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Socio-economic and spatial inequalities in delivery care in UP, India

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Abstract

India accounts for 19 percent of global maternal deaths, with the most recent statistics showing an average maternal mortality ratio of 167 per 100 000 live births at the national level. Uttar Pradesh is one of the largest contributors of maternal deaths (285 per 100000 lb) (SRS, 2013). The low utilization of delivery care services is main cause of poor maternal health status in state. Moreover, the statistics shows much difference across socio-economic strata of population. Despite the rigorous governmental and non-governmental effort the prevalence of inequality across various socio-economic groups of women is matter of worry for researchers. The present study explores why huge socio-economic inequality exist in utilization of institutional delivery care and what are the main contributing factors of delivery care inequality? The data on the utilization of delivery care has been taken from the two rounds of District Level Household Survey (DLHS 2nd and 3rd). The methods which employ to measure inequality are computation of ratio, concentration index, binary logistic regression and decomposition analysis. The entire state has divided in to four regions for capturing more detailed picture of delivery care. The results reveal that the inequality in utilization of delivery care has reduced across caste, religion, education of women. However, the highest wealth based inequality in non- institutional and unsafe delivery is concentrated in western and eastern region. Furthermore, illiteracy of women, rural place of residence, not received ANC and poor wealth status of household are leading contributors in women not going for institutional delivery.

Keywords: Institutional Delivery, Safe Delivery, Socio-Economic Inequality, Regional Inequality.

Introduction

Improving maternal health is an important goal of all developing countries, and this has been more focused and prioritized after ICPD 1994 and set of Millennium Development goals (MDG). In MDG: 5A it was targeted to reduce 75 percent of maternal mortality ratio by 2015 (base year 1990). The world has witnessed 45 percent reduction in maternal mortality ratio from 380 deaths in 1990 to 210 in 2013 per 100000 live births. The annual rate of decline in MMR increased from 2.2 percent during years 1990-2005 to 3.3% in 2005-2013[1]. Despite the progress only few countries are performed on track to achieve MDG 5A. Among the causes of maternal deaths Haemorrhage (27%) remains the leading cause followed by Hypertension (14%) and Sepsis (11%)[2]. Although much of these deaths are preventable, but low utilisation of maternal health care is primary barrier in saving these lives. One can see the huge variation in distribution of maternal health practices across geographic economic and social locations. The developing countries shares the 15 times higher burden of poor maternal health compare to developed countries. Globally, 50 percents of all maternal deaths are contributed by seven countries India (19%), Nigeria (14%), Democratic Republic of Congo (7%), Ethiopia (4%), Indonesia (3%), Pakistan (3%), United Republic of Tanzania (3%). Every year approximately 500,000 women die because of the birth related complications, among these most of deaths occurred because of preventable causes[1].

Institutional delivery is an element of safe motherhood initiatives which ensure accessible and affordable skilled care to women during pregnancy and childbirth. Consequently, this would help to prevents deaths of pregnant women due to obstetric complications. For improving the health of mother and newborn it is essential that delivery should be conducted in proper hygienic conditions and under supervision of trained health practitioner. The risk of maternal deaths and new born deaths could only be reduced by improving the coverage of institutional deliveries and safe deliveries. Any delivery conducted in either private or government health institution supervised by trained health practitioner called as institutional delivery and delivery which is either performed in health institution or at home by trained health practitioner called as safe delivery[3,4]. In India only 47 percent women deliver baby in health institutions and 48 percent delivery conducted under unsafe condition for mother and new born[4]. As posited by prior literature that utilization of maternal health services is not merely depends on accessibility and availability of services, but also socio-demographic and economic factors at individual and community level.

In India various program interventions have done to develop, strengthen or expand access to safe delivery and safe motherhood. For Achieving MDG 5A huge investment has been made by government of India. The biggest effort at policy level was the introduction of Janani Suraksha Yojna under umbrella of National rural Health Mission in 2005.

The programme was committed to address both supply and demand side factors of primary health care in India by involving respective states participation. This huge policy intervention gave some optimistic picture of maternal health-in 2012; the maternal mortality ratio was 178 per 100000 live births, reduced to 50 percent as compared to the 1990 level[5]. India accounts for 19 percent of global maternal deaths[6]. The poor accessibility, availability, affordability and acceptability deprived many women to deliver baby in safe and healthy condition. Only 47% of women go for institutional delivery, 76% birth is attended by skilled person and 27% women complete all three anti-natal checkups[7]. Moreover, wide disparity exists across states and socio-economic and cultural level. The socio-economic class represents important aspect of an individual. The women's attitudes for seeking medical care, nutrition level are highly influenced by the characteristics of socio-economic class to which they belong.

Evidence shows that the economically poor at socially marginalised locations, get least access to preventive and curative health services[6,8–10]. Similarly, the educational achievement of women entails higher autonomy and within household negotiation, awareness of modern health services, which increase the probability of using ante-natal, delivery and post delivery services[8,11–13]. In Nepal proportion of women using maternal health care services rose from 32%, among those with no education to and 66% among those with secondary or higher education[14,15].

Another study in Nigeria found that women with secondary/ higher education 4 times more likely of receiving delivery care than women with no education[12].

The degree and nature of association between women's education and health care utilization is not homogenous across social settings and geography. The Indian social system is primarily male dominating. All the decisions related to reproduction, going out for health care, number of children, use of contraception, birth interval is taken by husband only or with consensus of husband. So the role of husband's education in influencing wife's use of health services and reproductive services is significant[16]. The most vital factor in utilization of health services is household living standard. Household with better income could purchase better food; better nourishment and better access to health services. Another study found that women with poor status are less likely to report morbidity and go for health care because they don't perceive themselves morbid[17-20]. Whereas in rural area most of delivery takes place at women's or parent's home and are mostly assisted by untrained traditional birth attendant or by relative or by others. Moreover, the rural women do not consider pregnancy and delivery complications seriously and most of the time considers them to be normal[12,21,22]. Apart from socio-economic factors, the demographic attributes also play a vital role in women's decision to utilise health services. For instance, the likelihood of receiving antenatal care and delivering baby in an institution with women's increasing parity.

