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Beyond Healthcare Utilisation: Evaluating the Conditionality and Income Pathways of a CCT Scheme in Improving Maternal and Child Health

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by

Bhabesh Hazarika & N R Bhanumurthy[*]

Abstract

Maternity benefit programmes increasingly combine healthcare conditionalities with income support, yet it remains unclear whether improvements in maternal and child wellbeing arise through increased healthcare utilisation, additional household resources, or both. This study evaluates the Mukhyamantri Shramik Seva Prasuti Sahayata Yojana (MMSSPSY), a maternity benefit programme for women in the informal sector in Madhya Pradesh, India. Using primary survey data from 1,246 mothers and propensity score matching to compare beneficiaries with eligible non-beneficiaries, we estimate programme impacts across the maternal and child health continuum. The programme substantially increased antenatal care utilisation, institutional delivery, iron-folic acid supplementation, and child immunisation, while also reducing low birth weight and improving maternal body mass index. However, it had limited measurable effect on maternal anaemia or child undernutrition. Household expenditure patterns suggest that while the transfer improved engagement with healthcare services and supported some nutritional investment during pregnancy, it was insufficient to sustain the investments needed to improve longer-term child nutrition. The findings highlight the importance of integrating maternity cash transfers with sustained nutrition support and quality maternal healthcare. These findings also have implications for the growing use of unconditional cash transfers especially targeted towards women, which seek to strengthen household resource availability and could potentially improve broader nutritional outcomes among women and children.

Keywords: Conditional Cash Transfers; Maternal and Child Health; Programme Pathways; Informal Sector; Propensity Score Matching;

JEL Classification: I12; I18; J13; O15

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1. Introduction

Despite progress in maternal and child health, preventable risks during pregnancy and early childhood remain widespread in many low- and middle-income countries. More than 700 women continue to die each day from preventable causes related to pregnancy and childbirth, while childhood undernutrition remains a major contributor to poor health and developmental outcomes (WHO, 2026). These challenges are particularly acute among economically vulnerable households, where limited access to healthcare, inadequate maternity protection, and resource constraints often coincide during pregnancy and childbirth (Fuller et al., 2022; Bhattacharyya et al., 2025). For women in informal employment, that failure has a particular shape. Pregnancy arrives without income protection, imposes substantial costs through income loss, higher nutritional needs, healthcare expenditure, and does so precisely at the moment when investment in maternal and child health matters most (Mathur & Sen, 2024). In recent times, maternity benefit programmes combining conditional cash transfers with income support appear as fiscal policy response, built on a premise that is intuitive but unproven: that financial barriers and resource constraints must be tackled together for a higher utilization of health care service resulting in overall improvements in health and nutrition (Glassman et al., 2013; von Haaren & Klonner, 2021).

A large body of evidence shows that maternity cash transfer programmes increase utilisation of maternal and child health services, particularly antenatal care and institutional delivery among disadvantaged populations (Lagarde et al., 2007; Ranganathan & Lagarde, 2012). However, improvements in healthcare utilisation do not always translate into comparable gains in maternal and child wellbeing. While some studies report positive effects on birth outcomes, nutritional status, and child health, others find limited or inconsistent impacts despite substantial increases in service utilisation (von Haaren & Klonner, 2021; Chakrabarti et al., 2021; Patwardhan, 2023). This divergence suggests that the relationship between healthcare utilisation and health outcomes is more complex than is often assumed.

One possible explanation lies in the mechanisms through which maternity benefit programmes operate. Financial incentives may improve outcomes by encouraging utilisation of maternal and child health services, but they may also operate through a resource pathway by relaxing household budget constraints and partially compensating for income losses during pregnancy and childbirth (Fuller et al., 2022; Mathur & Sen, 2024). Although most recent maternity benefit programmes combine both elements, relatively little is known about their relative importance or whether improvements in maternal and child wellbeing arise primarily through increased healthcare utilisation, improved household resources, or the interaction of both mechanisms. This question has become particularly relevant in India as maternity benefit programmes have evolved from utilisation-focused interventions towards broader instruments of maternity support and income protection (Raghunathan et al., 2017; Chakrabarti et al., 2021).

The Mukhyamantri Shramik Seva (Prasuti Sahayata) Yojana (MMSSPSY), implemented by the Government of Madhya Pradesh for women working in the informal sector, provides a particularly relevant context for examining these issues. The programme combines healthcare-related conditionalities with maternity income support, thereby linking maternal health objectives with broader concerns of income protection during pregnancy and childbirth. This design allows an assessment of whether programme impacts are confined to

healthcare utilisation or extended to outcomes more closely associated with maternal and child wellbeing. It also broadens the evidence base beyond national programmes such as Janani Suraksha Yojana (JSY) and Pradhan Mantri Matru Vandana Yojana (PMMVY), about which many studies have covered.

The results indicate that MMSSPSY significantly improved utilisation of maternal and child health services, including antenatal care, IFA supplementation, institutional delivery, and child immunisation, providing strong support for the conditionality pathway. The programme was also associated with a reduction in low birth weight and modest improvements in maternal BMI, suggesting that the resource pathway was operative as well. However, no significant effects were observed for child stunting, wasting, underweight, or maternal anaemia. These findings suggest that improvements in healthcare utilisation and additional household resources may be sufficient to influence some pregnancy-related outcomes, but not necessarily longer-term indicators of maternal and child nutritional wellbeing.

The present study contributes to literature in several ways. First, it evaluates programme impacts through a framework that explicitly distinguishes between the conditionality and resource pathways, providing evidence on a question that remains largely implicit in much of the existing literature. Second, it examines outcomes spanning both pathways within a common empirical framework, allowing assessment of whether improvements in healthcare utilisation translate into broader gains in maternal and child health. Third, by incorporating detailed information on how beneficiary households allocated programme funds, the study provides rare evidence on the behavioural mechanisms underlying the resource pathway.

The remainder of the paper is structured around that argument. Section 2 presents the literature review. Section 3 provides an analytical framework, identification strategy, and data. Section 4 reports the results. Section 5 discusses the findings and their implications, and Section 6 concludes.

2. Review of Literature

2.1. Theoretical Foundations

The economic rationale for conditional cash transfers (CCT) in maternal and child health is that households may underutilise maternal and child health services in the presence of financial constraints, opportunity costs, and informational barriers. In such settings, public transfers are intended to reduce these constraints and encourage greater investment in maternal and child wellbeing (Lagarde et al., 2007; Glassman et al., 2013; Powell-Jackson et al., 2014). The theoretical literature identifies two broad pathways through which these programmes are expected to operate: a conditionality pathway and a resource pathway. Distinguishing between them remains a central question in the empirical literature.

The first is a demand-side financing pathway. Maternal healthcare utilisation remains below desirable levels when women face transport costs, informal payments, and time burdens that raise the effective price of seeking care (Glassman et al., 2013; Powell-Jackson et al., 2014; Dixit & Prinja, 2026). Even where these costs are modest, preventive care may be underutilised because its benefits are realised in the future while costs fall immediately — a problem compounded by present bias, imperfect information, and intra-household bargaining (Sun et al., 2021; McGuire et al., 2022). CCTs are intended to address both constraints by lowering the

economic cost of healthcare utilisation and strengthening incentives to engage with recommended maternal and child health services (Lagarde et al., 2007; Ranganathan & Lagarde, 2012).

The second is an income and resource pathway. Pregnancy can place considerable pressure on household resources through higher nutritional requirements, increased expenditure, and forgone earnings, particularly among women from informal worker households (Fuller et al., 2022; Mathur & Sen, 2024; Bhattacharyya et al., 2025). Cash transfers may therefore improve wellbeing not through the health system but by relaxing budget constraints, improving dietary intake, and compensating for income losses during the perinatal period (Raghunathan et al., 2017; Fuller et al., 2022; Patwardhan, 2023).

In practice, most programmes activate both pathways simultaneously, though their relative importance is likely to vary across settings. Where financial and behavioural barriers dominate, conditionalities may be more influential; where resource constraints are more binding, income support may matter more (Chakrabarti et al., 2021; Bhattacharyya et al., 2025; Osmani & Okunade, 2026). However, evidence on the relative importance of these pathways remains limited.

2.2. Antenatal Care Utilisation

The conditionality pathway predicts its clearest effects at the antenatal stage, where pregnancy registration and ANC visits are directly linked to benefit disbursement. Literature consistently documents positive effects on pregnancy registration, antenatal visits, and uptake of services including tetanus immunisation and iron-folic acid supplementation (Lagarde et al., 2007; Glassman et al., 2013; Ranganathan & Lagarde, 2012). Evidence from Indian context also confirms this pattern: JSY improved ANC utilisation substantially, particularly among poorer women (Lim et al., 2010; Khan et al., 2010; Gopalan & Varatharajan, 2012; Panja et al., 2012), with gains larger where ASHA outreach was more intensive indicating that the conditionality pathway depends on supply-side complementarity (Rahman & Pallikadavath, 2018; Sardar et al., 2025).

The more instructive finding concerns the limits of these gains. Programme effects are generally stronger for pregnancy registration and initial ANC contact than for completion of the recommended schedule or receipt of more comprehensive antenatal care (Joshi & Sivaram, 2014; Rahman & Pallikadavath, 2018). This suggests that CCTs are effective at bringing women into the health system but less successful at sustaining engagement throughout pregnancy. Evidence from other settings points to similar patterns, with variation in ANC gains linked to programme design, implementation quality, and local context (Jacobs & Downey, 2022; Shah et al., 2026). Thus, while the conditionality pathway appears effective in increasing ANC utilisation, its influence on continuity and completeness of care is at best limited.

2.3. Institutional Delivery

Institutional delivery is the outcome for which the conditionality pathway appears most effective. Childbirth involves substantial and immediate costs that financial incentives can directly offset, while the event itself is discrete and easily verifiable. Accordingly, facility-based delivery has emerged as one of the most responsive outcomes to maternity cash transfer programmes across a wide range of settings (Basinga et al., 2011; Pandey, 2018; Glassman et al., 2013). Evidence from India mirrors this pattern, with JSY/PMMVY contributing to substantial increases in institutional delivery, particularly among disadvantaged households (Lim et al., 2010; Gupta et al., 2012; Dongre, 2012; Mukhopadhyay et al., 2016). These gains have also been associated with a narrowing of socioeconomic inequalities in facility-based childbirth (Godha & Hotchkiss, 2022).

The literature consistently reports larger programme effects on institutional delivery than on antenatal or postnatal care including child immunizations. However, increased rate of institutional delivery did not consistently translate into better maternal and child health outcomes. Studies also suggest that overall of health benefits depend not only whether women give birth but also on the quality and capacity of care available at the health facilities (Joshi & Sivaram, 2014; Nandi & Laxminarayan, 2016; Csapo, 2022). The conditionality pathway can change where women give birth without changing how well they are cared for — a reminder that behaviour and biology are distinct, and that the chain from incentive to health outcome depends at every stage on implementation quality and health system capacity.

2.4. Postnatal Care and the Continuum of Care

If institutional delivery is where the conditionality pathway is strongest, postnatal care is where it most consistently fails. Across diverse settings, studies find limited or no increase in maternal postnatal visits even where large gains in ANC utilisation and facility delivery have been documented (Malik et al., 2013; Jackson et al., 2015; Rahman & Pallikadavath, 2018; Godha & Hotchkiss, 2022). Postnatal care is typically less directly linked to programme incentives and is shaped by social norms and caregiving practices that do not respond readily to financial transfers. Evidence from Kenya confirms the pattern (Vanhuyse et al., 2022), while payment delays, administrative burdens, and eligibility uncertainty further weaken programme effects during the postnatal period (Yoshino et al., 2023).

