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# Do socio-demographic factors still predict the choice of place of delivery: A cross-sectional study in rural North India

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## KEYWORDS

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**Abstract** Improving maternal health is one of the goals to be achieved under the Millennium Development Goal (MDG), especially MDG-5. One of the predictors of maternal health is place of child birth. This study was carried out to determine the prevalence of home delivery and different socio-demographic factors associated with them. This study was a community-based cross-sectional study. Women who delivered a baby in the past 1 year were included in this study. A total of 300 women responded (93.2%) and gave consent to participate in the study. Prevalence of home delivery was 37.7%. Bivariate analysis showed that religion, caste, education of women and their partners, occupation of the spouse, monthly family income and socioeconomic status had a significant association with the choice of place of delivery. But multivariate regression analysis showed only religion, caste, education of spouse and monthly income to be significant factors in determining place of delivery. The findings of this study suggest that individual countries have to formulate interventions which will target marginalized or vulnerable populations with reference to caste, religion and wealth. A significant improvement in reaching the 5th MDG can be achieved if the first three MDG goals are focused on, i.e., eradication of poverty, achieving universal education and women empowerment.

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## 1. Introduction

Improving maternal health is one of the goals to be achieved under Millennium Development Goals

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(MDG), specifically MDG-5. The deadline set for this aspiration is just around the corner. Two of the targets set under this goal were reducing maternal mortality by 75% and universalizing access (100%) to reproductive health care. Although some progress has been made, there is still an estimated 289,000 maternal deaths that occurred around the globe in 2013. There exists a large disparity among rich and poor nations as the maternal mortality ratio was 14 times higher in developing nations than in the developed nations. Regional estimates showed that developing countries were the major contributors to global maternal mortality (286,000 out of 289,000 maternal deaths, i.e., 99%), with 10–15 million more women annually who suffered from severe obstetric complications. Births attended by healthcare professionals increased only 2 percentage points from 31% to 33% in a span of 12 years (2000–2012). Rural and urban inequality was evident as over 32 million of the 40 million births not attended by skilled health personnel in 2012 occurred in rural areas [1,2]. Looking at the pace of progress, improving maternal health still stands as a challenge in front of policy makers [3]. As a developing nation, India contributes the highest (50,000 maternal deaths) to global maternal mortality among all countries. Lifetime risk of maternal death among Indian women was 1 in 190, which stands as one of the highest among Asian countries. The maternal mortality ratio in India was 178, which is far away from the MDG-5 target for India (109 maternal deaths per 100,000 live births) [2,4].

Provision of trained and well-equipped healthcare professionals during childbirth is necessary to avoid obstetric complications and maternal mortality. The health facility is the place where such provisions are found, and evidence suggests that institutional delivery is one of the critical interventions needed to reduce maternal morbidity and mortality [5,6]. Although India has recognized the importance of institutional delivery, it still has not materialized at the grass-roots level. Home as a preferred place of delivery is still prevalent in India where skilled attendants are mostly absent. According to an estimate, with current fertility rates and the percentage of annual change of skilled birth attendants of India, national births that are not attended by a skilled health worker are expected to reach 69 million between 2011 and 2015 [7,8].

Utilization of a health facility by women with respect to delivery is a complex phenomenon and is influenced by many factors. In the past, various studies worldwide [9,10] and in India [11,12] found inadequate availability of healthcare, large

socioeconomic differences, geographic regions, social factors, education levels, etc., are related to maternal healthcare utilization. In response to such situation, India has taken some steps to eliminate barriers for maternal health utilization, such as a conditional cash transfer system, strengthening of health facilities, infrastructural development, etc. [13]. Despite all the progress and implementation of promotional programs, India is still lagging behind. Whether all these factors still predict the utilization of a health facility as a preferred place of delivery is still questionable. The present study was carried out to determine the prevalence of home delivery and the different associated socio-demographic factors.

