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EL ROL DE LOS ESTUDIOS DE POBLACIÓN TRAS LA PANDEMIA DE COVID-19 Y  
EL DESAFÍO DE LA IGUALDAD EN AMÉRICA LATINA Y EL CARIBE

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## Título

**Financing Maternity Care in Public and Private Health Facilities in India**

## Abstract

Spending on maternity care [Antenatal Care (ANC), Delivery and Postnatal Care (PNC)] is gaining new records every day in public and private health sectors of India. It is often cited as the strongest barrier in utilizing quality care during pregnancy and childbirth. The objectives of this paper were, first, to estimate the extent of mean maternity spending by source of provider and socio-economic and demographic characteristics; second, to investigate the factors associated with public and private maternity spending using the unit-level data from the 75<sup>th</sup> round (2017-18) of the National Sample Survey Organization. The Heckman selection model was applied to examine the factors explaining component-wise public and private maternity spending in India. Overall, the component-wise mean maternity spending was skyrocketing in the private health provider compared with the public health provider. The results reveal that average expenditure incurred on delivery, ANC and PNC at a private health facility were over six, four and three times higher than public health facility, respectively. Multivariate analyses confirmed that age group, education, social and wealth status, religion, health insurance and place and region of residence emerged as responsible factors explaining component-wise public and private maternity spending. Findings from this study suggest the importance of government spending on the public health sector to magnify the accessibility and affordability of quality maternity care that may curtail the economic distress of households to obtain utmost care in private health facilities in India, irrespective of their socio-economic status.

**Keywords:** Maternity care, Healthcare expenditure, Public health facilities, Private health facilities, Heckman sample selection, India

## Introduction

Globally, over a quarter of a million women die annually due to pregnancy and childbirth complications. The low and middle-income countries suffer from undesirably high maternal deaths (94%), of which the Sub-Saharan African (77%) and South Asian (23%) countries accounted for about 86% (254 000) of the total maternal deaths in 2017 (WHO *et al.*, 2019). One of the reasons is the lack of access to institutional delivery care due to imposing a significant amount on the households that may stress their monetary burden and the likelihood of complications during prenatal and childbirth (UNICEF, 2008). India is home to 17.5% of the world's population and the poorest health performer in multiple indicators among the BRICS countries (Brazil, Russia, India, China, and South Africa) (Marten *et al.*, 2014). In 2017, Nigeria (23%) and India (12%) conjointly accounted for one-third (102,000) of the world's maternal deaths (WHO *et al.*, 2019). Although tremendous efforts have been made towards reducing maternal mortality ratio (MMR), safe motherhood remains an utmost dream for many developing countries, including India (Starrs, 2001). The Millennium Development Goals (MDGs) 5 suggest that improving maternal healthcare is critically dependent upon the availability and affordability of quality health facilities at institutional settings (Mavalankar *et al.*, 2008). Over the last few decades, India has witnessed enormous progress in reducing MMR from 556 to 130 per 100,000 live births (77% declined) between 1990 and 2014-16,

respectively (MoHFW, 2020), but failed to meet the MDG-5 target of MMR 109 by the end of 2015 (United Nations, 2014). After the failure of MDGs, a newly proposed Sustainable Development goals (SDGs) 3 aims to reduce MMR below 70 and financial protection to the households from exorbitantly high out-of-pocket expenditure (OOPE) on maternity care [Antenatal Care (ANC), Childbirth and Postnatal Care (PNC)] by 2030 in India (United Nations, 2015). However, maternal and neonatal deaths can be prevented if women have access to adequate care during their maternity phase, especially delivery care (WHO, 2006). Recently, the National Family Health Survey (NFHS) has shown that the reduction in MMR is more likely associated with an increase in institutional deliveries. The delivery care at the public health facility has increased from 18% in 2005–06 to 53% in 2015–16 while the private health facility has risen from 20% in 2005–06 to 26% in 2015–16, respectively (IIPS & Macro International, 2007; IIPS & ICF, 2017).

The private health sector is characterized by a predominant source of health financing system, while low health expenditure continues in the public health sector in India (NHSRC, 2018). Currently, it contributes nearly 3.8% of the Gross Domestic Product (GDP) (MoHFW, 2019), which is considerably low compared with countries having similar per capita income, poverty and inequality such as Malawi (8.4%), Niger (6.6%) and Uganda (9.8%) (Drèze & Sen, 2013). The recently published National Health Policy (NHP) aims to boost public health spending from 1.15% to 2.5% of the GDP to provide affordable and better-quality health facilities by 2025 (MoHFW, 2017). Furthermore, the household's financial distress is a critical factor for poor maternity performance in India (IIPS & Macro International, 2007). Acknowledging the importance of OOPE, a principal mode of healthcare financing throughout Asia (Randive *et al.*, 2013), accounting nearly 59% of the total health expenditure in India (MoHFW, 2009), and households incur a significant proportion of it on maternity care (Lim *et al.*, 2010; Skordis-Worrall *et al.*, 2011; Pradhan *et al.*, 2014). It may be catastrophic for the poor, rural, less educated and female-headed households, mostly during childbirth (Garg & Karan, 2009; Mohanty *et al.*, 2014; Kumar *et al.*, 2015). However, spending on maternity care is gaining faster than the household's consumption expenditure (Mohanty *et al.*, 2016). As a consequence, such additional expenses not only hold women back from obtaining maternal facilities but also drives them further into extremes of poverty (Bonu *et al.*, 2009); and that thwarts household's capacity to meet the essential needs (*e.g.*, food, cloth and education of their children) (Van Minh *et al.*, 2013). For instance, a substantial proportion of the households are selling their assets, borrowing loans and money from friends and relatives to meet additional expenses (Kruk *et al.*, 2009; Van Minh *et al.*, 2013; Joe, 2015).

