Out-of-pocket Expenditure on Delivery Care in Public Health Facilities in India: A Regional Analysis

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ABSTRACT

Objectives: The primary objectives of the study are (i) to measure the levels of out-of-pocket expenditure (OOPE) on delivery care and (ii) to estimate the degree of catastrophic expenditure (CE) and to determine the factors responsible for it in using public health facilities across the various regions of India.
Data and Methods: The data from the 71st round of the NSSO (2014) have been used for the study. The CE is measured as share of OOPE to the consumption expenditure and divided into two cut-offs. Descriptive and bivariate analysis is used to observe the nature of the variables and unadjusted association of the various independent variables on the dependent variable. Further, multivariate logistic regression model is used to assess the confounding factors of probability of CE with different cut-offs.
Findings: The result shows that average OOP expenditure by households on childbirth in public facilities in India is Rs. 3232, with the highest value observed in Northeast India (Rs. 5055). More than one-fourth (27 %) of the households experienced CE in the country. Varying effect of covariates is found across various regions of India. Overall the odds ratio shows the probability of experiencing CE is significantly higher for women who delivered in district level facility ($\beta = 1.22$, $p < 0.001$), stay longer duration ($\beta = 6.32$, $p < 0.001$), and received caesarean delivery ($\beta = 1.88$, $p < 0.001$).
Conclusion: The main finding of the study is that OOPE in delivery care, even in public health facilities, cause severe economic hardship to the households and can be a serious barrier in utilising maternal health care services in India. The study reemphasises the need for strengthening and expanding the depth, breadth and length of maternity benefits schemes such as JSY and JSSK.

Key Words : Out-of-pocket expenditure, Catastrophic expenditure, Maternal care, Caesarean delivery, Level of care

INTRODUCTION

Health care financing by households' out-of-pocket expenditure (OOP) is an important feature of health care system all over the world (Brown *et al.*, 2014). Large and unpredictable health payments by means of OOP can expose households to financial catastrophe and can result in impoverishment (van Doorslaer *et al.*, 2006). Many people are also restricted from using much needed medical care because they simply cannot afford to pay either the direct costs, such as for consultations, medicines and laboratory tests, or the indirect costs, such as for transport and special food (Xu *et al.*, 2005; Xu *et al.*, 2007). Households have a difficult choice of diverting resources between medical care and foregoing treatment with the risk of long-term deterioration in health and earnings capacity (O'Donnell *et al.*, 2005). Approximately, it is estimated that every year 44 million households or more than 150 million individuals all over the world experience catastrophic expenditure and about 25 million households or more than 100 million individuals are pushed into poverty as a result of OOP health care payments (Xu *et al.,* 2005, 2007). Recognizing the ill-effects of this private health care payment in the form OOP, national

and international organization regularly updates number of policy directives and set various goals for the world to achieve. The World Health Organization stressed that one of the primary goal in designing health sector reform strategies should be financial protection against high level of OOP health care expenditure (WHO, 2000). One of target for Sustainable Development Goals (SDGs-3) of the United Nations is to 'achieve universal health coverage, including financial risks protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all' (United Nations, 2017).

Like developed countries, India also witnessed increasing but steady trend of health care expenditure. However, public health expenditure has been terribly inadequate right from the 1940s (Bhat and Jain, 2004). Consequently, OOP health spending is the key source of healthcare financing in India and this leads to financial catastrophe which result in impoverishment for many households (Berman *et al.*, 2010; Ghosh, 2011; Pal, 2010). The government spending on health as a per cent of GDP in India has stagnated in the past two decades, varying from 0.9 per cent in 1990-91 to 1.2 per cent in 2009-10 of GDP (Rao and Choudhury, 2012). According to World Health Statistics (WHO, 2007), India ranked 184 among 191 countries in terms of public expenditure on health as a per cent of GDP. According to the estimates of Ministry of Health and Family Welfare (MoHFW), Government of India, OOP health expenditure incurred by the households stands at 69 per cent of the total health care expenditure in the country in 2013-14, a slight decline from 71 per cent in 2004-05 (National Health Accounts Cell, 2009; National Health Systems Resource Centre, 2016).

Studies have indicated that the inadequate level of public health provision in the country has forced the population to seek private health providers, resulting in substantial OOP spending (Arun and Kumar, 2013; WHO, 2004). Even poor households seek private providers to ensure minimal health care need due to declining preference over poor quality of public health is also a main reason for high OOP health expenditure in India (Arun and Kumar, 2013). In 2004–05, about 39 million Indians fell into poverty due to OOP health care payments including maternal health care (Modugu *et al.*, 2012).

Over the years reducing maternal mortality especially in developing countries is one of the top priorities in the global policy agenda as evidence by the United Nation's Goal-3 of Sustainable Development Goals (SDGs) where one of the targets is set to reduce global maternal mortality ratio (MMR) below 70 per 100,000 live births by 2030 (United Nations, 2017). As a result of the various efforts of the government, the country made a significant progress in reduction of maternal mortality ratio (MMR) and infant mortality rate (IMR). For instance, MMR in India decline from 437 per 100,000 live births in 1990 to 130 per 100,000 live births in 2014-16 (MOSPI, 2015; Office of Registrar General of India, 2018). However, maternal mortality is still a significant challenge in most of the developing countries despite a decline of 45 per cent in global MMR from 1990s. India accounts for 15 per cent (45000) of the total maternal deaths in the world in 2015 (United Nations, 2015; WHO UNICEF UNFPA World Bank Group and the United Nations Population Division, 2015).

In order to reduce OOP payments in delivery care services and improves the overall maternal health conditions in the country, the Government of India initiated several policy directives under its flagship programme National Health Mission (NHM) (Lim *et al.*, 2010; Ministry of Health and Family Welfare, 2011). Among others, *Janani Suraksha Yojna* (JSY) and *Janani Shishu Suraksha Karaykram* (JSSK) were implemented to promote facility-based delivery and to reduce the financial barriers in maternal health care services. The JSY is the largest conditional cash transfer and 100 per cent centrally sponsored scheme under which cash incentives are given to women for delivering their babies in public sector health facility or accredited private health facility. The JSSK scheme entitled all pregnant women delivering in public or accredited private health facilities to free delivery procedures, medications, diagnostics, meals, provision of blood, and transport services without any payments (Prinja *et al.*, 2015).

