

## Effect of Women's and Partners' Education on Maternal Health-care Services Utilization in Five Empowered Action Group States of India: An analysis of 13,443 Women of Reproductive Age

### Abstract

**Background:** Suboptimal utilization of maternal health-care services is a perennial problem in Empowered Action Group (EAG) states. This study examines role of women's and partners' education on usage of antenatal, postnatal care (PNC), and skilled birth attendance in these states. **Methodology:** National Family Health Survey-4 (2015–2016) data for 13,443 women in reproductive age group of 15–49 years in Bihar, Madhya Pradesh (MP), Odisha, Rajasthan, and Uttar Pradesh (UP) were analyzed using logistic regression. **Results:** Increasing level of education had a significant impact on utilization of antenatal services in all states, highest and lowest odds being observed with higher and primary level of partner's education, respectively. Skilled birth attendance universally showed rising trend with increasing women education, while it remained substantially low even at higher level of partner's education. For PNC, utilization increased with increasing level of maternal education. While significantly lower odds of PNC were seen with primary level of partner education in Rajasthan and UP, partner's secondary education showed positive and significant association in Bihar, Rajasthan, and UP. At higher level of partner education, positive and significant effects on PNC were observed only in Bihar, MP, and UP. **Conclusions:** Universal education is vital to attain sustainable development goals at the grassroot level, which is happening relatively slowly in the EAG states.

**Keywords:** Antenatal care, Empowered Action Group states, partner's education, postnatal care, skilled birth attendance, women's education

### Introduction

Research on the impact of formal erudition on maternal health outcomes and well-being of their young ones gained attention in developing countries during the mid-1990s after an International Conference on Population and Development in Cairo.<sup>[1]</sup> Till date, research has primarily focused on mother's education as an important predictor of woman and child well-being in developing countries.<sup>[2-4]</sup> It is a well-known fact that educated women are more likely to avail modern health-care services as compared to their illiterate counterparts as they are more mindful and conscious of modern health-care facilities and also enjoy greater autonomy within and outside the household. They gain skills from education which enable them to communicate effectively with health-care providers. Women with higher education are also better decision-makers and enjoy social networking.

Recent research on utilization of maternal health-care services in developing countries has explored variables beyond mother's education.<sup>[5-8]</sup> The literature in the United States on social disorganization, social capital, and collective ability<sup>[9,10]</sup> and on the diffusion effect<sup>[11]</sup> shows the impact of communities on individual characteristics. A study reflects a strong association between community level education and age of marriage and first birth in Sub-Saharan African countries after controlling the effect of mother's own education.<sup>[12]</sup> Another study also documented that as the level of education increases in the community, women are more likely to use maternal health-care services.<sup>[13]</sup>

Existing literature in developed countries shows a strong association of partner's education on maternal health outcomes.<sup>[14,15]</sup> However, as regards developing countries, some studies on maternal fertility and

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child mortality,<sup>[16]</sup> in Ghana and<sup>[17]</sup> in Indonesia, studied the impact of partner's education but not in the context of maternal health-care utilization. Most studies have focused on women's reproductive health, but the study variables are limited to women's individual characteristics or these studies have used partner's education as a control variable without elaborating upon it.

Role of partner's education in utilization of maternal health-care services may be explained by three factors: (1) discrimination of women in developing countries gives disproportionate supremacy to men.<sup>[18]</sup> This gender bias may prevent women from meeting their maternal health-care needs.<sup>[13]</sup> Partner's education makes them more receptive toward health information and utilization; (2) partner's education reflects higher social status in developing countries which indirectly impacts access to and availing of health services by the spouse; and (3) partner's education may increase fiscal security through employment in formal sector.

