Original Research

Cross-Sectional Study on Birth Preparedness and Complication Readiness among Women Attending Tertiary Care Center in North Karnataka

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Abstract

Background: Birth Preparedness and Complication Readiness (BPCR) is the process of preparing for a normal birth and anticipating the measures required in the event of an emergency. Despite being a cost-effective technique for improving maternal and neonatal health, BPCR is a neglected topic in India. Therefore, this study was undertaken to assess BPCR and to determine the factors associated with it among the antenatal and recently delivered women, in a tertiary care setting.

Materials and Methods: A cross-sectional study was conducted among 373 antenatal and recently delivered women attending tertiary care centre, Kalaburagi, using purposive sampling method from July to September 2024. A pre-tested, semi-structured questionnaire was used to collect data and the BPCR was evaluated using indicators from the Johns Hopkins Program for International Education in Gynaecology and Obstetrics (JHPIEGO).

Results: Our study found that 65% of the participants were well prepared for the birth and its complication and the BPCR index was 50.8%. Binary logistic regression revealed participants who residing in rural area, graduate, belonged to upper socioeconomic class and women with graduate and government employed spouses were found to be well prepared for the birth and complication compared to others. And these factors were statistically significant.

Conclusion: Pregnant women's understanding and utilization of BPCR services must be improved and the variables influencing their behaviour and decision-making with regard to BPCR must be addressed with the help of healthcare workers at the grassroot level.

Keywords: BPCR, Birth preparedness, Antenatal, Karnataka

Background

Childbirth carries unpredictable risks, making timely medical care is vital for reducing maternal mortality. The global MMR declined from 339 in 2000 to 223 per 100,000 live births in 2020. Despite this, 287,000 women died from maternal causes in

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2020, around 830 daily or one every two minutes. [1] India's MMR dropped from 103 in 2017 to 97 in 2020, surpassing the NHP 2017 target, but further reduction is needed to meet the UN SDG goal of 70 by 2030. [2]

Public health programs in India aim to reduce maternal and neonatal mortality,[3] but cultural biases and misinformation hinder childbirth preparedness and access to care. These barriers often lead to delays in seeking help and complications. To address this, JHPIEGO introduced the Birth Preparedness and Complication Readiness (BPCR) concept, ensuring timely care for pregnant women. [4]

Despite being a cost-effective strategy, BPCR remains underutilized in India, with limited data on its status. This study evaluates BPCR and its associated factors among antenatal and recently delivered women in a tertiary care setting in Kalaburagi, Karnataka.

Materials and Methods

A facility based cross-sectional study was conducted in antenatal outpatient clinic and postnatal wards of Tertiary care center from July to September 2024.

SAMPLE SIZE DETERMINATION

Based on a study done by Pandey P et.al.,[5] the proportion of women well prepared for delivery was 45.1%, using this proportion the sample size was calculated by using the formula Z^2 PQ/d^2 with 95% CI and 5% permissible error as 357.

INCLUSION AND EXCLUSION CRITERIA

All antenatal women who were in their second and third trimester of pregnancy and women who delivered recently (within 6 months) were included. Women who came for abortion, gynaecological problems, who were in active labour and who didn't give consent were excluded from the study.

DATA COLLECTION PROCEDURE

After getting informed written consent, the study participants were interviewed using a pre-tested and semi-structured questionnaire. The questionnaire consists of three sections which had socio demographic characteristics in section one, obstetric characters in section two and questions about knowledge and practice of BPCR in section three. It was based on 12 indicators which was given by **JHPIEGO** [4] to assess the BPCR at individual level. **[Table 1]**

Table 1: JHPIEGO indicators

1.Knowledge of danger signs of pregnancy
2.Knowledge of danger signs of labour and child birth
3.Knowledge of danger signs of postpartum period
4.Knowledge of danger signs of new born
5.First ANC check-up done in first trimester
6.Knowledge about minimum 4 ANC checkup during pregnancy
7.Knowledge about Government Financial Assistance for pregnant women
8.Knowledge about Government ambulance service for pregnant and delivered women
9.Identifying a doctor/health facility for delivery
10.Saving/saved money for expenses during delivery
11.Arranged a transport for reaching the place of delivery
12.Arranged a blood donor in case of emergency

All the participants were asked to enlist the danger signs of pregnancy, labor & childbirth, postpartum and new born without any probing. A woman was considered knowledgeable, when she mentioned at least three of the danger signs in each category. Women were given a score of one if they had knowledge of the danger signs and followed/ following the proper practices, and a score of zero if they did not. Participants were regarded as well prepared for birth and its complications when they scored at least six out of twelve.

