Original Research Article

Factors affecting maternal health care seeking behaviour in northeast states, India: evidence from district level household survey-4 (2012-2013)

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ABSTRACT

Background: In context of reducing maternal mortality ratio, Government of India has implemented various programs and public health facility centres in order to provide quality services at the time of delivery. In this paper, we assessed the factors for home, private and public health facility sector utilization of delivery care in Northeast state, India. District Level Household Survey fourth round was used to carried out analysis and data was extracted for the childbirth during the last five years preceding the survey.

Methods: The outcome variable was categorical, thus multinomial logistic regression was used to assess the factors of each variable independently on the predictor variables. To check the collinearity, variance inflation factor (VIF) was computed for all variables prior to inclusion of multilevel logistic regression.

Results: This shows that equal proportion of delivery was conducted at home (45%) and public health facility (45.2%) in comparison with private health facility (9.8%). For the choice set of public versus home, women with higher number of living children, wealth quintile and living in urban areas were associated with greater odds of delivering at public health facility centres.

Conclusions: The initiative programs can be implemented by the government by sending trained professionals with supplements required by pregnant women at each and every district in order to promote maternal health and recruit more interdisciplinary team, which will be responsible for maintaining women and infant health, and thus providing appropriate medical advice.

Keywords: Delivery care, Health facility, Maternal, Northeast states

INTRODUCTION

Globally, about 830 women die every day due to preventable pregnancy related cause (WHO, 2015), and out of which 99% of the deaths occur in developing countries.[1] According to the Millennium Development Goal 4 and 5 report, the maternal mortality ratio by 2010 is 200 deaths per 100,000 live births, as compared to 390 deaths per 100,000 live births by 2000.[2] The Sustainable Development Goal 3 focuses on the improvement of maternal health care, and to minimise the rate of maternal mortality to even less than 70 by 2030.[3]

In addition, providing quality services to all women at the time of child birth to not only save the life of mother, but their new born babies too. Several studies has presented the fact that poor availability of resources and services was one of the major cause of not utilizing quality services provided at the time of delivery. However, even if the services are readily available, women belonging to

illiterate class, poorest wealth quintile and residence of rural areas are devoid of these facilities.[4,5]

Many studies have reported the direct links in between the pregnancy related complications (occurred at the time of delivery) and maternal deaths in developing countries.[6] Quality of delivery care can only be enhanced with the better choice of delivery location as this would leads reduction in maternal mortality rate and improvises the health of both mother and child. The choice of delivery location in India can be broadly classified into three categories, namely home, public and private health facility.

Amongst all, home delivery is one of the cheapest options but is highly associated with high risk of maternal mortality. Public health facility is usually owned by government and charge minimal costs but, often the basic requirements are missing. In comparison, private health facility sector are expensive but are equipped with necessary amenities required for the women and her new born. Surprisingly, maximum number of women prefers to deliver at home because of several reasons, such as women with lack of decision making autonomy, dependency on husband and other family members, lack of money, and resources and thus all these factors prevents them to take adequate decisions concerning theirs and infant health.[7] Thus, women are required to empower in order to take necessary decisions at the time of pregnancy, thus eliminating the barriers that prevent them in opting quality services on time.

The purpose of the present study is to understand the major determinants of delivery location, i.e., home, public and private health facility in Northeast States of India using the data from District Level Household Survey-4 (2012-13). Northeast states of India is comprised of seven states, commonly known as seven sisters, which are, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. Meghalaya, Manipur and Tripura are amongst the densely populated states in north-east region of India, whereas literacy rate is high in Mizoram and Sikkim (Census 2011, RGI, GoI).

