The burden of maternal health care expenditure in India: multilevel analysis of national data

The Burden of Maternal Health Care Expenditure in India: Multilevel Analysis of National Data

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Abstract

Objective: To quantify the economic burden of maternal health care services on Indian households and examine the levels of expenditure incurred in public and private health care institutions at the national, state and community levels.

Methods: Cross-sectional population data from the 2004 National Sample Survey Organisation were used, which considered 9643 households for the analysis where at least one woman received maternal health care services during the year preceding the survey. Multilevel linear regression techniques were used to estimate the effect of household, cluster and state characteristics on the proportion of maternal health care expenditures over total household expenditures.

Results: Over 80% of households reported paying for maternal health care services, with those using private care facilities paying almost four times more than those using public facilities. Multilevel analyses show evidence of high burden of maternal health care expenditure, which varied significantly across states according to the level of health care utilisation, and with considerable heterogeneity at the household and community levels.

Conclusion: Maternal health care services in India are offered free at the point of delivery, yet many families face significant out-of-pocket expenditures. The recent governmental policy interventions to encourage institutional births by providing nominal financial assistance is a welcome step but this might not help to compensate mothers for other indirect expenditures, especially those living in rural areas and poorer communities who are increasingly seeking care in private facilities.

Keywords: Maternal health care, economic burden, out-of-pocket expenditures, household, public-private

Introduction

The progress in improving maternal health, as envisaged in the UN Millennium Development Goals (MDGs), critically depends on the availability, affordability and effective use of reproductive health services [1-4]. India is one of the rapidly developing economies where health challenges are myriad at the population level, yet trends in key maternal and child health indicators are showing little or no sign of progress [2].

India continues to account for a quarter of all maternal and child deaths at the global level [5]. The maternal mortality ratio in India showed a decline from 301 deaths per 100,000 live births in the period 2001-03 to 254 and 212 during 2004-06 and 2007-09 respectively, but the ratio still lags behind the MDG target of 109 by the year 2015 [6].

Financial hardship is one of the major reasons for poor uptake of maternal health care services in India [7]. For example in Bihar, one of India's poorest states where over 80% of births are home births, approximately 50% of women reported financial concerns as the reason for not opting for institutional delivery care [7] despite the fact that maternal health care services are provided free-of-charge in public health facilities in India. This is because informal payments for antenatal, delivery and postnatal services are widespread in the Indian public health sector, mainly as a result of service bias, social exclusion and impoverishment [8-10]. Similarly, the use of public maternal health care services is relatively high, except for delivery care services where public and private sectors have an almost equal share [7].

In India, the total health expenditure constituted 4.3% of GDP (2009), with private and public sectors accounting for 78% and 20% respectively [11]. Out-of-Pocket Expenses (OOPE) made up over 70% of the total health expenditure [11]. These additional expenses not only deter women from accessing health care services but also push households further into poverty [12-18]. Peters et al. (2002) estimated that a quarter of the Indian population fall into poverty as a direct result of the medical expenses incurred through hospitalisation [19]. Data from the National Sample Survey Organisation (NSSO) show an increase in household poverty in both rural and urban India after accounting for OOPE [11]. Evidence from a micro level study in Andhra Pradesh state indicated that health care debt was strongly associated with poverty [21]. Another study from West Bengal showed that the type of medical care, the number of episodes of illness, chronic illness of a household member, hospitalisations, and maternal health care costs were important predictors of household catastrophic expenditure [22].

To date, the evidence on individual and household OOPE for maternal health care services is limited in India. This is particularly the case in many southern and western states of India where the overall level of maternal health care utilisation is high [7, 23]. Furthermore, health practitioners and policy makers often overlook individual OOPE in maternal health care services.

We hypothesise that although maternal health care services in India are offered free at the point of delivery, many households bear excessive OOPE. The high indirect cost of hospitalisation and outpatient care in

India, particularly in terms of transport and food, have been well documented [24-25], although studies have not focused explicitly on maternal health care expenditures. A recent study by Bonu et al. analysed national data to examine maternal health care expenditure in Indian households [12]. However, this study did not consider the indirect costs associated with maternal health care expenditure, which could be substantial especially for the poorestpoor seeking care in the public sector. Our aim is to investigate the economic burden of maternal health care services on Indian households and quantify the levels of expenditure including indirect costs incurred at the national, state and community levels.

