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RESEARCH ARTICLE

Costs incurred and determinants of out-of-pocket payments for child delivery care in India: Evidence from a nationally representative household survey

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Summary

In India, out-of-pocket (OOP) expenditure on health care services has been showing an increasing trend. The cost and willingness to pay determines the use of facility-based maternal health services. Hence, the current study was done to find the costs and determinants of OOP payments on childbirth care in India. We analyzed the most recent National Family Health Survey-4 data (NFHS-4) gathered from the Demographic Health Survey (DHS) program. Stratification and clustering in the sample design were accounted for by using the "*svyset*" command. Out of 43 507 women, 26 916 (61.9%) had incurred OOP expenditure during their most recent institutional delivery. The average OOP expenditure for delivery care was INR 5985 ($93.3) with median cost being INR 1000 ($15.6). About 80% of women who had OOP expenditure reported that they handled the financial situation by utilizing the money in their bank/savings account. Determinants of OOP expenses were the age of mother, education, religion, state of residence, number of antenatal visits place of delivery, and mode of delivery ($P < .05$). Out-of-pocket expenditure for accessing care is one of the key determinants of service utilization which, if not

addressed by the health system, can deter women from having institutional deliveries in the future.

KEYWORDS
costs and cost analysis, delivery, health expenditures, India

1 | INTRODUCTION

The untimely death of a woman from any cause related to or aggravated by pregnancy or its management is objectionable. Every day, around 830 maternal deaths are reported globally, of which 99% can be attributed to developing countries like India.[1,2] The dearth of reproductive and child health care services along with poor accessibility and ineffective utilization in the Low and Middle Income Countries have led to such a disparity across nations.[3]

Millennium Development Goal (MDG) 5 aimed at reducing the maternal mortality ratio by three quarters in 15 years. However, India was able to reduce it by only 70%—from 374 in 1990 to 167 in 2015. India needs to decline it further by 58% with an annual rate of 3.2% by the year 2030 to achieve sustainable development goal (SDG) 3.[4,5] The primary indicator to assess the level of achievement of these goals is the availability of a skilled birth attendant at the time of delivery.[6] It is essential that a pregnant woman delivers in a hygienic environment with access to life-saving equipments in order to prevent complications and death.

Government of India launched the National Rural Health Mission with the motive to improve the health system performance in rural areas.[7] Under its purview, the Reproductive Maternal Neonatal Child Health + Adolescent (RMNCH+A) program aims at improving the health of various population groups with the principal focus on maternal health.[8] The program focuses on delivering essential and emergency obstetric services so as to prevent pregnancy-related complications. The utilization of these services in rural areas is particularly affected by high costs.[9] The cost for maternal and child health services occurs in three ways: cost to the providers, program, and household. The household cost is subdivided into the direct and indirect cost. The government subsidies are excluded while calculating the OOP expenditure incurred.[10]

In India, the out-of-pocket (OOP) expenditure incurred while utilizing health care services has been showing an increasing trend.[11] The cost and willingness to pay determines the use of facility-based maternal health services. Though various schemes like Janani Suraksha Yojana (JSY), Janani Shishu Surakshya Karyakram (JSSK), and Pradhan Mantri Matritva Vandana Yojana (PMMVY) have been implemented throughout India, there exist state-wise differences in their implementation, and only certain subsets of the population tend to utilize them adequately.[12-14] Only 36.4% of mothers utilized the JSY scheme.[15] Although several small scale studies have been conducted to determine OOP expenditure on health, little information is available on the cost incurred for maternal health services and its determinants at the national level.[16-21] Hence, this study aims at finding the costs incurred for child delivery care and determinants of OOP payments made toward the same in India.

