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Continuum of maternal healthcare services utilisation and associated factors among women who gave birth in Siyadebirena Wayu district, Ethiopia: community-based cross-sectional study

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ABSTRACT

Objective This study aimed to analyse the prevalence and factors associated with continuum of maternal healthcare services among women who gave birth in Siyadebirena Wayu district, Central Ethiopia.

Design Community-based cross-sectional study.

Setting At eight Kebeles in Central Ethiopia.

Participants The study was done on 614 women aged 15–49 years using interviewer-administered structured questionnaire. Following proportional allocation of the sample, we used simple random sampling technique to select study participants.

Methods Binary logistic regression model was fitted to identify the factors associated with the outcome. Variables with p<0.2 in the bivariable analysis were the candidates for multivariable analysis. A p<0.05 and adjusted OR (AOR) with 95% CI were taken to declare the factors and the strengths of association with continuum of maternal healthcare utilisation.

Outcome Continuum of maternal healthcare utilisation.

Results Only 16.1% (95% CI 13.3% to 19.0%) of the women had used a complete continuum of maternal health services. Variables, such as contraceptive use (AOR 4.95; 95% CI 1.61 to 15.20), autonomy (AOR 4.45; 95% CI 1.69 to 11.60), urban residence (AOR 3.91; 95% CI 1.06 to 14.39), educated women (AOR 5.36; 95% CI 1.15 to 25.06), took less than 30 min to reach a health facility (AOR 3.17; 95% CI 1.38 to 7.25), use public transportation (AOR 2.48; 95% CI 1.12 to 5.52) and good knowledge (AOR 9.88; 95% CI 3.89 to 25.0) were positively associated with continuum of maternal healthcare. In the contrary, women who had third child birth order (AOR 0.22; 95% CI 0.06 to 0.8) was negatively associated.

Conclusions Overall, the level of the continuum of maternal healthcare services utilisation was low compared with the national and global targets. Therefore, programme planners and implementer had better conduct health education to enhance the awareness of women about continuum of maternal healthcare services. Healthcare sector policy-makers and managers shall also scale up healthcare facilities to improve access to maternal healthcare services.

INTRODUCTION

Continuum of maternal healthcare is the continuity of care for maternal and child healthcare services, which includes antenatal care (ANC), skilled birth attendance and postnatal care (PNC) services to reduce maternal and neonatal morbidity and mortality.[1] Improving maternal health was one of the eight Millennium Development Goals (MDGs) to reduce the maternal mortality ratio (MMR) by three quarters and to realise universal access to reproductive health by 2015.[2] To realise the remaining business of MDGs, all United Nations (UN) member states had set an ambitious sustainable development goal (SDG) to reduce MMR to less than 70 per 100 000 births in 2030.[3] Alongside, the expected reduction of MMR to realise the SDG targets was 6.4% per year, but it was only 2.9%.[2 4]

Although the global MMR has declined by 38% from 2000 to 2017, over 800 women are dying each day from causes associated with obstetric complications in low-income and middle-income countries.[2 5] Of which, approximately 550 maternal deaths reported every day in sub-Saharan African (SSA) countries account 66% of the total deaths.[6]

Strengths and limitations of this study

- ► The continuity of key maternal healthcare service utilisation can be mentioned as the strengths of this study.
- ► This study might introduce social desirability bias, which results in overestimation of the results associated with self-reported data.
- ► Recall bias could also be another limitation since mothers were interviewed to respond to questions about their last 12 months pregnancy-related experiences.
- ► This study did not explore non-quantifiable judgments/perception of mothers since it lacked a qualitative aspect.

Table 1 Sociodemographic data of participants in Siyadebirena Wayu district, central Ethiopia, 2020 (n=614)

Variables	Frequency	%	CoC utilisation	
			Yes, n (%)	No, n (%)
Age of participants (years)				
15–24	103	16.8	30 (4.9)	73 (11.9)
25–34	373	60.7	60 (9.8)	313 (50.9)
>34	138	22.5	9 (1.5)	129 (21.1)
Marital status				
Married	559	91.0	78 (12.7)	481 (78.3)
Single	16	2.6	8 (1.3)	8 (1.3)
Divorced/widowed	39	6.4	13 (2.1)	26 (4.2)
Religion				
Orthodox	588	95.8	84 (13.7)	504 (82.1)
Muslim	9	1.5	7 (1.1)	2 (0.3)
Protestant	17	2.8	8 (1.3)	9 (1.5)
Residence				
Urban	130	21.2	61 (9.9)	69 (11.2)
Rural	484	78.8	38 (6.2)	446 (72.6)
Women education				
No formal education	455	74.1	31 (5.1)	424 (69)
Primary school level	59	9.6	14 (2.3)	45 (7.3)
Secondary and above	100	16.3	54 (11.4)	46 (7.5)
Women occupation				
Farmer	110	17.9	9 (1.5)	101 (16.4)
Merchant	45	7.3	11 (1.8)	34 (5.5)
Housewife	396	64.5	45 (7.3)	351 (57.2)
Governmental employee	47	7.7	23 (3.7)	24 (3.9)
Other	16	2.6	11 (1.8)	5 (0.8)
Husband's education				
No formal education	434	70.7	27 (4.4)	407 (66.3)
Primary school level	61	9.9	12 (2/0)	49 (8.0)
Secondary and above	119	19.4	60 (9.8)	59 (9.6)
Husband's occupation				
Farmer	378	61.6	18 (2.9)	360 (58.6)
Merchant	125	20.4	26 (4.2)	99 (16.1)
Governmental employer	90	14.7	48 (7.8)	42 (6.8)
Others	21	3.4	7 (1.1)	14 (2.3)
HH monthly income in *US$				
<31.26	69	11.2	2 (0.33)	67 (10.9)
31.26–78.15	282	45.9	23 (3.8)	259 (42.2)
>78.15	263	42.8	74 (6.2)	189 (30.8)

*US$1=ETB 31.99 in February 2020.
CoC, continuum of care; HH, household.