This may explain in a way first, women with higher parity, drawing on their maternity experience, may not feel the need to receive care during pregnancy and child birth. Second Women with large number of children may have difficulty in taking out time for attending health facility because they must arrange for child care[14,23,24]. Similarly, the utilization of services is affected by the age of women. Women who were younger in age and did not experience reproduction show high percentage of going for ANC and delivery service as compare to women who crossed their half of reproduction period[16].

In India the maternal deaths concentrated to some states like Assam, Uttar Pradesh Uttarakhand, Rajasthan, Madhya Pradesh, Chhattisgarh, Bihar and Orissa, formally called as empowered action group (EAG) states. The southern states Maharashtra, Tamilnadu and Kerala have already achieved MDG: 5A target. The country has noticed wide inequality among the states and within the state. The Utter Pradesh with its wide spatial area possesses high Socio-Economic diversity; the status of maternal health varies from one district to another. Uttar Pradesh shares more than 20 percent live births of country; whereas it accounts for 285 maternal deaths per 100000 live births[25]. However, government has invested lots of funds to develop health infrastructure especially in rural area to make health facility accessible to everyone. Therefore, there is need to examine the determinants of maternal health care practices in the state. The knowledge of governing socio-economic factors helps policy makers to recognize the high priority area. For knowing the impact of various programmes, it is necessary to trace chronological trend. Therefore, the present study aims to examine the following aspects of delivery care in Uttar Pradesh: i. To measure the socio-economic and spatial disparity in safe and institutional delivery. ii. To examine the determinants of delivery care. iii. To quantify the contribution of selected socio–economic predators in utilization of delivery care services.

Materials and methods

Data: The analysis was performed based on second and third rounds of District Level Household Survey (DLHS) conducted in 2002-04 and 2006-08, respectively, by the International Institute for Population Sciences under the supervision of Ministry of Health and Family Welfare (MoHFW). It is nationwide representative sample survey of 90415 household, 87564 ever married women of age group 15-49. The survey collected wide information on fertility, mortality, morbidity, reproductive health, maternal and child health with representative sample covering 601 districts in the country[4].

Variables: The outcome variable for this study have chosen considering the two situations at the time of delivery, first, the mother go to health institution on expected date of delivery or in case of experience of labour pain, second situation, due to sudden complications women are not able to go health facility and call doctors and health personnel at home. The delivery conducted in first situation termed as institutional delivery and

in second settings termed as safe delivery conducted by health personnel at home.

Predictor variable for the inequality decomposition and determinants analysis include key socio-economic and demographic indicators to calculate the contribution and mechanism through which inequality is occurring in each outcome variable. The socio-economic and demographic variable also dichotomized in to better off and poor off groups (e.g. poor /non poor, literate/ illiterate, SCs and STs/ Others, Hindu/ Non-Hindu, Rural/ urban) to perform the decomposition analysis.

Methods of Analysis: The methods of analysis took in to two issues in consideration first; what is the existing level of inequality across and within the socio-economic categories of women? And what is the contribution of each factor in inequality in maternal health indicators.

For looking at the relative magnitude of inequality within the social and demographic categories of women the study computed ratio such as education, religion and caste to elucidate caste and education based differentials for all outcome indicators. The value of these ratios is one in case equal distribution of maternal health practices. For instance, the caste ratio measured by given formula:

Caste Ratio of ANC/ Delivery Care/ PNC =

$$\frac{\text{Percent women went for Delivery Care in others caste}}{\text{Percent women went for Delivery Care in SC } and\ \ ST\ caste}$$

Religion Ratio of ANC/ Delivery Care/ PNC =

$$\frac{\text{Percent women went for Delivery Care in Hindu religion}}{\text{Percent women went for Delivery Care in non} - \text{Hindu Religion}}$$

Education Ratio of ANC/ Delivery Care/ PNC =

$$\frac{\text{Percent of highly educated women went for more than three Delivery Care}}{\text{Percent of primary educated women went for more than three Delivery Care}}$$

The economic inequality in maternal health indicators have been calculated by using Concentration Index (CI) proposed by Wagstaff et. al[26]. The value of CI lies between −1 and +1, where a negative value implies a concentration of outcome variable among disadvantageous groups and a positive value implies concentration among advantageous groups. A zero value of concentration index implies no inequality[26,27]. The following equation refers to the calculation of CI.

$$C = \frac{2}{\mu}\mathrm{cov_w}(y_i, R_i) \qquad (1)$$

Where: y_i is the health status of the ith individual and R_i is the fractional rank of the ith individual (for weighted data) in terms of *the index of household economic status*; μ is the (weighted) unconditional mean of the health variable of the sample and cov_w denotes the weighted covariance. In the study CI has been decomposed separately for all two indicators of delivery i. Unsafe delivery; ii. Not institutional Delivery. Moreover, for analysing the socio-economic determinants of delivery binary logistic regression has been used for both outcome variables.

The decomposition of inequalities in delivery care is carried out the method proposed by Wagstaff et. al[26]. The decomposition of delivery care inequality in Uttar Pradesh carried out in two stages. In the first stage of analysis, maternal health inequalities are examined using CIs. In the second stage, decomposition analysis carried out according to the following steps described by Wagstaff et. al[26].

Coefficients of the explanatory variables (β_k) are estimated by regressing the health variable through linear regression model for its socioeconomic predictors. i. Means of the health variable and each of its predictors (μ and X_k) are estimated. ii. Concentration indices for the health variable and its predictors (C and C_k) are estimated using equation (1) along with generalized concentration index of error term (GC_ε) where, Y_i and μ are the value of the predictors for the ith individual and the predictors mean, respectively. iii. Absolute contribution of each predictor is estimated by multiplying the health variable elasticity with respect to the predictor and its concentration index----$\left(\frac{\beta_k X_k}{\mu}\right) C_k$. iv. Percentage contribution of each predictor is calculated by dividing its absolute contribution by the concentration index of health variable ---- $\left(\frac{\beta_k X_k}{\mu}\right)\frac{C_k}{C}$.

The above mentioned steps are carried out adopting the given mathematical equations (1) of CI calculation.