STATISTICAL ANALYSIS

Data was entered into Microsoft excel and analysed using SPSS software version 20.0. Descriptive statistics were used to depict base line characters and clinical profile of study participants. The association between variables were determined by Chi-square/t-test and logistic regression. All statistical analysis were carried out at 5% level of significance and $p<0.05$ was considered statistically significant.

Results

Table 2 shows frequency distribution of socio-demographic characteristics of 373 mothers participated in the study. **Table 3** shows obstetric characteristics of the participants.

When asked about danger signs of pregnancy only 40% of women were able to mention at least 3 key danger signs and during other periods, very small proportion of participants mentioned at least 3 key danger signs in each category **[Fig 1].** The most commonly mentioned danger signs during pregnancy, childbirth and postnatal period were vaginal bleeding and during neonatal period was Not able to suck/ drink **[Table 4].** Even though most of them had 4 ANC visits, very less proportion of the mothers were aware about government schemes which benefits them and mothers who arranged blood donor if the need arises was also found to be low **[Fig 2].**

In our study we found that 65% of the participants were well prepared for the birth and complication which arises from it **[Fig 3].** And the BPCR index was 50.8%.

Table 2: Sociodemographic Characteristics of the Participants

S.no	Variable	N, (%)	S.no	Variable	N, (%)
1	**Age**		7	**Type of family**	
	<20	29(7.8)		Nuclear	**176(47.2)**
	20-25	**243(65.1)**		Joint	129(34.6)
	26-30	86(23.1)		Three generation	68(1.2)
	>30	15(4.0)	8	**Husband's education**	
2	**Religion**			Illiterate	69(18.5)
	Hindu	**315(84.5)**		Primary	39(10.5)
	Muslim	58(15.5)		Middle school	**79(21.2)**
				High school	106(10.2)
3	**Residence**			Diploma	38(10.2)
	Urban	138(37)		Graduate and above	42(11.3)
	Rural	**235(63)**			
4	**Educational status**		9	**Husband's occupation**	
	Illiterate	101(27.1)		Govt. employee	10(2.7)
	Primary	62(16)		Non govt employee	81(21.7)
	Middle school	87(23.3)		Self-employee	**143(38.3)**
	High school	79(21.1)		Coolie	55(14.7)
	Diploma	18(4.8)		Farmer	84(22.5)
	Graduate and above	26(7)			
5	**Occupation**		10	**Decision maker in seeking health care**	
	Working	77(20.6)		Self	14(3.8)
	Not working	**296(79.4)**		Husband	**194(52)**
6	**SES (acc.to B.G. Prasad scale)**			Both	150(40.2)
	Upper class	6(1.6)		Others	15(4)
	Upper middle class	62(16.6)			
	Middle class	**136(36.6)**	11	**Preferred source of antenatal care / delivery**	
	Lower middle class	131(35.1)		Public health sector	**291(78)**
	Lower class	30(8)		Private health sector	82(22)
	Total	373		Total	373

Table 3: Obstetric Characteristics of The Participants

	N, (%)
1.Gestational age	
2nd trimester	45(12.8)
3rd trimester	69(18.5)
Recently delivered	259(69.4)
2.Gravida	
Primi gravida	122(32.7)
Multi gravida	248(66.5)
Grand multi gravida	3(0.8)
3.Experienced miscarriage/ abortion	
Yes	36(9.7)
No	337(90.3)
4.History of stillbirth	
Yes	11(2.9)
No	362(97.1)
5.Experienced obstetric complication in previous delivery	
Yes	36(9.7)
No	337(90.3)
Total	373