Similarly, MMR in Ethiopia was 412 deaths per 100 000 live births in 2016.[1] Moreover, more than 10 million children died globally before their fifth years birth day from preventable and treatable childhood illness.[7 8] However, most of the maternal and child deaths that are related with pregnancy and childbirth complications are preventable and/or treatable.[3 9]

Continuum of care (COC) has recently been highlighted as a core principle of programmers to reduce the high burden of maternal, neonatal and child deaths.[10]

Table 2 Health service accessibility and autonomy related data of participants in Siyadebirena Wayu district, central Ethiopia, 2020 (n=614)

Variables	Frequency	%	CoC utilisation	
			Yes, n (%)	No, n (%)
Time to reach at HF				
<30 min	181	29.5	80(13)	101 (16.5)
≥30 min	433	70.5	19 (3.1)	414(67)
Distance from HF				
<5 km	145	23.6	73 (11.9)	72 (11.7)
5–10 km	194	31.6	22 (3.6)	172 (28.0)
>10 km	275	44.8	4 (0.7)	271 (44.1)
Means of transport				
On foot	472	76.9	32 (5.2)	440 (71.7)
Public transport	142	23.1	67 (10.9)	75 (12.2)
Health insurance membership				
No	261	42.5	16 (2.6)	245 (39.9)
Yes	353	57.5	83 (13.5)	270 (44.0)
Autonomy				
No	415	67.6	10 (1.6)	405 (66)
Yes	199	32.4	89 (14.5)	110 (17.9)
Media exposure				
No	287	46.7	12 (2.0)	275 (44.8)
Yes	327	53.3	87 (14.2)	240 (39.1)

CoC, continuum of care; HF, Health Facility.

Maternal, newborn and child healthcare services are inseparably linked and should be managed in an integrated way. In accordance with this, four prenatal care visits, skilled birth attendance and PNC, especially within the first 48 hours after births is recommended to manage postpartum haemorrhage and other causes of maternal and neonatal mortality.[9] Studies done in Pakistan, Laos and Nepal indicated that only 6.8%–45.7% women received complete maternal healthcare services.[4 11 12] Studies conducted in Kenya, Ghana and Tanzania also showed that only 8.0%–34.0% of women used the recommended full range of maternal health services.[13–15] More than 86% of mothers in SSA including Ethiopia did not also use complete maternal healthcare services.[16–18]

A few available evidences in Africa also indicated that maternal education, occupation, decision-making autonomy, transportation access, use of contraception and previous birth place were the major contributing factors for utilisation of maternal healthcare service.[13 17–19] Many countries including Ethiopia have implemented free service packages for maternal healthcare services to reduce the financial burden and to facilitate the realisation of Universal Health Coverage.[20–22] The progress of maternal health services utilisation, however, was insignificant.[23] Successful programme implementation to improve the COC relies on a better understanding of where the gaps are seeking care.[24]

Although COC is one of the key programme strategies to improve maternal and newborns health and to realise SDG, it was not well investigated in Ethiopia. Therefore, this study aimed to assess the level of continuum of maternal healthcare and associated factors in Siyadebirena Wayu district, Central Ethiopia.

MATERIALS AND METHODS
Study design and setting
A community-based cross-sectional study was conducted from 1 February 2020 to 10 March 2020 in Siyadebirena Wayu district which is located in Central Ethiopia. This district borders surrounded by the Oromia Region in the South, Ensaro in the West, Moretna Jiru in the North, and Basona Werana in the East. Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia, this district has a total population of 61,046, of whom, 31 322 were men and 7.41% were urban inhabitants.[25] There are one urban and thirteen rural kebeles in the district. There are 18 healthcare facilities:1 primary hospital, 3 health centres and 14 health posts that provide outpatient service, inpatient service and maternal health service to their catchment population.[26]
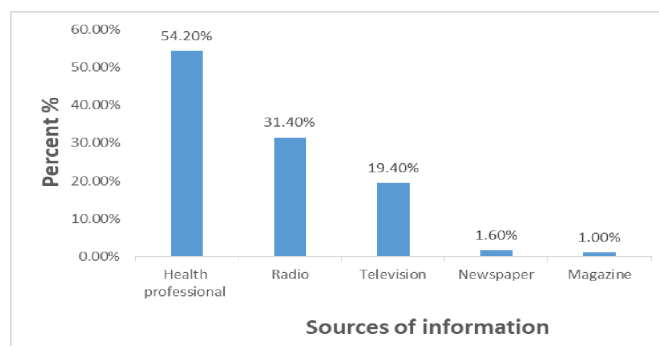
Population
All reproductive age women (15–49 years) in Siyadebirena Wayu district who gave birth 1 year ago from

Table 3 Perceived quality of care related data of participants in Siyadebirena Wayu district, central Ethiopia, 2020 (n=614)

Variables	Frequency	%
Perception on availability of adequate rooms		
No	23	3.7
Yes	591	96.3
Perception on availability of health professionals		
No	603	98.2
Yes	11	1.8
Perception on availability of drugs		
No	399	65
Yes	215	35
Perception on availability of medical equipment		
No	340	55.4
Yes	274	44.6
Perception on health professionals ensured privacy during examination		
No	20	3.3
Yes	594	96.7
Perception on health professional's willingness to help		
No	330	53.7
Yes	284	46.3
Perception on health professionals respecting of patients		
No	334	54.4
Yes	280	45.6
Perception on health professionals were examining well		
No	214	34.9
Yes	400	65.1
Perception on health professionals were welcoming well		
No	334	54.4
Yes	280	45.6
Perception on geting adequate information about patient's health status		
No	22	3.6
Yes	592	96.4
Perception on the health facilities were well cleaned		
No	310	50.5
Yes	304	49.5
Perceived quality of maternal healthcare services		
Poor	351	57.2
Good	263	42.8

Figure 1 Source of information about maternal health of participants in Siyadebirena Wayu district, central Ethiopia, 2020.

Sample size and sampling procedure

The sample size was determined using single population proportion formula: $n = \frac{(Za/2)^2 P(1-P)}{d^2}$. Proportion (p=9.7%) of mothers had continuum of maternal healthcare service utilisation in Arbaminch, Ethiopia[18]; 3% margin of error; 95% confidence level at $Z\alpha/2$ (α=0.05)=1.96; 10% non-response rate and 1.5 design effect were considered for sample size determination. As a result, the final sample size was 620.

In the study area, there are one urban and thirteen rural Kebeles. After stratifying into urban and rural areas, 1 and 7 sample kebeles were drawn from urban and rural kebele in the district, respectively, by lottery method (simple random sampling). We used the lists of all eligible women including mothers who gave birth at home from the health posts' community health information system (CHIS) maternal data on women who gave births from January 2019 to January 2020. In order not to miss women who gave birth at home or those who delivered at health facility but not found in that selected kebeles, health development army leaders were used to identify those mothers in each selected kebeles. Then, simple random sampling technique was used to select the participants after proportional allocation of women to each selected kebele had been made.

