



# Unintended effects of Janani Suraksha Yojana on maternal care in India

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## ABSTRACT

**Background:** The Janani Suraksha Yojana (JSY) is the largest ever conditional cash transfer programme worldwide. It primarily aimed to reduce the maternal and child mortality by increasing the facility based delivery in India. Besides, the JSY has resulted in reduction of out-of-pocket expenditure for delivery care and increased antenatal care. Though studies have examined the direct outcome of JSY, limited studies have attempted to understand the unintended effects (indirect) of the programme. The aim of this study is to examine the effect of JSY on contraceptive use, initiation of breast feeding and postnatal check-up in India.

**Data & Methods:** Data from the National Family Health Survey 4, 2015–16 was used in the analyses. A total of 148,746 institutional births in five years preceding the survey were analysed and the analyses were carried out for Low Performing States (LPS) and High Performing States (HPS). Descriptive statistics and the propensity score matching were used to understand the unintended effects of JSY.

**Results:** In India, the use of contraception, early initiation of breastfeeding and postnatal check up was consistently higher among JSY beneficiaries compared to non-JSY beneficiaries. Among JSY beneficiaries, about 45% of the mothers breastfed their child within one hour compared to 42% of the JSY non-beneficiaries. The pattern was almost similar for postnatal check-up. The variations in contraceptive use, breastfeeding practice and postnatal check-up among JSY beneficiaries were higher in LPS states compared to HPS. For instance, in LPS, among JSY beneficiaries, about 58% mothers breastfed their child within one hour of delivery compared to 46% in HPS. Controlling for socio-economic covariates, the JSY beneficiaries in LPS were 12% more likely to use contraception, 8% were more likely to initiate the breast feeding within one hour of child delivery and 6% were more likely to get their postnatal check-up than their counterparts in HPS.

**Discussion:** The unintended effects of JSY were strong and significant in the low performing states. The coverage of JSY should be further extended and the programme needs to be continued.

## 1. Introduction

Improving maternal and child health has been accorded priority in global, national and local development agenda. Reduction of maternal and child mortality were placed as two of the eight Millennium Development Goals (MDG, Goal 4 and Goal 5). Goal 3 of the Sustainable Development Goal (SDG) aims to improve health for all by 2030. Despite these, the global progress in reduction of maternal and child mortality has been slow and uneven (Bhutta et al., 2010; Souza et al., 2014; WHO, 2005). An estimated 8.8 million children die before reaching fifth birth day and 0.5 million mothers die during pregnancy and childbirth (Hogan et al., 2010; You et al., 2010). The majority of these deaths are of poor mothers from developing countries.

Improving facility based delivery has been recommended as the most

cost effective way to reduce maternal and child mortality and has been included as one of the key monitoring indicators in MDGs and SDGs. Many welfare government, the non-governmental organisation and international organisation in developing countries have implemented the conditional cash transfer programs, also known as the demand-side financing (DSF) to increase the facility based delivery (Ensor et al., 2017; Kuwawenaruwa et al., 2016; Rahman & Pallikadavath, 2018; Skiles et al., 2015; Yang et al., 2016). Studies have found that these programmes have been successful to increase maternal and child health care utilization, (Barber and Gartler, 2008; De Brauw et al., 2011; Morris et al., 2004; Powell-Jackson & Hanson, 2012).

India had the world's highest under five deaths in 2015 and had contributed to one-fifth of the maternal deaths worldwide (Liu et al., 2016; Montgomery et al., 2014). While the level of maternal and child

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mortality has been declining over time, the relative share remains similar. Poor, less educated and rural mothers are less likely to receive the maternal and child health services in the country (Das Gupta, 1990; Goli et al., 2013; Singh et al., 2012). In 2005, the Govt of India introduced the Janani Suraksha Yojana (JSY), a conditional cash transfer scheme under National Health Mission (NHM) that provides monetary incentives to poor and marginalised mothers to deliver in a health facility. With an estimated budget of 19.8 billion INR in 2009–10, the JSY is one of the largest ever centrally funded conditional cash transfer schemes worldwide. In 2016–17, the JSY covered one crore beneficiaries in the country (MoHFW, 2018). The scheme stratifies the states as Low Performing States (LPS) and High Performing States (HPS) based on rate of institutional delivery and accorded high priority to mothers from LPS. A sum of 1000 INR or \$ 22.2 in urban areas and 1400 INR or \$ 31.1 in rural areas were paid to mothers delivering at public/accredited private health centers in LPS. The JSY has also made provisional incentives for community-level health workers known as accredited social health activists (ASHAs).

Since the implementation of NHM, the progress in maternal and child health has been significant. The maternal mortality ratio (MMR) has declined from 254 in 2004–06 to 130 by 2014–16, while that of under-five declined from 69 in 2008 to 39 in 2016 (ORGI, 2018). A number of studies in India have focused on the impact assessment and welfare derived from the JSY scheme on maternal and child health care in India at the national, state, district and individual levels (Devadasan et al., 2008; Lim et al., 2010; Sharma et al., 2009; UNFPA, 2009). The JSY has been successful in increasing institutional delivery, reducing maternal and child mortality (Govil et al., 2016; Gupta et al., 2011; Lim et al., 2010), out-of-pocket expenditure and catastrophic health spending (Mohanty et al., 2012). However, regional variations exist in the coverage and effects of the implementation of JSY in India (Thonkong et al., 2017). Though studies have examined the effect of JSY on the coverage of antenatal care, institutional delivery, out-of-pocket expenditure, limited attempts were made to understand the effect of JSY in initiation of breastfeeding, postnatal care and contraceptive use (Carvalho et al., 2014; Gopalan and Durairaj, 2012; Gupta et al., 2011; Kumar et al., 2015; Lim et al., 2010; Lim et al., 2010, 2010; Mukherjee et al., 2018; Mukhopadhyay et al., 2016; Nandi & Laxminarayan, 2016; Ng et al., 2014; Powell-Jackson, 2015; Rahman & Pallikadavath, 2018; Sachdeva & Malik, 2012; Sengupta & Sinha, 2018; Sidney et al., 2016). We have termed these effects as unintended effects and used interchangeably as indirect effects. The objective of the paper is to examine the effects of JSY on contraceptive use, initiation of breastfeeding and postnatal check-up in India.