It is worth mentioning that there are several governmental policies aimed at reducing OOPE. For example, a national level safe motherhood intervention, the *Janani Suraksha Yojana* (JSY), was launched in India under the National Rural Health Mission (NRHM) programme for the period 2005-12 [26]. One of the objectives of this mission is to increase the level of utilisation of antenatal and delivery care services across Indian states. As part of the scheme, incentives are provided to poor women seeking institutional delivery care. The extent to which these incentives cover OOPE is rather unclear. Our study will partly address the issue by focusing on household OOPE within the poorest strata.

This study is timely in the Indian context where, given the push to alleviate poverty through public spending [24], there is an urgent need to understand whether the Government's strategies to tackle the economic burden of health care can reduce inequality in maternal health care

access and use. Our study includes both direct and indirect expenses related to maternal health care, taking into consideration potential state and cluster level effects in order to understand the heterogeneity of health care expenditure according to level of service utilisation, which is crucial if we are to elicit meaningful policy recommendations.

Data and methods

Data for the analyses are drawn from the 60th round of the NSSO held between January and June 2004 [27]. The 2004 NSSO questionnaire included a section on maternal health care which provides information on whether a woman had antenatal and/or postnatal care, and the amount of money spent on each of these services. The survey interviewed 73,868 households covering each state and union territory of India.

The expenditures information at the household level is used to measure maternal health care expenditures, estimated as the amount of money spent on maternal health care over the total household expenditure [18]. The direct costs are estimated for antenatal, delivery and postnatal services by type of facility. Since there is no information on the indirect costs related to delivery care, we consider the costs incurred for other health related problems which required inpatient treatment as a proxy for estimating indirect cost relating to delivery care, assuming that the level of inpatient treatment costs would be approximately the same for delivery care. An average of three days hospital stay is assumed for each delivery, although in general the average hospital stay for healthy

infants in India is estimated to be about 46 hours or approximately two days [28].

The analysis considered 9643 households where at least one woman used maternal health care services during the year preceding the survey. Of these, 26% of the households had missing data on antenatal care (13%), delivery (5%) and postnatal care (8%). Since we had to estimate indirect costs by matching the expenditure data with inpatient data and since not every household incurred inpatient or outpatient expenses, the final sample for statistical investigation was then reduced to 2466 households. We compared household characteristics such as residence, expenditure quintile and caste/ethnicity, which did not vary significantly between the study sample and the initial data.

The outcome variable is defined as the proportion of maternal health care expenditures measured in terms of total expenses incurred for maternal health care over the total household expenditures. The key explanatory variables include type of care (private or public), geographical location of the household, household size, sex, age, caste, religion, education and occupation of the head of household, expenditure quintiles and the number of pregnancies within the household in the year preceding the survey. The indirect expenses include the cost of accommodation, transportation and food as part of the hospital visit or stay.

The analysis used a multilevel structure including household, community and state levels to determine the extent of heterogeneity in maternal health care expenditure, accounting for: (i) potential use of care

within the household; (ii) potential variation in provision and availability of services at the community (Primary Sampling Unit) level; and (iii) variations in policy implementation at the state level. Linear regression models were fitted to estimate the burden of maternal health care expenditures. The multivariate analysis was chosen as it allows us to understand the extent of variations in expenditures between public and private sectors, and ascertain whether indirect costs vary substantially by the type of care.

The first stage of the modelling quantified the fixed effects (results not shown) associated with the economic burden controlling for variations within and between states, and the second stage applied the random effect at household, community and state levels. Including cluster level variation enabled a better understanding of how area/neighbourhood affluence determined use of health care services at the community level [29]. The explanatory variables were screened for possible multicollinearity, and variables highly correlated to each other were excluded in the regression.

Results

The percentage of women who received antenatal, delivery and postnatal care in the year preceding the survey disaggregated by those who gave a birth in public and private institutions is shown in Table 1. Approximately 57% of women gave birth at home and of the rest 21% gave a birth in public and 22% in private institutions. Among those who had antenatal care, 27.2% had a home birth and among those who had postnatal care

35.5% had a home birth. It should be noted that the expenditure analysis of delivery care included all women who had given birth irrespective of the place of delivery.

The percentage of households receiving maternal health care from public facilities by the amount paid for the service, as shown in Table 1, includes only the direct expenses. However, of those who received antenatal care in a public facility, less than half received care without incurring any direct costs and about 17% of households paid more than 500 INR (Indian Rupees, 1US$=52 INR approximately). Financial payment seems to be almost universal for delivery care services in India. About 85% of households reported to have paid some money for the delivery care (Table 1). Of those who paid for delivery care, about 35.8% paid 1000 INR or more. It is clear that although it is generally assumed that public health facilities provide maternal health care free-of-charge in India, the figures reported here show the opposite to be true.

