

Research Article

Utilization and Predictors of Maternal Health Care Services among Women of Reproductive Age in Hawassa University Health and Demographic Surveillance System Site, South Ethiopia: A Cross-Sectional Study

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Background. Regular utilization of maternal health care services decreases maternal morbidity and mortality. However, major predictors that influence the utilization of the existing maternal health care services are complex and differ from place to place. Therefore, assessing these predictors assists health planners to prioritize promotion strategies and is a fundamental step for intervention. This study assessed the utilization and predictors of maternal health care services among women of the reproductive age in Hawassa Health and Demographic Surveillance System site, South Ethiopia, 2019. **Methods.** A community-based cross-sectional study was conducted among 682 women of the reproductive age from January to February, in 2019. A two-stage stratified sampling method was utilized. Data were collected using a structured, face-to-face interviewer-administered questionnaire. The data were entered using Epi Data 3.1 and analyzed using SPSS version 20. The variables were entered into the multivariable model using the backward stepwise regression approach. Multivariable logistic regression analysis was used to identify factors associated with utilization of the maternal health care. Adjusted odds ratios (AORs) with 95% confidence interval (CI) were computed to assess the presence and strength of associations. **Result.** The overall utilization of ANC, institutional delivery, and PNC was 69.1, 52.1, and 32.7%, respectively. The odds of utilizing ANC were 4.72 times higher for women who have a formal education (AOR: 4.72, 95% CI = 2.82–7.90) as compared to those who have no formal education. The odds of utilizing institutional delivery were 5.96 times higher for women who had ANC follow-up (AOR: 5.96; 95% CI = 3.88–9.18) as compared to those who had no ANC follow-up. Presence of information about the PNC (AOR: 3.66; 95% CI = 2.18–6.14) and autonomy of a woman to make decision on health issues (AOR: 6.13, 95% CI = 3.86–9.73) were positively associated with utilization of PNC. **Conclusion.** The utilization of maternal health care services is far below the national target in the study area. Maternal and paternal education status, autonomy of the woman to make decision on the health issues, wealth status, and having a plan on the current pregnancy were major predictors of the maternal health care service utilization. Providing information and training about the model household to the women about maternal health care service utilization using various methods of health education should be considered.

1. Introduction

Maternal health is the health of the mother during pregnancy, childbirth, and the postpartum period, and maternal health care are antenatal care (ANC), institutional delivery, and postnatal care (PNC) [1]. Maternal health has been becoming a worldwide public health concern because the lives of millions

of mothers in the reproductive age group can be saved through maternal health care service utilization [2]. Despite the significant efforts to strengthen maternal health care service utilization, maternal mortality is still unacceptably high in the world. For instance, in 2016, an estimated 254,700 women died in the world from complications related to pregnancy or childbirth with the maternal mortality ratio ranging from a

high of 957 in south Sudan to a low of 2 in Iceland [3]. However, 99% of these deaths occurred in developing countries; greater than half of these happened in sub-Saharan Africa [4]. Greater than 90% of these deaths are preventable with interventions currently existing, specifically, in relation to skilled care during prenatal, at delivery, and a few days during the postnatal period [1].

Low utilization of the maternal health care is a great challenge in most low-resource settings, no exception in Ethiopia. Among the six top underutilized countries (India, Nigeria, Pakistan, Afghanistan, and the DRC), almost half of worldwide maternal mortality happens, and an estimated maternal mortality ratio of Ethiopia is 420 per 100,000 live births [5, 6].

The huge number of maternal death, specifically in low- and middle-income countries, is because of low level of maternal health care service utilization. The low level utilization of ANC compounded by the extremely low-skilled delivery and PNC utilization which are the major predictors for the high maternal deaths during the last two decades [6].

In addition, different predictors have been found to be associated with the utilization of maternal health care services and can be grouped as sociodemographic, behavioral, institutional, and service quality-related factors [7–10].

Maternal health care service utilization has been among the most relevant intervention strategies to reduce maternal morbidity and mortality. Due to this evidence, Ethiopia has given a special consideration to it in the last three decades. Maternal health is among the six priority areas in the reproductive health strategy of the country (the social and institutional parameters of women's health, fertility and family planning, HIV/AIDS, RH of young people, and reproductive organ cancers) to enhance maternal and child health in the continuum of care [11].

Moreover, evidence suggested that an integrated community-based maternal health care services from preconception through the postpartum period can improve maternal and neonatal outcomes, though the evidence from developing countries has been conflicting [12, 13]. The "continuum of care" approach is briefed as a basic programmatic principle of enhancing maternal newborn and child health [14–16]. This conceptual framework attempts to provide all women and newborns with a basic access to health care during pregnancy, childbirth, and the postpartum period by mixing effective interventions and delivery strategies within existing health system packages [15].

However, across the continuum of care, a significant dropout happens in the continuity of care from the antenatal period to the postpartum period. For example, 62% of pregnant women in Ethiopia make at least one antenatal visit while 28% gave birth with a skilled birth attendant, and only 16.5% of Ethiopia women receive a postnatal follow-up [6].

In spite of the fact that maternal health care service utilization is very important for further improvement of maternal health, limited evidence exists on the utilization and predictors of maternal health care services among women of the reproductive age in Hawassa University Health and Demographic Surveillance System (HDSS) site, South Ethiopia. In addition, information about maternal

health care services is also important because it is one of the targets for Ethiopian GTP 2 in 2012/2020, and the preparation for the third growth and transformation plan in Ethiopia is fast approaching. Moreover, assessing the current level of utilization and identifying the predictors of maternal health care services are important to guide public health planners, policymakers, and implementers to plan and design appropriate intervention strategies in order to enhance maternal health care service utilization. Therefore, the main aim of this study was to assess utilization and predictors of maternal health care services among women of the reproductive age in Hawassa University HDSS site, South Ethiopia, 2019.

