Birth preparedness, complication readiness, and associated factors among pregnant women in South Wollo Zone, Northeast Ethiopia

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BACKGROUND: Birth preparedness and complication readiness is a preparation strategy for normal birth and potential emergency situations, and is important for the safety and health of mothers and newborns during pregnancy, childbirth, and the postpartum period.
OBJECTIVE: This study aimed to assess the prevalence of birth preparedness and complication readiness and the associated factors among pregnant women.
STUDY DESIGN: This was a community-based, cross-sectional study conducted among randomly selected 480 pregnant women from February to April of 2020. Bivariable logistic regression was performed to assess the association of each independent variable with the dependent variable. All variables with a *P* value of <.2 were entered into a multivariable logistic regression model to identify associated factors. Adjusted odds ratios with 95% confidence intervals were estimated to measure the strength of the association.
RESULTS: Out of the 498 sampled pregnant women, 480 (96.4%) agreed to participate in the study; 104 were found to have satisfactory birth preparedness and complication readiness (21.7%; 95% confidence interval, 18.3−25.7). Having had an experience of obstetrical complications (adjusted odds ratio, 1.83; 95% confidence interval, 1.07−3.14), early starting time for antenatal care visits (adjusted odds ratio, 5.22; 95% confidence interval, 2.26−12.06), advice about birth preparedness (adjusted odds ratio, 2.99; 95% confidence interval, 1.21−7.39), and awareness about obstetrical danger signs during childbirth and the postpartum period (adjusted odds ratio, 2.23; 95% confidence interval, 1.33−3.74) were found to be significantly associated with birth preparedness and complication readiness.
CONCLUSION: The prevalence of birth preparedness and complication readiness was low. Experience of obstetrical complications, starting time for antenatal care visits, advice about birth preparedness and complication readiness, and awareness of key danger signs during childbirth and the postpartum period were significantly associated with birth preparedness and complication readiness.

Key words: birth preparedness, complication readiness, Ethiopia

Introduction

Birth preparedness and complication readiness (BPCR) strategies are used to prepare for normal birth and potential emergency situations, and are important for the safety and health of mothers and newborns during pregnancy, childbirth, and the postpartum period. The Safe Motherhood initiative and the Federal Ministry of Health sets BPCR program includes a matrix of shared responsibility: at the individual level, pregnant women and their partners can ready themselves for learning and recognize during pregnancy and postpartum care the danger signs of life-threatening complications for mothers and infants by saving money, arranging transportation, and identifying skilled birth attendants and health facilities to reach and receive healthcare in the case of an obstetrical emergency.[1,2]

The BPCR package promotes active preparation and decision-making of pregnant mothers and their families. However, their access to care is hampered by delays. Moreover, various delays contribute to high maternal and neonatal mortality in developing countries. The causes of these delays include

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Ethical approval was obtained from the ethical review committee of the Wollo University College of Medicine and Health Science. A permission letter was obtained from the Kutaber District Health Department. Written consent from respondents was obtained before data collection. Questionnaires were anonymized and participants reassured about the confidentiality of their responses and their right to discontinue participation at any time. All procedures were performed according to the guidelines.

All relevant data are included in the article. An English-version data collection tool and detailed operational definitions of the outcome variables are accessible upon reasonable request from the corresponding author.

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AJOG MFM at a Glance

Why was this study conducted?

In Ethiopia, utilization of birth preparedness and complication readiness (BPCR) strategies is very low, with variation in terms of time, place, and population. It is important to have up-to-date information for policymakers and program implications at different levels.

Key findings

The prevalence of BPCR was low. Experience of obstetrical complications, starting time for antenatal care visits, advice about BPCR, and awareness of key danger signs during childbirth and the postpartum period were significantly associated with BPCR.

What does this add to what is known?

