

Are Women in a Rural Community in South 24 Parganas of West Bengal Ready for Safer Pregnancy? A Cross -Sectional Study

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Abstract

Background: Birth Preparedness and Complication Readiness (BPCR) is a crucial aspect of maternal health interventions aimed at reducing delays in care-seeking, facility access, and treatment. While BPCR initiatives have been widely implemented, disparities persist, particularly in rural areas. In West Bengal, the maternal mortality ratio has fluctuated over the years, necessitating targeted efforts to improve maternal and neonatal outcomes. This study aims to find out the BPCR index among pregnant women in Magrahat – I community development block of South 24 Parganas, West Bengal, and its association with demographic and background characteristics. **Material and Methods:** In a descriptive cross-sectional study, 149 pregnant women who attended sub-centres in the study for antenatal care area during January to July 2023 were included. The study participants were selected through multi-stage sampling method. Data were collected through structured questionnaires and analyzed using Jamovi software. BPCR indicators were assessed. Binary logistic regression was used to identify association of socio-demographic, individual and health service related with status of BPCR. **Results:** The BPCR index was found to be 58.2, (include some key indicators). The birth preparedness was found to be significantly associated with maternal age (AOR=3.16, CI 1.17–8.53), parity (AOR=3.85, CI 1.36–10.89), and antenatal counselling (AOR=19.68, CI 5.00–65.77). **Conclusion:** Although BPCR in the study area shows improvement compared to previous reports, gaps remain in key indicators, particularly blood donor identification and awareness of danger signs during labour. Strengthening antenatal counselling and tailored education programs, particularly for younger and nulliparous women, may enhance maternal preparedness and reduce adverse pregnancy outcomes.

Keywords: Birth Preparedness and Complication Readiness, Maternal health, Maternal Mortality, Counselling, Rural community.

Received: 20 June 2025

Revised: 04 July 2025

Accepted: 19 August 2025

Published: 19 September 2025

INTRODUCTION

In public health, maternal and child health are very important as 'it presents the opportunity to end preventable deaths among women, children, and adolescents and to significantly improve their health and well-being'.^[1] The World Health Organization has long stressed the critical importance of ensuring universal access to high-quality maternal health services in order to improve outcomes for both mothers and their newborns.^[2] Among the various initiatives taken globally, the Birth Preparedness and Complication Readiness (BPCR) framework—developed by the Johns Hopkins Program for International Education in Gynecology and Obstetrics—has promoted early planning for childbirth and the anticipation of potential complications by engaging women, families, communities, healthcare providers, and policymakers.^[3–5] It advocates for actions such as identifying a skilled birth attendant, selecting a delivery location, arranging for transportation, and saving funds for childbirth-related expenses.^[4,6] By addressing these components, BPCR is designed to minimize delays in seeking care, in reaching healthcare facilities, and in receiving adequate treatment, thereby improving maternal and neonatal outcomes.^[4,6] In India, efforts to reduce maternal mortality have

encompassed a wide range of initiatives. These include safe motherhood programs, targeted strategies to end preventable maternal deaths, and national programs such as the Reproductive Maternal Newborn Child Adolescent Health Plus Nutrition (RMNCAH+N) strategy under National Health Mission.^[7,8] It included measures for reducing maternal mortality by promoting institutional deliveries and providing financial incentives to pregnant women.^[7,8] Despite these substantial efforts, challenges remain in ensuring equitable access to BPCR services, particularly in rural areas. West Bengal is uniquely placed in this aspect. Data from the Sample Registration Survey indicate that although the maternal mortality ratio (MMR) in West Bengal was historically lower than the national average, the situation has worsened since 2014.^[9] After an initial rise in MMR, a

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DOI:

10.21276/amt.2025.v12.i3.60

How to cite this article: Gayen R, Chakraborty S, Das N. Are Women in a Rural Community in South 24 Parganas of West Bengal Ready for Safer Pregnancy? A Cross -Sectional Study. *Acta Med Int.* 2025;12(3):188-193.

subsequent decline was noted; however, the current MMR in West Bengal continues to exceed the national average.^[10] As India moves toward achieving the Sustainable Development Goals related to maternal and child health, prioritizing the implementation of BPCR is imperative to ensure that every woman has the opportunity to experience a safe and healthy pregnancy and childbirth—especially in West Bengal, where targeted interventions are urgently needed to address existing disparities.^[11]

