Importance of Socio-Demographic Factors on Utilization of Maternal Health Care Services in India

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Abstract: There is a great socio-demographical discrepancy in utilization of maternal health care services in India. While social differences have long been established, why women in a few socio-economic groups are more likely to utilize maternity care than the others still remains inadequately understood. Furthermore, many women in particular socio-demographic groups also suffer from complications of pregnancy, delivery and maternal health care service utilization is far below the acceptable level. An attempt has been made in this study to examine the effect of socio-demographic factors on utilization of maternal health care services in India. National family health survey 2005-06 has been used to carry-out the analysis which is national representative survey of women in the age group 15-49. Basically two outcome variables i.e. use of antenatal care services and use of assistance during delivery by health professional used to estimate effect of socio-demographic variable on maternal health services utilizations. The result showed that only 77% of the women received antenatal care while 99.4% received assistance during delivery from health professional. In the logistic regression model educational status of the mother, household wealth, place of residence, birth order of the child and educational and occupational status of the husband were found to be strong indicators of utilization in the total sample of women.

Keywords: Antenatal Care, Assistance during Delivery and Place of Residence

1 Introduction

1.1 Overview of maternal health

The term maternal health includes the health of women during pregnancy, childbirth and the postpartum period. It encompasses the health care dimension of family planning, preconception, prenatal and postnatal care in order to reduce maternal morbidity and mortality [1,2,19,20,21]. In developing countries, pregnancy and child birth complications are major causes of maternal and child death [3] and these deaths are attributed to the fact that most pregnant mothers do not get the appropriate care [4] they need as a result of certain barriers to the health care facilities. According to WHO [5], maternal death is defined as death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management [6, 7,8], but not from accidental or incidental causes [9]. Globally, over half a million women die as a result of childbirth or pregnancy complication with approximately 99% of these deaths occurring in developing countries [3]. However, India accounts for the maximum number of maternal deaths in the world - 17 per cent or nearly 50,000 of the 2.89 lakh women who died as a result of complications due to pregnancy or childbearing [3,9].

1.2 Antenatal and delivery care services in India

Antenatal care (ANC) service is important as it offers pregnant women an opportunity to get different services which alerts the woman to the risks associated with pregnancy and for discussing her options for safe delivery [10,18]. Globally 30% of women aged 15-40 do not have ANC. Forty six percent of those who did not have ANC are in south Asia while 34% are in sub-Saharan Africa. Studies have shown that the use of health-care services is related to the availability, quality

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and cost of services, as well as to the social structure, health beliefs and individual characteristics of the users [11,12]. Studies also documented a strong association of the caste system with the antennal care visits [13,14].

Skilled attendance at birth has been adopted as a leading indicator of maternal health for numerous international agreements and agencies. In developed countries, 99% of deliveries are conducted by skilled attendants compared to 59% in developing income countries where over 90% of maternal death occurs [6]. Study in rural India showed that institutional delivery is much more common for first births than for subsequent births [15,16]. Another study in Punjab showed that more respondents reported home delivery than reported institutional delivery [14].

In what follows, the relationships are examined between socio-economic indicators and women's utilization of maternal health services in India. First, it is hypothesized that the higher the women's education, the greater is the utilization of maternal health services. The second hypothesis is that women from urban place of residence are more likely to seek maternal care. The hypotheses are tested while controlling for the availability of services. Additionally, study also tried to estimate the probabilities of use of the services by using a probability model.

2 Objective

The broad objective of the study is to understand the importance of socio-demographic factors on utilization of maternal health care services in India. However the specific objectives are
(i) To explain the utilization pattern of maternal health care services specifically antenatal and delivery services in India.
ii) To examine the effect of socio-demographic factors on utilization of antenatal care and delivery services gve in India.
iii) To illustrate the probabilities of use of antenatal care and delivery assistance using some selected independent variables in India.