2. Materials and Methods

2.1. Study Area. The study was carried out in Hawassa University HDSS site, Southern Ethiopia. The Hawassa University HDSS is located 330 km from Addis Ababa, the capital of Ethiopia. It is also 55 km from Hawassa, the capital of SNNPR. The site was established in 2015, and a set of operations has been used for longitudinal follow-up of well-defined entities or primary subjects (individual, household, and residential unit). All health and demographic-related outcomes within a clearly defined geographic area are followed up for every individual two times per year and house to house visit. As part of the Sidama zone, the site is bordered in the north by Shebadino, in the south by AletaWondo and Aleta Chuko, in the east by Gorche, and in the west by Loka Abaya districts. The site consists of 54 kebeles (lowest administrative unit of Ethiopia). According to the central statistical agency report of Ethiopia, the total population of the site was estimated to be 365,652 (51% are female and 49% are male). Of these, 61,430 were women of the reproductive age. The physical health service coverage of the site was 100%. There is only one-government general hospital, 15 health centers, 53 health posts, and 8 private clinics in the site. The site has a total of 1259 health professionals of different disciplines, 119 health extension workers, and 2,101 women development arms (WDAs). Agriculture is the main source of income in the site; inhabitants of the site mainly produce enset (false banana), cereals, cash crops (khat and coffee), and livestock. Approximately, half of the inhabitants live in the midlands (1750 to 2300 m above the sea level (ASL)), while 30% and 20% reside in the highlands (>2300 m ASL) and lowlands (<1750 m ASL), respectively. The average rainfall is between 9050 and 1160 mm per annum, and according to the season, temperatures vary from 10 to 31°C. The highest rainy season is between June and early October [17].

2.2. Study Design and Population. A community-based analytical cross-sectional study was carried out in the Hawassa University HDSS site from January to February, in 2019. The source and study population were all women of the reproductive age and all were randomly selected women of the reproductive age who gave live birth in the last twelve months preceding the survey and resided in the site for

6 months, respectively. Those women who lived less than 6 months, had serious diseases, and had her child/children critically ill were excluded from the study.

2.3. Sample Size Determination and Sampling Procedure. For the first objective, the sample size was calculated by using a single population proportion formula in consideration of the following assumptions. The utilization/proportion (P) of maternal health care from the previous study done in Haramaya regional government of East Ethiopia was 28.7% [9], with 95% confidence level and 5% margin of error. As a two-stage sampling technique was used to select the study participants, a design effect of 2 was considered, and a 10% nonresponse rate was added to the calculated sample size. Therefore, the final sample size was 692. Similarly, the sample size (n) for the second objective was calculated by using the Epi info TM 7 statistical package with the inputs of 95% confidence level, 80% power, 1 : 1 ratio between exposed and unexposed, and adjusted odds ratio (AOR) of 2.53. Thus, the final sample size was 392. A sample size of 692 obtained from the first specific objective was used because it was the largest sample size estimated and would be sufficient for the study.

A two-stage stratified sampling technique (i.e., considering each kebele as a stratum) was used to select a representative sample size. In the first stage, we have used the simple random sampling technique to select representative kebeles from the site. In the second stage, we used a systematic random sampling technique to select the study households. In the Hawassa University HDSS site, there are 54 kebeles, and from all 54 kebeles, 12 kebeles were selected by using a simple random sampling technique. Households with women of the reproductive age who had live birth in the last twelve months were identified using household ID from the database, and a sampling frame was prepared. It consisted of lists of the household in the selected kebeles. There were a total of 8,482 women in the selected kebeles and were eligible for the study. Initially, the total sample size was allocated to the kebeles proportional to their population size. The calculated sample interval ($K=N/n$) was 12. Finally, study participants were selected using a systematic sampling method with a sampling interval of 12. The first woman was identified by using simple random sampling. Then, consecutive women were selected at a regular interval of 12th household until the needed sample size was reached. If a woman was absent from the household for 3 consecutive visits and there were no other options, the next nearest woman was included. One woman was included by using a simple random sampling method when two or more women of the reproductive age existed in the selected households.

2.4. Study Variable. The outcome variables were maternal health care utilization (ANC, SBA, and PNC), and independent variables were sociodemographic variables such as mother's age, religion, ethnicity, marital status, occupation, education, wealth status, family size, and social media; environmental factors were distance, accessibility of roads and networks, and cost of the health service; behavioral/

individual factors were attitude towards pregnancy and delivery, husbands' attitude, decision-making, illness experience for the recent pregnancy, perceived quality of care, previous bad obstetric history, gravidity, and parity.

2.5. Data Collection Procedure and Quality Control. The survey questionnaire was adapted from a standard demographic and health survey questionnaire and other previous studies [6–10]. Data collection was administered by 12 Hawassa University HDSS site data collectors. A public health expert with MPH and the principal investigator intensively supervised the data collection process. Data were collected using a structured, face-to-face interviewer-administered questionnaire. Firstly, the questionnaire was prepared in English. Secondly, it was translated into the Sidama language. Finally, it was retranslated back to English to keep its consistency. The comparison was done to assess the inconsistency and nonaccuracy between the two versions of the questionnaire. It was pretested on 5% of samples in kebeles who were not included in the actual study area. Then, any inconsistency and nonaccuracy was corrected accordingly. Training was given to data collectors and supervisors by the principal investigator for two days. The training was focused on the objective, methods, and data collection process. Regular checkup for completeness and consistency of the data was made on a daily basis. Data were cleaned and entered by the principal investigator.

2.6. Operational Definitions. *Maternal health* is the health of the women during pregnancy, childbirth, and the postpartum period.

Maternal health care services are antenatal care, delivery care, and postnatal care services.

Antenatal care is the care received from health care professionals during pregnancy at least once.

Institutional delivery refers to childbirth either in public or private health facility and attended by skilled attendants such as midwifery, nurses, doctors, and health officers.

Postnatal care is the care received from health care professionals immediately after the childbirth until around 6 weeks.

Attitude was measured using the 8 attitude assessment questions. Accordingly, those who scored above mean, mean, and below mean to the correct answers were considered as positive and negative attitude, respectively.