Some studies identify positive spillovers. Neogi et al. (2025) find JSY participation associated with higher new-born check-up rates and zero-dose immunisation coverage, though gains appear to arise from increased system contact during pregnancy and delivery rather than explicit postnatal conditionalities suggesting the pathway can generate downstream momentum beyond the services it directly incentivises. Nevertheless, Ahmed et al. (2024), in a meta-analysis of twenty-three studies across nine African countries, find that completion of the full care pathway from adequate ANC to postnatal contact remains rare, with wealth, urban residence, and proximity to facilities as dominant predictors. The postnatal evidence points to a structural feature of the conditionality pathway: it is strongest where a single verifiable act is directly incentivised and progressively weaker as the required behaviour becomes more sustained, less observable, and more dependent on factors beyond the reach of a cash transfer scheme.

2.5. From Utilisation to Health Outcomes

The literature provides relatively strong evidence that maternity benefit programmes increase healthcare utilisation. The extent to which these gains translate into improvements in maternal and child wellbeing, however, is ambiguous. Evidence on birth outcomes, maternal nutrition, and child health remains mixed across programmes and settings (Raghunathan et al., 2017; Chakrabarti et al., 2021; von Haaren & Klonner, 2021; Patwardhan, 2023; Banerjee et al., 2025; Ray et al., 2026). Understanding this divergence requires shifting attention from healthcare utilisation itself to the mechanisms through which maternity benefits may influence health and nutritional outcomes.

The logic of the resource pathway is straightforward. Pregnancy often increases household expenditure through higher nutritional requirements, healthcare needs, and reduced earning opportunities, particularly among women in informal employment who lack maternity protection (Fuller et al., 2022; Mathur & Sen, 2024; Bhattacharyya et al., 2025). By supplementing household income during this period, cash transfers can improve food consumption, support health-related expenditure, and partially compensate for forgone earnings. Consequently, programme impacts may arise not only through increased utilisation of healthcare services but also through improved access to resources that directly influence maternal and child wellbeing (von Haaren & Klonner, 2021; Fuller et al., 2022; Patwardhan, 2023). This rationale underpins second-generation maternity benefit programmes such as PMMVY and *Mamata*[1], which combine healthcare conditionalities with explicit income support during pregnancy (Raghunathan et al., 2017; Chakrabarti et al., 2021; Patwardhan, 2023).

Evidence on the resource pathway is growing but remains mixed. In India, studies of Mamata and IGMSY/PMMVY revealed improvements in nutritional and birth outcomes, although gains are often uneven and appear more closely related to transfer adequacy than conditionality compliance (Chakrabarti et al., 2021; Patwardhan, 2023; Mathur & Sen, 2024). Similar patterns emerge elsewhere. Income transfers have been linked to improvements in maternal haemoglobin, infant growth, birth weight, child survival, and under-five mortality, particularly where support is sustained and adequately resourced (Falcão et al., 2023; Aizer et al., 2024; Dolati et al., 2025; Cavalcanti et al., 2025). At the same time, other studies report only modest health gains despite substantial improvements in healthcare utilisation (von Haaren & Klonner, 2021). Taken together, the evidence suggests that the resource pathway can improve maternal and child wellbeing, but its effectiveness depends critically on programme design, transfer adequacy, and household context.

The evidence therefore suggests that neither pathway alone can fully explain observed programme impacts. Improvements in healthcare utilisation do not necessarily translate into better health outcomes, as birth weight, child growth, and maternal nutritional status depend on factors such as service quality, nutritional supplementation, and household living conditions that extend beyond healthcare contact alone (Falcão et al., 2023; Dolati et al., 2025). At the same time, the effectiveness of income transfers depends on transfer adequacy, timing, and how resources are allocated within households. As Ngamasana and Moxie (2024) argue, healthcare utilisation and health outcomes should be viewed as distinct dimensions of programme performance. Consequently, understanding the effectiveness of maternity benefit

[1] A CCT Scheme for pregnant and lactating women by the Government of Odisha that provides health and nutritional support.

programmes requires an analytical framework that examines both pathways and assesses whether improvements in service utilisation are accompanied by measurable gains in maternal and child wellbeing.

Taken together, the literature suggests that neither increased healthcare utilisation nor additional household resources alone are sufficient to guarantee improvements in maternal and child wellbeing. Healthcare utilisation and health outcomes therefore need to be viewed as related but distinct dimensions of programme performance (Ngamasana & Moxie, 2024). Yet relatively little evidence examines both pathways within a common framework or traces their effects across the continuum from healthcare utilisation to maternal and child health outcomes. This limitation is particularly relevant for maternity benefit programmes that combine healthcare conditionalities with income support, where both pathways are expected to operate simultaneously.

3. Analytical Framework

3.1. Theory of Change

The Mukhyamantri Shramik Seva Prasuti Sahayata Yojana (MMSSPSY) was introduced by the Government of Madhya Pradesh in 2018 to improve maternal and child health among women working in the informal sector. The programme combines healthcare-related conditionalities with maternity income support and is available to registered women workers for up to two live births. Benefit payments are linked to compliance with specified maternal and child health requirements spanning pregnancy, childbirth, and the immediate postnatal period, including antenatal care, institutional delivery, and essential new-born care and immunisation practices. Detailed programme provisions, eligibility criteria, and benefit structure are presented in Appendix A.

Understanding how MMSSPSY is expected to influence maternal and child health, and where programme impacts may be attenuated, is essential for interpreting the empirical results. The programme is hypothesised to operate through two complementary pathways, which together form the analytical framework for the study (Fig. 1). The first is a conditionality pathway. Receipt of programme benefits is linked to compliance with specified maternal and child health requirements. By reducing the costs of care-seeking and creating incentives for service utilisation, the programme is expected to increase women's engagement with antenatal care, institutional delivery, and other maternal and child health services (Fiszbein & Schady, 2009; Gertler, 2004; Lagarde et al., 2007). The primary effects of this pathway are therefore expected to appear in outcomes related to healthcare utilisation and continuity of care. Increased contact with health providers may also generate spillover effects on delivery and new-born care practices beyond those directly linked to programme conditions.

[Insert Fig. 1]

The second is an income pathway. By providing maternity assistance during pregnancy and childbirth, the programme may relax household budget constraints and increase expenditure on food, dietary supplementation, healthcare, and other inputs to maternal and child wellbeing (Fuller et al., 2022). Unlike the conditionality pathway, which influences behaviour through incentives, this pathway operates through household resources. Its effectiveness therefore depends on whether the transfer is sufficient to influence household consumption

decisions and whether the additional resources are directed towards health- and nutrition-enhancing investments (Dolati et al., 2025; Mathur & Sen, 2024).

Together, these pathways generate three sets of testable outcomes. First, if the conditionality pathway is effective, programme beneficiaries should exhibit higher utilisation of antenatal care and delivery-related services. Second, increased engagement with the health system may extend to new-born care and childhood immunisation outcomes that are not directly conditioned but are facilitated by continued contact with health providers. Third, if the income pathway is operative, improvements may be observed in birth outcomes, maternal nutritional status, and child health indicators. The extent to which these effects materialise provides evidence on the relative importance of the two pathways and the mechanisms through which MMSSPSY influences maternal and child wellbeing.

These two pathways generate distinct, though potentially complementary, predictions. The conditionality pathway is expected to influence healthcare utilisation across pregnancy, delivery, and the immediate postnatal period, while the income pathway is expected to affect outcomes more closely linked to maternal nutrition, birth outcomes, and child health. The extent to which improvements in healthcare utilisation translate into broader gains in maternal and child wellbeing remains an empirical question. The analysis therefore examines programme impacts across three outcomes—antenatal care utilisation, delivery and immediate new-born care, and maternal and child health outcomes—thereby allowing an assessment of both pathways within a common analytical framework (Bhattacharyya et al., 2025; Falcão et al., 2023).

3.2. Design Constraints and Identification Strategy

The central identification challenge in evaluating MMSSPSY is that the programme was implemented statewide in 2018 as an entitlement for all eligible informal-sector women, leaving no variation in rollout across districts or over time that could be exploited for causal identification. The empirical task is therefore to construct a credible comparison between eligible women who received programme benefits and those who did not.

Two natural approaches are foreclosed by the data. Difference-in-differences estimation is not feasible because no baseline information exists for sampled households prior to programme participation. Regression discontinuity is similarly unsuitable because eligibility is determined by a combination of criteria—including informal employment status, parity restrictions, and utilisation of public health services—rather than by a continuous assignment variable with a clearly defined cutoff. The analysis therefore relies on propensity score matching (PSM), which compares beneficiaries with observationally similar non-beneficiaries based on pre-treatment characteristics (Rosenbaum & Rubin, 1983).

The credibility of this approach depends critically on the quality of the comparison group. Unlike many evaluations that compare programme beneficiaries with the broader population, the present study compares beneficiaries with eligible non-beneficiaries drawn from the same informal-sector worker population. Non-beneficiaries were women who delivered during the same period, resided in the same villages, and whose eligibility was independently verified through certification by ASHAs, ANMs, and village leaders. Beneficiaries were randomly selected from official programme records. Both groups were therefore exposed to the same local healthcare infrastructure, frontline workers, and programme environment.

Consequently, the comparison is constructed within the programme's intended target population rather than between fundamentally different socioeconomic groups, thereby reducing the scope for systematic differences unrelated to programme participation.

Eligibility, however, did not automatically translate into programme receipt. Administrative records and implementation reviews indicate that non-receipt often arose from registration difficulties, documentation requirements, verification delays, payment-processing issues, or failure to complete programme conditions within the prescribed time frame. Programme participation was therefore shaped not only by household characteristics and healthcare-seeking behaviour but also by administrative processes associated with programme delivery. While such factors do not eliminate concerns regarding selection bias, they suggest that non-receipt among eligible women cannot be interpreted solely as a reflection of underlying preferences or demand for maternal healthcare. This provides a stronger basis for constructing a comparison between beneficiaries and eligible non-beneficiaries than would be possible using a broader population sample.

3.3. Identifying Assumptions

The validity of propensity score matching rests on three standard assumptions: conditional independence, common support, and the stable unit treatment value assumption (Rosenbaum & Rubin, 1983). The conditional independence assumption (CIA) requires that, after conditioning on observed characteristics, treatment assignment is independent of potential outcomes: $(Y_1, Y_0) \perp T \mid X$. This assumption is untestable, and no matching estimator can fully rule out selection on unobserved factors. Its plausibility in this setting rests on three features of the study design. First, beneficiaries and non-beneficiaries are drawn from the same verified population of eligible informal-sector households — a stronger foundation than comparisons between programme participants and the general population. Second, both groups operated within the same programme environment, exposed to the same frontline workers, public facilities, and local implementation conditions. Third, as noted above, non-receipt was substantially driven by administrative processes rather than household preferences or health behaviour, reducing the scope for selection bias on health-relevant unobservables. The propensity score model further conditions on a comprehensive set of demographic, socioeconomic, geographic, and programme-awareness characteristics associated with both participation and maternal health outcomes. Rosenbaum bounds reported in Section 4 assess the sensitivity of the results to potential unobserved confounding.

The common support assumption requires sufficient overlap in the propensity score distributions of beneficiaries and non-beneficiaries. Observations falling outside the region of common support are excluded. The propensity score distributions and overlap diagnostics reported in Section 4 confirm substantial common support between the two groups.

The stable unit treatment value assumption (SUTVA) requires that one woman's treatment status does not affect another woman's potential outcomes. Because MMSSPSY operates through individual cash transfers deposited directly into beneficiaries' bank accounts, programme benefits are non-rival and substantial spillover effects are unlikely.

Under these assumptions, PSM identifies the average treatment effect on the treated:

$$\text{ATT} = E\left(Y_1 - Y_0 \mid T = 1\right)$$

The ATT measures the average impact of MMSSPSY on women who received programme benefits — the population for whom the programme was designed and whose outcomes the policy aims to improve. Because the study evaluates outcomes across both the conditionality and resource pathways, the ATT estimates reported in Section 4 capture not only whether the programme shifted healthcare utilisation but whether those shifts, and the income support provided, translated into measurable improvements in maternal and child health.

