

# Birth Preparedness, Complication Readiness, and Determinants Among Women Attending Antenatal Care from Ethiopia: A Cross-sectional Facility-Based Survey

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**Abstract:** A large number of mothers die from pregnancy complications and childbirth worldwide and Sub-Saharan Africa including Ethiopia accounts for the third. Although several studies were done on birth preparedness and complication readiness in different parts, there is limited information in the current study setting. Hence, the aim of the current study was to assess birth preparedness and complication readiness practices and determinants among pregnant women attending antenatal care in Sibu Sire District, East Wollega Zone, Ethiopia. Accordingly, a facility-based cross-sectional study was conducted on 398 women attending ANC. Data were collected through an interviewer applied structured questionnaire. Data were entered into EPI-INFO version 7 and exported to SPSS version 21 for analysis. After the descriptive statistics, bivariate and multiple variable regression were carried out using the odds ratio and its 95% confidence interval at  $p < 0.05$ . The response rate was 100% and the magnitude of BPCR among pregnant women in the study setting was 30.2%. Educated elementary, achieved secondary and above, history of live-birth, history of stillbirth, ANC four & above visits, knowledge of danger signs of pregnancy, awareness of BPCR, and knowledge of birth preparedness were significantly associated with BPCR with (AOR=2.59; 95% CI: 1.30-5.18), (AOR=5.88; 95% C/I: 2.57- 13.46), (AOR=4.31; 95% C/I: 2.45-7.60), (AOR=2.00; 95% C/I: 1.01- 3.86), (AOR=2.11; 95% C/I: 1.25-3.55), (AOR=2.21; 95% C/I: 1.17-4.18), (AOR=2.55; 95% CI: 1.48-4.40), (AOR=2.1; 95% C/I: 2.1 (1.24-3.53)) respectively. In conclusion, the magnitude of BPCR practice was low in the area. The key determinants in the study setting were educational status, history of live-birth, history of stillbirth, having ANC  $\geq 4$  visits, knowledge of danger signs of pregnancy, awareness of BPCR, and knowledge of BPCR. Therefore, improving the means of creating awareness, ANC attendance, and education coverage are recommended based on the finding. Furthermore, to explore the underlined reason a wide scope follow-up study and mixed methods studies is recommended.

**Keywords:** ANC, Birth Preparedness, Complication Readiness, Knowledge, Sire

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## 1. Introduction

Birth Preparedness and Complication Readiness (BPCR) is a strategy to promote the timely use of skilled maternal health care, especially starting from pregnancy, labor, delivery, and immediate postpartum period identified as

comprehensive strategies to address high maternal morbidity and mortality [1]. Birth preparedness and complication readiness counseling are expected to provide during antenatal care visits [2].

Globally, estimates of 303,000 women die each year during and following pregnancy and childbirth. About 99%

(302,000) of maternal deaths account for developing regions, with Sub-Saharan alone accounting for roughly a third followed by South Asia [3]. In Ethiopia, studies indicated maternal mortality remained stagnant. Ethiopia Demographic and health surveys (EDHS) of the last two decades show the maternal mortality ratio per 100,000 live births in 2000, 2005, 2011, and 2016 were 871, 673, 676, and 412 respectively [4].

According to WHO (2016), an estimate of 78% of pregnant women was attended by a skilled birth attendant during childbirth, 58% of them had four or more antenatal care visits, and only 52% received postpartum care [3]. In Ethiopia, a key factor contributing to high maternal mortality is the low rate of skilled care during pregnancy and delivery. The Ethiopian Demographic and Health Survey of 2016 showed that only 62% of pregnant women received ANC at least once and approximately 28% of births were assisted by skilled birth attendants. About half (50.7%) of pregnant women received ANC at least once and 22% had received four or more ANC in Oromia regional state [4].