The above equation gives the CI which is computed as twice the (weighted) covariance of the health variables, and a person's relative rank in terms of economic status, divided by the variable mean. The women are ranked in ascending order of their household living standard in order to find out the cumulative fraction of, for example women not going for institutional delivery, by their economic status[26].

Wagstaff *et al.* has proposed following linear regression model that links health variable of interest, Y, to a set of k health determinants, X_k[28]. This linear regression is estimated separately for each of the health variable i.e. unsafe delivery, non-institutional delivery by linking them to the socioeconomic predictors explained above. The same predictors used for all the maternal health service indicators.

$$Y_i = \alpha + \sum \beta_k X_{ki} + \varepsilon_i \qquad (2)$$

Where, ε is an error term. Given the relationship between Y_i and X_{ki} in equation, the concentration index for Y (C) can be written as:

$$= \sum\left(\frac{\beta_k X_k}{\mu}\right) C_k + \frac{GC_\varepsilon}{\mu} = C_y = \frac{GC_\varepsilon}{\mu} \qquad (3)$$

The above equation shows that C is made up of two components. The first is the deterministic or 'explained'

component. This is equal to a weighted sum of the concentration indices of the regressors, where the weights are elasticities [elasticity is a unit-free measure of (partial) association, i.e. the percent change in the dependent variable (maternal health variables) associated with a percent change in the predictor variables], $\left(\frac{\beta_k X_k}{\mu}\right)$ of Y with respect to each X_k, the second is a residual or 'unexplained' component $\left(\frac{GC\varepsilon}{\mu}\right)$, where GC is the generalized concentration index. The explained component reflects that proportion of inequalities in the dependant variable (health variable) which are explained by the systematic variation in the selected predictor's i.e. X_k,. The unexplained component reflects that part of inequalities which could not be explained by the selected predictors across socioeconomic groups[28].

Results and discussion

Socio-Economic, Demographic and Regional Inequality in Delivery Care: The risk of maternal deaths and new born deaths could only be reduced by improving the coverage of institutional deliveries and safe deliveries[23]. The results of ratio in Table-1 and 2 has exhibit that disparity has reduces in SC and ST, OBC, non-educated, primary and secondary educated women during two survey periods. In the Central, Eastern and Southern region institutional delivery more in favour of Hindu women, whereas in Western region during second DLHS period it was more in Hindu women and shifted more towards non-Hindu women in DLHS-3. The inter-caste differential narrowed during two survey period, which was 2.59 in DLHS-2 and 2.24 in DLHS-3 for Others/SC and ST and 1.88 in DLHS-2 and 1.66 in DLHS-3 for Others /OBC. Similarly, the higher educational achievements of women and their partners shows high level of institutional and safe delivery, as the ratio of institutional deliveries for Higher/ no educated women was 3.03 and higher/ secondary educated 1.81 during DLHS-3. Educational based disparity in the level of unsafe delivery concentrated in the Southern region during both DLHS periods, which shows more unsafe delivery among not educated and primary educated women as compared to higher educated women. It is widely accepted among researcher that proper anti-natal check-up promote the birth of baby attended by skilled person or at health institution[29]. In Uttar Pradesh the results of ratio articulate that women with 3+ANC showing three times higher coverage of institutional delivery and 40 percent less unsafe deliveries during DLHS-3.

The wealth based disparity in delivery care for both the indicators have been calculated through the concentration index (CI). As shown in Table-3 the value of CI was negative for all the four regions, which reflects the concentration of not institutional and unsafe delivery among women belonging to poorest wealth quintile. However, wealth based inequality has narrowed down in all four regions of state during two survey periods. The eastern and western regions have shown the maximum concentration of unsafe deliveries (-0.119 and -0.117) and non-institutional deliveries (-0.094 and -0.098). As shown in Table-4 and Figure-1, there is a huge disparity in delivery care across different districts of states. Out of 70 districts, 31 districts had less than 25 percent Institutional Delivery and 28 districts have more than 70 percent unsafe delivery in 2007-08. Some districts like Bahraich (6.8 percent), Balrampur (8.5 percent, Siddharthnagar (9.9 percent, Shahjahanpur (9.3 percent) Shrawasti (11.5 percent) showing very low level of institutional delivery. Similarly, Balrampur (89.3 percent), Bharaich (88.7 percent), Shahajahanpur (88.1 percent), Budaun (85.6 percent), Shrawasti(84.9 percent), Siddharthnagar (85.9 percent) are top most districts in unsafe delivery. The highest increase in level of institutional delivery between two survey period recorded in Mahoba (17.9 percent), Azamgarh(16.5 percent), Pratapgarh (15.8 percent), whereas districts like Gautam Budha Nagar and Lucknow recorded highest decrease of 14.93 and 9.33 percentpoints respectively. The level of unsafe delivery decresed in Sulatanpur (17.9 percent), Bulandshaher (17.9 percent), Mahoba (16.0 percent), Pratapgarh (14.91 percent). Whereas, Gautam Budha Nagar (10.9 percent), Lucknow (12.9 percent) has noticed increase in unsafe delivery from DLHS-2 to DLHS-3. On the basis of possible explanation drawn from previous literature, we can say that the district of low level of development showing low utilization of delivery care.

Table-1A: Ratio showing the disparity in Institutional Delivery Coverage by Residence, Religion, Caste groups, Sex, Women's Education and ANC Visits across the Uttar Pradesh, 2002-08.

Regions	Urban/Rural		Hindu/Non-Hindu		Others/ SC & STs		Others/OBC		Higher/Not Educated	
	2002-04	2007-08	2002-04	2007-08	2002-04	2007-08	2002-04	2007-08	2002-04	2007-08
Western	2.39	1.69	1.27	0.97	2.19	2.08	1.98	1.58	3.86	3.08
Central	3.98	2.11	0.75	0.94	3.22	2.75	1.88	1.71	4.19	2.9
Eastern	2.47	1.86	1.04	1.2	2.6	2.41	1.79	1.8	3.68	3.19
Southern	2.71	1.73	0.67	0.94	2.63	1.78	1.62	1.49	2.83	2.19
Total	2.6	1.74	1.03	1.06	2.59	2.24	1.88	1.66	3.73	3.03

Table-1B: Ratio showing the disparity in Institutional Delivery Coverage by Residence, Religion, Caste groups, Sex, Women's Education and ANC Visits across the Uttar Pradesh, 2002-08.