## 2. Methodology

The present study is a community-based cross-sectional study conducted in two nearby villages, namely, Barwala and Pooth Khurd, situated in the northwest district of Delhi. There are two rural health training centers (RHTCs), one in each of the two villages, which are attached to the Department of Community Medicine, Maulana Azad Medical College (MAMC), New Delhi. RHTCs undertake surveys from time to time to update the demographic profile of the population served by it. According to a recent survey (2011), both villages jointly cater to a population of nearly 19,000. There are two government hospitals present nearby the study area apart from RHTCs. The present study was carried out for 1 year from January to December 2012. The study population consisted of all the women residing in the study area who had delivered a live baby in the previous 1 year.

The study was carried out by a house-to-house visit in the study area, and those women who satisfied the inclusion criteria were included in the study. In the beginning, the purpose of the study was explained to the subjects in their local language. The interviews of all eligible participants were undertaken by investigators after receiving written informed consent from them. A total of 322 women fulfilled the inclusion criteria, but only 300 women responded (93.2%) and gave consent to participate in the study.

The study participants were interviewed through the pre-designed, pre-coded and semi-structured questionnaire. The study questionnaire was pre-tested on 28 women (nearly 10% of the total sample size) from another village nearby the study area and the necessary modifications were made beforehand. No leading or suggestive questions

were asked to avoid courteous responses and over-estimation. Socio-demographic and socio-cultural factors in relation to preference of place of delivery of the mothers and that of the family, like the particulars about age, marital status, educational status, occupation, religion, socio-economic status, monthly family income, etc., were collected. The Udai Pareek scale was used to determine the socio-economic status. It is very popular and is a validated questionnaire, especially for rural populations. The scale has nine items, i.e., caste, occupation, education, social participation, land, farm power, house, material possessions and family. The reliability of the scale was found to be very high ( $r = 0.93$ ) [14,15]. Although two separate villages were used as the study area, for analysis purposes, the results were combined for both the villages as both areas were adjacent to each other with no geographical and cultural differences.

The data collected were entered and analyzed by using SPSS version 17. The continuous variables were expressed by mean and standard deviation. The categorical variables were expressed in percentages, and the differences between percentages were computed using Chi-square test. Logistic regression was used to determine the predictors after adjusting for potential confounding variables, and adjusted odds ratios were calculated.  $P$  value  $< 0.05$  was considered statistically significant.

### 3. Results

A total of 300 subjects were included in the final analysis. Age distribution of the study population ranged from 17 to 40 years old, with a mean age of  $24.86 \pm 3.85$  years (not shown in Tables). Stratification of age into different categories showed that most of the participants belonged to the 20–29-year-old age group and very few to the extreme age brackets. Most of the study participants belonged to the Hindu religion (81.7%) and general caste (54.7%). Literacy level was 70% and 81% among the study subjects and their spouses, respectively. Almost half of the study population (48.3%) lived in extended families; 91.7% of the study subjects were housewives. Occupation-wise, husbands of the participants were either businessmen (57.3%) or laborers (33.3%), and only 2.3% of them were unemployed. Regarding family income, 48.7% of the study subjects were from families with a monthly income of less than 10,000 rupees (\$160 USD), and only 19.3% had a monthly family income of more than 20,000 rupees

(\$320 USD). When the study population was stratified according to socio-economic status, most of the participants belonged to the lower-middle (46.7%) class families (Table 1).

Deliveries that occurred at home, whether attended by a trained birth attendant (TBA: usually a grass-roots level health worker having gained some skills to conduct delivery through training) or not, were reported as home delivery, and deliveries in a health facility, whether in public or private, were reported as institutional delivery. For the index birth, 113 (37.7%) deliveries were at home and 187 (62.3%) occurred in a health facility.

Almost equal proportions of home deliveries occurred in the 21–24 year old (38.1%) and 25–29 year old (38.7%) age groups. Participants belonging to the Muslim community (65.4%) preferred home as a place for delivery, which showed a statistical significant difference when compared with Hindus. Similarly, mothers from a lower caste (other backward class or schedule caste) preferred home for childbirth. The higher preference of institutional delivery was seen in participants with an educational level of high school or above (81.1%), and the lowest preference was seen in illiterate mothers (40%). The proportion of institutional delivery remained almost equal in the other two educational categories (up to primary and middle school). This change in preference in relation to educational attainment showed statistical significance ( $p < 0.001$ ). Similarly, the proportion of institutional delivery increased significantly with an increase in the level of education among the spouses of the participants (Table 2).

