

## Factor influencing the utilization of non skilled birth attendant in empowered action group states, India

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### Abstract

**Background and aim:** Low use of maternal healthcare services is one of the reasons why maternal mortality is still considerably high in India. In India, the eight socioeconomically backward states of Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttarakhand and Uttar Pradesh, referred to as the Empowered Action Group (EAG) states, lag behind in the demographic transition and low utilization of maternal health care. Non-skilled birth attendants are likely to deliver low quality maternity care compared with skilled birth attendant. This study aimed to explore the risk of lacked skilled birth attendant during childbirth by different socioeconomic backgrounds among EAG states India.

**Methodology/finding:** Using information from the third round of District Level Household Survey (2007–08). The outcome variables included in the analyses is non skilled birth attendant. We have used bivariate and multivariate. Majority 90 percent women were assisted by non skilled birth attendant during delivery at home. Findings indicate that there is considerable amount of variation in use of NSBA by educational attainment, household wealth, religion, number of ANC visit, visit health facility for ANC checkup during first trimester and place of residence.

**Conclusion:** Delivery assisted by non skilled birth attendant was associated with women education, husband education, religion, caste, income strata and place of residence. Therefore this study recommended that effective governmental and non-governmental interventions are needed to address such inequalities in health care system and important policy level interventions to address the unmet need of maternity services among women in EAG states, India.

**Keywords:** EAG, DLHS-3, non skilled, birth attendant, antenatal care and India

### Introduction

Globally, nearly 300,000 thousand women die each year as a result of pregnancy related complications [1], 2.6 million babies are estimated to be stillborn [2], and 4 million more newborns die in the neonatal period [3]. The United Nations Millennium Development Goal 5 (MDG 5) focuses on

improving maternal health [4]. MDG 5a targets reducing the maternal mortality ratio by three quarters between 1990 and 2015. The proportion of births attended by skilled health personnel (skilled birth attendants) is one of the main indicators used to monitor progress in reaching MDG 5. Several studies has documented the fact that poor

availability of services is a one of the factor in non-use of skilled attendants during childbirth [5], but even in areas where these services are available certain groups of women, belonging poorest economic strata, illiterate, and rural backgrounds, non using properly these services [6-7]

Study pointed out that pregnancy related complications are associated with maternal death and disability for women aged between 15-49 years in developing countries [8]. In many developing countries, delivery at home take place in unhygienic circumstances, putting mothers and their newborns at risk for a variety of life-threatening infection. However, maternal and neo-natal death have been minimized by the improving the maternal and child health care facilities. Various studies have been indicated that countries which have improved their maternal health care services are successful in reducing the maternal morbidity or mortality [9-11]. However every women need access to all maternal care during the pregnancy and child birth. Therefore it is very imperative that all the births delivery at home should be attended by skilled health professionals, as timely delivery care, proper management and careful treatment can make the difference between life and death. Several post research on demographic behaviour has

indicated that much disparities in the northern and southern states of India [12-15]. The southern states of India are highly advanced in respect to demographic indicators. The Government of India (GOI) promoted maternal and child health including institutional deliveries through its flagship social sector scheme National Rural Health Mission, which is mainly focused on the poor, remote and isolated communities where hygienic obstetric, postnatal practices and other health services were suboptimal or not accessible. The Government of India (GOI) has prepared a list of eight states which are very poor in respect of demographic as well as the socioeconomic indicators. The GOI has given a name to these eight states as Empowered Action Groups or EAG states. These states are Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttarakhand and Uttar Pradesh [16].

Empowered Action Group (EAG) states, comprised of eight socioeconomically backward states of Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttarakhand and Uttar Pradesh,. Table 1 shows the socio-demographic profiles of the eight EAG states. Highest population density is in UP (828) and lowest density is in Chhattisgarh and Uttrakhand (189).

