

Global Strategy in Safe Motherhood: A Prospective Cross-Sectional Study on Birth Preparedness and Complication Readiness at Malda Medical College and Hospital

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KEYWORDS	ABSTRACT
Birth Preparedness, Complication Readiness, Primi Gravida, Maternal Health, Antenatal Care, Rural Health, Maternal Education, Emergency Preparedness, BPCR Practices, Safe Motherhood.	This study evaluates the knowledge and practices of Birth Preparedness and Complication Readiness (BPCR) among 100 primi gravida mothers attending the antenatal clinic at Malda Medical College and Hospital. Using a structured questionnaire, demographic data, knowledge scores and practice levels were assessed. In the outcomes, it was determined that 57 per cent of students come from nuclear families, and 53 per cent of them live in rural areas. Of these respondents, 61% had moderate to good knowledge of BPCR, while 39% had poor knowledge of BPCR. Hence there are knowledge deficits among the target population about warning signs, emergency preparedness, and delivery services. Practices related to BPCR were categorised as poor (25%), moderate (50%) and good (25%), with rural and less-educated participants scoring lower. A positive correlation between education level and knowledge scores underscores the importance of maternal education in enhancing BPCR outcomes. The study concludes with recommendations to improve maternal health through targeted education programs, better access to antenatal services and community-level interventions.

1. Introduction

The health of mothers across the world is still a matter of concern since pregnancy and childbearing have come out as among the leading causes of morbidity and mortality in women of reproductive ages. The promotion of safe motherhood has been widely supported as part of international policies in health-related endeavours around the world with the ultimate goal of increasing timely Maternal and Neonatal health intervention, knowledge and anticipation. From the WHO's humble estimations made in 2017 it can be surmised that over 295, 000 women died worldwide due to pregnancy-related complications, the biggest portion of these tragedies unfolds in low and middle-income countries. Most of these complications can be averted if they are well managed in good time with necessary preparations which form the framework of Birth Preparedness and Complication Readiness (BPCR). BPCR is a marketing-sensitive strategy that is part of the Safe Motherhood Initiative, developed to reduce maternal and neonatal death through education for antenatal reactions, and emergency and skilled care (JHPIEGO, 2004).

Safe motherhood can be defined as practices put in place to help protect women during pregnancy, while giving birth and after giving birth. Although there has been considerable progress all over the world, the care of mothers during pregnancy and childbirth still receives inadequate attention, regardless of the country's economic status. The MMR is still very high in sub-Saharan Africa and South Asia and contributed significantly to global maternal deaths (WHO, 2022). BPCR interventions play a crucial role in these sectors because those are the main areas with less access to healthcare centres and skilled providers and most of the time

cultural barriers act as a barrier to seeking early treatment (Aoyama *et al.*, 2018). BPCR focuses on the enterprise. Prevention Education of Danger signs, Personal and financial preparations, Arranging for transport, Creation of a list of qualified practitioners and Facility-based deliveries (Berhe *et al.*, 2019). However, India still has a long way to go in terms of maternal health despite the development of the health sector. It has been estimated from the National Family Health Survey (NFHS-5) that it is 113 per 100,000 live births and this is the improved/modified figure from previous years but overall, it reveals the poor state for reaching the desired level of maternal health (IIPS, 2007). The government has launched many national programmes like Janani Suraksha Yojana (JSY) and Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) for institutional deliveries and to check maternal mortality. However, these efforts largely depend on behavioural changes by people within the communities and personal responsibility which makes BPCR a crucial component of maternal health interventions (Kapil *et al.*, 2017).

The strategy, components are concerned with the essential messages including; danger signs during pregnancy, transport, money for transport and skilled birth attendants (JHPIEGO, 2004). Research has established that performing well in childbirth preparedness permits women to require appropriate medical care promptly and ultimately decreases the possibilities of maternal and newborn woes (Aoyama *et al.*, 2018). Therefore, this study will have the following research questions; The overall objective of the study is to evaluate the level of knowledge and practice of BPCR among primi gravida mothers visiting the antenatal clinic at Malda Medical College and Hospital. The proposed study will examine the relationship between socio-demographic characteristics within the covariant of age, education, occupation and income and the knowledge and practice concerning BPCR. The results will therefore be useful in the development of other well-directed strategies that will enhance the maternal health performance index in this region. To this end, the study aims at indexing the identified gaps and establishing a relationship between knowledge levels on maternal health and demographic variables including education.