The most causes of maternal deaths are postpartum hemorrhage, hypertensive disorders, infection, and complications from childbirth [5]. Cultural beliefs and the lack of awareness inhibit preparation in advance for delivery and expected babies in many developing countries. Since no action is taken before delivery, the family tries to act only when labor begins. In Ethiopia, the majority of pregnant women and families do not know how to recognize the dangerous signs of complications. This was exposed families to waste a great deal of time in recognizing the problem, getting organized, getting money, finding transport, and reaching to an appropriate referral facility after a complication occurs [6].

Good plans and preparations will increase the utilization of skilled care and reduce delays in accessing care in case of pregnancy and delivery complications [7]. However, inadequate preparation for rapid action in the event of obstetric complications, are well-documented factors contributing to delay in receiving skilled obstetric care in Ethiopia [8]. Even though BPCR is considered as the key strategy to enhance the utilization of skilled maternal care, no study was done to assess the practice of birth preparedness and complication readiness in the current study area. Therefore, this study is designed to measure the magnitude of birth preparedness and complication readiness practices and associated factors among pregnant mothers in Sibu Sire District, East Wollega Zone, Ethiopia.

## 2. Methods and Materials

### 2.1. Study Design and Study Area

A facility-based cross-sectional study design was conducted in Sibu Sire District, East Wollega Zone. Sibu Sire District is the western part of Ethiopia and is found at a distance of 50 kilometers from Nekemte town and 281 kilometers from the city town of Addis Ababa. According to

the 2007 census of the Central Statistics Agency of Ethiopia, there were 138,869 populations in the district and 4,819 of them were pregnant women. The district contains 27 public health facilities (one district hospital, four health centers, and 22 health posts); from that one district hospital and four health centers were selected for the study.

### 2.2. Study Population

All pregnant mothers attending antenatal care at public health facilities were the source population, whereas 398 pregnant women attending ANC in selected public health facilities were included in our study population. Pregnant women who were seriously sick were excluded from the study.

### 2.3. Sample Size and Sampling Procedure

The sample size was determined by using a formula for the estimation of a single population proportion. The magnitude of BPCR practice was 41.1% ( $p=0.411$ ) [6]. Sample size computed using a 95% confidence interval, 5% margin of error ( $d$ ), and 15% of the sample size was added for non-response. Using the correction formula the final sample size becomes 398.

A systematic random sampling technique was applied to select the study subject. One district hospital and four health centers that provide basic packages of antenatal services were randomly selected by a lottery method. Out of 862 total monthly client flows, 398 samples were proportionally allocated to the five health facilities. Then, the studied pregnant women were interviewed every  $k^{\text{th}}$  of total clients.

### 2.4. Operational Definition

Birth preparedness (BP) is a preparation that is planned well before delivery. A woman is considered well prepared for birth if she has identified a place of delivery, skilled birth attendant, saved money, and identified the mode of transport ahead of delivery. A participant who fulfilled at least three of the above criteria was considered well-prepared. Complication readiness (CR) was defined as an awareness of pregnancy and delivery-related health problems and was considered present when a woman made all necessary plans for emergencies. For example, the arrangement of (funds, transport, blood donor, and designated decision maker) in case of hemorrhage and loss of consciousness [1, 17].

A skilled care provider/attendant is a professional caregiver who has the knowledge and skills to manage labor, childbirth, and the postpartum period. She must be able to recognize complications and refer the woman or the newborn to a higher level of care if the complications require intervention beyond skilled attendants' competence [1, 17].

The postpartum period was defined as a time starting from the delivery of the placenta up to 6 weeks. A newborn/neonatal period refers to the first 7 days of the newborn's life [1, 17].

Knowledge of BPCR:- A woman has knowledge if she

knows five and above of the eleven selected components (identify place of delivery, save money, prepare essential items, identify skilled providers, awareness of the sign of an emergency, designating decision-makers on her, arranging emergency funds, identify the mode of transportation, arranging blood donors, identifying the institution for EmOC services) [1, 17].

Practice of BPCR:- A participant considered practiced if at least five of the selected components were done (identified place of delivery, saved money, prepared essential items, identified skilled providers, designated decision-makers on her, arranged emergency funds, identified mode of transportation, arranged bold donor, identified institution for EmOC service) [1, 17].