**Table 1. Profiles and demographic characteristics of states in Empowered Action Group states, India.**

Demographic characteristics	UP	Uttarakhand	Bihar	Jharkhand	Odisha	Chhattisgarh	M. P	Rajasthan
Land Ares (sq.km.) <sup>1</sup>	240928	53483	94163	79716	155707	135192	308252	342239
Total population in million <sup>1</sup>	199.58	10.11	103.80	32.97	41.95	25.54	72.60	68.62
Population size-% of national population <sup>1</sup>	16.5	0.83	806	2.72	3.47	2.11	6.00	5.66
Population density <sup>1</sup>	828	189	1102	414	269	189	236	201
Urban percentage <sup>1</sup>								
Female literacy rate (%) <sup>1</sup>	59.26	70.70	53.33	56.21	64.36	60.59	60.02	52.66
Schedule Caste (%) <sup>1</sup>	20.7	17.9	15.7	23.2	22.8	30.6	21.1	13.5
Schedule Tribe (%) <sup>1</sup>	0.6	2.9	1.3	26.2	22.8	30.6	21.1	13.5
Sex ratio – Females per 100 males <sup>1</sup>	912	963	918	948	979	991	931	928
Birth rate <sup>2</sup>	28.3	19.3	20.5	25.3	20.5	25.3	27.3	26.7
Death rate <sup>2</sup>	8.1	6.3	5.9	7.0	8.6	8.0	8.3	6.7
Natural growth rate <sup>2</sup>	2.02	1.30	1.46	1.83	1.19	1.73	1.89	2.00
Infant mortality rate <sup>2</sup>	61	38	31	42	61	51	62	55

Sources: 1-Census of India, 2011, 2-Sample Registration System, 2012.

The female literacy rate is highest in Uttarakhand 70.7 per cent According to Sample Registration System 2011, infant mortality rates (IMR) were found to be lower than the country's average of 47 deaths per 1000 live birth in all the states except Rajasthan (58), MP (62), Odisha and UP (61).

Research indicates that deliveries assisted by a skilled birth attendant are only one third in EAG states as compared to more than two third in Non-EAG states in India [17]. Almost, more than three-fourth deliveries take place at home in EAG states [17]. The general trend is that Non-EAG states perform better than EAG states, the performance in EAG states is almost half or less than half as compared to non-EAG states in utilization of health institutions for birth [17].

No study has been analyzed the factor influencing utilization non skilled birth attendant in EAG states, India. To feel the gap, present study going to analysis the risk of lacked skilled birth attendant during childbirth by different socioeconomic backgrounds among EAG states India.

### **Study setting, survey data method and ethics**

#### **Data**

We use data from the third round of the District Level Household Survey (DLHS-3) conducted during 2007–08. The DLHS is a nationally representative and one of largest ever demographic surveys conducted in India. It covers all states and union territories of India except Nagaland. The basic aim of DLHS-3 is to provide reliable estimates of maternal and child health, family planning and other reproductive health indicators at district level [18].

#### **Sampling design and study size**

DLHS-3 adopted a multi-stage stratified systematic sampling design. Detailed information about sampling employed in this survey can be obtained from the

national report of DLHS-3. The survey interviews 643,944 ever-married women aged 15–49 years from 720,320 sampled household (about 78% from rural and 22% from urban areas) spanning 601 districts of India. The overall response rate for ever-married women at the national level is 89%. Out of these 643,944 ever-married women, a total of 201,058 have had a still or live birth during three years preceding the survey [18]. We extracted individual women data for EAG states from country dataset. A total of 116973 women have given birth during three year preceding the survey. 79973 (68.37%) women took place their last child birth at home, including parent's home. Present study is based on 79973 women dataset.

#### **Outcome measurements**

The outcome variable was non skilled birth attendant (NSBA) during delivery at birth. NSBA was generated from response to the question that assessed “assistance during delivery and place of delivery. The place of delivery was the home and institutional delivery. For this study only home delivery was taken, among the home delivery NSBA was generated from response to the question that assessed “the type of person that assisted in the delivery during child birth. The responses were dichotomized as utilizing skilled attendant at birth (doctor/nurse/Lady Health Visitor (LHV)/Auxiliary Nurse Midwife (ANM)/other qualified health professionals) and others were non skilled birth attendant (0=skilled birth attendant and 1=non skilled birth attendant). If a woman had more than one child, utilization of skilled birth attendant was assessed based on her latest birth experience during the study period.