Regions	Higher/Primary		Higher/ Secondary		3+ANC/No ANC		3+ANC/3-ANC	
	2002-04	2007-08	2002-04	2007-08	2002-04	2007-08	2002-04	2007-08
Western	2.84	2.56	2.04	1.91	5.27	3.71	1.73	1.62
Central	3.11	3.45	2.16	1.82	6.87	4.39	2.11	1.57
Eastern	2.13	2.4	1.73	1.79	4.94	4.63	1.93	1.75
Southern	2.47	1.84	1.65	1.45	5.74	2.79	1.64	1.35
Total	2.57	2.55	1.89	1.81	5.4	3.87	1.87	1.63

Table-2A: Ratio showing the disparity in Unsafe Delivery Coverage by Residence, Religion, Caste groups, Sex, Women's Education and ANC Visits across the Uttar Pradesh, 2002-08.

Regions	Urban/Rural		Hindu/Non-Hindu		Others/SC &STs		Others/OBC		Higher/Not Educated	
	2002-04	2007-08	2002-04	2007-08	2002-04	2007-08	2002-04	2007-08	2002-04	2007-08
Western	0.67	0.75	0.92	1.03	0.72	0.74	0.73	0.79	0.31	0.42
Central	0.53	0.7	1.12	1.02	0.66	0.71	0.76	0.79	0.27	0.44
Eastern	0.61	0.59	0.97	0.92	0.68	0.65	0.75	0.71	0.36	0.4
Southern	0.54	0.6	1.2	1.14	0.69	0.67	0.78	0.74	0.28	0.35
Total	0.63	0.72	0.98	0.99	0.69	0.7	0.75	0.76	0.32	0.41

Table-2B: Ratio showing the disparity in Unsafe Delivery Coverage by Residence, Religion, Caste groups, Sex, Women's Education and ANC Visits across the Uttar Pradesh, 2002-08.

Regions	Higher/Primary		Higher/Secondary		3+ANC/No ANC		3+ANC/3-ANC	
	2002-04	2007-08	2002-04	2007-08	2002-04	2007-08	2002-04	2007-08
Western	0.38	0.46	0.4	0.74	0.47	0.59	0.65	0.75
Central	0.31	0.47	0.36	0.77	0.44	0.62	0.57	0.77
Eastern	0.4	0.47	0.49	0.7	0.48	0.57	0.62	0.72
Southern	0.3	0.38	0.38	0.76	0.39	0.6	0.58	0.78
Total	0.37	0.46	0.42	0.73	0.46	0.59	0.46	0.74

Table-3: Concentration index showing socio-economic inequality in Non-Institutional and Unsafe Delivery among Women in Uttar Pradesh, 2002-08.

	Non-Institutional Delivery		Unsafe Delivery	
Regions	2002-04	2007-08	2002-04	2007-08
Western	-0.117	-0.098	-0.142	-0.117
Central	-0.129	-0.089	-0.155	-0.105
Eastern	-0.088	-0.094	-0.115	-0.119
Southern	-0.105	-0.076	-0.152	-0.111
UP	-0.107	-0.093	-0.132	-0.113

Table-4: Level of Institutional Delivery, Unsafe Delivery by Districts of Uttar Pradesh, 2002-08.

Districts	Institutional Delivery		Unsafe Delivery		Inter-Survey Change	
	DLHS-2	DLHS-3	DLHS-2	DLHS-3	Institutional Deliveries	Unsafe Deliveries
Saharanpur	26.1	31.2	71.5	66.9	5.1	4.6
Muzaffarnagar	25.9	32	70.4	63.6	6.1	6.8
Bijnor	28.9	37.6	67.8	58.2	8.7	9.6
Moradabad	21.7	24.5	74	72.4	2.8	1.6
Rampur	19.3	22.9	77.2	74.3	3.6	2.9
Jyotiba Phule Nagar	19.1	28.9	75.2	66.5	9.8	8.7
Meerut	29.3	36.7	62.7	56.4	7.4	6.3
Baghpat	25.9	32.2	71	62.9	6.3	8.1
Ghaziabad	39.9	37.6	54.6	57.1	-2.3	-2.5
Gautam Buddha Nagar	42.2	27.3	49	59.9	-14.9	-10.9
Bulandshahar	23.8	31.8	73.7	55.9	8	17.8
Aligarh	28.5	32.2	64.9	61.5	3.7	3.4
Hathras	27.3	28.4	61.6	65.7	1.1	-4.1
Mathura	34.1	39.3	58.2	52.6	5.2	5.6
Agra	37.4	35.7	58.9	58.6	-1.7	0.3
Firozabad	23.5	25.8	74.3	70.5	2.3	3.8
Etah	21.9	20.6	73.3	73.4	-1.3	-0.1
Mainpuri	20.8	21	75.8	76.6	0.2	-0.8
Budaun	12.8	11.4	83.2	85.6	-1.4	-2.4
Bareilly	12.6	15.2	83.2	80	2.6	3.2
Pilibhit	9.5	20.1	88.3	78	10.6	10.3
Shahjahanpur	12.8	9.3	84.4	88.1	-3.5	-3.7
Kheri	12.8	14.1	82.5	82.2	1.3	0.3
Sitapur	18	21.8	78.7	75.3	3.8	3.4
Hardoi	8.6	13.7	90.4	84.8	5.1	5.6
Unnao	10.8	17.7	80	75.3	6.9	4.7
Lucknow	51.6	42.3	40	52.9	-9.3	-12.9
Rae Bareli	16	24.7	76.8	67	8.7	9.8
Farrukhabad	15.4	13.1	75.6	84.6	-2.3	-9
Kannauj	7.2	14	89.2	81	6.8	8.2
Etawah	18	25.9	71.6	71.3	7.9	0.3
Auraiya	10.5	14.3	84.3	80.2	3.8	4.1
Kanpur Dehat	15.6	22.7	79.8	74	7.1	5.8
Kanpur Nagar	35.9	32.4	57.9	62.4	-3.5	-4.5
Jalaun	23	33.9	67.1	59.3	10.9	7.8
Jhansi	34.7	40.4	57.1	51.7	5.7	5.4
Lalitpur	22	31.8	72.5	65.5	9.8	7
Total	22.4	24.5	71.2	69.8	1.4	-2.1