METHODS

We used the data from fourth round of District Level Household Survey (DLHS) conducted during 2012-13. A multi-stage stratified with probability proportional to size sampling design was adopted for rounds of survey. In rural area two-stage stratified sampling and in urban area three-stage stratified sampling were adopted.[8]

Outcome variable

A categorical dependent variable was computed for this analysis based on the most recent child birth (live or still birth). It has been categorised into three nominal response, that is, "Home" if the mother reported that the most recent child birth occurred at home or parent's

home, proportion of delivering at work place or on the way to hospital were negligible, "Public" if the most recent birth occurred in government hospital/dispensary, community health centre, rural hospital, public health centre, sub centre, urban health centre or urban family welfare clinic, and "Private" if the most recent birth occurred at private hospital or clinic or dispensary, private ayush hospital or clinic or non-government organisation (NGO).

Predictor variables

We have selected a range of demographic and socio-economic status. The variables included in the study are mother's age, mother's education, husband's education, occupation, no. of living children, religion, caste, wealth quintile, and community variables as place of residence, percentage of illiterate women in psu's, and percentage of tribal population and urbanization.

Analytical approach

The unit analysis was women who had given a child birth in past five years in Northeast states, India. The descriptive statistics and multinomial logistic regression was carried out to analyze the data. Descriptive statistics was carried out to describe the utilization of delivery care services for each category by the selected variables. The outcome variable was categorical, thus multinomial logistic regression was used to assess the factors of each variable independently on the predictor variables.

To check the collinearity, Variance Inflation Factor (VIF) was computed for all variables prior to inclusion of multilevel logistic regression. Thus, the presence of collinearity was not found between the explanatory variables in the regression model (highest VIF = 1.95).Results of the multinomial logistic regression were presented as estimated relative risk ratio (RRR) with 95% C.I. STATA (StataCorp Texas, USA) 13.0 version software used for analyzing the present study with svy command and MLwin (Centre for Multilevel Modelling, University of Bristol) software 2.30 version.

Ethical Statement

The data used in the study is available in public domain so, no ethical issue is involved.

RESULTS

The women interviewed in Northeast state under DLHS-4, who have undergone any sought of delivery care, were 15,415 out of 46,106 in totals. Table 1 represents the weighted proportion of respondents who had childbirth during the last five years preceding the survey by selected background characteristics of an individual household and community. The minimum age of the woman was 15 years while the maximum age was 49 years. The maximum proportion of women was under the age

category 20-34 years at last birth was 80.2%. The proportion of women with respect to educational level was 0.5% for illiterate, 33.6% for less than 5 years, 38.3% for 5-9 years and 27.5% for more than 10 years of education.

Table 1: Percent distribution of woman who had given birth during the last five years preceding the survey by selected background characteristics, Northeast States, India; DLHS-4 (2012-2013).

Background characteristics	Sample (n=15,415)	Weighted proportion	95% C.I
Maternal Age			
15-19	1405	9.1	[8.6,9.6]
20-34	12357	80.2	[79.6,80.8]
35-49	1653	10.7	[10.3,11.2]
Mother's education			
Illiterate	83	0.5	[0.4,0.7]
Less than 5 years	5195	33.6	[31.9,35.4]
5-9 years	5906	38.3	[37.3,39.4]
10 or more years	4231	27.5	[25.9,29.2]
Husband's education			
Illiterate	3061	19.8	[18.6,21.1]
Less than 5 years	1321	8.6	[7.9,9.3]
5-9 years	5705	37.0	[36.2,37.9]
10 or more years	5328	34.6	[32.8,36.3]
Occupation			
Not Working	12017	77.9	[76.9,78.8]
Working	3398	22.1	[21.2,23.1]
No. of living children			
1	5156	33.4	[32.5,34.4]
2-3	7006	45.4	[44.4,46.3]
4+	3253	21.2	[20.3,22.1]
Religion			
Hindu	3958	25.8	[24.6,27.0]
Christian	8246	53.5	[52.1,54.9]
Others	3211	20.7	[19.4,22.1]
Caste			
Schedule Caste	932	6.0	[5.3,6.8]
Schedule Tribe	11368	73.7	[72.2,75.2]
Other Backward Classes	1000	6.5	[5.8,7.2]
Others	2115	13.8	[12.7,15.0]
Place of residence			
Rural	11989	77.7	[70.8,83.3]
Urban	3426	22.3	[16.7,29.2]
Wealth Quintile			
Poorest	3105	20.0	[18.3,22.0]
Poorer	3531	22.9	[21.5,24.4]
Middle	2727	17.7	[16.9,18.5]
Richer	2976	19.4	[18.2,20.6]
Richest	3076	20.0	[18.0,22.1]
States			
Sikkim	988	6.4	[5.9,6.9]
Arunachal Pradesh	4633	30.1	[28.5,31.7]
Nagaland	1351	8.7	[8.0,9.4]
Manipur	2485	16.1	[15.2,17.1]
Mizoram	2955	19.2	[17.9,20.5]
Tripura	1243	8.0	[7.3,8.8]
Meghalaya	1760	11.5	[10.5,12.5]