In the Indian context, eight Empowered Action Group (EAG) states, viz., Bihar, Jharkhand, Uttar Pradesh (UP), Uttarakhand, Madhya Pradesh (MP), Chhattisgarh, Odisha, and Rajasthan, along with Assam account for about 48% of the total population and are the high focus states in view of their relatively poor socioeconomic indicators and higher fertility and mortality indicators.<sup>[19]</sup>

The present study is the first dedicated investigation that addresses not only the research gap that persists in examining the low usage of maternal health-care services among the EAG states in India but also another noteworthy aspect of education that has largely been overlooked in previous studies in low- and middle-income countries like India, i.e., the impact of partner's education on maternal health-care utilization. Five EAG states of India, namely Bihar, MP, Rajasthan, UP, and Odisha which are backward in economic and social development and show similarities with regard to their socioeconomic factors and other indicators with many developing countries were selected for this study which attempts to (1) explore the effect of women and partner's education on maternal health-care seeking behavior and (2) to study the interaction between mother's primary education and mother's higher education with partner's higher education as well as suggest policy measures based on the results.

## Methodology

The National Family Health Survey (NFHS) employs multistage stratified sampling to provide national-, state-, and district-level estimates on utilization of maternal and child health services. The present study used data from NFHS 4 (2015 to 2016) for five EAG states-Bihar, MP, Odisha, Rajasthan, and UP.

We analyzed data for women in the reproductive age group of 15–49 years in five EAG states of India and considered

three dependent variables: (1) antenatal care (ANC) received, (2) delivery assisted by skilled health-care professionals, and (3) receipt of postnatal care (PNC) services. The first dependent variable was estimated for all married women, but analysis of the last two dependent variables was limited to married women who had experienced child birth during the 5 years preceding the survey. These three dependent variables were dichotomized. Received ANC was dichotomized as “1” if she received ANC and “0” otherwise; skilled birth attendance as “1” if the latest delivery took place in the presence of health professionals (including doctor, auxiliary nursing midwife, nurse, and trained birth attendant) and “0” otherwise; and PNC within 2 days of delivery was assigned a value “1” if she had received PNC and “0” otherwise.

The key predictors were women's education and partner's education categorized as no education, primary education, secondary education, and higher education. The study also controlled for the influence of certain variables including women's age, birth order, religion, caste, place of residence, and household wealth.

To analyze the impact of women and partner's education on women's maternal health-care utilization, we used a logistic regression model after controlling for selected predictors. The logistic regression model is given as follows:

$$\text{logit}(P_{ij}) = \log\left(\frac{P_{ij}}{1-P_{ij}}\right) = \alpha_{ij} + \alpha_1 WEDU_{ij} + \alpha_2 PEDU_{ij} + \sum_{i=1}^p \beta_p X_{ij}^p \quad (1)$$

where WEDU refers to women's education, PEDU refers to partner's education, X stands for control variables, and  $\alpha_1$ ,  $\alpha_2$  are vector of coefficients to be estimated.

This study ran eight regressions for each dependent variable. Model 1 assessed the impact of women's primary level of education. Model 2 examined the impact of women's secondary level of education. Model 3 studied women's higher level of education. Model 4 estimated partner's primary level of education. Model 5 analyzed partner's secondary level of education. Model 6 observed partner's higher level of education. Model 7 analyzed the interaction of women's no education with partner's higher education, and Model 8 scrutinized the interaction of women's higher education with partner's higher education. All analyses were performed using STATA software package version 16 (Stata Corp, College Station, Texas, USA).

## Results

Figure 1 shows the percentage distribution of maternal health-care services utilization in the five selected EAG states of India. In general, total deliveries assisted by skilled health workers were higher than percentage utilization of

antenatal and PNC. At the state level, only 58% of women received ANC in Bihar versus 95% in Odisha. However, in case of deliveries assisted by skilled birth attendant (SBA), the utilization was almost similar in all the EAG states. The disparities in PNC ranged from 53% in Bihar to 85% in Odisha. Overall, Bihar showed the worst maternal health utilization parameters, while Odisha fared the best among the five selected EAG states.

As observed in Table 1, utilization of all maternal health-care services was mostly higher in urban areas, in younger age groups, and among women with first birth order across all the EAG states. As expected, as level of

education and wealth quintile increased, utilization of ANC, SBA, and PNC also showed an upward trend. Hindu women belonging to Bihar and Odisha showed better utilization of maternal health-care services as compared to Muslim and others, while women belonging to other religions in MP, Rajasthan, and UP availed more maternal health-care services. Utilization was also higher among the other caste women as compared to scheduled caste (ST), scheduled tribes (ST), and other backward classes in all the selected states.

