

DETERMINANTS OF ANTENATAL CARE SERVICE UTILIZATION AMONG MOTHERS IN ANEDED WOREDA, AMHARA REGION, NORTH WEST ETHIOPIA

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ABSTRACT

Objective: This study is aimed to determining the prevalence of antenatal care (ANC) utilization and associated factors among women of Aneded woreda who give birth in the past 12 months before the survey.

Methods: Community-based cross-sectional combining both quantitative and qualitative study design with total sample size of 415 is used. The data are entered and analyzed using the Statistical Package for the Social Sciences version 20 and binary logistic regression model is used to see the association of different variables with the outcome variable. Odds ratio at 95% confidence interval was used to measure strength, and statistical significance of associations.

Results: The overall mothers utilization of ANC is 60.5% (55.4, 65.3). Multivariable analysis shows being rural resident, no pregnancy complication, get health education about ANC, give birth at health center, and traveling less than or equal to 1 h distance on foot from home to health center that is significant factors for ANC service utilization.

Conclusion: In this study, even though the result revealed that percentage of women who utilized ANC service were greater than women who did not utilize; the difference is slightly lower as compared to the regional and national averages and more efforts should be needed to improve ANC utilization of mother.

Keywords: ANC utilization, Aneded woreda, Amhara Region, Ethiopia.

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INTRODUCTION

Accessible maternal health care is a critical component of reproductive health-care service that affects women, their families, communities, and nations at large. Beyond access, the quality of maternal health-care matters, and every woman everywhere has the right to high quality maternal health care [15].

Antenatal care (ANC) is one indicator of maternal health care. ANC can be defined as the care provided by skilled health-care professionals to pregnant women and adolescent girls in to ensure the best health conditions for both mother and baby during pregnancy. The components of ANC include: Risk identification; prevention and management of pregnancy-related or concurrent diseases; and health education and health promotion [24].

Worldwide, every day, approximately 830 women die from preventable pregnancy and childbirth related complications and up to 358,000 women die each year in pregnancy and childbirth related complications. Of this, 99% of all maternal deaths occur in developing countries. More than half of these deaths occur in sub-Saharan Africa [25]. According to Ethiopian demographic and health survey (EDHS), pregnancy-related maternal mortality in Ethiopia by 2016 was 412/100,000 live births [12].

The estimated worldwide coverage of the early ANC visits increased from 40.9% in 1990 to 58.6% in 2013, and in the developing regions, it was 48.1% in 2013 compared with 84.8% in the developed regions [1].

Only half of women worldwide receive the recommended amount of care (receiving eight ANC visits) during pregnancy. In 2018, 86% of pregnant women worldwide access ANC with a skilled health

personnel at least once, while only three in five (62%) receive at least four antenatal visits and in regions with the highest rates of maternal mortality, such as sub-Saharan Africa only half of women received at least four antenatal visits [26].

The utilization of maternal health-care services is inadequate in Ethiopia, as clearly depicted by ANC (62% receive at least once) and PNC (43.8% [16.5% for mothers and 27.3% for new born]). Only 20% of women had their first ANC during the first trimester, 26% during their 4–5th month of pregnancy, and 14% during their 6–7th month of pregnancy and 2% of women did not receive any ANC until the 8 month of pregnancy or later [12].

In Amhara region, where the study area is residing in 67.1% of women who had a live birth in the 5 years before the survey received ANC from a skilled provider at least once [12].

A research done in Dessie referral hospital revealed that mothers who did not attend ANC were 4 times more likely to have adverse birth outcome (still birth and low birth weight) when compared to those who attended ANC follow-up [7].

Most studies in Ethiopia indicate the low utilization of ANC even below the national average (62% in 2016). For instance, a study in Eastern Wollega shows that 57.5% of the respondents had at least one antenatal visit. Out of which 13.1% had only one, 31.8% had two antenatal contacts 40.2% had three visits, and only 14.9% had the recommended four or more antenatal visits [20].

A research done in Amhara region, Dembecha District also shows the low utilization of ANC service that was 57%. Marital status, educational status, and income were important predictors for ANC service

utilization [9]. This research uses only quantitative research design, done on pregnant women's (which may be difficult to collect data from mothers who are found at the beginning of their pregnancy) and it uses simple random sampling to select sample study kebeles without considering their distance from health center. The present research using a mixed research method combining both quantitative and qualitative research approaches as a supplementary to the quantitative method aimed to determine the current prevalence of ANC utilization among mothers and its associated factors. The target populations are mothers who give birth in the past 12 months before the survey and I separate rural kebeles of the woreda in to two based on their distance from health center to minimize error by the simple random sampling. In Amhara region, few researches were done and no prior research found in the study area, Aneded woreda. Therefore, the result of this study will contribute to improve mothers and their child's health.