#### **Defining predictor variables**

We have considered a range of socio-economic and demographic predictors such as age, woman's education, husband's education, working status, religion, social

status, exposure to mass media, economic status, complication during pregnancy, number of ANC visit, ANC visit first trimester and place of residence. The education level of the woman (mother) and her husband is defined using the number of years of schooling. The variable has four categories: non literate, primary, 6-9 years, and high school and above. The type of work in which the mother was engaged in the last year from the date of interview is considered her working status. The variable has two categories-working and not working. The entire sample of mothers can be divided in four social groups namely 'Others' (General), Scheduled Castes (SCs), Scheduled Tribes (STs) and Other Backward Classes (OBCs). Three categories for religion-Hindu, Muslim, and Other (includes Sikhism, Christianity, Buddhism, Jainism, and other religions). Age was recoded into five categories: 15-19, 20-24, 25-29, 30-34 and 35-49. ANC visit during first trimester was coded as yes or no, number of antenatal visit was recoded into three categories : No visit, 1-3 and 4 and more visits, and complications during pregnancy was coded as yes or no, and place of residence as coded rural and urban. Wealth index is generally used as a proxy for the economic status of the household [19]. It is a composite index of household amenities and assets with five categories-poorest, poorer, middle, richer, and richest.

### **Analytical approach**

We used both bivariate and multivariate analyses to identify factors associated with utilization non skilled birth attendant among mothers in EAG states, India. Chi-square test is used to determine the difference in proportions of the non skilled birth attendant utilization across selected socioeconomic and demographic characteristics. Binary logistic regression is applied to understand the net effect of predictor variables on the NSBA. We have chosen logistic regression

because the response variables in our study are of dichotomous (i.e., binary) nature. Only those predictor variables that are found significant in chi-square test are included in the final binary logistic regression model. The results of logistic regression are presented in the form of estimated odds-ratios with 95% CI. The whole analysis was performed using STATA version 13.0 to take into account the survey design (i.e. sampling weights with clustering and strata).

### **Ethical statement**

The study is based on data available in public domain, therefore no ethical issue is involved.

### **Results**

#### **Background characteristics of the women**

Table 2 represents the weighted percent distribution married women who had a childbirth in the three years preceding the survey by selected individual, household and community characteristics. Among the respondents, almost two third (62.9%) women were aged between 20 to 29 years. More than two third (68.5%) of women were illiterate and majority (81.3%) of were not working. Almost two fifth (40.7%) of the women visit for antenatal care during first trimester pregnancy while more than two third (46.0%) of the women not visit at all for antenatal care. About two third (62.2%) of the women reported that they have some complication during pregnancy. More than half (54.2%) and more than two fifth (46.0%) of the women have exposure through interpersonal communication (ANM/Doctor /Health worker Drama etc.) of antenatal care and safe delivery respectively. Majority (83.0%) of women belongs to Hindu religion and among them almost half (48.7%) of women from Other Backward Classes (OBCs). Ninety one per cent women belonged to rural areas, and more than one third (35.4%) were belongs to poorest wealth quintile.

**Table 2. Percent distribution married women who had childbirth in the three years preceding the survey by selected individual, household and community characteristics, DLHS-3 (2007–08), India.**