The results of the effect of Women's and their partner's education on maternal health-care services utilization are

**Table 1: Maternal health-care services utilization in five Empowered Action Group states by socioeconomic characteristics (in weighted percentages)**

Predictors	Bihar			Madhya Pradesh			Odisha			Rajasthan			Uttar Pradesh		
	ANC	SBA	PNC	ANC	SBA	PNC	ANC	SBA	PNC	ANC	SBA	PNC	ANC	SBA	PNC
Sector															
Urban	26.3	77.5	57.7	51.6	94.6	70.5	69.7	90.6	81.5	53.8	91.9	74.0	43.3	74.4	69.4
Rural	13.0	65.2	48.6	29.6	78.0	56.6	60.5	86.5	85.3	34.0	84.3	64.8	21.7	69.1	60.1
Women's age (years)															
15-24	16.8	73.1	51.9	36.0	84.2	60.4	62.4	89.7	86.4	40.6	89.4	69.8	28.7	76.5	65.2
25-34	14.2	65.5	49.9	36.4	82.6	61.1	62.8	87.3	84.4	38.6	85.7	66.7	27.4	70.4	63.0
35-49	8.7	53.0	41.7	28.9	74.2	56.0	55.6	78.2	81.2	28.4	73.3	55.8	17.7	57.1	52.3
Birth order															
1	22.6	78.2	56.2	44.3	91.2	67.1	65.7	94.4	87.1	46.5	94.3	74.0	38.2	84.4	70.8
2	16.2	69.3	51.4	37.4	85.1	61.4	63.2	90.1	84.5	42.5	88.1	69.2	30.2	74.4	65.3
3+	9.6	59.6	45.5	26.2	72.3	53.4	54.2	71.2	81.3	28.1	77.2	58.9	17.8	60.3	55.6
Women's education															
No education	7.9	57.7	44.0	22.5	69.3	50.5	53.6	69.0	81.0	26.3	76.9	58.4	15.3	57.8	53.3
Primary	12.6	66.8	49.4	31.8	81.2	57.7	57.4	86.2	83.7	38.1	87.1	68.4	21.8	67.4	59.9
Secondary	22.2	79.4	56.6	41.8	90.2	65.8	65.8	95.1	86.6	46.3	92.9	72.2	32.2	79.6	68.2
Higher	48.7	92.8	74.2	65.5	98.3	77.8	74.9	98.8	86.6	61.2	97.8	80.3	54.2	91.6	78.7
Partner's education															
No education	9.74	55.9	45.4	24.3	66.4	46.8	56.6	75.6	78.8	21.4	72.9	55.0	15.7	54.8	53.4
Primary	11.11	65.5	50.3	32.0	79.5	54.3	63.9	84.0	81.5	24.6	75.9	59.5	20.2	62.6	55.7
Secondary	18.75	72.4	54.6	36.2	86.5	62.5	68.1	93.1	85.9	44.0	88.7	67.0	27.5	74.0	64.7
Higher	41.15	91.7	72.8	63.7	95.9	76.0	69.2	97.9	89.6	50.2	95.2	73.6	47.7	87.5	77.8
Religion															
Hindu	14.6	69.2	50.8	34.9	81.8	60.1	62.1	88.0	85.0	38.6	86.7	67.9	25.9	72.0	62.3
Muslim	13.4	53.9	44.2	42.7	91.0	62.3	60.5	74.5	77.6	36.4	78.7	58.4	28.0	63.0	61.2
Others	9.3	59.0	38.4	62.3	94.2	75.8	56.9	70.5	82.7	46.3	97.5	67.0	73.8	90.6	84.9
Caste															
SC	8.6	60.6	47.3	35.0	85.5	60.1	58.4	87.4	83.7	36.0	86.8	66.3	20.0	67.1	58.2
ST	11.2	57.1	34.0	24.5	61.9	50.9	59.7	75.3	83.9	30.9	79.0	62.5	14.6	51.6	42.1
OBC	14.2	67.8	50.2	37.8	88.6	63.3	64.9	93.3	86.6	38.3	86.0	66.7	25.2	69.4	61.7
Other	24.4	71.9	55.1	47.2	91.5	66.4	62.3	92.5	83.9	48.3	91.1	72.1	39.6	78.9	70.4
Wealth quintile															
Poorest	8.4	58.3	44.3	19.7	65.8	46.9	54.2	76.0	83.0	21.5	73.2	54.7	11.3	58.7	49.3
Poorer	14.9	71.4	51.4	30.9	83.9	58.4	63.5	89.0	84.2	30.3	82.5	63.4	19.7	69.1	59.8
Middle	22.2	79.5	57.1	39.7	91.1	66.3	66.8	96.0	86.1	36.5	87.8	66.8	28.5	73.0	66.0
Richer	35.4	85.5	65.0	47.5	93.4	71.6	69.4	98.3	86.9	47.8	91.3	72.8	38.3	77.5	71.5
Richest	52.6	92.5	75.3	63.2	98.1	76.5	74.1	99.0	89.6	60.2	96.7	78.5	58.9	88.6	81.4