An extensive health literature has documented that financing during pregnancy and childbirth is often cited as a risk factor of the household's financial burden (OOPE). It may be catastrophic for the poor and considered to be fragile public health performance in the low and middle-income settings including India (Bonu *et al.*, 2009; Skordis-Worrall *et al.*, 2011; Leone *et al.*, 2013; Mukherjee *et al.*, 2013; Issac *et al.*, 2016; Goli *et al.*, 2016; Singh *et al.*, 2016; Mohanty & Kastor, 2017; Goli & Rammohan, 2018). Although, maternity care is offered free or at nominal charges in public health facilities but not at the point of delivery in India. A group of researchers has argued that maternal care in the public health sector is not always truly offered

free of cost. To some extent, many families are still paying a decent amount for user fees, diagnostics tests, medicines and bed charges to the public health facilities (Sengupta & Nundy, 2005; Chattopadhyay, 2013; Leone *et al.*, 2013). Several factors may explain the poor maternity performance in the public health sector in India. It has been diluted by the unavailability, absenteeism and callous behaviour of doctors or health professionals, poor health infrastructure, shortage of medicines and tools, physical inaccessibility, lack of diagnostic test and monitoring in the public health sector (Hussain, 2011; Skordis-Worrall *et al.*, 2011; Garg *et al.*, 2012; Mukherjee *et al.*, 2013; Goli *et al.*, 2016). These are the most critical factors, which have influenced a higher proportion of women to prefer private health facilities is marked by the quality of care and household's ability to pay (Griffiths & Stephenson, 2001; Garg *et al.*, 2012; Mohanty & Srivastava, 2013; Kumar & Mishra, 2015). It is worth mentioning that there are less significant costs associated with ANC and PNC. However, this figure does hold the opposite to be true in the context of delivery cost in either public or private health facilities. A range of study has shown that households incur high expenditure for seeking quality delivery care at private health facilities (Borghi *et al.*, 2006; Bonu *et al.*, 2009; Modugu *et al.*, 2012; Mohanty & Srivastava, 2013; Kowalewski *et al.*, 2017). For instance, delivery at public health facilities is inferior, women in wealthier society are more likely to prefer private health facilities (Skordis-Worrall *et al.*, 2011). Moreover, studies have explored that widespread informal payments on various aspects of maternity care at public health facilities are attributed to service bias, social exclusion and impoverishment (Sharma *et al.*, 2005; Pathak *et al.*, 2010; Skordis-Worrall *et al.*, 2011). Thus, on account of this, a quarter of Indian households further sink into extreme poverty and indebtedness (Navaneetham & Dharmalingam, 2002; Peters *et al.*, 2002; Bonu *et al.*, 2009; Garg & Karan, 2009; Balarajan *et al.*, 2011; Modugu *et al.*, 2012; Mohanty & Srivastava, 2013; Mukherjee *et al.*, 2013).

Since independence, maternity care has been at the core of health planning in India. Recognizing its importance, both the state and national government introduced various cash incentive schemes and policy directives (*Janani Suraksha Yojana (JSY)*, *Janani Shishu Suraksha Karyakram (JSSK)*, *Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA)*, *Janani Suvidha Yojana*, *Sambhav Vouchers*, *Agra Voucher*, *MAMATA scheme*, etc.) to reduce financial barriers, strengthen safe motherhood and child survival by availing better maternal facilities in public settings in India. However, the Ministry of Health and Family Welfare (MoHFW), Government of India (GoI), launched a series of flagship intervention programs under the umbrella of National Rural Health Mission (NRHM) in 2005, now renamed as National Health Mission (NHM). The key components of NHM include *JSY*, *JSSK* and *PMSMA* schemes. For instance, the *JSY*, a Conditional Cash Transfer (CCT) is being implemented with aims to recommend and motivate women to opt for institutional delivery and improve maternal and neonates survival in public or accredited private health facilities offering a monetary incentive of Indian Rupees (INR) 1400 supported by the Accredited Social Health Activist (ASHA) (MoHFW, 2005; MoHFW, 2006). Later, it was modified by *JSSK* in 2011, which covers annually cashless institutional deliveries and gives medical treatment to sick neonates in public health facilities for up to one year (Randive *et al.*, 2013; MoHFW, 2014). Recently, the *PMSMA* launched in 2016, aims to provide free ANC package and quality

ANC to all pregnant women (during the 2nd/3rd trimester) on 9th of every month in public health centres (MoHFW, 2019). Besides, there are many informal or inadequate health payments made by households at public health settings attributed to social disbaring and service bias (Sharma *et al.*, 2005; Skordis-Worrall *et al.*, 2011), which is hindering the safe motherhood entitlement in India (MoHFW, 2005; Lim *et al.*, 2010; Skordis-Worrall *et al.*, 2011; Mohanty & Srivastava, 2013; Randive *et al.*, 2013; MoHFW, 2014; MoHFW, 2017).