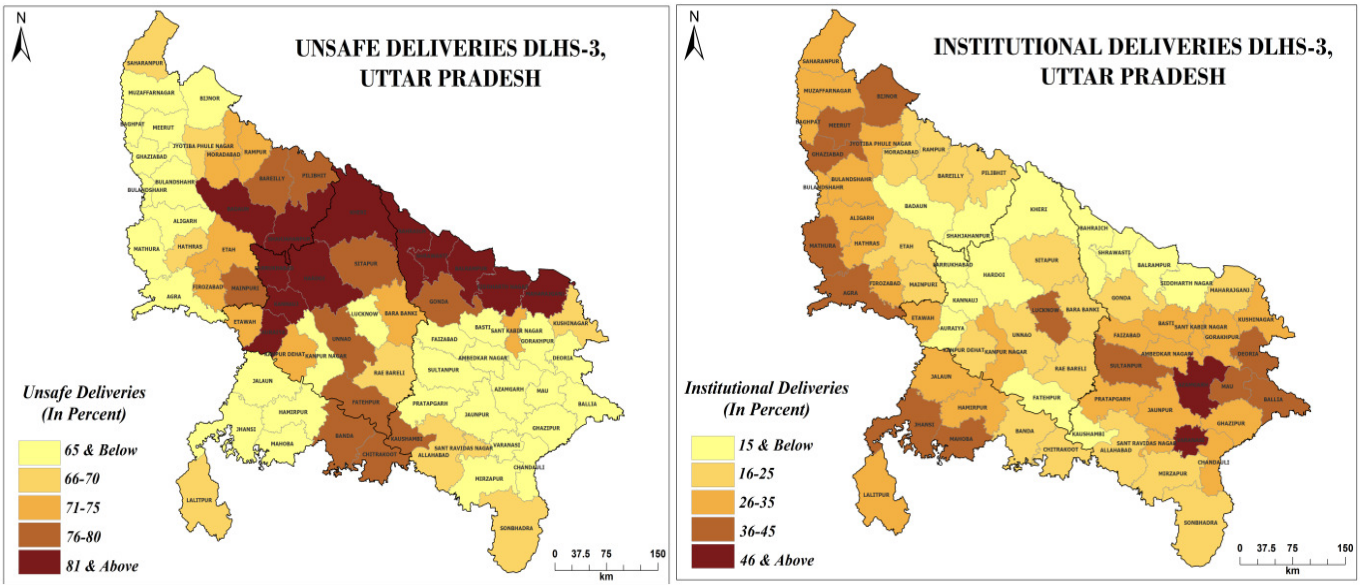

Figure-1: District Wise Unsafe and Institutional Deliveries in Uttar Pradesh, 2008.

Effect and contribution of factors in delivery care: This section is primarily focuses on the role of each socio and demographic factors considering the influence of wealth status on individual socio-demographic factors through decomposition of CI. As we discussed in previous section that the value of CI for not institutional and unsafe delivery was negative during both survey periods in all four regions of state, which shows the deprived position of poorest women in terms of institutional and safe delivery. Explaining the mechanism through which inequalities occurring in delivery care the results of decomposition of CI founds that the selected seven factors contributed 75 percent in non-institutional and 77 percent in unsafe delivery (Table-6 and 8). The illiteracy of women, rural place of residence and not going for ANC were three main contributors (50 percent) in inequalities in delivery care.

It is depicted from Tables-5, 6, 7, 8 that the pattern and sequence of leading contributors in non-institutional and unsafe delivery was same in DLHS-2 and 3 periods, though magnitude has changed. Illiteracy of women was again an important contributor in non-institutional delivery in DLHS, contributing 25 percent in 2002-04 and 23 percent in 2007-08. Not having any ANC was second important factor in non-institutional delivery, but the contribution of No ANC was reduced from 21 percent to 13 percent during 2002-04 to 2007-08. Contribution of the rural place of residence is also reducing which was 19 percent in 2002-04 and 12 percent in 2007-08, but still it is third most important predictor of non-institutional delivery. The role of poor households in institutional delivery is increasing; it was 8 percent in DLHS-2 and 11 percent in DLHS-3. The role of other three factors, belonging to STand SC, illiteracy of husband and four and above birth order of children is increasing and there total contribution was around 11 percent in non-institutional delivery in 2002-04 and it was increased up to 14 percent in 2007-08. Similarly, in case of unsafe deliveries, the rural residence is second highest contributor in unsafe delivery in both the surveys; 22 percent in DLHS-2 and 15 percent in DLHS-3. Results of these tables again prove that ANC is very important factors for maternal health care services. However, the contribution of No ANC by women in unsafe delivery was 20 percent in 2002-04 and reduced up to 13 percent in 2007-08. The contribution of belonging to Poor wealth quintile in unsafe delivery is increasing over the time, 7 percent to 12 percent from DLHS-2 to DLHS-3. In DLHS, illiteracy of mother explains less to not intuitional delivery than NFHS, but contribution was increased 16 to 20 percent during 2002-08. Apart from these factors, belonging to ST and SC, illiteracy of husband and higher birth order of children also contributing in unsafe delivery.

The odds ratio of logistic regression shows that the women whose husbands are highly educated 52 percent more likely to deliver baby in institution relative to not educated husband. The odds ratio of logistic regression in Tables-9 and 10 showed that increasing birth order of baby is associated with decreasing probability of institutional delivery. As compared to first birth order the second birth order is 63 percent and third birth order is 65 percent less likely for institutional delivery. The probability of institutional and safe delivery reduce with increasing level of social deprivation as odd ratio reveals that compare to SC/ST caste group the OBC were 10 percent and Other caste were 48 percent more likelihood for institutional and safe deliveries in DLHS-3.

The findings suggest that initial introduction to maternity care leading to more likelihood for institutional and safe delivery. For instance women went for three and more ANC visits were 3.18 times for institutional and 3.09 times more likely for safe delivery. Similarly women ever went for ANC showing 2.06 times more chances of delivering baby in safe settings.