In many societies around the world, cultural beliefs, place of residence, access to health facilities, education, and economic status are the most known documented factors to influence BPCR and delivery services. However, some factors such as family support, husband occupation, and travel time to health facilities have not been sufficiently studied in Ethiopia.

logistic and financial concerns, unsupportive policies, and gaps in services.[3–5] In Ethiopia, efforts have been made in encouraging the implementation of BPCR by promoting focused antenatal care (ANC) while stressing the counseling of women as an important element of this strategy.[6]

Maternal and neonatal mortality and morbidity are still high because of pregnancy-related complications. The World Health Organization estimates that every year, approximately 210 million women become pregnant; an estimated 30 million develop complications and 515,000 of these women die; and 3 million infants die in the first week of life. Almost all maternal deaths (99%) occur in developing countries, especially in sub-Saharan Africa. In addition, 50% of maternal deaths and >60% of neonatal deaths arise from poor-quality care.[7,8] Worldwide, 75% to 80% of all maternal deaths are due to direct causes. An estimated 40% of pregnant women experienced pregnancy-related health problems during or after pregnancy and childbirth, with 15% suffering serious or long-term complications.[5,9]

BPCR practice is higher outside African countries.[10] A community-based cross-sectional study conducted in Pakistan revealed that 45% of participants had satisfactory BPCR. Some studies conducted in India, Tanzania, and Thailand showed that 43.9%, 58.2%, and 78.6% of participants were had satisfactory BPCR, respectively.[11–13] However, BPCR practice is less common in many developing countries, including Ethiopia. In Ethiopia, the maternal mortality ratio remains high at 412 deaths per 100,000 live births, with 42% of infants delivered by traditional birth attendants and 28% by skilled providers.[10–14] The BPCR strategy is one of the most simple, cost-effective, and practicable means of reducing maternal and neonatal mortality and achieving the aims of the Sustainable Development Goal 3, Growth and Transformation Plan II, and Safe Motherhood initiative; however, it is not widely used by women and their partners, as evidenced by still occurring maternal deaths due to delays. More than 65% of pregnant women and their families do not know how to recognize the danger signs of complications.[15–17]

In Ethiopia, BPCR utilization is very low and there is variation in terms of time, place, and population. It is important to have up-to-date information for policymakers and program implications at different levels. In many societies around the world, cultural beliefs, place of residence, access to health facilities, education, and economic status are the most known documented factors to influence BPCR and delivery services. However, some factors such as family support, husband occupation, and travel time to health facilities have not been sufficiently studied in Ethiopia.

Materials and Methods

Study setting, design, and period

This was a community-based cross-sectional study including 498 pregnant women in the South Wollo Zone, Northeast Ethiopia from February to April of 2020. In the 2007 national census conducted by the Central Statistical Agency of Ethiopia, this district had a total population of 109,746, of whom 56,366 were men and 53,380 were women; 2849 or 2.25% of its population were urban dwellers.

Population and sample

All pregnant women who were living in the Kutaber district were the source population. All randomly selected pregnant women in the selected kebeles of the district were the study population. All pregnant women in selected kebeles and those who lived in the kebeles for ≥6 months were included in the study. Pregnant women who were critically ill during the data collection period were excluded.

Sample size determination and procedure

The sample size was calculated by using a single population proportion formula with the following assumptions: $Z\alpha/2$=the critical value at 95% confidence level of certainty (1.96), 5% marginal error, 26.9% prevalence of BPCR in Baso Liben district, Ethiopia,[18] with a design effect of 1.5. Finally, by adding 10% nonresponse rates, the final sample size was 498 study participants. Multistage sampling techniques were used to select the study participants. A total of 3698 pregnant women were assumed to reside in the district. To determine representative samples, 6 kebeles (5 rural and 1 urban kebele) were selected from the total kebeles by using the lottery method. Proportional allocation of the sample size was conducted according to the number of pregnant women in each selected kebele. The selected 6 kebeles had 1362 actual pregnant women during the study period. For preparing the sampling frame, the list of pregnant

women with their identification numbers was taken from Health Extension Workers (HEWs) delegated at each selected kebele. Finally, pregnant mothers were selected systematically by following the updated pregnant women registration location from each selected kebele, and the first respondent was selected by lottery method.

Data collection tools and procedure

The data were collected using a pretested structured questionnaire, which was mainly adapted from Jhpiego, and other literature on maternal and neonatal health monitoring and BPCR[1] was used. Data collection was conducted by 6 HEWs who work other than the selected kebeles and supervised by 2 BSc degree midwives.