Sources: Based on author's computation.

Table 2: Weighted percent distribution of place of delivery by selected individual, household and community characteristics in northeast, India; DLHS-4 (2012-2013).

Background characteristics	Home	Public health facility	Private health facility
	% [95% C.I]	% [95% C.I]	% [95% C.I]
Individual- household level variables			
Maternal Age			
15-19	42.3 [39.3,45.4]	51.3 [48.3,54.2]	6.4 [5.1,7.9]
20-34	43.8 [41.6,46.1]	46.0 [44.3,47.8]	10.2 [9.3,11.1]
35-49	56.3 [52.7,59.7]	33.7 [30.4,37.2]	10.1 [8.3,12.2]
$\chi2$=132.69 (p= 0.000)			
Mother's education			
Illiterate	58.2 [46.3,69.2]	40.5 [29.6,52.5]	1.3 [0.2,8.5]
Less than 5 years	68.1 [65.9,70.3]	28.3 [26.4,30.3]	3.6 [3.0,4.3]
5-9 years	41.5 [39.3,43.7]	52.0 [50.0,54.0]	6.4 [5.7,7.3]
10 or more years	21.4 [19.6,23.3]	56.3 [54.5,58.1]	22.3 [20.8,23.8]
$\chi2$=2617.2 (p= 0.000)			
Husband's education			
Illiterate	66.7 [63.9,69.4]	28.7 [26.5,31.1]	4.6 [3.5,6.0]
Less than 5 years	61.6 [58.5,64.6]	35.5 [32.6,38.5]	2.9 [2.2,3.8]
5-9 years	45.9 [43.8,48.1]	48.2 [46.3,50.2]	5.9 [5.2,6.7]
10 or more years	27.5 [25.6,29.5]	53.7 [52.1,55.4]	18.7 [17.4,20.1]
$\chi2$=1741.8 (p= 0.000)			
Religion			
Hindu	29.5 [27.2,32.0]	56.8 [54.5,59.0]	13.7 [12.3,15.2]
Christian	49.9 [47.3,52.6]	41.0 [38.7,43.2]	9.1 [8.1,10.2]
Others	51.6 [48.4,54.9]	41.5 [38.6,44.5]	6.8 [5.6,8.3]
$\chi2$=541.8 (p= 0.000)			
Caste			
Schedule Caste	28.0 [24.7,31.5]	59.7 [55.8,63.5]	12.3 [9.7,15.5]
Schedule Tribe	50.7 [48.3,53.0]	41.2 [39.2,43.2]	8.1 [7.3,9.0]
Other Backward Classes	28.7 [24.6,33.3]	59.3 [54.7,63.7]	12.0 [9.5,14.9]
Others	29.9 [26.5,33.5]	53.5 [50.7,56.3]	16.6 [14.4,19.0]
$\chi2$=608.8 (p= 0.000)			
Occupation			
Not Working	43.4 [41.2,45.5]	46.9 [45.1,48.6]	9.8 [8.9,10.6]
Working	50.8 [47.5,54.1]	39.2 [36.4,42.0]	10.0 [8.6,11.6]
$\chi2$=68.1 (p= 0.000)			
No. of living children			
1	30.0 [28.0,32.2]	56.2 [54.5,57.9]	13.8 [12.5,15.1]
2-3	46.9 [44.6,49.3]	44.1 [42.0,46.1]	9.0 [8.1,10.0]
4+	64.6 [62.0,67.1]	30.1 [27.8,32.6]	5.3 [4.4,6.2]
$\chi2$=1001.3 (p= 0.000)			
Wealth Quintile			
Poorest	76.6 [74.3,78.6]	21.3 [19.3,23.3]	2.2 [1.6,2.9]
Poorer	59.9 [57.9,61.8]	35.9 [34.1,37.7]	4.2 [3.6,5.0]
Middle	44.1 [41.7,46.4]	49.3 [46.9,51.7]	6.6 [5.6,7.8]
Richer	29.4 [27.4,31.4]	59.7 [57.7,61.6]	11.0 [9.8,12.3]
Richest	12.4 [11.0,13.8]	62.1 [60.1,64.1]	25.5 [23.4,27.8]
$\chi2$=3658.9 (p= 0.000)			
Community and District level variables			
Place of residence			
Rural	52.9 [51.0,54.7]	40.4 [39.0,41.9]	6.7 [6.0,7.5]
Urban	17.7 [15.5,20.1]	61.7 [59.3,64.0]	20.6 [18.0,23.5]
$\chi2$=1532.5 (p= 0.000)			
Percentage of illiterate women in psu's			
0-25	34.1 [32.1,36.1]	53.4 [51.6,55.2]	12.5 [11.5,13.6]
26-50	56.2 [52.8,59.6]	37.6 [34.6,40.7]	6.2 [5.2,7.4]