Socioeconomic characteristics (N=80697)	Weighted sample	Weighted proportion of sample estimate <sup>a</sup>	95% CI
<b>Individual characteristics</b>			
<b>Women's age</b>			
15-19	5014	06.2	[06.0-06.4]
20-24	25010	31.0	[30.6-31.4]
25-29	25745	31.9	[31.6-2.3]
30-34	14920	18.5	[18.2-18.8]
35-49	10009	12.4	[12.1-12.7]
<b>Women's education</b>			
Non-Literate	55232	68.5	[67.5-69.4]
Primary	10971	13.6	[13.3-13.9]
6-9 years	10024	12.4	[12.0-12.9]
High school and above	4442	05.5	[05.0-06.0]
<b>Husband's education</b>			
Non-Literate	29212	36.3	[35.6-37.0]
Primary	14268	17.7	[17.4-18.1]
6-9 years	20292	25.2	[24.8-25.7]
High school and above	16641	20.7	[20.2-21.2]
<b>Working status</b>			
Working	9200	18.7	[17.7-19.7]
Not working	39997	81.3	[80.3-82.3]
<b>ANC visit first trimester</b>			
Yes	17871	40.7	[40.0-41.3]
No	26101	59.3	[58.7-60.0]
<b>Antenatal visit</b>			
No visit	37102	46.0	[45.0-46.9]
1-3	38272	47.4	[46.7-48.2]
4 and above	5322	06.6	[06.3-07.0]
<b>Complication During Pregnancy</b>			
Yes	50163	62.2	[61.7-62.6]
No	30529	37.8	[37.4-38.3]
<b>Exposure to antenatal care messages</b>			
No exposure	18300	22.7	[22.0-23.4]
Only through mass media	3854	04.8	[04.5-05.1]
Only through interpersonal communication	43749	54.2	[53.4-55.0]
Both	14794	18.3	[17.4-19.3]
<b>Exposure to Institutional care messages</b>			
No exposure	27381	33.9	[33.1-34.8]
Only through mass media	3534	04.4	[04.1-04.7]
Only through interpersonal communication	37083	46.0	[45.2-46.7]
Both	12700	15.7	[14.9-16.6]
<b>Household characteristics</b>			
<b>Religion</b>			
Hindu	66996	83.0	[81.9-84.1]
Muslim	10769	13.3	[12.2-14.6]
Others	2931	03.6	[03.4-03.9]
<b>Social group</b>			
Scheduled castes	16930	21.0	[20.2-21.9]
Scheduled tribes	13207	16.4	[15.5-17.3]
Other backward classes	39202	48.7	[47.9-49.5]
Others	11212	13.9	[13.4- 14.4]
<b>Wealth quintile</b>			
Poorest	28594	35.4	[34.0-36.9]
Poorer	23104	28.6	[27.9-29.4]
Middle	14552	18.0	[17.7-18.4]
Richer	10003	12.4	[11.6-13.2]
Richest	4445	05.5	[04.5-06.7]
<b>Community characteristics</b>			
<b>Place of residence</b>			
Rural	73492	91.1	[85.4-94.7]
Urban	7205	08.9	[05.3-14.6]
Total			

Sources: Based on author's computation from DLHS-3 (2007-08).

<sup>a</sup>The total may not be equal due to some missing cases

**Differentials in non skilled birth attendant**

To identify the factors associated with the utilization non skilled birth attendant, we examined bivariate differential of the selected socio-demographic characteristics. Table 3 shows the weighted percentage and crude odds ratio of women with lacked skilled birth attendant during delivery at last child birth by selected background characteristics. Results indicate that NSBA in the study sample varied by education, antenatal care visit, social group, place of residence and income strata. Majority (89.8%) of the women lacked skilled attendants when giving birth at home. Illiterate women had more (91.9%) NSBA at home delivery as compared with those women with High school and above education. The proportion of non skilled attendance during delivery at home were found more (93.0%) among women who did not visit at all for antenatal care as compared to women who had visit for antenatal care during their pregnancy time. The utilization NSBA was observed to decrease with the increase in wealth quintile. For instance, 92% mothers belonging to the poorest wealth quintile were used NSBA, while this proportion was found to be 78.5% among mothers from the richest wealth quintile. Mothers belongs to the rural area were more (90.4%), use of non skilled birth attendant as compared to their counterpart urban area. Results indicate that the probability of utilization NSBA was found to be more likely higher among age of women: 25-29 (crude OR=1.165, 95%CI=1.045-1.298), 30-34 (crude OR=1.319, 95%CI=1.181-1.471), 35-49 (crude OR=1.439, 95%CI=1.252-1.648) as compared to younger age. Women having no education was strongly associated with lack of skilled birth attendants, the likelihood of NSBA was observed to be high among women with non-literate (crude OR=3.087, 95%CI=2.801-3.403), primary

(crude OR=2.110, 95%CI=1.891-2.354), 6-9 years schooling (crude OR=1.508, 95%CI=1.360-1.672) as compared with high school and above education. Women with no ANC visit were more likely to utilized NSBA (crude OR=3.7, 95%CI=3.374-4.059) than women who visit four or more ANC. The probability of utilization NSBA was found to be more likely among women who had no exposure to mass media and interpersonal communication: antenatal care messages (crude OR=2.186, 95%CI=1.954-2.446), institutional child birth messages (crude OR=2.218, 95%CI=1.982-2.481) as compared to women with exposures both mass media and interpersonal communication. The probability of utilization NSBA was also found to be more likely among scheduled caste (crude OR=1.557, 95%CI=1.426-1.701), scheduled tribe (crude OR=1.648, 95%CI=1.495-1.816), and other backward classes (crude OR=1.383, 95%CI=1.292-1.481) social group compared to women in others category (general category). Economic status was also found to be an important significant determinant in the NSBA, the probability of NSBA was found to be more likely among women with poorest wealth quintile (crude OR=3.144, 95%CI=2.766-3.575), poorer (crude OR=2.792, 95%CI=2.470-3.157), middle (crude OR=2.224, 95%CI=1.983-2.495), richer (crude OR=1.784, 95%CI=1.627-1.956) than women belongs to richest wealth quintile.