There are huge volumes of research that focused on maternal care, maternal mortality and its factors in India. For instance, factors which act as barrier to maternal care utilization in India includes supply side factor such as availability and accessibility (Navaneetham and Dharmalingam, 2002; Prinja *et al.*, 2015), socio-economic factor such as educational level, economic status, social group, religion have influence the utilization of maternal health care services (Bhatia and Cleland, 1995; Kesterton *et al.*, 2010; Mohanty, 2011; Mohanty and Pathak, 2009). Further, cost of maternity care services is frequently cited

as one of the important barriers in access to maternal health care service utilization (Bhatia and Cleland, 1995; Bonu, Bhushan, Rani, and Anderson, 2009; Coffey, 2014; Goli *et al.*, 2016; Goli *et al.*, 2018; Griffiths and Stephenson, 2001; Mohanty and Srivastava, 2012).

The limited study on socio-economic and demographic variations in cost of delivery care in the country suggests that payment of maternal health care services by means of OOP is a risk factor for financial catastrophe on households and cause impoverishment (Bonu *et al.*, 2009; Goli *et al.*, 2016, 2018; Mohanty and Srivastava, 2012; Prinja *et al.*, 2015; Skordis-Worrall *et al.,* 2011). Bonu *et al.* (Bonu et al., 2009) and Prinja et al. (Prinja *et al.*, 2015) found that mean expenditure in delivery care is significantly high for those delivered in private facility compared to public facility and home birth. However, the former study found higher mean expenditure for delivering in public facility than home birth whereas in the later, mean expenditure is higher for home birth. Cost of delivery tend to be higher for those women having caesarean section birth, residing in urban, higher educational level, and better economic condition (Goli *et al.,* 2016, 2018; Mohanty and Srivastava, 2012). The state level analysis of Mohanty and Srisvasta (Mohanty and Srivastava, 2012) also found that state with higher economic development tend to have higher mean OOPE in delivery care. Further, studies have pointed out that likelihood of experiencing catastrophic expenditure in maternal care is higher for those who are residents of urban, educated, lower income group and having delivery care in private facility (Bonu *et al.*, 2009; Goli *et al.,* 2016, 2018). Moreover, a recent study (Goli *et al.*, 2018) of Uttar Pradesh (India) conducted in hospitals settings found that with increase in the number of anti-natal cares (ANCs) visit and decision on institutional delivery by doctor rather than self/family taking the decision increases the risk of occurrence of catastrophic expenditure. The study which found 27 per cent of the households incurred catastrophic maternal expenditure also suggests that the probability of catastrophic maternal expenditure is much higher for caesarean delivery compare to normal delivery.

The studies on socio-economic differentials in maternal health care expenditure in India have certain limitations and majority of the study are based on old database prior to 2010. For instance, the studies conducted by Goli *et al.* (Goli *et al.*, 2018) and Skordis-Worrall *et al.* (Skordis-Worrall *et al.*, 2011) cannot be generalized to the national level as their analysis was based on local level evidence with small sample size. The study based on earlier round of NSS (Bonu *et al.,* 2009) were more likely to be under reporting of the expenditures as the information for maternal expenditure were collected at an aggregate level. The study of Mohanty and Srivastava (Mohanty and Srivastava, 2012) using District Level Household Survey (DLHS) have also the same limitations of under reporting of the expenditures. Moreover, the survey collected cost of delivery data for the last birth during five years prior to the survey. The information so collected was subject to potential recall bias due to the long reference period of the survey. Apart from the above limitations, all the earlier analysis on maternal health care expenditure was based on women giving births in public and private facilities. Till now, there is no study which primarily focused on the possibility of experiencing catastrophic expenditure in utilization of public facilities in maternal health care services. Further, isolated regional studies have been conducted in the past but there is no study which analyse the regional level variation using large scale nationally representative survey for the public facilities births only.

The primary objectives of the study are (i) to measure the levels of out-of-pocket expenditure (OOPE) on delivery care and (ii) to estimate the degree of catastrophic expenditure (CE) and to determine the factors responsible for it in using public health facilities across the various regions of India.

METHODOLOGY

Data:

The study uses data from 25th schedule of the 71st round of the National Sample Survey (NSS), conducted from January to June 2014 in India. The NSS followed multi-stage stratified design of sampling of census villages in the rural areas and urban frame survey blocks in the urban areas in the first stage, followed by second stage of sampling of households (NSSO, 2015). The nationally representative survey collected a total of 333104 persons from 65932 eligible households from India. Of the total households surveyed 36480 households were from 4577 rural villages and 29452 households were from 3720 urban blocks.

Data on delivery care expenditure were collected for women who give births in hospitals during the 365 days prior to the survey. Unlike the earlier rounds of NSS, the survey obtained information of expenditure on eight disaggregated sub-components; package component,

doctor's/surgeon's fee (hospital staff/other specialists), medicines, diagnostic tests, bed charges, other medical expenses (attendant charges, physiotherapy, personal medical appliances, blood, oxygen, etc.), transport for patient, and other non-medical expenses incurred by the household on food, transport for others, expenditure on escort, and lodging charges if any. Apart from the detailed information on socio-economic and demographic characteristics of the households, the survey also collected information on level of care, duration of stay, type of delivery (surgery/caesarean, normal) of the child births.

Data on household consumption expenditure was collected for 30 days prior to the survey through a set of five questions on consumption aggregates of the household. The five items used for calculating the household consumption expenditure were: (i) purchases; (ii) home-produced stock; (iii) receipts from exchange of goods and services; (iv) gifts and loans; and (v) free collection. This crude determination of household total expenditure from relatively few consumption aggregates rather than detailed listing of consumption items over a 30 days reference period remain a limitation for the current study (Bonu *et al.*, 2009).

In all, a total of 19445 women reported being pregnant in the last 365 days prior to the survey and 14587 women reported of having an institutional delivery during the reference period. Since the aim of paper is to examine the expenditure of delivery care in public facilities, the study is restricted to 8931 women who received delivery care as inpatient in public facilities.