3 Materials and Methods

Third round National Family Health Survey (NFHS-III) [17] data has been used to carry out the study. The NFHS-2005-06 collected information from nationally representative samples of 124,385 women aged 15-49 years and 74,369 men aged 15-54 years from all selected 29 states of India. All these individuals were interviewed during the survey using structured questionnaires. Three questionnaires were used for the interview; households questionnaire, mens questionnaire and womens questionnaire. For this study two dependent variables were used as indicators of maternal health care utilization i.e. antenatal care services and delivery assistance. A woman is considered to have used ANC if she was checked by a health professional (doctor, ANM/nurse/midwife/LHV, and other health personnel, Dai/TBA, Anganwadi/ ICDS worker) at least once during her pregnancy. This variable was coded as 1 if the woman received at least one antenatal care from a health professional and 0 if otherwise. Likewise, assistance during delivery is measured as whether the woman received assistance from a certified health professional (doctor, ANM/nurse/midwife/LHV, and other health professional). This was coded as 1 if the woman received assistance from a health professional and coded as 0 if otherwise. A total of 56438 women were included in this study to explore the factors that influence utilization of maternal health care services. Some socio-demographic variables were taken as independent variable to explore their effects on utilization of the maternal health services.

The data analysis was done using SPSS. Descriptive statistics (frequency and percentages) was used to describe the data. Bivariate analysis was done by taking each independent variables and calculating the proportion of use of antenatal and delivery assistance. For the calculation of the probabilities of use of ANC and delivery assistance a separate logistic regression model was fitted by using some of the independent variables.

4 Results

4.1 Pattern of Antenatal Care and Assistance during Delivery

Table1 shows the utilization pattern for antenatal care and assistance during delivery in India by residence. The majority of women (77.0%) received antenatal care from a health professional. Rural women (72.10%) were less likely to receive the antenatal care services as compared to urban women (90.6%) from health professional.
Assistance during delivery from a trained provider during delivery is recognized as critical for the reduction of maternal and neonatal mortality. While looking at the pattern of delivery assistance only 46.7% of the women gave birth with

assistance from health professionals (includes doctors, nurses/midwives or other health professionals). Likewise ANC services, rural women (37.5%) are less likely to have assistance during delivery compared to their urban counterparts (73.6%).

The number of antenatal care visits and the timing of the first visit are important for the health of the mother and the outcome of the pregnancy. The World Health Organization recommends that all pregnant women should have at least four antenatal care (ANC) assessments by or under the supervision of a skilled attendant (World Health Organization, 2006). Table 2 shows the distribution of women according to number of antenatal care visits. In India, only 37.3% of women had four or more ANC visits and 33.4% of women had 2-3 ANC visits. However, 27.0% of women dont have any ANC visit.

4.2 Antenatal care and delivery assistance by background characteristics

Table 3 presents the percentage distribution of women respondents according to antenatal care and assistance during delivery by age, residence, education, religion, work status, birth order, caste/tribe, and wealth status. In India, more than half of women received antenatal care in all the age groups from trained health professionals. The percentage of mothers who received ANC services increases sharply with education, from 61.8% for women with no education to 98.7% for women with higher education. This difference was also seen in the distribution of use by wealth index 93.5% of women in the richer wealth index category used the service while only 63.5% of those in the poorer category used the service. Working and having higher birth order women had a relatively lower percentage of use of antenatal care services when compared to those women, who were not working and who have lower birth order. As expected, antenatal care is much more common in urban (90.6%) areas than in rural (72.1%) areas.

Obstetric care from a trained health professional during delivery is recognized as critical for the reduction of maternal and neonatal mortality. Births delivered at home are more likely than births delivered in a health facility to be assisted by a health professional. Table 3 shows percentage distribution of women according to delivery assistance (by skilled provider only) with different womens characteristics. About 96% of women with higher education delivered with assistance from skilled provider where as women with no education group had a 26% chance of receiving assistance during delivery.

The percentage of births assisted by a doctor is lower (34.5%) for mothers age 35-49 than their younger counterparts, and the percentage decreases sharply by birth order. Women who have first order birth are more than four times as likely as to be assisted during pregnancy than those women who have sixth or above birth order. Deliveries are much more likely to be assisted by skilled provider in urban areas (73.6%) than in rural areas (37.5%). Similarly, 25.3% of births to women in the lowest wealth quintile households were assisted by skilled provider, compared with 76.9% of births to women in households in the highest wealth quintile. Only 25.4% of births to women who belong to scheduled tribes were assisted during delivery, compared with 59.9% percent of births to women who belong to other caste.

4.3 Association between maternal health care services and background characteristics

Table 4 shows the multivariate logistic regression results. This analysis shows the net effect of each variable on the status of use of antenatal care services and assistance during delivery separately. The result showed that women who were living in urban areas were more likely to receive antenatal care services as compared to their rural counterparts while controlling for all the other variables in the model (OR=1.692).