2 | METHODS

2.1 | Study setting

India is the second most populous country in the world with about 1210 million people officially residing in it.[22] This South Asian country is divided into 30 states and six union territories (UT). Each state and UT is further divided into districts. Districts are subdivided into census enumeration blocks and wards in urban areas and villages/taluks in rural areas. In India, currently 78.9% of women undergo institutional births (a sharp increase from 38.7% in NFHS-3 2005).[15,23] Among them, about 52.1% of mothers deliver in public hospitals while 26.3% of women deliver in private

facilities.[15] However, the cesarean section rate is higher among private hospitals (40.9% of total births in private facilities) when compared with public hospitals (11.9% of total births in public facilities). This can increase the cost during child delivery care in India.[15]

2.2 | Study design and study population

We conducted a cross-sectional analytical study by doing secondary data analysis on the most recent National Family Health Survey-4 data (NFHS-4) 2015-16 gathered from Demographic Health Survey (DHS) program. Initially, a proposal was submitted to DHS to conduct a study on costs and determinants of OOP payments for delivery care services among women aged 15 to 49 years, after which authorization to use data was obtained. NFHS captures data on the health and welfare of the Indian population through a nationally representative sample. Women aged 15 to 49 years who had a live birth in a health facility in the five years preceding the survey were taken as the study population for the current study.

2.3 | Sample size and sampling technique

The NFHS-4 methodology with respect to selection of households, data collection procedure, and data validation have been comprehensively described and published as a separate study elsewhere.[15] Women of reproductive age group between 15 and 49 years and men in the age group 15 and 54 years were eligible to participate in the survey in all the selected households.

2.4 | Statistical analysis

The analysis was done using STATA 14.2 (StataCorp, College Station, TX, USA). Sampling weights were included in the analysis to account for the differential probabilities of participation and selection. Stratification and clustering in the sample design were also accounted for, after which "*svyset*" command was used to declare the NFHS-4 datasets as survey type with two-stage cluster sampling: the selection of villages and census enumeration areas based on a probability proportionate to area size, and random selection of households from the complete list of households within the selected villages and enumeration areas. Out-of-pocket payments were assessed in the survey based on response to the question "How much in total did it cost you out of your pocket for this delivery." Details regarding modes of meeting this expenditure were also asked during the survey. Out-of-pocket payments were interpreted as both mean and median. All the costs were converted into US dollars as per the conversion rates in 2015 since the survey was conducted during this period.[24] Since the cost data was positively skewed, we did a log transformation of OOP payments to exhibit linearity and normalize the data. Then, we performed Log-Linear regression to assess the determinants of OOP payments for delivery care services. Socio-demographic variables such as age, education, wealth index, marital status, type of residence, religion, state of residence, number of antenatal visits, place of delivery, and mode of delivery were considered as independent variables. Natural logarithm of OOP payment was considered as a dependent variable, and beta coefficient with 95% confidence interval (CI) was reported. Variables with a *P* value less than.05 were considered statistically significant and considered into the multivariate regression model in a stepwise manner. Models were applied after adjusting for sampling weights and design using the "*svy*" command in STATA.

3 | RESULTS

Among females, 723 875 women of reproductive age group were identified to be eligible for the survey, out of which 699 686 women completed the questionnaire with a response rate of 97%. In total, 43 507 women who had

TABLE 1 Socio-demographic characteristics of the reproductive age group females (15-49 years) covered in NFHS-4 in India, N = 43 507

Socio-Demographic Characteristics	Frequency, N (Unweighted Proportion %)	Weighted Proportion (95% CI)
Age category (in years)		
15-19	1285 (2.9)	3.1 (2.8-3.3)
20-24	13 788 (31.7)	32.6 (32.0-33.3)
25-29	16 392 (37.7)	38.4 (37.8-39.0)
30-34	8182 (18.8)	18.0 (17.4-18.5)
35-39	2991 (6.9)	6.2 (5.9-6.5)
40-44	692 (1.6)	1.4 (1.2-1.5)
45-49	177 (0.4)	0.3 (0.2-0.4)
Marital status		
Never married	39 (0.1)	0.1 (0.05-0.15)
Currently married	42 918 (98.6)	98.7 (98.5-98.8)
Widowed/Separated/Divorced	550 (1.3)	1.2 (1.1-1.4)
Religion		
Hindu	34 331 (78.9)	82.2 (81.5-83.0)
Muslim	5606 (12.9)	12.6 (11.9-13.3)
Christian	1653 (3.8)	1.8 (1.6-2.0)
Others*	1917 (4.4)	3.4 (3.1-3.7)
Education status		
No formal education	10 548 (24.2)	23.6 (23.0-24.2)
Primary	5995 (13.8)	13.3 (12.8-13.8)
Secondary	21 493 (49.4)	49.2 (48.4-50.0)
Higher	5471 (12.6)	13.9 (13.2-14.5)
Wealth index		
Poorest (I quintile)	7898 (18.1)	16.1 (15.5-16.7)
Poorer (II quintile)	8884 (20.5)	19.3 (18.8-19.9)
Middle (III quintile)	9187 (21.1)	21.4 (20.7-22.0)
Richer (IV quintile)	8661 (19.9)	21.4 (20.7-22.1)
Richest (V quintile)	8877 (20.4)	21.8 (20.9-22.6)
Place of residence		
Urban	12 575 (28.9)	33.7 (32.4-34.9)
Rural	30 932 (71.1)	66.3 (65.1-67.6)
State		
North	12 710 (29.2)	23.5 (22.5-24.5)
Central	14 225 (32.7)	29.2 (28.2-30.2)
East	5462 (12.6)	11.9 (11.2-12.5)
Northeast	3301 (7.6)	2.5 (2.3-2.8)
West	3293 (7.5)	12.9 (11.9-13.9)
South	4516 (10.4)	19.9 (18.8-21.1)