Variables

Continuum of maternal healthcare utilisation was the dependent variable. The independent variables included sociodemographic factors (women's age, marital status, women's educational status, husband's educational status, women's employment status, husband's employment status, religion, residence and monthly income), health service accessibility-related factors (membership of health insurance, perceived required time to reach a health facility, perceived distance from the health facility, perceived quality of care, media exposure, autonomy and means of transport), obstetric characteristics (ANC initiation, history of contraceptive use, desire for pregnancy, and birth order), and women's knowledge-related factors (knowledge towards maternal healthcare and attitude towards maternal healthcare).

the data collection period were the source population while those women in the selected kebeles of the district were the study population. Those seriously ill women and women who lived less than 6 months in the district during the data collection period were excluded from the study.

Table 4 Knowledge of participants in Siyadebirena Wayu district, central Ethiopia, 2020 (n=614)

Variables	Frequency	%
Does antenatal care is needed?		
No	59	9.6
Yes	555	90.4
Should antenatal care examination be started within 4 months?		
No	521	84.9
Yes	93	15.1
Is it needed to count fetal movement in the late stage of pregnancy?		
No	536	87.3
Yes	78	12.7
Can anaemia prevent through eating more iron contained food during pregnancy?		
No	541	88.1
Yes	73	11.9
Is there a difference between giving birth at home and health facility?		
No	8	1.3
Yes	606	98.7
Should pregnant women often check blood pressure?		
No	527	85.8
Yes	87	14.2
Did you think keep lying is better when amniotic fluid breaks?		
No	557	90.7
Yes	57	9.3
Is it needed to go to hospital when severe headache happens?		
No	13	2.1
Yes	601	97.9
Is it needed to go to hospital when vision problem happens?		
No	2	0.3
Yes	612	99.7
Did you think breast feeding is better for newborn?		
No	168	27.4
Yes	446	72.6
Did you think newborn deformity most likely occur before 12 weeks of pregnancy?		
No	578	94.1
Yes	36	5.9
Did you think vaccination for new born baby is important?		
No	32	5.2
Yes	582	94.8
Overall knowledge about maternal health services		
Poor	500	81.4
Good	114	18.6

Table 5 Attitude of participants towards maternal healthcare services in Siyadebirena Wayu district, central Ethiopia, 2020 (n=614)

Variables	Frequency	%
I would like to attend antenatal care as required.		
No	42	6.8
Yes	572	93.2
I preferred to give birth at health facility for my next delivery.		
No	9	1.5
Yes	605	98.5
I Would like to get instruction of infant feeding from health worker.		
No	500	81.4
Yes	114	18.6
I Would like to be visited by health worker during postpartum period.		
No	544	88.6
Yes	70	11.4
I would like to breastfeed		
No	30	4.9
Yes	584	95.1
I would you like to return to work after giving birth.		
No	539	87.8
Yes	75	12.2
Overall attitude towards maternal health services		
Poor	486	79.2
Good	128	20.8

Knowledge about maternal healthcare was measured by using 12 knowledge measuring items. Accordingly, each item contains ('1=yes' and '0=no' alternatives) and those women who scored above 50% of the total knowledge measuring score were considered as having good knowledge.[29] Attitude towards maternal healthcare was measured using six attitude measuring items, each containing a five point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree) and those women who scored above 75% of the total attitude measuring scores were considered as having a favourable attitude.[29] Media exposure of the women was considered if they had a chance of getting maternal health-related information from any source, such as radio, television (TV), magazine, health professionals, etc.[30] Perceived quality of maternal healthcare of the women was measured by using 11-item questions, each containing a five point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree), and those women who scored over 75% of the total quality perception measuring score were considered as having good perception.[31] A woman was considered as having decision-making autonomy if she had a power to decide for healthcare needs by herself or with her husband.[18]

Operational definitions

Continuum of maternal healthcare utilisation was assumed to be completed if a woman had at least four prenatal care visits, skilled delivery, and at least one PNC visit within 6 weeks by skilled health workers.[14 18 19 27–29]

Table 6 Obstetrics characteristics of participants in Siyadebirena Wayu district, central Ethiopia, 2020 (n=614)

Variables	Frequency	%	CoC utilisation	
			Yes, n (%)	No, n (%)
Contraceptive use				
No	225	36.6	6 (0.9)	219 (35.7)
Yes	389	63.4	93 (15.1)	296 (48.2)
Pregnancy desire				
Unplanned	220	35.8	16 (2.6)	204 (33)
Planned	394	64.2	83 (13.5)	311 (50.7)
Order of baby				
1	65	10.6	24 (3.9)	41 (6.7)
2	137	22.3	40 (6.5%)	97 (15.8)
3	179	29.2	21 (3.4)	158 (25.7)
≥4	233	37.9	14 (2.3)	219 (35.7)
GA during first ANC initiation (n=358)				
<4 months	95	26.5	47 (13.1)	48 (13.4)
≥4 months	263	42.8	52 (14.5)	211 (58.9)

ANC, antenatal care; GA, gestational age.

Data collection tool and procedures

A structured interviewer administered questionnaire was developed through reviewing previous literatures[14 16 18 29–34] (online supplemental file 1). The questionnaire was prepared in English and translated to Amharic and back to English to maintain its consistency. The English language questionnaire was translated into the Amharic language by the authors of this research with the help of a language expert. The back-translation of the Amharic version was performed by senior academic staff of the Department of Health Systems and Policy who were not members of the research group and had no information about the original questionnaire. Then, the authors, the language expert and the senior academic staff members met and discussed the translation and back-translation. Finally, the last Amharic version of the questionnaire was prepared for data collection.

Data quality controls

Seven diploma and seven BSc degree graduate nurses were employed as data collectors and supervisors, respectively. Different measures were taken in order to assure the quality of the data. A 2-day training was given for data collectors and supervisors on the basic techniques of data collection. Pretest was also done in Enewari district on 31 participants to assess the validity, reliability and the clarity of the tools. Necessary modification was also done on unclear questions after the pretest. The result of the reliability test (Cronbach's alpha) for attitude towards maternal healthcare, knowledge about maternal healthcare, and perceived quality of healthcare was 0.72, 0.81 and 0.8, respectively. Regular monitoring and supervision of the overall activity was done by the supervisors and principal investigator to check the completeness and the quality of data.