General objective

The general objective of this study is to assess determinants of ANC utilization among women who give birth in the past 12 months before the survey in Aneded woreda.

Specific objectives

The specific objectives of this research are the following:

- To find out the prevalence of ANC service utilization among women of reproductive age in Aneded woreda.
- To investigate the determinant factors that affect ANC service utilization among women of reproductive age in Aneded woreda.

METHODS

Study area, period, and study design

The study was conducted in Aneded woreda from December 2018 to May 2019 GC. The woreda has a total area of 67,585.4 hectare. According to finance and economic office, department of population of Aneded woreda, the projected total population of the woreda in 2019 is 107,255, from this 52,520 are male and 54,705 are female. Of them, 3436 were living in urban and 103,788 were living in rural areas. According to health office of the woreda, it has 2301 total pregnant women in 2018 reported from each kebele by health extension workers, from this 548 of them are found in the selected study sites. There are four health centers, 20 health posts (1 in urban and the remaining are in rural), and four private clinics existed in the woreda. Community-based cross-sectional combining both quantitative and qualitative study design is used to conduct the study.

Data sources, source, and study population

The main data source for this study was primary data. The primary data source was collected through questionnaires, key informants, and focus group discussions. The study populations of this research are all women in the reproductive age who give birth in the past 12 months before the survey in Aneded woreda and all women in the reproductive age who give birth in Aneded woreda are the source population for the research.

Inclusion and exclusion criteria

All women in the reproductive age who give birth in the past 12 months before the survey in Aneded woreda are included in the study and women who are critically ill, unable to communicate and mentally impaired are excluded from the study.

Sample size determination

The sample size is determined by the single population proportion formula by considering 57% proportion of ANC utilization of a study done in Amhara region, Dembecha district with a marginal error of 5% between the sample and the population at 95% confidence level and with 10% non-response rates (Gedefaw *et al.*, 2014).

$$n = \frac{(Z\alpha/2)2p(1-p)}{d^2} \quad (\text{Cochran, 1963})$$

n = sample size required for the study

Z = standard normal distribution (Z=1.96), CI of 95% = 0.05

p = 57% (0.57) taken from a study conducted in Amhara region, Dembecha district

d = Absolute precision or tolerable margin of error = 5% (0.05)

$$n = \frac{[(1.96]^2 \times 0.57 \times 0.43}{(0.05)^2}$$

$$= 377$$

By adding 10% contingency the minimum sample size is 415.

Sampling and data collection techniques

First of all the researcher separate the total rural kebeles existed in the woreda purposively as near to health center and far from health center based on their distance from health centers to minimize the error caused by chance. By this method, the researcher get seven kebeles near to the health center and 12 kebeles far from health center. Then, the researcher proportionally selects one kebele from nearest kebeles and two from the remote kebeles using simple random sampling of lottery method. The selected kebeles are Amber Zuria from near to health centers and Wonga Nefasam and Gudalema from far from health centers. The researcher takes Amber Ketema kebele directly; hence, there is no other urban kebele in the woreda. In general, the researcher takes four kebeles as a sample from 20 kebeles existed in the woreda. Then, the samples are proportionally selected from each of the four kebeles. After that, the data are collected using systematic sampling method; hence, the list of mothers who gave birth in the past 12 months before the survey is obtained from health post of each kebele.

The data are collected by six female data collectors who have at least diploma educational level. Before the actual data collection, the data collectors are trained by the principal researcher about each question and data gathering techniques. Structured questionnaires are prepared in English, based on an existing literature, and translated into the local language (Amharic). To ensure that the questions were clear and could be understood by both the enumerators and the respondents, the questionnaire is pretested in yelemelem kebele which is one of the kebeles of Basoliben woreda (district) with 20 respondents and errors in spellings are observed and edited for the final data collection. The questionnaire collects information on demographic and socioeconomic, maternal; health facility and health-care provider related factors as well as use of ANC for the recent pregnancy (12 months before the survey). During the data collection process, data collectors are closely supervised by the principal investigator.