Attitude towards BPCR: Eight questions were asked on the attitude in a Likert-Scale. Pregnant mothers who scored whether above or equal to the mean score were labelled as favorable attitude and otherwise unfavorable attitude [1, 17].

### 2.5. Data Collection Procedure

Data was collected through a face-to-face interview with a structured questionnaire. The two-day training was given to two health officer supervisors and five diploma nurses to collect data. For this study, a structured questionnaire was adopted from JHPIEGO, Monitoring BPCR and based on the conceptual framework after a thorough review of different kinds of literature [1]. The questionnaire was pre-tested for suitability before actual data collection in other facilities in 5% of the sample that had no chance of being included in this study.

### 2.6. Data Quality Management

The questionnaire was prepared in English, translated to Afan Oromo (local language) and back to English to keep the consistency of the question. Training of data collectors and supervisors and pretesting of the question was made to ensure the quality of data. The principal investigator and supervisors were present on the spot to check and review all completed questionnaires, and to ensure the completeness and consistency of the information collected.

### 2.7. Data Processing and Analysis

Data were coded and entered into EPI -INFO version7 and exported to SPSS version 21 for further analysis. Descriptive statistics using frequencies, proportions were presented in the table to characterize the participants. Bivariate regression was done and variables with  $p \leq 0.2$  were selected as a candidate for multivariable analyses. Multiple regression analysis using the odds ratio with its 95% confidence interval was employed to determine independent predictors. All statically tests were considered significant at alpha less than 0.05.

### 2.8. Ethical Consideration

Ethical and study protocol approval was obtained from the Arsi University Institutional Research Review Committee. The purpose of the study, their right to refuse before and

during the interview, and assurance of confidentiality were informed to the study participants. Privacy and anonymity of the individuals were ensured. Written informed consent was obtained before interviewing each participant.

## 3. Results

### 3.1. Socio-demographic Characteristics

A total of 398 pregnant women have participated in the study. Among the participants, 226 (56.8%) had belonged to the age group of 25-34. About 246 (61.8%) participants were from rural residents and 152 (38.2%) were from urban residents. Most of the respondents were married (99.5%), and more than half (56%) were engaged in the farming occupation. Pregnant women who attended secondary and above school were 22.1%; while 32.9% of the mothers had unable to read and write (Table 1).

**Table 1.** Socio-demographic characteristics of pregnant women attending antenatal care in health facilities in Sibu Sire District, Oromia Region, Ethiopia, 2020 (n=398).

Variable	Frequency	Percent
Respondent age		
15-24	113	28.4
25-34	226	56.8
35 and above	59	14.8
Place of Residence		
Rural	246	61.8
Urban	152	38.2
Marital status		
Married	396	99.5
Single	1	0.25
Divorce	1	0.25
Educational status of mothers		
Unable to read and write	131	32.9
Read and write	31	7.8
Primary education	148	37.2
Secondary education and above	88	22.1
Occupation of mothers		
Housewife	102	25.6
Farmer	223	56.0
Merchant	42	10.6
Government employee	30	7.5
Others	1	0.3
Income		
<1000 Birr	113	28.4
1001-3000Birr	169	42.5
≥3001Birr and above	116	29.1

### 3.2. Obstetric Characteristics of the Respondent

The study showed that 302 (75.9%) of the respondents had more than two pregnancies. Participants who had up to 3<sup>rd</sup> ANC visits were 52.3%, whereas 47.7% of participants had four or more ANC visits. About 67 (16.8%) respondents had a history of stillbirth (Table 2).

**Table 2.** Obstetric characteristics of pregnant women attending antenatal care in health facilities in Sibire District, Oromia Region, Ethiopia, 2020 (n=398).