--- Table 1 about here ---

The extent of expenditures incurred for accessing maternal health care services has been shown to be considerable both in public and private health facilities in India. Table 1 shows evidence of the extent of expenditures incurred in accessing maternal health care services in public and private facilities. Home delivery also has cost implications, as the data show. The average indirect expenditures for delivery care is even higher than the direct expenditures, suggesting substantial OOPE for

delivery care in public health facilities. In contrast, the direct costs for delivery care in private facilities are much lower than the indirect costs. It is likely that the direct expenses in private health facilities also include accommodation costs.

The average direct and indirect expenditures at the country level masks the wide variation across different Indian states. Table 2 shows the state level distribution of average expenditures incurred for maternal health care services. The expenditures for delivery care in public health facilities in poor states such as Bihar, Uttar Pradesh, Madhya Pradesh and Orissa is substantially higher than the national average. The use of maternal health care is also significantly low in these states. By contrast, the costs associated with delivery care in private health facilities appear to be more in economically well-off states such as Goa, Himachal Pradesh, Delhi, Punjab and Kerala.

---Table 2 about here ---

Further investigations demonstrated evidence of a negative correlation between OOPE and the current level of institutional delivery across Indian states (r=-0.374). Despite the weak correlation coefficient for the states, it is clear that, overall, financial payments act as a barrier to seeking delivery care in public health facilities. On the other hand, economically developed states such as Punjab and Kerala also have high delivery care expenditures in public health facilities. The level of maternal health care expenditure incurred by households in these states is

extremely high given that those women using public health facilities usually represent the poorest sections of society. Indeed there is a substantial difference in maternal health care expenditures between the rich and the poor with regard to delivery care, with expenditure for those who give birth in private institutions particularly high (Figure 1). Variations in state level expenditure are marked with regard to those in the poorest quintile giving a birth in public health facilities (Figure 2).

---Figures 1 and 2 about here---

The results of the relative burden of maternal health care expenditure model with the significant variables are reported in Table 3. All differences in the multilevel model are due to the variations between states rather than within states. This is confirmed in the three-level random intercept model where the cluster level random effect is not significant (Model 2), whereas it is significant in the two-level model (Model 1) after removing the state effect. The results appear similar irrespective of whether we consider the fixed effect (not shown here) or random effect model. The key difference is in the expenditure quintile, which is not significant in any of the categories once we account for state and household effects. We speculate that state policies might mitigate the impact of wealth levels within households.

Residence and type of institution are highly significant, with care received in private health facilities recording the highest cost burden, as is to be expected. Rural households have a higher cost burden than their

urban counterparts irrespective of whether we include expenditures quintiles or not. When considering the interaction with expenditures, there does not seem to be any significant variation within expenditures levels. However, the differences seem to be even less relevant when state and household effects are controlled for. The interaction between residence and type of institution was not significant.

----Table 3 about here-----

The effect of the gender of the head of household on maternal health care expenditures is worth noting. Female-headed households tend to incur relatively higher levels of expenditure than their male-headed counterparts. Although there are limitations in using this variable, we can infer that female-headed households have greater autonomy and decision-making power with regard to using maternal health care services [30]. The number of deliveries has no significant impact on the cost burden. Household size has a negative impact on the economic burden; one possible explanation for this is that family resources have to stretch further in larger households meaning there is less to spend on maternal health care. The overall effect of education seems marginal but the economic burden is significantly higher in households where the head of household is educated beyond high school levels.

Discussion and conclusions

A reliable estimate of OOPE is difficult to obtain in a populous and socially diverse setting such as India. The NSSO data on health and consumer expenditure gathered from the head of the household are, therefore, unique in terms of quality, geographical coverage and representation. The head of household in India usually controls the expenditure of household members and they therefore have the final economic decision-making power within the household. The present analysis has examined expenditure data, rather than income or assets or land-ownership data, to measure the standard of living of the household, as the former gives a better picture of household expenditure including maternal health care costs. Additionally, NSSO data are nationally representative and comprise every strata of the population, including those who do not have access to services due to physical or financial barriers.

