The determinant of Antenatal Care Visits among Pregnant Women in Ethiopia

Setegn Muche Fenta (✉ setegn14@gmail.com)

Debre Tabor University

Research article

Keywords: Antenatal Care, Ethiopia, Zero Inflated Poisson

Posted Date: December 19th, 2019

DOI: <https://doi.org/10.21203/rs.2.19275/v1>

License: This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background Health care services during a pregnancy and after delivery are important for the survival and well being of both the mother and the infant. The World Health Organization recommends a minimum of four antenatal care visits during a pregnancy. In Ethiopia, only 38% of women aged 15-49 with a live birth received at least one-time antenatal care visits from a skilled provider. This value is much more below the average rates of least developed countries and Sub-Saharan Africa. This study aimed to identify the determinant factor of antenatal care service visits among pregnant women in Ethiopia

Method The national-level cross-sectional Ethiopian Demographic and Health 2016 survey data were accessed and used for the analysis. A total of 7913 pregnant women were included in the study. Zero-inflated Poisson regression models were employed to identify the determinant of antenatal care visits.

Results Only 35.5% of the pregnant mothers have visited at least four times and 64.5% of the pregnant mothers have visited less than four times during their periods of pregnancy. The study revealed that rich women (IRR 1.077, 95% CI: 1.029,1.127), having access to mass media (IRR=1.086, 95% CI: 1.045, 1.128), having pregnancy complications (IRR=1.203, 95% CI: 1.165, 1.242), secondary or above-educated women (IRR=1.112, 95% CI:1.052, 1.176), husband's having secondary or above level of education (IRR=1.085, 95% CI: 1.031, 1.142), being married (IRR = 1.187; 95% CI: 1.087,1.296) and women age >30 years (IRR=1.067, 95% CI: 1.024, 1.111) were strongly positively associated with the antenatal care visit. Rural pregnant women less antenatal visits (IRR=0.884, 95% CI: 0.846, 0.924) had also a statistically significant association with antenatal care visits.

Conclusion This study was revealed rural women, poor women, uneducated mothers, uneducated husbands, not having access to mass media, unmarried women, have not pregnancy a complication was significantly associated with less number of antenatal care visit. Therefore, efforts are needed to advance the socioeconomic status of women, increasing the educational level of women and their husbands. The concerned body also should be made maternal health-care programs should be stretched and intensified in rural areas.

Introduction

Every day, approximately 830 women die of preventable causes related to pregnancy and childbirth. Almost all maternal deaths (99%) occur in developing countries. More than half of these deaths occur in sub-Saharan Africa and almost one third occur in South Asia. The maternal mortality ratio in developing countries in 2015 is 239 per 100,000 live births versus 12 per 100 000 live births in developed countries[1, 2]. In Ethiopia, the pregnancy-related mortality ratio of are 412 deaths per 100,000 live births. This means a woman's lifetime risk of maternal death is 1 in 243 Ethiopia[2, 3]

Antenatal care (ANC) can be defined as the care provided by skilled health-care professionals to pregnant women and adolescent girls to ensure the best health conditions for both mother and baby during the pregnancy [4]. The goal of ANC is to have a healthy mother and healthy baby by monitoring the well-

being of both the woman and the fetus during pregnancy and helping them make a smooth transition to labor and delivery[4, 5]. ANC will also help to achieve the Sustainable Development Goals (SDG) of drop child mortality as low as 25 per 1000 live births and maternal mortality to as low as 70 per 100,000 live births by the year 2030[1].

In recent times, the World Health Organization (WHO) changed the antenatal care (ANC) model increasing the number of ANC contacts with a health provider from four to eight contacts[5]. Globally, 38% of pregnant women do not attend at least four ANC contacts. In Sub-Saharan Africa, approximately half of all mothers and newborns receive no skilled care during the pregnancy and immediately after birth[2, 6]. In Ethiopia, 62% of women do not attend at least four ANC visits during their last pregnancy[3]. Health Sector Transformation Plan (HSTP) of the Ethiopian Federal Ministry of Health addresses issues related to have focused antenatal care with at least four visits per pregnancy as mainstream at all service delivery levels with a target to increase the proportion from 68–95% at the end of 2020[7]. However, according to the EDHS (2016), the ANC coverage with at least four visits are only 32%, not 68%[3]. This indicated that ANC visit in Ethiopia is immobile under any acceptable standard. Consequently, ANC visits still the current problem in Ethiopia. Previous studies in Ethiopia were covered in small geographical areas like the regional level as well as the district area [8–13]. Therefore, this study tried to identify socioeconomic and demographic factors affecting ANC visits on the national level.