Source: NFHS data 2015–2016. EAG: Empowered Action Group; ANC: Antenatal care; SBA: Skilled birth attendance; PNC: Postnatal care; SC: Scheduled caste; ST: Scheduled tribes; OBC: Other backward classes, NFHS: National Family Health Survey

shown in Tables 2-4. Table 2 shows the effects of women's and partner's education on the use of ANC, while Tables 3 and 4 show these effects for skilled birth attendance and PNC, respectively. The results are divided into three parts. In the first part, this study deals with women's own level of education (M1, M2, and M3) on ANC, skilled birth attendance, and PNC services. In the second part, this study shows the effects of partner's level of education (M4, M5, and M6) on ANC, skilled birth attendance, and PNC. Finally, the study tries to capture the impact of women's primary level of education with partner's higher level of education (M7), i.e., substitution effect and women's higher level of education with partner's higher level of education (M8), i.e., multiplicative effect.

The results depict a strong association between education and use of ANC services [Table 2]. The base categories are women and partners with no education. The odds of taking ANC are higher for women with primary education as compared to no education; the effects of secondary and higher levels of education on ANC use are even stronger in all the selected EAG states. Similarly, the effect of partner's secondary and higher education on ANC use is high across all the selected states. The effect of partner's primary and secondary education was lower as compared to women's primary and secondary education, respectively, while partner's higher education had the highest association with taking ANC. As far as the interaction of women's primary

education and partners' higher education are concerned, strong significant interaction effects were observed. This reflects a substitution effect. In addition, the interaction of women's higher level of education with partner's higher level of education led to a positive and significant impact on the ANC utilization except in Odisha. This indicates a multiplicative effect.

The results presented in Table 3 show a slightly different pattern as compared to ANC. The utilization of SBA showed an upward trend with increasing women education, while in case of partner's education, the utilization of SBA remained substantially low even at higher level of education though, the results do find a significant substitution effect when we study the interaction of women's primary education with partner's higher level of education on skilled birth attendance.

Table 4 shows a positive and significant impact of mother's primary level of education only in MP and Odisha where 11% and 8% women, respectively, were more likely to receive PNC after delivery. However, as the level of maternal education increased, the utilization of PNC also increased. While significantly lower odds of utilization of PNC were seen with primary level of partner education in Rajasthan and UP, the effect of partner's secondary level of education showed a positive and significant association in Bihar, Rajasthan, and UP. However, at higher level of partner

**Table 2: Regression model results of the effect of women's and partner's education on antenatal care services utilization in the selected five Empowered Action Group states of India**