Measures:

The expenditure incurred in child delivery as reported in the survey is termed as out-of-pocket expenditure (OOPE) in our study and is the main dependent variable in our analysis. The study also examine whether the household incurred any catastrophic expenditure (CE) of delivery care. The measurement of CE in our paper in based on earlier studies on catastrophic health expenditure (Berki, 1986; Kawabata, Xu, and Carrin, 2002; Murray, Knaul, Musgrove, Xu, and Kawabata, 2000; Pal, 2010; Wagstaff and van Doorslaer, 2003; Wyszewianski, 1986; Xu, 2005; Xu *et al.*, 2007, 2003). Generally there are two types of method for calculating catastrophic health expenditure – (i) share of health care expenditure in the total resources of the household (Berki, 1986; Wagstaff and van Doorslaer, 2003) and (ii) compare health care expenditure to 'capacity to pay' of the households

calculated as the total annual consumption expenditure net of subsistence expenditure on food and other basic needs (Kawabata *et al.*, 2002; Xu, 2005; Xu *et al.,* 2007, 2003). We used the first method of measuring CE as the second method required disaggregated data on food and non-food expenditure, which is absent in this survey. We calculate OOPE on delivery care as catastrophic if it exceeds 5 per cent and 10 per cent of the annual consumption expenditure of household. The use of different thresholds/cut-offs for CE provides the possibility of assessing the severity and intensity of the problem (Xu *et al.*, 2003).

The differential in OOPE on delivery care is analysed with a set of explanatory variables. The socio-economic, demographic, household and health explanatory variables in the study were considered based on extensive review of existing literature. The social variables in the analysis include level of education (no education, primary, secondary, higher secondary, graduation and above), religion (Hindu, Muslim, other), and social group (Schedule Caste/Schedule Tribe, Other Backward Classes, others). Households were classified into lowest, low, middle, high and highest based on the monthly consumption expenditure and used as an economic variable. Demographic variables and health characteristics include age (24 years and below, 25-29 years, 30 and above), place of residence (rural, urban), type of delivery (normal, caesarean), level of care (primary care, secondary/tertiary care), and duration of stay in the facility (1 day, 2 days, 3 days, 4 days and above). Type of households was divided into 5 category *i.e.* self employed in agriculture, self employed in non-agriculture, regular wage/salary, casual labour and others.

For the purpose of our study the country has divided into 6 regions as North, Central, East, Northeast, West, and South. Various statistical techniques are used to understand the differentials and covariates of OOPE for each and every region. Descriptive statistics are used to observe the nature of the variables. The unadjusted association of the various independent variables on the dependent variables is examined by bivariate analysis. Further, multivariate logistic regression models were used to assess the effect of dependent variables on the probability of CE with different thresholds. The variables are coded as '0' for those where OOPE is less than or equal to 5/10 per cent and '1' for those where OOPE is greater than 5/10 per cent. All the analyses were done for each region separately and at all India level.

RESULTS

Descriptive statistics:

Table 1 shows the mean expenditure in delivery care by its major components. The average OOPE by households on delivery care in public facilities in India is Rs. 3232. The highest and lowest OOPE is observed in Northeast (Rs. 5055) and Central (Rs. 1904) region of India, respectively. Average expenditure incurred on medicines for institutional delivery in India is Rs. 1547 with Northeast region (2074) spending twice as much compare to the least spending Central (Rs. 1031) region. In terms of spending on diagnostic tests, Northern region spending the highest on average with Rs. 1008 whereas the least expenditure on average is recorded in Western region (Rs. 490) against the national average of Rs. 770. Further, average expenditure on other non-medical expenses shows that South (Rs. 1240), Northeast (Rs. 1015) and Northern (Rs. 840) region of the country spend relatively higher than the national average (Rs. 825). Overall, households pays higher amount on average in North, East and Northeast region whereas Central, West, and Sothern region spend relatively small amount in institutional delivery in public facilities.

Table 2 shows the sample distribution by socio-economic, demographic and health variables. It is observed that majority of the women who received delivery care in public facilities lives in rural areas across all the regions. Considering age of the women, 44 per cent of the women are below 25 years while 34 per cent are in the age group 25-29, and 22 per cent are in the age group 30 years and above in India. Southern region (53%) has the highest proportion of women below 25 years of age, Northern (38%) and Northeastern (31%) regions have the highest proportion of women in the age group 25-29 and 30 and above years, respectively. By level of education, Central region has the highest proportion of illiterate women with 32 per cent whereas in the Northeastern region, only 5 per cent of the samples are illiterate. On the other hand, Northern region (10%) has the highest share of women having education upto graduate and above and western region has the lowest share with 4 per cent. Considering religion, majority of the women belongs to Hindu religion ranging from 54 per cent in Northeast to 87 per cent in the Central region. Among all the regions Northeastern region (31%) have a significant proportion of women belong to neither Hindu nor Muslim religion. By social group, it is observed that Northeast region have the highest (50%) and lowest (25%) proportion of SC/ST and OBC, respectively compare to other regions. Whereas the highest proportion of women belong to OBC is found in Western region with 55 per cent. In terms of health variables, significant variation is observed among the various regions. For instance, by duration of stay in facility, 33 per cent of the women in the Central region stay for 1 day compared to only 6 per cent in the Southern region. Correspondingly, 14 per cent of the new mother stays for 4 days and above in Central region while majority (56%) of the women stay for the same period in Southern region. Further, Northeast and Western region also observed that majority of the women stays for 4 days and above in the hospital with 41 per cent and 34 per cent, respectively. Though 19 per cent women received care from primary level facility and corresponding 81 per cent get child delivery care from secondary/tertiary level facility in the country, significant regional variations is observed. In the Northern region, only 9 per cent received treatment from primary facility compared to 28 per cent in Central region. South, Northeast and North shows a significantly higher proportion of women received maternity care from secondary/tertiary facility. In terms of the type of delivery, at the national level 23 per cent of the women delivered their baby with surgical procedure. However, in the Central region a significantly less proportion (11%) of the women received caesarean delivery.

