregnancy outcomes remain same using additional child level controls.

5. Results

5.1. Health-seeking behaviour

Table 2 presents the regression estimates of the effect of cash transfer expansion in MRMBS on conditional health indicators. Columns 1 and 2 indicate that the programme led to 11.9 percentage points increase in likelihood of pregnancy being registered and 10.1 percentage points increase in institutional delivery among beneficiaries from the pre-treatment mean of 64 per cent and 76 per cent, respectively. We further observe that the MRMBS led to increases in uptake of DPT and polio of about 11 and 7.5 percentage points (columns 3–4), respectively. The increase in DPT and polio vaccines taken together is also found to be statistically significant at the 5 per cent level by about 8.7 percentage points over the pre-treatment mean of 66 per cent. Our analysis provides evidence that the programme was able to increase the demand for health services on which the CCT was conditioned.

Table 3 reports the effect of the MRMBS on unconditional health-seeking behaviour indicators. Column 1 highlights that the programme led to a 10.7 percentage point increase in beneficiary mothers going to at least four ANCs during their pregnancy given pre-treatment mean of 78 per cent. The likelihood of intake of iron tablets by pregnant mothers also increased by 10 percentage points because of the scheme expansion (Column 2). Further, we find that eligible

women from TN are 7.2 percentage points and 9.9 percentage points more likely to take tetanus injections and initiate breastfeeding respectively at birth compared to the control group, (columns 3–4). We also assess the impact on other health-seeking behaviours like full ANC coverage, postnatal check-up within 2 months of birth, blood pressure measurement and having a health card as additional indicators. The results tabulated in [Supplementary Appendix Table A3](#) suggest that 2 out of 4 of these indicators improve among beneficiaries following MRMBs expansion. To sum up, we find positive effects on the demand for health care services and health-seeking behaviour, even if such services were not a pre-condition for availing cash. This is an important finding as the evidence of the impact of CCTs on preventive health-seeking behaviour remains inconclusive, with studies finding positive effects in a few contexts (Morris et al., 2004b) and limited or no effect in other setups (Robertson et al., 2013).

Here, it is important to note that the eligible women from TN covered in the NFHS 3 survey, who are categorised as non-beneficiaries for the analysis, may not be true non-beneficiaries. This is because even before September 2006, these women had been receiving transfers under MRMBs though a much lower amount. As mentioned earlier, the programme was started in 1987 with financial assistance of Rs. 200 which was later raised to Rs. 300 in 1992 and Rs. 500 in 1995 until a major twelvefold increase in 2006. Further, studies also document that before 2006, the uptake of MRMBs was rather low, and institutional deliveries increased manifold only post-2006 (Pandian et al., 2013; Prasad et al., 2015). Given the meagre size and lower uptake of MRMBs transfers before 2006, coupled with significant supply-side constraints, we grouped the recipients receiving the benefits of the programme before September 2006 in the control category, along with those from the control state of Karnataka. However, because of this categorisation, our DDD causal estimates are possibly underestimating the actual effects.

5.2. Child health outcomes

Theoretically, CCTs can affect child health in multiple ways. First, cash reduces the resource constraints faced by poor families and increases investments in nutritious food, which in turn can have a positive effect on health outcomes, thereby reducing the likelihood of being stunted or underweight (Manley et al., 2020). Second, increased consumption of health services, like

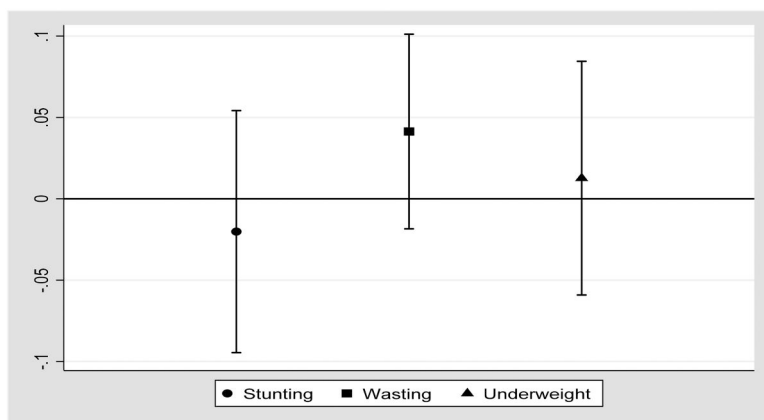


Figure 1. Effects on child health outcomes.