Data management and analysis

The data were checked for completeness, cleaned, coded and entered into EPI Data then exported to SPSS V.22 for analysis. Descriptive statistics were done and the result was presented with narrations, tables and graphs based on the nature of the variables. Both bivariable and multivariable logistic regression analyses were done. Model fitness was checked by Hosmer and Lemeshow goodness of test which was p=0.7. Variables having p<0.2 in the bivariable analysis were entered into the multivariable logistic regression analysis to identify the factors significantly associated with the outcome variable. Adjusted OR (AOR) with 95% CI and p<0.05 during the multivariable analysis were used to identify and measure the strength of the association with the outcome variables.

Consent to participate

The participants had got clear information about the procedures, risks and benefits of the study. In addition, it was also ensured that participants understood the information provided to decide voluntarily whether they want to participate or not. Written informed consent was obtained from each study participant to ensure their voluntariness for participation in this study. Assent from the parents/guardians were taken for participants aged below 18 years. The privacy and confidentiality of the participants were maintained by using anonymity.

Patient and public involvement

Before the data collection, we communicated with the district and kebele administrators about the nature of our study. Subsequently, we ensured the full collaboration and cooperation of the district and the local administration. We interviewed the participants after clarifying the benefits and risks of the study and obtaining their permission.

RESULTS

Sociodemographic characteristics of the participants

A total of 614 child birth women participated with a response rate of 99%. More than half (60.7%) of the respondents aged 25–34 years old with the median age of 30 (8 IQR) years old. More than 90% (91.0%) of the women were married and over 95.8% were orthodox Christians. One-fifth (21.2%) of the women were urban dwellers and more than half (57.1%) of the respondents had household monthly income of less than US$31.26 with a median (IQR) of US$71.9 (US$61.58). Nearly three-fourth (74.1%) of the mothers and 70.7% of their husbands had no formal education. Nearly two-thirds (64.5%) of the participants and 61.6% of their husbands were housewives and farmers, respectively (table 1).

Health service access and women's autonomy

Over two-thirds (70.5%) of the respondents accessed health facility after walking of ≥30 min to reach a health facility. Nearly a quarter (23.6%) of the women lived less than 5 km from health facilities. Among all participants, 76.9% went to a health facility on foot and 57.5% of the women were members of health insurance. Regarding autonomy, 32.4% of the women had decided to visit health facilities when they needed by themselves (table 2).

Perception of health service quality

Of all participants, 351 (57.2%) had poor perception about the quality of healthcare services. Above 95% of respondents perceived that health facilities had adequate rooms and health professionals. In addition, 340 (55.4%) and 399 (65%) of respondents thought health facilities had no adequate medical equipment and drugs, respectively. More than half of the respondents (54.4%) perceived that health professionals did not respect patients (table 3).

Source of information

More than half (54.2%) of the women had got maternal health-related information from health professionals. The source of information for nearly one-third (31.4%) and one-fifth (19.4%) of the participants were also radio and TV, respectively (figure 1).

Knowledge of women about maternal healthcare services

Majority of the respondents (81.4%) had poor knowledge about maternal healthcare services. Ninety percent (90.4%) reported that ANC was needed for mothers, but only 93 (15.1%) of women reported that ANC had started within 4 months of pregnancy. About 1/10th of respondents knew counting fetal heart beat and eating iron-rich food are important at the last stage of pregnancy and to prevent anaemia, respectively. Nearly all (98.7%) of the respondents knew the difference between gave birth at home and health facility, the importance of vaccination and breastfeeding for newborns. Only 36 (5.9%), 57 (9.3%) and 87 (14%) of them had good knowledge about the time of gestational deformity, what to do when amniotic fluid breaks, and the need for repeated blood pressure examination, respectively (table 4).

Attitude towards maternal healthcare services

More than the three-quarters (79.2%) of the respondents had an unfavourable attitude towards maternal healthcare services. Majority of respondents (93.2%) agreed with the necessity of ANC, 584 (95.1%) wanted to breastfeed, and 605 (98.5%) wanted to give birth at a health facility for their next delivery. Few (11.4%) of the respondents agreed on returning to work after giving birth and 114 (18.6%) agreed on getting instructions about infant feeding from health workers (table 5).

Obstetric-related characteristics

Nearly two-thirds (63.4%) of the women had a history of contraceptive use before they gave birth, and 394 (64.2%) of the participants responded that they had a desire to have a child. More than one-third (37.9%) of participants gave births more than three babies and 263 (42.8%) of the women had started to initiate their first ANC visit after 4 months gestational age (table 6).

Continuum of maternal healthcare services utilisation

Antenatal care

Over half (58.3%) with (95% CI 54.4 to 62.1) had first ANC visit and 44.5% with (95% CI 40.9 to 48.4) had at least four visits (ANC-4) during their recent pregnancy. Nearly all women had got blood pressure measurement, blood sample test, urine test, Tetanus Toxoid (TT) vaccination and HIV test. Three hundred and forty-three (95%) of the participants had got information about danger signs of pregnancy and iron supplementation (table 7).

Institutional delivery

Over one-third (43.2%) with (95% CI 39.4 to 47.1) of mothers gave birth at health institutions. Birth weight for all babies delivered at health institutions was measured. Out of all who gave birth at health institutions, 261 (98.5%), 254 (95.8%), 264 (99.6%), 82 (31%) and 89 (33.6%) had got skin to skin contact their mothers, initiate breastfeed within an hour, babies got vaccinated, counselled about postpartum contraceptive, and postpartum complication, respectively (table 8).

Postnatal care

In this study, 17.8% (95% CI 14.8% to 21.2%) of women had received at least one PNC service within 6 weeks after delivery. Over three-fourths women had counselled about when to bath their baby, exclusive breast feeding, a neonatal danger signs, immunisation and checked for vaginal bleeding. On top of that, 78 (71) and 9 (8.3%) women had checked their BP and got iron supplementation, respectively (table 9).

Regarding continuum of maternal health services, nearly one-third (30.8%) among ANC users gave birth at a health institution. Only 17.8% of women had also received at least one PNC service within 6 weeks after delivery. As a result, only 16.1% (95% CI 13.3% to 19%) of women had received the whole components of continuum of maternal health services (figure 2).