Table 1 : Mean expenditure of delivery care in public facilities by different components against regions of India, 2014 (Rs.)							
Expenditures	North	Central	East	Northeast	West	South	Total
Medicines	1741	1031	1486	2074	1300	1317	1547
Diagnostic	1008	560	658	907	490	858	770
Medical	2675	1510	2608	3804	2091	1901	2529
Transport	583	327	498	626	359	476	491
Other Non-medical	840	538	623	1015	611	1240	825
Total OOPE	3213	1904	3496	5055	2534	2829	3232

Source: NSS 71st Round, 2014

Table 2 : Distribution of sample women who received delivery care in public facilities by background variables against regions of India, 2014							
		Sample N(proportion)					
Variable	Category	North	Central	East	Northeast	West	South	Total
Place of residence	Rural	846 (58)	1113 (68)	1296 (67)	1080 (68)	475 (60)	912 (59)	5722 (64)
	Urban	608 (42)	534 (32)	627 (33)	499 (32)	311 (40)	630 (41)	3209 (36)
Age of women	24 and below	568 (39)	709 (43)	973 (51)	518 (33)	387 (49)	813 (53)	3968 (44)
	25 to 29	555 (38)	558 (34)	582 (30)	563 (36)	260 (33)	519 (34)	3037 (34)
	30 and above	331 (23)	380 (23)	368 (19)	498 (31)	139 (18)	210 (13)	1926 (22)
Educational level	No Education	361 (25)	525 (32)	458 (24)	82 (5)	113 (14)	162 (11)	1701 (19)
	Primary	317 (22)	392 (24)	584 (30)	499 (32)	213 (27)	329 (21)	2334 (26)
	Secondary	242 (16)	354 (22)	433 (23)	469 (30)	202 (26)	311 (20)	2011 (23)
	Higher Secondary	389 (27)	269 (16)	371 (19)	452 (28)	229 (29)	600 (39)	2310 (26)
	Graduate and above	144 (10)	107 (6)	71 (4)	77 (5)	29 (4)	139 (9)	567 (6)
Religion of the household	Hindu	1005 (69)	1437 (87)	1583 (82)	859 (54)	660 (84)	1274 (83)	6818 (76)
	Muslim	299 (21)	203 (12)	294 (15)	233 (15)	75 (10)	191 (12)	1295 (15)
	Others	150 (10)	7 (1)	46 (3)	487 (31)	51 (6)	77 (5)	818 (9)
Social groups	SC/ST	481 (33)	571 (35)	733 (38)	781 (50)	305 (39)	499 (32)	3370 (38)
	OBC	415 (29)	810 (49)	653 (34)	392 (25)	274 (35)	843 (55)	3387 (38)
	Others	558 (38)	266 (16)	537 (28)	406 (25)	207 (26)	200 (13)	2174 (24)
Monthly consumption expenditure	Lowest	154 (10)	520 (32)	596 (31)	195 (12)	131 (17)	145 (10)	1741 (19)
	Low	214 (15)	403 (25)	489 (25)	252 (16)	129 (16)	294 (19)	1781 (20)
	Middle	237 (16)	287 (17)	323 (17)	349 (22)	147 (19)	345 (22)	1688 (19)
	High	388 (27)	279 (17)	333 (17)	450 (29)	207 (26)	372 (24)	2029 (23)
	Highest	461 (32)	158 (9)	182 (10)	333 (21)	172 (22)	386 (25)	1692 (19)
Duration of stay in hospital	1 day	230 (16)	535 (33)	478 (25)	134 (8)	115 (15)	91 (6)	1583 (18)
	2days	432 (30)	401 (24)	574 (30)	421 (27)	181 (23)	166 (11)	2175 (24)
	3 days	429 (29)	474 (29)	340 (18)	380 (24)	220 (28)	425 (27)	2268 (25)
	4 days and above	363 (25)	237 (14)	531 (27)	644 (41)	270 (34)	860 (56)	2905 (33)
Level of care	PHC/HSC/Dispensary	127 (9)	455 (28)	378 (20)	366 (23)	203 (26)	184 (12)	1713 (19)
	Hospital	1327 (91)	1192 (72)	1545 (80)	1213 (77)	583 (74)	1358 (88)	7218 (81)
Type of delivery	Normal	1063 (73)	1460 (89)	1455 (76)	1170 (74)	631 (80)	1075 (70)	6854 (77)
	Caesarean	391 (27)	187 (11)	468 (24)	409 (26)	155 (20)	467 (30)	2077 (23)
Type of household	Self employed in agriculture	314 (22)	549 (33)	461 (24)	476 (30)	166 (21)	266 (17)	2232 (25)
	Self employed in non-agriculture	358 (25)	349 (21)	512 (27)	449 (28)	167 (21)	293 (19)	2128 (24)
	Regular wage/salary earning	405 (28)	236 (15)	270 (14)	360 (23)	205 (26)	362 (24)	1838 (20)
	Casual labour	326 (22)	462 (28)	604 (31)	247 (16)	240 (31)	588 (38)	2467 (28)
	Others	51 (3)	51 (3)	76 (4)	47 (3)	8 (1)	33 (2)	266 (3)
Total		1454	1647	1923	1579	786	1542	8931

Source: NSS 71st Round, 2014

Out-of-pocket expenditure:

Table 3 represent the average OOPE incurred in child birth in public facilities by background variables. Our estimate of mean OOPE of Rs. 3232 in using public maternal health care facility is quite similar to the National Family Health Survey (NFHS-4) estimates of Rs. 3198 in 2015-16 (IIPS and ICF, 2017). It is observed that urban women spend higher average OOPE than their counterpart rural women across the regions and at national level. At the national level mean OOPE increases with increased in age of the women. Average spending is Rs 2999 among women in the age group below 25 years, Rs. 3347 among women in age group 25-29, and Rs. 3532 in the age group 30 and above. However the same is not true in Central, East, West and Southern region of the country. In the Eastern region the OOPE is found to be highest among the women in the age group below 25 years (Rs. 3559) while in the Central (Rs. 2126), West (Rs. 2629) and South (Rs. 3034) region mean OOPE is highest in the age group 25-29 years. Similarly, it shows

that higher the educational level of the women higher is mean OOPE in the country and across the regions. However, it is observed that illiterate women spend higher mean OOPE among Central (Rs. 1533), Northeast (Rs. 4323), and West (2139) compare to women with primary level education. Considering religion of the women, overall Muslim women incurred higher mean OOPE (Rs. 3399) than Hindu women (Rs. 3139) in delivery care. However, among East, Northeast, West and Southern region Hindu women spend more OOPE than Muslim women. For instance, among Western region mean OOPE by Hindu women in giving births is Rs. 2620 while mean OOPE for Muslim women is Rs. 1848. In terms of social group, the national mean OOPE incurred by OBC households (Rs. 3061) is higher than the mean OOPE incurred by SC/ST households (Rs. 2947). The same pattern is seen in all the regions except the Northern region as OBC households spends on an average Rs. 2143 compared to Rs. 3105 by SC/ST households. Considering the economic status, the mean OOPE on child birth increases as