3.4. Outcome Estimation

Treatment effects are estimated by matching each beneficiary with eligible non-beneficiaries who have similar propensity scores and then computing the average difference in outcomes between the matched groups. The propensity score, defined as the probability of programme participation conditional on observed pre-treatment characteristics, is estimated using a logit model with the covariates listed in Table 1.

[Insert Table 1]

The covariates serve three distinct analytical purposes. The first group captures individual and household determinants of programme participation: the woman's age in 2017 and its squared term, educational attainment of both the woman and her husband, number of children under four years of age, occupational category, and household wealth quintile. The second group captures factors that independently shape maternal healthcare utilisation and could confound the estimated treatment effect: awareness of MMSSPSY, access to government-funded health insurance, rural residence, caste, and distance to the nearest health facility. The third group consists of district indicators, which absorb differences in programme implementation intensity, health infrastructure, and administrative capacity across the study area. Together, these variables aim to ensure that beneficiaries and matched non-beneficiaries are comparable on the observed dimensions most likely to drive both participation and maternal and child health outcomes.

Statistical inference is based on the Abadie–Imbens robust variance estimator, which accounts for the additional uncertainty introduced by the propensity score estimation step and is therefore preferred to standard bootstrapped standard errors in matched samples (Abadie & Imbens, 2016).

3.5. Robustness Strategy

Primary estimates are obtained using nearest-neighbour matching with five neighbours and replacement. Using multiple neighbours reduces estimator variance by drawing on a larger set of comparable observations, while matching with replacement improves match quality by allowing the same control observation to be used for multiple beneficiaries when suitable matches are limited. Given the sample size, this specification provides a reasonable balance between match quality and estimator precision.

Robustness is assessed using three alternative estimators: single-nearest-neighbour matching, kernel matching, and inverse probability weighted regression adjustment (IPWRA). Single-nearest-neighbour matching prioritises match quality by using only the closest control observation. Kernel matching uses weighted information from all observations within the common support region, while IPWRA provides doubly robust estimates that remain consistent if either the treatment or outcome model is correctly specified (Wooldridge, 2007).

Consistency of results across estimators that rely on different weighting and matching procedures increases confidence that the findings are not driven by a particular modelling choice.

Covariate balance is assessed using standardised percentage bias before and after matching, with post-matching bias below 10 per cent considered acceptable (Caliendo & Kopeinig, 2008). A likelihood ratio test on the matched sample provides an additional joint assessment of balance across the full set of covariates. Together, these diagnostics indicate whether the matching procedure succeeds in constructing observationally comparable treatment and control groups.

3.6. Falsification Test

The conditional independence assumption cannot be verified directly, but its plausibility can be assessed through a falsification exercise. The sex of the index child is used as a placebo outcome. Biological sex is determined at conception before a woman registers with the programme or begins the antenatal care schedule that conditions the first benefit instalment making it causally prior to any aspect of MMSSPSY participation. No mechanism exists through which programme enrolment could alter the probability of a male or female birth. A well-specified matching estimator should therefore produce a treatment effect on child sex that is indistinguishable from zero.

A null result on this placebo outcome supports the view that the propensity model has adequately balanced the dimensions of selection that matter for the substantive outcomes of interest strengthening confidence in the primary estimates. The falsification results are reported alongside the main findings in Section 4.

3.7. Data

Primary data were collected through face-to-face interviews using a semi-structured household interview schedule. A stratified multistage sampling design was adopted. Districts were first stratified into three performance categories (high, medium, and low) based on a composite index of programme implementation characteristics (Appendix B). Within each stratum, two districts were selected purposively in consultation with state officials, using the number of beneficiaries who had received the second instalment as the primary selection criterion. The final sample comprises seven districts: Bhopal, Barwani, Chhindwara, Jhabua, Morena, Sagar, and Satna.

Barwani was included to represent the urban stratum because the number of MMSSPSY beneficiaries in urban Jhabua was insufficient to support independent sampling when the sampling frame was developed. Consequently, findings for this stratum should be interpreted with appropriate caution. Within each selected district, blocks and villages were selected purposively in consultation with district officials.

Data were collected from mothers who gave birth between January 2019 and July 2020. The treatment group comprised women who had received at least the second instalment of MMSSPSY and were randomly selected from administrative beneficiary lists maintained by Block Accounts Managers. The control group comprised eligible non-beneficiaries identified from registers maintained by ANMs, ASHAs, and Anganwadi workers. Controls were restricted to women who delivered during the same reference period, resided in the same

villages as beneficiaries, met the programme eligibility criteria, but had not received MMSSPSY benefits.

To ensure comparability, all potential control households were independently verified as belonging to the programme's target population through certification by the local ASHA, ANM, and village head before being included in the sampling frame. Control households were then selected randomly from the verified list. This verification process ensured that both treatment and control groups were drawn from the same target population of eligible informal-sector workers and were exposed to the same local programme environment. The sampling procedure resulted in a final sample of 1,246 mothers across the seven study districts, comprising 661 MMSSPSY beneficiaries (53.1 per cent) and 585 eligible non-beneficiaries (46.9 per cent).

3.8. Outcome Variables

The outcome variables are organised into three layers that correspond to the programme's theory of change: (i) the antenatal care continuum, (ii) delivery and immediate newborn care, and (iii) birth, maternal, and child health outcomes. The first two layers capture outcomes associated with the conditionality pathway, while the third assesses whether increased healthcare utilisation and additional household resources translated into measurable improvements in wellbeing. Unless otherwise stated, all outcomes are binary indicators. Detailed definitions and descriptive statistics are reported in Appendix C.

Antenatal Care Continuum

The first layer captures women's engagement with antenatal care services during pregnancy. The indicators include pregnancy registration, at least one ANC visit, four or more ANC visits, four timely ANC visits, and receipt of iron-folic acid (IFA) supplementation. Together, these measures capture both initial contact with the health system and continuity of care during pregnancy.

Delivery and Immediate Newborn Care

The second layer focuses on healthcare utilisation around childbirth and the immediate postnatal period. Indicators include institutional delivery, skilled birth attendance, receipt of essential newborn care, early initiation of breastfeeding, exclusive breastfeeding, birth-dose immunisation, and full immunisation. These outcomes assess whether programme participation is associated with continued engagement with maternal and child health services beyond pregnancy.

Birth, Maternal, and Child Health Outcomes

The third layer examines whether programme participation is associated with improvements in maternal and child wellbeing. Child health outcomes include low birth weight, premature birth, stunting, wasting, underweight, and child BMI. Maternal outcomes comprise body mass index and anaemia status. Unlike the utilisation indicators, these outcomes are not directly linked to programme conditionalities and therefore provide evidence on whether programme effects extend beyond healthcare-seeking behaviour to broader health and nutritional outcomes.

4. Results

4.1. Pre-Matching Characteristics and Determinants of Participation

Table 2 presents the characteristics of beneficiaries and non-beneficiaries prior to matching. Several systematic differences are evident. Beneficiaries are slightly older, better educated, and more likely to belong to wealthier households than non-beneficiaries. Programme awareness also differs markedly, with over 80 per cent of beneficiaries reporting awareness of MMSSPSY compared with about half of non-beneficiaries. Differences in social group composition are visible as well, with Scheduled Tribe women accounting for a smaller share of programme participants. By contrast, the two groups are broadly similar in parity, occupation, rural residence, distance to the nearest health facility, and district distribution. These patterns suggest that programme participation is associated with observable socioeconomic characteristics that may independently influence maternal healthcare utilisation, underscoring the importance of constructing a comparable control group before estimating programme effects.

[Insert Table 2]

Table 3 reports the propensity score model used to estimate programme participation. The adequacy of the propensity score specification is assessed using the linktest, which provides no evidence of model misspecification (Appendix D). Awareness of MMSSPSY emerges as the strongest predictor of benefit receipt. Participation is also more likely among women from relatively better-off households and those whose husbands have higher levels of education, while Scheduled Tribe women are less likely to receive benefits. Some district-level variation is also evident, with participation relatively higher in Jhabua. In contrast, a woman's own education, parity, occupation, rural residence, and health insurance status are not significantly associated with participation once other characteristics are taken into account. Overall, the results suggest that programme uptake was shaped primarily by differences in awareness, socioeconomic circumstances, and programme access rather than by factors directly related to maternal healthcare utilisation. These characteristics are therefore incorporated into the matching procedure used to estimate treatment effects.

[Insert Table 3]

4.2. Balancing Diagnostics

Fig. 2 and Fig. 3 present propensity score distributions and standardised covariate biases before and after matching. Prior to matching, beneficiaries are concentrated at higher propensity scores, reflecting the systematic differences reported in Table 2. After matching, the distributions overlap closely within the common support region (0.078–0.887).

[Insert Fig. 2 & Fig. 3]

Balance diagnostics, reported in full in Appendix E, indicate that matching was successful. The likelihood ratio test of joint covariate significance on the matched sample is statistically insignificant ($p = 0.973$). Rubin's B falls from 91.9 to 21.2, below the recommended threshold of 25, while Rubin's R remains within the acceptable range. The pseudo-R^2 declines from 0.136 to 0.008, and mean standardised bias falls from 12.3 per cent to 3.0 per cent, with median bias declining from 8.9 per cent to 2.8 per cent. Remaining differences across individual covariates

are small and statistically insignificant. Taken together, these diagnostics suggest that the matching procedure substantially improved comparability between beneficiaries and non-beneficiaries. The treatment effects reported below are therefore estimated using matched samples that are balanced on observed pre-treatment characteristics.

4.3. Effects on Antenatal Care Utilisation

Table 4 reports the estimated ATT of MMSSPSY on antenatal care outcomes. The results provide consistent evidence that the conditionality pathway operated effectively at the antenatal stage. Under the preferred specification, programme participation increased the probability of pregnancy registration by 2.3 percentage points, receipt of at least one ANC visit by 10.4 percentage points, and receipt of iron-folic acid supplementation by 10.8 percentage points.[2] The largest effect is observed for completion of four or more ANC visits, where programme participation increases the probability of meeting this benchmark by 26.5 percentage points. The estimated effects are consistent in direction and significance across all matching specifications.

[Insert Table 4]

One finding within the antenatal care layer warrants particular attention. Despite the large effect on total ANC visits, the programme has no measurable effect on the timely completion of four visits. Estimated effects are small and statistically insignificant across all specifications. This divergence indicates that MMSSPSY increased women's engagement with antenatal care services but did not ensure that those contacts occurred within the recommended gestational windows. The programme therefore appears to have influenced the quantity of antenatal care utilisation rather than its timing, a distinction that may be important for understanding subsequent health outcomes.

4.4. Effects on Delivery, Newborn Care, and Child Immunisation

Table 5 presents estimated effects on delivery, newborn care, breastfeeding, and child immunisation outcomes. Programme participation is associated with a 1.8 percentage point increase in both institutional delivery and skilled birth attendance. These effects are statistically significant and consistent across estimators. The modest magnitude should be interpreted against baseline rates: where institutional delivery coverage was already high at the time of the survey, even well-designed programmes will produce smaller incremental gains, and the relevant question is whether the programme maintained coverage among the most vulnerable women in the sample rather than produced aggregate shifts.

[Insert Table 5]

The estimated effects on newborn care counselling and breastfeeding initiation within one hour of birth are positive but statistically insignificant across all specifications, indicating that the programme did not generate measurable improvements in these immediate postnatal practices. Exclusive breastfeeding shows a positive and generally significant effect of 5.6

[2] Pregnancy registration and the first ANC visit were not always concurrent. In many cases, registration preceded the first ANC visit, leaving an interval during which some women, particularly eligible non-beneficiaries, remained registered without subsequently receiving antenatal care. This sequencing provides a plausible explanation for the larger programme effects on ANC utilisation than on pregnancy registration.

percentage points, though the magnitude varies across estimators and this result should be interpreted with some caution.