Table 7 Antenatal care (ANC) service utilisation of participants in Siyadebirena Wayu district, central Ethiopia, 2020

Variables	Frequency	%
ANC		
No	256	41.7
Yes	358	58.3
No of ANC visit (n=358)		
1	1	0.2
2–3	84	13.7
≥4	273	44.5
Blood pressure measurement		
No	0	0
Yes	358	100
Blood sample test		
No	1	0.3
Yes	357	99.7
Urine test		
No	1	0.3
Yes	357	99.7
HIV test		
No	1	0.3
Yes	357	99.7
TT vaccination		
No	1	0.3
Yes	357	99.7
Information about pregnancy danger signs		
No	10	2.8
Yes	348	97.2
Iron supplementation		
No	15	4.2
Yes	343	95.8

Table 8 Institutional delivery service utilisation of participants in Siyadebirena Wayu district, central Ethiopia, 2020

Variables	Frequency	%
Place of delivery		
Home	349	56.8
Health facility	265	43.2
Getting baby's weight measurement (n=265)		
No	0	0
Yes	265	100
Exercise skin to skin contact		
No	4	1.5
Yes	261	98.5
Getting cord care		
No	1	0.4
Yes	264	99.6
Getting vaccination for baby		
No	1	0.4
Yes	264	99.6
Getting blood measurement for mothers		
No	1	0.4
Yes	264	99.6
Breast feed initiation within 1 hour after delivery		
No	11	4.2
Yes	254	95.8
Getting counselling about postpartum contraceptive use		
No	183	69
Yes	82	31
Getting counselling about postpartum complications		
No	176	66.4
Yes	89	33.6

Factors associated with maternal healthcare services

We fitted four regression models to identify factors associated with ANC, Institutional delivery, PNC and COC. The output of three regression models that identified the factors of key maternal services (ANC, institutional delivery and PNC) utilisation was presented with a single table and the interpretations are stated sequentially. The output of the fourth regression model which specifies the factors of COC was presented in a separate table with its detail interpretation.

In this study, urban residency (AOR 9.0; 95% CI 3.1 to 25.9), women aged 25–34 years (AOR 2.8; 95% CI 1.2 to 6.3), previous history of contraceptive utilisation (AOR 2.0; 95% CI 1.0 to 3.8), and HH monthly income more than US$78.15 (AOR 5.2; 95% CI 2.1 to 13.0) were positively associated ANC service utilisation. Moreover, urban residency (AOR 4.9; 95% CI 1.9 to 12.3), women

who lived less than 5 km (AOR 2.4; 95% CI 1.1 to 5.2), access to public transport (AOR 2.0; 95% CI 1.1 to 3.6), previous history of contraceptive use (AOR 2.0; 95% CI 1.1 to 3.8), and women who gave four or more births (AOR 2.8; 95% CI 1.2 to 6.6) were also 4.9, 2.4, 2.0,2.0 and 2.8 times more likely delivered in health institutions compared with their counterparts, respectively. Furthermore, urban residency (AOR 5.3; 95% CI 1.5 to 18.4), access to public transport (AOR 2.3; 95% CI 1.1 to 4.6), women who had good knowledge (AOR 5.4; 95% CI 2.0 to 15.3) and autonomous women (AOR 3.5; 95% CI 1.6 to 3.8) were positively associated with PNC service utilisation (table 10).

Factors associated with continuum of maternal healthcare service

In bivariable logistic regression analysis; age, women educational status, household monthly income, perceived time taken to reach a health facility, perceived

Table 9 Postnatal care (PNC) service utilisation of participants in Siyadebirena Wayu district, central Ethiopia, 2020

Variables	Frequency	%
PNC		
No	505	82.2
Yes	109	17.8
Time of PNC visit (n=109)		
Within 24 hours	106	17.3
48–72 hours	56	9.1
7–14 hours	6	1.0
>14 to 42 days	2	0.3
Counselled about when to bath the baby		
No	24	22
Yes	85	78
Counselled about exclusive breast feeding		
No	22	20.2
Yes	87	79.8
Counselled about neonatal danger signs		
No	22	20.2
Yes	87	79.8
Counselled about immunisation		
No	22	20.2
Yes	87	79.8
Blood pressure measurement		
No	22	20.2
Yes	87	79.8
Checked vaginal bleeding		
No	22	20.2
Yes	87	79.8
Getting wound care		
No	31	28.4
Yes	78	71.6
Iron and folic acid supplementation		
No	100	91.7
Yes	9	8.3
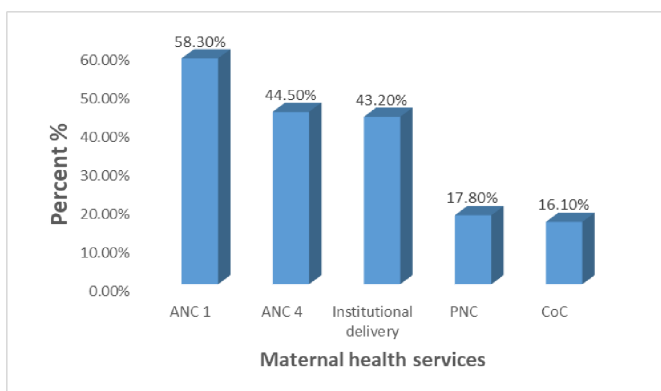
Figure 2 Continuum of maternal health service utilisation in Siyadebirena Wayu district, central Ethiopia, 2020. ANC, antenatal care; CoC, continuum of care; PNC, postnatal care.

distance from the health facility, perceived quality of care, autonomy, knowledge on maternal healthcare, attitude towards maternal healthcare, birth order, history of contraceptive use, means of transport, residency and desire for pregnancy had association with the continuum of maternal healthcare service utilisation at p<0.2. These variables had been entered to multi-variable logistic regression to determine the statistical significant association of variables with the dependent variable. After performing multivariable logistic regression analysis, knowledge about maternal healthcare, perceived time to reach a health facility, autonomy, history of contraceptive use, residency, women educational status, means of transport and birth order were found to be significantly associated with the continuum of maternal healthcare service utilisation at p<0.05.

Accordingly, women who had good knowledge were 9.88 (AOR 9.88; 95% CI 3.89 to 25) times more likely to utilise continuum of maternal healthcare service compared with women who had poor knowledge. Women who used public transport to reach at health facilities were 2.48 (AOR 2.48; 95% CI 1.12 to 5.52) times more likely to use continuum of maternal healthcare than women who went on foot. Women who gave birth to their third child were less likely to use continuum of maternal healthcare by 78% (AOR 0.22; 95% CI 0.06 to 0.8) compared with women who gave birth to their first child. Women who had history of contraceptive use were 4.95 (AOR 4.95; 95% CI 1.61 to 15.2) times more likely to utilise continuum of maternal healthcare compared with their counterparts. Autonomous women were 4.45 (AOR 4.45; 95% CI 1.69 to 11.6) times more likely to utilise continuum of maternal healthcare than non-autonomous women. Women who took less than 30 min to reach at health facility were 3.17 (AOR 3.17; 95% CI 1.38 to 7.25) times more likely to use continuum of maternal healthcare service compared with women who walked more than 30 min. Secondary and above attended women were 5.36 (AOR 5.36; 95% CI 1.15 to 25.06) times more likely to utilise continuum of maternal healthcare service compared with women with no formal education. Urban women were 3.91 (AOR 3.91; 95% CI 1.06 to 14.39) times more likely to utilise continuum of maternal healthcare compared with women who lived in rural areas (table 11).