**Predictors of non skilled birth attendant**

Table 4 demonstrates the results of the logistic regression analyses of the utilization non skilled birth attendant by four models for predicting utilization non skilled birth attendant among the women, using a backward stepwise approach, were built.

**Table 3. The distribution of non-skilled birth attendant among currently married women who had a childbirth in the three years preceding the survey by selected individual, household and community characteristics, DLHS-3 (2007-08), India.**

Socioeconomic characteristics (N=80697)	Lacked skilled attendant: Yes 72437 (89.83%)	95% C.I	Crude OR	95% C.I
<b>Individual characteristics</b>				
<b>Women's age</b>				
15-19 (ref)	88.4	[87.4-89.3]	1.000	
20-24	88.5	[87.9-89.1]	1.015	[0.912-1.130]
25-29	89.9	[89.3-90.4]	1.165***	[1.045-1.298]
30-34	90.9	[90.4-91.4]	1.319***	[1.181-1.473]
35-49	91.6	[90.9-92.3]	1.436***	[1.252-1.648]
<b>Women's education</b>				
Non-Literate	91.9	[91.5-92.2]	3.087***	[2.801-3.403]
Primary	88.5	[87.7-89.3]	2.110***	[1.891-2.354]
6-9 years	84.6	[83.7-85.5]	1.508***	[1.360-1.672]
High school and above (ref)	78.5	[76.6-80.3]	1.000	
<b>Husband's education</b>				
Non-Literate	92.7	[92.3-93.1]	2.153***	[1.976-2.347]
Primary	90.1	[89.6-90.6]	1.535***	[1.414-1.667]
6-9 years	88.7	[88.1-89.3]	1.334***	[1.234-1.442]
High school and above (ref)	85.5	[84.5-86.5]	1.000	
<b>Working status</b>				
Working	89.4	[88.6-90.1]	1.069***	[0.971-1.178]
Not working (ref)	88.7	[88.1-89.4]	1.000	
<b>ANC visit first trimester</b>				
No	88.5	[88.0-89.1]	1.401***	[1.314-1.495]
Yes (ref)	84.7	[83.7-85.6]	1.000	
<b>Antenatal visit</b>				
No visit	93.0	[92.7-93.3]	3.700***	[3.374-4.059]
1-3	88.2	[87.6-88.7]	2.063***	[1.887-2.254]
4 and above (ref)	78.3	[76.7-79.9]	1.000	
<b>Complication During Pregnancy</b>				
No	90.6	[90.0-91.2]	1.155***	[1.093-1.221]
Yes (ref)	89.3	[88.9-89.7]	1.000	
<b>Exposure to antenatal care messages</b>				
No exposure	92.9	[92.5-93.4]	2.186***	[1.954-2.446]
Only through mass media	85.8	[84.3-87.2]	1.005	[0.903-1.118]
Only through interpersonal communication	90.1	[89.7-90.5]	1.517***	[1.408-1.634]
Both (ref)	85.8	[84.7-86.8]	1.000	
<b>Exposure to Institutional care messages</b>				
No exposure	92.8	[92.4-93.1]	2.218***	[1.982-2.481]
Only through mass media	85.5	[84.1-86.8]	1.022	[0.928-1.126]
Only through interpersonal communication	89.5	[89.1-90.0]	1.482***	[1.357-1.618]
Both (ref)	85.2	[83.9-86.4]	1.000	
<b>Household characteristics</b>				
<b>Religion</b>				
Muslim	91.1	[90.2-91.9]	1.199	[1.097-1.311]
Others	91.3	[90.1-92.4]	1.238	[1.078-1.421]
Hindu (ref)	89.5	[89.0-89.9]	1.000	
<b>Social group</b>				
Scheduled castes	90.8	[90.2-91.3]	1.557***	[1.426-1.701]
Scheduled tribes	91.3	[90.7-91.9]	1.648***	[1.495-1.816]
Other backward classes	89.8	[89.3-90.2]	1.383***	[1.292-1.481]
Others (ref)	86.4	[85.4-87.4]	1.000	
<b>Wealth quintile</b>				
Poorest	92.0	[91.6-92.4]	3.144***	[2.766-3.575]
Poorer	91.0	[90.7-91.4]	2.792***	[2.470-3.157]
Middle	89.0	[88.5-89.5]	2.224***	[1.983-2.495]
Richer	86.7	[85.8-87.5]	1.784***	[1.627-1.956]
Richest (ref)	78.5	[76.4-80.4]	1.000	
<b>Community characteristics</b>				
<b>Place of residence</b>				
Rural	90.4	[90.2-90.7]	1.946	[1.769-2.140]
Urban (ref)	82.9	[81.6-84.2]	1.000	
<b>Total</b>	<b>89.8</b>	<b>[89.3-90.2]</b>		