Perceived quality of care can be defined as the women's opinion about the overall quality or image of the service with respect to its purpose of use as against its alternatives.

Road accessibility is defined as a road providing a means of entry and exit into a village in an ambulance, motorcycle, etc.

Formal education is the process of basic education linked stretching from primary education to secondary education and higher education and that requires an organized and careful purpose that concretizes itself in an official curriculum, applied with defined calendar and timetable.

2.7. Data Processing and Analysis. The data were entered into Epi Data 3.1 and exported to the Statistical Package for Social Sciences (SPSS) version 20.0 for analysis. All required variable recoding and computations were done prior to the main analysis. Descriptive analyses were conducted to obtain descriptive measures for the sociodemographic characteristics and other variables. Tables and graphs were used for the data presentation. Chi-square (X^2) test was used to determine the overall association between explanatory and outcome variables. Cross tabulations were used to test the assumption of X^2 . A sensitivity analysis was conducted to investigate the effect of missing data by multiple imputations. Principal component analysis (PCA) was conducted in the calculation of wealth status. Wealth status was computed as a composite indicator of the living standard based on 20 variables associated to ownership of chosen household assets, scale of agricultural land, number of livestock, materials utilized for house building, and ownership of improved water and sanitation facilities. The analysis generated a summary score that explained 64.1% of variability of the data, and the score was finally ranked into five categories such as lowest, second lowest, middle, second highest, and highest.

Binary logistic regression was used to identify predictors of maternal health care utilization. The binary logistic regression analysis started with unadjusted analysis in which each potential predictor was assessed separately for its association with maternal health care utilization. Variables with P values <0.25 on the unadjusted analysis were entered into a multivariable logistic regression model to find out independent predictors of maternal health care utilization adjusting for other factors in the model [18]. The variables were entered into the multivariable model using the backward stepwise regression approach. The main assumptions of the logistic regression model (absence of outliers, multicollinearity, and interaction among independent variables) were checked to be satisfied. Accordingly, none of the interaction terms was statistically significant, indicating absence of a significant effect modification. Multicollinearity between the independent variables was also assessed using multiple linear regression. No evidence of multicollinearity was found as the variance inflation factor (VIF) for all variables was less than 10 and the tolerance statistic was greater than 0.1. The fitness of the logistic regression model was also evaluated in the model using the Hosmer-Lemeshow statistic greater than 0.05. The presence and strength of association between maternal health care utilization and the predictors were assessed using adjusted odds ratios (AORs) with 95% CIs. Statistically significant association was declared when the 95% CI of the AOR did not contain 1.

2.8. Ethical Considerations. Ethical clearance was obtained from the Institutional Review Board (IRB) at the College of Medicine and Health Sciences of Hawassa University before commencing data collection (Ref. no: IRB/056/11). An official letter of permission was obtained from the Department of Public Health to the respective district health office.

Informed written permission was also obtained from the district health office. Informed written consent was also obtained from each study participant after explaining the objectives, risks/benefits, rights, confidentiality, nature of the study, and the scope of their involvement in the study.

3. Results

3.1. Sociodemographic Characteristics of the Respondents. Sociodemographic characteristics of the study participants are summarized in Table 1. From a total of 692, only 682 study participants answered questions, making a response rate of this study 98.6%. The mean (\pm standard deviation [SD]) of the age of participants was 27 (± 7) years. The majority of respondents were within the range of 25–34 years. The mean family size of each household was 4.5 persons. According to this study, the majority 661 (96.9%) of the study participants were from the Sidama ethnic group. The majority 632 (92.7%) and 634 (93%) of the study participants were followers of Protestant Christianity and married, respectively. One hundred and thirty two (19.4%) and 141 (20.7%) of the mothers and fathers never attended formal education in the study area. The four hundred (58.7%) of the household had access to the social media such as radio and television.

3.2. Utilization of Maternal Health Care Services. The overall utilization of ANC, institutional delivery, and PNC was 69.1, 52.1, and 32.7%, respectively, in the study area. Only 4 out of 10 women (37.8%) had four or more ANC visits for their most recent live birth. The main reason that initiated mothers to use ANC during the last pregnancy was health problems (34.4%). One in five women had their first ANC visit in the first trimester, as recommended. The main descriptive reasons that study participants did not use in institutional delivery care were 122 (37.3%) no road access, 119 (36.4%) delay of ambulance, and 86 (26.3%) dislike health facility. Only 60 (26.9%) of study participants had received a recommended PNC within six weeks of delivery (Table 2).

3.3. Predictors of Maternal Health Care Service Utilization. The study revealed that odds of ANC utilization were 3.56 times higher in women who had planned current pregnancy as compared to those who had not planned (AOR = 3.56; 95% CI = 1.67–8.01). In addition, training status of women about model household by health care providers (AOR = 8.52; 95% CI = 5.52–13.15) and maternal education status (AOR = 4.72; 95% CI = 2.82–7.90) was positively associated with utilization of ANC. Moreover, the odds of utilizing ANC were 5.88 times higher for women who had the highest wealth rank (AOR = 5.88, 95% CI = 2.38–14.28) as compared to those who had the lowest wealth rank (Table 3).

The odds of utilizing institutional delivery care were 5.96 times higher for women who had ANC follow-up (AOR = 5.96, 95% CI = 3.88–9.18) as compared to those who had no ANC follow-up. In addition, husband education status (AOR = 0.20; 95% CI = 0.13–0.32) was positively

TABLE 1: Sociodemographic characteristics of study participants in Hawassa University Health and Demographic Surveillance site, South Ethiopia, 2019 ($N=682$).