Notes: Figure presents marginal effects from OLS regressions, along with 90% confidence level calculated through standard errors clustered at the PSU level. The sample comprises eligible and ineligible children from TN and Karnataka covered in NFHS 3 and 4. Controls include mother's age at birth, mother's education, distance to health facility, caste, religion, sector, household size, birth order of the child, and child's gender. All regressions include the three double interaction terms along with state fixed effects and birth month-year fixed effects. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

higher engagement with health workers, can improve awareness related to health issues and caregiving practices, better monitoring of child health and growth, thereby improving the overall well-being of children.

Figure 1 presents the results of the programme expansion effect on the likelihood of stunting, wasting and being underweight. We observe that the coefficient of the triple interaction term is statistically insignificant at usual levels of significance pointing towards a null effect of the programme on these outcomes⁹. The effects on the underlying z-scores, that is, HAZ, WAZ, and WHZ, are also found to be insignificant (Supplementary Appendix Table A5). It is important to note that anthropometric indicators such as stunting reflect cumulative health and nutritional conditions over time. Since the NFHS is a repeated cross-sectional survey rather than a longitudinal panel, we are unable to track individual children over time and examine long-run health trajectories directly. Accordingly, our estimates should be interpreted as cohort-level differences in nutritional outcomes associated with programme exposure rather than individual-level long-term treatment effects.

These results are in contrast with the improved children's nutritional outcomes observed in Odisha, following state-sponsored CCT targeting maternal and child health in India (Kekre & Mahajan, 2023; Patwardhan, 2023). The result highlights the potential differential impacts of CCTs conditional on pre-intervention levels of child health outcomes. In contexts like Odisha, where the malnutrition burden is much higher, cash transfers may have positive marginal impacts, whereas, in states like TN, where the initial burden of malnutrition is lower than national average, cash transfers alone may not be sufficient to improve nutritional outcomes of children.

Additionally, we consider a host of short-term morbidity indicators like incidence of diarrhoea, fever, and cough among children along with anaemia. The impact of MRMBS expansion on these short-term health indicators and child anaemia is also found to be negligible (Supplementary Appendix Table A6). Taken together, these results suggest that the absence of effects also extends to short-term health outcomes. This reinforces our inference that improvements in health-seeking behaviour did not translate into measurable gains in child health outcomes.

We run several robustness checks to ensure that the inferences drawn from our main regressions are valid. They also address concerns that the observed effects may be contaminated by the existing policies that ran concurrently, like the TN Free Laptop Scheme (TFLS), launched in September 2011, and the Amma Baby Care Kit programme. Details on these robustness checks are presented in Supplementary Appendix R.

5.3. Pre-existing trends assumption

To test the validity of our results, we check for the absence of pre-existing trends assumption using data from NFHS rounds 2 and 3. For this, we estimate Equation (2) and the corresponding results are presented in Supplementary Appendix Table A7. The triple interaction coefficient is statistically insignificant for most of the conditional and unconditional indicators and child health outcomes. The coefficient of triple interaction is negative and significant for ANC visits. Hence, one should be careful before interpreting the corresponding estimates for ANC visits as the causal effect of MRMBS expansion. Note that we are unable to check for the parallel trends for pregnancy registration, and intake of iron tablets, as these variables were not reported in NFHS-2. The parallel pre-existing trends assumption does not hold for wasting, again indicating that the results reported earlier should be interpreted with caution.

