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The impact of birth preparedness and complication readiness (BPCR) on maternal outcomes among postpartum mothers

Salsha Billah Putri Radicha, Devi Arine Kusumawardani*

Departement of Midwifery, Faculty of Public Health, Universitas Jember
Jalan Kalimantan Kampus Bumi Tegalboto No. I/93, Krajan Timur, Sumbersari, Jember, East Java

Corresponding author: deviarine@unej.ac.id

ABSTRACT

Background: *Birth preparedness and complications readiness (BPCR) is a strategy to prevent three late causes of maternal death. Previous study results focused on BPCR intermediate outcomes, such as utilizing healthcare facilities during pregnancy and delivery, rather than maternal outcomes like maternal near miss, morbidity, and mortality.*
Objectives: *This study examined the correlation between BPCR practices and maternal outcomes among postpartum mothers*
Methods: *This cross-sectional research was conducted on postpartum mothers in the working area of the Sumberbaru Primary Health Service, Jember Regency, which was carried out from April to June 2023. A total of 78 postpartum mothers were selected using simple random sampling. The interview instrument was adopted from the BPCR JHPIEGO questionnaire, and maternal outcome observations were made using the MCH book. Data were analyzed using the chi-square test to examine the relationship between BPCR and maternal outcome. The level of statistical significance was set to p-value < 0.05*
Results: *The results of this study indicated that 69.2% of postpartum mothers had less prepared BPCR practices, and for most postpartum women, 55.1% recovered. There was a relationship between BPCR practices and maternal outcomes among postpartum mothers (p-value<0.05). Postpartum mothers with well-prepared BPCR practices had a 3.48 times higher chance of experiencing a complete recovery in maternal outcomes than those with less prepared BPCR practices.*
Conclusions: *The practice of BPCR in postpartum mothers is in the poor category; most mothers' maternal outcomes are in the fully recovered category. BPCR is an essential factor influencing maternal outcomes, so increasing counseling for mothers and families regarding BPCR is necessary to ensure more optimal maternal outcomes.*

KEYWORD: *birth preparedness and complication readiness; maternal outcome; postpartum*

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INTRODUCTION

Maternal health is one of the country's development priorities. Mothers will experience pregnancy until postpartum. During this period, a mother will be vulnerable to complications that affect the welfare of the mother. Filippi et al. mentioned that women could experience adverse effects due to complications during pregnancy and childbirth, which can affect women's health in the long term (1). These effects are referred to as maternal outcomes. Maternal outcome is the outcome of the labor process, divided into good and bad outcomes. Poor maternal outcomes such as hemorrhage are the leading cause of maternal death in the world (2). The global maternal mortality rate (MMR) in 2020 reached 223 per 100,000 live births (3). The global MMR reduction target by 2030 is 70 per 100,000 live births (4). Compared to the global MMR, Indonesia's MMR is lower at 189 per 100,000 live births (5). However, this figure is still far from the SDG's 2030 target. Thus, efforts are still needed to reduce maternal mortality. One of the promotive and preventive efforts that can be done to reduce maternal mortality is Birth Preparedness and Complication Readiness (BPCR). BPCR is a strategy to promote the use of prenatal and postnatal care by health workers to reduce delays in obtaining services(6). Previous studies have shown that 50% of maternal death cases that experienced three delays did not fill in the BPCR component in the MCH book completely (7).BPCR consists of several components, including planning for health workers as delivery assistants, referral health services, transportation to health services, delivery funds, etc. Research conducted at the Waihaong Ambon Health Center shows that the implementation of BPCR is still not optimal; this is because there are still pregnant women who do not consult with midwives and give birth with the help of traditional birth attendants (8). This shows that efforts are needed to improve community knowledge related to labor preparation and prevention of complications. The research results by Husnida and Yuningsih showed that 33.3% of respondents who did not follow BPCR experienced labor complications (9). Another study also showed that more mothers with the BPCR category “well prepared” did not experience maternal morbidity compared to mothers with the BPCR category “less prepared” (10). Several studies are related to BPCR in Indonesia, but only a few have analyzed the relationship between BPCR practices and maternal outcomes, especially among postpartum mothers. Research related to BPCR is expected to be used as input for policymakers in implementing programs to reduce maternal mortality. This study analyzes the relationship between BPCR practices and maternal outcomes in post-partum mothers in the Sumberbaru Health Center, Jember Regency working area.