## 2. Data and methods

### 2.1. Data

Data from the National Family Health Survey 4 (NFHS 4), 2015-16 has been used in the analyses. The NFHS 4 is the fourth in the series of the repeated cross-sectional Demographic and Health Surveys (DHS), conducted during 2015–16. The primary aim of NFHS 4 was to provide reliable estimates of demographic, maternal and child health (MCH) and nutrition across all states and union territories of India. A total of 601,509 households, 699,686 women aged 15–49 years and 112,112 men aged 15–54 years were successfully interviewed during 2015–16. While maintaining comparability with earlier rounds, the NFHS 4 has included a number of new domains and for the first time provided district level estimates of selected indicators. The detailed sampling design, coverage and findings of the survey are available in the national report (IIPS and ICF, 2017). We have used the unit data from the kids file that covered 190,898 births (last birth) in five year preceding the survey. Of these births, 148,746 births were conducted in health facilities of which JSY assistance was provided to the mothers of 63,665 births (Fig. 1).

### 2.2. Methods

#### 2.2.1. Outcome variables

The current contraceptive use, initiation of breastfeeding within an hour after childbirth and postnatal check-up of baby among the JSY beneficiaries and non-beneficiaries are the outcome variables in the analyses.

#### 2.2.2. Treatment variable

In NFHS 4, mothers were asked about receiving of any financial assistance at the time of delivery. The question was asked only for the last birth. Mothers who received cash assistance (yes/ no) from JSY have been treated as treatment group in this study. There was no overlapping between treatment and control group as they were mutually exclusive in nature.

#### 2.2.3. Matching variables

In this study, a number of matching variables have been included on the basis of available literature. The list of pre-intervention variables includes mothers' and household characteristics. The mother's characteristics include age (15–24, 25–34, 35+ years), educational attainment (no education, primary, secondary and higher), pregnancy complication (no complication, any complications), place of delivery (public health facility, private health facility) religion (Hindu, Muslim and others), caste (scheduled caste, scheduled tribe, other backward classes, others). The household characteristics include wealth quintile (poorest, poorer, middle, richer and richest), place of residence (rural, urban) and sex of the household (male, female). The pregnancy complications include excessive bleeding, prolonged labour or breech position.

#### 2.2.4. Statistical analysis

Descriptive statistics and the propensity score matching were used in the analyses.

#### 2.2.5. Propensity score matching analysis

Propensity score matching (PSM) analysis is a designed statistical tool to evaluate any programme or intervention in the absence of randomized clinical trial (Rosenbaum et al., 1985; Rubin et al., 1996). In this study, we compared the mothers who had received JSY benefit and who did not.

The advantage of matching method is that it compares the outcomes of treated and controlled individuals with similar observed characteristics or in other words, individuals have similar likelihood of being assigned in treated group (Babalola et al., 2005; Dixit et al., 2013; Do et al., 2006; Yanovitzky et al., 2005). A number of research studies have used the PSM for evaluating various programmes (Lechner, 2002;; Pufahl et al., 2009; Diaz et al., 2006; Mensah et al., 2010; Dixit et al., 2013). We have assumed that mothers who had received JSY benefit are random and not correlated with outcome of interest. The average outcome is compared between treated women (who had received JSY benefit) and untreated women (who had not received the benefit). The treated and untreated women are expected to be statistically equivalent in all relevant characteristics.

**2.2.5.1. Propensity score.** The PSM is the probability that a woman received JSY benefit with a certain pre-specified characteristics and written as

$$p(X) = \Pr(D = 1|X) \quad (1)$$

where  $D = 0$  if the woman belongs to JSY non-beneficiaries group.

$D = 1$  if the woman belongs to JSY beneficiaries group.

And  $X$  is the vector of pre-intervention characteristics.

**2.2.5.2. Defining impact of JSY benefit.** In PSM, three parameters are estimated. These are average treatment effect (ATE), average treatment

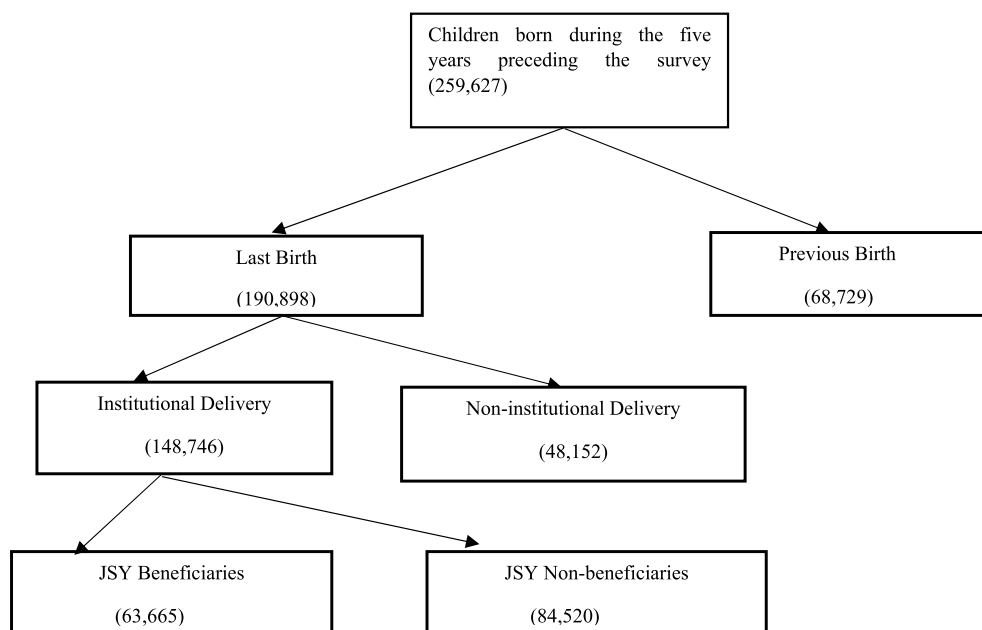


Fig. 1. Schematic presentation of children born in five year preceding the survey by place of delivery and JSY beneficiaries in India, 2015-16.