The quantitative data are supplemented by qualitative data which are collected from key informants from three health extension workers, woreda health office head, and health center heads from each kebele and two FGDs (one in near to health center and one far from health center) kebeles also conducted to supplement the quantitative data. The qualitative data of FGDS are collected from 8 mothers (two use ANC, two not use ANC, two book ANC in the 1st trimester, and two not book

Table 1: Study sites and sampling

S. No.	Near and far from health centers	Study kebele	Total population of pregnant women in 2018	Sample size
1.	Far	Wonga Nefasam	184	139
2.	Far	Gudalema	155	117
3.	Near	Amber Zuria	107	81
4.		Amber Ketema	102	78
Total			548	415

Source: Aneded Woreda Health Office

ANC in the 1st trimester) who give birth in the past 12 months prior to the survey of one group for each. Questions raised for generating qualitative results are the availability of ANC service, what present of mothers receive the service, major factors that prevent mothers for utilizing the service, utilization of ANC service with the recommended time and frequency, place of delivery, and measures to improve ANC utilization and first ANC booking.

Study variables

The outcome variable is ANC utilization and the explanatory variables are demographic, socioeconomic, maternal, health facility, and health-care provider factors.

Data quality control and analysis

Once the data are collected that it is cleaned, recoded, entered into, and analyzed using the Statistical Package for the Social Science version 20. Frequencies, graphs, and cross-tabulations are used to summarize the descriptive statistics.

Before the regression analyses, the categorical data were crosschecked to ensure that all expected frequencies in each cell of a cross-tabulation table were >1 and that no more than 20% were <5. Multicollinearity was checked based on variance inflation factors (VIF) and tolerance (T) values for continuous variables, and based on the VIF and T value, the variable number of children born was removed from regression analysis. For most of the variables when their Multicollinearity diagnosis was checked their VIF is near to 10 and their T is near to 0.1. it means the variables VIF is high and their T were low. It indicates that there is no multicollinearity effect between variables.

Binary logistic regression model is used to analyze ANC utilization which is an outcome variable, which is dummy. All the variables are entered in to bivariable analysis and those explanatory variables with $p < 0.25$ in crude analysis are considered as a candidate for multivariate analysis (Walter *et al.*, 2000) and those variables with $p < 0.05$ in multivariate analysis are considered as significant predictor of ANC utilization with 95% CI.

RESULTS

Demographic and socioeconomic characteristics of respondents

As indicated in Table 1 the sample size taken from wonga nefasam is 139, gudalema 117, amber zuria 81 and amber ketema is 78.

Out of 415 samples, 392 responded the interview with response rate of 94.4% within the period of data collection and 5.6% of the respondents not respond to the questionnaire, because some of them were not found in their home during the data collection period and some refuse to participate.

As indicated in Table 2, the mean age of the respondents was 28.56 year. The average age at 1st marriage and delivery was 12.16 year and 18.24 year, respectively, and also, the mean parity and mean family size were 3.2 and 4.8, respectively. Majority of mothers were married 363 (92.6%) and about 314 (80.1%) of the respondents live in rural areas.

As shown in the same table, the dominant religion was orthodox 381 (97.2%) and the average income of the respondents was 2889.02 birr. Most of the respondents were not educated 295 (75.3%) and majority of the respondents were house wife 331 (84.4%). Two hundred and seventy-one (69.1%) of the respondents husbands' were not educated and about 292 (74.5%) of the respondents did not get special support from family/spouse during their last pregnancy. About 63 (16.1%) of the respondents had Radio/TV and 329 (83.9%) of the respondents had no Radio/TV in their home. From those respondents who had radio/TV 40(63.5%) watch Radio/TV at least once, 5(7.9%) once and 18(28.6%) do not watch Radio/TV at all in a week. About 249 (63.5%) of the respondents had health insurance and 1439 (36.5%) do not had health insurance.

Table 2: Summary of descriptive statistics for demographic and socioeconomic characteristics of respondents

Continuous variable (n=392)	Minimum/ maximum	Mean/ St.deviation
Age	18/45	28.56/6.05
Income	500/17000	2889.02/2339.34
Age at 1 st marriage	6/26	12.16/4.17
Age at 1 st delivery	13/34	18.24/3.48
Parity	1/10	3.2/2.1
Family size	2/10	4.8/1.7
Categorical Variable (n=392)	Frequency	Percentage
Marital status		
Single	1	0.3
Married	363	92.6
Divorced	24	6.1
Widowhood	4	1
Religion		
Orthodox	381	97.2
Muslim	11	2.8
Residence		
Rural	314	80.1
Urban	78	19.9
Occupation		
House wife	331	84.4
Government employed	15	3.9
Others (daily laborer and merchants)	46	11.7
Educational status of mother		
Not educated	295	75.2
Primary	63	16.1
Secondary	18	4.6
Above secondary	16	4.1
Educational status of husbands		
Not educated	271	69.1
Primary	80	20.4
Secondary	21	5.4
Above secondary	20	5.1
Support from family/spouse		
Yes	100	25.5
No	292	74.5
Have Radio/TV		
Yes	63	16.1
No	329	83.9
Frequency of watching Radio/TV (n=63)		
At least once a week	40	63.5
Once a week	5	7.9
Not at all	18	28.6
Ownership of health insurance		
Yes	249	63.5
No	143	36.5

