

Completing the Continuum of Maternity Care and Associated Factors in Debre Berhan Town, Amhara, Ethiopia, 2020

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Background: The continuum of maternity care is the continuity of maternal health care services that a woman practices antenatal care, skilled birth attendant, and postnatal care. Even though there are positive inclinations towards the continuum of maternity care, the problem is still significant. So, the purpose of this study was to assess the utilization of continuum maternity care and associated factors among women who gave birth in the last 12 months before the data collection period in Debre Berhan town.

Methods: A community-based cross-sectional study was conducted from February 17 to March 15/2020. The respondents were selected by using the cluster sampling technique. Face-to-face interview was used for data collection. EpiData software version 3.1 was used for data entry and exported to SPSS version 21 for further analysis. In multivariable logistic regression, a statistically significant association has declared a p-value <0.05.

Results: In this study, the proportion of women who completed the continuum of maternity care was 37.2% (95% CI: 33.4–41.1). Completing primary education (AOR: 2.73, 95% CI: 1.17–6.38), secondary education (AOR: 3.11, 95% CI: 1.32–7.31), college and above educational level (AOR: 4.15, 95% CI: 1.79–9.57), initiation of first ANC visit ≤ 16 wks (AOR: 2.57, 95% CI: 1.41–4.68), knowing key pregnancy danger signs (AOR: 1.91, 95% CI: 1.15–3.19), and well prepared on birth and complication readiness (AOR: 1.59, 95% CI: 1.10–2.32) were found to positively increase the chance of completing maternity care in our study area.

Conclusion: Even if a higher proportion of mothers completed the continuum of maternity care in the study area than the finding at national level of 9.1% basing EDHS 2016 data, further interventions are mandatory to reach the acceptable level. Therefore, health promotion programs targeting mothers with no education and lower educational level are important to increase their awareness about the importance of completing all levels of maternity care, health education, and counseling regarding early initiation of ANC, pregnancy danger signs, and birth preparedness and complication readiness plan.

Keywords: completion, continuum, maternity care, Ethiopia

Background

The continuum of maternity care is defined as the continuity of health care services that a woman practices Ante Natal Care (ANC), Skill Birth Attendant (SBA), and Post Natal Care (PNC).¹ It is a critical strategy for reducing maternal mortality and morbidity.² The continuum of maternity care is an integrated service of care explained by time and space dimensions that women are required to avail of uninterruptedly. Moreover, it should be provided as a continuum throughout the

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lifecycle including adolescence, pregnancy, childbirth, and childhood; and also in seamless care that spans the home, community, and health facilities.³ Even though, there were great improvements over the last two decades, insufficient or non-existent care during pregnancy and delivery was fundamentally accountable for an estimated 295,000 maternal death in 2017.² In addition to saving maternal lives with CoC; Up to 160,000 newborn lives can be saved with high ANC coverage including a focused package of interventions, 390,000 additional newborn lives can be saved through high coverage of skilled childbirth care, and 310,000 lives through postnatal care.⁴

Globally, 86% and 65% of pregnant women accessed once and four antenatal visits respectively and treated by skilled health personnel in 2018. In Sub-Saharan Africa (52%) and South Asia (49%), women attended at least four antenatal visits. In Sub-Saharan Africa, not more than 57% of mothers are delivered in a health facility.² Each year about 18 million women in Africa gave birth at home and According to DHS data from 21 sub-Saharan African nations, only 13% of women who gave birth at home received PNC within three days.⁴ Different studies across the world showed a different level of continuum of care like; Nepal (41%) remote or isolated villages or Pakistan (6.4%) Ethiopia (9.1%) and northwest Ethiopia (47%).⁵⁻⁸

Educational status, residence, distance from the health facility, woman's decision making power, previous pregnancy-related complication, early initiation of ANC, wealth index, media access, Skills of health workers, health system supports, and presence of delivery fee was some of the identified determinant factors affecting CoC by different studies.^{1,4,5,8,9}

Evidence from EDHS showed that there are improvements in the proportion of individual MCH care package utilizations from 2016 to 2019 in Ethiopia; where ANC increased from 62% to 74%, SBA from 28% to 50%, and PNC from 17% to 34%.^{10,11} This showed that there are large discrepancies between the utilization of ANC, SBA, and PNC services continuously. An effective continuum of care strengthens the links between the home and the first level facility and the hospital, assuring the appropriate care is available in each place.⁴ The maternal continuum of care can be achieved using a combination of well-defined policies and strategies to improve home care practices and health care services throughout the lifecycle, building on existing programs and packages.