The previous health economics literature has explored that maternal healthcare expenditure or any specific component/s and its forces in low and middle-income settings including India (Bonu *et al.*, 2009; Lim *et al.*, 2010; Skordis-Worrall *et al.*, 2011; Sambo *et al.*, 2011; Mukherjee *et al.*, 2013; Mohanty & Srivastava, 2013; Leone *et al.*, 2013; Goli *et al.*, 2016; Singh *et al.*, 2016; Issac *et al.*, 2016; Mohanty & Kastor, 2017; Goli & Rammohan, 2018). As per knowledge in previous studies, almost none of the studies have estimated the factors explaining component-wise public and private maternity spending among currently married women in India using the latest 75<sup>th</sup> round of the National Sample Survey Organization (NSSO) in 2017-18. However, the availability of information on maternity spending has suffered from some serious limitations reported in the previous National Sample Survey (NSS) rounds and the studies from India. For example, studies based on the old datasets (Bonu *et al.*, 2009; Mohanty & Srivastava, 2013; Leone *et al.*, 2013; Mukherjee *et al.*, 2013; Singh *et al.*, 2016; Goli *et al.*, 2016; Mohanty & Kastor, 2017); have methodological constraints, geographical settings and limited or fewer sample sizes (Skordi-Worrall *et al.*, 2011; Sambo *et al.*, 2013; Govil *et al.* 2016; Issac *et al.*, 2016; Goli & Rammohan, 2018) and under-reporting of true maternity cost (NSSO, 2006; NSSO, 2015; NSSO, 2019) are the subjects immensely affected by the recall bias. Unlike previous NSS rounds, the recent 75<sup>th</sup> round re-defined a household to get reliable information on the cost of childbirth among women aged 15-49 years who had delivered a baby at any time in the last 365 days. Furthermore, the NSS rounds were not provided any information on the supply-side factors that may influence maternal financing (NSSO, 2006; NSSO, 2015; NSSO, 2019). Neither previous nor the 75<sup>th</sup> round of the NSS collected detailed information on the component-wise maternity care expenditure disaggregate level. Unlike the cost of delivery care incurred by households on institutional settings at a disaggregate level, the NSS 75<sup>th</sup> round provided information on home delivery care expenditure at an aggregate level. In future, considering the above limitations, the NSS surveys should have been carried out functionally on various aspects of maternity care expenditure, which would help the government come by better policy and planning initiatives. Additionally, in the last couple of years, a few of researcher has estimated the extent of OOPE and Catastrophic Health Spending (CHS) on maternity care in India using the nationally representative NSS datasets (Goli *et al.*, 2016; Singh *et al.*, 2016 and Mohanty & Kastor, 2017). For instance, a recent study by Mohanty & Kastor have estimated the OOPE and CHS on institutional delivery care and Total Maternity Care (TMC) during pre and post NHM periods using the 60<sup>th</sup> and 71<sup>st</sup> rounds of the NSS. With this backdrop, this study attempted to fill two research gaps. First, to estimate the extent of maternity spending by source of provider and socio-economic and demographic characteristics. Second, to investigate the factors associated with public and private maternity spending in India.

## **Methods**

### *Data*

The study primarily used unit-level records drawn from the 25<sup>th</sup> schedule of the NSS 75<sup>th</sup> round titled '*Key Indicators of Social Consumption in India: Health*' conducted between July 2017-June 2018 (NSSO, 2019). A multi-stage stratified sampling design was adopted to conduct this survey by the Ministry of Statistics and Programme Implementation (MoSPI), GoI. Census villages in the rural areas and urban blocks in the urban areas were considered in the first-stage units (FSUs) followed by households in the second-stage units. Detailed information and interview schedule can be availed in the survey report (NSSO, 2019). The nationally representative NSS 75<sup>th</sup> round covered 5,55,115 individuals from 1,13,823 households. Among them, 32,152 women aged 15-49 years who were reported being pregnant (comprising pre and postnatal care and childbirth) at any time during the 365 days preceding the survey across the States and Union Territories (UTs) in India.

To examine the all three components of maternity spending (ANC, childbirth and PNC) in public and private health facilities in India, this study restricted only currently married women aged 15–49 years who were pregnant or delivered a baby at any time in the last 365 days preceding the survey. The data on ANC and PNC costs were collected at an aggregate level. Unlike them, the delivery cost was collected at a disaggregated level as inpatient medical care expenditure including eight sub-components: package components, doctor's or surgeon's fee, medicines, diagnostic tests, bed charges, other medical expenses (attendant charges, charges related to physiotherapy, personal medical appliances, blood, oxygen, *etc.*), transportation charges for the patient, other non-medical expenses incurred by the households (food, transport cost for others, expenditure on escort and lodging charges if any, *etc.*) in the last 365 days (NSSO, 2019). Therefore, the analyses this study confined to 31,184 women who had sought any ANCs, about 26,443 women had delivered birth in a hospital setting and 26,005 women had availed PNCs during the reference period to capture all three component of public and private maternity spending. Like previous NSS rounds, the latest 75<sup>th</sup> round also includes information on household consumption expenditure which was collected through a set of five questions on (i) purchases (ii) home-produced stock (iii) receipts through an exchange of goods and services (iv) gifts and loans and (v) free collection to estimate household consumption expenditure, rather than a detailed listing of consumption items in the last 30 days preceding the survey. Furthermore, in India, it is difficult to obtain reliable household income data. Thus, the NSSO reported monthly per-capita household consumption expenditure (MPCE) used as a proxy measure to depict the relative wealth status of households.