A substantial gap in knowledge persists regarding the current status of BPCR in West Bengal. Much of the research in this area is more than a decade old, underscoring the need for updated investigations to inform contemporary practices and policies. For example, Mukhopadhyay et al. (2016) reported that the majority of women in certain parts of West Bengal registered for antenatal care and underwent several check-ups, with a high proportion opting for institutional deliveries; however, the overall BPCR index among both pregnant women and those who had recently delivered was only moderate.^[12,13] Similarly, Ghosh et al. (2017) in Kolkata observed that fewer than half of the women appeared adequately prepared for childbirth and potential complications, with factors such as educational status, spouse's education, and per capita income strongly influencing BPCR preparedness.^[14] In another study conducted by Mukhopadhyay et al. (2013) in the Uttar Dinajpur district, a significant proportion of women were found to register for antenatal care, attend multiple check-ups, and choose institutional deliveries, yet the overall BPCR index remained low.^[6] In contrast, Saha et al. (2014) in the Burdwan district found that a majority of women were well-prepared for childbirth, with key contributors including the presence of trained birth attendants, the identification of health facilities, pre-arranged transportation, and the allocation of savings for childbirth expenses.^[15] Despite these varied findings, the overall performance of West Bengal in reducing maternal mortality remains a matter of concern compared to the national average.

This study aims to address the existing knowledge gap with the following objectives – to find out the BPCR index in a community development block of South Twenty-Four Parganas district of West Bengal and to assess if birth preparedness and complication readiness is associated with demographic and background characteristics of study participants.

MATERIALS AND METHODS

Study Type, Design and Population: This descriptive cross-sectional study to assess Birth Preparedness and Complication Readiness (BPCR) among pregnant women attending the sub-centres of Magrahat-I block in South 24 Parganas, West Bengal, India for antenatal check-up. The study was conducted between January to July, 2023. It had a total population of 228,367 according to the 2001 Census of India, comprising 117,752 males and 110,615 females.^[16] Magrahat – I block was selected purposively keeping in mind about the proneness of the block to natural calamity and the importance of BPCR in such situations.^[16] Pregnant women

in their second or third trimester excluding those with serious illnesses at the time of data collection were included in the study.

Sample Size and Sampling Technique:

Data from the study by Mukhopadhyay et al., where the BPCR index was reported as 52, was used to calculate the sample size. Considering a 5% alpha error, 20% relative precision and 1.5 design effect, the minimum sample size was calculated to be 133. Assuming 20% non-response rate, the final sample size was 160. A two-stage sampling technique was adopted: initially, 50% of the 31 functional sub-centres were selected through simple random sampling, resulting in the inclusion of 16 sub-centres. Weighted sample size for each sub-centre was calculated based on number of target population in the concerned sub-centre and total number of target population in all 16 sub-centres. The requisite number of study participants from each sub-centre was selected through simple random sampling from the list of target population in that sub-centre. Study Tools and Techniques:

Data were collected through face-to-face interviews at a mutually convenient time and place using a structured, predesigned, and pretested questionnaire. The questionnaire comprised two distinct components. The first component gathered demographic and background information, including age (in completed years), religion (categorized as Hindu, Muslim, or others), caste (classified as Scheduled Caste, Scheduled Tribes, Other Backward Castes, or others), educational status of the pregnant women, and their occupational status prior to pregnancy. It also captured details regarding parity (distinguishing nulliparous from Primiparous & Multiparous women), the educational and occupational status of the husband, and the socio-economic status of the family based on the Modified BG Prasad Socio-economic Scale (updated as of March 2023).^[17] Additionally, respondents were queried on whether they had received any form of counselling related to BPCR during antenatal check-ups.

The second component focused on BPCR. It included 11 dichotomous (Yes/No) questions addressing key indicators: registration within 12 weeks of gestation, identification of a skilled birth attendant for delivery, saving money for potential expenses, arrangement of transportation for emergencies, identification of a blood donor, awareness regarding of at least one key danger sign during pregnancy, labour, postpartum period, as well as the newborn, and awareness regarding the government financial assistance schemes of like Janani Suraksha Yojana (JSY) and the referral transport scheme.^[3-6,12] Each of these indicators was quantified as a percentage of women with affirmative response in that question. The BPCR index was calculated as the unweighted average of all these indicators, expressed as a score out of 100.^[3,6] A threshold was then set: mothers who fulfilled at least eight of these indicators were classified as “well-prepared,” whereas those scoring below this cut-off were deemed “less prepared.”^[6]