effect on treated (ATT) and average treatment effect on untreated (ATU). The Average Treatment Effect (ATE) measures the mean impact of JSY benefit across all the women in the population. This parameter may be defined as

$$ATE = E(\delta) = E(Y_1 - Y_0) \quad (2)$$

where  $E(\cdot)$  means average and  $Y_1$  represents potential outcome for JSY beneficiaries and  $Y_0$  represents potential outcome for JSY non-beneficiaries.

With the help of counterfactual model, the Average Treatment Effect on the Treated (ATT) could be measured and can be written as

$$ATT = E(Y_1|D = 1) - E(Y_0|D = 1) \quad (3)$$

Where  $E(Y_1|D = 1)$  is the average outcome of the women who have received JSY benefit.

$E(Y_0|D = 1)$  is the counterfactual, it shows average outcome that the treated individuals would have obtained in absence of JSY benefit, which is unobserved.

Finally, the Average Treatment Effect on the untreated women (ATU) has been measured, which shows the impact of JSY benefit would have had on those who did not receive JSY benefit.

$$ATU = E(Y_1|D = 0) - E(Y_0|D = 0) \quad (4)$$

where  $E(Y_1|D = 0)$  is the average observed outcome for those women who did not have JSY benefit.

$E(Y_0|D = 0)$  the counterfactual and it shows the average outcome for those women who would have received the benefit which they had not received earlier, which is unobserved.

Logistic regression has been used to measure the gaps in odds of socio-economic controls on contraceptive use practice, breastfeeding within one hour and postnatal check-up. The independent variables are age of mother, education level, religion, caste, wealth quintile, sex of the head of the household, place of residence and place of delivery.

### 3. Results

#### 3.1. Coverage of JSY assistance in India

Fig. 2 presents the inter-state variation of JSY coverage in India.

Around 36% of the women in India were covered by JSY assistance; lowest in Goa (7%) followed by Maharashtra and Gujarat (9% each). It was highest in Odisha (73%) followed by Chhattisgarh and Assam (66%). More than half of the eligible women in seven states of India had received JSY assistance for facility based delivery.

Table 1 presents the socio-economic differentials in the coverage of JSY assistance in LPS and HPS. In general, the JSY coverage was higher in the LPS compared to HPS across all the selected socio-economic groups. In the rural areas, the JSY coverage was 60% in LPS compared to 23% in HPS. The JSY coverage was higher among less educated mothers compared to educated mothers in both LPS and HPS. For example, about 62% of women with no education had received JSY in LPS compared to 21% in HPS. The coverage of JSY assistance was 38% among the Hindus and 24% among the others. About 65% of the poorest and 28% of the richest women in the LPS received JSY assistance; and this varied between 30% of the poorest and 9% of the richest women in the HPS of India. In LPS, about 73% of mothers who delivered in public health facility had received JSY assistance compared to 30% in HPS. This percentage was very much lower for the mothers who delivered in private health facility because of very few accredited private hospitals provided JSY assistance. For instance only 5.4% and 4.4% of mothers received JSY in private health facility in LPS and HPS respectively.

#### 3.2. Variation in contraceptive use, breastfeeding practice and postnatal check-up

Table 2 presents the inter-state variations in contraceptive use, breastfeeding initiation and postnatal check-up of baby among JSY beneficiaries and non-beneficiaries in India in 2015–16. In LPS, the contraceptive use was 41% among JSY beneficiaries compared to 35% among JSY non-beneficiaries. The state pattern was almost similar; higher contraceptive use among JSY beneficiaries compared to JSY non-beneficiary with exception of Uttar Pradesh (38% among JSY vs. 42% among JSY non-beneficiaries). The variation in contraceptive use among JSY beneficiaries and JSY non-beneficiaries was lower in HPS. In the LPS, breastfeeding initiation within one hour was almost double among women receiving JSY assistance compared to JSY non-beneficiaries (58% among JSY beneficiaries and 29.9% among JSY non-beneficiaries). The pattern holds true across states of India. Among the LPS, breastfeeding initiation was highest in Odisha (70.6% among JSY

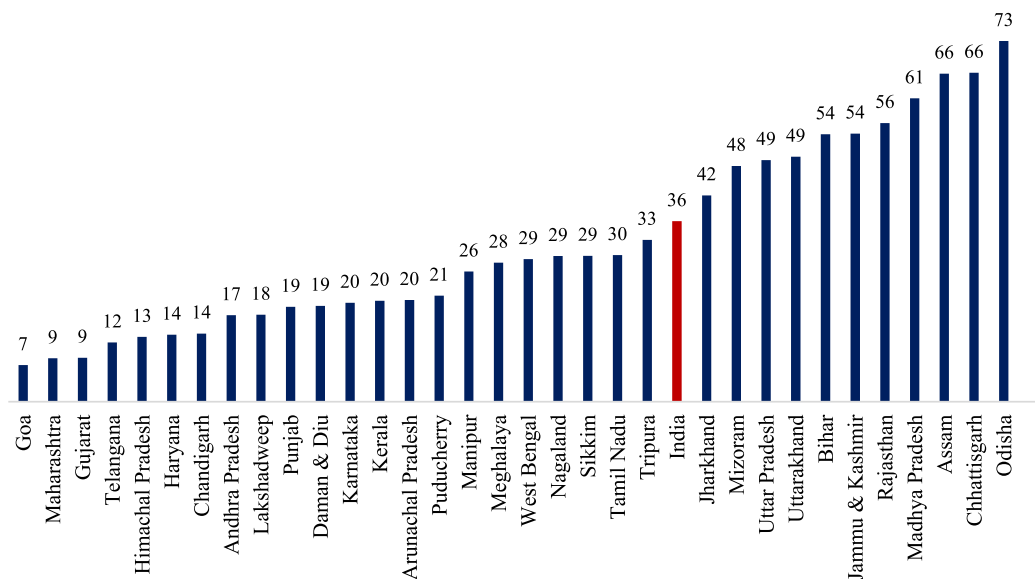


Fig. 2. Percentage of mothers received JSY assistance for facility based delivery in India, 2015-16.