### *Dependent variables*

This study measured six outcome variables, namely public ANC expenditure, private ANC expenditure, public delivery expenditure, private delivery expenditure, public PNC expenditure and private PNC expenditure, which were considered for the multivariate analyses. This study included only those women who were seeking maternity care in both public and private facilities using the latest NSS 75<sup>th</sup> round dataset. Data on various aspects of maternity cost were in continuous format and characterized by a cluster of data at zero and a right-skewed of the remaining sample distribution. However, the dependent variables were defined as any

expenditure (above zero) incurred by households for currently married women who had availed ANC, childbirth and PNC in public and private health facilities. Those who had not obtained the services by source of care at any time in the last 365 days preceding the survey, were coded as zero.

### *Covariates*

With regards to covariates, a set of socio-economic and demographic variables has been identified in previous studies and availability of those variables in the NSSO 75<sup>th</sup> round dataset as being critical factors for public and private maternity spending in Indian context (Navaneetham & Dharamalingam, 2002; Bonu *et al.*, 2009; Kesterton *et al.*, 2010; Mohanty, 2011; Leone *et al.*, 2013; Mohanty & Srivastava, 2013; Mukherjee *et al.*, 2013; Kumar *et al.*, 2015; Goli *et al.*, 2016; Singh *et al.*, 2016; Mohanty & Kastor, 2017, Goli & Rammohan, 2018; NSSO, 2019). The key explanatory variables included in the analyses were women age group (15–24, 25–34 and 35–49 years), place of residence (rural/urban), educational attainment (illiterate, primary, secondary, higher & above), religion (Hindu, Muslim and others (Christians, Sikhs, Jains, Buddhist, others), social group (Scheduled Castes (SCs), Scheduled Tribes (STs), Other Backward Castes (OBCs) and Other or General castes), MPCE quintile (poorest, poorer, middle, richer and richest), insurance coverage (no/any) and region of residence (north, central, east, north-east, west, south and union territories). Below, the details of the study variables analytic sample are given (See Table 1).

### *Statistical analysis*

Descriptive statistics were used to summarize the sample characteristics. Bivariate analyses were carried out to examine the adjusted association of socio-economic and demographic covariates and component-wise mean maternity spending in India. It is worth mentioning that all covariates, which had been identified as statistically significant in the bivariate analyses using Pearson's chi-square test, were included in the multivariate analyses. Therefore, the multivariate analyses ran six Heckman selection (*two-step*) models to identify the factors explaining component-wise public and private maternity spending after the sample selection bias had been corrected. The results of all six models were presented using the estimated odds ratio with 95% confidence intervals (CIs). Both bivariate and multivariate analyses were calculated using a respective sampling weight given by NSSO. Statistical analyses were performed using STATA 14.0 (StataCorp LP, College Station, TX, USA).

## **Results**

### *Socio-economic and demographic differentials in maternity spending by source of care*

Table 1 presents the socio-economic and demographic differentials in mean maternity spending by type of health facility in 2017-18, expressed in INR at the 2017 price. Overall, the component-wise mean maternity spending was much more expensive in the private health facility than the public ones. As results are shown in Table 2, India's average expenditure incurred in a private health facility for ANC (INR 1505), delivery (INR 3683) and PNC (INR

988) were manifold higher than that in a public health facility for ANC (INR 6963), delivery (INR 22,492), and PNC (INR 2966), respectively. It suggests that women prefer to obtain care from the private facility over the public facility due to poor quality of care, fewer health professionals and doctors, inadequate infrastructure and unavailability of health facilities in the public sector. Further, the extent of average expenditure incurred on childbirth, ANC and PNC in a private health provider were over six, four and three times higher than that from a public health provider.

The pattern of average spending on maternity care by source of health facility was varied significantly across socio-economic, demographic and regional factors. With respect to the place of residence, women in urban areas were incurred much higher average expenditure on maternity care in public health facility (ANC = INR 1921, delivery care = INR 6720, PNC = INR 1245) and private health facility (ANC = INR 7763, delivery care = INR 26,233, PNC = INR 1245) than those who were living in rural counterparts, respectively. The average maternity cost by type of health provider was much higher among women in the age group of 35-49 years, while it was lower among women in the age group of 15-24 years. Based on educational status, the mean spending on ANC, childbirth and PNC increases with an increase in women's educational level up to graduation and above in both public and private health facilities, while the lowest spending among women who had illiterate or less educated. Similarly, with reference to social group, the average ANC and delivery cost by source of care significantly increases with an increase in social order up to General or other castes. The average cost of ANC and delivery care were higher among Hindu women than Muslims, while it was vice-versa for the PNC. By MPCE quintile, the mean spending on maternity care increases with an increase in wealth status up to the richest quintile in both public and private. Moreover, compared with women in the poorest status, average expenditure incurred by a richer household was at least 1.5 and 1.4 times higher in both public and private health facilities to avail maternity care. It is worth mentioning that there were handsome differences in mean institutional delivery care costs between the richest and the poorest households, those who gave birth in a private setting spent 6.6 and 4.3 times more money than that in a public setting for seeking better-quality care during childbirth. In terms of health insurance coverage, the mean expenditure on maternity care was higher for women who were covered with any health insurance schemes in either public or private health facilities. In the context of region of residence, Table 2 further reveals that the regional variation in mean spending on various maternity components by type of health facility were non-linear patterns.