Data Collection and Data Analysis: After securing the necessary ethical and administrative approvals, the data collection process was carried out through direct interviews. The responses were independently entered into MS Excel by two researchers to ensure data consistency, and any discrepancies were resolved prior to subsequent analysis. The consolidated data were then imported into Jamovi (version 2.3.25) for further statistical evaluation.^[18] Qualitative variables were expressed in frequencies and percentages. For analytical purposes, age was

dichotomized using the median split method into two categories: ≤ 23 years and > 23 years. The self-reported caste was dichotomized into “backward classes” that included SC, ST, and OBCs and “others.” Educational status for both the pregnant women and their husbands was categorized as “less than Madhyamik” and “Madhyamik or above.” In terms of pre-pregnancy occupational status, pregnant women were classified as either homemakers or those engaged in income-generating activities, while the occupational classification for husbands was divided into two groups: “Unskilled/ Semi-skilled/ Skilled” and “Clerical/ Shop-owner/ Semi-professional/ Professional.” The overall BPCR responses were depicted graphically using a radar diagram. Finally, binary logistic regression analysis was employed with BPCR status (well prepared versus less prepared) as the dependent variable and background characteristics as independent variables. The fitness of the regression model was evaluated using the Hosmer-Lemeshow test, and the model’s explanatory power was estimated via the Nagelkerke R squared statistic.

Ethical Consideration: This study was conducted in strict adherence to the ethical guidelines applicable to descriptive cross-sectional studies. Ethical approval was obtained from the Institutional Ethics Committee of the Institute of Health and Family Welfare, Department of Health and Family Welfare, Government of West Bengal (Memo No. IHFW/IEC/2808 dated 13th April 2023).

RESULTS

Out of the 160 selected pregnant women, 149 responded (93.1 % response rate). BPCR index in this study was found to be 58.2. Most of the respondents were 23 years or below (78, 52.3%). They were primarily Muslim (54.4%), with

most belonging to the General category (57%). Educations levels vary, with 63.8% completing higher secondary education or beyond, while 91.3% of women are housewives. Husbands' education and occupation predominantly fall within middle school level (36.9%) and semi-skilled/skilled work (69.8%). Families are mostly joint setups (57.7%), and socio-economic status shows disparities, with middle-class forming the largest group (48.3%). In the regression analysis, age [AOR=3.16 (1.17-8.53)] and parity [3.85 (1.36-10.89)] play significant roles, with younger and nulliparous mothers being less prepared. Counselling [19.68 (5.00-65.77)] emerges as the most crucial factor, strongly enhancing preparedness. [Table 1] Regarding BPCR, most of the indicators were good except two – identification of blood donor in advance and awareness about at least one key danger sign of labour. For both of them, approximately four in five pregnant women responded negatively. [Figure 1]

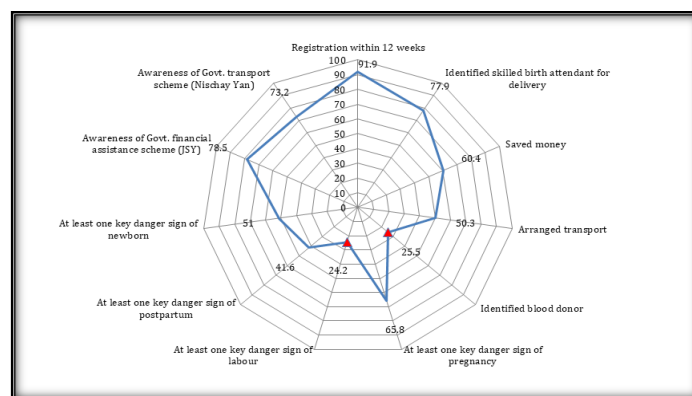


Figure 1: Radar Diagram depicting the percentage of achievement for different items of the BPCR index (n = 149).