Sources: Based on author's computation from DLHS-3 (2007-08).

Levels of significance: \*p&lt;0.10; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Model 1 was none and model 2 included the individual characteristics; model 3 included the individuals and household characteristics and model 4 combined individual, household and community factors. Findings show that women's age, women's education, husband education, women's working status, exposure to institutional care massage, religion, social status, wealth quintile and place of residence were found to be statistically significant determinants in lack of skilled birth attendants. Education showed the strongest relationship with utilization NSBA. That is, the women with no education were more likely to utilization NSBA during child birth at home. The odds of utilization NSBA with no education (aOR=2.078, aOR=1.741, aOR=1.737), primary schooling (aOR=1.605, aOR=1.388, aOR=1.381), 6-9 years schooling (aOR=1.363, aOR=1.213, aOR=1.218) were more even all models (model 2, model 3 and model 4) respectively as compared to women with high school and above education. Odds of utilization NSBA with women having no exposure to institutional birth messages were 1.5 times more even all models as compared to exposure women to mass media and interpersonal communication both. The results of logistic regression analysis showed that Muslim women by religion were (1.23 times, model 3) and (1.30 times, model 4) more likely to have NSBA during child birth than Hindu women. Compared to the others category women, schedule caste women were 1.2 times more likely to utilized NSBA (both model 3 and model 4). The likelihood of utilization NSBA was 1.5 times higher among women belongs to the poorest and poorer wealth quintile as compared with those women belongs to richest wealth quintile. As expected, women living in rural areas were more likely (aOR=1.465) to utilization NSBA than those women living in urban areas.

Predicted probabilities of utilization non skilled birth attendant were calculated using

logistic regression model 4. The graph (figure.1) constructed from the results of the probability calculation. It is seen that women living in rural area and who had no education were more likely to utilized non skilled birth attendant and from these women those with poorest and poorer wealth quintile showed the highest use. Women from urban area with education and with richest wealth quintile showed the lowest probability which is (68.6%) of utilization non skilled birth attendant when computed to the rest of women. Women with poorest level of wealth quintile have a higher probability of utilized non skilled birth attendant during delivery among no education but this result varies by the place of residence. Illiterate women with poorest wealth quintile living in rural areas had a higher probability of utilization NSBA during child birth at home 91.8% than educated women with richest quintile living in urban areas probability of 68.6%.