Variables ($N=682$)	Categories	N (%)
Age	15–24	213 (31.2)
	25–34	329 (48.2)
	35–49	140 (20.5)
Ethnicity	Sidama	661 (96.9)
	Amhara	19 (2.8)
	Guarage	2 (0.3)
Religion	Protestant	632 (92.7)
	Orthodox	17 (2.5)
	Muslim	18 (2.6)
	Catholic	15 (2.2)
Marital status	Married	634 (93)
	Cohabiting	4 (0.6)
	Divorced	38 (5.5)
Maternal education status	Widowed	6 (0.9)
	No formal education	132 (19.4)
	Have formal education	550 (80.6)
Husband education status	No formal education	141 (20.7)
	Have formal education	541 (79.3)
Occupation of mother	Housewife	631 (92.5)
	Government employer	6 (0.9)
	Merchant	39 (5.7)
Occupation of husband	Farmer	497 (72.9)
	Government employer	45 (6.6)
	Merchant	112 (16.4)
	Others	28 (4.1)
Wealth status	Lowest	143 (21)
	Second lowest	125 (18.3)
	Middle	156 (22.9)
	Second highest	75 (11)
Social media access	Highest	183 (26.8)
	Yes	400 (58.7)
	No	282 (41.3)

associated with utilization of institutional delivery care (Table 4).

In a multivariable model adjusted for several potential confounders, the odds of utilizing PNC were 3.66 times higher (AOR = 3.66, 95% CI: 2.18–6.14) among those who had information about the PNC. In addition, maternal education status (AOR = 2.57; 95% CI = 1.48–4.44) and autonomy of women to make decision on health issues (AOR = 5.88, 95% CI = 2.38–14.28) were positively associated with utilization of PNC (Table 5).

4. Discussion

A community-based cross-sectional study was conducted to assess utilization and predictors of maternal health care services among women of the reproductive age in Hawassa University HDSS, South Ethiopia. The utilization of ANC, institutional delivery, and PNC in Hawassa University HDSS was 69.1, 52.1, and 32.7%, respectively. Maternal education status, wealth status, training status on model household, and having a plan on the current pregnancy were pertinent predictors of ANC utilization. Husband education status and ANC follow-up were major predictors of institutional

delivery care utilization. Maternal education status, presence of information about the PNC, and autonomy of women to make decision on the health issues were significant predictors of PNC utilization. The underutilization of maternal health care among the women of the reproductive age is one of the leading causes of maternal morbidity and mortality in developing countries including Ethiopia [19].

In this study, the utilization of the antenatal care was 69.1%. This finding is in agreement with the study conducted in the rural Haramaya district, East Ethiopia (70%) [9]. A very similar finding with the present study was also reported in the forest belt of Ghana (68.5%) [20]. In contrary to the present finding, studies conducted in Debre Tabor town, Amhara regional state (35.5%), East Wollega (14.4%), Dejen and Anedad (12%), and Eastern Hararge zone (38.3%), Ethiopia, reported a lower utilization of antenatal care [21–24]. However, a higher utilization of antenatal care was reported in Nepal (87%) and Nigeria (81.5%) [25, 26]. This difference might be due to the difference in the sample size, study setting, and study period. In addition, variation in level of intervention has been taking place by the midwives, HEWs, and WDAs in auditing and mobilizing pregnant and lactating women to utilize the ANC to cover large sections of the population.

Utilization of institutional delivery care was 52.1% in this study. Studies conducted in the Benishangul-Gumuz region (51.1%) and Woldia (48.3%), Ethiopia, sub-Saharan African countries (53%), and East Delhi of India (51%) reported a comparable figure to our finding [19, 27–29]. However, studies conducted in Wukro and Butajera districts of the south region (15.7%), Banja district of the Amhara region (37.9%), and Enderfa district (25%) of Ethiopia reported a lower utilization of antenatal care [28, 30, 31]. In contrary to the present finding, studies carried out in the Holeta town (61.6%) and the Sodo district (62.2%) of South Ethiopia reported a higher utilization of institutional delivery care [32, 33]. This discrepancy might be due to the fact that these surveys included urban study participants. However, our study included study participants from the rural area. Hence, urban women might have well decision-making power and well access to information than rural women.

In this study, the utilization of the antenatal care was 32.7%. This finding is higher than studies conducted in the Jabitena district of the Amhara region (20.2%), rural Eastern Haramaya district (22.6%), North Shoa (28.4%), and the national prevalence in Ethiopia (17%) [6, 9, 34, 35]. In contrary to the present finding, studies conducted in the Enderta district of Tigray (49.7%), SNNPRS (37.2%), and Assella town of the Arsi zone (72.7%) of Ethiopia revealed higher utilization of postnatal care [36–38]. This discrepancy might be due to the difference in sociodemographic characteristics, health-seeking behaviors, culture, and level of urbanization across studies.

The study revealed that odds of ANC utilization were 3.56 times higher in women who had planned the current pregnancy as compared to those who had not planned. This is consistent with the study findings from the Debre Tabor town, Wonberma, and Yem special Woreda in Ethiopia and South Africa [21, 39–41]. This might be attributed to the fact that women who had a plan to have a child may want to have

TABLE 2: Utilization of maternal health care services among women of the reproductive age in Hawassa University Health and Demographic Surveillance site, South Ethiopia, 2019 ($N = 682$).

Variable $N = 682$	Categories	N (%)
ANC use	Yes	471 (69.1)
	No	211 (30.9)
Frequency of ANC use	1–3	293 (62.2)
	≥ 4	178 (37.8)
	No knowledge	36 (17.1)
Reason for not using ANC	Being in a good state	83 (39.3)
	Far from my house	48 (22.7)
	Too busy	44 (20.9)
Main reason initiated ANC use	Health problem	162 (34.4)
	Regular checkup purpose	309 (65.6)
Time started ANC use	<4 months	78 (16.6)
	4–5 months	157 (33.3)
	>5 months	236 (50.1)
Place of delivery	Health facility	355 (52.1)
	Home	327 (47.9)
Types of health facility	Hospital	132 (37.2)
	Health center	207 (58.3)
	Health post	16 (4.5)
Reason for home delivery	Dislike health facility	86 (26.3)
	Delay of ambulance	119 (36.4)
	No road access	122 (37.3)
Types of health care provider attended delivery	Doctor	87 (17.5)
	Midwife	71 (15.3)
	Nurse	340 (68.3)
PNC use	Yes	223 (32.7)
	No	459 (67.3)
Frequency of PNC use	1–3	163 (73.1)
	≥ 4 months	60 (26.9)
	Health problem	48 (20.9)
Main reason initiated PNC use	Regular checkup purpose	124 (55.6)
	EPI service	51 (22.9)
	Immediately after delivery	97 (43.5)
Time started PNC use	Within 24 hours	73 (32.7)
	>2 days	53 (23.8)

a healthy pregnancy and therefore may give more attention for their ANC service. In addition, women who had a plan to have a child are more likely to outweigh the benefits and risks of using ANC service.

