Completion of the maternal continuum of care and its association with antenatal care attendance during previous pregnancy among women in rural areas of the Gurage Zone, Southwest Ethiopia: a community-based cross-sectional study

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ABSTRACT

Objective The maternal continuum of care is a cost-effective intervention to prevent pregnancy and childbirth-related maternal and neonatal mortality and morbidity. This study aimed to investigate the prevalence of completion of the maternal continuum of care and its association with antenatal care (ANC) attendance during previous pregnancy among women in rural kebeles of Gurage Zone, Southwest Ethiopia.

Design A community-based cross-sectional study.

Setting The study took place in 12 rural kebeles of the Gurage Zone from 1 April 2022 to 12 May 2022.

Participants Randomly selected 497 women who gave birth in the previous 12 months in rural kebeles of the Gurage Zone.

Outcome The outcome of this study was the prevalence of completion of the maternal continuum of care.

Results Overall, the prevalence of completion of the maternal continuum of care was 15.5% (95% CI: 12.55% to 18.9%). After adjusting for potential confounders, having ANC attendance during a previous pregnancy (adjusted OR: 2.01; 95% CI: 1.07 to 3.76) was positively associated with the completion of the maternal continuum of care. In addition, having access to ambulance service as a means of transportation (AOR: 6.01; 95% CI: 3.16 to 11.39) and exposure to mass media (AOR: 2.43; 95% CI: 1.27 to 4.68) were positively associated with completion of the maternal continuum of care.

Conclusion The prevalence of completion of the maternity continuum of care was unacceptably low in this study. This result indicates that the women did not receive the maximum possible health benefit from existing maternal healthcare services. The completion of the maternal continuum of care was affected by ANC attendance in a previous pregnancy. Therefore, interventions that can strengthen ANC are crucial in the maternal continuum of the care pathway.

INTRODUCTION

Globally, approximately 295,000 women died from causes related to pregnancy, childbirth and the postnatal period in 2017.1 Middle-income and low-income countries contributed 94% of the maternal deaths, of which about 66% of the maternal deaths occurred in sub-Saharan Africa.1 The majority of the maternal mortality occurred during the intrapartum and immediate postpartum periods. Globally, 2.5 million children die during the first 28 days of birth with the highest burden in middle-income and low-income countries.2

The maternal continuum of care with quality antenatal care (ANC) service, safe institutional delivery and postnatal care (PNC) is a cost-effective intervention to prevent pregnancy and childbirth-related maternal and neonatal death.3,4 ANC improves birth preparedness, helps early identification and treatment of pregnancy-related complications and increases skilled birth attendance.5
Institutional delivery helps the woman to have a safe, clean and well-equipped environment with skilled personnel. In addition, institutional delivery is effective for early recognition and management of complications during childbirth. PNC provides early identification of obstetrics complications that helps to reduce maternal and neonatal mortality. Therefore, providing these three interventions as a continuum of care is crucial in reducing maternal and neonatal mortality.

The idea of the continuum of care has two dimensions: time and place. The time dimension refers to a situation where a woman receives maternal healthcare services throughout the life cycle of pre-pregnancy, pregnancy, childbirth, postpartum period, childhood and motherhood. However, the place dimension emphasises the combination of family level, community level and institution level of maternal healthcare services.

ANC helps women to have information about the importance of having skilled delivery and PNC. ANC creates the opportunity to familiarise the health facility environment, thereby reducing fear and stress related to institutional delivery services. Although the World Health Organization (WHO) recommended a minimum of eight ANC contacts in its guidelines from 2016, it is implemented only in some low-income and middle-income countries.

In studies in South Asia and sub-Saharan African countries, 75% and 86% of women discontinued the continuum of maternal care, respectively. In another study in Cambodia, 95% of women discontinued the maternal continuum of care. The dropout rate from the maternal continuum of care was 54.3% in Nepal, 93.2% in Lao PDR and 92% in Ghana. A study in Zambia and Tanzania reported that 38% and 10% of women completed the maternity continuum of care, respectively. According to the 2019 Ethiopia Mini Demographic and Health Survey, 43% of women received four and above ANC services; 48% of women delivered at a health facility by a skilled birth attendant; and 34% of women received PNC services. In Ethiopia, 26% and 40% of women were dropouts from the sequence of maternity healthcare services at the stage of delivery and PNC, respectively.