Table 1: Socio-demographic characteristics, obstetric history and counselling related factors associated with BPCR among study participants (n = 149)

Variable	BPCR		OR (95% CI)	AOR (95% CI)
	Less prepared n (%)	Well prepared n (%)		
Age (in completed years)				
≤ 23	57 (73.1)	21 (26.9)	3.71 (1.86-7.37)	3.16 (1.17-8.53)
> 23	30 (42.3)	41 (57.7)	1	1
Religion				
Hindu	41 (60.3)	27 (39.7)	1.15 (0.60-2.22)	1.59 (0.64-3.95)
Muslim	46 (56.8)	35 (43.2)	1	1
Caste				
SC/ST/OBC	36 (56.3)	28 (43.8)	0.85 (0.44-1.65)	0.65 (0.27-1.53)
General	51 (60.0)	34 (40.0)	1	1
Education				
Less than Madhyamik Passed	26 (70.3)	11 (29.7)	1.97 (0.89-4.38)	2.70 (0.52-7.90)
Madhyamik Passed & above	61 (54.5)	51 (45.5)	1	1
Working status				
Home Maker	79 (58.1)	57 (41.9)	0.86 (0.26-2.78)	0.99 (0.21-4.63)
Working women	8 (61.5)	5 (38.5)	1	1
Husband's education				
Less than Madhyamik Passed	49 (60.5)	32 (39.5)	1.20 (0.62-2.32)	2.82 (0.97-8.01)
Madhyamik Passed & above	38 (55.9)	30 (44.1)	1	1
Husband's occupation				
Unskilled/Semi-skilled/ Skilled	68 (60.2)	45 (39.8)	1.35 (0.63-2.87)	0.89 (0.32-2.42)
Clerical/Shop owner/ Semi-professional/Professional	19 (52.8)	17 (47.2)	1	1
Socio-economic status*				
Higher class	67 (55.4)	54 (44.6)	0.49 (0.20-1.21)	0.49 (0.16-1.50)
Lower class	20 (71.4)	8 (28.6)	1	1

Parity				
Nullipara	58 (72.5)	22 (27.5)	3.63 (1.83-7.21)	3.85 (1.36-10.89)
Primipara & Multipara	29 (42.0)	40 (58.0)	1	1
Faced miscarriage				
No	76 (58.5)	54 (41.5)	1.02 (0.38-2.71)	0.58 (0.16-2.03)
Yes	11 (57.9)	8 (42.1)	1	1
Counselling of mother				
No	30 (96.8)	1 (3.2)	17.10(4.23-59.18)	19.68 (5.00-65.77)
Yes	57 (48.3)	61 (51.7)	1	1
Hosmer and Lemeshow Test for multivariable logistic regression = 0.65				
Nagelkerke R Square = 0.43				
*Higher class include BG Prasad's class I, II, III, IV and Lower class include class V				
#Out of 11 BPCR indicators mothers who covered at least 8 indicators are called well prepared else called less prepared.				

DISCUSSION

This study aimed to examine the determinants of Birth Preparedness and Complication Readiness (BPCR) among recently pregnant women in the Magrahat-I block of South 24 Parganas, West Bengal, India. The results indicate a complex interplay among individual characteristics, obstetric history, and the receipt of targeted counselling that collectively influence maternal readiness for childbirth and the management of potential complications.

The BPCR index recorded in this study was 58.2. In comparison, previous investigations have reported lower values, with Mukhopadhyay et al. finding an index of 52.1 in Bankura (2016), and another study in the Uttar Dinajpur district documenting an index of 32.^[6,12] The observed incremental improvement in the BPCR index over time lends support to the proposition that antenatal counselling has progressively enhanced. Nonetheless, it is concerning that even after nearly a decade since the Uttar Dinajpur study, the BPCR index remains below the 60-point threshold.

Evidence in the literature suggests that initiating antenatal care (ANC) during the first trimester is critical for ensuring pregnancy safety. In this study, nearly nine out of ten respondents mentioned that they had their first ANC visit within the first trimester. This is an encouraging finding, representing an increase of approximately 15%–20% relative to the figures reported for West Bengal (72.6%) and South 24 Parganas (77.1%) in NFHS-5, and reflects a positive trend in early maternal care engagement.^[19]

In resource-constrained settings, the limited availability of liquid cash and reliable transportation—especially in remote regions—presents a significant barrier to accessing skilled care in emergencies.^[3,4,6,12,13] In the present study, less than two-thirds of the participants had secured funds or identified transportation options for emergencies. This may partly be attributed to the availability of the Nischay Jan scheme where it is provided free of charge under the JSY, thus diminishing the perceived need for personal preparation in these areas.^[6–8,12] However, the study was not designed to delve into the reasons underlying this knowledge gap, and further research may be required to fully understand these dynamics. The moderately low BPCR index may be partly due to suboptimal performance on specific indicators. For example, only one-quarter of the women had proactively identified a blood donor, and fewer than 25% demonstrated knowledge of at least one key danger sign during labour. Although these figures are higher than those reported in the Uttar Dinajpur study, where only 6% had identified a donor and 17% were

aware of danger signs during labour, they nevertheless highlight critical gaps in antenatal counselling.^[6] Such deficiencies suggest that even when counselling is provided, essential aspects of emergency preparedness may not be sufficiently emphasized. Recognizing and addressing these shortcomings is imperative for refining future counselling content to ensure that all key areas of preparedness are comprehensively covered.