Table-5: Effects and Contribution of Selected Predictor Variables based on Decomposition Analysis for Non-Institutional Delivery, in Uttar Pradesh, 2002-04.

Predictors	Mean	Marginal effect	CI	Contribution to CI	Percent Contribution
Belonging to Rural Area	0.704	0.111	-0.183	-0.018	18.84
Belonging to ST&SC	0.232	0.043	-0.262	-0.003	3.45
Illiteracy of Women	0.623	0.143	-0.211	-0.024	24.78
Illiteracy of Husband	0.279	0.036	-0.314	-0.004	4.13
Four and above Birth Order	0.416	0.064	-0.131	-0.004	4.56
Not Going for ANC	0.525	0.181	-0.166	-0.02	20.73
Belonging to Poor Wealth quintile	0.211	0.034	-0.784	-0.007	7.5
Non-Institutional Delivery	0.776		-0.098	-0.082	83.99
			Residual	-0.016	16.01

Table-6: Effects and Contribution of Selected Predictor Variables based on Decomposition Analysis for Non-Institutional Delivery, in Uttar Pradesh, 2007-08.

Predictors	Mean	Marginal effect	CI	Contribution to CI	percent Contribution
Belonging to Rural Area	0.825	0.102	-0.104	-0.012	12.47
Belonging to ST&SC	0.209	0.049	-0.241	-0.003	3.5
Illiteracy of Women	0.611	0.136	-0.19	-0.021	22.5
Illiteracy of Husband	0.275	0.048	-0.305	-0.005	5.79
Four and above Birth Order	0.411	0.084	-0.149	-0.007	7.33
Not Going for ANC	0.359	0.142	-0.174	-0.012	12.71
Belonging to Poor Wealth quintile	0.2	0.048	-0.8	-0.01	11.05
Non-Institutional Delivery	0.755		-0.093	-0.07	75.35
			Residual	-0.023	24.65

Table-7: Effects and Contribution of Selected Predictor Variables based on Decomposition Analysis for Unsafe Delivery, in Uttar Pradesh, 2002-04.

Predictors	Mean	Marginal effect	CI	Contribution to CI	% Contribution
Belonging to Rural Area	0.704	0.15	-0.183	-0.027	21.85
Belonging to ST&SC	0.232	0.046	-0.262	-0.004	3.16
Illiteracy of Women	0.623	0.169	-0.211	-0.031	25.11
Illiteracy of Husband	0.279	0.044	-0.314	-0.005	4.4
Four and above Birth Order	0.416	0.068	-0.131	-0.005	4.21
Not Going for ANC	0.525	0.2	-0.166	-0.024	19.72
Belonging to Poor Wealth quintile	0.211	0.039	-0.784	-0.009	7.32
Unsafe Delivery	0.712		-0.124	-0.106	85.76
			Residual	-0.018	14.24

Table-8: Effects and Contribution of Selected Predictor Variables based on Decomposition Analysis for Unsafe Delivery, in Uttar Pradesh, 2007-08.

Predictors	Mean	Marginal effect	CI	Contribution to CI	Percent Contribution
Belonging to Rural Area	0.825	0.139	-0.104	-0.017	15.05
Belonging to ST&SC	0.209	0.047	-0.241	-0.003	2.98
Illiteracy of Women	0.611	0.148	-0.19	-0.025	21.76
Illiteracy of Husband	0.275	0.052	-0.305	-0.006	5.54
Four and above Birth Order	0.411	0.09	-0.149	-0.008	6.91
Not Going for ANC	0.359	0.163	-0.174	-0.015	12.93
Belonging to Poor Wealth quintile	0.2	0.059	-0.8	-0.014	12.01
Unsafe Delivery	0.698		-0.113	-0.088	77.18
			Residual	-0.026	22.82

Table-9: Results of Logistic Regression (odds ratio and confidence interval) Showing Determinants of Institutional Delivery in Uttar Pradesh, 2002-08.

Background characteristics		2002-04	2007-08	Background characteristics		2002-04	2007-08
Place of residence	Rural®	-	-	Education of Husband	Not Educated®		
	Urban	1.41*** (1.29-1.53)	1.19*** (1.10-1.29)		primary	1.19* (0.98-1.43)	1.04 (0.90-1.21)
Religion	Hindu®	-	-		secondary	1.08 (0.98-1.19)	1.26*** (1.17-1.36)
	Non-Hindu	0.83*** (0.76-0.91)	0.94 (0.87-1.02)		Higher	1.41*** (1.27-1.57)	1.52*** (1.39-1.66)
Caste	SC/ST®	-	-	Birth order	First®		
	OBC	1.22*** (1.12-1.33)	1.15*** (1.07-1.24)		Second	0.53*** (0.48-0.58)	0.58*** (0.54-0.63)
	Others	1.43*** (1.29-1.58)	1.48*** 1.36-1.62)		Third	0.41*** (0.37-0.46)	0.47*** (0.43-0.51)
Age of Women in years	Less than 19®	-	-		Four and above	0.31*** (0.28-0.35)	0.36*** (0.33-0.40)
	20-24	1.21*** (1.06-1.37)	1.10* (0.99-1.22)	Pregnancy Complication	Yes®		
	25-29	1.47*** (1.28-1.70)	1.29*** (1.15-1.45)		No	0.70*** (0.65-0.75)	0.87*** (0.82-0.92)
	30-34	1.92*** (1.63-2.27)	1.41*** (1.23-1.61)	Number of ANC Visits	No visit®		
	35 and More	1.91*** (1.58-2.30)	1.49*** (1.28-1.73)		less than Three	2.28*** (2.10-2.47)	2.09*** (1.95-2.24)
Education of Women	Not Educated®	-	-		Three and More	3.86*** (3.54-4.22)	3.18*** (2.94-3.43)
	primary	1.30** (1.05-1.59)	1.22*** (1.07-1.40)	Wealth Quintile	Poorest®		
	secondary	1.17*** (1.07-1.28)	1.26*** (1.17-1.35)		Poor	1.15* (1.02-1.29)	1.16*** (1.05-1.27)
	Higher	2.35*** (2.10-2.63)	2.01*** (1.83-2.21)		Middle	1.40*** (1.24-1.57)	1.31*** (1.19-1.44)
					Rich	1.70*** (1.50-1.91)	1.61*** (1.47-1.77)
					Richest	3.17*** (2.76-3.63)	2.54*** (2.28-2.84)

Note: - ® -Reference category, Level of Significant -***P<0.01, **P<0.05 and *P<0

Table-10: Results of Logistic Regression (odds ratio and confidence interval) Showing Determinants of Safe Deliveries in Uttar Pradesh, 2002-08.