Table 3 : Mean OOPE of delivery care in public facilities by background variables against regions of India (Rs.), 2014

Variable	Category	North	Central	East	Northeast	West	South	Total
Place of residence	Rural	2985	1706	3368	4720	2175	2770	3049
	Urban	3530	2316	3760	5780	3082	2914	3558
Age of women	24 and below	2767	1704	3559	4720	2499	2760	2999
	25 to 29	3409	2126	3367	5095	2629	3034	3347
	30 and above	3650	1950	3533	5358	2452	2590	3532
Educational level	No Education	2411	1533	2509	4323	2139	2285	2229
	Primary	2615	1503	3086	3960	2050	2739	2799
	Secondary	3179	1839	3693	4884	2469	2800	3321
	Higher Secondary	3711	2263	4570	6015	3210	2968	3889
	Graduate and above	5262	4502	6087	8337	2736	3094	4979
Religion of the household	Hindu	2791	1856	3550	5731	2620	2874	3139
	Muslim	4112	2180	3245	4922	1848	2564	3399
	Others	4254	3743	3248	3926	2426	2746	3742
Social groups	SC/ST	3105	1453	3166	4141	2256	2735	2947
	OBC	2143	1801	3516	6534	2597	2906	3061
	Others	4102	3184	3922	5385	2860	2739	3941
Monthly Per consumption expenditure	Lowest	2482	1454	2792	4598	2058	2706	2505
	Low	2424	1473	3143	4785	2079	2518	2731
	Middle	3137	1566	3564	4849	2424	2713	3157
	High	3331	2437	4115	5110	2487	2901	3566
	Highest	3764	4154	5499	5669	3386	3147	4183
Duration of stay in hospital	1 day	1403	1222	1810	2461	939	1541	1528
	2days	2429	1458	2444	3483	1569	2060	2358
	3 days	2371	1584	3041	4620	2137	2069	2604
	4 days and above	6289	4836	6443	6879	4183	3489	5305
Level of care	PHC/HSC/Dispensary	2129	1551	2977	3561	1694	2154	2420
	Hospital	3317	2039	3623	5506	2826	2921	3425
Type of delivery	Normal	2494	1559	2631	4285	1783	2405	2550
	Caesarean	5169	4595	6186	7257	5591	3806	5483
Type of household	Self employed in agriculture	2673	1780	3286	4599	2145	2892	2977
	Self employed in non-agriculture	3353	2357	3577	5390	2928	3013	3593
	Regular wage/salary earning	3735	2386	4246	5857	2864	2745	3760
	Casual labour	2745	1410	3166	3817	2173	2687	2636
	Others	4403	2380	4186	6832	4733	4145	4360
	Total	3213	1904	3496	5055	2534	2829	3232

Source: NSS 71st Round, 2014

economic status of the households increases in India. The same pattern follows in all the regions as well with the exception in North and South where lowest income households spends marginally higher than the low income households. Among Central region, the highest income households spend nearly three times (Rs. 4154) on average compare to the lowest income households (Rs. 1454). In terms of health characteristics, as expected,

women who stays longer period in the hospitals, having received maternity service from secondary/tertiary and surgical procedure spends higher mean OOPE in all the regions. For instances, among Western region mean OOPE for those who stay for 4 days and above, having secondary/tertiary care and received surgery are Rs. 4183, Rs. 2826 and Rs. 5591 compared to Rs. 939 for those staying for only 1 day, Rs. 1694 for those having

Table 4 : Proportion of households experiencing CE in using delivery care in public facilities by background variables against regions of India (5% and 10% cut –offs), 2014															
Variable	Category	North		Central		East		Northeast		West		South		Total	
		5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%
Place of	Rural	24	7	12	4	39	14	50	23	17	6	20	5	28	11
residence	Urban	16	5	11	3	30	11	45	20	18	6	19	6	23	9
Age of	24 and below	17	5	10	3	38	14	45	19	17	6	18	5	25	9
women	25 to 29	20	6	13	4	34	13	50	23	17	5	22	6	27	10
	30 and above	26	8	13	5	35	10	49	23	17	7	19	7	30	11
Educational	No Education	20	7	11	4	31	12	54	29	11	5	19	5	21	8
level	Primary	23	5	10	2	34	11	46	19	15	6	21	7	28	9
	Secondary	18	7	13	5	40	14	48	23	18	5	19	4	29	11
	Higher Secondary	20	5	13	4	39	14	50	23	21	7	20	6	28	10
	Graduate and above	22	8	13	6	39	21	48	18	17	3	15	5	24	10
Religion of	Hindu	15	3	12	3	37	13	56	25	18	6	20	6	26	9
the	Muslim	39	17	13	5	32	13	55	21	9	1	14	4	31	12
household	Others	23	6	-	-	30	11	31	16	22	6	17	3	27	12
Social	SC/ST	19	5	10	2	37	14	36	16	18	6	22	6	26	9
groups	OBC	11	3	12	4	34	12	64	30	16	7	19	5	24	9
	Others	29	9	15	6	36	13	55	24	17	5	15	5	31	12
Monthly	Lowest	39	13	15	5	44	17	65	38	27	10	37	15	35	15
consumption	Low	27	11	10	3	34	11	64	32	20	5	23	8	29	11
expenditure	Middle	17	6	8	2	33	11	50	20	17	7	20	5	26	9
	High	22	6	11	4	35	12	43	18	13	4	16	4	25	9
	Highest	12	2	13	4	25	10	30	11	13	5	13	2	17	5
Duration of	1 day	4	-	4	1	19	5	22	8	2	1	9	2	10	3
stay in	2days	15	4	9	1	28	8	42	14	9	2	8	1	22	6
hospital	3 days	15	4	12	3	37	9	44	19	17	4	13	2	22	7
	4 days and above	43	16	33	16	59	28	60	31	29	12	26	9	43	19
Level of	PHC/HSC/Dispensary	9	2	8	2	40	13	35	11	8	4	14	3	21	7
care	Hospital	22	7	13	4	35	13	52	25	20	6	20	6	28	10
Type of	Normal	15	4	9	2	31	9	42	17	12	2	16	4	22	7
delivery	Caesarean	35	13	31	14	53	25	66	35	38	20	27	10	43	20
Type of household	Self employed in agriculture	17	4	10	3	35	12	49	21	14	4	21	6	26	9
	Self employed in non-agriculture	18	6	11	4	32	11	52	26	14	5	18	6	27	11
	Regular wage/salary earning	18	5	14	4	33	11	43	19	18	5	15	4	24	8
	Casual labour	27	9	12	4	40	15	47	21	20	7	21	6	27	10
	Others	35	12	16	4	46	22	47	26	25	25	30	6	36	15
Total		20	6	12	4	36	13	48	22	17	6	19	6	27	10