(Continues)

TABLE 1 (Continued)

Socio-Demographic Characteristics	Frequency, N (Unweighted Proportion %)	Weighted Proportion (95% CI)
Delivery by cesarean section		
Yes	35 679 (82.0)	78.6 (77.8-79.3)
No	7828 (18.0)	21.4 (20.7-22.2)
Place of delivery		
Public	32 403 (74.5)	69.3 (68.4-70.2)
Private	11 104 (25.5)	30.7 (29.8-31.6)
Number of antenatal visits		
<4 visits	19 345 (44.6)	41.4 (40.5-42.3)
≥4 visits	24 162 (55.4)	58.6 (57.7-59.5)

delivered during the 5 years preceding the survey reported their total OOP expenditure for delivery care services. Socio-demographic characteristics of the study participants are described in Table 1. The mean age of the participants was 26.9 years. About 38.4% of the study participants belonged to the age group of 25 to 29 years. Most of the women (49.2%) had educational qualification up to secondary level. Participants were almost equally distributed across all the five quintiles of wealth index. Almost two-third belonged to rural areas of residence. Around 41.4% had less than the recommended four antenatal visits during their period of pregnancy. About 21.4% of women had delivery by cesarean section, and nearly 31% had delivery in a private health facility. States were divided into six zones: North, Central, East, Northeast, West, and South. Most of the women (29.2%) belonged to the Central zone followed by North zone (23.5%).

Table 2 shows the OOP payments incurred toward child delivery care and the different coping mechanisms used to handle the same. Out of 43 507 women, 26 916 (61.9%) had OOP expenditure during their most recent institutional delivery. The average OOP expenditure for child delivery care was INR 5985 ($93.3). About 80% of women who had OOP expenditure reported that they handled the financial situation by utilizing the money in their bank/savings account. The second most common coping mechanism used was borrowing of money from friends. The median OOP expenditure for child delivery care in India was INR 1000 ($15.6).

Table 3 shows the determinants of OOP expenditure for child delivery care in India. We found that with an increase in age, there was an increase in OOP expenditure for delivery services, and it was statistically significant

TABLE 2 Out-of-pocket payments incurred due to child delivery care and coping mechanisms used among reproductive age group females (15-49 years) covered in NFHS-4 in India (N = 43 507)

Out-of-Pocket Payments	Mean INR ($US)	Median INR ($US)
Out-of-pocket payment incurred due to delivery care services in the most recent pregnancy	5985 ($93.3)	1000 ($15.6)
Coping mechanisms (N = 30 251)	**Frequency, N (Unweighted proportion %)**	**Weighted proportion (95% CI)**
Bank account/savings	24 682 (81.6)	80.1 (79.3-80.9)
Borrowed from friends	6658 (22.0)	22.6 (21.9-23.4)
Selling property	551 (1.8)	1.9 (1.7-2.3)
Selling jewellery	405 (1.3)	1.6 (1.4-1.9)
Insurance	118 (0.4)	0.4 (0.3-0.6)
Others	878 (2.9)	3.1 (2.8-3.5)

TABLE 3 Determinants of out-of-pocket payments on child delivery care among reproductive age group females (15-49 years) covered in NFHS-4 in India, N = 43 507