Source: Field survey 2019

Maternal and health facility related factors

As indicated in Table 3, 287 (73.2%) of respondents planned their last pregnancy, 233 (59.4%) delivered normally, and 159 (40.6%) delivered not normally when they deliver their last child. From those mothers who were not deliver normally 67(42.1%) was delivered by cesarean section and 92(57.9%) by episiotomy. About 132 (33.7%) had pregnancy complication, 260 (66.3%) do not had pregnancy complication, and from those who experience pregnancy complication, the dominant one was abdominal pain which covers 80 (33.6%) followed by fever 66 (27.7%).

As indicated in the same Table 3, the average distance between the home of the respondents and the nearest health center was 54.88 min, 174 (44.4%) of the respondents give birth at their home, and 218 (55.6%) give birth at health center. The qualitative result in both of the groups shows that most mothers delivered at home in their area due to long distances travelled to reach the health center by far from health center group and shortage of ambulance, lack of information,

Table 3: Maternal and health facility-related factors

Continuous Variable (n=392)	Minimum/ maximum	Mean/ St.deviation
Distance from home to health center in minutes	3/120	54.88/31
Categorical Variable (n=392)	Frequency	Percentage
Place of delivery		
Home	174	44.4
Health center	218	55.6
Type of pregnancy		
Planned	287	73.2
Unplanned	105	26.8
Mode of delivery		
Normal	233	59.4
Not normal	159	40.6
How you deliver your last baby (n=159)		
Cesarean section	67	42.1
Episiotomy	92	57.9
Pregnancy complication		
Yes	132	33.7
No	260	66.3
Pregnancy complications the respondent experienced (n=238)*		
Vaginal bleeding	9	2.3
Vaginal gush of fluid	1	0.26
Severe headache	58	14.8
Blurred vision	1	0.26
Fever	66	16.8
Abdominal pain	80	20.4
Convulsion	23	5.9

Source: Field survey 2019. *Multiple responses

and dissatisfaction with the service provided were answers from near to health center groups, and this answer is a little bit contradict with the quantitative one. According to woreda health office head, woreda health center head and health extensions' of the 3 kebeles most of the mothers deliver in health centers and delay of ambulance, not following their pregnancy in health centers, haste labor, and lack of information were reasons for why mothers deliver at home and this is in line with the quantitative result.

Health-care provider factors

Regarding the health-care providers to women during the time of their last pregnancy, the study shows that 28 (7.1%) of respondents were visited by health extension workers and about 364 (92.9%) were not visited by health extension workers.

As indicated in Table 4, about 108 (27.6%) had get health education and 284 (72.4%) did not get health education about ANC during their last pregnancy. From those who had get health education about ANC during their last pregnancy, about half of them 54 (50%) did not know very well by whom they had get this health education and about 169 (71.3%) of the respondents respond that health-care providers were available when they go to health centers for utilizing ANC service and the dominant sex of service provider was male which covers 90 (38%).

Magnitude of ANC service utilization (ANC)

About two hundred and thirty-seven (60.5%) respondents utilized ANC, 155 (39.5%) did not utilized ANC during their last pregnancy, and the dominant reason for not utilizing ANC service for mothers during their last pregnancy was apparently due to absence of complication or illness which covers 118 (38.7%).

The qualitative result for the groups near to health centers shows that ANC service is available in their area and about 30–50% of mothers in their area utilize the service, this is slightly lower than the quantitative result. The reason for why not utilizing ANC service get similar answer by the two groups, which include apparently healthy/no illness, not

Table 4: Health-care provider factors

Categorical Variable (n=392)	Frequency	Percentage
Home visit by health extension worker		
Yes	28	7.1
No	364	92.9
Availability of health-care provider (n=237)		
Yes	169	71.3
No	68	28.7
Taking health education about ANC		
Yes	108	27.6
No	284	72.4
Health education provider (n=108)		
Doctor	3	2.8
Nurse	3	2.8
Midwife	14	12.9
Health extension worker	34	31.5
I do not know very well	54	50
Sex of ANC service provider (n=237)		
Only male	90	38
Only female	61	25.7
Male/female	86	36.3

Source: Field survey 2019

satisfied with the service, shortage of knowledge on the service, and long distance reaching to health centers, in which most of the reasons support the quantitative result.