Source: NSS 71st Round, 2014

secondary/tertiary care and Rs. 1783 for those who delivers with normal procedure, respectively. By type of households, except Southern region, mean OOPE are higher for those households who have regular wage/ salary earning and lowest for self employed in agriculture households.

Catastrophic expenditure:

The results of catastrophic expenditure by 5 per cent and 10 per cent threshold cut-offs are given in Table 4. The table shows that overall 27 per cent and 10 per cent of the women who give births in public facility are facing catastrophic expenditure by 5 per cent and 10 per cent threshold levels, respectively. A significant variation in catastrophic expenditure across the regions is also observed from the tables. Northeast region of India found to be experiencing highest CE among the regions. For instance, by 5 per cent cut-offs the highest proportion of households experiencing CE is found in Northeast region with 48 per cent whereas it is found to be 36 per cent in East, 20 per cent in North, 19 per cent in South, 17 per cent in West, and 12 per cent in Central region. By 10 per cent cut-offs, it is found that the proportion of CE

experience by the households in delivery care ranges from as high as 22 per cent in Northeast region and as low as 4 per cent in Central region.

Determinants of Catastrophic Expenditure:

The odds ratio from logistic regression of likelihood of the households experiencing CE by 5 per cent and 10 per cent cut-offs is shown in Table 5. All the variables included in the model *viz.* place of residence, age of women, level of education, religion, social group, economic status, duration of stay, level of care, type of delivery, and household type are statistically significant predictors of the response variable CE in India in both the cut-offs level. However, it shows a varying effect of covariates across the various regions of India. For instance, place of residence is one of statistically significant variable in North, Central, and East region whereas the same is insignificant in Northeast, West and Southern region of India. However, variable such as economic status, duration of stay in the facility, level of care, and type of delivery are common statistically significant predictors across the regions of India.

By 5 per cent cut-offs, odds ratio for the country

Table 5 : Odds ratio from logistic regression of the likelihood of the households experiencing catastrophic expenditure (CE) in using delivery care in public facilities in India and its regions, 2014								
Variable	Category	North		Central		East		Northeast	
		5% cut off	10% cut off	5% cut off	10% cut off	5% cut off	10% cut off	5% cut off	10% cut off
Place of residence	Rural®								
	Urban	0.422***	0.64	0.515**	0.334**	0.646**	0.722	0.91	0.853
Age of women	24 and below®								
	25 to 29	0.906	0.765	1.273	1.551	0.883	0.981	1.292	1.394*
	30 and above	0.949	0.72	1.32	1.844	0.971	0.667	1.222	1.258
Educational level	No education®								
	Primary	1.384	0.714	0.754	0.413	1.038	0.815	1.163	0.854
	Secondary	0.941	1.181	0.9	0.791	1.494*	1.208	1.403	1.098
	Higher Secondary	1.526	1.18	1.022	0.671	1.575*	1.187	1.58	1.142
	Graduate and above	1.916*	2.251	0.654	0.568	1.66	1.951	1.257	0.66
Religion of the households	Hindu®								
	Muslim	2.939***	4.508***	0.964	1.135	0.65**	0.953	0.98	0.784
	Others	1.593	1.836	-	-	1.071	1.233	0.692*	1.28
Social groups	SC/ST®								
	OBC	0.475**	0.491	1.432	2.254*	1.263	1.075	2.355***	2.277***
	Others	1.477*	1.012	1.640*	2.919*	1.105	0.886	1.617*	1.847**
Monthly consumption expenditure	Poorest®								
	Poorer	0.493**	0.656	0.573*	0.67	0.539***	0.491***	0.83	0.565*
	Middle	0.287***	0.421*	0.385**	0.336*	0.436***	0.383***	0.396***	0.25***
	Richer	0.368***	0.299**	0.655	0.945	0.437***	0.404***	0.272***	0.201***
	Richest	0.120***	0.086***	0.613	0.514	0.188***	0.241***	0.151***	0.098***

Table5 contd...

Table 5 contd…

Variable	Category	West		South		India	
		5% cut off	10% cut off	5% cut off	10% cut off	5% cut off	10% cut off
Place of residence	Rural®						
	Urban	1.218	1.235	1.121	1.239	0.675***	0.693***
Age of women	24 and below®						
	25 to 29	0.824	0.577	1.231	1.242	1.132*	1.18
	30 and above	0.894	0.858	0.954	1.256	1.315***	1.321**
Educational level	No education®						
	Primary	1.582	1.196	1.2	1.547	1.335***	1.079
	Secondary	1.766	0.805	1.024	0.957	1.460***	1.313*
	Higher Secondary	2.308*	1.38	1.164	1.524	1.522***	1.267
	Graduate and above	1.687	0.418	0.907	1.717	1.295	1.261
Religion of the households	Hindu®						
	Muslim	0.443	0.184	0.594*	0.597	1.043	1.094
	Others	1.082	1.087	0.78	0.356	1.241*	1.661***
Social groups	SC/ST®						
	OBC	0.857	1.769	0.838	0.996	0.981	1.098
	Others	1.153	1.131	0.819	1.413	1.412***	1.394**
Monthly consumption expenditure	Poorest®						
	Poorer	0.497*	0.35	0.544**	0.537	0.606***	0.587***
	Middle	0.429*	0.468	0.437***	0.265***	0.439***	0.381***
	Richer	0.286***	0.27*	0.324***	0.221***	0.398***	0.342***
	Richest	0.189***	0.266*	0.226***	0.098***	0.193***	0.144***