Characteristics	Total	Median ($US)	Unadjusted Beta Coefficient (Natural Log)	*P* Value	Adjusted Beta Coefficient (Natural Log)	*P* Value
Age	43 507	1000 ($15.6)	0.06 (0.05-0.07)	**<.001**	0.03 (0.02-0.04)	**<.001**
Marital status						
Never married	39	200 ($3.1)	0.26 (-2.71-3.24)	.86	Omitted from the model	
Currently married	42 918	1000 ($15.6)	0.62 (0.06-1.18)	**.02**		
Widowed/Separated/Divorced	550	500 ($7.8)	Ref	-		
Religion						
Hindu	34 331	700 ($10.9)	0.75 (0.37-1.13)	**<.001**	0.90 (0.64-1.15)	**<.001**
Muslim	5606	2000 ($31.2)	1.70 (1.28-2.12)	**<.001**	1.33 (1.04-1.63)	**<.001**
Christian	1653	2000 ($31.2)	1.3 (0.57-2.02)	**<.001**	1.10 (0.51-1.69)	**<.001**
Others[a]	1917	20 ($0.3)	Ref	-	Ref	-
Residence						
Urban	12 575	1500 ($23.4)	0.72 (0.53-0.90)	**<.001**	–0.12 (–0.28-0.03)	.12
Rural	30 932	600 ($9.4)	Ref	-	Ref	-
Education status						
No formal education	10 548	500 ($7.8)	Ref	-	Ref	-
Primary	5995	500 ($7.8)	–0.07 (–0.2-0.11)	.45	0.02 (–0.13-0.18)	.79
Secondary	21 493	1000 ($15.6)	0.37 (0.23-0.51)	**<.001**	0.09 (–0.03-0.22)	.14
Higher	5471	5000 ($77.9)	1.95 (1.73-2.17)	**<.001**	0.27 (0.06-0.49)	**.01**
State						
North	12 710	600 ($9.4)	0.74 (0.39-1.09)	**<.001**	1.47 (1.24-1.71)	**<.001**
Central	14 225	700 ($10.9)	0.93 (0.59-1.28)	**<.001**	1.52 (1.29-1.74)	**<.001**

(Continues)

TABLE 3 (Continued)

Characteristics	Total	Median ($US)	Unadjusted Beta Coefficient (Natural Log)	*P* Value	Adjusted Beta Coefficient (Natural Log)	*P* Value
East	5462	2000 ($31.2)	2.21 (1.84-2.57)	**<.001**	2.78 (2.53-3.04)	**<.001**
Northeast	3301	3000 ($46.8)	2.58 (2.17-2.99)	**<.001**	3.19 (2.84-3.56)	**<.001**
West	3293	20 ($0.3)	Ref	-	Ref	-
South	4516	1000 ($15.6)	0.68 (0.29-1.08)	**.001**	0.28 (−0.01-0.58)	.06
Wealth index						
Poorest (I quintile)	7898	500 ($7.8)	Ref	-	Ref	-
Poorer (II quintile)	8884	500 ($7.8)	0.13 (−0.02-0.28)	.09	0.12 (−0.02-0.25)	.09
Middle (III quintile)	9187	500 ($7.8)	0.25 (0.07-0.43)	**.006**	0.04 (−0.12-0.20)	.60
Richer (IV quintile)	8661	1000 ($15.6)	0.79 (0.59-0.99)	**<.001**	0.03 (−0.15-0.20)	.76
Richest (V quintile)	8877	5000 ($77.9)	1.88 (1.68-2.09)	**<.001**	0.01 (−0.22-0.24)	.93
Place of delivery						
Public	32 403	20 ($0.3)	Ref	-	Ref	-
Private	11 104	10 000 ($155.9)	4.80 (4.66-4.94)	**<.001**	4.63 (4.49-4.78)	**<.001**
ANC visits						
<4	19 345	500 ($7.8)	Ref	-	Ref	-
≥4	24 162	1000 ($15.6)	0.61 (0.47-0.74)	**<.001**	0.23 (0.11-0.35)	**<.001**
Mode of delivery						
Normal delivery	35 679	500 ($7.8)	Ref	-	Ref	-
Cesarean section	7828	15 000 ($233.8)	2.64 (2.44-2.83)	**<.001**	0.95 (0.78-1.11)	**<.001**

[a]Includes Sikh, Buddhist, Jain, Jewish, and others.