Table 1

Percentage of mothers receiving JSY assistance by socio-economic characteristics in India, 2015–16.

Background characteristics	India		Low Performing States		High Performing States	
	%	N	%	N	%	N
<b>Age of Mother</b>						
15–24	36.57	19,560	54.21	16,377	21.07	4850
24–35	35.9	29,785	56.37	26,803	17.42	6137
35 and above	38.75	4548	57.34	4670	13.64	550
<b>Place of Residence</b>						
Rural	43.77	43,408	60.19	40,504	22.72	7979
Urban	21.39	10,484	39.49	7346	13.1	3558
<b>Level of Education</b>						
No education	51.38	16,450	62.39	17,554	21.97	1548
Primary	44.41	8218	61.72	7579	23.3	1571
Secondary	32.92	25,163	54.55	19,700	19.02	7155
Higher	19.13	4060	32.2	3017	11.6	1263
<b>Religion</b>						
Hindu	37.92	45,276	56.93	41,008	18.94	9152
Muslim	32.08	6786	49.19	6188	15.48	1344
Others	24.01	1830	50.63	654	19.67	1042
<b>Sex of Head of the Household</b>						
Male	36.11	47,182	55.71	41,807	18.34	10,157
Female	38.29	6710	55.67	6042	19.99	1380
<b>Wealth Quintile</b>						
Poorest	58.83	15,337	65.45	16,707	30.48	1215
Poorer	48.28	14,335	63.44	13,418	26.48	2607
Middle	36.28	11,419	56.7	8809	22.17	3334
Richer	26.36	8393	46.18	5755	16.86	2932
Richest	15.14	4409	28.15	3160	9.04	1449
<b>Pregnancy Complication</b>						
No complication	39.84	24,632	55.88	24,630	16.74	3426
Any complications	33.88	29,260	55.52	23,220	19.4	8111
<b>Place of Delivery</b>						
Public	53.5	61,219	73.1	48,324	29.5	12,895
Private	4.7	2446	5.4	1181	4.41	1265

beneficiaries and 62.8% among JSY non-beneficiaries) and lowest in Rajasthan (31.2% among JSY beneficiaries and 24.3% among JSY non-beneficiaries). More than 10% difference in breastfeeding initiation was observed in Chhattisgarh, Jharkhand and Madhya Pradesh among these states among those covered and not covered by JSY assistance.

In the LPS, postnatal check-up was 63% among JSY beneficiaries

compared to 34% among JSY non-beneficiaries. The pattern holds true across all the states with the exception of Uttar Pradesh and Telangana. Among the LPS, it was highest in Odisha (62% among JSY beneficiaries vs. 47% among non-beneficiaries). Bihar had the lowest prevalence of baby’s postnatal check-up (23.9% for the JSY beneficiaries and 20.7% among the JSY non-beneficiaries).

Table 3 presents the percentage variation of contraceptive use, breastfeeding initiation and postnatal check-up by JSY coverage and selected social and demographic correlates. The contraceptive use among the JSY beneficiaries and non-beneficiaries did not show much difference across the age groups, place of residence, religion, sex of the head of household, children ever born and pregnancy complications at the last birth. On the other hand, JSY beneficiaries had higher prevalence of initiation of breastfeeding within one hour and postnatal check-up across all socio-demographic strata. However, the contraceptive use has shown positive relation with wealth quintile for both JSY beneficiaries and non-beneficiaries. But in case of breastfeeding and postnatal check-up, no strong relation has been found.

### 3.3. Impact assessment of JSY on contraceptive use, breastfeeding initiation and postnatal check-up of baby in India

Table 4 illustrates the results of propensity matching score to understand the impact of JSY assistance on contraceptive use, breastfeeding initiation and postnatal check-up. It eliminates most of the bias attributable to observable covariates. The differences in the mean outcomes in the matched samples are used to get an estimate of the average treatment effect on the treated cases. Moreover, the raw estimates, i.e. without matching results are measured using unmatched sample estimates. ATT, ATU and ATE present the estimates after matching.

The unmatched sample estimates revealed that before matching the JSY beneficiaries in India had 3% higher chance of using contraception than the JSY non-beneficiaries. The ATT value of treated and control groups were 0.443 and 0.385 respectively which suggests that mothers who received JSY assistance if they would not have received it, then only 38% mothers used contraception. This pattern was similar for LPS, but for HPS the difference in ATT was very low than LPS. ATU value shows that mothers who did not receive JSY assistance would have received the benefit; their chances of using contraception would have increased up to 6%. This increment is higher in LPS than HPS (7% in LPS vs. 0.7% in

**Table 2**

Percentage of mothers used contraceptive, initiate breastfeeding and had postnatal check-up of baby by JSY coverage in India, 2015–16.