>50	72.0 [68.6,75.1]	23.9 [21.1,26.8]	4.1 [3.1,5.4]
$\chi2$=1420.5 (p= 0.000)			
Percentage of Tribal Population in district			
0-25	20.5 [17.1,24.4]	57.3 [54.1,60.5]	22.2 [19.1,25.6]
26-50	32.9 [29.3,36.8]	58.3 [54.9,61.6]	8.8 [7.3,10.6]
>50	50.1 [47.6,52.6]	41.3 [39.2,43.4]	8.7 [7.8,9.6]
$\chi2$=699.1 (p= 0.000)			
Urbanization in district			
0-25	57.5 [54.4,60.5]	35.0 [32.7,37.4]	7.5 [6.5,8.7]
26-50	31.0 [27.7,34.5]	57.7 [55.0,60.4]	11.3 [9.6,13.2]
>50	20.7 [18.2,23.5]	63.5 [60.0,66.8]	15.8 [13.4,18.5]
$\chi2$=1503.7 (p= 0.000)			
Total	45.0 [42.8,47.2]	45.2 [43.4,46.9]	9.8 [9.0,10.7]

Source: Based on author's computation.

More than one-third (77.9%) of the population of women was not working and half of the population (53.5%) comes under Christian religion. Almost one-third (73.7%) of the women belongs to schedule tribe category. The household economic status was represented as wealth quintile, where 20% belongs to poorest category and 22.9% belongs to poorer category.

Thirty percent of studied population was under the Arunachal Pradesh of northeast state. To identify the factors associated with the place of delivery, we examined the bivariate differentials of the selected demographic and socio-economic characteristics. Table 2 represents the weighted percentage with 95% C.I of women in accordance with place of delivery by selected background characteristics.

Results indicate that majority of women delivered at public health facility (45.2%), and at home (45.0%) whereas the percentage of delivery at private health facility (9.8%) was comparatively low.

Women of age group 35-49 years shows 56.3% of birth occurred at home, 33.7% of delivery took place at public health facility while the proportion was low in private health facility (10.1%).

The proportion of birth in public health facility was bit high (56.3%) for women who had more than 10 years of education as compared to the home delivery (21.4%) and private health facility (22.3%).

Substantial increase in birth order leads to increment in the larger proportion of birth occurred at home delivery, for instance, the proportion was found in first birth order was 30%, in second and third birth order was 46.9% and 64.6% in the four and above birth order. Among the households of poorest wealth quintile to richest wealth quintile shows the increasing trend for the proportion of birth in private health facility (2.2% and 25.5%

respectively) and decreasing trend in home delivery (76.6% and 12.4% respectively). Strikingly, percentage of illiterate women in psu's and tribal population shows almost similar trend in proportion of births with respect to place of delivery. Also, compared to rural areas where only 6.7% of births occurred at private health facility, a larger proportion of birth was 20.6% in urban areas.