The present analysis has contributed to a better understanding of the burden of expenditure associated with maternal health care in India since it takes into account the indirect costs including OOPE for specific health care components. The multilevel approach to statistical analysis confirmed the presence of unobserved heterogeneity associated with maternal health care expenses, which has not previously been explored systematically with NSSO data. To the best of our knowledge, no other study has used this dataset to explore both direct and indirect expenses related to maternal health care.

This study has demonstrated clear evidence that despite free access to most maternal health care services at the point of delivery, many Indian families still pay above the minimum threshold for these services, especially those living in the poorest strata. It is likely that there are no significant costs associated with antenatal care in Indian households but this does not hold true in the case of institutional deliveries, regardless of whether these are in a public or private facility. Perhaps the high OOPE associated with delivery care explains the lack of progress in the uptake of institutional births in India in recent decades [1,3,4,12-13].

The expenditure incurred in public health facilities is mainly attributed to the unavailability of medicines and diagnostics facilities within these facilities. This is particularly a concern in rural households where women rely on facilities located in small towns or cities and often borrow money to cover transportation, food and accommodation costs [10, 12]. Moreover, there is a tendency among public providers to ask care seekers to cover accommodation costs [31]. Households using private maternal health care services incurred substantial costs, overall almost four times higher than those using public facilities. The poorest spend the least in absolute terms but face the highest burden in relative terms, making them the most disadvantaged. This indicates that the poorest are at risk of falling into a debt trap if they use maternal health care services, as has also been seen to be the case with general health services [21].

Interestingly, female-headed households spend considerably more on maternal health care than male-headed. Studies also show that female-headed households in India are poorer than male-headed households, as the former are mainly headed by elderly widows without access to adequate economic resources [32]. Maternal health care expenditure can exacerbate the economic burden in these households. Further work is needed to investigate the reasons for higher expenditure and to ascertain whether female-headed households ultimately have greater autonomy in decision-making with regard to health expenditure, or whether they simply experience more health complications.

Overall, urban households spent a smaller proportion of household expenditure on maternal health care relative to their rural counterparts, though income levels are also relatively higher in urban areas. However, the burden is alarmingly high in absolute terms, which suggests the high economic burden associated with use of health care facilities in urban areas. We believe that the economic burden might still be the strongest barrier to access to maternal health care. There is an indication that despite various health reforms, policy makers have not paid enough attention to the increasing cost of the maternal health care services in India, including in public health facilities where women still bear considerable costs.

It is anticipated that the JSY programme introduced in India over the last five years might help to reduce the cost burden for the poor accessing maternal health care services in institutions [33]. However, our study shows that the burden of maternal health care expenditure

generally exceeds the amount currently assigned to the poor through the JSY programme.

The health sector in India is largely administered at the state level with guidelines and financial schemes from the national government. As such the overall expenditure we observe at the national level might also reflect the efficiency of the state government in administering the public health system in India. Future surveys should collect systematic data on both direct and indirect costs in order to quantify state level variations.

We believe that the present study has undertaken a detailed exploration of the NSSO data and confirmed the size of the economic burden of maternal health care in India. Follow-up or panel studies are needed to explain systematically the expenditure patterns of maternal health care and their potential impact on household impoverishment.

It is important to highlight the limitations of the data used in this study. Unfortunately, the NSSO data do not have information at district level nor information on the typology or quality of services received or the nature of complications during pregnancy or birth. The indirect costs considered in the analyses are proxy, based on inpatient treatment costs for other health related problems within the household. This might not accurately reflect the real burden of OOPE related to maternal health care services. Also, the total expenditure data are not disaggregated by food and non-food items and hence we could only calculate the overall burden instead of considering the non-food items in the denominator. However we do not consider this to be a major issue when looking at the overall burden. Other opportunity costs, for example loss of income, are also not

included in the estimation. Finally, the duration of hospitalisation is likely to be longer for mothers who experienced complications during pregnancy and/or delivery. The NSSO does not provide this level of detail. The assumed three days average is therefore an approximation to counterbalance other risks associated with delivery care. Overall, we consider that differences might even out at the aggregate level.

References

1. Mavalankar, D., Voraa, K., & Prakasamma, M. (2008). Achieving Millennium Development Goal 5: is India serious? Bulletin of World Health Organisation, 86(4), 243-244.

2. Srinivasan, K., Shekar, C., & Arokiasamy P. (2007). Reviewing reproductive and child health programmes in India. Economic and Political Weekly, 42(27-28), 2931-2939.