State	JSY beneficiaries				JSY non-beneficiaries			
	Using any contraceptive method	Breast feeding within 1 h	Baby's postnatal check-up	N	Using any contraceptive method	Breast feeding within 1 h	Baby's postnatal check-up	N
<b>India</b>	<b>43.6</b>	<b>45.2</b>	<b>40.9</b>	<b>63,665</b>	<b>44.1</b>	<b>41.9</b>	<b>37.7</b>	<b>84,520</b>
<b>Low performing states</b>	<b>40.5</b>	<b>58</b>	<b>63</b>	<b>49,505</b>	<b>35.3</b>	<b>29.9</b>	<b>33.9</b>	<b>36,393</b>
Assam	61.3	63.6	44.7	4305	55	56	37.4	1904
Bihar	19.5	38.4	23.9	6532	14.1	32.5	20.7	4945
Chhattisgarh	41.1	52.5	57	3278	40.7	38.3	54.1	1650
Jammu and Kashmir	60.6	47	31.8	2967	47.8	42.4	28.4	2317
Jharkhand	31.9	41.3	38.7	2468	27	29	37.9	3283
Madhya Pradesh	41.9	39	29.1	8678	33	28.5	23.8	5461
Odisha	58.2	70.6	61.6	5742	48.1	62.8	46.5	1993
Rajasthan	48.9	31.2	30.7	5852	43.7	24.3	30.8	4393
Uttar Pradesh	38.4	32.4	38.1	9683	41.5	21.9	41.6	10,447
Uttarakhand	45.4	33.2	33.7	1595	41.7	21.5	32	1439
<b>High performing states</b>	<b>52</b>	<b>45.7</b>	<b>48</b>	<b>14,160</b>	<b>48.5</b>	<b>47.9</b>	<b>39.5</b>	<b>48,127</b>
Andhra Pradesh	54.7	42.1	47.8	365	50.7	39.2	37.1	1731
Gujarat	36.2	41.1	39.1	601	33.3	50.5	27.4	4499
Haryana	60.1	62	54	643	55.1	41.6	39.7	4144
Karnataka	33.5	61	36.4	1302	35.9	53.8	26.9	4223
Kerala	46.1	62.4	56.4	440	39.2	62.8	53.7	1685
Maharashtra	53.9	66.5	56.2	600	50.6	57.5	37.9	5842
Punjab	74	34.5	69.2	815	71.8	28.3	56.5	3020
Tamil Nadu	43.8	59.5	63.6	1871	41	53.7	53.3	4259
Telangana	42.5	49.1	27.4	219	43.3	36	32.7	1405
West Bengal	70.7	53.3	56.8	1046	72.1	41.2	48.9	2425

\*\*Manipur, Mizoram, Meghalaya, Tripura, Himachal Pradesh, Delhi are excluded due to smaller sample size.

HPS). The ATE for contraceptive use was 3%. This indicates that the average treatment effect of JSY on contraceptive use. ATE was much higher in LPS (12%) compared to HPS (4%). Similarly, in case of breastfeeding practice, the difference of ATT between treated and control was 5%. It was higher in HPS (9%) compared to LPS (7%). ATU follows reverse pattern of higher difference in LPS compare to HPS (9% in LPS vs. 1% in HPS). For breastfeeding, ATE was 8% in LPS and 3% in HPS. ATE for postnatal check-up was 4% which shows positive impact of JSY on postnatal check-up.

### 3.3.1. Verification of the estimates of PSM analysis

Table 5 shows the mean value of each matching variables before and after matching for both treated and control groups. Also, the table represents percentage bias reduction after matching and t-test for the differences between matched pairs. The percentage bias reduction was varied from 70.8% for sex of the head of the households to 100% for education level of mother, wealth quintile and place of delivery. It was found that mean difference became insignificant after matching for almost all covariates, i.e. covariates were sufficiently balanced.

Fig. 3 represents the quality of the matching by the distribution of the propensity scores for women who had received JSY benefits. Treated women with propensity score were above the line and controlled women were below the line. From the figure, it can be said that the distributions are almost identical for treated and control groups after propensity score matching. The common support assumption has been confirmed by the existence of a substantial overlap between the characteristics of treated and controlled women.

Result from logistic regression in Table 6 also supports the fact that odds of using contraception, breastfeeding within 1 h of delivery and postnatal check-up were higher for the mothers who had received JSY assistance. Although, both PSM and regression analysis serves the purpose of removing confounders and adjusting for imbalances between the groups, here, regression model captures the gaps in odds of unintended effects with JSY beneficiaries and other socio-economic correlates. Moreover, it serves as robustness check of the PSM model.

## 4. Discussion

The primary objective of JSY in India was to increase the facility based delivery through financial incentives. It was initially launched in low performing states and was extended to all states and union territories of India over time. Besides its direct outcome, it also provides an opportunity to examine the unintended consequences of the financial incentives on closely inter-wined yet non-incentivised behaviours of women. Beyond the primary objective of increasing facility based delivery, this paper is essentially examined the positive externalities of JSY induced facility based delivery, namely, contraception use, breastfeeding practice and postnatal check-up in India. All these variables are important component of reproductive health and helpful in improving the health of mothers and children. The salient findings of this study are as follows:

First, the inter-state variation in receiving JSY assistance was prominent. It was higher in the low performing states compared to high performing states of India. Over half of the women in the states of Bihar, Jammu & Kashmir, Rajasthan, Madhya Pradesh, Assam, Chhattisgarh, Odisha received JSY assistance while it was less than 10% in Gujarat, Maharashtra, Goa. The socio-economic distribution of JSY coverage also suggested that it was higher in rural, among uneducated mothers, mothers with higher parity and mothers belonging to poor households at the national level as well as in the low performing states. Second, the state variations in outcome variables such as contraceptive use, breastfeeding initiation and postnatal check-up varied widely across the LPS and HPS. The states such as Odisha, Chhattisgarh and Assam with the highest prevalence of JSY coverage performed better not only than the other LPS but better than many HPS. For example, the JSY beneficiaries in the LPS had higher contraceptive prevalence than Gujarat, Maharashtra and Telangana where around less than 15 percent of the women were covered under the JSY scheme. The breastfeeding initiation after delivery in Odisha (68.1%) was one of the highest in India after Goa (70.3%) and Mizoram (70%). Besides some of the LPS having low postnatal coverage, quite a few states with lower JSY coverage also had

**Table 3**

Percentage of mothers using contraception, initiate breastfeeding and having postnatal check-up of baby by JSY and non-JSY beneficiaries in India, 2015–16.