Table 3 shows the association of socio-economic factors with the choice of place of delivery. Only a few of the participants were employed (12.7%) to financially support their family, and their occupation did not show a significant difference in preference for place of delivery. Around half (43%) of the women whose spouses were laborers or unemployed delivered at home. This proportion decreased significantly ( $p = 0.015$ ) when compared with participants whose spouses were businessmen (37.8%) or were serving in either the government or the private sector (9.5%). On the economic front, this study showed that as monthly income and socio-economic status decreased, the proportion of home delivery increased in significant proportion ( $p < 0.001$ ) (Table 3).

Factors which had a significant contribution to choice of place of delivery ( $p$  value  $< 0.05$ ) were included in the regression analysis. The logistic regression model showed Muslim women had more than six times the chance of giving birth at home.

**Table 1** Socio-demographic profile of the study population ( $N = 300$ ).

Variable	Number (%)
<i>Age (in Years)</i>	
<20	13 (4.30)
20–24	132 (44.0)
25–29	119 (39.7)
≥30	36 (12.0)
<i>Religion</i>	
Hindu	245 (81.7)
Muslim	52 (17.3)
Sikh	3 (1.0)
<i>Caste</i>	
General	164 (54.7)
OBC	30 (10.0)
Schedule caste	106 (35.3)
<i>Education</i>	
Illiterate	90 (30.0)
Up to primary	43 (14.3)
Middle school	72 (24.0)
High school and above	95 (31.7)
<i>Education of spouse</i>	
Illiterate	57 (19.0)
Up to primary	44 (14.6)
Middle school	86 (28.7)
High school and above	113 (37.7)
<i>Type of family</i>	
Nuclear	155 (51.7)
Joint	145 (48.3)
<i>Occupation</i>	
Housewife	275 (91.7)
Gainfully employed	25 (8.3)
<i>Occupation of spouse</i>	
Unemployed	7 (2.3)
Laborer	100 (33.3)
Business	172 (57.3)
Service	21 (7.0)
<i>Monthly family income in rupees</i>	
≤9999 (160 USD)	146 (48.7)
10,000–19,999 (160–320 USD)	96 (32.0)
≥20,000 (>320 USD)	58 (19.3)
<i>Socioeconomic status</i>	
Upper middle/middle	132 (44.0)
Lower middle	140 (46.7)
Lower	28 (9.3)

Odds of delivering at home increased significantly among women belonging to the scheduled caste (CI<sup>-</sup> 1.01, 4.10). As the education level among spouses of the participants and monthly family income decreased, the odds of delivering at home increased significantly. The education level of

participants, occupation of spouses and socio-economic status of family did not show any significant increase in odds in preference of place of delivery (Table 4).

#### 4. Discussion

The current study investigated the prevalence of home deliveries and influence of different socio-demographic factors on choice of place of delivery. The prevalence of home delivery was found to be 37.7%. According to a national level health survey (National Family Health Survey-3), the prevalence of home deliveries in rural areas of India was 59.8%, which was higher than the current study's findings [16]. Reasons for this difference might be due to the national survey which included rural areas of all States of India, including the empowered action group (EAG) States known to have the worst maternal healthcare indicators. The survey included participants who had given birth in the previous 5 years. Moreover, the current study setting in the national capital of India has a better infrastructure, such as more health facilities and better accessibility to them, which may act as a promotional factor for institutional delivery [17–19]. A survey conducted by the Government of India (District Level Health Survey-3) included information for births in the previous 2 years and another study showed a more or less similar prevalence for the State of Delhi, India (current study area) [17,20].