Variable	Level	Frequency	Percent (%)
Number of pregnancy	1	96	24.1
	2 and above	302	75.9
Number of delivery	0	175	44.0
	1 and above	223	56.0
Gestational age	First trimester	12	3.0
	Second trimester	193	48.5
	Third trimester	193	48.5
Born alive	0	102	25.6
	1 and above	296	74.4
Born dead	0	331	83.2
	1 and above	67	16.8
Number of ANC visit	ANC 1st visit to 3 <sup>rd</sup> visit	208	52.3
	ANC 4 <sup>th</sup> and above visit	190	47.7

### 3.3. Knowledge and Attitude Towards Birth Preparedness and Complication Readiness

The proportion of pregnant women who know at least three danger signs during pregnancy, delivery, and postnatal period were 15.8%, 26.6%, and 9.5%, respectively. Severe vaginal bleeding has the most frequently mentioned

complication by women during pregnancy (49.5%), labor and delivery (50%), and the postpartum period (24.1%). The sources of information to hear about BPCR were health professionals 206 (51.8%), friends/relatives 38 (9.5%), and medias 19 (4.8%). Of the total sampled respondents, 45.7% had more knowledge, and 42.5% of the respondents had a favorable attitude for BPCR (Table 3).

**Table 3.** Knowledge and Attitude of pregnant women attending antenatal care in health facilities in Sibire District, Oromia Region, Ethiopia, 2020 (n=398).

Variable	Yes/No	Frequency	Percent (%)
Knowledge			
Identify a place of delivery	Yes	284	71.4
	No	114	28.6
Save money	Yes	276	69.3
	No	122	30.7
Prepare essential items	Yes	269	67.3
	No	129	32.4
Identify skilled provider	Yes	116	29.1
	No	282	70.9
Awareness of the sign of an emergency	Yes	59	14.8
	No	339	85.2
Designating decision-maker on her	Yes	103	25.9
	No	295	74.1
Arranging emergency fund	Yes	138	34.7
	No	260	65.3
Identify the mode of transportation	Yes	62	15.6
	No	336	84.4
Arranging blood donors	Yes	17	4.3
	No	381	95.7
Identifying the institution for EmOC services	Yes	63	15.8
	No	335	84.2
Summary of knowledge mentioned at least five variables from above			
5 and above (knowledgeable)		182	45.7
Less than 5 (not knowledgeable)		216	54.3
Knowing at least three danger sign of pregnancy	Yes	63	15.8
	No	335	84.2
Knowing at least three danger sign of labor and delivery	Yes	106	26.6
	No	292	73.4
Knowing at least three danger sign of the postnatal period	Yes	38	9.5
	No	360	90.5
Having heard about birth preparedness and complication readiness	Yes	267	67.1
	No	131	32.9
Attitude (above or equal to mean score)	Yes	169	42.5
	No	229	57.5

### 3.4. The Magnitude of BPCR in the Study Setting

The magnitude of BPCR practice in the study participants was 30.2% by preparation of five and/or more among eleven components (table 4).

**Table 4.** Magnitude of BPCR practice among pregnant women attending antenatal care in health facilities in Sibu Sire District, Oromia Region, Ethiopia, 2020 (n=398).

Variable	Level	Frequency	Percent (%)
Components of BPCR practice			
Identified a place of delivery	Yes	298	74.9
Saved money	Yes	214	53.8
Prepared essential items	Yes	244	61.3
Identified skilled provider	Yes	111	27.9
Detected early sign of the emergency	Yes	108	27.1
Designated decision-maker	Yes	157	39.4
Arranged emergency fund	Yes	148	37.2
Identified the mode of transportation	Yes	244	61.3
Arranged blood donor	Yes	60	15.1
Identified an institution providing 24 hrs EmOC service	Yes	89	22.4
5 and above (Good preparation)		120	30.2
Less than 5 (Poor preparation)		278	69.8

### 3.5. Factors Associated with Birth Preparedness and Complication Readiness Practice

From mothers' educational status, pregnant women who attended primary school, secondary, and above school, respectively, were 2.5 times [AOR=2.5 (95% CI; 1.30, 5.18)] and 5.8 times [AOR=5.8 (95% CI; 2.57, 13.46)] more likely to be prepared for birth and complication compared to

women who had no any formal education. Women who had a history of stillbirth were statistically significant associations [AOR=1.97 (95% CI; 1.01, 3.86)] with birth and complication readiness practice. ANC visits during the 4<sup>th</sup> and above were 2.1 times [AOR=2.11 (95% CI; 1.25, 3.55)] more to be prepared for birth and complications than those attended below the fourth visit (table 5).