The programme's effects on child immunisation are among the largest in the results. Beneficiary children were 4.8 percentage points more likely to receive birth-dose vaccines and 12.6 percentage points more likely to be fully immunised than comparable children in the control group. The full immunisation result is particularly notable: it captures completion of the age-appropriate vaccination schedule well beyond the immediate postnatal period, indicating that the conditionality pathway generated sustained engagement with child health services that extended beyond the behaviours directly incentivised under the programme.

4.5. Effects on Birth, Maternal, and Child Health Outcomes

Table 6 presents the estimated effects of MMSSPSY on birth, maternal, and child health outcomes. The results reveal a clear but uneven pattern across outcome domains. The strongest effect is observed for low birth weight. Under the preferred specification, programme participation reduced the probability of delivering a low birth weight child by 11.0 percentage points. The estimate is statistically significant at the 1 per cent level and remains remarkably consistent across all matching specifications. This finding is discussed further in Section 5.2. No significant effects are observed for premature delivery or delivery complications under the preferred specification, although premature delivery shows weakly positive effects in some alternative estimators.

[Insert Table 6]

The results for child nutritional status are notably different. Estimated effects on stunting, wasting, and underweight are small and statistically insignificant across all specifications. Thus, despite the improvement in birth weight, there is no evidence that the programme produced measurable improvements in child anthropometric outcomes during the period covered by the survey.

For maternal health, the programme is associated with a statistically significant improvement in maternal BMI, a result that is robust across estimators. In contrast, no significant effects are observed for maternal anaemia. Taken together, the findings suggest that programme impacts on health outcomes were concentrated in birth weight and maternal nutritional status, with little evidence of broader improvements in child nutrition or maternal anaemia. This pattern suggests that the programme was effective in improving outcomes during pregnancy but insufficient to sustain the nutritional investments needed to reduce maternal anaemia and improve child growth. The mechanisms underlying this divergence are discussed in Section 5.2.

4.6. Heterogeneity Analysis

The main estimates pool all beneficiaries and non-beneficiaries within the matched sample. To examine whether programme effects vary across the population in ways that are theoretically meaningful and policy-relevant, treatment effects are estimated separately by household economic status and place of residence. If financial barriers are the primary constraint on healthcare utilisation, the conditionality pathway should produce larger effects among poorer households, where those barriers bind most tightly. If geographic access is a binding

constraint, rural-urban differences in effect size would be expected. Fig. 4 and Fig. 5 present the heterogeneous treatment effects; complete estimates are reported in Appendix F.

[Insert Fig. 4 & Fig. 5]

Results by economic status are broadly consistent with the view that programme impacts are larger where barriers to healthcare utilisation are greater. MMSSPSY is associated with improvements in antenatal care utilisation, IFA supplementation, institutional delivery, skilled birth attendance, and child immunisation among both poor households (wealth quintiles 1–3) and non-poor households (wealth quintiles 4–5). The estimated effects on institutional delivery, skilled birth attendance, and full immunisation are, however, larger among poorer households. Reductions in low birth weight are observed across both groups. In contrast, effects on child stunting, wasting, underweight, maternal stunting, and maternal anaemia remain small and statistically insignificant in both subgroups, suggesting that the absence of impacts on longer-term nutritional outcomes is not due to income differences.

Results by place of residence follow a broadly similar pattern. Positive effects on antenatal care utilisation, institutional delivery, skilled birth attendance, and child immunisation are observed in both rural and urban areas. The full immunisation effect is larger in rural areas, consistent with the interpretation that programme-induced system contact generates larger downstream gains where baseline engagement with child health services is weaker. The exclusive breastfeeding effect is more pronounced in urban areas, plausibly reflecting greater availability of postnatal counselling support in urban facilities. For most other outcomes, effects are comparable across locations, and there is no evidence of significant effects on child nutritional outcomes or maternal anaemia in either setting.

4.7. Sensitivity Analysis

Propensity score matching controls for observed differences between beneficiaries and non-beneficiaries but cannot rule out selection on unobserved characteristics. Rosenbaum bounds were estimated for key outcome indicators to assess how large a hidden bias would need to be to overturn the main findings (Table 7).

[Insert Table 7]

The utilisation results are exceptionally robust. For pregnancy registration, at least one ANC visit, IFA supplementation, institutional delivery, skilled birth attendance, birth-dose vaccination, and four or more ANC visits, the estimated effects remain statistically significant at critical Γ values of 3.00 or above implying an unobserved confounder would need to more than triple the odds of programme participation to render these findings insignificant. These thresholds substantially exceed what would be plausible given the verified-population comparison group and the administrative sources of non-receipt documented in Section 3.2.

The low birth weight reduction shows a critical Γ of approximately 1.75, more sensitive to hidden bias than the utilisation results, but still meaningful. A confounder of this magnitude would need to be both strongly associated with programme participation and independently predictive of birth weight after conditioning on wealth, education, awareness, and district. Given that non-receipt was driven primarily by administrative rather than health-related factors, a confounder operating through health preferences alone at this scale is implausible.

The asymmetry between the two sets of Γ values is itself informative. Conditionality pathway findings are robust to very large hidden bias because the incentivised behaviours are directly observable and leave little room for unobserved health preferences to confound the estimates. The resource pathway finding rests on a narrower margin, consistent with income effects operating through household allocation decisions that are less directly tied to the programme. The sensitivity analysis supports the main findings across both pathways while appropriately calibrating the confidence placed in each.

4.8. Falsification Test

Table 8 reports the falsification test using child sex as a placebo outcome. As discussed in Section 3.6, child sex is determined at conception and therefore cannot be affected by programme participation. Under a valid identification strategy, estimated programme effects should not be statistically significant. The results are consistent with this expectation. Estimates from nearest-neighbour matching (one and five neighbours) and kernel matching are small and statistically insignificant. Although the IPWRA estimate is marginally significant at 10 per cent level, the absence of similar effects across the matching-based estimators suggests that this result is unlikely to reflect systematic bias. Overall, the falsification test strengthens confidence that the estimated programme effects reflect programme participation rather than residual differences between beneficiaries and matched controls.

[Insert Table 8]

5. Discussion

5.1. The Conditionality Pathway

The conceptual framework proposed that healthcare-related conditionalities would increase engagement with maternal and child health services by reducing financial and behavioural barriers to care-seeking. The empirical evidence provides strong support for this proposition. Programme participation is associated with higher rates of pregnancy registration, antenatal care utilisation, IFA supplementation, institutional delivery, skilled birth attendance, and child immunisation. This pattern is consistent with the broader literature on conditional cash transfers, which finds that financial incentives are most effective for services directly linked to programme requirements and readily verifiable by administrators (Lagarde et al., 2007; Ranganathan & Lagarde, 2012). Similar patterns have been documented under JSY and PMMVY, where participation increased antenatal care and institutional delivery particularly among women facing greater economic barriers (Lim et al., 2010; Khan et al., 2010; Gopalan & Varatharajan, 2012). The substantial increase in four or more ANC visits and the positive effects on immunisation support the argument that maternity cash transfers can sustain engagement with the health system beyond a single contact (Rahman & Pallikadavath, 2018; Sardar et al., 2025). The heterogeneity analysis further shows that programme effects on institutional delivery, skilled birth attendance, and full immunisation were larger among poorer households, suggesting that the conditionality pathway is most effective where the marginal cost of healthcare utilisation is highest. (Godha & Hotchkiss, 2022; Dongre, 2012).

Support for the conditionality pathway is not universal, however. The programme had no measurable effect on timely ANC completion, newborn care counselling, or breastfeeding initiation within one hour of birth. This pattern mirrors findings from earlier studies showing

that financial incentives increase service uptake more reliably than they improve the timing, sequencing, or quality of care received (Joshi & Sivaram, 2014; Rahman & Pallikadavath, 2018). Jacobs and Downey (2022) attribute such gaps to implementation quality and local health system conditions, while Shah et al. (2026) show that timely and repeated engagement remains difficult among vulnerable populations even when incentives are available. Yoshino et al. (2023) further identify payment delays and administrative burdens as factors that weaken programme effects, particularly during the postnatal period and the recommended gestational windows. Consistent with this evidence, MMSSPSY increased healthcare utilisation but had little effect on the timing of care, suggesting that financial incentives alone may not be sufficient to ensure timely engagement across the maternal care continuum.

5.2. The Resource Pathway

The framework proposed that maternity benefits influence maternal and child wellbeing through additional household resources and partial compensation for income losses during perinatal period. The evidence provides partial but meaningful support for this mechanism. The clearest evidence comes from the reduction in low birth weight and the improvement in maternal BMI. Since neither outcome is directly conditioned under MMSSPSY and their improvement cannot be explained by increase in healthcare utilisation alone. Instead, they point to an income effect operating through increased household resources, improved dietary intake, and reduced financial stress during pregnancy (Fuller et al., 2022; von Haaren & Klonner, 2021). Comparable findings have been reported in Brazil, where cash transfer exposure during pregnancy improved birth weight (Falcão et al., 2023), and in India, where transfer size rather than conditionality compliance explained a substantial share of health gains under IGMSY (Mathur & Sen, 2024). Dolati et al. (2025) provide direct evidence that income transfers can improve maternal haemoglobin and infant growth independently of changes in healthcare utilisation, but only when transfers are sufficiently large and provided during critical gestational windows.

The expenditure data in Table 9 establish that a meaningful share of beneficiaries directed transfers toward food and healthcare, consistent with the resource pathway operating through improved household resource allocation during pregnancy. Rural beneficiaries were significantly more likely to spend on nutritious food than their urban counterparts, suggesting the pathway operated more consistently where competing expenditure demands were less varied. At the same time, the expenditure data indicate that the transfer was not directed primarily towards nutritional investments. A majority of beneficiaries did not report spending on nutritious food, while many allocated the benefit to savings, durable goods, and other household expenditures. The resource pathway therefore operated selectively, concentrated among households that directed sufficient funds toward dietary investment, rather than uniformly across the beneficiary population. This selectivity, as the following section argues, is central to understanding why the programme improved birth outcomes without generating broader gains in maternal and child nutritional status.

[Insert Table 9]

5.3. Why Do Utilisation Gains Not Fully Translate into Health Gains?

The divergence between strong programme effects on healthcare utilisation and limited improvements in nutritional outcomes is a central finding of the study. Household

expenditure patterns reported in Table 9 offer an important explanation for this divergence. The argument is not simply that cash transfers are insufficient to address deep-rooted nutritional deficits, though that is true. It is more specific: the pattern of how beneficiaries actually allocated the transfer explains, outcome by outcome, why the resource pathway closed at birth weight but not beyond.

Low birth weight provides the clearest illustration of this mechanism. Birth weight is largely determined during pregnancy and is sensitive to maternal nutrition, physical workload, and financial stress during the prenatal period. The timing of MMSSPSY coincides with this critical window, allowing additional household resources to influence fetal growth. Although only a proportion of beneficiary households reported spending the transfer on nutrition, the investment appears to have been sufficient to generate measurable improvements in birth weight. In other words, improving birth weight may require only a modest increase in nutritional investment during pregnancy, whereas sustaining healthy child growth demands continued investments well beyond the prenatal period.

Stunting, wasting, and underweight present a different picture. Unlike birth weight, these outcomes reflect cumulative nutritional deprivation during the first two years of life and therefore require sustained investments well beyond pregnancy. The expenditure data suggest that such sustained investment was limited. Although some beneficiaries reported spending the transfer on nutritious food, a majority did not, and the transfer itself represented a one-time increase in household resources rather than a continuing source of support. Aizer et al. (2024) similarly argue that lasting improvements in child health require transfers that are sufficiently large and sustained to alter household resource allocation over time. Taken together, these findings suggest that while MMSSPSY may have provided enough support to improve prenatal outcomes, it was less able to generate the sustained nutritional investments required to influence child growth.