A higher percentage of Muslim women delivered at home (65.4%) when compared with Hindu women (35.4%), and on a regression analysis, religion remained a statistically significant predictor of choice of place of delivery ( $p = 0.001$ ). In India, Muslims are considered as minority population with low social, educational and economic status. Fertility behavior strongly correlates with healthcare utilization and a higher total fertility rate (TFR) among Muslim women than any other religion in India, which raises the concern over their awareness about maternal health and healthcare utilization [21–23].

The presence of a caste system is strongly felt in India. Schedule caste, other backward caste and general caste in order represents lower to upper caste. The current study found that scheduled caste members deliver more at home as compared with upper caste women. Caste or social class is defined by control over productive resources, which explains the economic inequality between higher and lower classes. Economic inequalities in turn pave the path for disparity in standard of

**Table 2** Association between socio-demographic factors and choice of place of delivery.

Variables	Place of delivery		Total N (%)	p-Values
	Home N (%)	Institutional N (%)		
<i>Age (in Years)</i>				
≤20	16 (40.0)	24 (60.0)	40 (13.3)	0.819
21–24	40 (38.1)	65 (61.9)	105 (35.0)	$\chi^2 = 0.926$
25–29	46 (38.7)	73 (61.3)	119 (39.7)	
≥30	11 (30.6)	25 (69.4)	36 (12.0)	
<i>Religion*</i>				
Hindu	79 (31.9)	169 (68.1)	248 (81.7)	<b>&lt;0.001</b>
Muslim	34 (65.4)	18 (34.6)	52 (17.3)	$\chi^2 = 20.583$
<i>Caste</i>				
General	51 (31.1)	113 (68.9)	164 (54.7)	<b>0.028</b>
OBC	12 (40.0)	18 (60.0)	30 (10.0)	$\chi^2 = 7.161,$
Schedule caste	50 (47.2)	56 (52.8)	106 (35.3)	
<i>Type of family</i>				
Nuclear	59 (38.1)	96 (61.9)	155 (51.7)	0.883
Joint	54 (37.2)	91 (62.8)	145 (48.3)	$\chi^2 = 0.022$
<i>Education</i>				
Illiterate	54 (60.0)	36 (40.0)	90 (30.0)	<b>&lt;0.001</b>
Up to primary	15 (34.9)	28 (65.1)	43 (14.3)	$\chi^2 = 33.514$
Middle school	26 (36.1)	46 (63.9)	72 (24.0)	
High school and above	18 (18.9)	71 (81.1)	95 (31.7)	
<i>Education of spouse</i>				
Illiterate	40 (70.1)	17 (29.9)	57 (19.0)	<b>&lt;0.001</b>
Up to primary	27 (61.4)	27 (38.6)	54 (14.7)	$\chi^2 = 57.393$
Middle school	26 (30.2)	60 (69.8)	86 (28.7)	
High school and above	20 (17.7)	93 (82.3)	113 (37.6)	

The values in bold shows the significant association i.e.  $p$ -value < 0.05.

\* As Sikhs constitute only 1% of the study subjects, they are included in the Hindu religion for analysis.

**Table 3** Economic factors and place of delivery.

Variable	Place of delivery		Total N (%)	p-Value
	Home delivery N (%)	Institutional delivery N (%)		
<i>Occupation</i>				
Unemployed	99 (37.8)	163 (62.2)	262 (87.3)	0.911
Gainfully employed	14 (36.8)	24 (63.2)	38 (12.7)	$\chi^2 = 0.013$
<i>Occupation of spouse</i>				
Unemployed/laborer	46 (43.0)	61 (57.0)	107 (35.7)	<b>0.015</b>
Business	65 (37.8)	107 (62.2)	172 (57.3)	$\chi^2 = 8.377$
Service	2 (9.5)	19 (90.5)	21 (7.0)	
<i>Monthly family income in rupees</i>				
0–9999	75 (51.4)	71 (48.6)	146 (48.7)	<b>&lt;0.001</b>
10,000–19,999	29 (30.2)	67 (69.8)	96 (32.0)	$\chi^2 = 26.070$
≥20,000	9 (20.9)	49 (84.5)	58 (19.3)	
<i>Socio-economic status</i>				
Lower	21 (77.8)	6 (22.2)	27 (9.0)	
Lower middle	63 (44.7)	78 (55.3)	141 (47.0)	<b>&lt;0.001</b>
Middle/upper middle	29 (22.0)	103 (78.0)	132 (44.0)	$\chi^2 = 35.309$

The values in bold shows the significant association i.e.  $p$ -value < 0.05.