The head of the woreda health office said that ANC service is available in the woreda and about 50–85% of women utilize the service and this is slightly higher than the quantitative result and also the reason for not utilizing ANC according to him are mothers did not know pregnancy needs always follow-up and traditional attitudes and perceptions.

The head of health center said that ANC service is available in the woreda and about 75% of mothers utilize the service and this is slightly higher than the quantitative result and according to him problem of caples agreement, problem of transportation, and the land of the woreda is not accessible are possible reasons for not utilizing the service.

The health extension workers said that ANC service is available in their area and about 30–90% of mothers utilize the service and the reasons for not utilizing the service are no illness, long distance to go to health centers, and dissatisfied with the service providers which are some of them. This is in line with the quantitative result.

Both groups of FGDS and the key informants said that giving adequate education in each sub kebele; increase the number of ambulance and construction of the health centers, give the service with trained health professions, strength one to five relations, and strength relations of health centers with health posts, and improves transportation service as the possible measures to be taken to improve ANC utilization of the Aneded woreda.

As showmen in Table 5 below from those who received ANC service, the dominant service given to them during their last pregnancy was blood pressure measured 237 (26.5%) followed by give a urine sample 235 (26.3%). About 136 (57.4%) of the respondents frequency of ANC visit was ≤3 times and 101 (42.6%) of the respondents frequency of ANC visit were 4 and above times.

Factors associated with ANC utilization

Bivariable and multivariable logistic regression were used to identify factors which had association with dependent or outcome variable. Accordingly, all independent variables were checked with binary logistic regression. Bivariable analysis indicated that residence, educational level of mother, educational level of husband, type of pregnancy, pregnancy complication, own health insurance, get support from family/spouse, get health education about ANC, home visit by HEW, place of birth, mode of delivery, distance from home to health

center, family size, age at first marriage, and age at first delivery had association with ANC utilization. Variables, with $p < 0.25$ for bivariable analysis, had taken into multivariable analysis for further analysis to

manage confounding effect [22].

Those variables had $p < 0.05$, which were considered as significantly associated or influence the outcome variable or ANC service utilization.

Table 5: Services get by the respondents during their ANC follow-up and reasons for not utilizing ANC service

Variable	Frequency	Present (%)
Services get during ANC follow-up (n = 893)*		
Blood pressure measured	237	60.4
Give a urine sample	235	60
Give a blood sample	234	59.6
Nutritional counseling	187	47.7
Reasons for not utilizing ANC service (n = 305)*		
Not trust on health worker	5	1.27
Not satisfied with the service	75	19.13
Service is far from my home	46	11.73
Health workers did not respect me	2	0.5
Work load at home	53	13.5
Husband is not willing	6	1.53
Apparently healthy/no illness	118	30

Source: Field survey 2019. *Multiple responses

As indicated in Table 6 below the significant association shows that urban residents were 8.4 times more likely to utilize ANC service as compared to rural residents with adjusted OR=8.4, 95% CI: 2.5, 27.7. Mothers with no pregnancy complication were 0.361 times less likely to utilize ANC service as compared to mothers who had pregnancy complication with adjusted OR=0.361, 95% CI: 0.205, 0.636 and mothers who get health education about ANC service were 4.32 times more likely to utilize ANC service as compared to mothers who did not get health education about ANC with adjusted OR=4.32, 95% CI: 1.9, 9.6. Mothers who give birth at health centers were 2.89 times more likely to utilize ANC services as compared to mothers who give birth at home with adjusted OR=2.89, 95%CI: 1.11, 7.5 and mothers traveled ≤ 1 h distance from home to health center were 2.15 times more likely to utilize ANC service as compared to mothers who travelled 1 h and above distance from home to health center with adjusted OR=2.15, 95% CI: 1.26, 3.66.