Table 5 contd…

Variable	Category	North		Central		East		Northeast	
		5% cut off	10% cut off	5% cut off	10% cut off	5% cut off	10% cut off	5% cut off	10% cut off
Duration of stay in hospital	1 day®								
	2 days#	4.442***		2.538**	2.007	1.624**	1.539	2.038**	1.229
	3 days	4.290***	1.03	3.247***	6.261***	2.912***	2.106*	2.711***	2.296*
	4 days and above	15.285***	3.857***	10.603***	39.667***	7.675***	8.276***	4.853***	4.226***
Level of care	Primary®								
	Secondary/tertiary	1.67	1.777	1.118	0.734	0.715*	0.714	2.015***	2.733***
Type of delivery	Normal®								
	C-Section	1.874***	1.798*	2.09**	2.351**	1.685***	1.999***	2.216***	2.314***
Type of household	Self employed in agriculture®								
	Self employed in non-agriculture	1.375	1.492	1.374	2.249	1.215	1.078	1.142	1.453*
	Regular wage/salary	1.488	1.578	1.805*	2.401	1.29	1.256	0.941	1.14
	Casual labour	1.775*	1.613	1.264	1.755	1.682***	1.807**	0.859	1.074
	Others	2.321*	2.18	1.641	0.97	2.552**	3.318**	0.743	1.328
	Constant	0.040***	0.032***	0.036***	0.003***	0.298***	0.078***	0.211***	0.062***
Number of observation		1453	1223	1640	1640	1917	1917	1579	1579
LR chi2(24)		369.20	152.42	166.64	134.71	349.09	227.22	366.87	271.76
Prob > chi2		0	0	0	0	0	0	0	0
Pseudo R2		0.251	0.237	0.141	0.265	0.140	0.154	0.168	0.164
Log likelihood		-551.27	-245.23	-508.81	-186.74	-1076.83	-622.88	-909.79	-693.09

Table 5 contd…

Table 5 contd...

Variable	Category	West		South		India	
		5% cut off	10% cut off	5% cut off	10% cut off	5% cut off	10% cut off
Duration of stay in hospital	1 day®						
	2 days#	5.33*	1.864	1.025	0.297	2.372***	2.277***
	3 days	10.318**	3.294	1.768	1.116	2.649***	2.820***
	4 days and above	15.742***	5.932	3.903**	3.853	6.317***	8.048***
Level of care	Primary®						
	Secondary/tertiary	2.335**	0.901	1.466	1.995	1.219**	1.243*
Type of delivery	Normal®						
	C-Section	3.192***	9.017***	1.368*	1.759*	1.875***	2.146***
Type of household	Self employed in agriculture®						
	Self employed in non-agriculture	0.883	1.338	0.894	1.074	1.290**	1.456**
	Regular wage/salary	1.16	1.209	0.792	0.696	1.154	1.189
	Casual labour	1.64	1.932	0.926	0.926	1.123	1.12
	Others	3.088	19.281**	1.997	1.145	1.958***	2.129***
	Constant	0.010***	0.010***	0.146***	0.021***	0.102***	0.024***
Number of observation		786	786	1541	1541	8923	8923
LR chi2(24)		133.24	86.43	130.43	90.65	1237.28	785.62
Prob > chi2		0	0	0	0	0	0
Pseudo R2		0.185	0.247	0.086	0.138	0.120	0.138
Log likelihood		-293.89	-131.97	-692.98	-283.57	-4545.33	-2463.05

® Reference category; SC/ST=Schedule caste/Schedule Tribe; OBC=Other Backward Classes
*** p<0.001, ** p<0.01, * p<0.05,
# Reference category of duration of stay for North (10 % cut off)
Source: NSS 71st Round, 2014

shows that probability of experiencing CE on child birth is significantly higher for women delivered in district level hospitals (β = 1.22, p < 0.001) compared to PHC/HSC/Dispensary (β = 1). Further, the likelihood of incidence of CE increases for those hospitalised for 4 or more days (β = 6.32, p < 0.001) and who received caesarean delivery (β = 1.88, p < 0.001) compared to those stay for 1 day (β = 1) and received normal delivery (β = 1).

Moreover, higher the income level of the households lower is the likelihood of experiencing CE. For instance, compare to the lowest income level, the likelihood of incidence of CE for the highest income level is decline by 80 per cent. Though age of the women is a significant predictors at the national level, the variable is only significant in the Northeast region of India in 10 per cent cut-offs. Similarly, the odds ratio reveals a higher probability of CE with increase in the educational level of women, but the variable has no significant effect in Central, Northeast, and Southern region of the country. Considering religion, compare to Hindu women the likelihood of facing CE by Muslim women increase by

2.94 times in the Northern region. While social group significantly determine the CE in Northeast region as OBC households are 2.36 times more likely to face CE compare to women belong to SC/ST households.

Discussion:

The central theme of the paper is to find out whether delivery care expenditure in utilisation of maternal health care services causes catastrophic expenditure. Despite significant progress in improving maternal health and the continuous efforts by the central government, India failed to reach the target of reducing MMR upto three quarters by the end of 2015 under the Millennium Development Goals (MDGs-5) (MOSPI, 2015; Office of Registrar General of India, 2018). Moreover, significant proportion of child births took place in India without any medical assistance. According to the reports of National Family Health Survey (NFHS-4), 79 per cent of the women give births in a maternal health care facility while the remaining proportion were delivered with or without any medical assistance (IIPS and ICF, 2017). The report

suggests that among others, high cost of delivery in facilities is the main reason for not using the services. Similarly, findings from earlier studies have put forward that lack of access to better quality maternal health care services at affordable cost along with various socio-economic and demographic factors plays a major constraint in accessing the services (Bhatia and Cleland, 1995; Bonu *et al.*, 2009; Coffey, 2014; Goli *et al.*, 2016, 2018; Griffiths and Stephenson, 2001; Mohanty and Srivastava, 2012; UNICEF WHO World Bank United Nations, 2015).