Unlike other parts of the world and including Ethiopia, there is no available data or evidence regarding the

proportion of mothers who completed the continuum of maternity care and factors that enhance the completion of maternity care in our study area. So this study aimed to assess the utilization of continuous maternity care and associated factors in Debre Birhan town, Ethiopia 2020.

Methods

Study Design and Setting

A cross-sectional (community-based) study was conducted from February 17 to March 15/2020 among mothers who gave birth in the last year preceding the data collection period in Debre Berhan town. Debre Berhan Town, located in the North Shewa Zone of the Amhara region, 130 kilometers far from the capital city, Addis Ababa. According to the 2019 report of Debre Berhan Town administration's mayor's office, the Town consists of nine kebeles (the smallest administrative unit) with an estimated total population of 114,652 (Male=51,843 and Female=62,809). Of the 62,809 female population, 39,066 were within the age group of 15–49 years. The town has four public (one referral hospital and three health centers) and three private health institutions. All the above health institutions had maternal health services.

Sample Size and Sampling Technique

The sample size was calculated using the single population proportion formula. The estimated proportion of completing the continuum of maternity care was taken from a related study (48.7%),⁷ the confidence level of 95%, 5% degree of precision, design effect of 1.5, and non-response rate of 10%, was assumed. The final sample size was estimated to be 634 mothers.

Study participants were selected using a cluster sampling technique. From the total of 9 kebeles in the town, 5 kebeles were selected by the lottery method, and all mothers in the selected kebeles who fulfill the eligibility criteria were incorporated in the study. We found a total of 659 women who full fill the inclusion criteria from the selected clusters using data from health extension workers (registration log book) and all of them were included in to our study.

Population

Mothers who gave their most recent birth in the last 12 months, who had booked for ANC, and those who were at six weeks or more after birth at the time of data collection were included. Women who lived in the study area for less

than six months at the period of data collection were excluded from the study.

Data Collection Tools and Procedures

Data were collected through face to face interviews using pre-tested structured questionnaires by trained data collectors. The data collection tool was adapted from the Ethiopian Demographic and Health Survey (EDHS) and other literature.^{7,10,12–17} The tool incorporates socio-demographic, reproductive and obstetrics, and maternal health service-related variables.

Measurement

- Completing the continuum of maternity care: was considered if the women had four or more ANC visits and childbirth and at least one PNC after discharge from the health facilities within six weeks by skilled health personnel (medical doctors, midwives, nurses, health officers, or community health extension workers) or with in the first week by community health extension workers during their home visit. If they missed any one of the above visits, it is considered an incomplete continuum of maternity care.¹⁴
- Knowledgeable about pregnancy danger signs: women were categorized as knowledgeable if they stated at least two of the four key pregnancy danger signs (vaginal bleeding, severe headache, blurring of vision, and swelling of the face); if not they were categorized as not knowledgeable.¹⁴
- Not Knowledgeable about pregnancy danger signs: women were categorized as not knowing if they stated at less than two of the four key pregnancy danger signs (vaginal bleeding, severe headache, blurring of vision, and swelling of the face); if not they were categorized as not knowledgeable.¹⁴
- Well prepared for birth preparedness and complication readiness were considered when women reported that they have applied five or more of (BPCR) otherwise considered as “not well prepared”. The elements of BPCR considered in this study were identified birthplace, recognized sign of labor, identify supplies needed during labor/delivery, saving money for an emergency, identified emergency transportation, people to support during/after birth, and identified potential blood donors as needed.^{18,19}
- Planned pregnancy: A woman who plans to become pregnant by making lifestyle choices for optimal health in advance of the planned conception.

- Unplanned pregnancy: happened mainly due to the results of not using contraception or inconsistent or incorrect use of effective methods.
- Health extension workers: Health Extension Workers are short term trained health workers assigned to local health posts and provide a package of essential interventions to meet population health needs at this level.

Data Quality Assurance

Five data collectors (two Midwives and three Nurses) and two supervisions were recruited to collect the data of the study. One-day training on the objective of the study, sampling technique, and data collection tool was provided. Back and forth questionnaire translation was done to check its consistency with the original meaning. Before commencing data collection, a pre-test was conducted among 5% of the study sample and, the required adjustments were made on unclear questions.

Data Processing and Analysis

Data were coded and entered after checking the completeness of the data. EpiData software version 3.1 was used for data entry and SPSS version 21 was used for analysis. Descriptive statistics were used to measure the proportion of women who complete the continuum of maternity care and other variables of the study participants. Variables with a P value of less than 0.25 on bivariate logistic regression were selected as a candidate for multivariate logistic regression. Finally, multivariable Logistic regressions were used to assess the relative impact of explanatory variables on dependent variables and to select important predictors of the continuum of maternity care. Hosmer and Lemeshow goodness of test was used to check Model fitness and variance inflation factor was applied to diagnosed multicollinearity between the explanatory variables with cut-off point $VIF > 10$ as problematic.²⁰ In multivariable logistic regression, a statistically significant association was declared a p-value less than 0.05 to determine factors associated with the completion of the continuum of maternity- care and reported by using adjusted odds ratio with 95% CI.