6. What explains the absence of impact on child health outcomes?

Why do these beneficiary-children not show an improvement in terms of child health despite a noticeably positive impact on conditional and unconditional indicators? In the context of CCTs, evidence suggests that their impact on health and human capital outcomes depends

critically on the size of the transfer (Daidone, Davis, Handa, & Winters, 2019; McIntosh & Zeitlin, 2024). In our context, the transfer amount, even though large, when shared across household members and over time, may not be large enough to induce sustained improvements in child nutrition. This may contribute to the absence of effects on health outcomes. In addition, there can be other possible reasons that explain the null results for child health outcomes. We explore whether spending patterns, engagement with health care workers and quality of diet can explain the absence of any observable impact on child health outcomes.

i. Spending on temptation goods and welfare-enhancing amenities

A common concern with CCTs is that the beneficiaries may use the cash to spend on temptation goods like tobacco, and alcohol (White & Basu, 2016). If this happens, the likely investment in health may fall, leading to no meaningful improvement. Ideally, this would be examined using detailed expenditure data; however, the NFHS does not collect information on household spending. As a proxy, we examine whether adult male members in the household report smoking or alcohol consumption. While this measure does not capture changes in expenditure or intensity of consumption, it provides an indication of whether the likelihood of engaging in such behaviours is higher in households who are potential beneficiaries. We define tobacco as 1 if the male members in the household consume tobacco and 0 otherwise. Similarly, alcohol is defined as 1 if the male member consumes alcohol and 0 otherwise. [Supplementary Appendix Figure F2](#) indicates no significant increase in the likelihood of consumption of temptation goods among males in the beneficiary households. We also explore the possibility of higher investment in durable assets such as televisions, fridges, motorcycles, and cars and again do not find any observable effect on the likelihood of possessing such goods ([Supplementary Appendix Figure F3](#)).

Next, we examine any discernible effect on Water, Sanitation and Hygiene (WASH) facilities like having piped water in the household premises, having a toilet, or using clean fuel for cooking purposes. This is likely also because of added interventions promoting these amenities through several Government of India schemes like Swachh Bharat Mission, Jal Jeevan Mission and Pradhan Mantri Ujjwala Yojana.¹⁰ While the effect on clean fuel and piped water adoption remains negligible, we observe a significant increase in the likelihood of having a toilet ([Supplementary Appendix Figure F3](#)). The fact that the likelihood of having a toilet increases at first sight would suggest that child health outcomes should also improve. A number of studies highlight open defaecation as one of the reasons for persistent stunting among children in India (Spears, Ghosh, & Cumming, 2013). Our analysis suggests that despite improved access to toilet facilities, there is no discernible improvement in child health. Below, we explore this further.

ii. Dietary diversity

With cash transfers easing liquidity constraints, dietary diversity among children may improve, which in turn may reduce the likelihood of stunting, wasting, and being underweight (Khamis et al. 2019; Zhu et al. 2024). To test this, we examine the effect of MRMBs expansion on consumption of various food groups - grains, roots, and tubers; legumes and nuts; dairy products; eggs; flesh food; vitamin-A enriched fruits and vegetables and other fruits and vegetables for children aged 6 months or above. We also construct the binary indicator wherein minimum dietary diversity is defined as 1 if the child consumed food from at least four food groups out of seven and 0 otherwise (WHO, 2017) and meal frequency for children in the age-group of 6 to 23 months. [Supplementary Appendix Figure F4](#) indicates that the MRMBs beneficiaries were not more likely to have better diet quality, which may explain the null impact on nutritional outcomes.

iii. Engagement with health workers

The compliance with MRMBS requirements may result in higher engagement with health workers, which can potentially create long-term health awareness among beneficiary women and facilitate discussions on improved childcare practices. We define engagement with health workers as 1 if the mother met any community health worker during last 3 months and 0 otherwise¹¹. We observe no significant increase in engagement of beneficiaries with community health workers in comparison to the control group ([Supplementary Appendix Figure F5](#)).

A potential concern is that our measure of engagement with health workers may be confounded by underlying illness rates. If beneficiary households experience better health, they may require lesser illness-related visits. However, in the Indian context, interactions with front-line health workers, such as Accredited Social Health Activists (ASHAs), Anganwadi workers, and Auxiliary Nurse Midwives (ANM) are not solely driven by illness episodes.¹² These workers are mandated under the National Health Mission to conduct regular household visits for a range of preventive services, including antenatal and postnatal care, and health awareness activities, irrespective of the immediate health status of the household members. Therefore, the absence of increased engagement among beneficiaries is unlikely to be driven by reduced morbidity alone and more plausibly reflects limited intensification of outreach or sustained interaction with health workers.