Table 6: Factors associated with ANC utilization

Categorical variables	ANC utilization		B (S.E)	Crude OR (95% CI)	Adjusted OR (95% CI)
	Yes	No			
Residence					
Rural (ref)	163 (51.9%)	151 (48.1%)			
Urban	74 (94.9%)	4 (5.1%)	2.13 (0.608)	17.1 (6.1, 48)	8.4 (2.5, 27.7)***
Mothers education level					
Not educated	161 (54.6%)	134 (45.4%)	-1.2 (1.012)	0.075 (0.018, 0.31)	0.27 (0.038, 1.9)
Primary	44 (69.8%)	19 (30.2%)	-1.1 (1.011)	145 (0.031, 66)	0.33 (0.046, 2.4)
Above primary (ref)	32 (94.1%)	2 (5.9%)			
Husband education level					
Not educated	143 (52.8%)	128 (47.2%)	-0.1006 (0.99)	0.057 (0.014, 0.24)	0.36 (0.052, 2.5)
Primary	55 (68.8%)	25 (31.2%)	-0.52 (1.006)	0.113 (0.025, 0.504)	0.59 (0.083, 4.2)
Above primary (ref)	39 (95.1%)	2 (4.9%)			
Type of pregnancy					
Planned (ref)	180 (62.7%)	107 (37.3%)			
Unplanned	57 (54.3%)	48 (45.7%)	-0.35 (0.3)	0.706 (0.449, 1.11)	0.701 (0.38, 1.2)
Pregnancy complication					
Yes (ref)	95 (72.0%)	37 (28%)			
No	142 (54.6%)	118 (45.4%)	-1.01 (0.28)	0.469 (0.298, 0.736)	0.361 (0.2, 0.636)***
Owen health insurance					
Yes (ref)	145 (58.2%)	104 (41.8%)			
No	92 (64.3%)	51 (35.7%)	-0.35 (0.304)	1.29 (0.846, 1.97)	0.703 (0.38, 1.2)
Support from family					
Yes (ref)	77 (77.0%)	23 (23.0%)			
No	160 (54.8%)	132 (45.2%)	0.049 (0.36)	0.362 (0.215, 0.609)	1.05 (0.51, 2.13)
Get health education					
Yes	95 (88%)	13 (12.0%)	1.4 (0.41)	7.3 (3.9, 13.6)	4.32 (1.9, 9.6)***
No (ref)	142 (50.0%)	142 (50.0%)			
Home visit by HEW					
Yes	22 (78.6%)	6 (21.4%)	-0.607 (0.608)	2.5 (1.006, 6.4)	0.54 (0.16, 1.7)
No (ref)	215 (59.1%)	149 (40.9%)			
Where did you give birth					
Home (ref)	81 (46.6%)	93 (53.4%)			
Health center	156 (71.6%)	62 (28.4%)	1.06 (0.48)	2.8 (1.9, 4.3)	2.89 (1.11, 7.5)*
Normal delivery					
Yes	132 (56.7%)	101 (43.3%)	0.808 (0.48)	0.672 (0.44, 1.02)	2.24 (0.86, 5.8)
No (ref)	105 (66.0%)	54 (34.0%)			
Distance to health center					
≤ 1 h	84 (31.5%)	183 (68.5%)	0.76 (0.27)	2.86 (1.84, 4.43)	2.15 (1.26, 3.66)*
≥ 1 h (ref)	71 (56.8%)	54 (43.2%)			
Continuous Variables					
Family size	0.01 (0.089)		0.873 (0.77, 0.98)		1.01 (0.851, 1.2)
Age at first marriage	-0.04 (0.043)		1.08 (1.03, 1.14)		954 (0.876, 1.03)
Age at first delivery	0.02 (0.052)		1.13 (1.06, 1.2)		1.02 (0.922, 1.13)

Significant at * $p < 0.05$, ** $p < 0.01$ and *** $p < 0.001$. ref: Reference category

DISCUSSION

This study provides the result that reveals ANC utilization of mothers who give birth in the past 12 months before data collection in Aneged woreda. The overall utilization of ANC was 60.5 with CI of (55.4, 65.3). A study conducted in rural areas of Bangladesh, 63.4%, (Farah and Karim, 2015), DHS result in Ethiopia, 62% [12], east Wollega zone, 57.5% [20] and Dembecha district, and 57% [9], were in line with this study. The finding was low as compared to researches conducted in India, 94% [17], Pakistan, 75.5% [18], China, 90.1% [27], and selected rural areas of Bangladesh, 94.9% [28]. This may be due to differences in socioeconomic level, infrastructure, and level of awareness. It was also low as compared to researches done in Benishangul gumeze (81.9%) and Ambo town (84.9%) in Ethiopia [5,19]. This may be due to differences in access of health centers nearby and study area (rural). The finding was slightly low as compared to Nigeria (67%) [29], and this may be due to differences in socioeconomic and cultural factors. It was also slightly lower than a study conducted in Ambo town (84.9%) [21], and this may be due to study area difference (the study covers more rural areas). The finding was also slightly higher than researches done in Yem special woreda in southern Ethiopia (28.5%) and Mekele town (49.8%) [4,10], and this may be due to difference in study time.