Educational status of women, residence, the distance between home and health facility, autonomy in decision-making for healthcare, timely initiation of ANC, having planned pregnancy and pre-pregnancy contraceptive usage are the main predictors of completion of the maternal continuum of care.

Previous studies in Ethiopia mainly focused separately on ANC or delivery or PNC service usage. These studies do not ensure whether a woman received a package of maternity healthcare interventions continuously from ANC to PNC services. Ethiopia has established many strategies and programmes to increase and improve the use of facility healthcare services. Ethiopia provides free services for family planning (FP), ANC, institutional delivery and PNC.

Despite efforts to improve the use of maternity healthcare services, the maternal continuum of care services in Ethiopia remained low. So, it needs further research to provide evidence-based interventions. In addition, there is a scarcity of data about the maternity continuum of care in rural settings of Ethiopia. Previous studies also did not assess the association between ANC attendance during previous pregnancy and completion of the maternal continuum of care. The current study aimed to investigate the prevalence of completion of the maternal continuum of care and its association with previous ANC attendance among women who gave birth during the last 12 months in rural areas of the Gurage Zone, Southwest Ethiopia.

METHODS
Study design and settings
This was a community-based cross-sectional study conducted among women in rural areas of the Gurage Zone in Southwest Ethiopia. The Gurage Zone is located 158 km far from Addis Ababa, the capital city of Ethiopia. Wolkite city is the administrative centre of the zone. The zone has 20 woredas, 2 town administrations and 443 kebeles (411 rural and 32 urban). Ethiopia is administratively divided into regions/city administration (largest divisions), zones, woredas and kebeles (smallest divisions). In this study, zone, woreda and kebele refer to province, district and village, respectively.

According to the 2012 population projection of Central Statistical Agency, the total population is 1 767 518 in the Gurage Zone. There are seven hospitals: five public and two non-governmental in the Gurage Zone. In addition, there are 79 health centres (7 are Non-governmental Organization), and 444 functional health posts serving the total population in the zone.

Abeshige, Sodo, Gumer, Cheha, Enemor and Deta woredas were selected randomly from 20 districts in the administrative zone for this study. Two rural kebeles were selected from each woreda in the same way, a total of 12 kebeles. The study took place from 1 April to 12 May 2022.

Participants
The source populations were women who gave birth during the last 12 months in rural areas of the Gurage Zone, Southwest Ethiopia. The study populations were women who gave birth in the last 12 months in the selected kebeles of Gurage Zone rural areas, Southwest Ethiopia.

Inclusion and exclusion criteria
We included women who gave birth in the last 12 months in the selected kebeles of Gurage Zone rural areas.

Women who were less than 42 days into the postpartum period were not eligible for this study. This is because to decide whether a woman received PNC or not after discharge, completing 42 days is mandatory. Since the continuum of care starts from ANC, we excluded women...
who did not have at least one ANC follow-up during pregnancy.

**Sample size and sampling technique**

The sample size was determined using Epi Info V.7 with the assumption of a two-sided confidence level of 95%, power of 80% and the ratio of unexposed (those who had an unplanned pregnancy and completed the maternal continuum of care, 4.0%) to exposed (those who had planned pregnancy and completed the maternal continuum of care, 11.4%)\(^1\) 1:1. By adding a 10% non-response rate, the final sample size was 504.

Secondary data was used from the registration log books in the health posts at rural kebeles of Abeshige, Sodo, Gumer, Cheha, Enemor and Deta districts to obtain the sampling frame. A total of 3212 women who gave birth in the last 12 months in selected 12 kebeles (from 28 March 2021 to 28 March 2022) were registered. Of 3212 deliveries, 1723 women who started ANC in a health facility and stayed 6 weeks or more were selected and listed out. Then, the required number of study participants was allocated proportionally for each kebele. Finally, a sampling frame was prepared for each kebele, and the required number of study participants was selected using a computer-generated random sampling technique.