**Table 5.** Multivariate logistic regression analysis of birth preparedness and complication readiness practice among pregnant women attending antenatal care in health facilities in Sibu Sire District, 2020 (398).

BP/CR	Yes n (%)	No n (%)	COR (95%CI)	AOR (95%CI)
Residence				
Rural	65 (54.2)	181 (65.1)	1	1
Urban	55 (45.8)	97 (34.9)	1.57 (1.02-2.44)	1.14 (0.62-2.10)
Educational status of mothers				
Not educated	24 (20)	107 (38.5)	1	1
Read and write	8 (6.7)	23 (8.3)	1.55 (0.61-3.88)	2.02 (0.72-5.68)
Primary education	42 (35)	106 (38.1)	1.76 (1.00-3.12)	2.59 (1.30-5.18)
Secondary and above	46 (38.3)	42 (15.1)	4.88 (2.65-8.97)	5.88 (2.57-13.46)
Family income				
<1000ETB	25 (20.8)	88 (31.7)	1	1
1000-3000ETB	55 (45.8)	114 (41)	1.69 (0.98-2.93)	1.17 (0.61-2.24)
3001ETB and above	40 (33.3)	76 (27.3)	1.85 (1.03-3.33)	0.63 (0.28-1.42)
Total gave birth				
0	29 (24.2)	146 (52.5)	1	1
1 and above	91 (75.8)	132 (47.5)	3.47 (2.14-5.60)	4.31 (2.45-7.60)
History of still birth				
0	87 (72.5)	244 (87.8)	1	1
1 and above	33 (27.5)	34 (12.2)	2.72 (1.59-4.66)	1.97 (1.01-3.86)
ANC visit				
1 <sup>st</sup> visit to 3 <sup>rd</sup> visit	49 (40.8)	159 (57.2)	1	1
4 <sup>th</sup> and above visit	71 (59.2)	119 (42.8)	1.93 (1.25-2.99)	2.11 (1.25-3.55)
Knowledge of at least three danger sign of pregnancy				
Yes	30 (25)	41 (14.7)	1.92 (1.13-3.27)	2.21 (1.17-4.18)
No	90 (75)	237 (85.3)	1	1
Knowledge of at least three danger sign of the postnatal period				
Yes	17 (14.2)	21 (7.6)	2.02 (1.02-3.98)	2.00 (0.84-4.72)
No	103 (85.8)	257 (92.4)	1	1
Heard BPCR				
Yes	69 (57.5)	198 (71.2)	1	1
No	51 (42.5)	80 (28.8)	1.82 (1.17-2.85)	2.55 (1.48-4.40)
Knowledge of BPCR				

BP/CR				
Variables	Yes n (%)	No n (%)	COR (95%CI)	AOR (95%CI)
Yes	66 (36.5)	116 (63.3)	1.70 (1.10-2.62)	2.1 (1.24-3.53)
No	54 (25)	162 (75)	1	1
Attitude of BPCR				
Favorable	60 (50)	109 (39.2)	1.55 (1.00-2.38)	1.41 (0.84-2.37)
Unfavorable	60 (50)	169 (60.8)	1	1

## 4. Discussion

The magnitude of BPCR practice among pregnant women in Sibru Sire district was 30.2%. This magnitude was low when compared to the study done in India (41%), Central Tanzania (58.2%), and Nigeria (40.3%) [9–11]. Reasons for the difference may be due to the countries are better wealth status and availability and accessibility of health services for intervention than in Ethiopia. However, it was consistent with studies conducted in Arbaminch Zura Woreda of Sidama Zone (30%) [12]. On the other hand, this finding was higher compared to the study done in Basoliben district (26.9%) and Duguna Fango district (18.3%) [13, 14]. The possible reason might be the difference in the study setting.