MATERIALS AND METHODS

This cross-sectional study comprised 330 post-partum mothers who gave birth from

July to December 2022 in the Sumberbaru Primary Health Service Area, Jember Regency. The sampling technique used was simple random sampling with the formula, and 78 samples of post-partum mothers were obtained. Mothers who died during pregnancy, childbirth, or postpartum in the period July-December 2022 were excluded from this study.

The instrument used in this study was a modified questionnaire from the BPCR guidelines by JHPIEGO. The questionnaire was divided into several sections, including sociodemographic characteristics, BPCR practice, and maternal outcome. Sociodemographic characteristics included age, latest education, employment status, family income, and parity. The question instrument for the BPCR practice section used 8 BPCR components: conducting ANC at least 6 times during pregnancy, the first ANC visit in the first trimester, planning delivery at a health worker, preparing delivery costs, preparing transportation that will be used at the time of delivery, preparing a potential blood donor, preparing a birth attendant, and planning the use of post-coital family planning. In this question, if > 5 BPCR components are fulfilled, it is considered "well prepared," but if ≤ 5 BPCR components are fulfilled, it is considered "less prepared." The maternal outcome question section consists of fully recovered as an excellent maternal outcome and maternal morbidity and maternal near miss (MNM) as a bad maternal outcome (1).Data has been collected and processed using SPSS software. The analysis was conducted using univariate analysis to determine the frequency and bivariate analysis using the chi-square test to determine the correlation between BPCR practices and maternal outcomes.

RESULTS AND DISCUSSIONS

RESULTS

Table 1 shows that most post-partum mothers were 20-35 years old (79.5%). Twenty-six (33.3%) of the post-partum mothers in this study had elementary as their last education. Most (78.2%) of the post-partum mothers were not working. The family economy in this study based on Jember minimum wage 2022 was IDR 2,555,662. In this study, the family economy of most post-partum mothers was less than Jember minimum wage. Most (67.9%) post-partum mothers were multiparous.

Table 2 shows that the practice of Birth Preparedness and Complication Readiness (BPCR) by post-partum mothers was generally "less prepared." Only 34.6% of the post-partum mothers had received ANC less than 6 times, but most (75.6%) initiated ANC attendance in the first trimester of pregnancy. About 70.5% of the post-partum mothers had planned for skilled birth attendants (midwifery, doctor). Fifty (64.1%) of the post-partum mothers had practiced planning funds for delivery. Half of the post-partum mothers had practiced planning transport (50%). Planning for blood donor(s) in case of complications during delivery was reported in

9%. The most common birth preparedness practice component observed was planning assistance to the delivery place (85.7%). There, 71.8% of post-partum mothers had planned contraception after birth to reduce the chance of complications after delivery. Of the eight BPCR practice components considered in this study, only 30.8% of post-partum mothers were classified as well-prepared.

Table 1. Distribution of sociodemographic characteristics

Characteristics	n	Percentage (%)
Age (years old)		
<20	2	2.6
20-35	62	79.5
>35	14	17.9
Education level		
Elementary	26	33.3
Junior High School	19	24.4
Senior High Shcool	23	29.5
University	10	12.8
Working status		
Employed	17	21.8
Unemployed	61	78.2
Income		
< Jember minimum wage	56	71.8
≥ Jember minimum wage	22	28.2
Parity		
Primipara	24	30.8
Multipara	53	67.9
Grandemultipara	1	1.3

Maternal outcomes in this study were divided into recovery, maternal morbidity, and maternal near miss (MNM). Recovery was a healthy condition of mothers after delivery. Maternal morbidity was a condition that could lead to complications. However, maternal near miss (MNM) was when a mother was in near miss condition.

Table 2. Birth Preparedness and Complication Readiness Components

BPCR Components	n	Percentage (%)
Frequency of ANC visits		
≥ 6 times	27	34.6
< 6 times	51	65.4
Gestation of pregnancy at first ANC		
1st trimester	59	75.6
2nd trimester	19	24.4
Planning birth attendants		
Yes	55	70.5
No	23	29.5
Planning funds for delivery		
Yes	50	64.1
No	28	35.9
Planning transport		
Yes	39	50
No	39	50
Planning blood donor(s)		
Yes	7	9
No	71	91
Planning Assistant		
Yes	66	85.7
No	12	15.4
Planning contraception after birth		
Yes	56	71.8
No	22	28.2
BPCR practice		
Well-prepared (> 5 components)	24	30.8
Less prepared (≤ 5 components)	54	69.2