3. Goldie, S.J., Sweet, S., Carvalho, N., Natchu, U.C.M., & Hu, D. (2010). Alternative strategies to reduce maternal mortality in India: A cost-effectiveness analysis, PLoS Medicine 7(4): e1000264. doi:10.1371 /journal.pmed.1000264)

4. Rai, S.K., Dasgupta, R., Das, M.K., Singh, S., Devi, R., & Arora, N.K. (2011). Determinants of utilization of services under MMJSSA scheme in Jharkhand 'Client Perspective': a qualitative study in a low performing state of India, Indian Journal of Public Health, 55(4), 252-259.

5. WHO, The WHO report: Make every mother and child count, W.H. Organisation, Editor. 2005, WHO: Geneva.

6. Registrar General of India. (2011). Maternal Mortality in India and States from Special Survey of Deaths, Registrar General of India, New Delhi (http://nrhm-mis.nic.in/).

7. International Institute for Population Sciences and Macro International. (2007). National Family Health Survey (NFHS-3), 2005-06: India. Mumbai: IIPS.

8. Pathak, P.K., Singh, A., & Subramanian, S.V. (2010). Economic inequalities in maternal health care: Prenatal care and skilled birth attendance in India, 1992–2006. PLoS ONE 5(10): e13593. doi:10.1371/journal.pone.0013593.

9. Sharma, S., Smith, S., Sonnavelett, E., Pine, M., Dayaratna, V., & Sanders, R. (2005) Formal and informal fees for maternal health care services in five countries: Policies, practices and perspectives. Policy Working Paper Series No. 16, USAID. (http://www.policyproject.com/pubs/workingpapers/WPS16.pdf).

10. Skordis-Worrall, J., Pace, N., Bapat, U., Das S., More, N.S., Joshi, W., Pulkki-Brannstrom, A-M., & Osrin, D. (2011). Maternal and neonatal health expenditure in Mumbai slums (India): A cross sectional study. BMC Public Health, 11:150 doi:10.1186/1471-2458-11-150.

11. Ministry of Health and Family Welfare. (2009). National Health Accounts India 2004–05. (With Provisional Estimates from 2005–06 to 2008–09), National Health Accounts Cell, Government of India, (http://planning commission.nic.in/reports/genrep/health/National_Health_Account_04_05.pdf)

12. Bonu, S., Bhushan, I., Rani, M., & Anderson, I. (2009). Incidence and correlates of 'catastrophic' maternal health care expenditure in India, Health Policy Planning, 24(6), 445-456.

13. Mohanty, S.K., & Srivastava, A. (2012). Out-of-pocket expenditure on institutional delivery in India, Health Policy and Planning, (published online PMID: 22709923).

14. Balarajan, Y., Selvaraj, S., & Subramanian, S.V. (2011). Health care and equity in India, Lancet, 377, 505-515.

15. Selvaraj, S., & Karan, A. (2009). Deepening health insecurity in India: evidence from national sample surveys since 1980s. Economic & Political Weekly, 44, 55–60.

16. Yip, W., & Mahal, A. (2008). The health care systems of China And India: performance and future challenges, Foreign Affairs, 27(4), 921-932.

17. Dilip, T.R. (2010). Utilization of inpatient care from private hospitals: trends emerging from Kerala, India, Health Policy and Planning, 25(5), 437-446.

18. Garg, C.C., & and Karan, A.K. Reducing out-of-pocket expenditures to reduce poverty: a disaggregated analysis at rural-urban and state level in India, Health Policy Planning, 24(2), 116-128.

19. Peters, D.H., Yazbeck, A.S., Sharma, R.R., Ramana, G.N.V., Pritchett L,H., & Wagstaff, A. (2002). Better health systems for India's Poor: Findings, analysis, and options, Human Development Network, Health, Nutrition and Population Series, Washington DC: The World Bank.

20. Gupta, I. (2009). Out-of-pocket Expenditures and Poverty: Estimates from the NSSO 61st Round, Paper presented to the expert group on poverty in Planning Commission, Government of India.

21. Krishna, A. (2006). Pathways out of and into poverty in 36 villages of Andhra Pradesh, India, World Development, 34(2):271-288.

22. Mondal, S., Kanjilal, B., Peters, D.H., & Lucas, H. (2010). Catastrophic out-of-pocket payment for health care and its impact on households: Experience from West Bengal, India. http://www.chronicpoverty.org/uploads/publication_files/mondal_et_al_health.pdf

23. Navaneetham, K., & Dharmalingam, A. (2002). Utilization of maternal health care services in Southern India, Social Science & Medicine, 55(10), 1849-1869.