Background characteristics		2002-04	2007-08	Background characteristics		2002-04	2007-08
Place of residence	Rural®	-	-	Education of Husband	Not Educated®	-	-
	Urban	1.55*** (1.43-1.68)	1.41*** (1.31-1.52)		primary	1.12 (.94-1.32)	1.01 (.88-1.16)
Religion	Hindu®	-	-		secondary	1.07 (.99-1.17)	1.21*** (1.12-1.29)
	Non-Hindu	.76*** (.70-.83)	.92** (.86-.99)		Higher	1.45*** (1.32-1.60)	1.49*** (1.37-1.62)
Caste	SC/ST®	-	-	Birth order	First®	-	-
	OBC	1.21*** (1.12-1.31)	1.10*** (1.03-1.17)		Second	.55*** (.50-.60)	.59*** (.55-.64)
	Others	1.39*** (1.27-1.53)	1.48*** (1.36-1.61)		Third	.48*** (.43-.53)	.49*** (.45-.53)
Age of Women in years	Less than 19®	-	-		Four and above	.39*** (.35-.44)	.39*** (.36-.43)
	20-24	1.15** (1.02-1.29)	1.11** (1.00-1.23)	Pregnancy Complications	Yes®	-	-
	25-29	1.27*** (1.11-1.45)	1.25*** (1.11-1.40)		No	.69*** (.65-.74)	.86*** (.82-.91)
	30-34	1.45*** (1.25-1.69)	1.31*** (1.15-1.48)	Number of ANC Visits	No visit®	-	-
	35 and More	1.50*** (1.26-1.77)	1.40*** (1.22-1.61)		less than Three	2.15*** (2.00-2.31)	2.06*** (1.94-2.20)
Education of Women	Not Educated®	-	-		Three and More	3.66*** (3.37-3.97)	3.09*** (2.88-3.32)
	primary	1.31*** (1.09-1.59)	1.21*** (1.07-1.37)	Wealth Quintile	Poorest®	-	-
	secondary	1.32*** (1.21-1.43)	1.26*** (1.18-1.34)		Poor	1.10* (.99-1.22)	1.17*** (1.07-1.27)
	Higher	2.67*** (2.39-2.99)	2.09*** (1.90-2.30)		Middle	1.30*** (1.18-1.44)	1.33*** (1.22-1.44)
					Rich	1.68*** (1.51-1.87)	1.63*** (1.49-1.77)
					Richest	3.00*** (2.65-3.40)	2.56*** (2.31-2.84)

Note: ® -Reference category, Level of Significant -***P<0.01, **P<0.05 and *P<0.

Conclusion

The findings of this study were accordant with many past studies that emphasized on role of economic status and social status of women in inequality in maternal health care utilization. The inequalities in utilization of delivery care have narrowed slightly over time in Uttar Pradesh and its four regions. The overall coverage of delivery care services is higher in southern and eastern part of the state, co-existed with higher persistence of inequalities across socio-economic groups. It is interesting to note that wealth based inequality has decreased in the western, central and southern regions, whereas it increased in the eastern region from DLHS-2 to DLHS-3. This study showed the consistency with the fact that distribution of things vary with the geography. The existing regional differential in utilization of delivery care services could be argued in context of number of urban centres and rate of urbanization in a particular region. The result found that the western and central part of state showing high relative coverage of safe deliveries, however the trend was declining between two survey periods. The urban centres assumed as providing better availability of public health services compare to rural locations, but the increasing numbers of urban poor who are still deprived of quality health care and basic opportunities, are new side of coin. The trend has shown very sluggish increase in coverage of institutional deliveries from DLHS-2 to DLHS-3 in Uttar Pradesh and its four regions. The coverage of institutional deliveries more in favour of urban women, highly educated women, wife of highly educated

husband, women of other caste groups, richest women and first birth order of child. Moreover, these categories of women also noticed remarkable increase in coverage of institutional deliveries over time. The detailed examination of trend shows that over the period of time coverage of delivery care services has increased among already privileged women, whereas the deprived women still lacking socio-economic access to health services. The result of decomposition analysis reveals that apart from wealth status of women, the education attainment and urban and rural place of residence play a substantial role in not utilizing maternal health care services[12,8]. Prior literature asserted that the secondary and higher educational attainment of women affects use of antenatal, delivery care, post-natal and reproductive services in many ways including increasing agency and autonomy of women and greater exposure to information of modern health care practices[30]. This study has reflected that it's not only women's education but the educational attainment of husband has substantial contribution in utilization of maternal health care services[31]. The finding of Uttar Pradesh Male Reproductive Survey (MRHS) suggest that the married men in the northern Indian state of Uttar Pradesh who were better educated were significantly more knowledgeable about the serious problems a women may experience during delivery[15].

Furthermore, the social positioning of women plays a decisive role in accessibility and affordability of services. In India where social hierarchies are dominant in practice, women of Schedule and other backward caste groups are subjects of discrimination and neglect by health practitioner and other local dominant social groups (Brahmin and other caste groups). Bhatia et al. 1995 found that the advantageous position of high caste Hindu in terms of educational attainment, household wealth, social capital contribute substantially in their greater access to modern health care services[16,27,32]. The current study showed that women who were exposed to modern heath care services during the initial phase of maternity (ante-natal period) were more likely to go for institutional delivery. During ANC checkups women were made aware about the advantages of institutional delivery for women and new born and other incentives given to women covered by various governmental schemes. In conclusion this study has shown that within a state there are lot of variation at regional and district level in utilization of different kind of maternal health care services and furthermore the each socio-economic factor are in itself associated with different exposure of using maternal health care services. This study posit that it's not only the educational achievements of women but the education attainment of husband also play a crucial role in utilization of maternal health care services, whereas the policy discourse still emphasise on women education isolated to husband's education. Moreover, within high focused states there is some high focused district, which needs intensive efforts to bring women in to contact of modern maternal health care services. This study has tried to give the detailed insight of spatial, social and economic inequalities which are prevailing in utilization of delivery care services and the pathways through which these inequalities can be addressed. Although further research is needed in order to understand the quality of maternal health care and differential in treatment from heath practitioner side reported by the women of different socio-economic and demographic strata. This study paves the way to further research in order to suggest policy maker more effective measures to address the prevailing socio-economic and spatial inequalities in maternal health care.