To sum up, we find that despite improved toilet facilities, there is no discernible improvement in child health, possibly because of insignificant improvements in complementary indicators like engagement with health workers, and dietary quality of children.

7. Policy implications and conclusion

In the context of a developing country with adverse health outcomes, CCTs, providing financial assistance to mothers have gained significance in the past two decades. However, evidence on the benefits derived through these interventions remains inconclusive. In this paper, we assess the impact of the expansion of cash benefits under the MRMBS programme, which, like other CCTs, provides financial assistance to mothers conditional on pregnancy registration, institutional delivery, and immunisation of children, however, the cash component is substantially higher than other CCTs in the country. We find a significant improvement in conditional health-seeking behaviour that is linked to the programme as well as unconditional indicators, which are not directly linked. However, we find no improvement in the nutritional status of the child, particularly on stunting, wasting and being underweight, anaemia, and even short-term morbidity.

The null effects on these outcomes corroborate studies documenting a limited impact of CCTs on child health outcomes in Zambia (Chakrabarti, Handa, Natali, Seidenfeld, & Tembo, 2020), Bangladesh (Ahmed, Quisumbing, Nasreen, Hoddinott, & Bryan, 2009), and Ecuador (Paxson & Schady, 2010), though systematic reviews have indicated a small but positive effect on child nutritional outcomes (Lagarde, Haines, & Palmer, 2007). To explore why these health outcomes did not show any improvement, we examine how the cash transfers from the MRMBS programme were spent by the beneficiaries. While we do not find any increase in consumption of temptation goods or possession of durable goods, we do observe a significant increase in the likelihood of these households having toilets. This is counterintuitive, as improved sanitation practices should be associated with better health outcomes. We provide two potential reasons to explain the insignificant health gains. First, we find no improvement in diet quality among MRMBS recipients. Second, the beneficiaries were not more likely to engage with health workers relative to the non-beneficiaries, both of which may play a key role in achieving better health.

It must be noted that TN has been historically among the most developed states in India not only in terms of per-capita income but also in well-being outcomes, even before the increase in cash benefits under the MRMBS. For example, the share of children of eligible mothers from

TN, who were stunted or wasted was already lower at 28 and 19 per cent in 2005–2006, respectively. These are among the lowest in India, well below the other states with similar per-capita incomes like Gujarat and Maharashtra. In such a context, the potential for additional improvements through CCTs like MRMBs alone may be limited. While the programme might address specific barriers to maternal and child health, the diminishing marginal returns of such stand-alone interventions potentially become evident when pre-intervention outcomes are already relatively good. To achieve further improvements, particularly in reducing stunting and wasting or improving other health metrics, complementary and innovative interventions may be necessary.

To this end, our paper offers important policy implications. First, the lack of improvement in diet quality among beneficiaries highlights the need to complement cash transfers with targeted nutrition-specific interventions. While cash transfers can address immediate financial barriers, they may not automatically translate into improved nutritional choices. Strengthening nutrition education programmes is therefore crucial to raising awareness about the importance of diverse and balanced diets, particularly for maternal and child health. In addition, existing food security initiatives, such as the Public Distribution System (PDS) and school meal programmes, should be expanded to include a greater variety of protein-dense and nutrient-rich foods. Second, the limited interaction between MRMBs beneficiaries and health workers underscores the need for more proactive outreach. Health workers play a critical role in delivering essential healthcare services and health literacy, which are pivotal for translating financial support into tangible health improvements. To enhance engagement, complementary interventions that provide incentives for health workers, such as performance bonuses and reduced workload, can be explored. Additionally, leveraging technology, such as mobile-based apps and telehealth services, could facilitate consistent communication between health workers and beneficiaries.

It is important to acknowledge certain limitations of the study. First, in the absence of longitudinal data, we are unable to track the children of the beneficiaries over time to study the changes in health-seeking behaviour and outcomes. Second, in the absence of data on receipt of cash transfers, we are able to identify only the intended beneficiaries rather than actual recipients. Furthermore, in the context of MRMBs, transfers were disbursed in multiple instalments conditional on compliance with programme requirements. However, the NFHS does not provide information on these instalments received by the beneficiaries. Consequently, beneficiaries may have received different effective transfer amounts, but we are unable to observe this. Therefore, our estimates should be interpreted as ITT effects of the transfer expansion of MRMBs rather than dosage-specific treatment effects. Despite these limitations, our study identifies key policy instruments that can complement the programme and can help improve child health outcomes.