Ethical Consideration

A letter of Ethical clearance was secured from the Institutional Review Board (IRB) of health Science College, Debre Berhan University. A formal letter of permission was obtained from the Debre Berhan town health

office. Informed written consent was obtained from study subjects. Additionally, after doing the witness attests that the consent information was accurately explained for those who cannot read and write, that the subject apparently understood the information, and informed consent was given freely. Participants had the right to self-determination regarding participation in research, both initially and during the research. For confidentiality purposes, the names of the participant were not included in the questionnaire. The collected data were kept confidential and used only for the study. This study was conducted following the Declaration of Helsinki.

Results

Socio-Demographic Characteristics

A total of 647 women were interviewed, giving a response rate of 98.2%. The majority 442 (68.3%) of respondents were aged 25–34 years and the mean age was 28.5 ± 4.48 years. Most women 605 (93.5%), were married and 28 (4.3%) were divorced. While 67 (10.4%) did not attend modern education, 259 (40.0%) had college and above education. Nearly 96% were Amhara in ethnicity. Five hundred seventy-one (88.2%) were Orthodox Christians. Most 591 (91.3%) had information about maternal health services. Almost half 339 (52.4%) of participant's partners achieved tertiary education, and 260 (40.2%) of them were government employees (see Table 1).

Reproductive Health and Maternal Health Service-Related Characteristics

Among study participants, 247 (38.2%) of women were in the first pregnancy, whereas 64 (9.9%) had four and more pregnancies. Six hundred twenty-six (96.8%) of the participant's recent pregnancy was planned. Five hundred twenty-nine (81.8%) of women had initiated their first antenatal visit at ≤ 16 weeks of gestation and 482 (74.5%) had four or more antenatal care visits throughout their pregnancy (see Table 2).

Out of all respondents, 412 (63.7%) of women received their antenatal care at public health centers. Five hundred twenty-two (80.7%) got husband's support during maternal health visit. Regarding the services taken during the pregnancy period; 635 (98.1%) measured their blood pressure, and 609 (94.1%) received nutritional counseling (see Figure 1).

Almost all respondents, 641 (99.1%) had skilled birth attendant/health facility delivery, of which 210 (32.8%)

had stayed in the health facility for 24hrs or more after delivery and 324 (50.5%) had informed on when to return for PNC (see Table 3).

The Proportion of Women Completing the Continuum of Maternity Care

The overall proportion of women completing the continuum of maternity care was 37.2% (95% CI: 33.4–41.1). Additionally, 482 (74.5%) mothers had at least four ANC visits, and 480 (74.2%) of them delivered at a health facility by skilled birth attendants. Correspondingly, from those who had ANC4+ and SBA, 241 (37.2%) got at least one PNC within six weeks of discharge (see Figure 2).

Factors Associated with Completing the Continuum of Maternity Care

The current study has identified some important factors that are associated with the completion of the continuum of maternity care in Debre Berhan town. Maternal educational status, initiation of ANC visit ≤ 16 wks of gestation, knowing pregnancy key danger signs, and well prepared on birth and complication readiness plan become a statistically significant association with the outcome variable.

The odds of completing the continuum of maternity care was higher among educated women; women who attend primary education (AOR: 2.73, 95% CI: 1.17–6.38), secondary education (AOR: 3.11, 95% CI: 1.32–7.31), and college and above (AOR: 4.15, 95% CI: 1.79–9.57) contribute for completing the continuum of maternity care than those who had no education. The odds of completing the continuum of maternity care was almost three times higher for those who had their first ANC visit at ≤ 16 weeks of gestation than their counterparts (AOR: 2.57, 95% CI: 1.41–4.68). Similarly, the odds of completing the continuum of maternity care were 91% higher among women knowledgeable on the key danger signs of pregnancy than those who were not knowledgeable (AOR: 1.91, 95% CI: 1.15–3.19). Women who were well prepared on birth preparedness and complication readiness plan had higher odds to accomplish continuum of maternity care than those who had not (AOR: 1.59, 95% CI: 1.10–2.32) (see Table 4).

Discussion

The finding of this study showed that about one-third (37.2%, 95% CI: 33.4–41.1) of women in the study area received all elements of the continuum of maternity care.