24. O'Donnell, O., et al., The Incidence of Public Spending on Healthcare: Comparative Evidence from Asia. The World Bank Economic Review, 2007. 21(1): p. 93-123.

25. Mahal, A et al. 2002. Who Benefits from Public Sector Health Spending in India. New Delhi: National Council for Applied Economic Research.

26. Ministry of Health and Welfare (2006). *Janani Suraksha Yojana*, Government of India. New Delhi. (http://jknrhm.com/PDF/JSR.pdf).

27. National Sample Survey Organisation. (2006). Morbidity, Health Care and Condition of the Aged: NSSO 60th Round (January-June 2004). New Delhi:

National Sample Survey Organization, Ministry of Statistics and Programme Implementation, Government of India.

28. Gupta, P., Malhotra, S., Singh, D.K., & Dua, T. (2006). Length of postnatal stay in healthy newborns and re-hospitalization following their early discharge. Indian Journal of Pediatrics, 73(10), 897-900.

29. Das, J., & Hammer, J. (2005). Which doctor? Combining vignettes and item response to measure clinical competence. Journal of Development Economics, 78(2), 348-383.

30. Das Gupta, M. (1995). Life course perspectives on women's autonomy and health outcomes, American Anthropologist, 97(3), 481-491.

31. Dhar, R.S.G., Nagpal, J., Sinha S., Bhargava V.L., Sachdeva A., Bhartia A. (2009). Direct cost of maternity-care services in south Delhi: A community survey, Journal of Health, Population & Nutrition, 27(3): 368-378.

32. Meenakshi, J.V., Ray, R., & Gupta, S. (2000). Estimates of poverty for SC/ST and female-headed households, Economic and Political Weekly, 35(31), 2748-2754.

33. United Nations Population Fund. (2009). Concurrent assessment of Janani Suraksha Yojana (JSY) in Selected States, UNFPA India, New Delhi.

Figure 1 Estimated average maternal care expenditure (in Indian Rupees) by household expenditure quintile, all India data

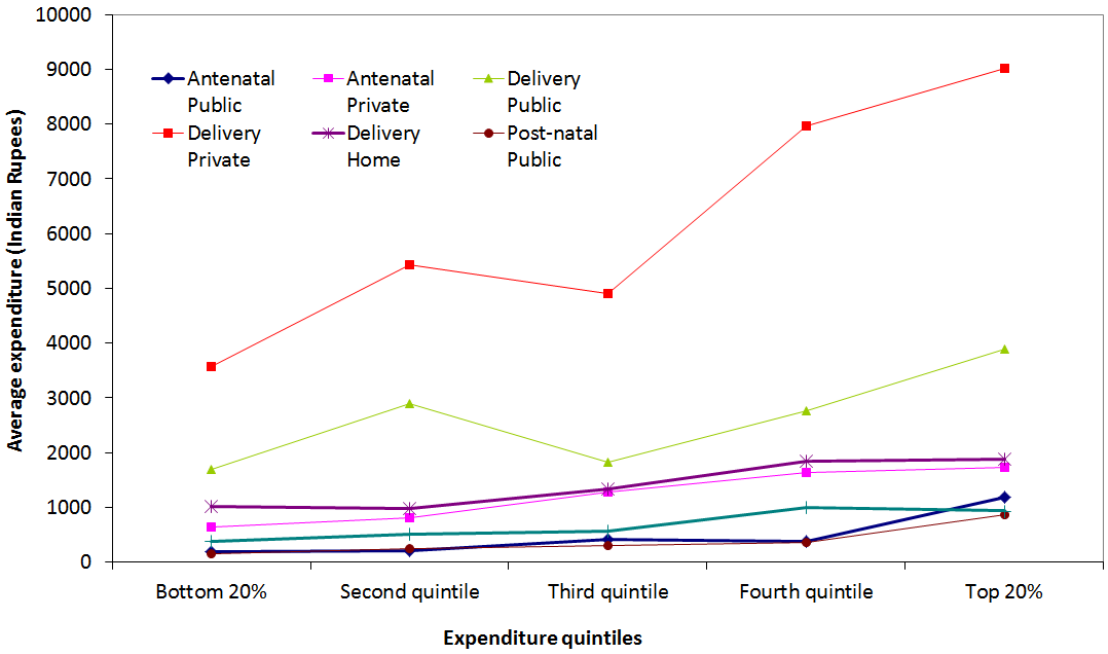

Figure 2 Average delivery expenditure in public health facilities for the bottom 20% of the expenditure quintiles in India, 2004