A statistically significant difference was seen by education even after controlling for the other variables. The odds of using antenatal care service was almost ten times higher if the woman has higher education as compared to those with no education (OR 9.857) and two times higher odds if the woman has primary education when compared to women with no education (OR 2.080). Muslim women had a fifteen percent less odds of using antenatal care services compared to Hindu women (OR 0.856). The odds of using ANC increased with increase in household wealth index in the total sample. The odds of using the antenatal care services was 2.6 times higher if the woman belongs to the richer wealth quintile cluster as compared to those belonging to the poorer wealth quintile counterparts (OR 2.688).

Likewise, socio-demographic factors strongly predict the assistance during safe delivery also. In the analysis of the factors that influence assistance during delivery, selected indicator variable was included in the model. The result of multivariate analysis showed that women who have higher education had a five times higher odds of delivering with assistance by health professional (OR 4.873) as compared to those women who have no education. Household wealth was

also related with assistance during delivery, the result shows a statistical significance for women in the richer and middle wealth group (OR 2.125) and (OR 1.342) respectively.

However, the result was not statistically significant for women living in the rural areas. Other caste women had more than twice odds of delivering by assistance from health professionals when compared to schedule caste women (OR 2.281).

4.4 Result for calculations of Predicted probabilities of use of antenatal care services

In this analysis influence of significant factors on the use of antenatal care services was estimated. Predicted probabilities of antenatal care utilization were calculated using three of the variables that showed strong effect in the logistic regression model. These variables were place of residence, wealth index and education status of the mother. A separate logistic regression model was fitted using these three independent variables by taking antenatal care use as an outcome variable. Then the probability was calculated as follows.

Logit (probability of use of antenatal care) = -0.261 +1X1+ 2X2+ 3X3,
Where, X1= Educational level of the mother,
X2=Wealth index, and
X3=place of residence.
The coefficients for each variable were taken from the logistic regression model output.

The graph below (Fig 1.) was constructed form the results of the probability calculation. It is seen that the probability of using antenatal care increases with increasing education and wealth quintile and the probability shows a different pattern by combined measures of wealth quintile and place of residence. Women in the lowest wealth index group with no education and living in rural areas showed the lowest probability of use of antenatal care $(1/1+e-(-0.261 +(0)(0)+(0)(0)+(0)(0))$ which was 0.56 or 56% followed by those with no education and living in the urban areas.

At the highest wealth index level place of residence and educational status of the mother seem to have same probabilities of using antenatal care. As education increases the gap between the residence/wealth quintile groups decreases. The highest probability of use of ANC was observed for women living in urban area, with higher education and in the highest wealth index group $(1/1+e-(-0.261 + (3)*0.805+ (2)*0.507+ (1)*(0.436))$ which is 98

4.5 Influence of place of residence, wealth index and education on using assistance during delivery

Predicted probability of using assistance during delivery is calculated using variables that showed strong association in the logistic regression model. These variables were educational status, wealth index and place of residence of the mother. A separate logistic regression model was fitted using these variables. The probability was calculated as follows:

Logit (probability of assistance during delivery) = -0.683+ 1X1+ 2X2+ 3X3
Where, X1= Educational status of the mother
X2= wealth index, and
X3=Place of residence
The B coefficients for each variable were taken from the logistic regression model output.

From the graph below (Fig 2) it is seen that women living in urban areas and who belong to richer wealth quintile were more likely to delivery with health professional assistance and from these women those with secondary and higher education showed the highest use. Women in this group were 91% $(1/1+e-(-0.683+1.972*(3)+0.794*(2)+0.297*(1))$ more likely to deliver with assistance. Women from rural areas with poorer wealth quintile and with no education showed the lowest probability $(1/1+e-(-0.683+ (0)*(0) + (0)*(0) + (0)*(0))$ which is 0.43 or 43% of delivering with professional assistance when compared to the rest of the women.