Table 4: Knowledge Of Danger Signs Of Participants

1	**Danger signs during pregnancy**	**N, (%)**
	Vaginal bleeding	152(40.75)
	Swollen hands and face	37(9.92)
	Blurred vision	21(5.63)
	High fever	47(12.6)
	Severe lower abdominal pain	116(31.1)
	Convulsion	95(25.4)
	Loss of consciousness	100(26.81)
	Severe headache	51(13.67)
	Reduced foetal movement	55(14.75)
	Excessive vomiting	88(23.59)
	Gush of fluids	13(3.49)

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	Premature onset of labour	8(2.14)
	Don't know	98(26.27)
2	**Danger signs during labour and childbirth**	
	Severe vaginal bleeding	119(31.9)
	Prolonged labour	27(7.24)
	Convulsion	71(19.03)
	Retained placenta	8(2.14)
	Loss of consciousness	78(20.91)
	Don't know	193(51.74)
3	**Danger signs during Postpartum**	
	Vaginal bleeding	91(24.4)
	Foul smelling vaginal discharge	12(3.22)
	Blurred vision	28(7.51)
	High fever	71(19.03)
	Severe lower abdominal pain	48(12.87)
	Convulsion	42(11.26)
	Loss of consciousness	54(14.48)
	Severe headache	59(15.82)
	Don't know	193(51.74)
4	**Danger signs of new born**	
	Convulsion	43(11.53)
	Fast breathing	40(10.72)
	Very small baby	61(16.35)
	Loss of consciousness	28(7.51)
	Not able to suck /drink	74(19.84)
	Don't know	200(53.62)

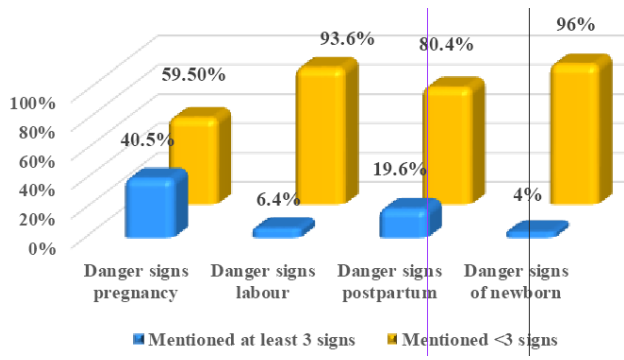

Fig 1:

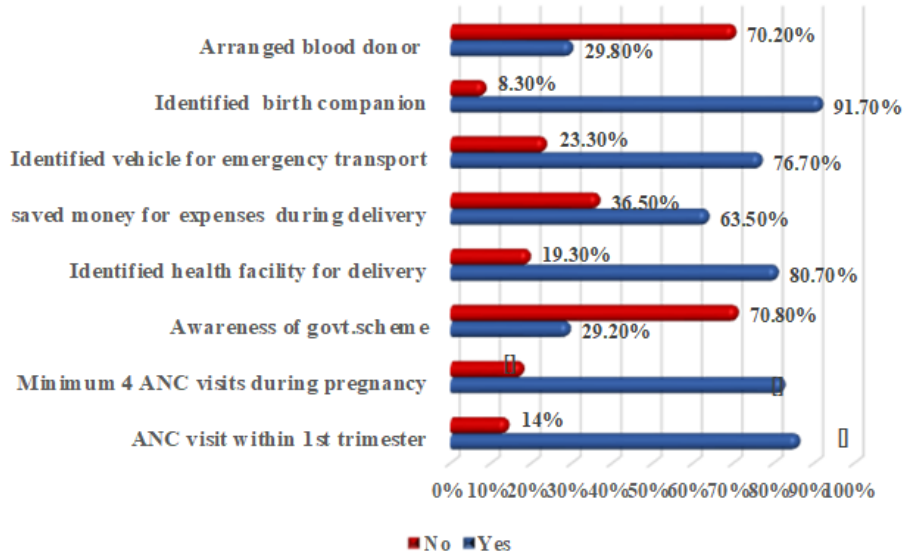

Fig 2: Response of the participants to practice component of BPCR indicators

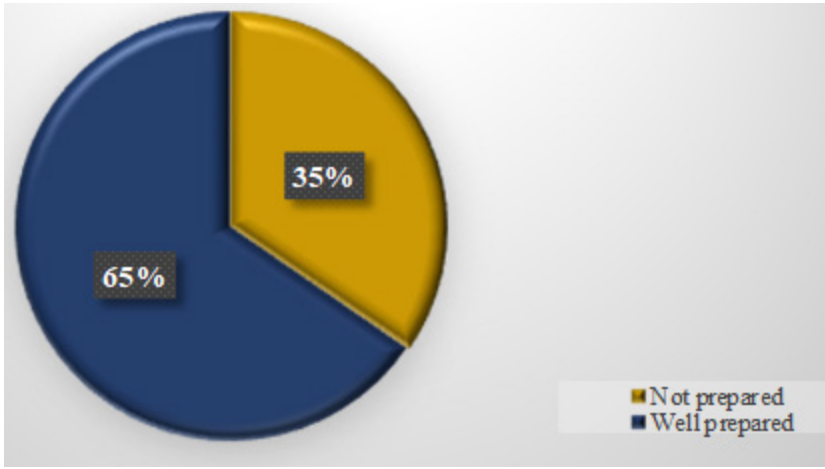

Fig 3: Proportion of BPCT among participants

Table 5 shows association between participants sociodemographic and obstetric characteristics with BPCR. While applying chi square test, it revealed that residence, education, socio-economic status, husband's education & occupation, making own decision in seeking health care and h/o stillbirth were significantly associated with birth preparedness and complication readiness.

Binary logistic regression revealed participants who residing in rural area were 2 times more likely to be prepared [OR=**2.469**, CI= (1.547-4.020)]. The odds of preparing for birth in women who completed primary school [OR=**3.695**, CI= (1.789-7.632)] and graduation [OR=**4.118**, CI= (1.440-11.772)] were 3 times and 4 times more compared to illiterate women, respectively. When compared to lower class, women who belonged to upper middles class were 3 times more likely to prepare for birth [OR=**3.908**, CI= (1.367-11.169)]. Women who had husband, who finished middle school [OR=**2.375**, CI= (1.201-4.697)] and graduated [OR=**5.500**, CI= (2.054-14.727)] were found to be 2 times and almost 6 times more prepared than others respectively. Also, women whose spouse was in government job were 8 times more prepared than others [OR=**8.679**, CI= (1.029-73.215)] and these factors were statistically significant. **[Table 6]**

Table 5: Factors Associated with Birth Preparedness and Complication Readiness

S. No	Factors	Not prepared N, (%)	Well prepared N, (%)	Total	Chi Square	P value
1	**Age**					
	<20	8(27.6)	21(72.4)	29	3.13	0.372
	20-24	85(35)	158(65)	243		
	25-29	28(32.6)	58(67.4)	86		
	>30	8(53.3)	7(46.7)	15		
2	**Religion**					
	Hindu	106(33.7)	209(66.3)	315	2.42	0.302
	Muslim	23(39.6)	35(60.4)	58		
3	**Residence**					
	Urban	31(22.5)	107(77.5)	138	14.22	0.000
	Rural	98(41.7)	137(58.3)	235		
4	**Educational status**					
	Illiterate	50(49.5)	51(50.5)	101	18.19	0.003
	Primary	13(21)	49(79)	62		
	Middle school	28(32.2)	59(67.8)	87		
	High school	26(32.9)	53(67.1)	79		
	Diploma	7(38.9)	11(61.1)	18		
	Graduate and above	5(19.2)	21(80.8)	26		
5	**Occupation**					
	Working	28(36.4)	49(63.6)	77	0.136	0.713
	Not working	101(34.1)	195(65.9)	296		
6	**SES (acc.to B.G. prasad scale)**					
	Upper class	2(33.3)	4(66.7)	6	24.12	0.001
	Upper middle class	8(12.9)	54(87.1)	62		
	Middle class	49(37.4)	82(62.6)	131		
	Lower middle class	52(38.2)	84(61.8)	136		
	Lower class	11(36.7)	19(63.2)	30		
7	**Type of family**					
	Nuclear	62(35.2)	114(64.8)	176	0.062	0.969
	Joint	44(34.1)	85(65.9)	129		
	Three generation	23(33.8)	45(66.2)	68		
8	**Husband's education**					
	Illiterate	33(47.8)	36(52.2)	69	15.778	**0.008**
	Primary	15(38.5)	24(61.5)	39		
	Middle school	22(27.8)	57(72.2)	79		
	High school	41(38.7)	65(61.3)	106		
	Diploma	12(31.6)	26(68.4)	38		
	Graduate and above	6(14.3)	36(85.7)	42		