Notes

1. For more information, visit <https://unstats.un.org/sdgs/report/2017/goal-03/> (accessed on June 21, 2026).
2. Before 2006, the support was minimal, starting at Rs. 200 and later raised to Rs. 300 and Rs. 500.
3. The cash component of the state-specific MRMBs was substantially higher than the cash incentive provided under national cash transfer programme JSY in India. In JSY, the amount transferred was Rs.700 in rural areas and Rs. 600 in urban areas.
4. <https://cms.tn.gov.in/sites/default/files/go/scan0017.pdf> (accessed on December 22, 2023).
5. First instalment was conditional on registering pregnancy within 16 weeks. However, due to paucity of data, we are not able to test the effect of the programme on pregnancy registration timing.
6. The information pertaining to Hepatitis-B vaccine is only available in NFHS-4, hence, we are unable to examine the effect on Hepatitis B immunisation.
7. Ideally, we should consider childbirths from 2006 onwards after the monetary allotment expansion. But NFHS-4 provides information only for children born in the last five years prior to the survey. Hence, we are only able to consider children born from 2010 onwards.
8. NFHS-3 does not provide district information.

9. We do not find any significant effect of MRMBS expansion on nutritional outcomes even for children up to 1 year and those aged 3 or below ([Supplementary Appendix Figure F1](#)).
10. More information on these programs can be obtained from <https://swachhbharatmission.ddws.gov.in>, <https://ejalshakti.gov.in/> and <https://pmuy.gov.in/> (accessed on June 18, 2026).
11. Refer to [Supplementary Appendix Table A1](#) for variable definition.
12. For more information, refer to <https://nhm.gov.in/index1.php%3Flang%3D1%26level%3D1%26sublinkid%3D150%26lid%3D226> (accessed on June 18, 2026).

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Ethical approval

This study is based entirely on secondary analysis of anonymised publicly available survey dataset. The primary dataset used is from the National Family Health Survey, which can be obtained from the website of the Demographic and Health Surveys (<https://dhsprogram.com/>). The survey involved human participants and were conducted in accordance with relevant ethical guidelines and procedures governing household survey research. The datasets made available through the respective public repositories are anonymised and contain no personally identifiable information. Informed consent was obtained from all participants by the original survey teams prior to data collection. The authors of the present study did not conduct primary data collection and had no direct interaction with human participants.

In addition, the study was assessed using the University of Manchester Ethics Decision Tool, which determined that formal ethical approval was not required because the analysis used fully anonymised secondary data within the scope of the original participant consent.

The University of Manchester Ethics Review board exempted this research from full review as it uses fully anonymised secondary data obtained with personal consent. All research was performed in accordance with relevant university guidelines and regulations. URL: https://www.training.itservices.manchester.ac.uk/uom/ERM/ethics_decision_tool/story.html and <https://www.manchester.ac.uk/research/environment/governance/ethics/approval/>

Author contributions

CRedit: **SHREYA BISWAS**: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Supervision, Writing – original draft, Writing – review & editing; **UPASAK DAS**: Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Software, Supervision, Writing – original draft, Writing – review & editing; **NARBADESHWAR MISHRA**: Data curation, Investigation, Resources, Software, Writing – original draft, Writing – review & editing.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, the authors used ChatGPT and Claude AI to edit and improve the readability and language of the manuscript. These AI platforms helped in identifying typographical and grammatical errors in the draft. After using these AI platforms, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Data availability statement

The data (National Family Health Survey) used in this article can be obtained from the website of the Demographic and Health Surveys (<https://dhsprogram.com/>).