Maternal health care parameters in the country also show a significant variation across the states. For instance, proportion of institutional delivery varies from 100 per cent in Kerala, 99 per cent in Tamil Nadu and 94 per cent in Karnataka to 33 per cent in Nagaland, 51 per cent in Meghalaya, and 52 per cent in Arunachal Pradesh (IIPS and ICF, 2017). In terms of MMR, state like Kerala and Tamil Nadu have low ratio with 46 and 66 maternal deaths per 100,000 live births, respectively whereas the ratio is highest in Assam and Uttar Pradesh with 237 and 201 maternal deaths per 100,000 live births, respectively (Office of Registrar General of India, 2018). In this context, this paper studies the OOPE differentials in delivery care in public facilities in India and its various regions and also explore the socio-economic, demographic and health characteristic influencing the OOPE and CE of the households.

Using data from NSS 71st round the study analyse the OOPE in delivery care in public health facilities in India and across the regions. The estimated mean OOPE in delivery care in the country is Rs. 3232 which is significantly higher than the estimated mean expenditure of Rs. 2566/$41.76 in a recent study conducted in Uttar Pradesh (UP) (Goli *et al.*, 2018). However, comparing to the Central region in our study (which include UP, Madhya Pradesh and Chhattisgarh), mean OOPE (Rs.1904) is slightly lower than their study. The lower expenditure in our study can be of two reasons (i) the sample for the earlier study were drawn from one of the largest public hospital in UP where chances of admitting women with critical condition were high compare to our study where sample were drawn from both primary, secondary and tertiary level care; (ii) the proportion of women received caesarean section (59%) was significantly higher in their study compare to our study (23%).

The result of the study is in line with previous study where it is found that economically better off and educated women spend higher than their counterparts (Goli *et al.*, 2016, 2018). Moreover, the study also shows that women undergoing caesarean section and having delivered in sub-centres and PHC (Mohanty and Srivastava, 2012) spend much more that those delivered with normal procedure and at secondary/tertiary hospitals. Considering CE in delivery care, the study found that significant proportion (27%) of the women experience CE due to OOPE which is tune to earlier study which states that high OOPE can induce households to incur catastrophic expenditure and can result in impoverishment especially the socio-economically vulnerable households.

Regionally, significant variation in the mean OOPE is observed in our study. Relatively developed region like West (Rs. 2534) and South (Rs. 2829) spend less than the national average. However, less developed region like Central (Rs. 1904) spend the lowest mean OPPE while Northeast region spend the highest mean OOPE (Rs. 5055). The reasons for significantly low mean OOPE in Central and high OOPE in Northeast may be due to the following factors (i) proportion of illiterate women is highest in the Central region (32%) and lowest in the Northeast region (5 %) as study shows that higher the educational level higher the health care expenditure, (ii) in the Central region, proportion of women staying for longer duration in the facility is lowest (14%) while that of Northeast is relatively high (41%), (iii) relatively high percentage of women were hospitalised in the primary level care in Central region compared to Northeast region, and (iv) high mean OOPE in Northeast region is attributed to the relatively large proportion of women giving births by means of caesarean section (26%) compared to Central region (11%). Interestingly, it is observed from the estimate of NFHS-4 data (IIPS and ICF, 2017) that proportion of institutional delivery were one of the lowest in the regions where mean OOPE is highest in our study. This evidence strengthens the arguments earlier arguments of high cost in delivery care is a major barrier in maternal health care service utilisation (Bonu *et al.*, 2009; Goli *et al.*, 2016, 2018; Mohanty and Srivastava, 2012; Prinja *et al.,* 2015; Skordis-Worrall *et al.*, 2011). However, lower mean OOPE in West and South region may be of different factors; (i) the region is economically better and public health expenditure is significantly higher than the other regions, (ii) availability of effective maternity benefit schemes, and (iii) better accessibility to quality

primary level care which result in reducing direct cost and indirect cost of delivery care.

Several studies highlight the effect of safe motherhood intervention program under NHM such as JSY/JSSY in increasing institutional deliveries in India, reducing the burden of OOPE in maternal care and greater financial risk protection (Lim *et al.*, 2010; Prinja *et al.*, 2015; Tripathi, Saini, and Prinja, 2014). Mohanty and Srivastava (Mohanty and Srivastava, 2012) attributes decline in average OOPE in public health centres for maternal care over time in their study to the increasing spending under NHM. However, it is also found that the vulnerable sections of the society were deprived of the benefits and getting less than the prescribed JSY cash entitlements (Goli *et al.*, 2018). It is evident from our study that case benefit entitlements of JSY is inadequate to give any significant impact on reducing the economic burden of delivery care on the households as the mean OOPE estimates is significantly high even if the families gets the full entitlement.

Conclusion:

On paper, reproductive and child health (RCH) services in the country are supposed to be free as per safe motherhood programme of the government. However, our study highlight that households had to incur OOPE for delivery care in various services such as diagnostic tests, medicines, transports etc. The main finding of the study is that OOPE in delivery care, even in public health facilities, cause severe economic hardship to the households and can be a serious barrier in utilising maternal health care services in India. This high OOPE also result in financial catastrophe and push households into impoverishment and trap in a vicious cycle of poverty and ill-health. Policy makers and planner needs to be closely monitored at the significant variation in mean spending across the regions of India. Special focus should be given to the socio-economically backward regions with high mean expenditure on delivery care as incidentally, it is these regions where institutional delivery is one of the lowest in India (IIPS and ICF, 2017). Findings from the study also suggest to reiterate the need for scope of development in anti-natal care to avoid unnecessary complications at delivery as significantly higher proportion of women were having caesarean section compared to the WHO's recommended level of 10-15 per cent (WHO, 2015). Further, the meagre entitle cash benefit amount under JSY for institutional delivery is not sufficient to

protect the households from financial risk even for child delivery in public health care facilities as evident from our study. Moreover, the cost of caesarean delivery is significantly higher than the normal delivery. So it is of the suggestion that not only increase in the overall maternity cash benefit, incentive for those delivered with caesarean section should be increase. Finally, this study reemphasizes the need for strengthening and expanding the depth, breath and length of maternity benefits scheme such as JSY and JSSK.

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