The odds of utilizing ANC were 5.88 times higher for women who had the highest wealth rank as compared to those who had the lowest wealth rank. This finding is in agreement with the studies done in Nigeria and in Ethiopia [6, 42]. It has been argued that women from poor communities or with scarce resources might have difficulties to pay for the health care cost [20]. Another similar study also argued that women from high-income families were more likely to use maternal health care services when they have personal control over the resource [43].

Maternal education status was positively associated with utilization of ANC. This finding is in agreement with studies conducted in Debre Tabor town, West Wolega in Ethiopia, and in the forest belt of Ghana [20–22].

Husband education status was positively associated with utilization of institutional delivery care. This is consistent with the study findings from rural Bangladesh and the Benishangul-Gumuz region of Ethiopia [27, 44].

The odds of utilizing institutional delivery care were 5.96 times higher for women who had ANC follow-up as compared to those who had no ANC follow-up. This finding is in agreement with the studies conducted in the Benishangul-Gumuz region, Wukro and Butajera districts, and Sodo town of Ethiopia [27, 31, 33].

Maternal education status was positively associated with utilization of PNC. Similarly, EDHS 2016 and studies carried out in Nepal and Nigeria reported a highly significant association between maternal education and postnatal utilization [45, 46]. This might be explained by the notion that education is an important factor in empowering women decision-making power towards maternal health care services, increasing knowledge of fundamental health care services, and being informed about health risks, with all of these consequently directing to the good health-seeking behavior.

In a multivariable model adjusted for several potential confounders, the odds of utilizing PNC were 3.66 times higher among those who had information about the PNC. This finding is in agreement with studies done in Demebecha district, Northwest Ethiopia [47]. Moreover, studies from

TABLE 3: Predictors of ANC utilization among women of the reproductive age in Hawassa University Health and Demographic Surveillance site, South Ethiopia, 2019 (N= 682).

Variables	ANC utilization		COR	AOR
	Yes (%)	No (%)		
<i>Age of women</i>				
15–24	148 (69.5)	65 (30.5)	1	1
25–34	235 (71.5)	94 (28.6)	1.10 (0.68, 1.42)	0.88 (0.55, 1.41)
35–49	88 (62.9)	54 (37.1)	0.72 (0.55, 1.82)	0.72 (0.41, 1.26)
<i>Wealth status</i>				
Lowest	84 (58.7)	59 (41.3)	1	1
Second lowest	67 (53.6)	58 (46.4)	1.23 (0.75, 2.00)	0.94 (0.53, 1.64)
Middle	136 (87.2)	20 (12.8)	0.21 (0.12, 0.37)	0.09 (0.04, 0.19)**
Second highest	48 (64.0)	27 (36.0)	0.80 (0.45, 1.42)	0.47 (0.20, 1.08)
Highest	136 (74.3)	47 (25.7)	0.49 (0.30, 0.78)	0.17 (0.07, 0.42)*
<i>Maternal education</i>				
Have formal education	413 (75.1)	137 (24.9)	3.85 (2.59, 5.70)	4.72 (2.82, 7.90)**
No formal education	58 (43.9)	74 (56.1)	1	1
<i>Training on model household</i>				
Yes	333 (85.8)	55 (14.2)	6.84 (4.75, 9.86)	8.52 (5.52, 13.15)**
No	138 (46.9)	156 (53.1)	1	1
<i>Road accessibility</i>				
Yes	406 (67.4)	196 (32.6)	0.48 (0.27, 0.86)	0.57 (0.27, 1.22)
No	65 (81.2)	15 (18.8)	1	1
<i>Media access</i>				
Yes	259 (64.8)	141 (35.2)	0.61 (0.43, 0.85)	0.69 (0.36, 1.34)
No	212 (75.2)	70 (24.8)	1	1
<i>Current pregnancy planned</i>				
Yes	448 (71.3)	180 (28.7)	3.36 (1.90, 5.91)	3.65 (1.67, 8.01)*
No	23 (42.6)	31 (57.4)	1	1
<i>Presence of information about ANC</i>				
Yes	427 (71.5)	170 (28.5)	2.34 (1.47, 3.71)	1.43 (0.67, 3.05)
No	44 (51.8)	41 (48.2)	1	1
<i>Counseled about danger sign during pregnancy</i>				
Yes	361 (71.3)	145 (28.7)	1.49 (1.04, 2.14)	1.56 (0.86, 2.85)
No	110 (62.5)	66 (37.5)	1	1

1 indicates the reference categories. *Significant association (P value <0.05). **Highly significant association (P value <0.01).

TABLE 4: Predictors of delivery care utilization among women of the reproductive age in Hawassa University Health and Demographic Surveillance site, South Ethiopia, 2019 (N= 682).