### *Multivariate analysis*

Table 2 represents the results of the Heckman selection model showing the effects of covariates on public and private ANC expenditures. The dependent variables were public ANC expenditure in the first model (Table 2 columns 1 and 2) and private ANC expenditure in the second model (Table 2 columns 3 and 4). In both selection models (Table 2 column 2 and 4), the coefficients of public ANC expenditure depended significantly and more likely among urban women, age group of 25-34 years, those had completed secondary and higher education, social group up to others, top three wealth quintiles, coverage of any health insurance and



women who had lived in the Central, North-east and Southern regions, while it was vice-versa for the private ANC expenditure. Further, Table 2 shows strong significant evidence of the selection effects in both models explaining public and private ANC expenditures displayed by the correlation between the error terms, where  $\rho$  coefficients were 0.07 and 0.74, those were positively significant. However, in both main models (Table 2 column 1 and 3), the coefficients such as respondent's age group of 25-34 and 35-49 years, richest wealth quintile, coverage of any health insurance and those had belonged in the UTs and Southern regions were making significant positive contribution to public ANC spending, while age group of 35-49 years, those had completed up to secondary education, households had middle and richer quintiles and women who had lived in the East, North-east and Western regions were also making significant positive contribution to drive private ANC spending. Thus, the results indicate that women significantly incurred higher public and private ANC expenditures after correcting the selections (Table 2 column 2 and 4), as they had higher financial ability to pay for ANC in either public or private facilities.

Table 3 shows the results of the Heckman selection to estimate the factors of public and private delivery care expenditures. In selection models, the coefficients of public delivery spending (Table 3 column 2) depended significantly and positively among urban women, age group of 25-34 years, those had completed graduation and above education, social group up to others, wealth status up to richest quintile, while it was vice-versa for the private spending on delivery care (Table 3 column 4). Besides, the delivery cost differences were more significant by the respondent's social and wealth status, an increase in social and wealth status increases the probability of public spending on delivery care, while it was vice-versa for the private spending on delivery care. Moreover, Table 3 demonstrates strong significant evidence of the selection effects in both models explaining public and private spending on delivery care showed by the correlation between the error terms, where  $\rho$  coefficients were 0.77 and 1.00, and both were high and positive. However, in both main models (Table 3 column 1 and 3), the positive coefficients such as urban women, age group of 25-34 and 35-49 years, those had completed graduation and above education, social group up to others, top three MPCE quintiles, coverage of any health insurance and those had lived in the UTs, Central and Southern regions were more likely significant associated with public delivery care expenditure, while urban women and those had belonged in the UTs, East and North-eastern regions were making significant positive contribution to private delivery care expenditure. Furthermore, the coefficients such as urban women, social group up to others and coverage of any health insurance were less likely significant associated with private delivery care expenditure (Table 3 column 3). It clearly states that high delivery cost might put all women off who sought delivery care at private health facilities, as they had lesser ability to pay for it.

Table 4 demonstrates the results of the Heckman model to estimate the factors of public and private PNC expenditures. In both selection models (Table 4 column 2 and 4), the coefficients of public PNC expenditure were more likely significant among women in urban, age group of 25-34 and 35-49 years, those had completed secondary and higher education, social group up to others, households had poorest to richest quintile, coverage of any health insurance and those had lived in the Central and Southern regions, while women in urban, those had completed

graduation and above education, social group up to others, richest quintile, coverage of any health insurances and those had belonged in the Central and Southern regions were less likely significant associated with private PNC expenditure (Table 4 column 4). However, Table 4 reveals strong significant evidence of the selection effects in both models explaining public and private PNC expenditure showed by the correlation between the error terms, where  $\rho$  coefficients were 0.64 and 1.00, which were high and positive. In both main models (Table 4 column 1 and 3), the positive coefficients such as women age group of 25-34 and 35-49 years, those had completed secondary and graduation and above education, top two MPCE quintiles, coverage of any health insurance and those had resided in the UTs and Southern regions were more likely significant contributed with public and private PNC expenditure. After correcting for the selection effects, the results further express women were considerably incurred higher expenditure in both public and private PNC, as they had higher financial means to pay for seeking quality of PNC. Thus, the above results highlighted the significance of considering the selection models while estimating the covariates explaining public and private spending on maternity care in India.

## Discussion

Financing on maternity care remains the core for a preference of accessing care by type of health facility. Over the last few decades, India has been significantly progressing towards utilizing maternity care in the public health sector but not so faster than the private sector (MoHFW, 2019). The analyses of the present study contributed to a better understanding of the component-wise average maternity spending in public and private health facilities in India and identified the responsible factors associated with it. With regards to this paper, none of the previous studies have explored exhaustively on all three aspects of maternal healthcare expenditure using the latest NSS 75th round dataset. Below, the critical findings of the paper are discussed.

The findings suggest that there were substantial socio-economic and demographic differentials in mean delivery cost between public and private health facilities, while it was not hold true in other aspects of maternity care, and these findings are consistent with the previous studies in India, although the magnitude is varied (Bonu *et al.*, 2009; Leone *et al.*, 2013; Kumar & Mishra, 2015; Mohanty & Kastor, 2017). The extent of the average cost of delivery, ANC and PNC in a private health facility were six, four and three times higher than that from a public health facility. The recently published NFHS-4 reported that although a significant number of women had visited public health facilities, a good proportion of women had availed private health facilities with the prospect of getting quality care during childbirth (IIPS & ICF, 2017). Further, the results explore that the gap in mean maternity cost between public and private health facilities has been widened in the last couple of years (NSSO, 2006; Mohanty & Srivastava, 2013; NSSO, 2015; NSSO, 2019). It can be attributed to the absolute gap in average maternity cost as an increase in the number of women opt for better-quality care at private health facilities and maybe the underestimation of the absolute level of maternity cost in the latest NSS 75<sup>th</sup> round than the previous estimates (NSSO, 2006; NSSO, 2015). Moreover, the results show that institutional delivery cost by source of care was much more expensive than

the cost of other maternity components, this may be due to an increase in the number of caesarean births and associated expenses. Besides, women in well-off households prefer obtaining delivery care in private health providers due to unsatisfactory and inadequate care in public health providers (Skordis-Worrall *et al.*, 2011). Reasons for the shortage of health professionals, poor infrastructure, deficient medicines and diagnostic tests at public hospitals (Leone *et al.*, 2013; Kumar & Mishra, 2015), are the critical factors, which have discouraged many women from opting private facilities for the sake of better-quality care that in turn could have pushed them down with exorbitantly higher OOPE.