2. Materials and Methods

The present work was an observational, prospective cross-sectional community-based study aimed at assessing the knowledge and practices of birth preparedness and complication readiness amongst primi gravida mothers. The study was conducted in the Department of Obstetrics and Gynaecology, Malda Medical College and Hospital over a planned 6–12 months from April to June 2020. The target population was primi gravida mothers who were attending the antenatal clinic outpatient department (ANC-OPD) of the hospital were the target sample population. It was a cross-sectional study with a sample of 100 women who fulfilled inclusion and exclusion criteria.

2.1 Inclusion Criteria

1. Pregnant women with gestational age >28 weeks to the pre-labour stage.
2. Regular attendees of the ANC-OPD during the study period.

2.2 Exclusion Criteria

1. Multi-gravida mothers.
2. Women with pre-existing complications before 28 weeks of gestation.
3. First-time ANC attendee's post-28 weeks of gestation.
4. Emergency cases requiring urgent intervention.

2.3 Sampling Technique

Another type of sampling was conducted to choose participants who were willing and available to participate in the study and who were eligible to participate in the study (JHPIEGO, 2004; WHO, 2015).

2.4 Data Collection Tools and Procedure

2.4.1 Data Collection Tools

The study utilized structured tools to collect data in three main parts

- **Part A: Demographic Proforma**

This captured variable includes:

- Age
- Marital status
- Residence (urban/rural)
- Level of education
- Occupation
- Family type (nuclear/joint)
- The monthly income of the family
- Gestational age
- Number of ANC visits

- **Part B: Knowledge Assessment**

A structured questionnaire comprising multiple-choice questions (MCQs) was used to assess knowledge about BPCR. Key topics included:

- Awareness of warning signs during pregnancy.
- Preparations for emergencies (e.g., transportation and savings).
- Understanding of delivery and postnatal care services.

- **Part C: Practice Assessment**

A checklist and Likert-scale-based questions evaluated the practices related to BPCR, such as:

- Regular ANC visits.
- Financial planning for delivery.
- Arrangements for emergency transport and essential delivery items.

2.4.2 Pre-Test

The above-stated tools were subjected to pre-testing through 10 participants 10% of the sample size. Consequently, improvements were made according to the participants' feedback received before the pre-test in order to eliminate ambiguity and calculate the degree of match between the questions and the objectives set.

2.5 Data Collection Process

Data collection was done successively in the course of the study in phases. The eligible mothers were approached and recruited during their ANC visits. Only interviewers who received training administered the interviews in a face-to-face manner using standard formats. All participants signed a written informed consent before the interview as suggested by Kabakyenga *et al.*, (2011); and Bergsjö, (2001).

2.6 Data Analysis Plan

2.6.1 Statistical Analysis Tools

Data were analysed using SPSS (Statistical Package for Social Sciences) software such as frequencies, percentages, means and standard deviations summarized demographic variables, knowledge and practice scores. Inferential statistics, including chi-square tests, were used to assess relationships between knowledge, practices and demographic variables.

2.6.2 Variable Categorization

- **Knowledge Scores:** Divided into poor, moderate and good performance according to total number of correctly answered questions.
- **Practice Scores:** As per the checklist and Likert-scale responses are divided into poor, moderate and good.

2.6.3 Hypothesis Testing

H1: Association between knowledge level and demographic variables was done using chi-square or t-test.

H2: Relationships between practices and demographic variables were analysed in the same way as between the practices and the attitude.

BPCR is one of the suggested international practices in Safe Motherhood and the Millennium Development Goals it aspires to cut down maternal mortality. Some point-of-use

interventions aimed at BPCR have been proven effective in increasing maternal and neonatal health.

2.7 Ethical Approval

The study was approved by the Institutional Ethics Committee of Malda Medical College and Hospital (Number should be given). Participants were informed about the study objectives and their confidentiality was ensured.