Variables	Place of delivery		COR	AOR
	Health facility (%)	Home (%)		
<i>Age of women</i>				
15–24	119 (55.9)	94 (44.1)	1	1
25–34	175 (53.2)	154 (46.8)	1.11 (0.71, 1.36)	0.84 (0.55, 1.28)
35–49	61 (43.6)	79 (56.4)	1.64 (1.01, 2.98)	0.77 (0.44, 1.38)
<i>Maternal education</i>				
No formal education	48 (36.4)	84 (63.6)	1	1
Have formal education	307 (55.8)	243 (44.2)	0.45 (0.31, 0.67)	0.87 (0.53, 1.42)
<i>Husband education</i>				
No formal education	31 (22.0)	110 (78.0)	1	1
Have formal education	324 (59.9)	217 (40.1)	0.19 (0.12, 0.29)	0.20 (0.13, 0.32)**
<i>Training on model household</i>				
Yes	244 (62.9)	144 (37.1)	2.79 (2.04, 3.82)	1.43 (0.98, 2.08)
No	111 (37.8)	183 (62.2)	1	1
<i>ANC use</i>				
Yes	309 (65.6)	162 (34.4)	6.84 (4.68, 9.98)	5.96 (3.88, 9.18)**
No	46 (21.8)	165 (78.2)	1	1
<i>Total number of pregnancy</i>				
One	78 (54.2)	66 (45.8)	1	1
Two	95 (51.9)	88 (48.1)	0.91 (0.59, 1.42)	1.02 (0.61, 1.69)
Three	80 (53.3)	70 (46.5)	0.97 (0.61, 1.53)	1.16 (0.66, 2.05)
Four	66 (54.5)	55 (45.5)	1.02 (0.62, 1.65)	1.08 (0.59, 1.99)
≥5	36 (42.9)	48 (57.1)	0.63 (0.37, 1.09)	0.69 (0.35, 1.40)

1 indicates the reference categories. *Significant association (P value <0.05). **Highly significant association (P value <0.01).

TABLE 5: Predictors of PNC utilization among women of the reproductive age in Hawassa University Health and Demographic Surveillance site, South Ethiopia, 2019 ($N=682$).

Variables	PNC utilization		COR	AOR
	Yes (%)	No (%)		
<i>Maternal education</i>				
No formal education	20 (15.2)	112 (84.8)	1	1
Have formal education	203 (36.9)	347 (63.1)	3.28 (1.98, 5.46)	2.57 (1.48, 4.44)*
<i>Current pregnancy planned</i>				
Yes	214 (34.1)	414 (65.9)	2.58 (1.24, 5.39)	1.69 (0.74, 3.84)
No	9 (16.7)	45 (83.3)	1	1
<i>Information about PNC</i>				
Yes	201 (40.4)	297 (59.6)	5.22 (3.20, 8.51)	3.66 (2.18, 6.14)**
No	21 (11.5)	162 (88.5)	1	1
<i>Place of delivery</i>				
Health facility	131 (36.9)	224 (63.1)	1.49 (1.08, 2.06)	1.23 (0.85, 1.76)
Home	92 (28.1)	235 (71.9)	1	1
<i>Autonomy of women to make decision on health issues</i>				
Myself	197 (45.5)	236 (54.5)	7.16 (4.57, 11.20)	6.13 (3.86, 9.73)**
Others	26 (10.4)	223 (89.6)	1	1

1 indicates the reference categories. *Significant association (P value <0.05). **Highly significant association (P value <0.01).

Nigeria and Nepal also reported a highly significant association between having information about PNC and PNC utilization [45, 46]. This might be because informed women were more likely to have a good awareness, increased level of the knowledge and skill of maternal health care service, and increased access to maternal health care services.

Autonomy of women to make decision on health issues was positively associated with utilization of PNC. This is consistent with the study findings from South Ethiopia and Bangladesh [48, 49]. This might be because women who have a power of decision-making on health issues are more likely confident to utilize postnatal care service.

4.1. Limitation of the Study. This study has a number of strengths. Among these are the community-based nature, enrollment of a relatively large number of study participants from multiple kebeles, and utilization figure presentation for various maternal health care. Also, these large study participants provided representative and valuable evidence for all women of the reproductive age which is important to develop a relevant policy strategy for efficient promotion of maternal health care utilization. Further, we tried to measure and accounted for several potential confounders that can individually explain the association between the variables of interest. Regardless of its strengths, our study has some basic limitations that might be considered while interpreting the findings. First, the cross-sectional nature of the study design does not exactly establish the cause and effect relationship. Secondly, the study might be prone to recall bias because the information was collected by the study participants' self-report.

5. Conclusions

The utilization of maternal health care services was far below the targeted health sector growth and transformation plan in the study area. The low utilization of maternal health care

services in the study area indicated that much work remains to be done to improve the health of women.

Maternal education status, wealth status, training status on model household, and having a plan on the current pregnancy were pertinent predictors of ANC utilization. Husband education status and ANC follow-up were major predictors of institutional delivery care utilization. Maternal education status, presence of information about the PNC, and autonomy of women to make decision on the health issues were significant predictors of PNC utilization. Therefore, increasing ANC follow-up of the women using various methods of health education should be considered. In addition, enhancing autonomy of women to make decision on the health issues to have an explicit power is also important. Moreover, providing relevant information about PNC for women who have no information is also of paramount importance. Finally, further research using the analytical study design to identify predictors of maternal health care utilization is required.

Abbreviations

AOR:	Adjusted odds ratio
ANC:	Antenatal care
CI:	Confidence interval
DRC:	Democratic Republic Congo
GTP 2:	Growth and transformation plan 2
HDSS:	Health and Demographic Surveillance System
HEWs:	Health extension workers
IRB:	Institutional Review Board
OR:	Odds ratio
PCA:	Principal component analysis
PNC:	Postnatal care
RH:	Reproductive health
SBA:	Skilled birth attendance
SD:	Standard deviation
SPSS:	Statistical Packages for Social Science
VIF:	Variance inflation factors

WDAs: Women development arms
WHO: World Health Organization.

Data Availability

Data are available upon request from the corresponding author.

Disclosure

The funded agency did not take part in the thesis design, data collection, and manuscript preparation process.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

ES was involved in initiation of the research question, prepared the research proposal, carried out the research, did the data entry and analysis, and wrote the manuscript. AY was involved in thesis development, did the data entry and analysis, and wrote and revised the manuscript. AT conducted edition, advising, cooperatively prepared research tools with PI, and revised the manuscript. All authors read and approved the final manuscript.