Table 3 represents the results of multinomial logistic regression model which presents the relative risk ratio of factors on the likelihood of delivery with 95% confidence interval.

Results for the set of public versus home delivery, and private versus home, women with higher number of living children and wealth quintile and those who were living in urban areas had greater odds of delivering at public and private health facility, compared to home delivery.

While increasing maternal age, following religion other than Hindu, belongs to schedule tribe category and percentage of illiterate women in psu's were associated with greater odds of delivering child at home. Moreover, wealth quintile was also the most significant determinant, with the high standard of living leads to the greater likelihood of delivering at private health facility.

We also found the similar trend when we considered the public health facility deliveries however; the case was totally opposite for delivery at home. Compared the women who had one living children, women with two or three living children had 44% less likely of delivery at public, while women with four living children had 57% less likely to delivery at public. A similar trend was noted for percentage of illiterate women in psu's; women who were in the proportion of >50% of illiteracy had 35% lesser odds of delivering at public health facility. Respondents belonging to age category 20-34 years and 35-49 years were 1.56 and 2.07 times respectively, more likely to deliver at private health facility.

Table 3: Multinomial logistic regression analysis of the odds of delivering at public, private health facility vs home.

Background Characteristics	Public vs. Home		Private vs. Home	
	RRR	[C.I]	RRR	[C.I]
Individual- household level variables				
Maternal Age				
15-19	1		1	
20-34	1.12	[1.0, 1.3]	1.56	[1.2, 2.0]
35-49	1.08	[0.9, 1.3]	2.07	[1.5, 2.9]
Mother's education				
Illiterate	1		1	
Less than 5 years	0.82	[0.5, 1.4]	3.45	[0.5, 25.8]
5-9 years	1.29	[0.8, 2.1]	5.11	[0.7, 38.0]
10 or more years	1.56	[0.9, 2.6]	12.02	[1.6, 89.5]
Husband's education				
Illiterate	1		1	
Less than 5 years	0.83	[0.7, 1.0]	0.55	[0.4, 0.8]
5-9 years	0.93	[0.8, 1.1]	0.69	[0.5, 0.9]
10 or more years	1.02	[0.9, 1.2]	1.14	[0.9, 1.5]
Religion				
Hindu	1		1	
Christian	0.57	[0.5, 0.6]	0.70	[0.6, 0.9]
Others	0.66	[0.6, 0.7]	0.58	[0.5, 0.7]
Caste				
Schedule Caste	1		1	
Schedule Tribe	0.71	[0.6, 0.9]	0.52	[0.4, 0.7]
Other Backward Classes	0.87	[0.7, 1.1]	0.86	[0.6, 1.2]
Others	0.79	[0.6, 1.0]	0.87	[0.6, 1.2]
Occupation				
Not Working	1		1	
Working	0.90	[0.8, 1.0]	0.95	[0.8, 1.1]
No. of living children				
1	1		1	
2-3	0.56	[0.5, 0.6]	0.47	[0.4, 0.5]
4+	0.43	[0.4, 0.5]	0.38	[0.3, 0.5]
Wealth Quintile				
Poorest	1		1	
Poorer	1.63	[1.4, 1.8]	1.91	[1.4, 2.6]
Middle	2.41	[2.1, 2.7]	2.80	[2.1, 3.8]
Richer	3.51	[3.1, 4.0]	4.97	[3.7, 6.7]
Richest	7.00	[5.9, 8.3]	17.56	[12.9, 23.8]
Community and District level variables				
Place of residence				
Rural	1		1	
Urban	1.63	[1.5, 1.8]	2.12	[1.8, 2.5]
Percentage of illiterate women in psu's				
0-25	1		1	
26-50	0.79	[0.7, 0.9]	0.77	[0.6, 0.9]
>50	0.65	[0.6, 0.7]	0.76	[0.6, 1.0]
Percentage of Tribal Population in district				
0-25	1		1	
26-50	1.58	[1.3, 2.0]	0.71	[0.5, 1.0]
>50	1.06	[0.9, 1.3]	0.60	[0.4, 0.8]
Urbanization in district				
0-25	1		1	
26-50	1.78	[1.6, 2.0]	0.87	[0.7, 1.0]
>50	2.37	[2.1, 2.7]	1.72	[1.4, 2.1]

Source: Based on author's computation.