**Data measurement and study variables**

The dependent variable was the completion of the maternal continuum of care defined as a woman who received all the three components of maternal health-care services: received ANC at least four times during pregnancy by a skilled provider, delivered at a health institution assisted by a skilled birth attendant (doctors, midwives or nurses in health institution) during childbirth and received PNC services at least once within 42 days during the postnatal period.\(^9\)\(^11\)\(^30\)\(^31\)

The primary independent variable was ANC attendance during a previous pregnancy. The possible covariates were: age, educational status of women, occupation, marital status, parity, use of pre-pregnancy contraception, having planned pregnancy, the distance between home and health facility, means of transportation to the health facility, autonomy in decision-making for maternal care, exposure to social media, knowledge about the maternal continuum of care and timely initiation of ANC recent pregnancy.

**Good knowledge**

Women who scored 60% and above of the total knowledge-measuring items.\(^32\) Knowledge about the maternal continuum of care was measured using knowledge questions related to the three packages of care (ANC, delivery care and PNC). There were 19 knowledge-measuring items for each package of care. Each item contains two alternatives (1=yes and 2=no). The overall knowledge score about the maternal continuum of care was measured using 57 knowledge-measuring items.

**Poor knowledge**

Women who scored less than 60% of the total knowledge-measuring items.\(^32\)

**Data collection tool and procedure**

Data were collected using face-to-face interviews through home-to-home visiting. A selected woman who was not available during the home-to-home visit for data collection was revisited for the next 2 days. A woman who was not available for three visits was considered non-respondent. The questionnaire consisted of socio-demographic characteristics, health service-related characteristics, obstetrics-related factors, maternity care service-related variables and questions to assess the knowledge status of women about the maternal continuum of care.

**Data quality control**

To ensure the quality of data trained research assistants were collecting the data under the supervision of the principal investigator. A pretest was conducted on 5% of the sample size to verify the appropriateness of the tool. Some unclear questions were modified to local context based on the pretest result. Filled questionnaires were checked daily for consistency and completeness.

**Data management and analysis**

Data were entered using EpiData V.3.1 and exported to SPSS V.25 for analysis. Descriptive statistics were summarised using percentages for categorical variables and mean with standard deviation (SD) or median with Inter quartile range (IQR) based on the data distribution for continuous variables. The crude OR with 95% CI was calculated to know the crude association between ANC attendance in previous pregnancy and completion of the maternal continuum of care. In addition, the p value and crude OR with 95% CI were calculated for each possible confounder variable. Variables with p value>0.25 from the bivariate analysis were entered into the multivariable logistic regression model. We checked multicollinearity using the variance inflation factor and the result ranged from 1.19 to 1.56, which indicates there was no possibility of a multicollinearity issue. Multivariable logistic regression analysis was performed to see the association between ANC attendance during previous pregnancy and completion of the maternal continuum of care while controlling the possible effects of confounders.

Model fitness was assessed using the Hosmer-Lemeshow statistic. Good fitness was indicated when the significance value is greater than 0.05. Since the significance value of the calculated model in the current analysis was greater than 0.05 (0.196), there was sufficient evidence for good model fitness. The strength of association was measured using an adjusted OR with a 95% CI. A p value<0.05 was used as a cut-off point to declare a significant statistical association.

**Patient and public involvement**

Patients or the public were not involved in the design, conduct, reporting or dissemination plans of our research.
RESULTS

Socio-demographic characteristics

A total of 497 women who gave birth in the last 12 months completed the interview, yielding a response rate of 98.6%. The mean age (±SD) of women was 26.28 (±4.98) years, ranging from 18 to 42 years. Of 497 total respondents, 414 (83.3%) were housewives, and 437 (87.9%) were married. Regarding the educational status of women, among the total respondents, 267 (53.7%) women had no formal education. About 241 (48.5%) participants were Muslims, and 194 (39.0%) were Orthodox. Regarding the occupational status of partners, 282 (64.4%) of partners were farmers (table 1).

Sociocultural and obstetrics-related characteristics

This study revealed that 286 (57.5%) women travel to the health facility on foot, and 155 (31.2%) women travel more than 30 min to reach the health facility. This study also revealed that 368 (74.0%) women had the autonomy to decide on receiving maternal healthcare services, and 163 (32.8%) women were exposed to social media. This study revealed that 409 (82.3%) women used a modern contraceptive before the current pregnancy, and 438 (88.1%) women reported planned pregnancy. Regarding parties, 316 (63.6%) women were multipara (table 2).