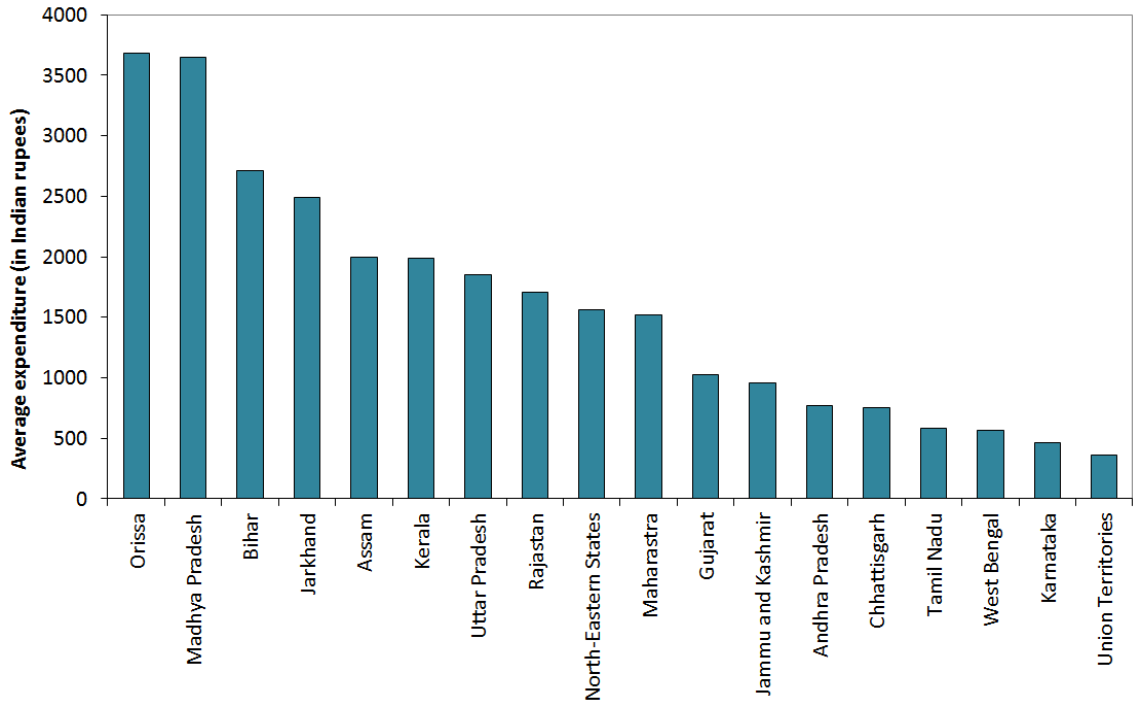

Table 1

Descriptive statistics showing the type of care, direct expenses in public hospitals and average direct and indirect expenditure related to maternal care services, India, 2004

	Antenatal Care	**Delivery Care**	**Postnatal Care**
Type of care (percent)			
Public	41.6	21.0	28.5
Private	31.2	22.3	35.9
Home	27.2*	56.7	35.6*
Number of observations	8806	6538	6538
Direct expenses in Indian rupees, public hospitals (percent)			
None	46.5	14.8	36.5
1-499	36.7	25.0	44.1
500-999	8.8	24.4	11.1
1000-2499	6.4	23.3	6.8
2500-4999	0.9	7.2	1.0
5000+	0.7	5.3	0.5
Number of observations	6411	6538	4193
Average Expenditure in Indian rupees (SD)			
Total			
Direct	708(823)	1634 (2970)	499 (728)
Indirect	38 (52)	2135 (3058)	13 (51)
Public			
Direct	304 (1153)	1183 (1817)	293 (560)
Indirect	29 (193)	1285 (1857)	10 (37)
Private			
Direct	1142 (1308)	4782 (6873)	597 (1034)
Indirect	20 (108)	1938 (2945)	14 (61)
Home			
Direct	na	461 (514)	Na
Indirect	na	737 (1024)	Na
Number of observations	6411	6538	4193

*indicate not receiving any care; *na= not applicable; SD refers to Standard Deviation*
Source: computed from NSSO data, 2004

Table 2

Average expenditure (in Indian Rupees) on maternal health care services for the year preceding the survey by states, 2004