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References

- [1] World Health organization (WHO), *Maternal, Child and Adolescent Health Care*, WHO, Geneva, Switzerland, 2016.
- [2] S. O. Gyimaha, B. Takyi, and I. Addai, "Challenges to the reproductive health needs of African women: on religion and maternal health care utilization in Ghana," *Social Science & Medicine*, vol. 62, pp. 2930–2944, 2016.
- [3] R. Lozano, M. Naghavi, K. Foreman, S. Lim, K. Shibuya, and V. Aboyans, "Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2016: a systematic analysis for the global burden of disease study," *Lancet*, vol. 380, no. 9859, pp. 2095–2128, 2016.
- [4] World Health Organisation (WHO), *Trends in Maternal Mortality: 1990 to 2010*, World Health Organization, Geneva, Switzerland, 2010.
- [5] L. Kululanga, J. Sundby, A. Malata, and E. Chirwa, "Male involvement in maternity health care in Malawi," *African Journal of Reproductive Health March*, vol. 16, no. 1, p. 145, 2012.
- [6] Central Statistical Agency (CSA), "[Ethiopia] and ICF," *Ethiopia Demographic and Health Survey 2016: Key Indicators Report. 2016: Addis Ababa, Ethiopia, and Rockville, CSA and ICF, Maryland, USA, 2016*.
- [7] T. Bahilu, A. G. Mariam, and D. Yohannes, "Factors affecting antenatal care utilization in Yem special woreda, southwestern Ethiopia," *Ethiopian Journal of Health Sciences*, vol. 2010, 2009.
- [8] A. Zeine and O. Shimeles, "Factors influencing antenatal care service utilization in hadiya zone," *Ethiopian Journal of Health Sciences*, vol. 20, no. 2, pp. 75–82, 2009.
- [9] D. Kifle, Y. Assefa Gelaw, and Y. A. Melsew, "Maternal health care service seeking behaviors and associated factors among women in rural Haramaya District, Eastern Ethiopia," *BMC Journal*, vol. 14, no. 6, 2017.
- [10] D. A. Yinager, "Factors affecting utilization of postnatal care service in Jabitena district, Amhara region, Ethiopia," *Sci J Public Health*, vol. 2014, 2014.
- [11] FMOH, *National Reproductive Health Strategy to Improve Maternal and Child Health*, FMOH, Addis Ababa, Ethiopia, 2016–2020.
- [12] J. Borghi, B. Thapa, D. Thapa et al., "Economic assessment of a women's group intervention to improve birth outcomes in rural Nepal," *The Lancet*, vol. 366, no. 9500, pp. 1882–1884, 2005.
- [13] T. Colbourn, B. Nambiar, A. Bondo et al., "Effects of quality improvement in health facilities and community mobilization through women's groups on maternal, neonatal and perinatal mortality in three districts of Malawi: MaiKhanda, a cluster randomized controlled effectiveness trial," *International Health*, vol. 5, no. 3, pp. 180–195, 2013.
- [14] K. J. Kerber, Z. A. Bhutta, J. E. de Graft-Johnson et al., "Continuum of care for maternal, newborn, and child health: from slogan to service delivery," *The Lancet*, vol. 370, no. 9595, pp. 1358–1369, 2007.
- [15] M. Kinney and K. Kerber, "Science in action: saving the lives of Africa's mothers, newborns, and children," in *RfASAD Editor Initiative*, National Academies, Cape Town, South Africa, 2009.
- [16] Z. A. Bhutta, G. L. Darmstadt, B. S. Hasan, and R. A. Haws, "Community-based interventions for improving perinatal and neonatal health outcomes in developing countries: a review of the evidence," *Pediatrics*, vol. 115, no. 2, pp. 519–617, 2005.
- [17] Hawassa University Research Center, *Annual Research Center Health and Demographic Surveillance System Site Report*, Hawassa University Research Center, Hawassa, Ethiopia, 2018.
- [18] L. S. Hosmer-Lemeshow, *Purposeful Selection of Variable in Logistic Regression. Applied Logistic Regression*, Wiley, New York, NY, USA, 2000.
- [19] W. Wang, W. Shanzhao, and F. Alfredo, "Levels and trends in the use of maternal health services in developing countries," DHS comparative reports. No. 26, ICF Macro, Calverton, MA, USA, 2016.
- [20] P. A. B. Gladys Buruwaa Nuamah, K. A. Mensah, and D. Boateng, "Access and utilization of maternal healthcare in a rural district in the forest belt of Ghana," *BMC Pregnancy and Childbirth*, vol. 19, no. 1, 2019.
- [21] T. W. Ayalew and A. M. Nigatu, "Focused antenatal care utilization and associated factors in Debre Tabor Town, northwest Ethiopia," *BMC Journal*, vol. 11, no. 1, 2017.