DISCUSSION

This study revealed that women who had at least four ANC, institutional delivery and at least one PNC were 44.5, 43.2 and 17.8%, respectively. Moreover, the overall continuum of maternal healthcare service was 16.1% (95% CI 13.3% to 19.0%). This indicated that those women who had attended four or more ANC might not guarantee for the completion of the remaining maternal healthcare services, such as institutional delivery and PNC utilisation.

This finding was comparable with studies carried out in Kenya (18%)[15] and sub-Sahara Africa countries (14%).[32]

Table 10 Factors affecting key maternal health service utilisation in Siyadebirena Wayu district, central Ethiopia 2020 (n=614)

Variables	ANC (4+)			Place of delivery			PNC (1+)		
	Yes, n (%)	No, n (%)	AOR (95% CI)	HF, n(%)	Home, n (%)	AOR (95% CI)	Yes, n (%)	No, n (%)	AOR (95% CI)
Residence									
Urban	111 (18.1)	19 (3.1)	9.0 (3.1 to 25.9)***	114 (18.6)	16 (2.6)	4.9 (1.9 to 12.3)***	66 (10.7)	64 (10.4)	5.3 (1.5 to 18.4)**
Rural	162 (26.4)	322 (52.4)	1	151 (24.6)	333 (54.2)	1	43 (7.0)	441 (71.8)	1
Age in years									
15–24	74 (12.8)	29 (4.7)	1	59 (9.6)	44 (7.2)	1	31 (5.0)	72 (11.7)	1
25–34	158 (25.7)	215 (35.0)	2.8 (1.2 to 6.3)*	153 (24.9)	220 (35.8)	0.8 (0.4 to 1.7)	65 (10.6)	308 (50.2)	1.3 (0.6 to 4.7)
≥35	41 (6.7)	97 (15.8)	0.9 (0.5 to 1.5)	53 (8.6)	85 (13.8)	0.5 (0.3 to 0.9)	13 (2.1)	125 (20.4)	0.7 (0.2 to 1.8)
Contraceptive use									
No	61 (9.9)	164 (26.4)	1	72 (11.7)	153 (24.9)	1	12 (2.0)	213 (34.7)	1
Yes	212 (34.5)	177 (28.8)	2.0 (1.0 to 3.8)*	193 (31.4)	196 (31.9)	2.0 (1.0 to 3.8)*	97 (15.8)	292 (47.6)	2.1 (0.7 to 6.4)
HH monthly income (US$)									
<31.26	9 (1.5)	60 (9.8)	1	16 (2.6)	53 (8.6)	1	5 (0.8)	64 (10.4)	1
31.26–78.15	115 (18.7)	167 (27.2)	4.6 (1.9 to 11.1)**	116 (18.9)	166 (27.0)	0.8 (0.4 to 1.7)	29 (4.7)	253 (41.2)	1.3 (0.4 to 4.7)
>78.15	149 (24.3)	114 (18.6)	5.2 (2.1 to 13.0)**	133 (21.7)	130 (21.2)	0.5 (0.3 to 0.9)*	75 (12.2)	188 (30.6)	0.7 (0.2 to 1.8)
Pregnancy desire									
Unplanned	70 (11.4)	150 (24.4)	1	83 (13.5)	137 (22.3)	1	22 (3.6)	198 (32.2)	1
Planned	203 (33.1)	191 (31.1)	1.6 (0.8 to 3.4)	182 (29.6)	212 (34.5)	1.0 (0.5 to 2.1)	87 (14.2)	307 (50.0)	1.1 (0.3 to 3.8)
Distance									
<5 km	108 (17.6)	37 (6.0)	1.8 (0.8 to 4.1)	103 (16.8)	42 (6.8)	2.4 (1.1 to 5.2)*	75 (12.2)	70 (11.4)	2.1 (0.6 to 7.6)
5–10 km	94 (15.3)	100 (16.3)	1.1 (0.7 to 1.9)	101 (16.4)	93 (15.1)	1.9 (1.1 to 3.1)*	26 (4.2)	168 (27.4)	1.0 (0.3 to 2.8)
>10 km	71 (11.6)	204 (33.2)	1	61 (9.9)	214 (34.9)	1	8 (1.3)	267 (43.5)	1
Autonomy									
No	136 (22.1)	279 (45.4)	1	143 (23.3)	272 (44.3)	1	16 (2.6)	399 (65.0)	1
Yes	137 (22.3)	62 (10.1)	1.5 (0.8 to 2.5)	122 (19.9)	77 (12.5)	0.9 (0.5 to 1.6)	93 (15.1)	106 (17.3)	3.5 (1.6 to 7.8)*
Knowledge									
Poor	178 (29.0)	322 (52.4)	1	177 (28.8)	323 (52.6)	1	30 (4.9)	470 (76.5)	1
Good	95 (15.5)	19 (3.1)	2.1 (0.8 to 5.2)	88 (14.3)	26 (4.2)	1.4 (0.6 to 3.1)	79 (12.9)	35 (5.7)	5.4 (2.0 to 15.3)***
Women education									
No formal education	146 (23.8)	309 (50.3)	1	133 (21.7)	322 (52.4)	1	35 (5.7)	420 (68.4)	1
Primary school	38 (6.2)	21 (3.4)	1.1 (0.5 to 2.8)	43 (7.0)	16 (2.6)	2.1 (0.9 to 4.8)	16 (2.6)	43 (7.0)	1.1 (0.4 to 3.1)
Secondary and above	89 (14.5)	11 (1.8)	2.2 (0.8 to 6.6)	89 (14.5)	11 (1.8)	3.0 (1.1 to 8.0)	58 (9.4)	42 (6.8)	2.5 (0.7 to 8.7)
Attitude									