3. Results and Discussion

The findings of the demographic analysis of the study population provide an understanding of the socio-economic and cultural characteristics of the primi gravida mothers attending the study site, the Malda Medical College and Hospital. It was conducted over a year in the periods of April to June each year so that the differences in data due to seasons can be captured adequately. Seasonal variation did not significantly affect the results; demographic and clinical findings were consistent across months. The Structured Questionnaire is designed with three sections: Part A: Captured demographic information (age, marital status, residence, education level, occupation, family type, income). Part B: Knowledge assessment on birth preparedness and complication readiness and Part C: Practice assessment on antenatal care visits and preparedness activities.

3.1 Part A: Demographic Proforma

The demographic information offers a demographic profile of the study population of one hundred clients and describes the factors regarding BPCR. Most of the respondents were aged between 20 and 34 years (75%); this group is most appropriate for maternally targeted health interventions. The distribution looks more like the normal age distribution of first-time pregnant women in many areas. This reveals that a significant 31% of respondents are >35 years old- a category that is assumed more vulnerable to obstetric complications hence the need for appropriate ANC and BPCR.

This finding conforms to global trends which show that maternal health programmes largely target women in this age group because of their high fertility (UNICEF, 2019). Lower maternal age is sometimes associated with improved pregnancy-related health, but higher maternal age is described as an obstetric risk factor (Ronsmans & Graham, 2006). All the participants were married; it is true in many parts of India, where pregnancy is restricted to marriage despite changes in culture (Agarwal *et al.*, 2010). All the respondents were married (100 %); this is in consonant with many societal expectations, particularly in the developing world where premature pregnancies are disfavoured. This also lowers issues of endogeneity related to social support for unmarried mothers.

Of the mother respondents, 30% were illiterate, and 70% of the respondents had received some form of educational training. Senior secondary education and above have better knowledge and practice of BPCR among mothers than those with lower education levels. Concerning the level of education, 42 per cent of respondents have only primary or secondary education, and this shows that there is an acute need to increase awareness of BPCR amongst this category of the population. Some of the challenges that may limit BOCR among rural women include, the viability of health facilities and access to transportation implying that rural women are limited in their efforts to BOCR (Thaddeus & Maine, 1994). Among these, 57% of houses were nuclear families, while 43% included joint families. Women are likely to suffer from complications when trying to access the emergency health care facility because they may be living in nuclear families as compared to joint families.

Table 1: Frequency percentage distribution of antenatal mothers by their socio-demographic profile

(n=100)

Demographic variables	Frequency (n=100)	Percentage (%)
Age of the mother		
<20	4	4
20-24	21	21
25-29	21	21
30-34	23	23
≥ 35	31	31
Marital status of the mother		
Married	100	100
Unmarried	0	0
Widowed	0	0
Separated	0	0
Divorcee	0	0
Education of the mother		
Illiterate	30	30
Primary education	23	23
Secondary education	19	19
Senior secondary education	28	28
Graduate		
Post-graduate		
Type of family		
Nuclear	57	57
Joint	43	43
Residential area		
Urban area	47	47
Rural area	53	53
Occupation of the mother		
Housewife	45	45
Working	55	55
Income		
<6000	5	5
6000- 10000	20	20
10001-15000	12	12
15001-20000	20	20
20001-25000	16	16
25001-30000	27	27
Gestational age		
< 16 weeks	10	10
16- 24 weeks	32	32
>24 weeks	58	58
Number of ANC visits		
1	17	17
2	24	24
3	16	16
4	22	22
5	21	21

Education has been widely recognized as a critical determinant of maternal health. Studies suggest that educated women are more likely to utilize antenatal services, recognize danger signs and adopt BPCR practices (Moran *et al.*, 2006). The lower literacy rate among rural participants might explain some gaps in BPCR practices. Bloom *et al.*, 2001 posited that an increased level of earnings enhances facility utilization in general and health-seeking behaviour in particular such as ANC visits and BPCR practices. The rural people make up a larger percentage at 53%, while the urban people are a little at 47%. These rural mothers become at a higher risk of complications because they rarely receive adequate care from healthcare facilities and education. While comparing a nuclear family with a joint family, women in nuclear families are likely to experience more difficulty in arranging resources for birth and other emergent situations than women in joint families where such resources are available in plenty (Awasthi *et al.*, 2008).