Data quality control and management

Data quality was ensured at each step. A week before data collection, training of the data collectors and their supervisors was undertaken for 1 day, focusing on the objectives, relevance of the study, method of interviewing, confidentiality of the information, and informed consent. The questionnaire was prepared in English, translated to the local Amharic language, and translated back to English after data collection by English language experts. The questionnaire was pretested in nonselected kebeles (Lwinco kebele) that had similar population characteristics to those of the study population, and 5% of the sample population (25 mothers) were interviewed a week before data collection. On the basis of the pretest, questions were revised, and those found to be unclear or confusing were modified. Supervisors followed the data collectors closely throughout the data collection period along with the principal investigator. Data were entered using EpiData statistical software, Version 3.1 before being exported to IBM SPSS Statistics, Version 23.0 (IBM Corp., Armonk, NY) for analysis.

Data processing and analysis procedure

Data from the questionnaires were checked manually for completeness and coded. First, the data were entered by using EpiData, and then exported to SPSS for analysis. Descriptive statistics were used to show the distribution of characteristics among respondents with frequency and percentage, and presented in the form of text, tables, and figures. Bivariable logistic regression was performed to assess the association of each independent variable with the dependent variable. All variables with a P value of $<.2$[19] at bivariable logistic regression were entered into a multivariable logistic regression model to control for all possible confounders and to identify factors associated with dependent variables. In multivariable logistic regression, variables with P value $<.05$ were considered significant.

Results

Sociodemographic characteristics of the respondents

Out of the 498 sampled pregnant women, 480 agreed to participate in the study, amounting to a response rate of 96.4%. The mean (±SD) age of the respondents was 25.1 (±3.8) years, with a range of 19 to 37 years. Regarding religion, 437 (91.0%) participants were Muslims and 43 (9.0%) were Orthodox Christians. All of the respondents were from the Amhara ethnic group. Regarding educational status, 221 (46.0%) participants could not read and write. The occupation status of 276 (57.5%) of the respondents was housewife. Concerning marital status, 466 (97.1%) of the respondents were married; 233 (48.5%) had a family size of 4 to 6 people, and 229 (47.7%) respondents made decisions jointly with their husbands on money use. Regarding husband education, 280 (58.3%) could not read and write (Table 1).

Obstetrical history of respondents

In the assessment of obstetrical characteristics, 29 (6.0%) of the respondents were primigravidas, and a total of 372 (77.5%) women had 2 to 3 pregnancies. Among the respondents, 397 (82.7%) had 1 to 3 children, and the mean and SD of gravidity and parity were 2.2±0.7 and 2.0±0.4, respectively. For 337 (70.2%) of the respondents, starting time for ANC visits was at 4 months; of these respondents, only 9 (1.9%) had ≥4 ANC visits. Out of 480 respondents, women with the obstetrical complications of abortion and stillbirth were 118 (24.6%), 33 (6.9%), and 19 (4.0%), respectively.

Source of information about birth preparedness and complication readiness, regarding maternal health service utility, support and roles in decision-making

In this study, 395 (82.3%) respondents were informed about BPCP. Out of the respondents, 476 (99.2%) women reported that they have a planned place for delivery. Regarding transportation, 382 (79.6%) respondents reported having used an ambulance as a community transportation service to reach a health facility.

Most (397 [82.7%]) of the respondents reported that their families were to assist them with birth and in case of complications. More than half (253 [52.7%]) of respondents made decisions together with their husbands about ANC follow-up. Regarding time needed to travel from home to health facilities, 307 (64.0%) of the study participants reported between 15 and 30 minutes.

The extent of birth preparedness and complication readiness

Of all the respondents, 104 (21.7%; 95% confidence interval [CI], 18.3−25.7) were found to have BPCR; 258 (53.8%) planned for a place of delivery, 103 (21.5%) planned to identify skilled birth attendants, and 125 (26%) identified the mode of transportation. Furthermore, 271 (56.5%) of participants were saving money for an obstetrical emergency, 182 (37.9%) prepared essential items for childbirth, and only a few (22 [4.6%]) had a planned blood donor.