The absence of any effect on maternal anaemia provides further insight into the limits of the programme. MMSSPSY substantially increased IFA supplementation, indicating that the programme successfully improved compliance with this component of antenatal care. However, higher IFA uptake did not translate into lower anaemia prevalence. This suggests that improving access to supplementation alone may be insufficient when adherence, dietary quality, or the quality of counselling remain inadequate (Nandi & Laxminarayan, 2016; Csapo, 2022). The expenditure data reinforce this interpretation. Although many beneficiary households reported spending the transfer on food, very few used it specifically for nutritious foods, indicating that the additional resources were unlikely to generate sustained improvements in micronutrient intake. Given that maternal anaemia depends not only on iron supplementation but also on adequate diet, iron-rich foods, and sustained nutritional support (Dolati et al., 2025; Raghunathan et al., 2017), the findings suggest that cash transfers alone are unlikely to substantially reduce anaemia without complementary nutrition interventions and effective counselling.

The results for timely ANC provides a similar insight from the conditionality pathway. Although MMSSPSY substantially increased the number of antenatal visits, it had no effect on whether those visits occurred within the recommended gestational windows. This distinction is important because many of the benefits of antenatal care, including early detection of pregnancy complications and timely nutritional supplementation, depend not only on the

number of visits but also on their timing (Joshi & Sivaram, 2014; Jacobs & Downey, 2022). The pattern mirrors the evidence from household expenditure. Just as the transfer increased household resources without ensuring that they were directed towards nutrition, the programme increased healthcare utilisation without ensuring that care was received at the most clinically appropriate time. Together, these findings suggest that improving the quantity of engagement, whether through additional healthcare contacts or additional household resources, is not always sufficient to generate broader improvements in maternal and child health. The effectiveness of both pathways ultimately depends on the quality, timing, and targeting of those investments.

6. Conclusion

This study evaluated the impact of the Mukhyamantri Shramik Seva Prasuti Sahayata Yojana (MMSSPSY), a maternity benefit programme for women working in the informal sector in Madhya Pradesh. Drawing on primary household data from beneficiaries and eligible non-beneficiaries, the analysis used propensity score matching to estimate programme effects across the maternal and child health continuum. The study was guided by a dual-pathway framework that distinguishes between a conditionality pathway operating through healthcare utilisation and a resource pathway operating through household income and consumption.

The findings show that MMSSPSY substantially increased utilisation of maternal and child health services. Beneficiaries were more likely to register pregnancies, complete antenatal care visits, receive IFA supplementation, deliver in health facilities, and fully immunise their children. The programme also reduced the incidence of low birth weight and improved maternal BMI, suggesting that additional household resources contributed to some improvements in maternal and birth outcomes. However, these gains did not translate into significant reductions in child stunting, wasting, underweight, or maternal anaemia. Taken together, the results suggest that while both pathways operated, their effects are at best limited and not sufficient to generate broad improvements across all dimensions of maternal and child wellbeing in the medium term.

Several limitations should be acknowledged. The analysis relies on observational data and propensity score matching, which cannot fully eliminate the possibility of bias arising from unobserved differences between beneficiaries and non-beneficiaries. The study is based on selected districts of Madhya Pradesh and may not capture the full diversity of implementation contexts within the state. In addition, maternal and child health outcomes are observed at a single point in time, limiting the ability to assess longer-term effects on child development and nutritional trajectories.

Notwithstanding these limitations, the study contributes to the literature in several ways. It provides the first rigorous evidence on MMSSPSY and adds to the limited evidence on state-level maternity benefit programmes in India. More importantly, it evaluates the conditionality and resource pathways within a common analytical framework, demonstrating that improvements in healthcare utilisation do not necessarily translate into equivalent improvements in health outcomes. The findings suggest that maternity benefits can be effective in increasing service utilisation and improving selected birth outcomes, but sustained improvements in maternal nutrition and child growth require continued nutritional investments beyond pregnancy. More broadly, the results have implications for the growing

use of cash transfer programmes including unconditional support schemes especially targeted towards women that seek to strengthen household resources and has potential to address broader nutritional issues among women and children rather than influence specific health behaviours. It is possible that CCTs (income support through schemes such as MMSSPSY) could be more effective when supported by adequate transfer amounts and payment schedules that provide smaller but more frequent instalments aligned with critical stages of pregnancy and early childcare. Further, stronger convergence with the existing complementary interventions such as ICDS, POSHAN, maternal nutrition services, counselling, and postnatal care is likely to contribute to sustained improvements in overall maternal and child wellbeing in the medium term.

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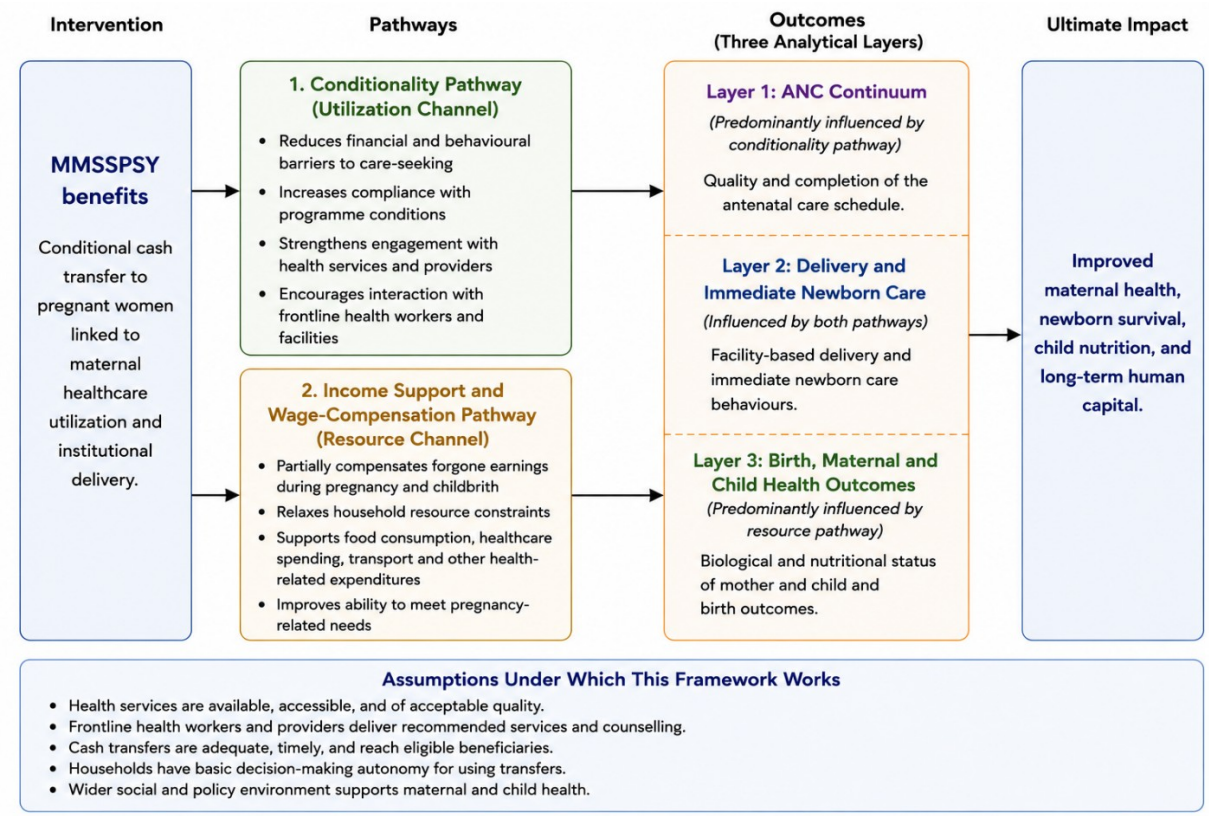
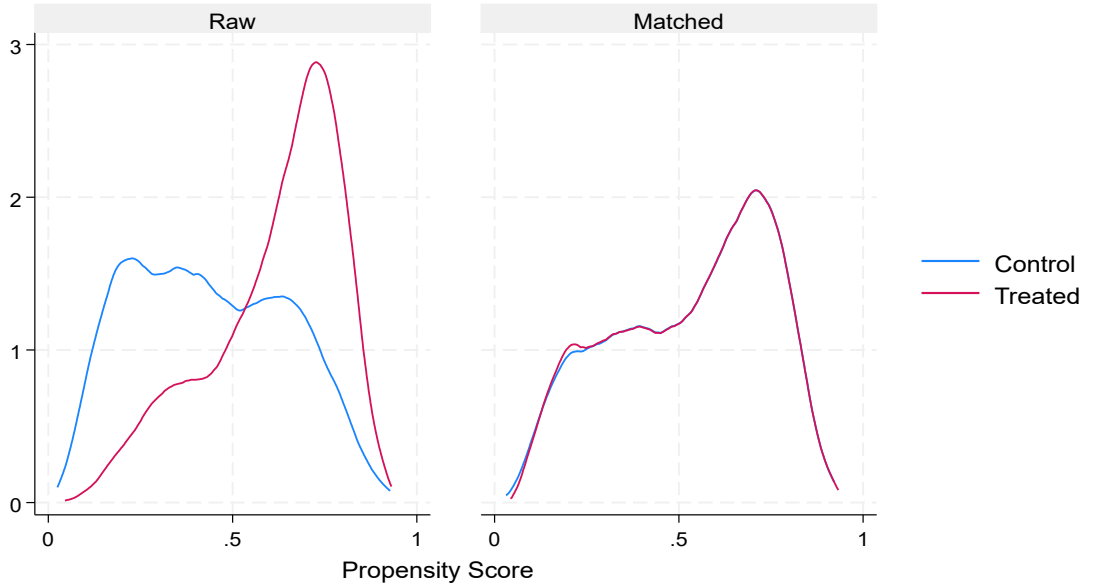
Fig. 1: MMSSPSY Impact Pathways Across the Maternal and Child Health Continuum



Source: Authors' conceptualisation based on MMSSPSY programme guidelines and existing literature.

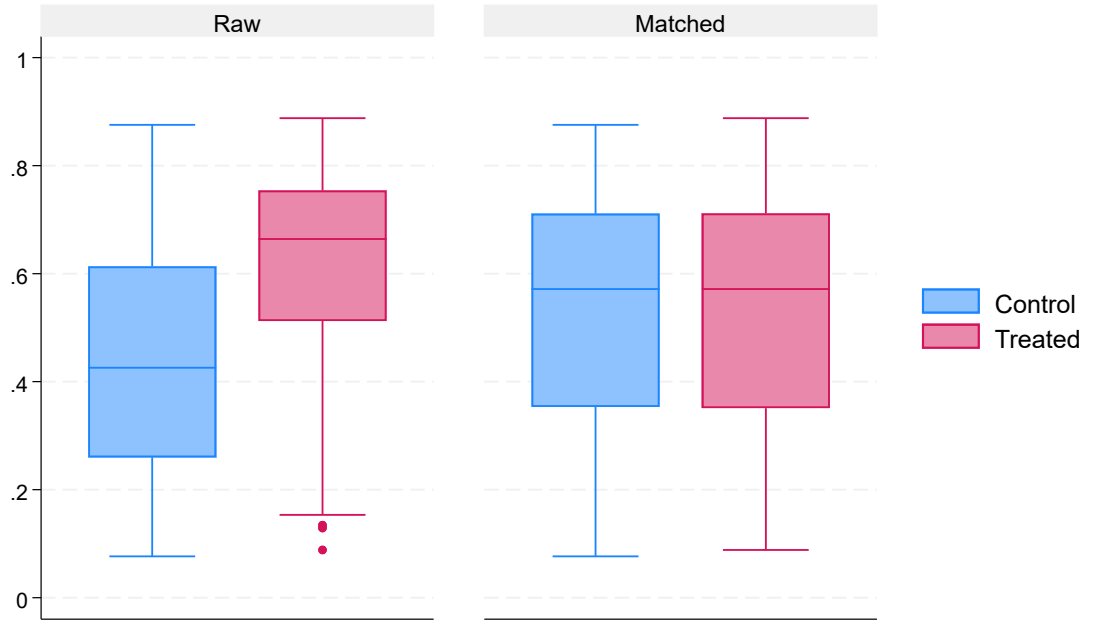
Fig. 2: Kernel Density of Estimated Propensity Scores Before and After Matching



Source: Authors' estimates based on MMSSPSY survey data

Notes: Kernel density of estimated propensity scores before and after matching. Greater overlap after matching indicates improved common support.