Variable	JSY beneficiaries			Non-JSY beneficiaries		
	Using any contraceptive method	Breast feeding within 1 h	Baby's postnatal check-up	Using any contraceptive method	Breast feeding within 1 h	Baby's postnatal check-up
<b>Age of Mother</b>						
15–24	35.1	45.8	41.8	34.6	41.8	37.6
24–35	48.3	45.3	40.5	49.2	42.2	37.7
35 and above	49.4	42.3	39.5	51.3	40.5	37.4
<b>Place of Residence</b>						
Rural	41.9	44.8	40.8	41.1	41.3	38.7
Urban	50.8	47	41.1	48.4	42.8	36
<b>Level of Education</b>						
No education	38.6	40.5	34.9	37.1	36.3	32.4
Primary	44.7	44.2	40.7	44.6	39.8	36.4
Secondary	46.2	48.7	44.5	45.6	44.5	38.9
Higher	45.6	45.3	42.8	45.7	40.6	39.4
<b>Religion</b>						
Hindu	43.4	45.3	40.9	44.2	41.7	37.5
Muslim	42.2	43.4	37	41	41.7	36.2
Others	53.4	50.9	54.3	50.8	45.7	42.8
<b>Caste</b>						
SC/ST	43.7	47	43.9	43.3	42.9	38.7
Non SC/ST	43.6	44.2	39.1	44.4	41.6	37.2
<b>Sex of Head of the Household</b>						
Male	45.2	45.4	41.3	45.2	41.9	37.7
Female	32.6	44	37.9	35.9	42	37.2
<b>Children ever Born</b>						
1	30.6	45.5	43.6	29.6	40.3	38.2
2–3	50.9	47	40.8	55.1	43.6	37.7
4 and more	47	39.2	35.5	47.1	39.6	34.5
<b>Wealth Quintile</b>						
Poorest	34.7	43.3	35.9	30.7	38.4	31.3
Poorer	43.6	45.1	40.1	39.4	41.7	37.1
Middle	47.5	46.9	44.8	43.9	43.7	38.7
Richer	48.9	46.9	44	46.1	44.2	39.2
Richest	54.6	44.7	44.6	51.1	40	38.2
<b>Pregnancy Complication</b>						
No complication	37.9	40.6	31.1	38.7	38.5	30.5
Any complications	48.4	49.1	49.1	47.6	44.2	42.3
<b>Place of delivery</b>						
Public	43.7	45.3	40.6	43.8	46.4	37.9
Private	42.0	43.5	48.5	44.3	37.8	37.5

low prevalence of postnatal coverage. Third, all three outcome variables were higher among JSY beneficiaries compared to non-beneficiaries in LPS. However, states such as Bihar and Uttar Pradesh among the LPS had lower prevalence of contraceptive use, breastfeeding initiation and postnatal check-up. Fourth, results from propensity score matching suggested that the JSY has significantly contributed to the increase use of contraceptive, initiation of breastfeeding within 1 h and have postnatal check-up done that their other counterpart controlling for socio-economic characteristics. Though both the LPS and HPS had benefitted from the JSY assistance, the unintended effects were more prominent in the LPS. We found that women who were covered under the JSY scheme in LPS had 12% higher chance to adopt contraception compared to those not covered. The pattern was similar but of lower magnitude in HPS. Similarly, in case of breastfeeding, the JSY recipients in the LPS had 8% higher chances of initiating breastfeeding within 1 h compared to 3% in HPS. When the impact of JSY assistance on postnatal care was examined, we found that JSY beneficiaries were 6% and 5% more likely to opt for postnatal check-up in LPS and HPS respectively. Fifth, logistic results support the findings that after controlling the selected socio-economic factors, the odds of the outcome variables are higher for the mothers who had received JSY assistance.

Here, we provide some plausible explanations for the above findings. The financial incentive received through JSY probably motivated the mothers to avail the facility based delivery and that in turn has positive externalities on outcome variables. In the absence of JSY, the institutional delivery would have been lower than what we observed and

would have also lowered these three outcome variables. The higher unintended effects in the LPS could be explained by the fact that the advanced states have already achieved better health facilities and better maternal and child indicators compared to the LPS. Thus, receiving JSY provides an impetus to them to avail reproductive health care utilization. Earlier studies have demonstrated that fertility is amenable to change in the face of conditional cash transfer (Morris et al., 2004; Stecklov et al., 2006). Our findings suggest that receiving JSY is having a modest and stronger effect in the uptake of contraception in the LPS than the HPS could be validated by the fact that fertility is much lower in the HPS. It has been documented in the literature that during pregnancy, women are most amenable to being convinced to use services that are favourable to them and their children (Agha & Carton, 2011). The increased interaction of the JSY beneficiaries with the health system, specifically ASHA workers, might elevate the likelihood of up-taking better health decisions, particularly in the early postpartum period (Carvalho et al., 2014). This is reflected in the early initiation of breastfeeding among women. Seeking medical assistance following delivery could impart knowledge to women for the benefits of receiving child immunization (Anichukwu & Asamoah, 2019). Moreover, certain studies have revealed that the roles played by the ASHAs have a large impact on receiving JSY and thereby adhering to the better health decisions. The availability of contraception should be universal along with the method choices. The promotion of modern spacing methods among first time mothers is recommended along with the early implementation of JSY was understandably prioritized in the LPS.

**Table 4** Matching estimates of JSY on contraceptive use, breastfeeding initiation and postnatal check-up of baby among JSY beneficiaries and non-beneficiaries in India, 2015–16.