Table I Socio-Demographic Characteristics of Study Participants in Debre Berhan Town, North Shewa, Amhara, Ethiopia 2020 (n=647)

Characteristics		Frequency	Percentage (%)
Age of women in years	19–24	124	19.2
	25–34	442	68.3
	≥35	81	12.5
Religion	Orthodox	571	88.2
	Muslim	36	5.6
	Protestant	35	5.4
	Others	5	0.8
Ethnicity	Amhara	620	95.8
	Others (Oromo, Tigre ...)	27	4.2
Marital status	Married	605	93.5
	Divorced/separated	28	4.3
	Widowed	5	0.8
	Single	9	1.4
Educational status	No education	67	10.4
	Primary education(1–8)	183	28.3
	Secondary education(9–12)	138	21.3
	College and above	259	40.0
Occupation	Farmer	15	2.3
	Housewife	312	48.2
	Private employed	73	11.3
	Gov't employed	170	26.3
	Merchant	48	7.4
	Others	29	4.5
Family monthly income(ETB)	≤500	8	1.2
	501–1500	52	8.1
	1501–2500	94	14.5
	≥2501	493	76.2
Educational status of partner	No education	51	7.9
	Primary education(1–8)	101	15.6
	Secondary education(9–12)	156	24.1
	College and above	339	52.4
Occupation of partner	Farmer	36	5.6
	Private employed	145	22.4
	Gov't employed	260	40.2
	Merchant	144	22.3
	Daily laborer	39	6.0
	Others	23	3.5
Ever Heard maternal health services	Yes	591	91.3
	No	56	8.7
Source of maternal health information(n=591)	Mass-media(tv/radio)	207	35.0
	Health care provider	362	61.3
	Others	22	3.7

Table 2 Reproductive and Obstetrics Characteristics of Study Participants in Debre Berhan Town, North Shewa, Amhara, Ethiopia, 2020 (n=647)

Characteristics		Frequency	Percentage (%)
Number of pregnancy	1	247	38.2
	2–3	336	51.9
	≥4	64	9.9
Pregnancy planned	Yes	626	96.8
	No	21	3.2
Number of children	1	253	39.1
	2–3	339	52.4
	≥4	55	8.5
Number of ANC visit for the last pregnancy	<4	165	25.5
	≥4	482	74.5
Timing of first ANC visit for the last pregnancy	≤16 weeks	529	81.8
	>16 weeks	118	18.2

This finding was consistent with the study done in Nepal where 41% of the women received Antenatal Care (ANC), delivery from Skilled Birth Attendant (SBA) as well as the Postnatal Care (PNC) during their most recent birth.⁵

This finding was higher than the study conducted in two studies from Ethiopia (9.1%),⁷ Arbaminch Zuria wor-eda 9.7%²¹ Ghana (8%),¹⁷ Tanzania (10%),¹⁴ remote or isolated villages of Pakistan (6.4%)⁶ and trend study in Pakistan (27%),¹³ This difference might be due to, our study was conducted only in urban areas while the

compared studies were done at a general level and specifically at rural areas which had relatively creates a better chance of accessing maternal health services. This was supported by studies showing that being rural resident negatively affect the chance of receiving full continuum of maternal care than urbans.^{8,9,22}

On the other hand; the finding of this study was found to be lower than the evidence from study done in north-west Ethiopia 47% (CI (43.2%–50.2%)),⁸ Debre Markos town (67.8%),²³ Nepal (45.7%),²⁴ Cambodia (60%),¹⁶ and Egypt (50.4%).¹² This variation could be explained by the

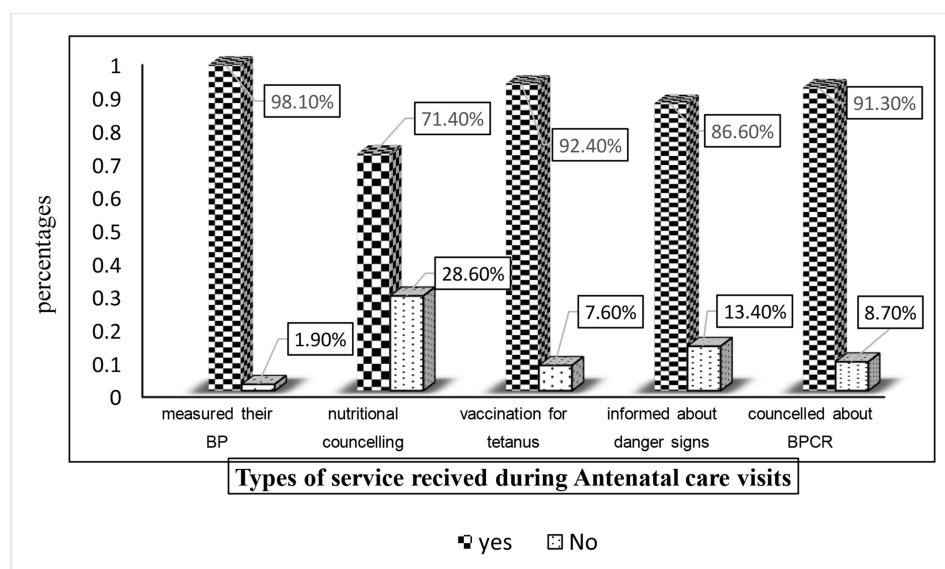
**Figure 1** Types of health services received during antenatal care visits in Debre Berhan Town, Ethiopia 2020.