Methods

Data source

The data used for this study were taken from the 2016 Ethiopian Demographic and Health Survey (EDHS). This survey is the fourth compressive survey designed to provide estimates for the health and demographic variables of interest in the whole urban and rural areas of Ethiopia as a domain. Women who had 9 months of pregnancy during the survey interview were included in the analysis. The study includes 7193 of the fertile age group in the country of women who had at least 9 months of pregnancy period during the survey in 2016 EDHS.

Variable of the study

Dependent variables

The dependant variable considered in this study was count variable: the number of ANC visits during the pregnancy.

Independent variables

The independent variables of this study were selected by reviewing related work of literatures [8-18]. The variable women education level, husband's occupation, wealth index, marital status, women's occupation mother's age, husband's education level, planned pregnancy, access to mass media, pregnancy

complications, desire for the pregnancy and residence, were considered to be a possible independent variable in the study

Data analysis

The data were analyzed by using R software version 3.5.3. Descriptive statistics including percents and frequencies were used to describe the study respondents. The zero-inflated Poisson regression model was employed to explore the association between the response variable and the predictor variables. Point estimates of the Incidence Rate Ratio (IRR) and Adjusted Odds Ratio (AOR) with 95% confidence interval (CI) were computed to estimate the strength of association between the independent and dependent variables, number of antenatal care visit. P-values of less than 0.05 were considered to be statistically significant.

Results

From a total of 7913 pregnant women; 2545(35.4%) of the pregnant women have not visited ANC and only 2.9% visited eight and more than eight times. Besides, the variance of the number ANC visit (5.614) is larger than its mean (2.53) representing over-dispersion. Moreover, the data has excess zeros (35.4%) and the Zero Inflated Poisson model would be appropriate to predict the number of ANC visits **(Table 1)**.

Table 1: The number of mothers that experienced ANC visits

Number of visits	Count	Percent
0	2545	35.4
1	342	4.8
2	563	7.8
3	1187	16.5
4	1136	15.8
5	621	8.6
6	402	5.6
7	187	2.6
8+	108	2.9
Total	7193	100.0
Mean	2.53	
Variance	5.614	

Socio-Demographic Characteristics

The majority of the study respondents were from rural residences (79%) and 21% of the respondents in urban residences. Most of the respondents were a housewife (70%) and 30% of the respondents were employed. About 60.6% of mothers no attended primary school and only 12.4% of mothers attended secondary and above education. The greater part, (69.4%) of the respondents had no pregnancy complications and 64.4% had not got access to mass media. About 91.5 percent of women were married, 3.2 percent of women

were never married, while t 5.3% were divorced and widowed. The majority, 79.8% of pregnancy was planned and 91.1% pregnancy was not terminated. The greater part, (69.4%) of the respondents had no pregnancy complications and 64.4% had not got access to mass media. Regarding husbands' education, 31.7% of husbands' had no formal education while 30% of husbands attend primary education. The more (50.70%) of women from low economic status, only 14.3% were from the medium. Regarding the mother's age, the majorities of mothers were under the age group of 30 years plus, then followed 25-29 years (Table 2).

Table 2: Characteristics of respondents in the study of determinant of Antenatal Care Visits among Pregnant Women in Ethiopia

Categories	Frequency (n)	Percentage (%)
Residence		
Urban	1512	21
Rural	5681	79
Occupation of mothers		
Housewife	5033	70
Others	2160	30
Planned pregnancy		
No	1452	20.2
Yes	5741	79.8
Terminated pregnancy		
No	6556	91.1
Yes	637	8.9
Wealth index		
Low	3607	50.7
Medium	1028	14.3
Rich	2558	35.6
Marital status		
Never married	230	3.2
Married	6579	91.5
Divorced/widowed	384	5.3
Age of women in a year		
15-24	1852	25.7
25-29	2015	28.1
30 and above	3326	46.2
Husband education		
No education	3719	51.7
Primary	2160	30.0
Secondary and above	1314	18.3
Woman's education		
No education	4359	60.6
Primary	1942	27
Secondary and above	892	12.4
Access to mass media		
No	4646	64.6
Yes	2547	35.4
Pregnancy complications		
No	5015	69.7
Yes	2178	30.3
Husbands occupation		
Not working	1285	17.9
Working	5908	82.1