References

- Aggarwal, S. C. (2021). Inclusiveness and the progress of Indian states: Evidence from inclusive development index between 2011 and 2018. *Indian Journal of Human Development*, 15(2), 200–228. doi:10.1177/09737030211008688
- Ahmed, A., Quisumbing, A. R., Nasreen, M., Hoddinott, J. F., & Bryan, E. (2009). *Comparing food and cash transfers to the ultra-poor in Bangladesh*. International Food Policy Research Institute.
- Almond, D., & Currie, J. (2011). Killing me softly: The fetal origins hypothesis. *The Journal of Economic Perspectives*, 25(3), 153–172. doi:10.1257/jep.25.3.153
- Almond, D., Currie, J., & Duque, V. (2018). Childhood circumstances and adult outcomes: Act II. *Journal of Economic Literature*, 56(4), 1360–1446. doi:10.1257/jel.20171164
- Baird, S., Friedman, J., & Schady, N. (2011). Aggregate income shocks and infant mortality in the developing world. *Review of Economics and Statistics*, 93(3), 847–856. doi:10.1162/REST_a_00084
- Balasubramanian, P., & Ravindran, T. S. (2012). Pro-poor maternity benefit schemes and rural women: Findings from Tamil Nadu. *Economic and Political Weekly*, 47(25), 19–22.
- Barham, T., Brenzel, L., & Maluccio, J. A. (2007). *Beyond 80 percent: Are there new ways of increasing vaccination coverage?* Evaluation of CCT Programs in Mexico and Nicaragua. Washington (DC): World Bank.
- Barker, D. J. (1990). The fetal and infant origins of adult disease. *BMJ (Clinical Research ed.)*, 301(6761), 1111–1111. doi:10.1136/bmj.301.6761.1111
- Bastagli, F., Hagen-Zanker, J., Harman, L., Barca, V., Sturge, G., & Schmidt, T. (2019). The impact of cash transfers: A review of the evidence from low-and middle-income countries. *Journal of Social Policy*, 48(03), 569–594. doi:10.1017/S0047279418000715
- Bhat, P. M., & Rajan, S. I. (1990). Demographic transition in Kerala revisited. *Economic and Political Weekly*, 25, 1957–1980.
- Carvalho, N., Thacker, N., Gupta, S. S., & Salomon, J. 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. doi:10.1371/JOURNAL.PONE.0109311
- Case, A., Fertig, A., & Paxson, C. (2005). The lasting impact of childhood health and circumstance. *Journal of Health Economics*, 24(2), 365–389. doi:10.1016/J.JHEALECO.2004.09.008
- Chakrabarti, A., Handa, S., Natali, L., Seidenfeld, D., & Tembo, G. (2020). More evidence on the relationship between cash transfers and child height. *Journal of Development Effectiveness*, 12(1), 14–37. doi:10.1080/19439342.2020.1731568
- Coffey, D. (2014). Costs and consequences of a cash transfer for hospital births in a rural district of Uttar Pradesh, India. *Social Science & Medicine*, 114, 89–96. doi:10.1016/j.socscimed.2014.05.035
- Coffey, D., & Spears, D. (2021). Neonatal death in India: Birth order in a context of maternal undernutrition. *Economic Journal*, 131(638), 2478–2507. doi:10.1093/ej/ueab028
- Daidone, S., Davis, B., Handa, S., & Winters, P. (2019). The household and individual-level productive impacts of cash transfer programs in Sub-Saharan Africa. *American Journal of Agricultural Economics*, 101(5), 1401–1431. doi:10.1093/ajae/aay113
- Das, J., Daniels, B., Ashok, M., Shim, E. Y., & Muralidharan, K. (2022). Two Indias: The structure of primary health care markets in rural Indian villages with implications for policy. *Social Science & Medicine*, 301, 112799. doi:10.1016/j.socscimed.2020.112799
- De, P. K., & Timilsina, L. (2020). Cash-based maternal health interventions can improve childhood vaccination—Evidence from India. *Health Economics*, 29(10), 1202–1219. doi:10.1002/hec.4129