Multivariable analysis result showed that being urban resident, no pregnancy complication, get health education about ANC, give birth at health center, and distance from home to health center had significant association with ANC utilization. The significant association indicated that urban residents were 8.4 times more likely to utilize ANC service as compared to rural residents. This result was in line with researches done in Ghana [11], EDHS data Ethiopia [16], Benishangul gumeze [13], and Mekele in Ethiopia [10]. This may be due to many infrastructures; including health, education, transport, and information which are highly concentrated in urban areas compared to rural areas. The availability of these infrastructures in urban areas may have a contribution for mothers for ANC service utilization.

Mothers who had no pregnancy complication are 0.361 times less likely to utilize ANC service as compared to mothers who had pregnancy complication. This agrees with studies conducted in Ethiopia using EDHS data [16]. This shows that when mothers who have no pregnancy complication increase their ANC service utilization decreases. This may be due to those mothers who have no pregnancy complication consider themselves as healthy (no illness) and no need of utilizing ANC service.

Mothers who get health education about ANC service were 4.32 times more likely to utilize ANC service as compared to mothers who did not get health education about ANC. This result was in line with a research done in east Wollega zone (5.5 times more likely to utilize ANC) [20]. This may be explained by the fact that those mothers who had taken health education about ANC service will have knowledge about the advantages of following pregnancy and awareness of pregnancy related complication, and this influences them to utilize ANC service.

Mothers who give birth at health centers were 2.89 times more likely to utilize ANC services as compared to mothers who give birth at home. This result was in line with a research conducted in rural areas of India [14]. This shows that mothers who had delivered their children at health center utilize ANC service more as compared to home.

Mothers traveled ≤ 1 h distance from home to health center were 2.15 times more likely to utilize ANC service as compared to mothers who travelled 1 h and above distance from home to health center. A research conducted in Pakistan supports this result that is long distance to the antenatal clinics has proved to be a problem that tends to limit access to the antenatal service [2]. This result contradicts with a research conducted in rural areas of Bangladesh (that is mothers from long distances utilize ANC as like mothers from short distances) [6]. This may be due to difference in level of socioeconomic development between Ethiopia and Bangladesh. Researches' conducted in Iraqi [3] and different areas in Ethiopia (Yem woreda [4], bench Maji zone [23], and east Wollega [20]) also support this result.

CONCLUSION

In this study, even though the result revealed that percentage of women who utilized ANC service was greater than women who did not utilize; the difference is slightly lower as compared to the regional and national averages and more efforts should be needed to improve ANC utilization of mothers. The study identified being urban resident, no pregnancy complication, get health education about ANC, give birth at health center, and traveling ≤ 1 h distance on foot from home to health center that is significant factors for ANC utilization.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical clearance and approval is obtained from the Institutional Review Board (IRB) of UOG College of social science and humanities, department of population studies. A formal letter from University of Gondar, college of social science and humanities, department of population studies was submitted to all the kebeles selected and, to all relevant offices and concerned bodies to obtain their cooperation. Before administering the questionnaire consent is obtained from the study participants by informing them about data collected from them is confidential and also useful to improve maternal health. Furthermore the respondents are informed as they can skip questions that they do not want to answer fully or partly and also to quit the process at any time if they want to do so and, their participation is voluntary. After obtaining informed consent from the study subject, they sign on it. After getting the consent, the questionnaire is distributed among the study subjects.