Table 3. Maternal outcomes

Maternal Outcomes	n	Percentage (%)
Recovery	43	55.1
Maternal morbidity	31	39.7
Maternal Near Miss (MNM)	4	5.2

Table 3 shows that most post-partum mothers recovered (55.1%). Previous research showed a higher prevalence of maternal outcome recovery, namely 92% of mothers giving birth in a healthy state "(11). This study showed that only a few (39.7%) of post-partum mothers had maternal morbidity and 5.2% had maternal near misses. According to the result of the interview, maternal morbidity among post-partum mothers were breech birth, prolonged labor, premature rupture of membrane, and cesarean or operation delivery. Maternal near misses among post-partum mothers were through the referral process and severe bleeding.

Table 4 shows a correlation between the practice of birth preparedness and complication readiness (BPCR) with maternal outcomes in post-partum mothers. Analysis using chi-square test p-value = 0.019 with OR = 3.48 (1.20-10.12). This study shows that mothers with BPCR practices in the good preparation category have the opportunity to have a fully recovered maternal outcome of 3.48 times compared to post-partum mothers with BPCR practices in the poor preparation category.

Table 4. BPCR practices and maternal outcome

BPCR Practices	Maternal Outcomes				p-value	OR (CI 95%)
	Recovery		Maternal Morbidity & Maternal Near Miss (MNM)			
	N	%	N	%		
Well prepared	24	55.8	6	17.1	0.035	3.48 (1.20-10.12)
Less prepared	19	44.2	29	82.9		
Total	43	100	35	100		

DISCUSSION

Based on **Table 1** , most postpartum mothers fall into age 20-35, meaning more mothers are pregnant at the ideal age. At this age, mothers are ready to manage the family and care for children to prepare more optimally for pregnancy and childbirth. Apart from that, at this age, mothers also have knowledge, skills, and experience in caring for their family "(10,11). Most postpartum mothers' education levels are low, or they have graduated from elementary school. Education and knowledge are key factors in behavior change. Mothers and husbands with a high level of education can increase their knowledge, access, and decisions in

accessing more optimal health care during pregnancy, childbirth, and postpartum(12). Another study showed that education level and parity were important predictors of knowledge of danger signs during pregnancy, labor, and postpartum. Knowledge about danger signs among mothers was the key factor influencing timely access to care (13). These findings mirror the findings of the study in Tanzania, which also found that education level is an important factor, and pregnant women with two to four pregnancies were also more knowledgeable than other categories. Despite that, the level of education is a strong predictor of birth preparedness and complication readiness, and pregnant women who are educated are six to ten times more likely to be prepared for labor and ready for complications than their lower-educated pregnant women(14,15).

The findings of our study were contrary to studies conducted in Southern Ethiopia dan Wolaita Zone, where primiparous women were found to practice BPCR 43% more than multigravida women. Multigravida mothers have prior experience of labor and having a child, so it can make them more reluctant towards pregnancy than primiparous mothers who have perceived the experience of childbirth as a newly high-risk experience (16). Our study's findings align with those of other studies that found that women with low family incomes were less involved in maternal healthcare utilization decision-making than women with high family incomes. This might be because most of the head's family are males, and men have the economic and decision-making power, including maternal health care utilization(17). Another study showed that mothers who have high income and wealth assets were 2,01 times more likely to practice birth preparedness and complication readiness than mothers who have low income. High-income people must save money for emergency funding and transportation, making health facilities more accessible(18).

Based on **Table 2,** the poor BPCR practices in this study corroborated an earlier study conducted on post-partum mothers in Southwest Ethiopia, which found that only 22.2% of the recently delivered mothers were well prepared for BPCR (19). A high level of BPCR practices has been reported in other Ghanaian studies, and 78% of post-partum mothers were well prepared for their BPCR practices (20). That study used a population of mothers who visited a health facility. This finding aligns with another study in Nigeria, which showed that the level of birth preparedness, complication readiness, skilled birth attendants, and delivery utilization among women is high because the women were in their third trimester of pregnancy (6-9 months) are more likely to have initiated planning activities and be well-prepared compared to those in the first or second trimester(21,22).