Knowledge status of women about the maternal continuum of care

Of the total respondents, 95.4% of women had good knowledge about ANC, 73.8% had good knowledge about delivery service and 39.2% had good knowledge about PNC. A total of 343 (69%) women had good knowledge about the continuum of maternal healthcare services (figure 1).

Maternity healthcare services

Regarding ANC follow-up in the index pregnancy, 234 (47.1%) women started their ANC follow-up in the first

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Table 1
Socio-demographic characteristics of study participants among women who gave birth in the last 12 months in rural areas Gurage Zone, Southwest Ethiopia, 2022 (n=497)

| Variables                  | Category          | Frequency | Percentage |
|----------------------------|-------------------|-----------|------------|
| Age                        | 18–20 years       | 34        | 6.8        |
|                            | 20–34 years       | 423       | 85.1       |
|                            | ≥35 years         | 40        | 8.0        |
| Occupational status of women| Housewife         | 414       | 83.3       |
|                            | Employed          | 35        | 7.0        |
|                            | Merchant           | 34        | 6.8        |
|                            | Daily labourer     | 14        | 2.8        |
| Educational status of the women| No formal education | 267       | 53.7       |
|                            | Primary education  | 160       | 32.2       |
|                            | Secondary education and above | 70 | 14.1 |
| Religion                   | Orthodox          | 194       | 39.0       |
|                            | Protestant        | 30        | 6.0        |
|                            | Muslim            | 241       | 48.5       |
|                            | Catholic          | 32        | 6.4        |
| Marital status             | Single            | 34        | 6.8        |
|                            | Married           | 437       | 87.9       |
|                            | Divorced          | 19        | 3.8        |
|                            | Widowed           | 7         | 1.4        |
| Occupation of partner (n=437) | Merchant       | 58        | 13.3       |
|                            | Farmer            | 281       | 64.3       |
|                            | Employed          | 98        | 22.6       |
| Educational status of partner (n=437) | No formal education | 224       | 51.2       |
|                            | Primary education  | 89        | 20.4       |
|                            | Secondary education | 66 | 15.1 |
|                            | College and above  | 58        | 13.3       |

n, number.

Table 2
Health services and obstetrics-related characteristics of women who gave birth in the last 12 months in rural areas Gurage Zone, Southwest Ethiopia, 2022 (n=497)

| Variables                                      | Category                        | Frequency | Percentage |
|------------------------------------------------|---------------------------------|-----------|------------|
| Means of transportation to the health facilities | On foot                         | 286       | 57.5       |
|                                                | Public transport                | 88        | 17.7       |
|                                                | Ambulance                       | 123       | 24.7       |
| Time spent to reach a health facility          | <30 min                         | 242       | 48.8       |
|                                                | ≥30 min                         | 155       | 31.2       |
| Autonomy of women in decision-making power in maternity care | Yes                          | 368       | 74.0       |
|                                                | No                              | 129       | 26.0       |
| Media exposure of women                        | Yes                             | 163       | 32.8       |
|                                                | No                              | 334       | 67.2       |
| Types of media (n=163)                         | Television                     | 44        | 27.0       |
|                                                | Radio                           | 119       | 73.0       |
| Parity                                         | Primipara                       | 119       | 23.9       |
|                                                | Multiparous                     | 316       | 63.6       |
|                                                | Grand multiparous               | 62        | 12.5       |
| History of antenatal care in a previous pregnancy | Yes                          | 112       | 22.5       |
|                                                | No                              | 385       | 77.5       |
| Desire for recent pregnancy                    | Planned                         | 438       | 88.1       |
|                                                | Unplanned                       | 59        | 11.9       |
| Use of pre-pregnancy contraception             | Yes                             | 409       | 82.3       |
|                                                | No                              | 88        | 17.7       |

n, number.
trimester and only 20 (4.0%) women started their ANC visits in the third trimester. A total of 150 (30.2%) women had four or more ANC visits in the index pregnancy. Regarding the services provided during pregnancy, 391 (78.7%) women got advice about birth preparedness and complication readiness plan, 410 (82.5%) women got a tetanus vaccine and 462 (93.0%) women tested for HIV. About 352 (70.8%) women gave birth in health institutions with the assistance of a skilled birth attendant. Regarding the postpartum period, out of 352 women with a skilled birth attendant, 216 (61.4%) women returned for PNC after discharge. This accounts for 43.5% of the total participants (table 3).