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REFERENCES

- Moller AB, Petzold M, Chou D, Say L. Early antenatal care visit: A systematic analysis of regional and global levels and trends of coverage from 1990 to 2013. *Lancet Glob Health* 2017;5:e977-83.
- Ali SA, Dero AA, Ali SA, Ali GB. Factors affecting the utilization of antenatal care among pregnant women: A literature review. *J Preg Neonatal Med* 2018;2:41-5.
- Aziz AA, Muhammad J. Determinants of utilization of antenatal care services in Erbil city. *Zanco J Med Sci* 2014;19:984-90.
- Tewodros B, Mariam AG, Dibaba Y. Factors affecting antenatal care utilization in Yem special woreda, southern Ethiopia. *Ethiop J Health Sci* 2009;19:45-51.
- Bala ET. Determinants of antenatal care utilization in Ambo town, Central Ethiopia: Community based cross sectional study. *J Med Physiol Biophys* 2017;36:30.
- Begum N, Rahman M, Rahman MM, Nayan SK, Zinia SN, Khan SZ. Utilization of Antenatal care Services in a selected rural area in Bangladesh. *Northern Int Med Coll J* 2014;6:25-8.
- Cherie N and Mebratu A. Adverse birth out comes and associated factors among delivered mothers in dessie referral hospital, North East Ethiopia. *J Womens Health Reprod Med* 2017;1:4.
- Cochran J. *Sampling Techniques*. 2nd ed. New York: John Wiley and Sons, Inc.; 1963.
- Farah S, Karim M. Determinants of utilization of antenatal care services in rural area of Bangladesh. *Bangladesh Med J* 2015;44:67-71.
- Gedefaw M, Muche B, Aychiluhem M. Current status of antenatal care utilization in the context of data conflict: The case of Dembecha district, Northwest Ethiopia. *Open J Epidemiol* 2014;4:208-16.
- Tura G. Antenatal care utilization and associated factors in Metekel zone, Northern Ethiopia. *Ethiop J Health Sci* 2014;19:69415.
- Nketiah-Amponsah E, Senadza B, Arthur E. Determinants of utilization of antenatal care services in developing countries: Recent evidence from Ghana. *Afr J Econ Manage Stud* 2013;4:58-73.
- Ethiopian Central Statistical Agency; 2016.
- Kindie F, Kasahun T. Determinant Factors of Antenatal Care Service Utilization in Benishangul Gumuz Region; West Ethiopia. ???; ???;

- 2011.
14. Kakati R, Barua K, Borah M. Factors associated with the utilization of antenatal care services in rural areas of Assam, India. *Int J Community Med Public Health* 2016;3:64.
 15. McGowan K. *Maternal Health Care and Universal Health Coverage*. Michigan: MHTF Blog; 2018.
 16. Abegaz KH. Exploring trend and barriers of antenatal care utilization using data mining: evidence from EDHS of 2000 to 2016. *BioRxiv* 2018;???:???
 17. Kushwaha P, Mehnaz S, Ansari MA, Khalil S. Utilization of antenatal care services in periurban area of Aligarh. *Int J Med Sci Public Health* 2016;5:2004-8.
 18. Gaur L, Gupt P, Kuldeep R, Sharma M, Gupta R, Manohar RK. Factors Associated with Antenatal Care Services Utilization and Institutional deliveries. *IOSR J Dent Med Sci* 2014;13:96-100.
 19. Amentie M, Abera M, Abdulahi M. Utilization of antenatal care services and influencing factors among women of child bearing age in Assosa District, Benishangul Gumuz Regional State, West Ethiopia. *Global J Med Res* 2015;15:949.
 20. Terfasa TG, Afework MF, Berhe FT. Antenatal care utilization and its associated factors in east Wollega zone, Ethiopia. *J Preg Child Health* 2017;4:316.
 21. Damme TG, Workineh D, Gmariam A. Time of antenatal care booking and associated factors among pregnant women attending ambo town health facilities, central Ethiopia. *J Gynecol Obstet* 2015;3:103-6.
 22. Shewhart WA, Samuel SS. *Applied Logistic Regression*. 2nd ed. United States: John Wiley & Sons, Inc.; 2000. p. 95.
 23. Senay WT. Factors influencing antenatal care service utilization among pregnant women in pastoralist community in Menit-Shasha district, Ethiopia. *Int J Med Res Health Sci* 2018;7:143-156.
 24. World Health Organization. *World Health Organization's Recommendations on Antenatal Care for a Positive Pregnancy Experience*. Geneva: World Health Organization; 2016.
 25. World Health Organization. *Maternal Mortality*; 2018. Available from: <https://www.who.int/news-room/fact-sheets/detail>
 26. United Nations Children's Fund Data: *Monitoring the Situation of Children and Women*; 2018. Available from: <https://www.data.unicef.org/>.accessedonGoogle
 27. Alam Y, Qureshi A, Adil M, Ali H. Factors affecting utilization of Antenatal Care among women in urban slum areas of Islamabad. *RMJ* 2004;29:71-5.
 28. Zhao Q, Huang ZJ, Yang S, Pan J, Smith B, Xu B. The utilization of antenatal care among rural-to-urban migrant women in Shanghai: A hospital-based cross sectional study. *BMC Public Health* 2012;12:1012.
 29. Umar AS, Bawa SB. Antenatal care services utilization in Yobe state, Nigeria: Examining predictors and barriers. *Int J MCH AIDS* 2015;4:35-46.