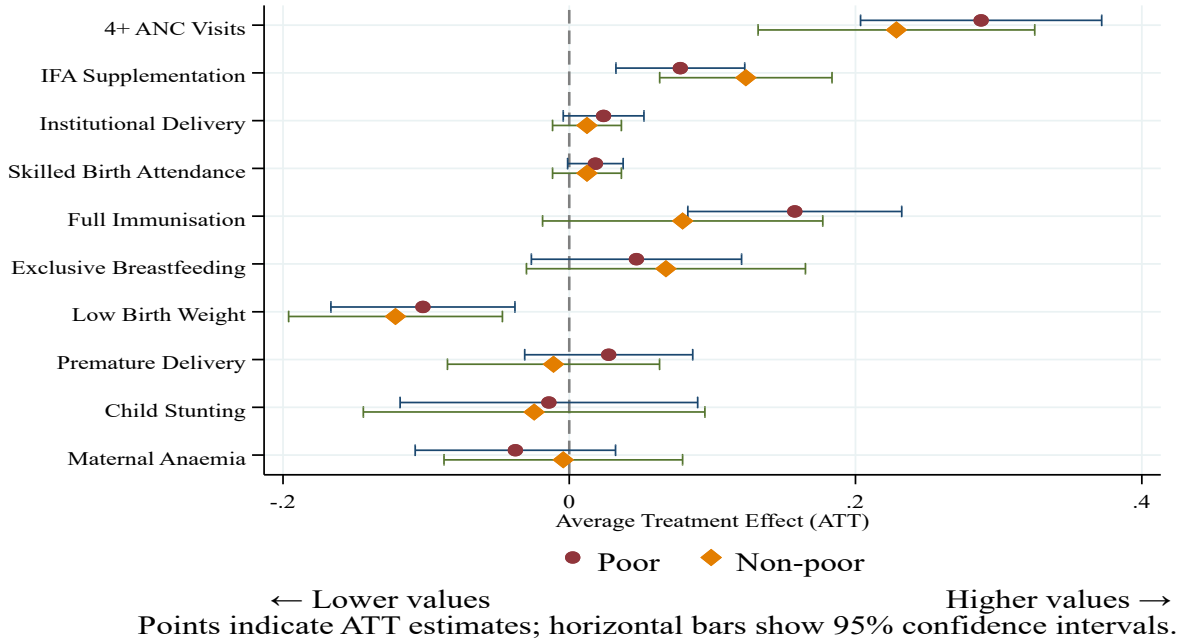
Fig. 3: Covariate Balance Before and After Propensity Score Matching



Source: Authors' estimates based on MMSSPSY survey data

Notes: The figure shows the distribution of standardized covariate bias before and after matching. Reduced dispersion after matching indicates improved covariate balance.

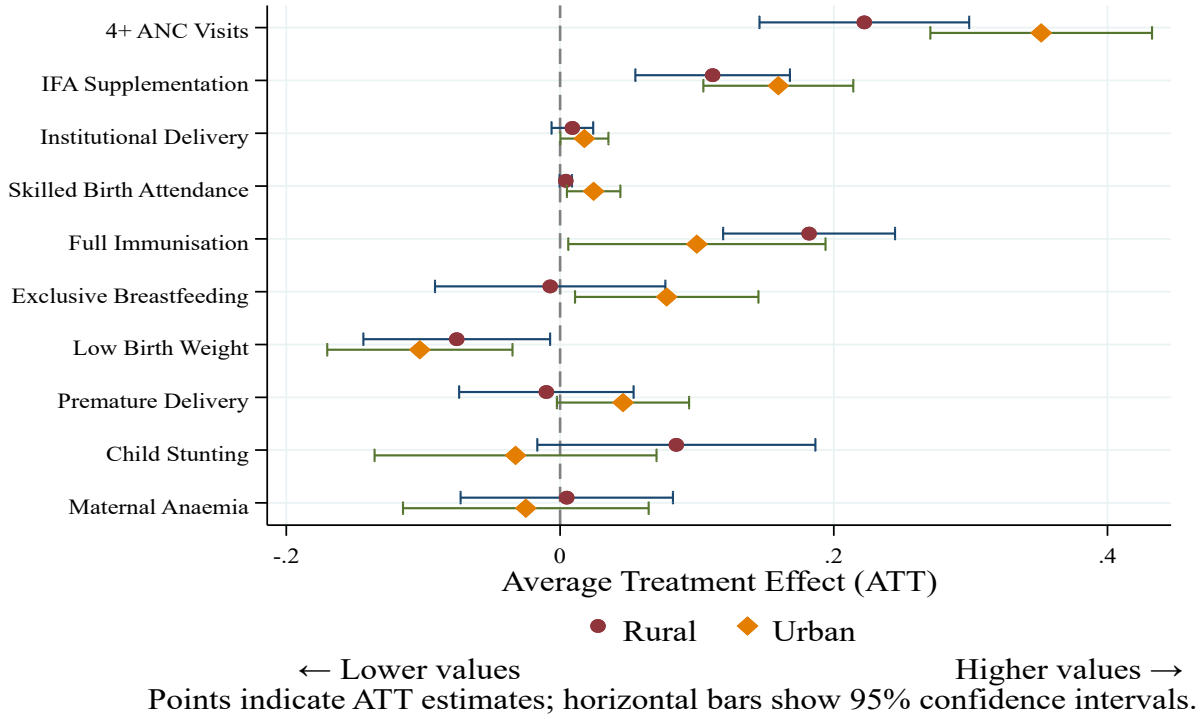
Fig. 4: Heterogeneous Effects of MMSSPSY across Household Wealth Quantiles



Source: Authors' estimates based on MMSSPSY survey data.

Note: The figure presents ATEs with 95% CI for selected indicators. Full heterogeneity estimates are provided in Appendix F.

Fig. 5: Heterogeneous Effects of MMSSPSY by Place of Residence



Source: Authors' estimates based on MMSSPSY survey data.

Note: The figure presents ATEs with 95% CI for selected indicators. Full heterogeneity estimates are provided in Appendix F.

List of Tables

Table 1: List of Covariates used in the Propensity Score Model

Covariates	Definitions
Treatment variable	
MMSSPSY Benefits	Received MMSSPSY benefits [no-0; yes -1]
Covariates	
Age in 2017	Age of women before implementation [in years]
Age in 2017 square	Squared terms of age of women before implementation
Women' Education	Education level of women [no schooling -1; primary -2; middle/secondary -3; higher secondary+-4]
Husband Education	Education level of husband [no schooling -1; primary -2; middle/secondary -3; higher secondary+-4]
Children under 4	No. of children under 4 years in household [continuous]
Occupation	Occupation of the women [house-wife- 1, informal sector wage earner -2, others -3]
Wealth Quantiles	Wealth quantile of the household [poorest -1; poor -2; middle -3; richer -4; richest -5]
MMSSPSY awareness	Awareness of the MMSSPSY scheme [no- 0; yes -1]
Govt. Insurance	Access to govt. funded insurance program [no- 0; yes -1]
Rural	Place of stay of women (urban -0; rural-1)
Caste	Caste of the women [General -1; OBC -2; SC -3; ST -4]
Distance	Distance to nearest medical facilities [in km]
District	Name of home district of women (Bhopal -1; Chhindwara -2; Barwani/Jhabua -3; Morena -4; Sagar -5; Satna -6)

Table 2. Sample Characteristics by Treatment Status

Covariate	Control	Treatment	tests
Woman's Age in 2017 (years)	20.583 (3.302)	20.980 (3.232)	2.144 (0.032)
Woman's education (base: no schooling, %)	0.128 (0.335)	0.083 (0.276)	13.133 (0.004)
Primary	0.120 (0.325)	0.091 (0.288)	
Middle/Secondary	0.571 (0.495)	0.590 (0.492)	
Higher Secondary+	0.181 (0.386)	0.236 (0.425)	
Husband's education (base: no schooling, %)	0.108 (0.310)	0.056 (0.230)	49.085 (0.000)
Primary	0.198 (0.399)	0.107 (0.310)	
Middle/Secondary	0.496 (0.500)	0.501 (0.500)	
Higher Secondary+	0.198 (0.399)	0.336 (0.473)	
No of Children under 4 years	1.605 (0.549)	1.575 (0.530)	0.989 (0.323)
Woman's Occupation (Base: Housewife, %)	0.824 (0.381)	0.829 (0.377)	3.799 (0.150)
ISWE	0.077 (0.267)	0.053 (0.224)	
Others	0.099 (0.299)	0.118 (0.323)	
Wealth Quantile (base: poorest, %)	0.244 (0.430)	0.162 (0.369)	34.685 (0.000)
Poor	0.215 (0.411)	0.186 (0.389)	
Middle	0.219 (0.414)	0.183 (0.387)	
Richer	0.179 (0.384)	0.218 (0.413)	
Richest	0.142 (0.349)	0.251 (0.434)	
PSY awareness (%)	0.504 (0.500)	0.826 (0.379)	12.101 (0.000)
Access to govt. insurance (%)	0.403 (0.491)	0.455 (0.498)	1.848 (0.065)
Rural (%)	0.494 (0.500)	0.507 (0.500)	0.451 (0.652)
Distance to nearest hospital (km)	1.484 (0.761)	1.551 (0.779)	-1.535 (0.125)
Social Group (base: General, %)	0.056 (0.231)	0.092 (0.290)	12.976 (0.005)
OBC	0.453 (0.498)	0.487 (0.500)	
SC	0.262 (0.440)	0.257 (0.437)	
ST	0.229 (0.421)	0.163 (0.370)	
District (base: Bhopal, %)	0.179 (0.384)	0.163 (0.370)	5.860 (0.320)
Chhindwara	0.178 (0.383)	0.151 (0.359)	
Jhabua	0.142 (0.349)	0.171 (0.377)	
Morena	0.142 (0.349)	0.145 (0.353)	
Sagar	0.176 (0.381)	0.207 (0.406)	
Satna	0.183 (0.387)	0.162 (0.369)	

Notes: Means are reported with standard deviations in parentheses. Percentages are shown for categorical variables. Reported test statistics compare beneficiaries and non-beneficiaries before matching using t-tests and χ^2 tests, as appropriate.

Table 3: Logit Model of Programme Participation

MMSSPSY Participation	OR	RSE	ME	Z-value	p-value
Woman's Age in 2017	1.250	0.212	0.046	1.320	0.187
Woman's Age in 2017 Square	0.996	0.004	-0.001	-1.170	0.242
Woman's education (base: no schooling)					
Primary	1.036	0.301	0.007	0.120	0.903
Middle/Secondary	1.200	0.277	0.037	0.790	0.429
Higher Secondary+	0.990	0.278	-0.002	-0.040	0.972
Husband's education (base: no schooling)					
Primary	0.947	0.259	-0.012	-0.200	0.842
Middle/Secondary	1.565	0.380	0.095	1.840	0.065
Higher Secondary+	2.312	0.634	0.176	3.050	0.002
No of Children under 4 years	0.915	0.107	-0.018	-0.760	0.447
Woman's Occupation (Base: Housewife)					
ISWE	1.169	0.325	0.032	0.560	0.574
Others	1.432	0.341	0.073	1.510	0.132
Wealth Quantile (base: poorest)					
Poor	1.313	0.261	0.058	1.370	0.169
Middle	1.342	0.286	0.062	1.380	0.167
Richer	1.878	0.439	0.132	2.700	0.007
Richest	2.155	0.551	0.160	3.000	0.003
PSY awareness	4.619	0.677	0.314	10.430	0.000
Access to govt. insurance	1.016	0.139	0.003	0.110	0.909
Rural	0.965	0.175	-0.007	-0.200	0.843
Distance to nearest hospital	1.262	0.090	0.048	3.270	0.001
Social Group (base: General)					
OBC	0.857	0.212	-0.031	-0.620	0.534
SC	0.954	0.246	-0.010	-0.180	0.855
ST	0.590	0.169	-0.109	-1.840	0.066
District (base: Bhopal)					
Chhindwara	1.016	0.239	0.003	0.070	0.947
Jhabua	1.784	0.442	0.118	2.330	0.020
Morena	1.567	0.384	0.092	1.830	0.067
Sagar	1.446	0.346	0.076	1.540	0.122
Satna	1.540	0.359	0.089	1.850	0.064
Constant	0.006	0.011		-2.700	0.007
N	1246.000				
Wald chi2(27)	191.670				
P-value	0.000				
log pseudo likelihood	-740.611				
Pseudo R2	0.136				
Pearson chi2(1203)	1223.020				
P-value	0.280				

Notes: Odds ratios (OR) and average marginal effects (ME) from the logit model of MMSSPSY participation are reported. Robust standard errors are used for statistical inference. The model is estimated to identify factors associated with programme participation and to generate propensity scores for the matching analysis. Results indicate association rather than causation. Reference categories are shown in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 per cent levels, respectively.