References

1. WHO (2010). Trends in Maternal Mortality : 1990 to 2010. *World Health Organization*.
2. MHFW (2011). Ministry of Health and Family Welfare. *Annual Report to the People On Health*.
3. Gottlieb P. and Lindmark G. (2002). WHO indicators for evaluation of maternal health care services, applicability in least developed countries: a case study from Eritrea. *Afr. J. Reprod. Health* **,** 13-22.
4. DLHS-3 (2007). District Level Household and Facility Survey.
5. Registrar General of India (2013). Special bulletin on maternal mortality in India 2010–12. *Government of India*.
6. Dasgupta R. and Qadeer I. (2005). The National Rural Health Mission (NRHM): a critical overview. *Indian J. Public Health,* 49(3), 138-140.
7. International Institute for Population Sciences (2007). India National Family Health Survey (NFHS-3), 2005-06.
8. Kumar C., Singh P.K. and Rai R.K. (2013). Coverage gap in maternal and child health services in India: Assessing trends and regional deprivation during 1992-2006. *J. Public Heal. (United Kingdom),* 35(4), 598-606.
9. Mohanty S.K. and Pathak P.K. (2009). Rich-poor gap in utilization of reproductive and child health services in India, 1992-2005. *J. Biosoc. Sci.,* 41**,** 381-98.
10. Tiwari M. and Kumar K. (2001). Women ' s Autonomy and Utilization of Maternal and Child Health Care Services in India. 1-4.
11. Malhotra C. and Do Y.K. (2013). Socio-economic disparities in health system responsiveness in India. *Health Policy Plan.,* 28(2)**,** 197-205.
12. Ononokpono D.N. and Odimegwu C.O. (2014). Determinants of Maternal Health Care Utilization in Nigeria: a multilevel approach. *Pan African Medical Journal,* 17.
13. Rao P.S. and Richard J. (1984). Socioeconomic and demographic correlates of medical care and health practices. *J. Biosoc. Sci.,* 16(3)**,** 343-355.
14. Furuta M. and Salway S. (2006). Women's position within the household as a determinant of maternal health care use in Nepal. *Int. Fam. Plan. Perspect.,* 32(1), 17-27.

15. Rowe Meredith L., Kumar Bijaya Thapa, Levine Robert, Levine Sarah and Tuladhar Sumon K. (2005). How Does Schooling Influence Maternal Health Practices ? Evidence from Nepal. *Comp. Educ. Rev.* 49(4), 512-533.

16. Bhatia J.C. and Cleland J. (1995). Determinants of maternal care in a region of South India. *Heal. Transit. Rev.,* 5, 127-142.

17. Drèze J. and Sen A. (1996). India: Economic Development and Social Opportunity. *Canadian Journal of Development Studies*, 17, 554-557.

18. Baru R., Acharya A., Acharya S., Kumar K.S. and Nagaraj K. (2010). Inequities in Access to Health Services in India. *Econ. Polit. Wkly.,* xlv**,** 49-58.

19. Patra S., Arokiasamy P. and Goli S. (2014). Relevance of Health Knowledge in Reporting Maternal Health Complications and Use of Maternal Health Care in India. *Health Care Women Int.,* 1-19. doi:10.1080/07399332.2014.946509

20. Falkingham J. (2003). Inequality and changes in women's use of maternal health-care services in Tajikistan. *Stud. Fam. Plann.,* 34, 32-43 .

21. Bronstein J.M. and Morrisey M.A. (1990). Determinants of rural travel distance for obstetrics care. *Med. Care,* 28(9), 853-866.

22. Chen M.K. (1982). Health Care Services and Health Status in a Rural Setting: The Utility of Some Predictors. *Inquiry,* 19(3), 257-261.

23. Arokiasamy P. and Pradhan J. (2013). Maternal health care in India : access and demand determinants. 14(4), 373-393. doi:10.1017/S1463423612000552

24. Ram F. and Singh A. (2006). Is antenatal care effective in improving maternal health in rural uttar pradesh? Evidence from a district level household survey. *J. Biosoc. Sci.,* 38(4), 433-448.

25. Registrar General of India.(2013). Special Bulletin on Maternal Mortality: 2010-2012. 11-14.

26. Wagstaff A., Paci P. and Van Doorslaer E. (1991). On the Measurement of inequalities in Health. *Soc. Sci. Med.,* 33(5), 545-557.

27. Gupta A., Kumar P. and Dorcas O.A. (2016). Decomposing the Socio-economic Inequalities in Utilization of Full Antenatal Care in Jharkhand State, India. *International Journal of Population Studies,* 2(2), 92-106.

28. Wagstaff Adam, Doorslaer Eddy Van and Watanabe Naoko (2003). On decomposing the causes of health sector inequalities with an application to malnutrition inequalities in Vietnam. *J. Econom.,* 112(1), 207-223.

29. Singh R.K. and Patra S. (2013). Differentials in the Utilization of Antenatal Care Services in EAG states of India. 2, 28-32.

30. World Bank (2012). Education and health: Where do gender differences really matter?. *World Dev. Rep.,* 104-148.

31. Martin Sandra L., Moracco Kathryn E., Garro Julian, Tsui Amy Ong, Kupper Lawrence L., Chase Jennifer L. and Campbell Jacquelyn C. (2002). Domestic violence across generations : findings from northern India. 31(3), 560-572.

32. Yadav A. and Kesarwani R. (2016). Effects of Individual and Community factors on Maternal Health Care Services Use in India: A multilevel Approch. *J. Biosoc. Sci,* 48, 1-19.