### *Determinants of birth preparedness and complication readiness practice*

Using multivariable regression analysis, mothers' educational status was statistically significantly associated with BPCR. Pregnant women who attended primary school, secondary, and above were more likely to have BPCR with [AOR=2.5 (95% CI; 1.30, 5.18)], [AOR=5.8 (95% CI; 2.57, 13.46)] respectively when compared to counterparts. This finding was consistent with the results from India and Arsi Robe of Ethiopia, where the magnitude of BPCR was significantly higher among educated mothers [15, 16].

History of stillbirth was another independent predictor that was statistically associated with BPCR practice. Women who had a history of stillbirth were had more odds for BPCR than without a history of stillbirth [AOR=1.97 (95% C/I; 1.01, 3.86)]. This result is comparable to the findings of studies conducted in Adegrat and Adama town [17, 18]. The possible reason for this result might be due to those pregnant women could anticipate serious complications from their previous experiences. There was also an association between the number of ANC visits and BPCR practice. Pregnant women who attended ANC visits 4 times and above were more to be planned for BPCR than those who attended below fourth visit [AOR=2.11 (95% CI; 1.25, 3.55)]. A similar report from Adegrat showed that ANC visit at 4<sup>th</sup> and above was significantly associated with BPCR [17]. The evidence is suggested by WHO that ANC visit is more effective if pregnant woman visit a minimum of four during her total pregnancy time.

Knowing to mention three and above of at least three danger signs during pregnancy was another determinant that statistically significantly associated with BPCR. Mothers who knew mentioning three and above for at least three danger signs during pregnancy were more to be prepared for BPCR than those who had mentioned below three

[AOR=2.21 (95% C/I; 1.17, 4.18)]. This finding was in line with studies in Arsi Robe woreda and South wollo [16, 19]. Besides, Pregnant women that had adequate knowledge were two times more likely to have BPCR than those who lacked knowledge [AOR=2.1 (95% CI; 1.24, 3.53)]. The result was consistent with a report from South Wollo and Goba woreda [19, 20]. This implies that mothers with knowledge of obstetric complications may predict something that happens during pregnancy and seek advice and support from health personnel.

The hundred percent response rate and the use of primary data were the strength of the study. However, the readers of this article should bear in mind that the study limitation is inherent to the design and the finding implies the single time fact. The smallness of samples and place also can limit the representativeness of the finding.

## 5. Conclusions and Recommendations

The findings of the study indicated that a low magnitude of BPCR practice was observed among pregnant women of Sibru Sire district when we compared to the study findings in different parts of the world. The analysis of the data shows that from multiple evaluated variables some of them attending primary school, secondary, and above, having ANC visits of 4 times and above, and having a history of stillbirth were had a statistically significant association. Having adequate knowledge and hearing about BPCR were also important positive predictors in reducing the magnitude of obstetric complications in pregnant women in the study setting.

From the findings of this study, authors recommend that increasing awareness of BPCR for pregnant women should also be considered as an important intervention program. Furthermore, there is a need to conduct similar researches in private health facilities at a large scale and using both qualitative and quantitative methods.

## Abbreviations

ANC, ante-natal care; AOR, adjusted odds ratio; BPCR, birth preparedness and complication readiness; CI, confidence interval; COR, crude odds ratio; EDHS, Ethiopian demographic and health survey; EmOC, emergency obstetric care; ETB, Ethiopian birr; SPSS, statistical package for social science; WHO, a world health organization.

## Availability of Data

Data is available and kept in the investigators' database. Can only be shared at reasonable request.

## Ethical Issues

Ethical and study protocol approval was obtained from the Arsi University College of Health Sciences Research Review Committee. Written informed consent was obtained from each participant with the agreement to participate just before starting interviewing.

## Author Contributions

All authors made considerable contributions to the conception, design, and execution, acquisition of data, or analysis and interpretation of data; had a part in drafting the article, or revised it critically; agreed to submit to the journal; gave final approval for the version to be published; and agreed to be responsible and accountable for all regards of the articles.

## Disclosure

All the authors do not have any possible conflicts of interest.

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