In this study, of the eight components of BPCR practices, planning blood donor(s) was the most minor action (9.0%) post-partum mothers had undertaken towards

BPCR practices. This prevalence is similar to the 10.1% reported by (23) in a study in India. This prevalence is higher than in a recent study in Ethiopia; only 3.3% of the participants identified blood donors when needed (19). In contrast to this study, a higher prevalence was found in Ghana, with 51% having made arrangements for blood donors (20). This showed a very low level of preparedness that can increase the risk of maternal and neonatal mortality due to hemorrhage. Based on the interview results, this is due to mothers' lack of knowledge regarding the importance of preparing prospective blood donors. Post-partum mothers in this study have a stigma if preparing prospective blood donors during pregnancy becomes something excessive and frightening. In general, socio-cultural perceptions underlie a person's decision to give or receive blood donation (20). Healthcare providers should regularly educate pregnant women and their families on the need to identify a blood donor as a part of the birth preparedness and complication readiness practices during antenatal care visits (24,25). The findings of our study showed that the most mentioned practice of birth preparedness and complication readiness is the planning of birth assistants and facilities for delivery. This finding is similar to a previous study conducted in Nigeria, which showed that the identification of the facility of labor may be because these studies were conducted in health facilities. However, there are still variations between the choice and the actual use of health facilities for delivery among pregnant women (26).

This is in line with previous research, which states that mothers with good BPCR practices have 2 times the chance of having good maternal outcomes compared to mothers with poor BPCR practices (27,28). Mothers with good BPCR practices will be better at choosing birth attendants, namely, giving birth in health facilities/health workers, to have a good maternal outcome. The objectives of BPCR are to prevent three delays by increasing the use of health workers in labor to reduce maternal mortality. The study's results mentioned that mothers who did not receive health services from professionals were more at risk of experiencing three delays (29). This study is different from previous research, which states that there is no significant relationship between BPCR practices and maternal morbidity and maternal near miss (MNM) (30,31). This study showed that of the mothers who had maternal morbidity as a maternal outcome, 29.9% belonged to mothers with a category of BPCR practice of less preparation. Another study showed that identified components of birth preparedness and complication readiness are associated with good birth outcomes. Antenatal care utilization, preparedness for birth and its complications, self-preference of health facilities for labor and delivery, and mode of delivery were strong predictors of maternal and birth outcomes. Antenatal care utilization is associated with good maternal and birth

outcomes (32). This finding is similar to another study in that pregnant women who attended antenatal care were two times more likely to have good maternal and birth outcomes than those who had not. Lack of antenatal care is associated with maternal morbidity (18,33). Antenatal care provides preventive interventions for pregnant women to prepare for better maternal and fetal outcomes. Another study showed that mothers who were well prepared for birth preparedness and complication readiness were two times more likely to have good outcomes than those who were less prepared. Birth preparedness and complication readiness contribute to maternal well-being and are associated with reducing maternal and neonatal morbidity and mortality in developing countries (34,35). The results of this study are based on the theoretical framework proposed by Filippi, which states that maternal morbidity is cyclic from the time a woman experiences pregnancy, so every maternal condition during the current pregnancy will influence the condition of future pregnancies. The results of this study also show that the impact of maternal morbidity can last for an extended period, not only during the six weeks postpartum but also affects a woman's entire life during the post-reproductive or postmenopausal period. The results of this study are based on the maternal morbidity framework theory, which states that maternal health is a social and economic phenomenon, so it is not only influenced by clinical and biological issues. And the importance of a woman-centered approach in maternal health services so that maternal and fetal outcomes are good (1).

This study is limited to a single institution; however, the data quality is better since it was collected through an interviewer-administered questionnaire and observation, and the study tried to identify the association between birth preparedness and complication readiness with maternal outcomes. This study could not predict a direct causal association between birth preparedness, complication readiness, and maternal outcomes because of the research design. It is equally important to emphasize the other designs and sample size, such as prospective cohort and experimental design, to examine whether there is a direct causal association between birth preparedness, complication readiness, and maternal outcomes.

CONCLUSION AND RECOMMENDATION

The practice of BPCR in postpartum mothers is in the poor category; most mothers' maternal outcomes are in the fully recovered category. BPCR is an essential factor influencing maternal outcomes, so increasing counseling for mothers and families regarding BPCR is necessary to ensure more optimal maternal outcomes. Therefore, the Jember Regency Health office, specifically the Sumberbaru district health officers and providers, strongly recommend improving women's birth preparedness and complication readiness by

empowering women, increasing educational access to women and families, the quality and accessibility of antenatal care services for every woman at the community, and providing adequate information about the risk of lack of birth preparedness through community mobilization during maternal class, during ANC follow up visit, and postnatal follow-up visit by cadres. This will alert them to prepare all the components of birth preparedness and complication readiness, specifically in blood donors.

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