Factors that influence birth preparedness and complication readiness

Multivariable analyses were conducted to control for potential confounders and identify independent predictors of BPCR. Experience of obstetrical complications, starting time for ANC visit,

TABLE 1
Sociodemographic characteristics of pregnant women in Kutaber woreda, Ethiopia, 2020

Variables	Categories	Frequency	Percentage
Age at interview (y)	<20	25	5.2
	20–25	245	51.1
	26–30	173	36.0
	>30	37	7.7
Marital status	Married	466	97.1
	Other (single, widowed, divorced)	14	2.9
Educational status	Cannot read and write	221	46.0
	Can read and write	98	20.6
	Primary school	106	22.1
	Secondary school and above	55	11.5
Religion	Orthodox Christian	40	8.3
	Muslim	437	91.0
	Protestant	3	0.6
Ethnicity	Amhara	480	100.0
Occupation	Housewife	276	57.5
	Farmer	176	36.7
	Government employee	18	3.8
	Daily laborer	5	1.0
	Merchant	5	1.0
Monthly income (ETB)	≤500	257	53.5
	501–1500	165	34.4
	>1500	58	12.1
Husband education	Cannot read and write	280	58.3
	Can read and write	75	15.6
	Primary school	58	12.1
	Secondary school and above	67	14.0
Husband occupation	Farmer	334	69.6
	Government employee	36	7.5
	Daily laborer	36	7.5
	Merchant	74	15.4
Family size	1–3	205	42.7
	4–6	233	48.5
	≥7	42	8.8
Money decision-maker	Self	175	36.5
	Household	76	15.8
	Self and husband jointly	229	47.7

ETB, Ethiopian birr.

Mola. Birth preparedness, complication readiness, and associated factors among pregnant women. Am J Obstet Gynecol Glob Rep 2023.

advice about BPCR, and awareness of key danger signs during childbirth and the postpartum period were significantly associated with BPCR at $P<.05$. The odds of practicing BPCR were 1.83 times higher for mothers with experience of obstetrical complication compared with women without such experience (adjusted odds ratio [AOR],

TABLE 2
Bivariable and multivariable analysis for birth preparedness and complication readiness among pregnant women at Kutaber woreda, Ethiopia, 2020

Variable	Birth preparedness and complication readiness		COR (95% CI)	AOR (95% CI)
	Not well prepared	Well prepared		
Husband occupation				
Farmer	251	83	3.17 (1.39−7.17)	1.16 (0.46−2.94)
Government employee	26	10	3.68 (1.27−10.69)	2.26 (0.69−7.32)
Daily laborer	32	4	1.19 (0.33−4.38)	1.55 (0.38−6.37)
Merchant	67	7	1	1
Obstetrical complication				
No	296	65	1	1
Yes	80	39	2.22 (1.39−3.54)	1.83 (1.07−3.14)[a]
Received information about BPCR				
No	78	7	1	1
Yes	298	97	3.62 (1.62−8.13)	1.91 (0.77−4.77)
Awareness of danger signs during childbirth				
No	284	51	1	1
Yes	92	53	3.21 (3.21−5.03)	2.23 (1.33−3.74)[a]
Awareness of danger signs during postpartum period				
No	298	56	1	1
Yes	78	48	3.27 (2.07−5.18)	2.40 (1.41−4.09)[a]
Starting time for ANC visits (mo)				
≤3	25	21	4.31 (2.03−9.18)	5.22 (2.26−12.06)[b]
4	58	279	0.75 (0.43−1.32)	0.89 (0.49−1.66)
≥5	21	76	1	1
Advice about BPCR				
No	65	7	1	1
Yes	316	97	2.63 (1.16−5.95)	2.99 (1.21−7.39)[a]
Family support				
No	72	10	1	1
Yes	304	94	2.23 (1.11−4.49)	1.73 (0.81−3.68)

1=reference category.

ANC, antenatal care; *AOR*, adjusted odds ratio; *BPCR*, Birth Preparedness and Complication Readiness; *CI*, confidence interval; *COR*, XXX.