- Debnath, S. (2021). Improving maternal health using incentives for mothers and health care workers: Evidence from India. *Economic Development and Cultural Change*, 69(2), 685–725. doi:10.1086/703083
- Glewwe, P., Jacoby, H. G., & King, E. M. (2001). Early childhood nutrition and academic achievement: A longitudinal analysis. *Journal of Public Economics*, 81(3), 345–368. doi:10.1016/S0047-2727(00)00118-3
- Javadekar, S., & Saxena, K. (2025). The seen and unseen: The unintended impact of a conditional cash transfer program on prenatal sex selection. *Journal of Population Economics*, 38(1), 32. doi:10.1007/s00148-025-01091-6
- Kekre, A., & Mahajan, K. (2023). Maternity support and child health: Unintended gendered effects. *Journal of Comparative Economics*, 51(3), 880–898. doi:10.1016/j.jce.2023.03.002
- Khamis, A. G., Mwanri, A. W., Ntwenya, J. E., & Kreppel, K. (2019). The influence of dietary diversity on the nutritional status of children between 6 and 23 months of age in Tanzania. *BMC pediatrics*, 19(1), 518.
- Lagarde, M., Haines, A., & Palmer, N. (2007). Conditional cash transfers for improving uptake of health interventions in low-and middle-income countries: A systematic review. *JAMA*, 298(16), 1900–1910. doi:10.1001/jama.298.16.1900
- Lim, S. S., Dandona, L., Hoisington, J. A., James, S. L., Hogan, M. C., & Gakidou, E. (2010). India's Janani Suraksha Yojana, a conditional cash transfer programme to increase births in health facilities: An impact evaluation. *Lancet*, 375(9730), 2009–2023. doi:10.1016/S0140-6736(10)60744-1
- Majumder, S., Kayal, P., Chowdhury, I. R., & Das, S. (2022). Regional disparities and development in India: Evidence from Wroclow Taxonomy and K-means clustering. *GeoJournal*, 88(3), 3249–3282. doi:10.1007/s10708-022-10805-2
- Manley, J., Balarajan, Y., Malm, S., Harman, L., Owens, J., Murthy, S., ... Khurshid, A. (2020). Cash transfers and child nutritional outcomes: A systematic review and meta-analysis. *BMJ Global Health*, 5(12), e003621. doi:10.1136/bmjgh-2020-003621
- Mathur, A., & Sen, G. (2025). Money matters: Evidence from a conditional cash transfer scheme on child health. *Journal of Human Capital*, 19(3), 435–473. doi:10.1086/734859
- McIntosh, C., & Zeitin, A. (2024). Cash versus kind: Benchmarking a child nutrition program against unconditional cash transfers in Rwanda. *The Economic Journal*, 134(664), 3360–3389. doi:10.1093/ej/ueae050
- Morris, S. S., Flores, R., Olinto, P., & Medina, J. M. (2004a). Monetary incentives in primary health care and effects on use and coverage of preventive health care interventions in rural Honduras: Cluster randomised trial. *Lancet (London, England)*, 364(9450), 2030–2037. doi:10.1016/S0140-6736(04)17515-6
- Morris, S. S., Olinto, P., Flores, R., Nilson, E. A., & Figueiró, A. C. (2004b). Conditional cash transfers are associated with a small reduction in the rate of weight gain of preschool children in northeast Brazil. *The Journal of Nutrition*, 134(9), 2336–2341. doi:10.1093/jn/134.9.2336
- Nandi, A., & Laxminarayan, R. (2016). The unintended effects of cash transfers on fertility: Evidence from the Safe Motherhood Scheme in India. *Journal of Population Economics*, 29(2), 457–491. doi:10.1007/s00148-015-0576-6
- Pandian, J., Suresh, S., Desikachari, B. R., & Padmanaban, P. (2013). Increased utilization of primary health care centers for birthing care in Tamil Nadu, India: A visible impact of policies, initiatives, and innovations. *Journal of Family Medicine and Primary Care*, 2(4), 329–333. doi:10.4103/2249-4863.123781
- Patwardhan, V. (2023). The impact of the Mamata conditional cash transfer program on child nutrition in Odisha, India. *Health Economics*, 32(9), 2127–2146. doi:10.1002/HEC.4720
- Paxson, C., & Schady, N. (2010). Does money matter? The effects of cash transfers on child development in rural Ecuador. *Economic Development and Cultural Change*, 59(1), 187–229. doi:10.1086/655458
- Powell-Jackson, T., Mazumdar, S., & Mills, A. (2015). Financial incentives in health: New evidence from India's Janani Suraksha Yojana. *Journal of Health Economics*, 43, 154–169. doi:10.1016/J.JHEALECO.2015.07.001
- Prasad, V., Swaminathan, M., Murugan, G., Shanmugavelayutham, R., & Nundy, M. (2015). *Towards universalisation of maternity entitlement: An exploratory case study of the Dr. Muthulakshmi Maternity Assistance Scheme, Tamil Nadu*. New Delhi: Public Health Resource Network.
- Rampal, P. (2013). Dynamics of changing nutritional status of children in Andhra Pradesh. Retrieved December 27, 2023, from https://www.younglives-india.org/sites/default/files/syndicated/YL-WP113_Rampal-Changing-nutritional-status_1.pdf. (accessed on December 27, 2023)
- Rathore, U., & Das, U. (2019). Explaining the superior education outcomes of Kerala: The role of state activism and historical endowment. *Oxford Development Studies*, 47(2), 205–221. doi:10.1080/13600818.2018.1539471
- Reddy, A. A., Rani, C. R., & Reddy, G. P. (2014). Labour scarcity and farm mechanisation: A cross state comparison. *Indian Journal of Agricultural Economics*, 69(3), 347–358.
- Robertson, L., Mushati, P., Eaton, J. W., Dumba, L., Mavise, G., Makoni, J., ... Gregson, S. (2013). Effects of unconditional and conditional cash transfers on child health and development in Zimbabwe: A cluster-randomised trial. *Lancet*, 381(9874), 1283–1292. doi:10.1016/S0140-6736(12)62168-0
- Soares, F. V., Ribas, R. P., & Osório, R. G. (2010). Evaluating the impact of Brazil's Bolsa Família: Cash transfer programs in comparative perspective. *Latin American Research Review*, 45(2), 173–190. doi:10.1017/S0023879100009390
- Spears, D., Ghosh, A., & Cumming, O. (2013). Open defecation and childhood stunting in India: An ecological analysis of new data from 112 districts. *PLOS One*, 8(9), e73784. doi:10.1371/JOURNAL.PONE.0073784