Place of residence plays crucial and differential roles in deciding maternity cost by type of health facility in India. Urban women were spending higher mean maternity costs in public and private health facilities than their rural counterparts, which suggests that the household's wealth status is significantly higher in urban areas associated with better maternal facilities. Studies have suggested that rural households are paying or borrowing considerable expenses to cover transport, food and accommodation costs to access quality health facilities located in the nearest towns or cities during pregnancy and childbirth, are at the risk of losing their job or monthly wealth capacity and unwillingly falling into extreme poverty, especially poor and marginalized (Bonu *et al.*, 2009; Skordis-Worrall *et al.*, 2011; Garg *et al.*, 2012; Mohanty & Srivastava, 2013; Kumar & Mishra, 2015). An interesting finding was that the average ANC and PNC costs by type of health facility were higher among women affiliated with Hindu and Muslim religions. Perhaps women in other religions were of wealthier status and preferred better care in a private facility than public ones. Furthermore, the results show that the component-wise mean maternity cost increases with an increase in women's education level, social order and MPCE quintile in both public and private health facilities, respectively. It may be because women in higher socio-economic status are seeking to improve maternal facilities, take additional care of their health and have the ability to pay for it. It is worth mentioning that the female-headed households (mostly widows) who are poorer than male-headed, are likely to spend much more on maternity care due to having higher decision-making autonomy who had experienced complications during and following pregnancy and childbirth (Meenakshi *et al.*, 2000). However, spending on maternity care seems to be very progressive in India. Women who are well educated, general castes and high-income households have higher ability to pay substantial expenses for seeking quality maternal care in private facilities than those less educated/illiterate, SCs and low-income households. For instance, the results show that there was a substantial gap in maternity cost between the richest and the poorest households, e.g. women in wealthier status significantly incurred higher expenditures for seeking quality care. Despite high maternity costs in private facilities, poor women still prefer private facilities more effectively than public ones (Griffiths & Stephenson, 2001). Besides, women who had any insurance spent more on any source of care than those with no insurance. This paper also highlighted that regional variation in maternity cost might be due to variations in the level of education, wealth status, availability and accessibility of maternal health facilities. The regional differentials are widened in remote areas where women still receive inadequate care due to inaccessibility and lack of communication with small towns or cities to get better maternal facilities.

Spending on Maternity care in India is directly or indirectly associated with women's socio-economic and demographic and household's wealth status. The findings of the multivariate analyses confirmed that age group, education, social and wealth status, religion, health insurance and place and region of residence emerged as highly significant covariates contributing component-wise public and private spending on maternity care. The results suggest that women who had low/high-educated, SCs/other social groups and poorer/richer status were more likely to incur higher expenditure on various aspects of public and private maternity care. Interestingly, the findings found that the public and private maternity care cost were significantly influenced by the social and wealth status in the selection models, an increase in social and wealth status increases the probability of public spending on all three aspects of maternity, while it was vice-versa for the private spending on maternity care in India.

Concluding, the findings believe that the household's wealth status would be a serious curtailment of accessing better-quality maternal care in India. Despite many un/conditional cash transfer schemes run by the national and state government towards reducing exorbitantly high OOPE and improving quality maternity care, it has failed to concentrate both. For instance, the JSY and JSSK emerged as a milestone to promote cashless maternal and infant health facilities and reduce the financial distress of households, but it was not sufficient to minimize all, and poor and less educated women were not always likely to receive the Voucher to meet additional maternity costs. Here, the estimated average cost of delivery care is multiple times higher than the *Voucher* received under the JSY. A newly proposed PMSMA has contributed to making safe pregnancies covered over cashless 9.18 lakh high-risk pregnancy cases and 1.89 crores ANC check-ups in approximately 13,672 public health facilities (MoHFW, 2019). The findings suggest that despite having such cashless schemes, the health insurance schemes are not enough to face sky-rocketing costs related to maternity care in either public or private health facilities in India. Given the extent of considerable public and private maternal health expenditure gaps, the government needs to: improve the better-quality maternal facilities, mindful about pregnancy complications, strengthen health infrastructure, priorities state-specific scheme/s, strengthen and extend the *Voucher* amount and increase the awareness of continuum of maternity care, which would help in reducing the financial distress of households (OOPE/CHS) and sky-high cost in private health centres, especially at the time of childbirth. From a policy perspective, health planners and policymakers have to be concerned about adequate health scheme/s to cope with exorbitantly high expenditure on maternity entitlements. Thus, this study has suggested some fundamental principles for policy implication. For instance, the government also need to: improve the accessibility and availability of adequate maternity care in the public health sector, avoid childbirth complications to restrict huge expenses, develop the public-private partnership, implement maternity-specific policy, provide adequate *Voucher* or direct cash transfers to all women are needed to be adopted to reduce the financial distress of households as well as minimize the expenditure gap between public and private health facilities in India. However, highlighting the above findings, the center along with state government should adopt some of the above dominant principles very cautiously for policy implication to extend better maternity outcomes in public settings by ensuring "financial safety" in terms of receiving quality maternity care to all pregnant women, irrespective of their class-caste-religion-region.