	Antenatal		Delivery			Postnatal	
State	Public	Private	Public	Private	Home	Public	Private
India	333	1162	2468	6720	1198	303	611
North							
Delhi	329	2155	845	10099	561	365	778
Haryana	151	1224	3106	6138	1920	180	1031
Himachal Pradesh	601	1593	1956	16168	2036	664	624
Jammu & Kashmir	1029	2433	3064	7792	2432	561	1851
Punjab	1082	2447	6761	8456	1558	680	668
Rajasthan	287	1012	2381	5415	1243	461	1159
Uttaranchal	53	1967	3640	8943	753	623	133
Central							
Chattisgarh	181	604	1183	7302	1089	159	320
Madhya Pradesh	337	1104	5545	7972	976	320	553
Uttar Pradesh	180	748	4135	5932	1422	272	410
East							
Bihar	717	524	5032	4414	1356	294	395
Jharkhand	294	397	1638	5383	843	189	249
Orissa	303	726	3112	5634	873	384	550
West Bengal	392	886	2108	6210	841	245	447
West							
Goa	434	501	778	21000		384	1897
Gujarat	142	1851	2388	5080	705	209	1407
Maharashtra	267	1419	1625	6475	780	245	705

Contd.

Table 2 (contd.)

Average expenditure (in Indian Rupees) on maternal health care services for the year preceding the survey by states, 2004

	Antenatal		Delivery			Postnatal	
State	Public	Private	Public	Private	Home	Public	Private
South							
Andhra Pradesh	483	1529	1197	7816	880	307	504
Karnataka	181	1165	899	8596	898	202	665
Kerala	2231	1905	2779	6429		1108	1535
Tamil Nadu	139	1905	1233	8232	1213	108	664
Northeast							
Assam	342	1141	2471	14594	2158	377	592
Northeast (without Assam)	499	1604	2378	20264	565	575	380
Union Territories	605	1051	1551	11114	1402	86	692

[1] *Northeastern region comprises of small states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim & Tripura:* [2]*the Union Territories include Andaman & Nicobar Islands, Chandigarh, Dadra & Nagar Haveli, Daman & Diu, Lakshadweep & Pondicherry.*

Table 3

Fixed and random intercept models predicting the effect of selected characteristics on the proportion of maternal health care expenditure over total household expenditure, pooled data at all India level

Variables	**Model 1** (Random effects Household and cluster level)		**Model 2** (Random effects at Household, cluster and State level)		Number of observations
	B	SE	B	SE	
Type of care					
Public (ref)					836
Private	2.07***	*0.36*	2.02***	*0.37*	877
Home	-0.21	*0.38*	-0.22	*0.39*	754
Residence					
Rural (ref)					1456
Urban	6.50***	*1.04*	6.63***	*1.05*	1011
Sex head of household					
Male (ref)					2313
Female	2.67***	*0.61*	2.81***	*0.62*	154
Number of deliveries					
One (ref)					2376
More than one	0.85	*0.83*	0.99	*0.83*	91
HH size	-0.24***	*0.07*	-0.24***	*0.07*	
Education of household head					
None (ref)					720
Primary	0.15	*0.4*	0.21	*0.41*	612
Secondary	0.33	*0.46*	0.36	*0.47*	412
High school and above	1.30**	*0.45*	1.38**	*0.45*	722
Expenditure quintile					
Poorest (ref)					750
Second	-0.06	*0.5*	0	*0.5*	692
Middle	-0.41	*0.54*	-0.37	*0.55*	550
Fourth	-0.51	*0.61*	-0.53	*0.62*	288
Richest	-1.56*	*0.87*	-1.4	*0.88*	183
*Interaction exp quint*residence*					
Poorest*rural (ref)					
Second*urban	-6.95***	*1.29*	-7.05***	*1.31*	
Middle*urban	-6.89***	*1.22*	-6.93***	*1.24*	
fourth*urban	-7.10***	*1.22*	-7.02***	*1.24*	
Richest*urban	-6.89***	*1.34*	-7.14***	*1.36*	
Constant	2.32**	*0.72*	1.97**	*0.63*	
Household level variance	*49.68*	*-1.44*	*51.98*	*-1.57*	
Cluster level random effect	*6.77*	*2.03*	*0.1*	*-0.56*	
State level random effect			*0.04*	*-0.2*	
log-likelihood/F test	*-8360.6*		*-8373.6*		

****p<0.001; **0.001<p<0.05; *0.05<p<0.10; SE refers to Standard Errors*