Table 3 Maternal Health Service-Related Characteristics of Study Participants in Debre Berhan Town, North Shewa, Amhara, Ethiopia, 2020 (n=647)

Characteristics		Frequency	Percentage (%)
Place of ANC visit	Gov't hospital	149	23.0
	Gov't health center	412	63.7
	Private hospital	46	7.1
	Private clinic	40	6.2
Partner support	Yes	522	80.7
	No	125	19.3
Informed pregnancy danger sign	Yes	598	92.4
	No	49	7.6
Knowledge on danger sign(n=598)	Knowledgeable	502	83.9
	Not knowledgeable	96	16.1
Blood pressure measured at ANC	Yes	635	98.1
	No	12	1.9
Urine sample taken	Yes	623	96.3
	No	24	3.7
Blood sample taken	Yes	638	98.6
	No	9	1.4
Nutritional counseling	Yes	609	94.1
	No	38	5.9
TT vaccine at ANC	Yes	462	71.4
	No	185	28.6
Number of TT vaccine(n=462)	One	129	27.9
	Two or more	333	72.1
Iron tablet taken	Yes	591	91.3
	No	56	8.7
Deworming during ANC	Yes	250	38.6
	No	397	61.4
Informed about Birth preparedness plan	Yes	560	86.6
	No	87	13.4
Status of Birth preparedness(n=560)	Well prepared	297	53.0
	Not well prepared	263	47.0
Place of birth	Home	6	0.9
	Health facility	641	99.1
Type of facility(n=641)	Gov't hospital	340	53.0
	Gov't health center	275	42.9
	Private hospital	24	3.7
	Private clinic	2	0.3
Duration of stay after birth(n=641)	<24 hours	431	67.2
	≥24 hours	210	32.8
Informed danger sign at PNC(n=641)	Yes	547	85.3
	No	94	14.7

(Continued)

Table 3 (Continued).

Characteristics		Frequency	Percentage (%)
Knowledge on PNC(n=547)	Knowledgeable	500	91.4
	Not knowledgeable	47	8.6
Informed when to return for PNC(n=641)	Yes	324	50.5
	No	317	49.5
Post natal visit after discharge(n=641)	Yes	323	50.4
	No	318	49.6
Timing of first PNC after delivery(n=327)	First day(24hrs)	20	6.1
	Day 3(48–72hrs)	71	21.7
	Between days 7–14	142	43.4
	Six weeks	94	28.7
Number of PNC(n=327)	One	169	51.7
	Two	121	37.0
	Three or more	37	11.3
Place of PNC received(n=327)	Gov't hospital	86	26.3
	Gov't health center	223	68.2
	Private hospital	10	3.1
	Private clinic	6	1.8
	Others	2	0.6

difference in study settings like study period, sample size, and study area in addition to the possible difference in socio-demographic characteristics.

Women's educational status was positively associated with completing the continuum of maternity care. Women with primary education, secondary education, and college or above education had nearly three and higher odds of completing the continuum of maternity care compared to

non-educated women. This is consistent with studies in Northwest Ethiopia, Nepal, and Pakistan.^{8,13,24} The above finding is also maintained by other studies in which, maternal educational status of secondary school and above were positively associated with maternal health service utilization.^{15,25} Increasing women's education alters the traditional balance of power within the family, leading to changes in decision making and allocation of resources within the households, modifies women's beliefs about disease causation and cure, influencing domestic child care practices, use of modern health care services, improving their ability to communicate with health care providers, increase antenatal healthcare use, potentially owing to changes in women's cognitive skills, economic resources, and autonomy.^{7,26,27}

Early initiation of antenatal care increases the odds of completing the continuum of maternity care. The odds of completing the continuum of maternity care was almost 3 times higher for those who had their first ANC visit at ≤ 16 weeks of gestation than their counterparts. This finding was supported by a study done in northwest Ethiopia where early initiation of ANC visits was significantly associated with the completion of maternity care.⁸ This could be explained by, women who are late for booking of ANC will have a poor birth preparedness plan, lower