**Table 4** Regression analysis model predicting home delivery with some selected socio-demographic variables.

Variables	Adjusted *Odds ratio	Confidence intervals
<i>Religion</i>		
Hindu	1	2.640–14.746
Muslim	6.240	
<i>Caste</i>		
General	1	
OBC	0.607	0.220–1.676
Schedule caste	2.038	1.011–4.108
<i>Women's education</i>		
High school and above	1	
Middle school	1.497	0.555–4.035
Up to primary	0.796	0.319–1.989
Illiterate	1.438	0.527–3.923
<i>Education of spouse</i>		
High school and above	1	
Middle school	0.907	0.332–2.481
Up to Primary	4.171	1.659–10.487
Illiterate	5.761	2.031–16.338
<i>Occupation of spouse</i>		
Service	1	
Business	0.473	0.092–2.437
Unemployed/laborer	1.102	0.185–6.561
<i>Income</i>		
≥20,000	1	
10,000–19,999	3.055	1.416–6.590
< 9999	4.277	1.552–11.784
<i>SES</i>		
Upper middle/middle	1	
Lower middle	0.512	0.100–2.613
Lower	1.279	0.549–2.982

\* Adjusted for all variables with a p-value < 0.05.

living, employment and decision-making capacity leading to poor healthcare utilization [11,24,25].

The present study reaffirms the findings from different studies that both women and their partner's education significantly predict the place of childbirth. Education leads to better health awareness, and this may sensitize choices for the quality of healthcare provided at various facilities, as concluded by Navaneetham et al. [26]. Educated couples may be more open to modern medicine, aware of the benefits of skilled attendants, more able to communicate with health workers and demand appropriate care. Educated husbands may also put fewer constraints on their wives' mobility and decision-making, thus facilitating care-seeking behavior [27,28].

Economic and related factors, such as the occupation of the spouse, monthly income and socio-economic status, were found to be associated with

place of delivery in this study. No association was found of women's occupation in maternal healthcare use. This may be due to the study classifying female laborers into the gainfully employed group. This type of employment may be poverty-induced and indicates resource constraints, which would make this subgroup of working women less likely to use health services for delivery. A number of previous studies did not find any association of maternal working status or occupation with place of delivery [29,30], while others found that formally employed women are more likely to use health institutions for delivery services [31]. As most of the women in the study were housewives, the monthly family income was mainly contributed by the husband's occupation. Moreover, socio-economic status interplays between occupation and monthly income. Among all socio-economic factors (occupation, monthly income and socio-economic status),

women having the lowest monthly household income showed significant increase in odds (1.5 times) of giving birth at home. Research consistently showed that low income and more out-of-pocket expenditures of institutional delivery are serious constraints in maternal healthcare utilization [32,33].

## 5. Conclusion

The current study confirms that socio-demographic factors still prevail in determining the choice of place of delivery. The strength of this study lies in the selected study area, which is situated in the outskirts of the national capital of India. The presence of a number of healthcare facilities (two secondary level government hospitals and more than one private health facility) with a good public transportation system in the study area might eliminate availability and accessibility factors to a healthcare facility during childbirth, as shown in previous studies [9,10]. Inclusion of mothers who had given birth in the previous year as study participants also helped the present study to know the current status prevalence and predictor of home delivery. One of the limitations of this study was its generalizability to the whole of India. The findings of this study suggest that the country has to formulate interventions which will target marginalized or vulnerable populations with reference to lower caste, Muslim religion and belonging to the lower wealth quintile. Moreover, to make significant progress in reaching MDG-5, focus on the first three MDGs, i.e., eradication of poverty, achieving universal education and promoting equity, must be enforced.

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