Table 4. ATT Estimates: Antenatal Care Outcomes

Outcome variables	N	PSM NN5	PSM NN1	NN1	NN5	IPWRA
Pregnancy Registration	1240	0.023*** (0.006)	0.033*** (0.010)	0.020** (0.009)	0.029*** (0.010)	0.025*** (0.008)
At least 1 ANC uptake	1240	0.104*** (0.018)	0.141*** (0.024)	0.152*** (0.028)	0.128*** (0.022)	0.121*** (0.020)
At least 4 ANCs uptake	1240	0.265*** (0.029)	0.265*** (0.037)	0.291*** (0.037)	0.292*** (0.033)	0.272*** (0.028)
Timely uptake of 4 ANCs	1156	-0.017 (0.031)	-0.038 (0.037)	0.038 (0.034)	0.043 (0.030)	0.01 (0.028)
Received IFA tablets	1240	0.108*** (0.019)	0.152*** (0.026)	0.153*** (0.030)	0.130*** (0.023)	0.130*** (0.021)

Notes: Estimates report average treatment effects on treated (ATT) obtained using propensity score matching (PSM) with one and five nearest neighbours, nearest-neighbour matching (NN), and inverse probability weighted regression adjustment (IPWRA). Robust standard errors are reported in parentheses. The preferred specification is PSM with five nearest neighbours (PSM NN5). *, **, and *** denote statistical significance at the 10, 5, and 1 per cent levels, respectively.

Table 5. ATT Estimates: Delivery, Immunization, and Breastfeeding

Outcome variables	N	PSM NN5	PSM NN1	NN1	NN5	IPWRA
Institutional Delivery	1240	0.018** (0.007)	0.018* (0.011)	0.020* (0.011)	0.019** (0.009)	0.013** (0.005)
Access to Skilled Birth Attendants	1240	0.018** (0.007)	0.017* (0.010)	0.008 (0.005)	0.011* (0.006)	0.014** (0.006)
Received Counselling on new-born care	1240	0.010 (0.026)	0.015 (0.033)	0.050 (0.037)	0.052 (0.033)	0.019 (0.029)
First Feeding with 1 hour of birth	1240	0.016 (0.034)	0.006 (0.038)	0.030 (0.041)	0.036 (0.035)	0.021 (0.032)
Exclusive Breastfeeding for first 6 months	1240	0.056* (0.030)	0.037 (0.037)	0.065* (0.037)	0.083** (0.034)	0.057* (0.031)
Birth dose vaccines	1240	0.048*** (0.012)	0.074*** (0.019)	0.059*** (0.021)	0.042*** (0.015)	0.060*** (0.015)
Full Immunization	1240	0.126*** (0.031)	0.126*** (0.038)	0.120*** (0.035)	0.110*** (0.033)	0.119*** (0.029)

Notes: Estimates report average treatment effects treated (ATT) obtained using propensity score matching (PSM) with one and five nearest neighbours, nearest-neighbour matching (NN), and inverse probability weighted regression adjustment (IPWRA). Robust standard errors are reported in parentheses. The preferred specification is PSM with five nearest neighbours (PSM NN5). *, **, and *** denote statistical significance at the 10, 5, and 1 per cent levels, respectively.

Table 6. ATT Estimates: Health Outcomes

Outcome variables	N	PSM NN5	PSM NN1	NN1	NN5	IPWRA
Low Birth Weight	1240	-0.110*** (0.027)	-0.099*** (0.030)	-0.115*** (0.032)	-0.105*** (0.028)	-0.097*** (0.025)
Premature Delivery	1240	0.014 (0.024)	0.048* (0.025)	0.056** (0.026)	0.024 (0.024)	0.019 (0.022)
Delivery Complications	1240	0.043 (0.032)	0.002 (0.040)	0.020 (0.041)	0.036 (0.037)	0.026 (0.031)
Child Stunting	899	-0.031 (0.038)	-0.011 (0.047)	-0.017 (0.046)	0.005 (0.042)	-0.014 (0.037)
Child Underweight	899	0.004 (0.036)	-0.054 (0.049)	-0.007 (0.049)	-0.019 (0.044)	-0.011 (0.038)
Child Wasting	899	0.002 (0.029)	-0.050 (0.040)	0.005 (0.043)	-0.023 (0.039)	0.007 (0.030)
BMI of Mother	1240	0.035** (0.014)	0.038*** (0.014)	0.046*** (0.017)	0.041*** (0.016)	0.032** (0.014)
Mother Stunting	1174	0.007 (0.019)	0.023 (0.028)	0.001 (0.025)	-0.002 (0.022)	0.004 (0.018)
Mother Anaemic	1118	-0.018 (0.032)	-0.053 (0.037)	-0.028 (0.039)	-0.031 (0.033)	-0.032 (0.028)

Notes: Estimates report average treatment effects treated (ATT) obtained using propensity score matching (PSM) with one and five nearest neighbours, nearest-neighbour matching (NN), and inverse probability weighted regression adjustment (IPWRA). Robust standard errors are reported in parentheses. The preferred specification is PSM with five nearest neighbours (PSM NN5). *, **, and *** denote statistical significance at the 10, 5, and 1 per cent levels, respectively.

Table 7: Sensitivity of Estimated Treatment Effects to Hidden Bias: Rosenbaum Bounds

Outcome	Critical Γ (5% level)	Interpretation
Pregnancy registration	> 3.00	Highly robust
At least one ANC visit	> 3.00	Highly robust
Four or more ANC visits	≈ 3.00	Highly robust
IFA supplementation	> 3.00	Highly robust
Institutional delivery	> 3.00	Highly robust
Skilled birth attendance	> 3.00	Highly robust
Birth-dose vaccination	> 3.00	Highly robust
Low birth weight	≈ 1.75	Moderately robust

Notes: The table reports the critical value of Γ (Gamma) at which the estimated treatment effect becomes statistically insignificant at the 5 per cent level. Larger values indicate greater robustness to potential bias arising from unobserved confounders. Γ represents the extent to which an unobserved factor would need to influence the odds of programme participation to overturn the estimated effect.

Table 8: Falsification Test for the Identification Strategy: Child Sex as the Outcome (Pre-Treatment)

Specification	ATT	Std Error	p-value
PSM NN5	-0.045	0.034	0.187
NN5	-0.025	0.037	0.497
IPWRA	-0.061	0.032	0.062

Notes: The outcome variable is child sex (female = 1), which is determined prior to programme participation and cannot plausibly be affected by MMSSPSY.

Table 9: Use of Cash Benefits Received by Beneficiary Households

Expenditure pattern	All (661)		Rural (335)		Urban (326)		Chi^2 p-value
	Mean (%)	SD	Mean (%)	SD	Mean (%)	SD	
Individual categories							
Usual food items	56.58	0.496	58.81	0.493	54.29	0.499	0.242
Nutritious food	46.14	0.499	50.15	0.501	42.02	0.494	0.036
Medical care and medicine	41.75	0.494	42.09	0.494	41.41	0.493	0.860
Savings	24.05	0.428	21.79	0.413	26.38	0.441	0.168
Durable goods	19.82	0.399	20.60	0.405	19.02	0.393	0.611
Clothing	11.95	0.325	12.24	0.328	11.66	0.321	0.818
Repayment of debt	5.30	0.224	6.27	0.243	4.29	0.203	0.257
Credit	2.27	0.149	2.99	0.170	1.53	0.123	0.210
Miscellaneous	17.85	0.383	15.82	0.365	19.94	0.400	0.167
Essential items only#	11.20	0.316	13.43	0.342	8.90	0.285	0.064
Essential items and others	21.63	0.412	23.28	0.423	19.94	0.400	0.296
Exclusively on nutritious food	0.91	0.095	0.60	0.077	1.23	0.110	0.393
Not spending on nutritious food	53.86	0.499	49.85	0.501	57.98	0.494	0.036

Notes: The percentage add-ups across items exceeds 100% as beneficiaries were asked to give multiple responses; *Households who spent money on all three items, namely nutritious food items, usual food items, and medical care and medicine, are included under the essential item category.

Appendices

Appendix A: Key Features of MMSSPSY

Component	Description
Programme name	Mukhyamantri Shramik Seva Prasuti Sahayata Yojana (MMSSPSY)
Programme objectives	Promote maternal healthcare utilisation, safe delivery, new-born care, and provide maternity assistance to women in the unorganised sector
Implementing agency	National Health Mission, Government of Madhya Pradesh
Year launched	2018
Target group	Registered women workers in the unorganised sector
Age eligibility	Women aged 18 years or above
Birth eligibility	Available for up to two live births
Total benefit amount	₹16,000 per eligible beneficiary
First instalment (₹4,000)	Payable during pregnancy upon fulfilment of antenatal care requirements
Conditions for first instalment	Registration of pregnancy and completion of the prescribed antenatal care schedule
Second instalment (₹12,000)	Payable after childbirth upon fulfilment of delivery and new-born care conditions
Conditions for second instalment	Institutional delivery in a government facility, early breastfeeding/new-born care requirements, and completion of birth-dose immunisation
Mode of payment	Direct Benefit Transfer (DBT) to beneficiary bank account

Appendix B. Construction of the District Performance Index

To ensure representation of districts with different levels of maternal and child health service utilisation, a district-level performance index was constructed using data from the National Family Health Survey (NFHS-4, 2015–16). Seven indicators reflecting key dimensions of maternal and child health service coverage were selected:

i. Women receiving their first antenatal check-up during the first trimester;
ii. Women consuming iron-folic acid (IFA) tablets for at least 100 days during pregnancy;
iii. Pregnancies registered under the Mother and Child Protection (MCP) card;
iv. Institutional deliveries;
v. Children aged 12–23 months who were fully immunised;
vi. Children aged 9–59 months receiving a Vitamin A dose during the preceding six months; and
vii. Infants aged below six months who were exclusively breastfed.

Each indicator was expressed as the district-level coverage rate reported in NFHS-4. The indicators were first standardised to place them on a common scale and then aggregated with equal weights to construct a composite performance index for each district. Districts were subsequently ranked according to the composite index and classified into three strata representing high-, medium-, and low-performing districts. This stratification formed the first stage of the sampling design.

Within each performance stratum, districts were selected purposively in consultation with the Department of Women and Child Development, Government of Madhya Pradesh. The principal selection criterion was the number of women who had received at least the second instalment of MMSSPSY, ensuring adequate numbers of programme beneficiaries for household sampling while maintaining representation across different levels of programme and health system performance.