- Srinivasan, R., Ganesan, S. K., Premkumar, P. S., & Kang, G. (2020). Influence of publicly funded conditional cash transfer programmes on utilization patterns of healthcare services for acute childhood illness. *International Health*, 12(4), 339–343. doi:[10.1093/inthealth/ihz099](https://doi.org/10.1093/inthealth/ihz099)
- Sun, A., & Yao, Y. (2010). Health shocks and children’s school attainments in rural China. *Economics of Education Review*, 29(3), 375–382. doi:[10.1016/j.econedurev.2009.04.006](https://doi.org/10.1016/j.econedurev.2009.04.006)
- Taneja, B., & Roy Chowdhury, I. (2025). From cash to care: Impact of conditional cash transfers on continuum of care for maternal and child health in India. *The Journal of Development Studies*, 62, 974–999.
- von Haaren, P., & Klonner, S. (2021). Lessons learned? Intended and unintended effects of India’s second-generation maternal cash transfer scheme. *Health Economics*, 30(10), 2468–2486. doi:[10.1002/hec.4390](https://doi.org/10.1002/hec.4390)
- Weaver, J., Sukhtankar, S., Niehaus, P., & Muralidharan, K. (2024). *Maternal cash transfers for gender equity and child development: Experimental evidence from India* (No. w32093). National Bureau of Economic Research.
- White, J. S., & Basu, S. (2016). Does the benefits schedule of cash assistance programs affect the purchase of temptation goods? Evidence from Peru. *Journal of Health Economics*, 46, 70–89. doi:[10.1016/j.jhealeco.2016.01.005](https://doi.org/10.1016/j.jhealeco.2016.01.005)
- WHO. (2017). *Global nutrition monitoring framework: Operational guidance for tracking progress in meeting targets for 2025*. <https://www.who.int/publications/i/item/9789241513609>.
- Zhu, Y., An, Q., & Rao, J. (2024). The effects of dietary diversity on health status among the older adults: An empirical study from China. *BMC Public Health*, 24(1), 674. doi:[10.1186/s12889-024-18172-y](https://doi.org/10.1186/s12889-024-18172-y)