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9	**Husband's occupation**					
	Govt. employee	1(10)	9(90)	10	13.87	0.012
	Non govt employee	31(38.3)	50(61.7)	81		
	Self-employee	38(26.6)	105(73.4)	143		
	Coolie	27(49.1)	28(50.9)	55		
	Farmer	32(38.1)	52(61.9)	84		
10	**Decision maker in seeking health care**					
	Self	3(21.4%)	11(78.6%)	14	8.883	**0.034**
	Husband	57(29.4)	137(70.6%)	194		
	Both	65(43.3%)	85(56.7%)	150		
	Others	4(26.7%)	11(73.3%)	15		
11	**Preferred source of antenatal care / delivery**					
	Public health sector	94(32.3%)	197(67.7%)	291	3.047	0.081
	Private health sector	35(42.7%)	47(57.3%)	82		
12	**Gestational age**					
	2nd Trimester	16(35.6)	29(64.4)	45	0.26	0.97
	3rd Trimester	24(34.8)	45(65.2)	69		
	Postpartum	89(34.4)	170(65.6)	259		
13	**Gravida**					
	Primi gravida	45(36.9%)	77(63.1%)	122	0.424	0.805
	Multi gravida	83(33.5%)	165(66.5%)	248		
	Grand multigravida	1(33.3%)	2(66.7%)	3		
14	**Experienced miscarriage/abortion**					
	Yes	12(33.3%)	24(66.7%)	36	0.028	0.868
	No	117(34.7%)	220(65.3%)	337		
15	**History of stillbirth**					
	Yes	3(27.3%)	8(72.7%)	11	4.228	0.04
	No	122(33.7%)	240(66.3%)	362		
16	**Experienced obstetric complication in previous delivery**					
	Yes	15(41.7%)	21(58.3%)	36	0.883	0.347
	No	114(33.8%)	223(66.2%)	337		

Table 6: Logistics Regression Analysis on Factors Associated with the Practice Of BPCR