Continued

Table 10 Continued

Variables	ANC (4+)			Place of delivery			PNC (1+)		
	Yes, n (%)	No, n (%)	AOR (95% CI)	HF, n(%)	Home, n (%)	AOR (95% CI)	Yes, n (%)	No, n (%)	AOR (95% CI)
Unfavourable	185 (30.1)	301 (49.0)	1	182 (29.6)	304 (49.5)	1	47 (7.7)	439 (71.5)	1
Favourable	88 (14.3)	40 (6.5)	0.9 (0.4 to 2.1)	83 (13.5)	45 (7.3)	1.1 (0.5 to 2.2)	62 (10.1)	66 (10.7)	0.8 (0.3 to 2.4)
Time taken									
<30 min	135 (22.0)	46 (7.5)	1.3 (0.7 to 2.6)	130 (21.2)	51 (8.3)	1.4 (0.7 to 2.6)	82 (13.4)	99 (16.1)	1.3 (0.5 to 3.5)
≥30 min	138 (22.5)	295 (48.0)	1	135 (22.0)	298 (48.5)	1	27 (4.4)	406 (66.1)	1
Means of transport									
On foot	171 (27.9)	301 (49.0)	1	160 (26.1)	312 (50.8)	1	38 (6.2)	434 (70.7)	1
Public transport	102 (16.6)	40 (6.5)	1.1 (0.6 to 2.0)	105 (17.1)	37 (6.0)	2.0 (1.1 to 3.6)*	71 (11.6)	71 (11.6)	2.3 (1.1 to 4.6)*
Birth order									
1	46 (7.5)	19 (3.1)	2.8 (1.2 to 6.8)*	43 (7.0)	22 (3.6)	2.8 (1.2 to 6.6)*	26 (4.2)	39 (6.4)	2.3 (0.6 to 9.8)
2	94 (15.3)	43 (7.0)	1.9 (0.9 to 3.80)	76 (12.4)	61 (9.9)	1.3 (0.7 to 2.6)	43 (7.0)	94 (15.4)	0.8 (0.2 to 2.5)
3	77 (12.5)	102 (16.6)	1.1 (0.6 to 2.0)	84 (13.7)	95 (15.5)	1.6 (0.9 to 2.9)	23 (3.7)	156 (25.4)	0.8 (0.3 to 2.4)
≥4	56 (9.1)	177 (28.8)	1	171 (27.9)	62 (10.1)	1	17 (2.8)	216 (35.2)	1
Perceived quality of care									
Poor	123 (20.0)	228 (37.1)	1	134 (21.8)	217 (35.3)	1	25 (4.1)	326 (53.1)	1
Good	150 (24.4)	113 (18.4)	1.5 (0.9 to 2.3)	131 (21.3)	132 (21.5)	0.9 (0.6 to 1.4)	84 (13.7)	179 (29.2)	1.8 (0.8 to 4.3)

US$1=ETB22.74.
*P<0.05, **p<0.01, ***p<0.001.
ANC, antenatal care; AOR, adjusted OR; HF, Health Facility; HH, household; PNC, postnatal care.

Table 11 Factors associated with continuum of maternal health service utilisation in Siyadebirena Wayu district, central Ethiopia, 2020 (n=614)

Variables	CoC utilisation		COR (95% CI)	AOR (95% CI)
	Yes, n (%)	No, n (%)		
Age in years				
15–24	30 (4.9)	73 (11.9)	1	1
25–34	60 (9.8)	313 (50.9)	0.47 (0.3 to 0.8)	0.39 (0.14 to 1.09)
≥35	9 (1.5)	129 (21.1)	0.17 (0.1 to 0.4)	0.28 (0.06 to 1.35)
HH monthly income (US$)				
<US$31.26	2 (0.33)	67 (10.9)	1	1
US$31.26–US$78.15	23 (3.8)	259 (42.2)	2.98 (0.7 to 12.9)	3.19 (0.43 to 23.9)
>US$78.15	74 (6.2)	189 (30.8)	13.1 (3.1 to 54.9)	4.61 (0.6 to 35.3)
Pregnancy desired				
Unplanned	16 (2.6)	204 (33)	1	1
Planned	83 (13.5)	311 (50.7)	3.4 (1.9 to 5.9)	1.98 (0.42 to 9.3)
Contraceptive use				
No	6 (0.9)	219 (35.7)	1	1
Yes	93 (15.1)	296 (48.2)	11.5 (4.9 to 26)	4.95 (1.61 to 15.2)***
Distance				
<5 km	73 (11.9)	72 (11.7)	68.7 (24 to 194)	2.46 (0.48 to 12.57)
5–10 km	22 (3.6)	172 (28)	8.7 (2.9 to 25)	1.15 (0.29 to 4.5)
>10 km	4 (0.7)	271 (44.1)	1	1
Autonomy				
No	10 (1.6)	405 (65.9)	1	1
Yes	89 (14.5)	110 (17.9)	32.8 (16.5 to 65)	4.45 (1.69 to 11.6)***
Knowledge				
Poor	20 (3.3)	480 (78.2)	1	1
Good	79 (12.9)	35 (5.7)	54 (29.8 to 98.6)	9.88 (3.89 to 25)***
Women education				
No formal education	31 (5.1)	424 (69)	1	1
Primary school	14 (2.3)	45 (7.3)	4.3 (2.1 to 8.6)	0.97 (0.28 to 3.34)
Secondary and above	54 (11.4)	46 (7.5)	16.1 (9.4 to 27.5)	5.36 (1.15 to 25.06)*
Residence				
Urban	61 (9.9)	69 (11.2)	10.4 (6.4 to 16.7)	3.91 (1.06 to 14.39)*
Rural	38 (6.2)	446 (72.6)	1	1
Attitude				
Unfavourable	37 (0.6)	449 (73)	0.09 (0.05 to 0.14)	0.58 (0.19 to 1.8)
Favourable	62 (10.1)	66 (10.8)	1	1
Time to reach at HF				
<30 min	80 (13)	101 (16.5)	17.3 (10 to 29)	3.17 (1.38 to 7.25)***
≥30 min	19 (3.1)	414 (67)	1	1
Means of transport				
On foot	32 (5.2)	440 (71.7)	1	1
Public transport	67 (10.9)	75 (12.2)	12.3 (7.6 to 19.9)	2.48 (1.12 to 5.52)*
Birth order				
1	24 (3.9)	41 (6.7)	1	1
2	40 (6.5)	97 (15.8)	0.7 (0.38 to 1.3)	0.19 (0.05 to 0.69)

Continued

Table 11 Continued

Variables	CoC utilisation		COR (95% CI)	AOR (95% CI)
	Yes, n (%)	No, n (%)		
3	21 (3.4)	158 (25.7)	0.28 (0.16 to 0.45)	0.22 (0.06 to 0.8)*
≥4	14 (2.3)	219 (35.7)	0.11 (0.05 to 0.23)	0.27 (0.07 to 1.07)
Perceived QoC				
Poor	19 (3.1)	332 (54.1)	1	1
Good	80 (13)	183 (29.8)	7.6 (4.5 to 13)	1.38 (0.48 to 3.98)

US$1=ETB22.74.
*P<0.05, ***p<0.001.
AOR, adjusted OR; CoC, continuum of care; COR, Crude Odds Ratio; HF, Health Facility; HH, household; QoC, quality of care.