($P < .001$). Women with higher educational qualifications (median = INR 5000, $77.9) had significantly higher OOP expenses when compared with women with no formal education (median = INR 500, $7.8; $P < .001$). Currently, married women (median = INR 1000, $15.6) had significantly higher OOP expenditure when compared with women who were divorced/separated (median = INR 200, $3.1; $P = .02$). Women who were Muslim by religion (median = INR 2000, $31.2) had higher OOP payments when compared with women who were Hindu, Christian, or any other, and it was statistically significant ($P < .001$). The mothers belonging to the richest quantile (median = INR 5000, $77.9) spent significantly more than those from the poorest quantile (median = INR 500, $7.8) on delivery care services ($P < .001$). Women living in urban areas (median = INR 1500, $23.4) spent significantly more OOP payments on delivery care when compared with those in rural areas (median = INR 600, $9.3; $P < .001$). Women in North-Eastern states (median = INR 3000, $46.8) had significantly higher OOP payments for delivery care when compared with women in any other state in India ($P < .001$). Women who made four or more antenatal visits (median = INR 1000, $15.6) during their pregnancy had significantly higher OOP expenses when compared with women attending less than the recommended antenatal visits (median = INR 500, $7.8; $P < .001$).

Two other important determinants of OOP expenses found in our study were place and mode of delivery. Women delivering in private health facilities (median = INR 10 000, $155.9) spent a significantly higher amount on delivery care services when compared with those delivering in public health facilities (median = INR 20, $0.31; $P < .001$). Women who underwent cesarean section (median = INR 15 000, $233.8) had higher OOP expenses compared with women undergoing normal vaginal delivery (median = INR 500, $7.8; $P < .001$). Multivariate analysis found that age of the mother, education, religion, state of residence, number of antenatal visits, place of delivery, and mode of delivery were the significant determinants of OOP payments on delivery care services in India ($P < .001$).

4 | DISCUSSION

Previously, large-scale surveys have reported that the reason quoted by mothers for nonutilization of maternity care services in India is the costs involved in it.[23,25] Hence, it is important to understand the costs involved as well as the determinants of OOP expenditure due to policy implications. NFHS-4 data provided sufficient opportunity to study OOP expenses incurred by women during delivery care services in India. Cost data obtained using this survey were reliable as it involved a large representative sample taken throughout the country.

We found that about 62% of mothers had OOP expenses during their most recent delivery. The median OOP expenditure for child delivery care in India was INR 1000 ($15.6) with an average cost of INR 5985 ($93.3). This finding was similar to some of the small-scale studies conducted in various parts of India like Odisha (INR 1100), Mangalore (INR 1150), and Lucknow (INR 1406).[17-19] However, a previous large-scale survey conducted in India (District Level Household Survey-3) showed significantly lesser OOP expenses ($44) for delivery services when compared with the current study findings.[25] This shows that the cost of delivery services has increased over the past decade. But the OOP cost of delivery care in our country is lesser than neighboring countries like Bangladesh and Myanmar.[26,27] Coping mechanism employed by the majority of women to deal with OOP expenditure was borrowing of money from friends.

We also explored the determinants of OOP expenses for delivery care. Age of the mother was positively associated with OOP expenses. Women with higher educational qualifications had significantly higher OOP expenses for child delivery care. This could be because women with higher educational levels expect a higher quality of care and might additionally have the ability to pay for those services. Out-of-pocket expenses were also found to be higher for mothers living in North-Eastern states when compared with any other state in India. This difference can be attributed to the difference in budget allocation, as health is a state subject in India. It can also be due to the difference in utilization of various maternity services and ratio of mothers who deliver in tertiary care hospitals or district hospitals (which involves higher costs) to those who deliver in subcenters or primary health centers.

Two important determinants of higher OOP expenses for delivery care were place and mode of delivery. With respect to the place of delivery, women delivering in private health facilities had significantly higher OOP expenses for delivery services compared with those delivering in public facilities. It could be due to the increased spending by the Government under the National Health Mission (NHM) which led to an improvement in facilities and availability of drugs in public facilities. This might have led to a decline in average OOP expenditure to women delivering in public facilities.