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**Table 1.** Socio-economic and demographic differentials in mean maternity spending (in INR at 2017 prices) in source of health provider, India, 2017-18

Covariates	ANC (INR 4234)				Delivery Care (INR 13,088)				PNC (INR 1977)			
	Public	±95% CI	Private	±95% CI	Public	±95% CI	Private	±95% CI	Public	±95% CI	Private	±95% CI
Age group												
15-24	1357	3	6209	15	3353	11	19671	48	940	3	2776	14
25-34	1451	4	6965	16	3021	17	23891	57	993	3	3078	11
35-49	1359	14	7899	80	4036	27	26737	185	1153	20	3640	59
Place of residence												
Rural	1278	3	6023	14	2995	8	19856	40	917	2	2881	11
Urban	1921	7	7763	20	6720	39	26233	74	1245	6	3180	14
Women education												
Illiterate	1033	6	5848	49	2646	16	16163	84	829	4	2188	14
Primary	1191	4	6080	26	2694	10	17540	88	934	4	2297	15
Secondary	1489	4	6102	17	3716	16	20139	57	983	5	2770	15
Higher & above	1907	7	7633	18	6189	39	27002	67	1215	6	3596	16
Religion												
Hindu	1451	3	6767	13	3671	12	22892	46	931	2	2849	10
Muslim	1351	8	6091	28	3566	18	19555	71	1184	9	3039	20
Others	1609	12	7783	50	4439	47	26407	186	1132	14	2980	35
Social group												
SCs	948	4	5226	40	2816	21	17039	165	685	4	2718	45
STs	1255	4	6349	33	3102	18	19633	103	922	4	3088	23
OBCs	1428	4	6451	15	3725	15	21490	47	1071	4	3013	13
Others	1758	6	7421	22	4884	28	25713	80	1025	5	2977	15
MPCE quintile												
Poorest	1049	3	5215	26	2690	12	17703	83	825	3	2610	17
Poorer	1372	5	5920	29	3148	16	18437	68	888	3	2747	25
Middle	1532	6	6300	19	3668	18	19462	69	999	4	2855	16
Richer	1656	8	7511	32	4720	29	22075	73	1262	12	2859	19
Richest	1900	10	8138	25	6902	68	29469	94	1277	9	3583	20
Insurance												
No	1347	3	6233	12	3626	11	21274	42	969	2	2907	9
Any	1708	8	7986	30	3852	24	27742	108	1006	11	3281	27
Region of residence												
North	1339	4	6004	25	3086	11	18150	50	1092	3	2868	13
Central	1622	11	6475	28	4839	61	20756	90	841	5	2392	16
East	1028	5	6215	45	2694	22	19580	141	747	6	3032	31
North-east	1580	7	5383	24	3777	20	21131	124	827	5	2319	27
West	3632	137	6559	332	5020	320	29921	1395	3209	108	3568	261
South	2455	11	8832	21	5659	32	26936	68	1182	11	3408	20
Union territories	1898	25	12147	144	6580	159	64240	574	1005	13	7524	150
India	1505	3	6963	13	3683	10	22492	39	988	2	2966	9

Source: Estimated by authors based on the 75<sup>th</sup> round of the NSSO, 2019

Notes : INR: Indian National Rupees; Public: Public Facility; Private: Private Facility; CI: difference of upper and lower limit at the 95% Confidence Interval.

**Table 2.** Estimated coefficients of Heckman selection model for antenatal care expenditure, India, 2017-19

Covariates	Public expenditure		Private expenditure	
	Main model	Selection equation	Main model	Selection equation
Place of residence ( <i>Rural</i> )				
Urban	332.438	0.335***	−209.429**	−0.330***
Age group ( <i>15-24</i> )				
25-34	331.702**	0.044**	8.023	−0.051***
35-49	2183.920***	−0.021	172.317**	0.005
Women education ( <i>Illiterate</i> )				
Primary	−80.865	−0.024	288.041***	0.080**
Secondary	542.591	0.125***	352.246***	−0.054***
Higher & above	1358.255	0.495***	155.409	−0.402***
Religion ( <i>Hindu</i> )				
Muslim	−421.061**	−0.036	87.397	0.029
Others	−82.235	−0.045	−84.107**	−0.016*
Social group ( <i>SCs</i> )				
STs	1364.459	0.429***	33.999	−0.334***
OBCs	912.916	0.579***	−86.757	−0.483***
Others	1812.973	0.713***	−6.042	−0.597***
MPCE quintile ( <i>Poorest</i> )				
Poorer	114.076	0.024	81.365	−0.015
Middle	386.013	0.066***	138.734**	−0.037***
Richer	783.635	0.210***	297.023***	−0.175***
Richest	1662.274**	0.412***	136.856	−0.360***
Insurance ( <i>No</i> )				
Any	732.587***	0.119***	−42.461	−0.116***
Region of residence ( <i>North</i> )				
Central	705.017	0.415***	−276.720**	−0.364***
East	681.150	−0.249***	174.999**	0.267***
North-east	124.531	0.103***	370.836***	−0.045**
West	816.378	−0.059	2050.331***	0.125
South	3227.475***	0.568***	248.069	−0.509***
Union Territories	4031.377***	−0.421***	293.804*	0.402***
Constant	−1946.696	−1.732***	159.177*	1.455***
<i>N</i>	30,293		30,293	
Uncensored observation	9,612		20,132	
Wald chi2(20)	343.65		170.78	
Prob>chi2	0.000		0.000	
$\rho$	0.077		0.739	

Source: Estimated by authors based on the 75<sup>th</sup> round of the NSSO, 2019Notes: ®: Reference Category; *p*-value: \**p*<0.10; \*\**p*<0.05; \*\*\**p*<0.01.  $\rho$  is the correlation of the error terms of degrees of freedom.