Moreover, women belonging to schedule tribes were 71% less likely to deliver at public health facility and 52% less likely to deliver at private health facility.

DISCUSSION

Turning on to the discussion of our findings based on the output of multinomial logistic regression model, women education, wealth quintile and those living in urban areas show the positive influence on delivering at private and public health facility. The 27.5% of health facility delivery rate in Northeast states of India was much low as compared to the whole India average for institutional deliveries.[9]

Of the place of delivery in Northeast states, almost equal proportion took place in home and public health facility whereas there was wide gap in between to private health facility. Low economic development, less educated respondents and non-working class and major proportion from rural residence might be the fact of discrepancy in the institutional deliveries. Many studies found that maternal and paternal education, and schedule tribe status were the factors responsible for determining the choice of delivery among private and public/home deliveries.[10]

This study reveals that women belonging to schedule tribe state were less likely to deliver at private and public health facility. Also, the result showed that increasing maternal education and household socio-economic status (wealth quintile) leading to the increasing proportion of utilization of institutional deliveries. Thus, education leads to better health awareness and this may cause family to provide quality of health services at the time of delivery.[11,12]

The common perception of our country was that private facilities were better in providing quality care to women than public health facility.[13] Unfortunately, the present study has lack of quality indicators but private health facility delivery were more opted by the richest wealth quintile and urban population. Interestingly, with an increase in the number of living children, they were more likely to occur at home.[14-16]

CONCLUSION

The purpose of our study is to analyse the choice of delivery location in Northeast states, India. With the substantial increase in maternal education and awareness, there was a possibility in achieving reduction to maternal mortality rate as delivery care was among the important key factors of maternal care.

Efforts should be made in terms of education, outreach programs and policies to build up awareness among women along with family members. Thus, it will enhance the communication of a woman with her husband and other family members and helps to develop a confidence in them to make decision related to their health problems.

Thus it is key factor to bring up changes in health related issues. Spreading information and generating awareness about the availability of various subsidized health services utilize by mother that government run could help to improve the status of maternity services among certain groups. Firstly, home deliveries in Northeast states should be taken place under the guidance of trained attendant or doctors. Making sure that at every antenatal visit to doctor is accompanied with a discussion regarding signs and symptoms experienced by the pregnant women. Any concerns associated with antenatal and postnatal care should be accounted.

Secondly, in the case of private health delivery care system if the Indian economy continues to grow it will leads to the growth in household income and in turn there was an increase in the utilization of private health facility to ensure quality services. Thirdly, public sector delivery care should be improved as the maximum of this sector services were utilized by low and middle income group of our country and maximum proportion belongs to these categories only.

Hence to achieve goal, the programs initiated by government who aims to strengthen maternal care like National Health Mission and Janani Suraksha Yojana and education sector has to move in right direction in order to reduce maternal mortality rate, and thus enhancing the quality care deliver at the time of childbirth. In addition, government should recruit more interdisciplinary team, which will be responsible for maintaining women and infant health, and thus providing appropriate medical advice.

The team should include gynaecologists, paediatricians, physiotherapists and nursing staff. In certain hospitals, antenatal and postnatal educational sessions are delivered by these doctors and physiotherapists to educate the mother and family, as to what expect during delivery and what are the factors which should be considered and subsequently monitored after delivery. Moreover, initiative programs can be implemented by the government at rural areas by sending trained professionals with supplements required by pregnant women at each and every districts in order to promote maternal health.

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