Appendix C: Definition, Measurement and Descriptive Statistics of Outcome Variables

Domain	Outcome Variable	Definition and Measurement	N	Mean	SD
Antenatal Care Continuum	Pregnancy registration	Pregnancy registered with a health facility/frontline health worker (1=Yes, 0=No)	1,246	0.986	0.116
	At least one ANC visit	Received at least one antenatal check-up (1=Yes, 0=No)	1,246	0.933	0.251
	Four or more ANC visits	Received ≥4 ANC visits during pregnancy (1=Yes, 0=No)	1,246	0.708	0.455
	Timely completion of four ANC visits	Four ANC visits completed according to the recommended schedule (1=Yes, 0=No)	1,162	0.213	0.410
	Received IFA tablets	Received iron-folic acid supplementation during pregnancy (1=Yes, 0=No)	1,246	0.900	0.301
Delivery and Newborn Care	Institutional delivery	Delivery occurred in a health facility (1=Yes, 0=No)	1,246	0.990	0.098
	Skilled birth attendance	Delivery attended by a skilled health professional (1=Yes, 0=No)	1,246	0.990	0.098
	Newborn care counselling	Mother received counselling on new-born care practices (1=Yes, 0=No)	1,246	0.653	0.476
	Early initiation of breastfeeding	Breastfeeding initiated within one hour of birth (1=Yes, 0=No)	1,246	0.594	0.491
	Exclusive breastfeeding	Child exclusively breastfed for first six months (1=Yes, 0=No)	1,246	0.677	0.468
Immunisation	Birth-dose vaccination	Child received birth-dose vaccines (1=Yes, 0=No)	1,246	0.958	0.200
	Full immunisation	Child received all age-appropriate vaccinations (1=Yes, 0=No)	1,246	0.416	0.493
Birth Outcomes	Low birth weight	Birth weight < 2.5 kg (1=Yes, 0=No)	1,246	0.158	0.365
	Premature delivery	Delivery before 37 completed weeks of gestation (1=Yes, 0=No)	1,246	0.140	0.348
	Delivery complications	Mother reported delivery-related complications (1=Yes, 0=No)	1,246	0.618	0.486
Child Nutrition	Stunting	Height-for-age z-score < -2 SD (WHO standards)	905	0.588	0.492
	Underweight	Weight-for-age z-score < -2 SD (WHO standards)	905	0.410	0.492
	Wasting	Weight-for-height z-score < -2 SD (WHO standards)	905	0.212	0.409
Maternal Nutrition	Low maternal BMI	BMI below recommended threshold (1=Yes, 0=No)	1,246	0.067	0.251
	Maternal stunting	Maternal height below the stunting threshold (1=Yes, 0=No)	1,180	0.092	0.290
	Maternal anaemia	Haemoglobin level below WHO threshold (1=Yes, 0=No)	1,124	0.790	0.407

Notes: Means represent the prevalence of the outcome in the analytical sample. Child anthropometric indicators are defined using WHO growth standards and maternal anaemia using WHO haemoglobin thresholds.

Appendix D: Linktest for the Propensity Score Model

MMSSPSY Participation	Coef.	SE	z	95% CI	
				LL	UL
_hat	0.999	0.073	13.630	0.855	1.142
_hatsq	-0.047	0.074	-0.630	-0.193	0.099
_cons	0.036	0.085	0.420	-0.131	0.203
LR chi2(2)	233.270				
Prob > chi2	0.000				

Notes: Linktest results are reported for the propensity score model. A significant _hat and an insignificant _hatsq indicate that the model is adequately specified. Robust standard errors are reported.

Appendix E: Covariate Balance Diagnostics Before and After Matching

Variable	Unmatched /Matched	Mean			% reduction in bias	t-test	p>t
		Treated	Control	%bias			
Woman's Age in 2017	U	20.980	20.583	12.200		2.140	0.032
	M	20.985	21.100	-3.500	71.100	-0.630	0.529
Woman's Age in 2017 Square	U	450.610	434.540	10.900		1.920	0.055
	M	450.800	456.710	-4.000	63.200	-0.710	0.480
Woman's education							
No schooling	U	0.083	0.128	-14.700		-2.600	0.009
	M	0.083	0.095	-3.900	73.700	-0.750	0.452
Primary	U	0.091	0.120	-9.400		-1.670	0.096
	M	0.091	0.087	1.300	86.400	0.250	0.802
Middle/ Secondary	U	0.590	0.571	3.900		0.680	0.496
	M	0.589	0.574	3.100	20.600	0.560	0.577
Higher Secondary	U	0.236	0.181	13.500		2.370	0.018
	M	0.236	0.244	-1.800	86.700	-0.310	0.757
Husband's Education							
No schooling	U	0.056	0.108	-18.900		-3.370	0.001
	M	0.056	0.057	-0.400	97.700	-0.100	0.924
Primary	U	0.107	0.198	-25.400		-4.520	0.000
	M	0.108	0.109	-0.300	98.700	-0.070	0.944
Middle/ Secondary	U	0.501	0.496	1.000		0.180	0.859
	M	0.502	0.495	1.300	-32.500	0.240	0.809
Higher Secondary	U	0.336	0.198	31.500		5.510	0.000
	M	0.335	0.339	-1.000	96.900	-0.160	0.871
No of Children under 4 years	U	1.575	1.605	-5.600		-0.990	0.323
	M	1.574	1.607	-6.100	-8.200	-1.130	0.260
Woman's Occupation							
Housewife	U	0.829	0.824	1.300		0.240	0.812
	M	0.829	0.807	5.700	-320.600	1.010	0.311
ISWE	U	0.053	0.077	-9.700		-1.720	0.085
	M	0.053	0.056	-1.200	87.400	-0.240	0.809
Others	U	0.118	0.099	6.100		1.060	0.287
	M	0.118	0.137	-5.900	2.000	-1.010	0.314
Wealth Quantile							
Poorest	U	0.162	0.244	-20.600		-3.650	0.000
	M	0.162	0.145	4.200	79.400	0.850	0.393
Poor	U	0.186	0.215	-7.300		-1.290	0.197
	M	0.186	0.190	-0.900	87.600	-0.170	0.866
Middle	U	0.183	0.219	-8.900		-1.580	0.115

	M	0.183	0.192	-2.300	74.600	-0.420	0.673
Richer	U	0.218	0.179	9.600		1.690	0.091
	M	0.218	0.222	-0.800	91.300	-0.150	0.884
Richest	U	0.251	0.142	27.700		4.850	0.000
	M	0.250	0.251	-0.200	99.200	-0.040	0.970
PSY awareness	U	0.826	0.504	72.500		12.870	0.000
	M	0.826	0.821	1.200	98.400	0.250	0.806
Access to govt. insurance	U	0.455	0.403	10.500		1.850	0.065
	M	0.455	0.470	-3.200	69.700	-0.570	0.566
Rural	U	1.493	1.506	-2.600		-0.450	0.653
	M	1.494	1.480	2.800	-11.300	0.520	0.605
Distance to nearest hospital	U	2.759	2.633	9.200		1.610	0.108
	M	2.755	2.684	5.200	43.400	0.920	0.358
Social Group							
General	U	0.092	0.056	13.700		2.400	0.017
	M	0.091	0.081	3.700	73.000	0.630	0.530
OBC	U	0.487	0.453	6.800		1.200	0.228
	M	0.488	0.510	-4.400	35.200	-0.800	0.422
SC	U	0.257	0.262	-1.000		-0.170	0.861
	M	0.258	0.258	-0.200	79.100	-0.040	0.970
ST	U	0.163	0.229	-16.600		-2.930	0.003
	M	0.164	0.150	3.400	79.700	0.670	0.506
District							
Bhopal	U	0.163	0.179	-4.300		-0.750	0.452
	M	0.164	0.154	2.600	39.800	0.480	0.630
Chhindwara	U	0.151	0.178	-7.100		-1.260	0.208
	M	0.152	0.140	3.200	55.400	0.610	0.543
Jhabua	U	0.171	0.142	8.000		1.410	0.160
	M	0.171	0.197	-7.200	10.400	-1.220	0.222
Morena	U	0.145	0.142	1.000		0.170	0.866
	M	0.145	0.148	-0.600	36.800	-0.110	0.913
Sagar	U	0.207	0.176	7.900		1.390	0.164
	M	0.206	0.233	-6.800	14.500	-1.170	0.242
Satna	U	0.162	0.183	-5.600		-0.980	0.326
	M	0.162	0.129	8.800	-58.500	1.720	0.086
Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R
Unmatched	0.136	232.720	0.000	12.300	8.900	91.900*	0.680
Matched	0.008	14.720	0.973	3.000	2.800	21.200	1.050
* if B>25%, R outside [0.5; 2]							

Notes: Covariate balance is assessed before and after propensity score matching. Lower standardised bias and insignificant differences following matching indicate improved comparability between beneficiaries and non-beneficiaries on observed characteristics.

Appendix F: Heterogeneous Effects by Economic Status and Place of Residence

Outcome variables	Poor	Non-poor	Rural	Urban
Pregnancy Registration	0.023***	0.019	0.016**	0.026***
	(0.009)	(0.014)	(0.008)	(0.010)
At least 1 ANC uptake	0.079***	0.107***	0.102***	0.171***
	(0.018)	(0.030)	(0.026)	(0.028)
At least 4 ANCs uptake	0.288***	0.229***	0.222***	0.352***
	(0.043)	(0.049)	(0.039)	(0.041)
Timely uptake of 4 ANCs	0.037	-0.021	0.001	0.025
	(0.035)	(0.047)	(0.038)	(0.026)
Received IFA tablets	0.078***	0.123***	0.112***	0.160***
	(0.023)	(0.031)	(0.029)	(0.028)
Institutional Delivery	0.024*	0.012	0.009	0.018**
	(0.014)	(0.012)	(0.008)	(0.009)
Access to Skilled Birth Attendants	0.018*	0.012	0.004*	0.025**
	(0.010)	(0.012)	(0.002)	(0.010)
Received Counselling on newborn care	0.058	0.025	0.113***	0.005
	(0.038)	(0.040)	(0.037)	(0.040)
First Feeding with 1 hour of birth	0.043	-0.005	0.080*	0.005
	(0.044)	(0.044)	(0.046)	(0.038)
Exclusive Breastfeeding for first 6 months	0.047	0.068	-0.007	0.078**
	(0.037)	(0.050)	(0.043)	(0.034)
Birth dose vaccines	0.059***	0.045*	0.038*	0.088***
	(0.018)	(0.024)	(0.020)	(0.032)
Full Immunization	0.158***	0.079	0.182***	0.100**
	(0.038)	(0.050)	(0.032)	(0.048)
Low Birth Weight	-0.102***	-0.121***	-0.075**	-0.102***
	(0.033)	(0.038)	(0.035)	(0.035)
Premature Delivery	0.028	-0.011	-0.010	0.046*
	(0.030)	(0.038)	(0.033)	(0.025)
Delivery Complications	0.057	0.010	0.094**	0.020
	(0.042)	(0.048)	(0.042)	(0.046)
Child Stunting	-0.014	-0.025	0.085	-0.033
	(0.053)	(0.061)	(0.052)	(0.053)
Child Underweight	0.025	0.026	0.053	-0.023
	(0.045)	(0.052)	(0.053)	(0.060)
Child Wasting	0.010	0.020	0.017	-0.007
	(0.044)	(0.046)	(0.053)	(0.043)
BMI of Mother	0.043***	0.030	0.019*	0.063***
	(0.016)	(0.023)	(0.010)	(0.024)
Mother Stunting	0.021	-0.016	0.030	-0.029
	(0.024)	(0.028)	(0.021)	(0.035)
Mother Anaemic	-0.038	-0.004	0.005	-0.025
	(0.036)	(0.043)	(0.040)	(0.046)

Notes: Estimates report ATTs from propensity score matching (five nearest neighbours). Robust standard errors are reported in parentheses. Economic status is defined as poor (wealth quintiles 1–3) and non-poor (wealth quintiles 4–5). Results are also reported separately for rural and urban households. *, **, and *** denote statistical significance at the 10, 5, and 1 per cent levels, respectively.

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