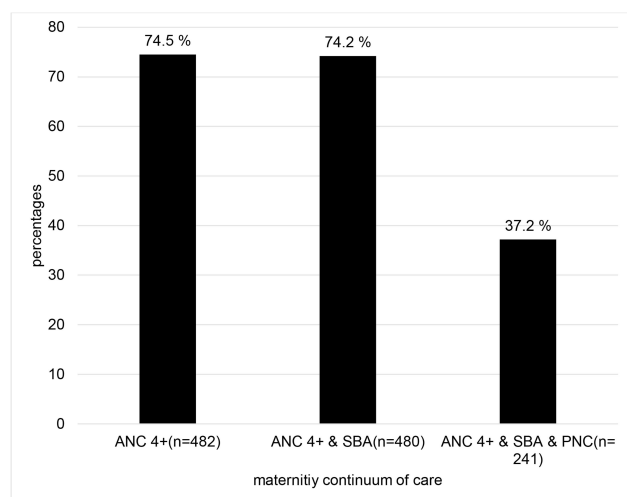


Figure 2 Proportion of women completing the maternity continuum of care along the continuum care path way in Debre Berhan Town, Ethiopia 2020.

Table 4 Bivariable and Multivariable Logistic Regression Analysis of Factors Associated with the Completion of Maternity Continuum of Care in Debre Berhan Town, North Shewa, Amhara, Ethiopia, 2020 (n=647)

Variables	Completion of Maternity Continuum of Care		COR(95% CI)	AOR(95% CI)
	Yes	No		
Age of the mother				
19–24	50	74	1.93(1.05–3.56)	1.89(0.97–3.69)
25–34	170	272	1.79(1.05–3.04)	1.55(0.87–2.77)
≥35	21	60	1	
Educational status of the mother				
Primary education	60	123	3.59(1.62–8.01)	2.73(1.17–6.38)*
Secondary education	48	90	3.93(1.74–8.91)	3.11(1.32–7.31)**
College and above	125	134	6.88(3.16–14.97)	4.15(1.79–9.57)**
No education	8	59	1	
Ever heard about maternal health services				
Yes	229	362	2.32(1.20–4.49)	1.40(0.67–2.93)
No	12	44	1	
Timing of first ANC visit				
≤16 weeks	223	306	4.05(2.38–6.88)	2.57(1.41–4.68)**
>16 weeks	18	100	1	
Husband support				
Yes	211	311	2.15(1.38–3.36)	0.89(0.52–1.54)
No	30	95	1	
Knowledge of danger sign of pregnancy				
Knowledgeable	214	288	3.25(2.06–5.11)	1.91(1.15–3.19)*
Not knowledgeable	27	118	1	
Iron and folate taken				
Yes	229	362	2.32(1.20–4.49)	1.38(0.67–2.83)
No	12	44	1	
Informed about BPCR				
Yes	218	342	1.77(1.07–2.94)	1.15(0.64–2.06)
No	23	64	1	
Status of BPCR				
Well-prepared	140	157	2.19(1.59–3.04)	1.59(1.10–2.32)*
Not well-prepared	101	249	1	

Notes: *p<0.05, **p<0.01.

Abbreviations: 1, reference; BPCR, birth preparedness and complication readiness; COR, crude odds ratio; AOR, adjusted odds ratio.

knowledge of the expected date of delivery, lower likelihood of having a birth plan in terms of the desired place of delivery, preferred birth attendant, birth companion, means of transport and blood donor. Additionally early booking of ANC was found to increase emergency preparedness with better knowledge of danger signs during pregnancy and postpartum periods.²⁸ Additionally, this might be early ANC booking creates great opportunity to familiarize themselves with the health facility environment and this, in turn, would have helped them to avoid

needless fear and stress related to maternal health service use. It also helps women to set birth plans by discussing with the ANC provider and hence increase women's occurrence to complete the continuum of maternity care.^{29,30}

The odds of completing the continuum of maternity care were almost 2 times higher among those women who were knowledgeable about the danger signs of pregnancy than their counterparts. This finding is in agreement with the prior studies conducted in Ethiopia.^{7,22} Another study

done in rural Haramaya District, Eastern Ethiopia revealed that women with knowledge of pregnancy complications were more likely to seek maternal health service utilization as compared with their counterparts.³¹ The reason might be knowledgeable women have understandings of the consequences of pregnancy danger signs and its complications. This increases their curiosity and accountability for their own and their child's health.