With respect to the mode of delivery, women undergoing cesarean section had significantly higher OOP expenditure when compared with women who had a normal vaginal delivery. This finding has huge implications when viewed in light of current cesarean section rates in urban private hospitals in India which are three times the WHO-recommended limit of 10% to 15%.[28]

The study has several strengths. First, it covers nationwide representative samples from rural, urban, and tribal regions which enable the study findings to be generalizable for the Indian context. Second, the large number of representative women interviewed in the study gives adequate power to examine the relationship with multiple exposure variables. Third, the complex sampling frame adapted in the study design is adjusted using the appropriate statistical modeling techniques.

The study has the following limitations. This study was done based on secondary data sources of NFHS-4 which again was based on self-reported answers provided by the respondents. Hence, there is a possibility of recall bias and errors in the cost findings. There could have been several antenatal mothers who were not able to use delivery services due to unaffordability. These scenarios could not be captured by the current study. We were unable to report data on the split-up of OOP expenses on delivery care such as direct medical, direct nonmedical, indirect, and intangible costs. We were also unable to differentiate the costs involved depending on complications during delivery.

Out study has several programmatic implications. We found that there are OOP expenses involved in delivery care in spite of the several national and state-level schemes that are in place. We also found that place and mode of delivery are significant determinants of costs involved in delivery care. Hence, we suggest that schemes such as JSY and JSSK should continue with an increase in the incentives provided under the former for cesarean delivery. However, before increasing the JSY package rate, the utilization rate of JSY need to be improved as only 36.4% of mothers are utilizing it currently. Additionally, the cost of delivery in private facilities should be regulated to reduce OOP expenses in the country. Further studies are necessary to find the underlying reasons for the variations observed in OOP expenses as it will be useful to promote the value and efficiency in delivery care services in the long run.

5 | CONCLUSION

Our study found that almost two-third of mothers incurred OOP expenses during child delivery care in India. The median OOP expenditure was INR 1000 ($15.6). We also found a huge variation in the OOP expenses related to the age of mother, education, religion, number of antenatal visits, state of residence, place of delivery, and mode of delivery. Out-of-pocket expenditure for accessing care is one of the key determinants of service utilization which, if not addressed by the health system, can deter women from having institutional deliveries in the future.

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None declared

A STATEMENT CONFIRMING COMPLIANCE WITH ANIMAL/HUMAN ETHICS GUIDELINES, INCLUDING THE NAME OF ETHICS APPROVAL COMMITTEE AND DATE OF APPROVAL

This study does not require ethical approval as it was a secondary data analysis of NFHS-4 data conducted after obtaining authorization to use the data from DHS program.