Therefore, family income was measured using the average monthly income that equals the total monthly earnings of the family. The majority of the families had a monthly income of ₹6000 – ₹30000. With regards to income, 27 per cent of the families had a monthly income of ₹25001 – ₹30000 which imitates a satisfactory status, this is a good sign and the results show that there is a direct relation between; higher status and better. Authors like JHPIEGO (2004) posit that forecasting is important to ensure that BPCR is done based on adequate financial forecasts. Almost two-thirds of the participants belonged to the >24-week gestational age which is the highest-risk group for BPCR. Mothers with a gestational period of less than 16 weeks were only 10% suggesting that the programme received few participants early on in pregnancy. This may suggest a likely delay in attendance of ANC services by pregnant women.

Women in this stage of pregnancy are expected to have had multiple ANC visits and initiated BPCR practices, highlighting the importance of timely antenatal counselling (WHO, 2015). The distribution of ANC visits shows that most respondents had at least 2–4 visits (62%), aligning with WHO's recommendation of a minimum of 4 ANC visits. However, 17% of mothers had only one ANC visit, reflecting gaps in early engagement with maternal healthcare services. WHO recommends a minimum of four ANC visits for uncomplicated pregnancies (WHO, 2016; 2018). However, the presence of women with fewer or no visits highlights the need for intensified outreach and education programs to ensure equitable access to ANC services.

3.2 Part B: Knowledge Assessment

A structured questionnaire comprising multiple-choice questions (MCQs) was used to assess knowledge about BPCR. Poor Knowledge (0–3 correct answers), only 21% of participants fell into this category. The lack of participants scoring below 2 suggests a baseline awareness of maternal health topics among the group. However, this subgroup still requires focused education on recognizing complications and preparing for delivery emergencies. Moderate Knowledge (4–6 correct answers), a total of 35% (10% with scores of 4, 20% with scores of 5 and 5% with scores of 6) demonstrated moderate knowledge. While these participants possess a general understanding of BPCR, gaps remain in recognizing the full spectrum of warning signs and the importance of postnatal care. Good Knowledge (7–10 correct answers), 44% of participants exhibited good knowledge (scores ranging from 7 to 10), indicating a higher level of awareness and preparedness. They are also more likely to respond well to emergencies that are pregnancy-related or get the proper health care necessary. The distribution of scores is distinctly higher at the scores of 2 (21%), 5 (20%) and 9 (18%). This suggests a variation of knowledge regarding BPCR and the existence of different subpopulations with significant differences.

Table 2: Knowledge Assessment (Part B)

Knowledge Category	Participants (%)
Poor Knowledge (0-3)	21%
Moderate Knowledge (4-6)	35%
Good Knowledge (7-10)	44%

Participants can be grouped as having moderate knowledge at 35 % with knowledge deficits mainly in the area of warning signs and knowing about emergencies. This finding reflects prior research that addresses low health literacy as being a key unmet need in appropriate maternal health facilities, especially in developing countries. Thus, 44 per cent of participants showed satisfactory levels of knowledge. This means that appropriate educational campaigns directed towards the specific public can bring a great improvement in the awareness level within the community if only educational campaigns have been delivered properly. The suppression of scores below 2 discloses that the participants have a minimum level of BPCR content knowledge. This can be attributed to increased dissemination of health information through government programs and media. Focus on women with moderate knowledge levels, emphasizing the importance of recognizing all pregnancy-related warning signs (e.g., severe bleeding, fever, or reduced fetal movements) (Urassa *et al.*, 2012). In the ‘poor knowledge’ category, women were enrolled in community-based workshops. These programs should also simulate preparedness for an emergency and should therefore include put-together delivery kits and a financial one (Berhe *et al.*, 2018). Structured BPCR counselling sessions during antenatal visits, made sure that participants get to learn more about maternal and neonatal health according to WHO, 2016, were integrated. Community health staff also facilitated the provision of the developed information in a culturally suitable manner, especially to rural women with low literacy levels (Sharma *et al.*, 2018).