Of women who attended PNC at least once after discharge from the health facility, 123 (56.9%) attended PNC within 2 days, 37 (17.1%) attended PNC in 3–7 days, 22 (10.2%) attended PNC in 7–14 days and 34 (15.7%) attended PNC in 2–6 weeks of the postpartum period (figure 2).

Completion of the maternal continuum of care
Among all women who received at least one ANC visit, 150 (30.2%) continued up to four and above ANC visits. The other 69.8% of women dropped from the maternal continuum of care pathway during pregnancy. Of 150 women who received ANC at least four times (ANC4*) during the antenatal period, 119 (79.3%) continued up to delivery, and the other 31 (20.7%) dropped from the pathway. This accounts for 23.9% of the total number of women in the study. After delivery, another 42 (35.3%) women dropped from PNC. The overall prevalence of completion of the maternity continuum of care was 77 (15.5%) (95% CI: 12.5% to 18.9%) (figure 3).

Factors associated with completion of maternity continuum of care
After adjustment for potential covariates, the likelihood of completion of the maternal continuum of care was 2.01 (adjusted OR (AOR): 2.01; 95% CI: 1.07 to 3.76) times more likely among women who had ANC attendance during a previous pregnancy (table 4).

Having access to an ambulance for transportation to a health facility and exposure to social media remained independently associated with the completion of the maternal continuum of care. Women who had access to an ambulance for transportation to a health facility were also 6.01 (AOR: 6.01; 95% CI: 3.16 to 11.39) times more likely to complete the maternal continuum of care. In addition, the likelihood of completion of the maternal

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**Figure 1** Percentage of knowledge of women about the maternal continuum of care among women who gave birth in the last 12 months in rural areas of the Gurage Zone, Southwest Ethiopia, 2022 (n=497). ANC, antenatal care; PNC, postnatal care; SD, skilled delivery.

**Table 3** Maternal health services of women who gave birth in the last 12 months in rural areas of the Gurage Zone, Southwest Ethiopia, 2022 (n=497)

| Variables                                      | Category       | Frequency | Per cent |
|------------------------------------------------|----------------|-----------|----------|
| **Timing of first antenatal care visit**       |                |           |          |
| First trimester                               | 234            | 47.1      |          |
| Second trimester                              | 243            | 48.9      |          |
| Third trimester                               | 20             | 4.0       |          |
| **Number of visits**                          |                |           |          |
| One                                           | 32             | 6.4       |          |
| Two                                           | 42             | 8.5       |          |
| Three                                         | 273            | 54.9      |          |
| Four and above                                | 150            | 30.2      |          |
| **Birth preparedness and complication advice**|                |           |          |
| Yes                                           | 391            | 78.7      |          |
| No                                            | 68             | 13.7      |          |
| Do not know                                   | 38             | 7.6       |          |
| **Tetanus toxoid vaccine during pregnancy**    |                |           |          |
| Yes                                           | 410            | 82.5      |          |
| No                                            | 77             | 15.5      |          |
| Do not know                                   | 10             | 2.0       |          |
| **Receive HIV testing during pregnancy**       |                |           |          |
| Yes                                           | 462            | 93.0      |          |
| No                                            | 25             | 5.0       |          |
| Do not know                                   | 10             | 2.0       |          |
| **Nutritional advice**                        |                |           |          |
| Yes                                           | 379            | 76.3      |          |
| No                                            | 81             | 16.3      |          |
| Do not know                                   | 37             | 7.4       |          |
| **Place of delivery**                         |                |           |          |
| Home                                          | 145            | 29.2      |          |
| Health institution                            | 352            | 70.8      |          |
| **Mode of delivery**                          |                |           |          |
| Vaginal                                       | 470            | 94.6      |          |
| Caesarean section                             | 27             | 5.4       |          |
| **At least one postnatal care after discharge**|                |           |          |
| Yes                                           | 216            | 43.5      |          |
| No                                            | 281            | 56.5      |          |

n, number.
continuum of care was 2.43 (AOR: 2.43; 95% CI: 1.27 to 4.68) times more likely among women who had access to social media (table 4).