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REFERENCES

1. World Health Organisation. Maternal mortality [Internet].WHO. [cited 2019 May 23]. Available from: https://www.who.int/news-room/fact-sheets/detail/maternal-mortality
2. Alkema L, Chou D, Hogan D, et al. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. *Lancet*. 2016;387(10017):462-474.
3. Singh PK, Rai RK, Alagarajan M, Singh L. Determinants of maternity care services utilization among married adolescents in rural India. *PLoS ONE*. 2012 Feb 15;7(2):e31666.
4. Sachs JD. From millennium development goals to sustainable development goals. *Lancet*. 2012 Jun 9;379(9832):2206-2211.
5. Hogan MC, Foreman KJ, Naghavi M, et al. Maternal mortality for 181 countries, 1980–2008: a systematic analysis of progress towards Millennium Development Goal 5. *Lancet*. 2010 May 8;375(9726):1609-1623.
6. Campbell OM, Graham WJ, on behalf of The Lancet Maternal Survival Series steering group. strategies for reducing maternal mortality: getting on with what works. *Lancet*. 2006;368(9543):1284-1299.
7. Kumar S. Challenges of maternal mortality reduction and opportunities under national rural health mission—a critical appraisal. *Indian J Public Health*. 2015;49(3):163-167.
8. Salam A, Siddiqui SA. Socioeconomic inequalities in use of delivery care services in India. *J Obstetr Gynecol India*. 2006;56(2):123-127.
9. Das NP, Mishra VK, Saha PK. *Does community access affect the use of health and family welfare services in rural India?* National Family Health Survey Subject Reports No. 18. Mumbai: International Institute for Population Sciences and Honolulu; East-West Centre; 2001.
10. Mohanty SK, Srivastava A. Out-of-pocket expenditure on institutional delivery in India. *Health Policy Plan*. 2012;28(3):247-262.
11. Balaji R, Dilip T, Duggal R. Utilisation of and expenditure on delivery care services: some observations from Nashik District Maharshtra. Regional Health Forum WHO-South-East Asia Region. 2003
12. Government of India, Ministry of Health and Family Welfare, Maternal Health Division, New Delhi. Janani Suraksha Yojana: features & frequently asked questions and answers. Available from: http://mohfw.nic.in/dofw%20website/JSY_features_FAQ_Nov_2006.htm
13. Press Information Bureau, GOI. Health ministry launches Janani-Shishu Suraksha Karyakram JSSK to benefit more than one crore pregnant women and newborns. [cited on 2019 May 23]. Available from: http://pib.nic.in/newsite/erelease.aspx?relid=72433
14. Press Information Bureau, GOI. Maternity benefits under Pradhan Mantri Matru Vandana Yojana. [cited on 2019 May 23]. Available from: http://pib.nic.in/newsite/PrintRelease.aspx?relid = 174949
15. International Institute of Population Sciences, Ministry of Health and Family Welfare. National Family Health Survey, India 2015-16. Available from: http://rchiips.org/Nfhs/NFHS-4Reports/India.pdf.
16. Sharma S, Verma PB, Viramgami AP, Vala MC, Lodhiya KK. Analysis of out-of-pocket expenditure in utilization of maternity care services in urban slums of Rajkot City, Gujarat. *Indian J Community Med*. 2018;43(3):215-219.
17. Tellis SB, Rent PD, Dmello MK. Utilization of antenatal care and out of pocket expenditure on delivery care in Dakshina Kannada. *Int J Community Med Public Health*. 2018;5:3553-3558.

18. Shukla M, Agarwal M, Singh JV, Gupta A. Out-of-pocket expenditure on institutional delivery in rural Lucknow. *Indian J Community Health*. 2015;27(2):241-246.
19. Sahu KS, Bharati B. Out-of-pocket health expenditure and sources of financing for delivery, postpartum, and neonatal health in urban slums of Bhubaneswar, Odisha, India. *Indian J Public Health*. 2017;61(2):67-73.
20. Issac A, Chatterjee S, Srivastava A, Bhattacharyya S. Out of pocket expenditure to deliver at public health facilities in India: a cross sectional analysis. *Reprod Health*. 2016;13(1):99.
21. Goli S, Rammohan A. Out-of-pocket expenditure on maternity care for hospital births in Uttar Pradesh, India. *Health Econ Rev*. 2018;8(1):5.
22. Chandramouli C, General R. Census of India 2011. In: *Provisional population totals*. New Delhi: Government of India; 2011.
23. Indian Institute for Population Sciences (IIPS) and Macro International. *National family health survey (NFHS 3) 2005-06—India*. I Mumbai: IIPS; 2007.
24. OECD (2019), Exchange rates (indicator). https://doi.org/10.1787/037ed317-en (Accessed on 23 May 2019)
25. International Institute for Population Sciences (IIPS). *District Level Household and Facility Survey (DLHS-3), 2007–08: India*. Mumbai: IIPS; 2010.
26. Sarker AR, Sultana M, Ali N, et al. Cost comparison and determinants of out-of pocket payments on child delivery care in Bangladesh. *Int J Health Plann Mgmt*. 2018;33(4):e1232-e1249.
27. Myint ANM, Liabsuetrakul T, Htay TT, Wai MM, Sundby J, Bjertness E. Impoverishment and catastrophic expenditures due to out-of-pocket payments for antenatal and delivery care in Yangon Region, Myanmar: a cross-sectional study. *BMJ Open*. 2018;8:e022380.
28. WHO. WHO statement on caesarean section rates: Department of Reproductive Health and Research World Health Organization; 2015. http:// www.who.int/reproductivehealth/publications/maternal_perinatal_health/csstatement/en/

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