Dependent Variables	Sample	India					LPS					HPS				
		Treated	Controls	Difference	S.E.	t-statistic	Treated	Controls	Difference	S.E.	T-stat	Treated	Controls	Difference	S.E.	T-stat
Contraceptive use	Unmatched	0.4425	0.4093	0.0333	0.003	12.83	0.4399	0.3785	0.0614	0.003	18.1	0.4512	0.4324	0.0188	0.005	3.96
	ATT	0.4425	0.3856	0.0568	0.033	1.73	0.4399	0.2795	0.1604	0.036	4.48	0.4512	0.4964	0.0452	0.030	-1.49
	ATU	0.4093	0.4705	0.0612	.	.	0.3785	0.4576	0.0791	.	.	0.4324	0.4402	0.0078	.	.
	ATE			0.0308				0.1260						0.0427		
Breast feeding initiation within 1 h	Unmatched	0.4683	0.4082	0.0600	0.003	23.13	0.4446	0.3121	0.1325	0.003	39.72	0.5513	0.4810	0.0703	0.005	14.74
	ATT	0.4683	0.4089	0.0594	0.034	1.75	0.4446	0.3732	0.0713	0.036	1.99	0.5513	0.4559	0.0954	0.031	3.09
	ATU	0.4082	0.4925	0.0842			0.3121	0.4091	0.0970			0.4810	0.4981	0.0171		
	ATE			0.0735				0.0822						0.0349		
Baby postnatal check-up	Unmatched	0.4001	0.3596	0.0412	0.003	16.19	0.3865	0.3496	0.0369	0.003	11.07	0.4505	0.3671	0.0834	0.005	17.94
	ATT	0.4007	0.3404	0.0604	0.033	1.86	0.3865	0.3266	0.0599	0.035	1.69	0.4505	0.3746	0.0759	0.029	2.6
	ATU	0.3596	0.3893	0.0298			0.3496	0.4038	0.0542			0.3671	0.4595	0.0924		
	ATE			0.0429				0.0575						0.0487		

Following the success of JSY, the next step could be strengthening it beyond the states and focus on the low performing districts. The unintended effects shown in this paper may be larger than those observed when JSY finally reaches to all the districts of India. Furthermore, demand side financial incentive further needs supply side in place and, therefore, efforts may be taken to enhance and strengthen the prevailing infrastructure to intensify the quality of obstetric care available to women in the health facilities. This should include improvements in staff behaviour, improved interpersonal communications, availability of skilled staffs and supply of essential drugs and equipment (Ahmed and Khan, 2011). Earlier studies have suggested that the implementation of JSY has led to increased workload and thereby degrading quality of obstetric care especially in the low performing states have been observed (Devadasan et al., 2008; Lahariya, 2009). Expanding the cash incentives for receiving institutional delivery in the private health facilities through public-private partnerships could reduce the loads from the public health centers alone.

### 5. Conclusion

Receipt of cash assistance for institutional delivery through cash transfer programme resulted in an increased subsequent use of contraceptives, initiation of breastfeeding and postnatal check-ups. Besides improving the existing health infrastructure with special emphasis being laid on the low performing states, the continuation of conditional cash transfer programme for maternal care is highly recommended.

### Ethical approval

Ethical approval is not required; the study used secondary data from cross-sectional survey.

### Data sharing

The data used in this study is available at: <https://dhsprogram.com/data/available-datasets.cfm>, which can be downloaded after request from DHS website.

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### Declaration of competing interest

The authors declare that they have no competing interests.

### CRedit authorship contribution statement

**Soumendu Sen:** Conceptualization, Formal analysis, Writing - original draft, Writing - review & editing. **Sayantani Chatterjee:** Formal analysis, Writing - original draft, Writing - review & editing. **Pijush Kanti Khan:** Formal analysis, Writing - review & editing. **Sanjay K. Mohanty:** Conceptualization, Writing - review & editing, Supervision.

### Appendix A. Supplementary data

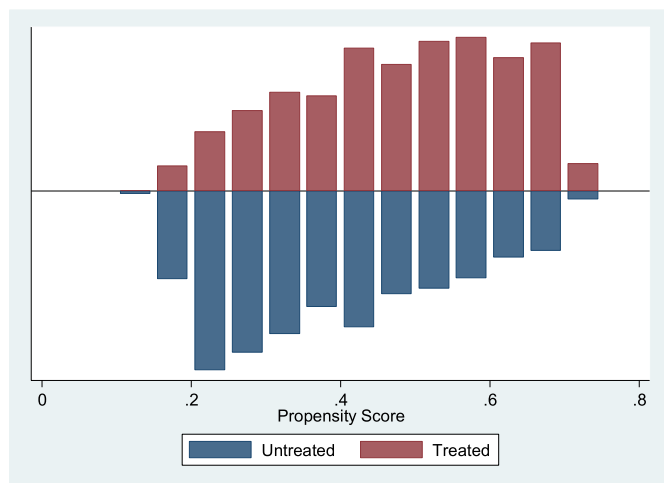
Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2020.100619>.

### Appendix

A. State differentials in contraceptive use, breastfeeding practice and

**Table 5**  
Covariate balance check and absolute bias reduction, India, 2015–16.

Variable		Mean			% bias	% reduction bias	t-test	
		Sample	Treated	Control			t	p > t
Age of Mother	U		1.7503	1.7559	-0.9		-1.73	0.083
	M		1.7503	1.7493	0.2	81.4	0.30	0.763
Level of Education	U		1.3304	1.7073	-39.0		-74.49	0.000
	M		1.3304	1.3304	0.0	100.0	0.00	0.998
Pregnancy Complication	U		0.5557	0.5853	-6.0		-11.41	0.000
	M		0.5557	0.5559	0.0	99.3	-0.08	0.937
Religion	U		1.2928	1.3922	-15.3		-28.79	0.000
	M		1.2928	1.2924	0.1	99.6	0.12	0.904
Caste	U		0.6017	0.6859	-17.7		-33.77	0.000
	M		0.6017	0.6026	-0.2	99.0	-0.32	0.748
Wealth Quintile	U		2.5171	3.3341	-62.3		-118.26	0.000
	M		2.5171	2.5174	0.0	100.0	-0.04	0.968
Place of Residence	U		1.8087	1.6447	37.4		70.39	0.000
	M		1.8087	1.8092	-0.1	99.7	-0.24	0.814
Sex of Head of Household	U		1.1176	1.121	-1.0		-1.99	0.047
	M		1.1176	1.1167	0.3	70.8	0.55	0.583
Place of Delivery	U		1.0384	1.4747	-115.3		-209.1	0.000
	M		1.0384	1.0384	0.0	100.0	0.0	1.000



**Fig. 3.** Predicted probability of JSY assistance: matched sample, India, 2015–16.

postnatal check-up of baby in India, 2015–2016.