DISCUSSION
This study has assessed the prevalence of the completion of the maternity continuum of care and its association with ANC attendance during previous pregnancies in rural settings of Gurage Zone, Southwest Ethiopia. The prevalence of completion of the maternal continuum of care was 15.5% (95% CI: 12.5% to 18.9%). This study revealed that ANC attendance during a previous pregnancy was positively associated with the completion of the maternal continuum of care.

The prevalence of completion of the maternal continuum of care in this study was comparable with a study in the Siyadibirena Wayu district in Ethiopia (16.1%) and Kenya (18%). However, this finding is much lower than the study conducted in Enemay district (45%) and Motta town and Hulet Eji Enese (47%) in Northwest Ethiopia. Our result is also lower than studies in Egypt (50.4%), Nepal (45.7%) and Cambodia (60%). The discrepancies might be due to the differences in the measurement of outcome variables. In this study, women were counted as PNC attendants when they returned at least once for PNC services after discharge of institutional delivery. However, the Enemay district study includes a woman who received PNC within 48 hours after delivery. In addition, the Northwest Ethiopian study uses at least one ANC visit as inclusion criteria for a continuum of care, whereas we consider at least four ANC visits as inclusion criteria. The discrepancies might also be associated with the variation in healthcare service accessibility and technology.

The prevalence of completion of the maternal continuum of care in this study was much lower than studies conducted in Enemay district (45%) and Motta town and Hulet Eji Enese (47%) in Northwest Ethiopia. Our result is also lower than studies in Egypt (50.4%), Nepal (45.7%) and Cambodia (60%). The discrepancies might be due to the differences in the measurement of outcome variables. In this study, women were counted as PNC attendants when they returned at least once for PNC services after discharge of institutional delivery. However, the Enemay district study includes a woman who received PNC within 48 hours after delivery. In addition, the Northwest Ethiopian study uses at least one ANC visit as inclusion criteria for a continuum of care, whereas we consider at least four ANC visits as inclusion criteria. The discrepancies might also be associated with the variation in healthcare service accessibility and technology.

The prevalence of completion of the maternal continuum of care in this study was higher than study findings in Southern Ethiopia (9.7%) and Northwest Ethiopia (12.1%). The discrepancy might be due to variations in the study period, settings and populations. The study populations included both rural–urban settings in Southern and Northwest Ethiopian studies, whereas the study populations were from only rural settings in our study.

The current study revealed that the likelihood of completion of the maternal continuum of care was two times higher among women who had ANC attendance during previous pregnancies than their counterparts. This indicates the importance of ANC in creating awareness about the continuum of care and producing a conducive environment through counselling and education. Receiving effective care throughout ANC improves birth preparedness, helps early identification and treatment of pregnancy-related complications and increased skilled birth attendance in subsequent pregnancy.

Attending ANC helps women to have information about the importance of having skilled delivery and PNC. In addition, ANC creates the opportunity to familiarise the health facility environment. This increases the likelihood of women going along the maternal continuum of the care pathway.

Women who had access to mass media were two times more likely to complete the maternal continuum of care than their counterparts. A similar association was found in Northwest Ethiopia, Holeta town in Ethiopia and Nepal. The media provides different educational messages and information about the importance of receiving maternal healthcare services.

The odds of completing the maternal continuum of care were higher among women who had ambulance
access for transportation to the health facility. This finding is consistent with study findings in Ghana. The possible reason might be the availability of ambulance services, which makes it easy to reach health facilities. A woman in night labour with a lack of transport to travel to a health facility for delivery services is encouraged to deliver at home, thereby reducing the likelihood of maternal continuum of care completion.

This study was a cross-sectional study that might not show a cause-and-effect relationship. This study did not assess the quality of maternal healthcare provided during ANC, delivery and PNC. Since the data collection was through face-to-face interviews among women who gave birth in the last 12 months there might be a possibility of social desirability and recall bias, which underestimate or overestimate our results. The wealth index that has been shown to have an association with seeking healthcare was not assessed in this study.

**CONCLUSIONS**

In this study, the level of completion of the maternity continuum of care was unacceptably low. This result indicates that the women did not receive the maximum possible health benefit from existing maternal healthcare services. Completing the maternal continuum of care was positively associated with ANC attendance during a previous pregnancy. Therefore, interventions that can strengthen ANC are crucial for the continuum pathway of maternal healthcare.