[a] <.05,; [b] <.01.

Mola. Birth preparedness, complication readiness, and associated factors among pregnant women. Am J Obstet Gynecol Glob Rep 2023.

1.83; 95% CI, 1.07−3.14). Women who had a starting time for an ANC visit of ≤3 months were 5.22 times more likely to practice BPCR compared with those with a starting time for an ANC visit >5 months (AOR, 5.22; 95% CI, 2.26 −12.06). The odds of practicing BPCR were 2.23 and 2.4 times more likely with women who had awareness about key danger signs of obstetrical complication during childbirth (AOR, 2.23; 95% CI, 1.33−3.74) and the postpartum period (AOR, 2.4; 95% CI, 1.41 −4.09), respectively, compared with women without such awareness. Women who received advice about BPCR were 2.99 times more likely to practice BPCR compared with women who did not receive such advice (AOR, 2.99; 95% CI, 1.21−7.39) (Table 2).

Discussion

This community-based study attempted to identify the extent and factors associated with BPCR in the South Wollo Zone. It revealed that the proportion of the study cohort with satisfactory BPCR was 21.7% (95% CI, 18.3−25.7), lower than those found in studies in India (43.9%),[11] Tanzania (58.2%),[12] Goba, Oromia (29.9%),[20] and the Jimma Zone

(23.3%).[14] The possible reason might be cultural variation and commitment differences among health professionals regarding the creation of awareness about BPCR for pregnant women. However, this proportion was higher than those found in studies from the Robe woreda, Oromia (16.5%)[5] and the Wolaita Zone (18.3%).[19] This could be due to sociodemographic characteristics, difference in implementation of health programs, or marital partner support.

Mothers who experience obstetrical complications were 2 times more likely to practice BPCR than women without such experience. This finding is supported by another community-based study conducted in Nepal.[21] This could be due to women who had experienced obstetrical complications practicing BPCR and promoting the use of skilled maternal and child health services.[1]

Women who had awareness of obstetrical danger signs during childbirth and the postpartum period were 2 times more likely to practice BPCR compared with those without such awareness. This finding is supported by another community-based study conducted in Tanzania.[12] In a similar study about BPCR conducted in the Arsi Zone, women who had awareness about obstetrical danger signs were 3 times more likely to be prepared than mothers without such awareness. A possible reason might be the provision of information in this area to increase awareness of women practicing BPCR.

Early and frequent ANC visit attendance is important to identify and alleviate risk factors in pregnancy and to encourage women to prepare for birth.[12] Findings in this study showed that pregnant women who started ANC visits during the first trimester were 5 times more likely to prepare for birth and its complications compared with those who started after the first trimester. This finding was in line with studies conducted in the Robe woreda, Diguna Fango district, and the Pokot districts of Kenya.[5,19,22] This demonstrates the potential utility of raising awareness of the importance of early ANC visits for BPCR of women during pregnancy.

Women who received advice about BPCR were 3 times more likely to practice BPCR compared with women who did not receive such advice. This is in line with a study conducted in the Gurage Zone,[23] and reinforces the importance of sharing information to empower women and their families to make informed decisions on delivery plans and seeking care.

Limitations of the study

This study may not have been able to demonstrate direct cause and effect between the dependent and independent variables because of its cross-sectional design. Other limitations include that the data collectors were HEWs, potential social-desirability bias in responses regarding some variables, and the participants having not completed their pregnancies.

Conclusion and recommendation

The proportion of participants with satisfactory BPCR was relatively low. Factors that were significantly associated with BPCR were previous experience with obstetrical complications, early starting time for ANC visits, advising about BPCR for pregnant women, and awareness of key danger signs during childbirth and the postpartum period.

In light of these findings, BPCR programs should be promoted in communities through collaboration of woreda health offices with healthcare providers and supervision of extension workers by health facility managers. Healthcare providers should take initiative in advising women about key danger signs during childbirth and the postpartum period at the time of ANC visits. HEWs can make further efforts to create awareness about BPCR among communities, and qualitative research can contribute to minimizing maternal and child complications and death related to the explained factors. ■

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