Women with higher level of education have a higher probability of using assistance during delivery in both rural and urban regions but this result varies by the status of wealth.
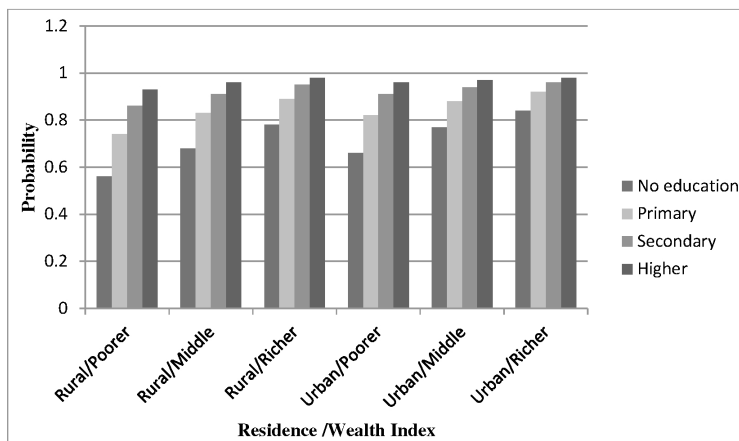
Figure 1 Predicted probability of use of antenatal care by place of residence, educational status of the mother and wealth index in India.
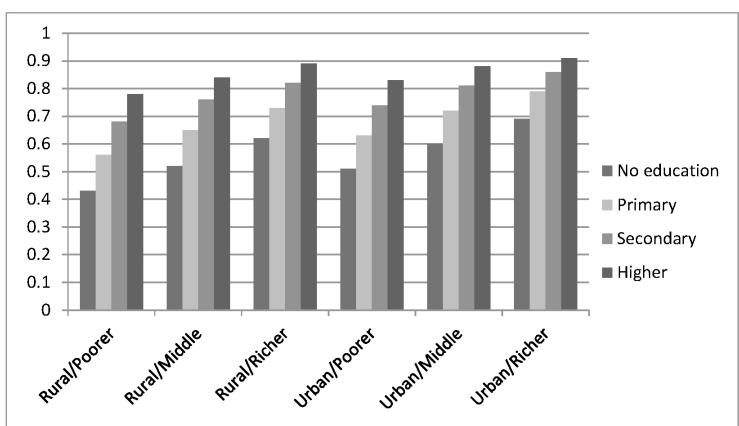

Figure 2. Predicted probability of using assistance during delivery by place of residence, educational status of the mother and wealth index in India.

Table 1. Distribution of use of antenatal care and assistance during delivery of the women, 2005-06

Variable	Description		Total		Urban		Rural	
			No.	%	No.	%	No.	%
Antenatal Care	Received ANC at least once during pregnancy	Yes	30327	77.0	9540	90.6	20787	72.10
		No	9035	23.0	985	9.4	8050	27.90
Assistance During Delivery	Received any assistance during delivery	Yes	26293	46.7	10507	73.6	15786	37.5
		No	30067	53.3	3775	26.4	26292	62.5

[1] delivery by skilled provider includes doctor, ANM/nurse/midwife/LHV, and other health personnel.

Table 2. Distribution of women according to number of ANC visits.

Number of ANC visit	Frequency	Percent
None	9035	23.0
1	2377	6.0
2-3	13282	33.7
4+	14667	37.3
Total	39362	100.0

Table 3. Percent distribution of women according to ANC and delivery assistance by different background characteristics in India, 2005-06

Characteristics	Women who received ANC		Women who delivered with assistance	
	N	%	N	%
Age of the Respondents				
Less than 18	539	78.9	332	42.8
18-24	12572	81.2	11364	49.6
25-34	14987	77.0	13063	46.9
35 & above	1704	63.0	1236	34.5
Maternal Education				
No education	11516	61.8	7377	26.2
Primary	4574	82.9	3686	46.6
Secondary	11924	92.7	12535	71.9
Higher	2312	98.7	2695	96.0
Religion				
Hindu	24104	77.6	20958	47.5
Muslim	4676	72.9	3738	38.8
Others	1415	86.4	1534	67.0
Maternal Work Status				
Not Currently Working	19689	80.2	18714	53.0
Currently Working	10629	71.2	7573	36.0
Birth Order				
1	9148	88.3	11154	65.4
2-3	14873	82.3	11649	47.7
4-5	4409	63.9	2600	27.3
6+	1897	47.1	890	16.6
Place of Residence				
Rural	20787	72.1	15786	37.5
Urban	9540	90.6	10507	73.6
Wealth Index				
Poorer	11452	63.5	6817	25.3
Middle	6182	80.0	5483	49.1
Richer	12693	93.4	13993	76.9
Caste				
SC	5836	73.9	4752	40.7
ST	2588	70.2	1380	25.4
OBC	11770	74.4	10601	46.7
Other	9099	84.4	8858	59.6

Table 4. Multivariate logistic regression results with odds ratios for use of antenatal care and assistance during delivery.