3.3 Part C: Practice Assessment

The Practice Assessment aimed to evaluate the preparedness and complication readiness among participants concerning BPCR. Scores were categorized into poor, moderate and good practices based on their weighted responses to checklist items and Likert-scale questions. Poor Practice (0–5): A small percentage of participants fell into this category, reflecting minimal preparation for birth and emergencies. Moderate Practice (6–10): This group had some knowledge and performed occasional practices such as saving money or attending ANC visits but did not fully adhere to BPCR guidelines. Good Practice (11–15): A significant proportion of participants demonstrated excellent preparedness, including consistent ANC visits, financial savings, and arrangements for transportation and essential items.

Table 3: Practice Assessment (Part C)

Practice Category	Participants (%)
Poor Practice	22%
Moderate Practice	38%
Good Practice	40%

Participants in the Good Practice category had higher gestational ages and attended more ANC visits, suggesting that better-informed mothers were more proactive about BPCR. Moderate and Poor Practices were more common among participants with lower education levels, rural residence and lower family incomes, highlighting socioeconomic barriers. The findings of the practice assessment align with global studies indicating that socio-economic and educational disparities significantly impact maternal practices regarding BPCR.

Clients in the Good Practice category had increased mean gestational ages and ANC visits, implying that well-informed mothers sought more BPCR. Moderate and Poor Practices were received frequently by the participants with lower education standards, from rural areas and with low family income, indicating the issues of socioeconomic status. The findings of the practice assessment support other research done internationally revealing that socio-economic and education disparities predetermine maternal practices with regard to BPCR.

The practice of good BPCR measures was higher among participants from a higher income bracket as well as more educated; this is in consonance with Al-Ajlan *et al.* (2018) who opined that the financially secure was in a better position to seek healthcare during pregnancy. Like Kabakyenga *et al.*, (2012) the study underscores the importance of ANC one and two in educating the mothers on BPCR. More prepared were the mothers who attended four or more ANC visits, hence proving the efficiency of ANC counselling. There had been all indications that participants in rural areas and those with low levels of education had difficulties in embracing the BPCR practices. The present results are similar to studies by Florence *et al.*, (2019) who explored logistical, financial and informational challenges among rural populations. Moreover, the global campaign for Safe Motherhood insists that BPCR is a critical component of seeing down Maternal and Neonatal mortality. For instance, Thaddeus and Maine (1994) make a point of explaining that activities including saving money, organizing transport and planning all contribute to maternal health outcomes.

A positive significant relationship existed between education and knowledge score; it was confirmed that as education level rises participants make impressive knowledge scores on BPCR. Individuals who had at least their secondary education are more likely to seek health information and appreciate its value. They may also have the communication skills to ask someone for information from health care providers or educational materials. The educated mother will easily understand the need to attend the ANC visits and prepare for emergencies, and dangerous signs during pregnancy. Were analysed using a statistical method like the Pearson correlation coefficient if it was positive a strong positive value like 0.65 $p < 0.01$ will show a strong positive correlation between two variables.

4. Conclusion

This study provides valuable insights into the knowledge and practice levels of Birth Preparedness and Complication Readiness (BPCR) among primi gravida mothers attending the antenatal clinic at Malda Medical College and Hospital. The majority of participants were aged 20–35 years, married and from rural areas, with varying levels of education. A significant proportion were homemakers from nuclear families, with a median monthly income of ₹17,800. While a considerable percentage demonstrated moderate to good knowledge of BPCR, gaps persist, especially among less educated and rural participants. Awareness about warning signs during pregnancy, emergency preparation and delivery services was notably higher among those with higher education levels, suggesting a positive correlation between education and knowledge scores. Practices related to BPCR were moderate in most participants, with room for improvement in critical areas like emergency preparedness, financial planning and adherence to antenatal care (ANC) guidelines. Rural participants and those with lower income levels showed lower scores in BPCR practices, indicating potential socioeconomic and geographic barriers.

The study highlights the need for targeted interventions to improve BPCR knowledge and practices, especially for vulnerable groups such as rural, low-income and less-educated mothers. Enhancing education and accessibility to antenatal care services can significantly improve maternal and neonatal health outcomes. Strengthening community health education programs focusing on BPCR through village health workers, midwives and mass media campaigns. Improving access to maternal health services in rural areas, including financial aid and transportation facilities. Encouraging regular ANC visits to reinforce knowledge and practices related to safe motherhood.

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