However, the finding was slightly higher than studies conducted in Arbaminch (9.7%),[18] a multilevel analysis in Ethiopia (9.1%),[17] Ghana (8%)[13] and Tanzania (10%).[14] The possible explanation for this difference might be due to the variation in access to health institutions. Women who dwelling in urban and near to the town enable them to access information, and healthcare service utilisation.[35] The time gap and coverage of a wide geographical area for the multilevel analysis from the Ethiopian Demographic and Health Survey (EDHS) 2016 could be another possible justification. Within these time gap, Ethiopia has been implemented different strategies and advocation for maternal healthcare utilisation. Sociodemographic and methodological differences might also be the other justification for these variations, such as a study conducted in Ghana was predominantly in rural areas. The road network linking for most communities to reach at the district town was bad which hindered access to health facilities. In the contrary, this finding was lower than studies conducted in Egypt (50.4%),[27] Cambodia (60%),[36] Pakistan (27%),[19] Nepal (45.7%)[12] and South Asia (25%).[16] This variation might be due to the differences in socioeconomic status, health service access, and rural–urban discrepancy across the study areas. For example, urbanisation in those study areas might enable women to access health facilities and women education, which, in turn, increased continuum of maternal care utilisation.

The result of this study showed that being urban dwellers has a significant and positive effect on three (ANC, institutional delivery and PNC) of maternal service utilisation in the three regression models which is supported by previous studies carried out in Ethiopia[37] and Nigeria.[38] The possible justification might be due to access to healthcare services in urban areas are better than rural.

Women who had history of contraceptive use more likely to use ANC and institutional delivery compared with their counterparts. This finding was consistent with a study done in Arbaminch, Ethiopia.[16] The possible reason might be due to women who had history of contraceptive use would have an exposure for health information about the importance of maternal service utilisation.

Women who had access to public transport were more likely to receive institutional delivery and PNC services. This finding was in line with a study reported in Ghana.[13] The possible justification might be because of women who travel long distance on foot might face physical difficulties to reach at health facilities.

Urban dwellers had a better continuum of maternal health service utilisation compared with rural women. This was supported by studies done in Nepal,[12] South Asia and sub-Sahara Africa,[16] and a review report in low-income and middlee-income countries.[32] The possible justification might be due to women who lived in urban areas might have relatively higher socioeconomic status and better access to both public and private healthcare services. This might be related with an inequitable distribution of healthcare facilities between urban and rural areas.[33] In the contrary, this finding was contradicted with studies conducted in Ethiopia,[17] Pakistan[19] and Cambodia.[36]

Women who had a decision-making autonomy on their own healthcare service utilisation had better COC utilisation compared with non-autonomous women. This was supported by studies carried out in Pakistan,[19] South Asia and sub-Saharan Africa,[16] and Nigeria.[33] This might be due to empowered women might decide on their social and healthcare needs without others influence. Besides, autonomous women might develop self-confidence and abilities to decide on continuity of healthcare services utilisation.[37]

Knowledgeable women were more likely complete maternal healthcare services compared with non-knowledgeable women. The possible justification might be that women who have good knowledge about maternal healthcare would be directly linked to maternal healthcare utilisation since knowledgeable women might have better understanding of their health which contribute to their acceptance and utilisation healthcare services.[39]

Women who walked less than 30 min to reach at health facility better-utilised COC compared with those women who took more than 30 min. This finding was consistent with studies done in Egypt[27] and northern Ethiopia.[40] The possible explanation could be mothers who have longer travelling time might be tired which might be associated

with their long distance travelling and this made women to be bored.

Secondary and above educated women were more likely to use maternal healthcare service utilisation. This finding was consistent with studies conducted in Pakistan,[19] Lao,[4] Nepal,[12] Egypt,[27] South Asia and sub-Saharan Africa.[16] This might be due to education could influence women's overall empowerment, access to information and financial freedom to support themselves to take transport, receive quality healthcare services, pay for services and easily absorb healthcare messages by mass media and health professionals. Education might also more empower women on the decision-making process in household issues including utilisation of health services.[29 33]

Women who were using contraceptive methods had a better continuum of maternal service utilisation compared with women who did not use. This finding was in line with a study conducted in Arbaminch zuria district.[18] The possible justification might be that women who utilised prepregnancy contraception were familiar with the health facility environment and well informed about subsequent maternal and newborn services.

Women who accessed public transport had better completion of maternal health services compared with those who travelled on foot. This finding was consistent with the study done in Ghana.[13] The possible justification might be women who travelled long distances on foot might face physical difficulties to reach at health facilities. Travelling on foot to health facilities for receiving maternal healthcare could be difficult and transportation might also expensive to rural women.[13]

Women who had only one birth had also a better utilisation of maternal healthcare service. This was consistent with the study carried out in Egypt,[27] Pakistan,[19] sub-Saharan Africa.[41] The possible explanation might be due to the fact that women who gave birth before may have trouble access to childcare. This perhaps would simplify the consequences of pregnancy associated with delivery and may not be encouraged to use healthcare services.[42 43] Women in their first pregnancy may also be anxious of complications since they had no previous experience of pregnancy.[27]

Strengths and limitations of the study

Assessing the continuity of key maternal care utilisation is the strength of this study. This study might introduce social desirability bias in relation with its self-reporting nature of the study. Recall bias might also another limitation of this study associated with mothers requested to remember their 1 year ago experience. Moreover, this study could not explore the sociocultural facilitators and inhibitors for completion of maternal healthcare services since it was not supported by a qualitative study.

CONCLUSION

In this study, continuum of maternal healthcare service utilisation was low. Significant decrement was observed among women who received four or more ANC on completion of the remaining maternal healthcare services, such as institutional delivery and PNC. Place of residence, maternal education, time taken to reach health facility, access to public transport, decision making autonomy of women, women awareness and a history of contraceptive use were the factors affecting continuum of maternal healthcare services. Therefore, empowering women's education and decision-making autonomy had a paramount importance to enhance continuum of maternal healthcare services utilisation. Healthcare programmers and decision-makers had better to physical access of health facilities to improve maternal healthcare services.

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