Characteristics	Women who received ANC	Women who delivered with assistance
Age of the Respondents		
Less than 18®		
18-24	1.102	1.288***
25-34	1.275**	1.538***
35 & above	1.215	1.469***
Maternal Education		
No education®		
Primary	2.080***	1.612***
Secondary	3.462***	2.218***
Higher	9.857***	4.873***
Religion		
Hindu®		
Muslim	0.856***	0.833***
Others	0.929	1.565***
Maternal Work Status		
Not Currently Working®		
Currently Working	1.233***	1.010
Birth Order		
1®		
2-3	0.686***	0.654***
4-5	0.383***	0.456***
6+	0.249***	0.381***
Place of Residence		
Rural®		
Urban	1.692***	1.398***
Wealth Index		
Poorer®		
Middle	1.547***	1.342***
Richer	2.688***	2.125***
Caste		
SC®		
ST	1.074	0.779***
OBC	0.851***	1.874***
Other	1.104**	2.281***

®Reference Category
*** p<0.01; ** p<0.05; *<0.1

Table 5. Description of the level and values of β coefficients for the independent variables included in calculation of predicted probabilities of use of antenatal care

Predictor Variables	Level of predictor variables	Value of β coefficient
Maternal Education		
No education	$X10=0$	$\beta10=0$
Primary	$X11=1$	$\beta11=0.928$
Secondary	$X12=2$	$\beta12=1.532$
Higher	$X13=3$	$\beta13=2.791$
Wealth Index		
Poorer	$X20=0$	$\beta20=0$
Middle	$X21=1$	$\beta21=0.467$
Richer	$X22=2$	$\beta22=1.047$
Place of Residence		
Rural	$X30=0$	$\beta20=0$
Urban	$X31=1$	$\beta31=0.426$

Table 6. Description of the level and values of β coefficients for the independent variables included in calculation of predicted probabilities of use of delivery assistance.

Predictor Variables	Level of predictor variables	Value of β coefficient
Maternal Education		
No education	$X10=0$	$\beta10=0$
Primary	$X11=1$	$\beta11=0.587$
Secondary	$X12=2$	$\beta12=0.979$
Higher	$X13=3$	$\beta13=1.972$
Wealth Index		
Poorer	$X20=0$	$\beta20=0$
Middle	$X21=1$	$\beta21=0.333$
Richer	$X22=2$	$\beta22=0.794$
Place of Residence		
Rural	$X30=0$	$\beta30=0$
Urban	$X31=1$	$\beta\ 31=0.297$

5 Conclusion and discussion

A total of 56438 women were included in this study to explore the factors that influence utilization of maternal health care services. In this study it has been attempted to examine the effects of socio-demographic variables on the utilization behavior of maternal health care. In rural areas maternal health service utilization was found to be very low and it was seen that use of this services were unequally distributed. This study was consistent with the many previous studies (Laishram et al 2013, Sarita et al 1993).

Poor and uneducated women were less likely than wealthier and highly educated women to use maternal healthcare services. It is because poor and uneducated women were less likely to be aware about the benefits of maternal health services. Thus, the education and wealth both not only increase the awareness about the services but it significantly affects the utilization of maternal health care services among women (Jejeebhoy et al 2001, Govindasamy et al 1997). The proportion of delivery with assistance was substantially lower than the average among SC and ST mothers. This may be due to the fact that most of the women in SC and ST castes were socio-economically disadvantaged. And therefore, they may not be able to afford appropriate health care at delivery (Kavita and Audinarayana 1997).

Birth order of the child was found to be significant associated with utilization of both the selected maternal health care services. It was observed that higher the birth order the lower is the chance of receiving antenatal care services and delivery assistance and vise-versa. The decreasing odds are more consistent with the increasing birth order. This finding is similar with the previous studies (Rao and Richard, 1984). Religion shows a significant association with use of antenatal care services and delivery assistance. Muslim women were 15 percent less likely to receive antenatal care when compare to their Hindu counterparts. However, women of other religion were more likely to receive assistance during delivery.

Predicted probabilities for antenatal care visits in this study illustrate that, women who have higher education despite their difference in wealth quintile and place of residence, women were found to have higher level of use of ANC. This depicts education of women to be the most significant predictor of increased utilization of health services (Govindasamy et al 1997).

In conclusion, it is very important and urgent to make basic maternal health care services accessible and affordable to all women to prevent adverse consequences of pregnancy. Women who are from lower socio-economic group, illiterate and rural areas were at a greater disadvantage. An Appropriate measure of delivering maternal health care services should be taken to address the needs of this section.

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