- [22] T. Tekelab, B. Yadecha, and A. S. Melka, "Antenatal care and women's decision making power as determinants of institutional delivery in rural area of Western Ethiopia," *BMC Research Notes*, vol. 8, no. 1, p. 769, 2015.
- [23] T. Getachew, A. A. Abajobir, and M. Aychiluhim, "Focused Antenatal care service utilization and associated factors in Dejen and Aneded Districts, Northwest Ethiopia," *Prime Healthcare Services*, vol. 4, p. 4, 2014.
- [24] D. Z. Ayele, B. Belayihun, K. Teji, and D. Admassu Ayana, "Factors affecting utilization of maternal health Care Services in Kombolcha District, eastern Hararghe zone, Oromia regional state, eastern Ethiopia," *International Scholarly Research Notices*, vol. 2014, Article ID 917058, 7 pages, 2014.
- [25] A. F. Fagbamigbe and E. S. Idemudia, "Assessment of quality of antenatal care services in Nigeria: evidence from a population-based survey," *Reproductive Health*, vol. 12, 2015.
- [26] H. Tuladhar and N. Dhakal, "Impact of antenatal care on maternal and perinatal outcome: a study at Nepal Medical College Teaching Hospital," *Nepal Journal of Obstetrics and Gynaecology*, vol. 6, no. 2, pp. 37-43, 2016.
- [27] S. Weldemariam, A. Kiros, and M. Welday, "Utilization of institutional delivery service and associated factors among mothers in North West Ethiopian," *BMC Research Notes*, vol. 11, p. 194, 2018.
- [28] A. Worku, J. Muhammed, and A. Gedefaw, "Institutional delivery service utilization in Woldia, Ethiopia," *Science Journal of Public Health*, vol. 1, no. 1, pp. 18-23, 2013.
- [29] P. C. Anita, A. T. Kannan, and S. Gayatri, "Determinants of utilization pattern of antenatal and delivery services in an urbanized village of east Delhi Indian," *Journal of Preventive & Social Medicine*, vol. 41, pp. 3-4, 2010.
- [30] A. Aregay, H. Assefa, and W. Terefe, "Factors associated with maternal health care services in Enderta district, Tigray, northern ethiopia: a crosssectional study," *American Journal of Nursing Science*, vol. 3, no. 6, pp. 117-125, 2016.
- [31] S. D. Hagos, M. Assegid, A. Mekonen, M. A. Fantahun, and S. Ahmed, "Utilization of institutional delivery service at Wukro and Butajera districts in the northern and South Central Ethiopia," *BMC Pregnancy Childbirth*, vol. 14, p. 178, 2016.
- [32] K. Birmeta, Y. Dibaba, and D. Woldeyohannes, "Determinants of maternal health care utilization in Holeta town, central Ethiopia," *BMC Health Services Research*, vol. 13, p. 256, 2015.
- [33] F. Hailemichael, M. Woldie, and F. Tafese, "Predictors of institutional delivery in Sodo town, Southern Ethiopia," *African Journal of Primary Health & Family Medicine*, vol. 5, no. 1, p. 9, 2013.
- [34] S. S. Matijasevich, M. Silveira, M. Domingues, and A. Barros, "Inequities in maternal postnatal visits among public and private patients: 2014 Pelotas Cohort study," *BMC Public Health*, vol. 9, p. 335, 2014.
- [35] W. T. Mohammed Akibu, T. Megersa, and S. Nurgi, "Prevalence and determinants of complete postnatal care service utilization in northern Shoa, Ethiopia," *Journal of Pregnancy*, vol. 2018, Article ID 8625437, 7 pages, 2018.
- [36] D. A. Amame Tumbure, E. Fantahun, and M. Negusu, "Assessment of postnatal care service utilization and associated factors in asella town, Arsi zone, oromiya regional state, Ethiopia," *Global Journal of Reproductive Health*, vol. 6, no. 1, 2020.
- [37] Y. Gebeyehu and D. W. Hailu, "Factors affecting utilization of postnatal care service in Jabitena district, Amhara region, Ethiopia," *Science Journal of Public Health*, vol. 2, no. 3, pp. 169-176, 2014.
- [38] N. Rikiba, "Antenatal and postnatal care service utilization in Southern Ethiopia: a population -based study," Awasa, Ethiopia, Unpublished thesis.
- [39] A. M. Joy Ebonwu, M. Uys, and M. L. Wainberg, "Determinants of late antenatal care presentation in rural and peri-urban communities in South Africa: a cross-sectional study," *PLoS One*, vol. 13, no. 3, Article ID e0191903, 2018.
- [40] K. T. Mulat and M. Aychiluhim, "Antenatal care service utilization and its associated factors among mothers who gave live birth in the past one year in womberma woreda, north west ethiopia," *Epidemiology*, vol. S2, no. 3, 2015.
- [41] D. Y. Tewodros, "Factors affecting antenatal care utilization in Yem special woreda, southwestern Ethiopia," *Ethiopian Journal of Health Sciences*, vol. 19, no. 1, 2009.
- [42] A. A. Emmanuel Olorunleke Adewuyi, V. Khanal, and O. David Bamidele, "Prevalence and factors associated with underutilization of antenatal care services in Nigeria: a comparative study of rural and urban residences based on the 2013 Nigeria demographic and health survey," *PLoS One*, vol. 13, no. 5, Article ID e0197324, 2013.
- [43] N. Chakraborty, "Determinants of the use of maternal health services in rural Bangladesh," *Health Promotion International*, vol. 18, no. 4, pp. 327-337, 2003.
- [44] S. Yaya, G. Bishwajit, and M. Ekholuenetale, "Factors associated with the utilization of institutional delivery services in Bangladesh," *PLoS One*, vol. 12, no. 2, Article ID e0171573, 2017.
- [45] K. Vishnu, M. Adhikari, and R. Karkee, "Factors associated with the utilisation of postnatal care services among the mothers of Nepal: analysis of Nepal Demographic and Health Survey 2011," *BMC Women's Health*, vol. 14, 2014.
- [46] O. D. Somefun and L. Ibisomi, "Determinants of postnatal care non-utilization amongwomen in Nigeria," *BMC Research Notes*, vol. 9, 2016.
- [47] M. Ayana Hordofa, M. G. Berhanu, and H. B. Lemiso, "Postnatal care service utilization and associated factors among women in Dembecha district, northwest Ethiopia," *Science Journal of Public Health*, vol. 3, 2015.
- [48] S. G. Anteneh Asefa, T. Messele, Y. Letamo, and E. Shibr, "Mismatch between antenatal care attendance and institutional delivery in south ethiopia: a multilevel analysis," *BMJ Open*, vol. 9, Article ID e024783, 2019.
- [49] M. R. Haider, Z. P. Qureshi, and M. M. Khan, "Effects of women's autonomy on maternal healthcare utilization in bangladesh: evidence from a national survey," *Sexual & Reproductive Healthcare*, vol. 14, 2017.