### **Discussion**

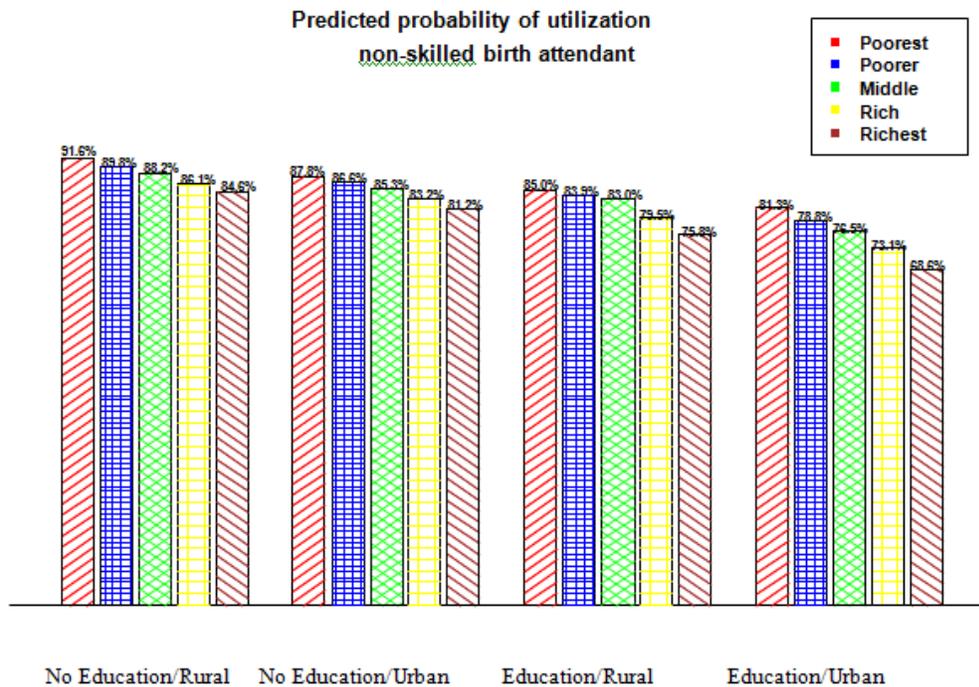
The present study has comprehensively demonstrated the trends in women with utilization non skilled birth attendant during delivery at home. Maternal health care has been at the top of the agenda of the Government of India since 1996 when the integration of the Safe Motherhood and Child Health Program into the Reproductive and Child Health Program (RCH) took place. However, the issue of high utilization of non skilled birth attendant among women in EAG states, India rarely had any special place in academic and policy discussions until recently. Almost 90 percent women were assisted by non skilled birth attendant during delivery at home. Analysis indicates that women aged 20-49 years were more likely to report assistance by NSBA during their delivery compared with women aged 15-19 years.

**Table 4. Estimated effects and significance levels of selected background characteristics on utilization of non- skilled birth attendant among currently married women who had a childbirth in the three years preceding the survey, DLHS-3 (2007-08), India.**

	Model 1	Model 2	Model 3	Model 4
<b>Constant</b>	8.775	8.775	8.775	8.775
<b>Individual characteristics</b>				
<b>Women's age</b>				
15-19 (ref)		1.000	1.000	1.000
20-24		1.140*	1.162**	1.170**
25-29		1.181***	1.225***	1.239***
30-34		1.150*	1.191***	1.209***
35-49		1.118	1.160*	1.185**
<b>Women's education</b>				
Non-Literate		2.078***	1.741***	1.737***
Primary		1.605***	1.388***	1.381***
6-9 years		1.363***	1.213***	1.218***
High school and above (ref)		1.000	1.000	1.000
<b>Husband's education</b>				
Non-Literate		1.305***	1.168***	1.217***
Primary		1.064	0.962	0.998
6-9 years		1.018	0.955	0.978
High school and above (ref)		1.000	1.000	1.000
<b>Working status</b>				
Working		0.888**	0.845***	0.830***
Not working (ref)		1.000	1.000	1.000
<b>ANC visit first trimester</b>				
No		1.122***	1.114***	1.107***
Yes (ref)		1.000	1.000	1.000
<b>Antenatal visit</b>				
No visit		1.231	1.309	1.265
1-3		1.681***	1.666***	1.639***
4 and above (ref)		1.000	1.000	1.000
<b>Complication During Pregnancy</b>				
No		1.094**	1.109***	1.115***
Yes (ref)		1.000	1.000	1.000
<b>Exposure to antenatal care messages</b>				
No exposure		1.203*	1.121	1.100
Only through mass media		0.961	0.987	0.993
Only through interpersonal communication		1.093*	1.035	1.025
Both (ref)		1.000	1.000	1.000
<b>Exposure to Institutional care messages</b>				
No exposure		1.554***	1.522***	1.503***
Only through mass media		1.013	1.011	1.004
Only through interpersonal communication		1.069	1.045	1.033
Both (ref)		1.000	1.000	1.000
<b>Household characteristics</b>				
<b>Religion</b>				
Muslim			1.229***	1.302***
Others			1.210	1.211
Hindu (ref)			1.000	1.000
<b>Social group</b>				
Scheduled castes			1.209***	1.251***
Scheduled tribes			1.139	1.172*
Other backward classes			1.138***	1.162***
Others (ref)			1.000	1.000
<b>Wealth quintile</b>				
Poorest			1.707***	1.429***
Poorer			1.775***	1.510***
Middle			1.579***	1.376***
Richer			1.518***	1.387***
Richest (ref)			1.000	1.000
<b>Community characteristics</b>				
<b>Place of residence</b>				
Rural				1.465***
Urban (ref)				1.000