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**Contributors** SGT: Conceptualisation; Investigation; Supervision; Resource; Writing the original draft; Writing—review and editing. YM: Conceptualisation; Investigation; Methodology; Writing—review and editing. MAE: Conceptualisation; Investigation; Formal analysis; Resource; Writing the original draft. BC: Conceptualisation; Formal analysis; Investigation; Resource; Validation; Writing original draft; Writing—review and editing. BTZ: Conceptualisation; Data curation; Formal analysis; Investigation; Resource; Writing the original draft. DT: Conceptualisation; Data curation; Formal analysis; Investigation; Supervision; Validation; Writing—review and editing. SGT is the guarantor of the study.

**Competition interests** None declared.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not applicable.

**Ethics approval** This study was conducted per the Helsinki Declaration of Research involving human subjects. The Institutional Research Ethical Review Committee of the College of Medical and Health Sciences, Wolofte University in Ethiopia approved this study (ref no. RCSUJ 0025/14). Participants gave informed consent to participate in the study before taking part.

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**Table 4** Factors associated with completion of maternity continuum of care among women who gave birth in the last 12 months in rural areas of the Gurage Zone, Southwest Ethiopia, 2022 (n=497)

| Variables                                | Category                  | No (%) | Yes (%) | 95% CI   | COR   | AOR   |
|------------------------------------------|---------------------------|--------|--------|----------|-------|-------|
| Educational status of women             | No formal education       | 236 (88.4) | 31 (11.6) | 1.0 | 1.0 |
|                                          | Primary education         | 128 (80.0) | 32 (20.0) | 1.9 (1.01 to 3.26) | 1.3 (0.73 to 2.60) |
|                                          | Secondary and above       | 56 (80.0) | 14 (20) | 1.9 (0.95 to 3.81) | 1.0 (0.46 to 2.52) |
| Antenatal care contact in a previous pregnancy | No                        | 343 (89.1) | 42 (10.1) | 1.0 | 1.0 |
|                                          | Yes                       | 77 (88.8) | 35 (31.2) | 3.7 (2.22 to 6.20) | 2.0 (1.07 to 3.76)* |
| Means of transportation to a health facility | On foot                   | 266 (93.0) | 20 (7.0) | 1.0 | 1.0 |
|                                          | Public transport          | 76 (86.4) | 12 (13.6) | 2.1 (0.98 to 4.49) | 1.7 (0.79 to 3.96) |
|                                          | Ambulance                 | 78 (63.4) | 45 (36.7) | 7.6 (4.28 to 13.76) | 6.0 (3.16 to 11.39)† |
| Time spent to reach a health facility    | ≥30 min                   | 125 (80.6) | 30 (19.4) | 1.0 | 1.0 |
|                                          | <30 min                   | 295 (86.3) | 47 (13.7) | 0.66 (0.40 to 1.10) | 0.85 (0.46 to 1.56) |
| Autonomy of women in the decision-making of maternal care | No                        | 117 (90.7) | 12 (9.3) | 1.0 | 1.0 |
|                                          | Yes                       | 303 (82.3) | 65 (17.7) | 2.09 (1.09 to 4.01) | 0.84 (0.39 to 1.83) |
| Exposed to media                         | No                        | 304 (91.0) | 30 (9.0) | 1.0 | 1.0 |
|                                          | Yes                       | 116 (71.2) | 47 (28.8) | 4.11 (2.48 to 6.81) | 2.43 (1.27 to 4.68)† |
| Number of parties                        | Primipara                 | 95 (79.8) | 24 (20.2) | 1.0 | 1.0 |
|                                          | Multipara                 | 276 (87.3) | 40 (12.7) | 0.57 (0.33 to 1.00) | 0.84 (0.44 to 1.60) |
|                                          | Grand multipara           | 49 (79.0) | 13 (21.0) | 1.05 (0.49 to 2.24) | 2.07 (0.85 to 5.06) |
| Knowledge about the continuum of care    | Poor knowledge            | 138 (89.6) | 16 (10.4) | 1.0 | 1.0 |
|                                          | Good knowledge            | 282 (82.2) | 61 (17.8) | 1.87 (1.04 to 3.36) | 1.16 (0.60 to 2.27) |

*p=0.029; †p<0.001; ‡p=0.008.

AOR, adjusted OR; COR, crude OR.