This study also revealed that the BPCR status of women ahead of childbirth is an important predictor of completing the continuum of maternity care. Those women who were well prepared on birth preparedness and complication readiness plan had 60% more likely to complete the continuum of maternity care than those who were not well prepared. This finding is supported by studies conducted in Goba district and Nepal respectively.^{18,19} This might be due to well-prepared women have recognized the value of birth preparedness and complication readiness plan, and better social support to get maternal health services. This helped women to increase the use of skilled care at birth and to increase the timely use of facility care for obstetric and newborn complications.³²

Limitation of the Study

The finding of this study might not be representative of the zonal population since it was done in an urban area. Additionally, there might be recall bias during our data collection, but we tried to manage it by including data regarding their recent births.

Conclusion and Recommendations

The proportion of women completing the continuum of maternity care was low in Debre Berhan town according to the expected proportion according to the world health organization and ministry of health recommendations. So Health promotion programs targeting mothers with no education and lower educational level are important to increase their awareness about the importance of completing all levels of maternity care. Additionally, health facilities should intensively work on increasing the early initiation of ANC using different methods of information dissemination, counseling, and health education. Finally, increasing women's knowledge about pregnancy danger signs through counseling and health education, as well as encouraging them to be well prepared for birth and ready for possible complications are important to improve maternal use of a continuum of care. Finally, we recommend

further researches to be done addressing both urban and rural areas supplemented with qualitative data.

Abbreviations

ANC, antenatal care; AOR, adjusted odds ratio; BPCR, birth preparedness and complication readiness; CI, confidence interval; CoC, continuum of care; COR, crude odds ratio; EDHS, Ethiopian Demographic and Health Survey; EMDHS, Ethiopian Mini Demographic and Health Survey; HSTP, Health Sector Transformation Plan; MMR, maternal mortality ratio; PNC, postnatal care; SBA, skill birth attendant; WHO, World Health Organization.

Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Author Contributions

All authors contributed to data analysis, drafting or revising the article, have agreed on the journal to which the article will be submitted, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no conflicts of interest for this work.

References

1. Owili PO, Muga MA, Mendez BR, et al. Quality of maternity care and its determinants along the continuum in Kenya: a structural equation modeling analysis. *PLoS One*. 2017;12(5):e0177756. doi:10.1371/journal.pone.0177756
2. UNICEF. Antenatal care, based on population based national household survey data and routine health systems. 2019.