	M1	M2	M3	M4	M5	M6	M7	M8
<b>Bihar</b>								
Coefficient	1.04**	1.64*	3.34*	0.92 (NS)	1.39*	3.50*	5.57*	1.72*
LR $\chi^2$	135*	592*	433*	181.31*	183.0*	206.8*	354.6*	199.03*
Number of Obs.	2773	2773	2773	2773	2773	2773	2773	2773
<b>Madhya Pradesh</b>								
Coefficient	1.09***	1.57*	2.22*	0.94 (NS)	1.17***	3.57*	3.6*	1.28*
LR $\chi^2$	466*	730*	549*	198.39*	199*	212.2*	204.4*	200.2*
Number of Obs.	2669	2669	2669	2669	2669	2669	2669	2669
<b>Odisha</b>								
Coefficient	1.11***	1.64*	2.11*	0.64 (NS)	1.54***	2.82***	2.64*	0.96**
LR $\chi^2$	18.5	89*	27.7*	18.22*	17.8*	19.5*	14.6*	17.6*
Number of Obs.	1490	1490	1490	1490	1490	1790	1790	1790
<b>Rajasthan</b>								
Coefficient	1.19**	1.64*	3.5*	0.54*	1.18*	2.70*	5.5*	1.70*
LR $\chi^2$	177*	306*	278*	149.51*	152.7*	150.0*	172*	165.3*
Number of Obs.	1858	1858	1858	1858	1858	1858	1858	1858
<b>Uttar Pradesh</b>								
Coefficient	1.08**	1.42*	2.6*	0.87 (NS)	1.28*	3.0*	4.6*	1.52*
LR $\chi^2$	548*	548*	537*	370.62*	371.8*	385.4*	667.6*	379.6*
Number of Obs.	4653	4653	4653	4653	4653	4653	4653	4653

Source: Authors' estimation based on NFHS data. \*Significant at 1% level, \*\*Significant at 5% level, \*\*\*Significant at 10% level. M1: Women's primary education; M2: Women's secondary education; M3: Women's higher education; M4: Partner's primary education; M5: Partner's secondary education; M6: Partner's higher education; M7: Interaction of women's primary education with partner's higher education; M8: Interaction of women's higher education with partner's higher education; NS: Not significant; LR: Likelihood Ratio; Number of Obs: Number of observations



**Table 3: Regression model results of the effect of women and partner's education on skilled birth attendance in the selected five Empowered Action Group states of India**

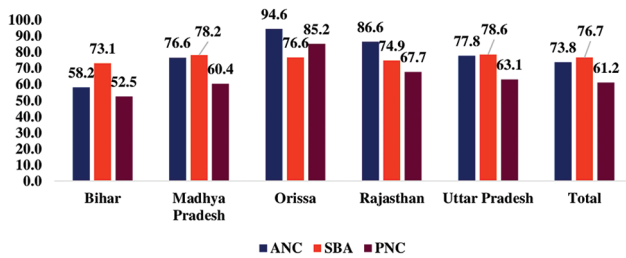
States	M1	M2	M3	M4	M5	M6	M7	M8
<b>Bihar</b>								
Coefficient	0.99 (NS)	1.04***	1.16**	0.071 (NS)	0.034 (NS)	0.042 (NS)	1.20*	0.92*
LR $\chi^2$	24.12*	27.26**	33.6	13.22	13.06	12.99	14.72	13.92
Number of Obs.	2622	2622	2622	2622	2622	2622	2622	2622
<b>Madhya Pradesh</b>								
Coefficient	0.95 ns	1.06**	1.18*	0.031 (NS)	0.067 (NS)	0.15 (NS)	1.14*	0.93*
LR $\chi^2$	7.02**	12.3*	22.34	23.68	24.1	24.58	28.88	12.77
Number of Obs.	2567	2567	2567	2567	2567	2567	2567	2567
<b>Odisha</b>								
Coefficient	0.99 (NS)	0.97***	1.05 (NS)	0.014 (NS)	0.075 (NS)	0.21 (NS)	1.11**	1.02ns
LR $\chi^2$	27.6*	30.4	28.8	29.46	29.8	30.49	29.65	0.85
Number of Obs.	1429	1429	1429	1429	1429	1429	1429	1429
<b>Rajasthan</b>								
Coefficient	0.95 (NS)	1.01 (NS)	1.13**	0.045 (NS)	0.122 (NS)	0.089 (NS)	1.17*	0.94**
LR $\chi^2$	27.36*	25.2	35.21*	18.29	19.57	18.71	19.04	6.03
Number of Obs.	1781	1781	1781	1781	1781	1781	1781	1781
<b>Uttar Pradesh</b>								
Coefficient	0.98 (NS)	0.97***	1.06***	0.17 (NS)	0.009 (NS)	0.075 (NS)	1.10*	0.99 (NS)
LR $\chi^2$	104.4*	106.4*	109*	16.51	13.83	14.33	19.54	0.3
Number of Obs.	4399	4399	4399	4399	4399	4399	4399	4399