Sources: Based on author's computation from DLHS-3 (2007-08).

Levels of significance: \*p<0.10; \*\*p<0.05; \*\*\*p<0.01



**Figure 1: Predicted probability of utilization non-skilled birth attendant by place of residence, wealth index, by education after adjusting other predictor variables.**

The results from this study show that illiterate women exert a significant influence on the utilization NSBA after controlling for other selected covariates. That is, the women with no education were more likely to utilization NSBA during child birth at home. Many studies have showed that women education is one of the most important determinants of maternal health care utilization after controlling others selected covariates [20-28]. Several studies indicated that the use of healthcare services is lower among Muslim mothers than their counterparts among Hindu mothers [29-32]. A few studies suggested that utilization of maternal health care services among Muslim and scheduled caste was lower [33-34] in India. This study also found that women belong with Muslim by religion were more likely utilized non skilled birth attendant at time of child birth. Many studies indicate that economic group of women was associated with maternal healthcare utilization [35-38]. Various studies indicated that the household wealth effect the maternal healthcare utilization [39-42]. Results from

this study also indicated that wealth status of women was positively associated with assistance delivery by non skilled birth attendant. Illiterate women with poorest wealth quintile living in rural areas had a higher probability of utilization NSBA during child birth at home than educated women with richest quintile living in urban areas. Many studies indicate that poor maternal care, births delivered outside a health facility, and mostly by non skilled person are associated with high neonatal adverse outcomes [43]. This study found a considerable difference in the probability of utilization NSBA among women living in rural and urban areas. Poor accessibility and communication, substandard infrastructural facilities, coupled with traditional beliefs more likely to utilization NSBA in rural areas.

### Conclusion

This study concludes that delivery assisted by non skilled birth attendant was associated with women education, husband education, religion caste, income strata and place of

residence. Women with no education were found to have a significant impact on utilization NSBA, this suggest that improving educational opportunities to women, particularly the poor, remote and isolated communities in rural area, may have a large impact on the utilization of skill birth attendant and safe delivery. In order to reduce maternal and infant mortality rates as we get close to the MDG deadline of 2015. To make sure that all women labour to health facility or at-least delivery assisted by trained person in case of home delivery. However institutional delivery service free at the point of delivery, referral systems in case of emergency and also treat complications free of charge during pregnancy. Existing government policies and programs should target households with illiterate married women belonging to poorest and poorer wealth quintile and specific subgroups (like social group, religion) of the population living in the rural area to address unmet need for maternal health care services utilization in order to reduce maternal mortality and neonatal deaths. Finding of this study indicates that women who had some exposure about institutional delivery, they have less utilization non skilled birth attendant during her delivery, therefore this study recommended that the messages and educational sessions must be provided to pregnant women and also targeting the whole community on the dangers of utilizing non skilled birth attendant in EAG states, India.

### **Limitation of the study**

While, this study explores several unfold dimensions of non skilled birth attendant in EAG states, India but still it suffers from some of the limitations too. We could not include many community and health system variables that are thought to have influence on health care utilization behavior of mothers. DLHS-3 provides data on district hospitals' human resources, training,

equipment etc. but we could not merge that information with individual files and hence missed some important supply side variables in the analysis. We have used only those women as deliver their children at home. However in prospective studies could use more dependent variables to gain better insights into health care behavior of women in India.

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#### **Funding**

No funding was received to conduct this study.

#### **Competing interests**

The authors declare that they have no competing interests.

#### **Author's contribution**

JY , SG and JY contributed in the concept of the analysis of DLHS-3 dataset. JKS and JY performed all statistical analysis. JK, JKS and SG wrote manuscript and all authors have read and approved the final manuscript.

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