An important observation from the study concerns the impact of maternal age on BPCR. Younger mothers, specifically those aged 23 years or below, exhibited lower levels of preparedness compared to their older counterparts. Initial analyses without adjustment revealed a significant disadvantage for younger mothers; however, after controlling for confounding factors such as education and counselling, the strength of this association diminished, though it remained statistically significant. This attenuation indicates that age may exert its influence indirectly through other modifiable factors.^[20–23] Limited life experience, restricted access to information, and fewer established support networks may render younger mothers more vulnerable in terms of readiness. This finding has concurred with other research that has demonstrated the mediating effects of broader socio-demographic variables on antenatal care outcomes and underscores the need for tailored interventions that provide specific educational content and enhanced support for younger mothers.^[20–23] Another significant predictor of BPCR identified in the study is parity. Nulliparous women, or first-time mothers, were considerably less prepared compared to primiparous and multiparous women, even after adjustment for other factors.²⁴ The absence of prior childbirth experience may result in lower awareness levels and a reliance on a limited network for information, which further emphasizes the necessity of additional support for nulliparous women. This effect is observed in other study as well.^[21,23,24] Future research might explore the potential benefits of structured peer-support models or mentorship programs that leverage the experiences of multiparous women to assist those encountering pregnancy for the first time.

In contrast to the factors of age and parity, socio-cultural variables such as religion and caste did not exhibit statistically significant associations with BPCR. This finding is consistent with several reports indicating that in contexts where basic healthcare services are uniformly accessible, socio-cultural distinctions may be attenuated by the overall access to health services and effective information dissemination. The absence of pronounced differences based on religion or caste suggests that public health initiatives aimed at enhancing BPCR can adopt a more universal strategy without extensive cultural customization. Nevertheless, it remains essential to maintain sensitivity to

cultural contexts, as subtle differences might emerge with more refined categorization or in varying socio-cultural settings.^[25-28]

Arguably, the most striking outcome of the study is the significant impact of counselling on maternal preparedness. Women who received BPCR-related counselling demonstrated markedly better preparedness, as evidenced by the strong independent association that persisted in the adjusted analysis. A robust body of literature supports the transformative role of effective, culturally sensitive counselling in improving antenatal care outcomes. Such counselling has been identified as one of the most cost-effective strategies for reducing maternal and neonatal morbidity and mortality. The current study's findings are in line with conceptual frameworks advanced by organizations like JHPIEGO, which advocate for a comprehensive approach that integrates counselling, education, community engagement, and structured support to optimize maternal health outcomes. In light of these results, it is plausible to hypothesize that antenatal care programs featuring interactive and repeated counselling sessions—particularly those designed for younger and nulliparous women—could substantially improve BPCR across diverse settings.^[20-23]

It is important to acknowledge that the cross-sectional design of this study limits the ability to infer causality. Although significant associations were observed between maternal age, parity, counselling, and BPCR, establishing a causal relationship would require longitudinal studies. Prospective cohort studies or randomized controlled trials, such as those comparing the efficacy of intensive counselling sessions with routine antenatal care, could offer critical insights into whether these interventions result in sustained improvements in preparedness and obstetric outcomes. Future investigations employing such designs would be instrumental in elucidating the temporal dynamics and causal pathways that underlie maternal readiness for childbirth.

CONCLUSION

Although BPCR in the study area shows improvement compared to previous reports, gaps remain in key indicators, particularly blood donor identification and awareness of danger signs during labour. Women who received BPCR-related counselling demonstrated markedly better preparedness, as evidenced by the strong independent association that persisted in the adjusted analysis. A robust body of literature supports the transformative role of effective, culturally sensitive counselling in improving antenatal care outcomes. Thus, Strengthening antenatal counselling and tailored education programs, particularly for younger and nulliparous women, may enhance maternal preparedness and reduce adverse pregnancy outcomes.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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