	Factors	OR (95% CI)	P value
1	**Age**		
	<20	1	
	20-24	1.412(0.621-3.517)	0.429
	25-29	1.267(0.513-3.366)	0.618
	>30	**3.000**(0.827-11.468)	0.098
2	**Religion**		
	Hindu	1	
	Muslim	0.772(0.434-1.372)	0.378
3	**Residence**		
	Urban	1	
	Rural	**2.469**(1.547-4.020)	0.000
4	**Educational status**		
	Illiterate	1	
	Primary	**3.695**(1.789-7.632)	0.000
	Middle school	**2.066**(1.139-3.747)	0.017
	High school	1.998(1.086-3.679)	0.026
	Diploma	1.541(0.553-4.293)	0.408
	Graduate and above	**4.118**(1.440-11.772)	0.008
5	**Occupation**		
	Working	1.103(0.648-1.851)	0.713
	Not working	1	
6	**SES (acc.to B.G. prasad scale)**		
	Upper class	1.158(0.182-7.384)	0.877
	Upper middle class	**3.908**(1.367-11.169)	0.011
	Middle class	0.969(0.426-2.205)	0.940
	Lower middle class	0.935(0.412-2.122)	0.873
	Lower class	1	
7	**Type of family**		
	Nuclear	1	
	Joint	1.051(0.652-1.694)	0.839
	Three generation	1.064(0.590-1.919)	0.837
8	**Husband's education**		
	Illiterate	1	
	Primary	1.467(0.659-3.263)	0.348
	Middle school	**2.375**(1.201-4.697)	0.013
	High school	1.453(0.787-2.683)	0.232
	Diploma	1.986(0.865-4.561)	0.106
	Graduate and above	**5.500**(2.054-14.727)	0.001
9	**Husband's occupation**		
	Govt. employee	**8.679**(1.029-73.215)	0.047
	Non govt employee	**2.664**(1.397-5.083)	0.003
	Self-employee	1.567(0.787-3.118)	0.201
	Coolie	1	
	Farmer	1.555(0.778-3.110)	0.212
10	**Decision maker in seeking health care**		
	Self	**1.526**(0.410-5.673)	0.529
	Husband	1	
	Both	0.544(0.348-0.851)	0.008
	Others	1.144(0.350-3.743)	0.824
11	**Preferred source of antenatal care / delivery**		
	Public health sector	**1.561**(0.945-2.578)	0.082
	Private health sector	1	
12	**Gestational age**		
	2nd Trimester	1	
	3rd Trimester	1.034(0.471-2.271)	0.933
	Postpartum	1.054(0.544-2.043)	0.877
13	**Gravida**		
	Primi	1	
	Multi gravida	1.162(0.739-1.827)	0.516
	Grand multigravida	1.169(0.103-13.256)	0.900
14	**Experienced miscarriage/ abortion**		
	Yes	1.064(0.513-2.203)	0.868
	No	1	
15	**History of stillbirth**		
	Yes	**3.443**(1.020-13.351)	0.052
	No	1	
16	**Experienced obstetric complication in previous delivery**		
	Yes	**1.397**(0.683-2.798)	0.349
	No	1	

Note: 1= reference category; OR= Odds ratio; BPCR= Birth Preparedness and Complication Readiness; CI= confidence interval

Discussion

In a tertiary care setting, 373 pregnant and recently delivered women participated in our study. After analysing 12 indicators, the BPCR index was discovered to be 50.8%. Studies by Mazumdar R et al., (47.8%), Kushwah SS et al., (50%), Viswanathan VT et al. (59.5%), and Tura G et al., (53.1%) showed similar index values. [6-9] However, research by Kamineni V et al., (71.5%) and Sharma N et al., (66.9%) revealed greater BPCR levels. [10-11]

Our participants (65%) had a moderate level of readiness for complications and for giving birth. Comparing this to the research conducted by Meseret M et al., (21.7%), Sabitra Subedi (9.3%), Agarwal S et al., (47.8%), Pandey P et al., (46.4%), and Nimavat et al (32.2%) is encouraging. [12-14,5,15] Higher levels of readiness were discovered in studies conducted by Kiataphiwasu N et al., (78.6%) and Akshaya KM et al., (84%) at the same time. [16,17] The variance in the BPCR scores could be explained by variations in the study populations' sociodemographic traits, awareness of key warning indicators, health system elements and cultural customs, as well as variations in how health programs are implemented and the support of a spouse.

With respect to the three main danger signs of pregnancy, over half of the participants (59.5%) were unaware of them. Knowledge of the most important danger signs during labour and delivery, the post-partum period, and the neonatal period was 6.4%, 19.6%, and 4%, respectively. These figures are identical to those of a study by Acharya et al.,[18] but they are significantly lower than those of a study carried out in West Bengal [6] and Ethiopia [9] which reported a much higher percentage.

The study population's varying levels of education, media exposure, and access to high-quality prenatal care facilities could all be contributing factors to the disparities in the prevalence of knowledge of the key danger signs of pregnancy. Being aware of the warning signs helps to prevent unnecessary delays in seeking medical attention and facilitates the early detection of potentially fatal consequences.