**Table 3.** Estimated coefficients of Heckman selection model for delivery care expenditure, India, 2017-18

Covariates	Public expenditure		Private expenditure	
	Main model	Selection equation	Main model	Selection equation
Place of residence ( <i>Rural</i> )				
Urban	4980.332***	0.313***	802.064**	-0.317***
Age group ( <i>15-24</i> )				
25-34	4082.055***	0.094***	-176.785	-0.132***
35-49	7959.704***	0.050	573.570	-0.024
Women education ( <i>Illiterate</i> )				
Primary	-2336.992*	-0.132***	-86.011	0.054
Secondary	1464.183	-0.037	-235.143	-0.108***
Higher & above	12062.190***	0.365***	-1288.683**	-0.529***
Religion ( <i>Hindu</i> )				
Muslim	-3522.215***	-0.077***	372.673	0.123***
Others	1364.573	0.017	211.233	0.017
Social group ( <i>SCs</i> )				
STs	8818.958***	0.128***	-696.544*	-0.205***
OBCs	13322.880***	0.422***	-2032.903***	-0.512***
Others	18448.710***	0.546***	-2688.499***	-0.640***
MPCE quintile ( <i>Poorest</i> )				
Poorer	1250.968	0.064**	-146.884	-0.051**
Middle	2646.653*	0.197***	-615.417*	-0.220***
Richer	5692.507***	0.281***	330.093	-0.312***
Richest	13277.070***	0.528***	-1280.181*	-0.550***
Insurance ( <i>No</i> )				
Any	4190.546***	0.004	-782.299***	-0.033
Region of residence ( <i>North</i> )				
Central	9535.445***	0.359***	-1594.940***	-0.424***
East	-3321.655*	-0.269***	1166.867***	0.262***
North-east	1644.773	-0.121***	2335.186***	0.144***
West	3460.424	-0.212	1271.115	0.282**
South	14103.340***	-0.346***	-750.329	-0.422***
Union Territories	10968.410***	-0.438	3809.693***	0.429***
Constant	-35080.410***	-1.327***	663.516*	1.678***
<i>N</i>	26,351		26,351	
Uncensored observation	9,007		18,003	
Wald chi2(20)	473.64		211.26	
Prob>chi2	0.000		0.000	
$\rho$	0.766		1.000	

Source: Estimated by authors based on the 75<sup>th</sup> round of the NSSO, 2019Notes: ®: Reference Category; *p*-value: \**p*<0.10; \*\**p*<0.05; \*\*\**p*<0.01.  $\rho$  is the correlation of the error terms of degrees of freedom.

**Table 4.** Estimated coefficients of Heckman selection model for postnatal care expenditure, India, 2017-18

Covariates	Public expenditure		Private expenditure	
	Main model	Selection equation	Main model	Selection equation
Place of residence ( <i>Rural</i> )				
Urban	681.882	0.289***	−330.655**	−0.217***
Age group ( <i>15-24</i> )				
25-34	595.557***	0.123***	95.400*	−0.011
35-49	1577.496***	0.086**	391.699***	0.035
Women education ( <i>Illiterate</i> )				
Primary	126.934	−0.015	181.817**	0.066**
Secondary	1049.827***	0.116***	171.242**	0.000
Higher & above	2543.065***	0.474***	−223.700	−0.265***
Religion ( <i>Hindu</i> )				
Muslim	154.436	−0.075***	573.364***	0.115***
Others	−479.694**	−0.021	126.321	−0.021
Social group ( <i>SCs</i> )				
STs	137.746	0.275***	−179.252*	−0.064**
OBCs	805.055	0.499***	−407.486**	−0.237***
Others	1223.747	0.602***	−657.612***	−0.324***
MPCE quintile ( <i>Poorest</i> )				
Poorer	46.836	0.034***	−60.692	−0.015***
Middle	466.030	0.157***	−16.301	−0.089***
Richer	958.234**	0.245***	−79.667	−0.190***
Richest	1894.704***	0.465***	−394.411	−0.336***
Insurance ( <i>No</i> )				
Any	291.073**	0.044**	−187.157**	−0.068***
Region of residence ( <i>North</i> )				
Central	817.374	0.360***	−892.593***	−0.281***
East	−815.558	−0.262***	327.356**	0.203***
North-east	−877.243***	−0.098***	88.261	0.023
West	−40.975	−0.174	2733.373***	0.362***
South	2082.791***	0.454***	−104.457	−0.192***
Union Territories	733.373**	−0.284***	700.688**	0.453***
Constant	−5973.870*	−1.714***	−1047.194**	0.644***
<i>N</i>	30,293		30,293	
Uncensored observation	8,717		16,593	
Wald chi2(20)	136.37		148.63	
Prob>chi2	0.000		0.000	
$\rho$	0.639		1.000	

Source: Estimated by authors based on the 75<sup>th</sup> round of the NSSO, 2019Notes: ®: Reference Category: *p*-value: \**p*<0.10; \*\**p*<0.05; \*\*\**p*<0.01.  $\rho$  is the