3. Lawn J, Kerber K. Opportunities for Africa's newborns: practical data, policy and programmatic support for newborn care in Africa. Partnership for Maternal, Newborn and Child Health, Cape Town, 2006. 32.
4. Kerber KJ, de Graft-Johnson JE, Bhutta ZA, Okong P, Starrs A, Lawn JE. Continuum of care for maternal, newborn, and child health: from slogan to service delivery. *The Lancet*. 2007 Oct 13;370(9595):1358-69.
5. Chalise B, Chalise M, Bista B, et al. Correlates of continuum of maternal health services among Nepalese women: evidence from Nepal Multiple Indicator Cluster Survey. *PLoS One*. 2019;14(4):e0215613. doi:10.1371/journal.pone.0215613
6. Maheen H, Hoban E, Bennett C. Factors affecting rural women's utilisation of continuum of care services in remote or isolated villages or Pakistan—a mixed-methods study. *Women Birth*. 2020. doi:10.1016/j.wombi.2020.04.001
7. Chaka EE, Parsaiean M, Majdzadeh R. Factors associated with the completion of the continuum of care for maternal, newborn, and child health services in Ethiopia. Multilevel model analysis. *Int J Prev Med*. 2019;10.
8. Asratie MH, Muche AA, Geremew AB, Amo-Adjei J. Completion of maternity continuum of care among women in the post-partum period: magnitude and associated factors in the northwest, Ethiopia. *PLoS One*. 2020;15(8):e0237980. doi:10.1371/journal.pone.0237980
9. Akinyemi JO, Afolabi RF, Awolude OA. Patterns and determinants of dropout from maternity care continuum in Nigeria. *BMC Pregnancy Childbirth*. 2016;16(1):282. doi:10.1186/s12884-016-1083-9
10. CSACE, I. *Ethiopia Demographic and Health Survey 2016*. Addis Ababa, Ethiopia, and Rockville, Maryland, USA: CSA and ICF; 2016.
11. Institute, E.P.H. and ICF. *Ethiopia Mini Demographic and Health Survey 2019: Key Indicators*. Rockville, Maryland, USA: EPHI and ICF; 2019.
12. Hamed A, Mohamed E, Sabry M. Egyptian status of continuum of care for maternal, newborn, and child health: Sohag Governorate as an example. *Int J Med Sci Public Health*. 2018;7(6):1. doi:10.5455/ijmsph.2018.0102607032018
13. Iqbal S, Maqsood S, Zakar R, et al. Continuum of care in maternal, newborn and child health in Pakistan: analysis of trends and determinants from 2006 to 2012. *BMC Health Serv Res*. 2017;17(1):189. doi:10.1186/s12913-017-2111-9
14. Mohan D, LeFevre AE, George A, et al. Analysis of dropout across the continuum of maternal health care in Tanzania: findings from a cross-sectional household survey. *Health Policy Plan*. 2017;32(6):791–799. doi:10.1093/heapol/czx005
15. Shibnuma A, Yeji F, Okawa S, et al. The coverage of continuum of care in maternal, newborn and child health: a cross-sectional study of woman-child pairs in Ghana. *BMJ Glob Health*. 2018;3(4):e000786. doi:10.1136/bmjgh-2018-000786
16. Wang W, Hong R. Levels and determinants of continuum of care for maternal and newborn health in Cambodia-evidence from a population-based survey. *BMC Pregnancy Childbirth*. 2015;15(1):62. doi:10.1186/s12884-015-0497-0
17. Yeji F, Shibnuma A, Oduro A, et al. Continuum of care in a maternal, newborn and child health program in Ghana: low completion rate and multiple obstacle factors. *PLoS One*. 2015;10(12):e0142849. doi:10.1371/journal.pone.0142849
18. Belda SS, Gebremariam MB. Birth preparedness, complication readiness and other determinants of place of delivery among mothers in Goba District, Bale Zone, South East Ethiopia. *BMC Pregnancy Childbirth*. 2016;16(1):73. doi:10.1186/s12884-016-0837-8
19. Nawal D, Goli S, Baradaran HR. Birth preparedness and its effect on place of delivery and post-natal check-ups in Nepal. *PLoS One*. 2013;8(5):e60957. doi:10.1371/journal.pone.0060957
20. Vittinghoff E, Glidden DV, Shiboski SC, McCulloch CE. *Regression Methods in Biostatistics: Linear, Logistic, Survival, and Repeated Measures Models*. Springer Science & Business Media; 2011.
21. Haile D, Kondale M, Andarge E, et al. Level of completion along continuum of care for maternal and newborn health services and factors associated with it among women in Arba Minch Zuria woreda, Gamo zone, Southern Ethiopia: a community based cross-sectional study. *PLoS One*. 2020;15(6):e0221670. doi:10.1371/journal.pone.0221670
22. Muluneh AG, Kassa GM, Alemayehu GA, et al. High dropout rate from maternity continuum of care after antenatal care booking and its associated factors among reproductive age women in Ethiopia, Evidence from Demographic and Health Survey 2016. *PLoS One*. 2020;15(6):e0234741. doi:10.1371/journal.pone.0234741
23. Amare NS, Araya BM, Asaye MM. Dropout from maternity continuum of care and associated factors among women in Debre Markos town, Northwest Ethiopia. *bioRxiv*. 2019;620120.
24. Tamang TM Factors associated with completion of continuum of Care for Maternal Health in Nepal. in proceedings of the IUSSP XXVIII International Population Conference, Cape Town, South Africa. 2017.
25. Fekadu GA, Ambaw F, Kidanie SA. Facility delivery and postnatal care services use among mothers who attended four or more antenatal care visits in Ethiopia: further analysis of the 2016 demographic and health survey. *BMC Pregnancy Childbirth*. 2019;19(1):64. doi:10.1186/s12884-019-2216-8
26. Weitzman A. The effects of women's education on maternal health: evidence from Peru. *Soc Sci Med*. 2017;180:1–9. doi:10.1016/j.socscimed.2017.03.004
27. Elo IT. Utilization of maternal health-care services in Peru: the role of women's education. *Health Transition Rev*. 1992;2:49–69.
28. Atisa FO. *Influence of Early Booking for Antenatal Care on Antenatal and Early Pregnancy Outcomes at Kenyatta National Hospital*. University of Nairobi; 2015.
29. Bishanga DR, Drake M, Kim Y-M, et al. Factors associated with institutional delivery: findings from a cross-sectional study in Mara and Kagera regions in Tanzania. *PLoS One*. 2018;13(12):e0209672. doi:10.1371/journal.pone.0209672
30. Tiruneh GT, Worku A, Berhane Y, et al. Determinants of postnatal care utilization in Ethiopia: a multilevel analysis. *BMC Pregnancy Childbirth*. 2020;20(1):1–12. doi:10.1186/s12884-020-03254-7
31. Kifle D, Azale T, Gelaw YA, et al. Maternal health care service seeking behaviors and associated factors among women in rural Haramaya District, Eastern Ethiopia: a triangulated community-based cross-sectional study. *Reprod Health*. 2017;14(1):6. doi:10.1186/s12978-016-0270-5
32. WHO. WHO recommendation on birth preparedness and complication readiness 31 May 2015.2015

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