In our study, 76.7% of women arranged transport for delivery. This is in agreement with the findings of Salroo et al., (77.6%) [19] and Viswanathan VT et al., (71.7%).[8] The high percentage of prior identification of transport in the current study could be ascribed to the fact that the majority of the participants were from rural areas where road connection and availability of transportation in the event of an emergency is unknown and plays a role. 63.5% of women were saving money for delivery-related expenses. This is ahead of studies conducted by Singh et al (46%) and Berhe et al (38.7%). But Moran et al., found a greater prevalence (83.3%). [20-22] The variations in the prevalence of saving money may be due to differences in the studied population's socioeconomic condition, access to monetary services and social norms. In our study, only 29.8% of respondents prepared blood donors, which is similar to studies done by Ravish K S.et al (29.7%) [23] and Subedi S (21.3%) [13] but encouraging when compared to studies done in India and other developing countries.[24,25,8] Preparation of blood donors before delivery may be owing to the fact that most pregnant women do not want to foresee negative events during and after pregnancy, therefore they made no plans for emergencies, expecting and believing that everything will be normal.

Binary logistic regression revealed residence, education of women and her husband, socioeconomic status, husbands' occupation had statistically significant association with BPCR. Participants who were residing in rural area were 2 times more likely to be prepared for birth and its complications [OR=2.469, CI= (1.547-4.020)]. This is in contrast to the study done by Limenih et al., where urban dwellers were more likely to prepared for birth and its complications.[26] This difference could be due to more rural participants in our study and also this could be driven by cultural practices, perceived risks, limited access to healthcare, and targeted health education programs in rural areas.

The odds of preparing for birth in women who completed primary school [OR=3.695, CI= (1.789-7.632)] and graduation [OR=4.118, CI= (1.440-11.772)] were 3 times and 4 times more compared to illiterate women and also women who had husband, who finished middle school [OR=2.375, CI= (1.201-4.697)] and graduated [OR=5.500, CI= (2.054-14.727)] were found to be 2 times and almost 6 times more prepared than others respectively. This is in line with the studies done by Salroo et al., Agarwal et

al., and Rajesh P et al. [14,27] More educated women likely to have more new health-related information. Familiarity with current medical culture, increased decision-making power, and self-confidence all contribute to improved use of healthcare facilities during pregnancy. In addition, better educated spouses may be more open to obtaining health care and aware of the benefits of seeing a doctor throughout pregnancy and delivery, as well as the availability of government financial assistance. They are also less prone to limit their wives' mobility and decision-making.

When compared to lower class, women who belonged to upper middle class were 3 times more likely to prepare for birth [OR=3.908, CI= (1.367-11.169)]. Similarly, Wudu MA et al., and Kaur A et al., found that women of higher socioeconomic status were 3 times more likely to prepared for birth. [28,29] Higher socioeconomic status often translates into better access to information, healthcare and resources which directly contribute to improved birth preparedness compared to lower socioeconomic class.

Also, our study revealed women whose spouse was in government job were 8 times more prepared than others [OR=8.679, CI= (1.029-73.215)]. Government employees often have higher literacy, job security and access to paid leave like paternity leave, which allows families to plan for childbirth more effectively. The assurance that the spouse can take time off from work to support the woman during childbirth or emergencies makes it easier for women to prepare for potential complications.

Conclusion

According to our study, 65% of women had a good BPCR, and the BPCR index was 50.8%. Less was known about danger signs, with knowledge ranging from 40.5% throughout pregnancy to 4% in newborn period. It is crucial to prepare a woman for pregnancy and educate her about possible complications because this will not only increase her knowledge but also empower her to make timely decisions, resulting in a safe motherhood strategy that improves outcomes for both the mother and the foetus. Pregnant women's understanding and utilization of BPCR services must therefore be improved and the variables influencing their behaviour and decision-making with regard to BPCR must be addressed. Healthcare workers at the grassroot level (ANM, ASHA, and AWW) should be encouraged to include women's spouses and other family members when explaining BPCR and critical warning signs, with a focus on young, economically disadvantaged and illiterate women. Antenatal clinics can be utilized for the same. And also, studies to assess the impact of health education programs on BPCR recommended. Further, to get an in-depth understanding of factors influencing BPCR a qualitative approach can be undertaken.

LIMITATIONS

As this is a facility-based study the generalizability of the study findings is questionable. Chance of recall bias and social-desirability bias in responses regarding some variables. This study may not demonstrate direct cause and effect between variables because of its cross-sectional design.

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