	Using any method of contraceptives	Breastfeeding within 1 h	Postnatal check-up of new-born	N
<b>India</b>	<b>42.6</b>	<b>41.4</b>	<b>37</b>	<b>148,746</b>
<b>Low performing states</b>	<b>36.5</b>	<b>34.9</b>	<b>32.8</b>	<b>72,559</b>
Assam	57.3	61.3	38.8	6223
Bihar	16.3	34.1	20.1	11,525
Chhattisgarh	40.8	46.5	53.7	4936
Jammu and Kashmir	53	45.6	28.6	5310
Jharkhand	27.2	32.2	33.6	5783
Madhya Pradesh	37.8	33.9	26.2	14,186
Odisha	55.2	68.1	57.6	7777
Rajasthan	46.5	28.1	28.6	10,273
Uttar Pradesh	39	24.9	36.2	3051
Uttarakhand	42.6	27.3	30.4	3495
<b>High performing states</b>	<b>49.3</b>	<b>48.6</b>	<b>41.7</b>	<b>59,447</b>
Andaman and Nicobar Islands	37.3	NA	NA	503
Andhra Pradesh	51.3	39.9	40.1	2100
Arunachal Pradesh	28	55.6	32.9	2085
Chandigarh	73.8	31.5	54.2	138
Dadra and Nagar Haveli	24.3	NA	NA	218
Daman and Diu	17.5	NA	NA	301
Delhi	52.4	26.9	28.2	1126
Goa	23.1	70.3	53.2	342

(continued on next page)



**Table 6**

Odds ratio (OR) and 95% Confidence Interval (CI) of Contraceptive use, Breastfeeding Practice and Postnatal Check-up with JSY assistance and other socio-economic correlates in India, 2015–16.

	Using any contraceptive method		Breastfeeding within 1 h		Postnatal check-up	
	OR	95% CI	OR	95% CI	OR	95% CI
<b>JSY received</b>						
No						
Yes	1.30***	1.26, 1.33	1.12***	1.10,1.15	1.28***	1.25,1.31
<b>Age of mother</b>						
15–24						
24–35	1.86***	1.81,1.90	1.08***	1.06,1.11	1.01	0.98,1.03
35 and above	2.08***	2.00,2.16	1.12***	1.07,1.16	0.99	0.95,1.03
<b>Level of Education</b>						
No education						
Primary	1.16***	1.12,1.21	1.14***	1.10,1.18	1.15***	1.11,1.19
Secondary	1.08***	1.04,1.11	1.40***	1.36,1.44	1.15***	1.11,1.18
Higher	0.87***	0.83,0.91	1.29***	1.24,1.35	1.13***	1.08,1.18
<b>Religion</b>						
Hindu						
Muslim	0.87***	0.85,0.90	0.99	0.96,1.02	0.90***	0.87,0.93
Others	0.73***	0.70,0.76	1.36***	1.31,1.41	0.77***	0.74,0.80
<b>Caste</b>						
SC/ST						
Non SC/ST	1.05***	1.02,1.08	0.91***	0.89,0.93	0.91***	0.89,0.93
<b>Wealth quintile</b>						
Poorest						
Poorer	1.34***	1.30,1.39	1.03*	0.99,1.06	1.05**	1.01,1.08
Middle	1.54***	1.49,1.60	1.01	0.97,1.05	1.12***	1.08,1.16
Richer	1.67***	1.60,1.74	0.96*	0.92,1.01	1.14***	1.10,1.19
Richest	2.22***	2.12,2.32	0.81***	0.77,0.84	1.26***	1.20,1.32
<b>Place of residence</b>						
Urban						
Rural	0.97**	0.94,0.99	0.94***	0.91,0.96	1.22***	1.19,1.26
<b>Sex of the head of the household</b>						
Male						
Female	0.64***	0.62,0.66	1.01	0.98,1.04	0.98	0.94,1.01
<b>Place of delivery</b>						
Public						
Private	0.96**	0.93,0.98	0.70***	0.69,0.72	1.10***	1.07,1.13
<b>Constant</b>	0.24***	0.23,0.26	0.58***	0.55,0.60	0.28***	0.26,0.29

\*p < .1, \*\*p < .05, \*\*\*p < .01.

(continued)

	Using any method of contraceptives	Breastfeeding within 1 h	Postnatal check-up of new-born	N
Gujarat	33.3	49.1	29.4	5122
Haryana	52.7	42.3	39	4792
Himachal Pradesh	44.5	40.9	44.3	1775
Karnataka	36.1	55	28.6	5555
Kerala	40.5	62.7	54.3	2126
Lakshadweep	35.5	NA	NA	260
Maharashtra	51	57.9	39.7	6451
Manipur	25.9	64.1	17.2	3034
Meghalaya	19.7	61.4	36.4	1774
Mizoram	30.3	70	26.6	2887
Nagaland	20.2	52.6	4.1	1081
Puducherry	46.9	64.5	57.9	876
Punjab	72.1	30.1	58.3	3835
Sikkim	36.6	NA	NA	856
Tamil Nadu	41.8	55.2	56.2	6136
Telangana	43.6	36.8	32.5	1637
Tripura	65.1	43.3	14.7	942
West Bengal	70.3	45.4	50.8	3495

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