Source: Authors' estimation based on NFHS data. \*Significant at 1% level; \*\*Significant at 5% level; \*\*\*Significant at 10% level. M1: Women's primary education; M2: Women's secondary education; M3: Women's higher education; M4: Partner's primary education; M5: Partner's secondary education; M6: Partner's higher education; M7: Interaction of women's primary education with partner's higher education; M8: Interaction of women's higher education with partner's higher education; NS: Not significant; LR: Likelihood Ratio; Number of Obs: Number of observations

**Table 4: Regression model results of the effect of women and partner's education on postnatal care in the selected five Empowered Action Group states of India**

States	M1	M2	M3	M4	M5	M6	M7	M8
<b>Bihar</b>								
Coefficient	0.90 (NS)	1.17*	1.38*	0.83 (NS)	1.16**	1.33***	1.45*	0.84*
LR $\chi^2$	30*	50.16*	42.36*	2.24 ns	3.93**	3.69***	22.31*	32.19*
Number of Obs.	2225	2225	2225	2225	2225	2225	2225	2225
<b>Madhya Pradesh</b>								
Coefficient	1.11**	1.13*	1.35*	1.04 (NS)	1.14 (NS)	1.29***	1.68*	0.71*
LR $\chi^2$	250*	257*	262*	0.18 (NS)	1.23 (NS)	2.89***	61.87*	117.97*
Number of Obs.	2112	2112	2112	2112	2112	2112	2112	2112
<b>Odisha</b>								
Coefficient	1.08*	1.07 (NS)	1.15 (NS)	1.20 (NS)	1.20 (NS)	0.97 (NS)	1.31***	0.85*
LR $\chi^2$	3.69***	1.38 (NS)	1.36 (NS)	0.62	1.06 (NS)	0.01 (NS)	17.36***	6.51
Number of Obs.	1116	1116	1116	1116	1116	1116	1116	1116
<b>Rajasthan</b>								
Coefficient	1.00 (NS)	1.12**	1.22*	0.60**	1.38**	1.26 (NS)	1.39*	0.79*
LR $\chi^2$	75.7*	87.8*	83.6*	10.81	8.28	2.32	21.64	35.26*
Number of Obs.	1469	1469	1469	1469	1469	1469	1469	1469
<b>Uttar Pradesh</b>								
Coefficient	0.96 (NS)	1.13*	1.26*	0.78**	1.19***	1.45*	1.36*	0.79*
LR $\chi^2$	208*	232*	240*	5.31	6.05	12.34	60.55*	88.93*
Number of Obs.	3243	3243	3243	3243	3243	3243	3243	3243

Source: Authors' estimation based on NFHS data. \*Significant at 1% level; \*\*Significant at 5% level; \*\*\*Significant at 10% level. M1: Women's primary education; M2: Women's secondary education; M3: Women's higher education; M4: Partner's primary education; M5: Partner's secondary education; M6: Partner's higher education; M7: Interaction of women's primary education with partner's higher education; M8: Interaction of women's higher education with partner's higher education; NS: Not significant; LR: Likelihood Ratio; Number of Obs: Number of observations



**Figure 1: Percentage distribution of maternal health-care service utilization across the selected Empowered Action Group states. National Family Health Survey 2015–2016**

education, positive and significant effects were observed only in Bihar, MP, and UP. The effects of partner's education on PNC reflect a significant substitution effect in all the selected EAG states, while the "multiplicative effect" in case of PNC utilization disappeared with higher level of women education.

## Discussion

Although maternal mortality in India has regressed from 556/lakh live births in 1990 to 113/lakh live births in 2018,<sup>[20]</sup> it has missed the National Health Policy 2017 target of reducing the maternal mortality ratio (MMR) to 100,<sup>[21]</sup> and the current MMR is nearly double the United Nations sustainable development goals (SDG) target of reducing the MMR to 70 by 2030. Utilization of maternal health-care services is a proximal determinant of maternal mortality, but there is a dearth of research on the impact of women and partners' education on maternal health-care services in India. The present study attempts to bridge this gap by examining the effect of parent's level of education on maternal health outcomes such as ANC, skilled birth attendance, and PNC in the five EAG States of India where the level of maternal health-care services is historically low.

The findings of this study revealed that the effect of education was neither constant across the selected five EAG states nor similar for the three different health outcomes. Women whose partners had higher education were 3 times more likely to receive ANC services across all five EAG states as compared to women whose partners had no education. There was a significant effect of partner's higher education on utilization of skilled birth attendance. In addition, women whose partner's had higher education were 33% more likely to use PNC services in Bihar, 29% in MP, and 45% in UP as compared to women whose partners had no education. However, women with secondary level of education were more likely to use ANC services as compared to partners with secondary level education in all five EAG states. This finding is supported<sup>[16]</sup> in Ghana. They concluded the effect of women ANC education is greater than that of partner's education. However, we got varied results in the case of skilled birth attendance and PNC. The reason for this could be attributed to the fact that women have more knowledge about their health-care needs.

Across all the selected EAG states, partner's primary level of education emerged to be a less important predictor of maternal health services utilization than women's own primary education, which showed a positive and significant impact on the use of maternal health-care services in some states, while significantly lower odds of utilization of PNC were seen with primary level of partner education in Rajasthan and UP. A study<sup>[22]</sup> also reported effect of women's primary education on child survival.

The present study examines two different interactions of partner's level of education. The interaction of partner's higher education with women's primary education shows a 'substitution effect'. This was reflected in the use of ANC services, skilled birth attendance, and PNC, but in case of interaction of maternal higher education with partner's higher education, we found a positive association only with utilization of ANC in all the selected EAG states except Odisha (multiplicative effect).

The interaction of partner's higher education with women's primary education showed the highest effect on maternal health-care services utilization, but the odds were not constant across all the states. This could be explained by the following: first and foremost-educated husbands can provide better information to their wives, which leads to better utilization of maternal health-care services.<sup>[15]</sup> Partner's education influences wives' economic status, which plays an important role in health-seeking behaviors. Wives of educated men with far-reaching social networks are more likely to develop a broader vision regarding fulfillment of health-care needs. This may also affect her psychosocial well-being; she has more probability of participating in local organizations that widen her own social contacts, thus increasing the likelihood of utilization of maternal health-care services. Second, women may emulate her educated partner's attitudes coined as "cultural capital"<sup>[23]</sup> toward maternal health-care needs. It is important to note that cultural capital also establishes interaction with medical health professionals.<sup>[24]</sup> The third is knowledge toward health-care needs. Education leads to perfect knowledge of the health-care needs and greater receptivity regarding health messages and facilitates positive behavior.<sup>[25-27]</sup>

## Conclusions

This study reiterates that in developing countries like India, education is indeed an important factor that effects maternal health-care utilization. Education of the mother even if only up to primary level has shown greater effect than partner's primary level of education which had no significant effect on women's maternal health-care use. The interaction between partner's higher level of education and women's primary level of education was associated with the highest odds of utilization. Hence, to improve the utilization of maternal health-care services in India, it is imperative to focus on educating the entire

eligible population of school-going age including boys and girls who are the future prospective parents, in addition to the 2030 agenda of “SDG” which focuses on female education and aims at increasing the enrollment ratio to fill the gap between male and female literacy. The present study, thus, provides striking evidence of the role of not only maternal but also her partner's education in maternal health-care services utilization in the five ill-famed EAG states of India and may serve as empirical evidence for formulating policies and programs on maternal health in these states.

### Ethical clearance

Ethical clearance for the present study has been obtained from Institutional Ethical Committee of Government Medical College, Jammu vide letter no. IEC/GMC/Cat C/ 2020/194 dated 31-08-2020.

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### Conflicts of interest

There are no conflicts of interest.

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