Factors associated with ANC visit in Ethiopia

Table 3 presents summaries from the Zero-inflated Poisson model result of both the negative binomial and logit components. The Poisson component shows that the Incidence rate of ANC visits (IRR). The finding of this study revealed that woman and husbands' levels

of education have a significant factor in the number of ANC visits. The incidence rate of non-zero ANC visit for women's with primary education was 1.06 (IRR =1.06; 95%CI: 1.02, 1.10) times higher compared to their uneducated counterparts. The incidence rate of non-zero ANC visit for women's with secondary and above education was 1.11 (IRR =1.11; 95% CI: 1.05, 1.18) times higher compared to their uneducated counterparts. Likewise, the incidence rate of non-zero ANC visit for husbands with primary education was 1.05 (IRR =1.05; 95% CI: 1.01, 1.10) times higher compared to their uneducated counterparts. Similarly, the incidence rate of non-zero ANC visit for husbands with secondary and above education was 1.09 (IRR =1.09; 95%CI: 1.03, 1.14) times higher compared to their uneducated counterparts. The incidence rate of non-zero ANC visits of the rural woman was decreased by 12% (IRR =0.88; 95%CI: 1.85, 1.92) compared to their woman who was living in urban area.

The study also indicated that the husband's wealth index and marital status were a significant factor in the number of ANC visits. The incidence rate of non-zero ANC visits for rich wealth index would be 1.08 (IRR =1.08; 95% CI: 1.03, 1.13) times higher compared to their poor wealth index. The incidence rate of non-zero ANC visits for married women would be 1.19 (IRR =1.19; 95% CI: 1.09, 1.30) times higher compared to their never-married women.

Moreover, the incidence rate of non-zero ANC visits for women who had seen signs of pregnancy complications was 1.20 (IRR =1.20; 95% CI: 1.17, 1.24) times higher compared to their women who had no sign's pregnancy complication. The incidence rate of ANC visit for women being the use of mass media was 1.09 (IRR =1.09; 95% CI: 1.05, 1.13) times higher compared to their not to use of mass media. The incidence rate of non-zero ANC visit for mothers age 25-29 was 1.06(IRR =1.06; 95% CI: 1.02, 1.10) times higher compared to whose age is 15-24. The incidence rate of non-zero-ANC visits for mothers age 30 and above was 1.07 (IRR =1.07; 95% CI: 1.02, 1.11) times higher compared to whose age is 15-24 (Table 3).

Table 3: Zero-inflated Poisson regression model result (IRR and AOR)

Parameter	Poisson part		Bernoulli part	
	IRR(95% CI of IRR)	p-value	AOR(95%CI of AOR)	p-value
Intercept	3.051(2.777,3.352)*	0.0001	0.542(0.399, 0.738)*	0.0001
Residence				
Urban	1		1	
Rural	0.884(0.846, 0.924)*	0.0001	2.254(1.780, 2.855)*	0.0001
Access to mass media				
No	1		1	
Yes	1.086(1.045, 1.128)*	0.0001	0.612(0.525,0.713)*	0.0001
Planned pregnancy				
No	1		1	
Yes	1.028(0.989, 1.069)	0.168	0.794(0.685, 0.920)*	0.0020
Husbands occupation				
not working	1		1	
Working	1.017(0.959, 1.077)	0.576	0.761(0.655,0.884)*	0.003
Wealth index				
Low	1		1	
Medium	1.039(0.989, 1.093)	0.130	0.594(0.501, 0.704)*	0.0001
Rich	1.077(1.029, 1.127)*	0.001	0.568(0.479, 0.672)*	0.0001
Women's education				
No education	1			
Primary	1.057(1.015, 1.101)*	0.008	0.454(0.388, 0.531)*	0.0001
Secondary and above	1.112(1.052, 1.176)*	0.0002	0.389(0.286, 0.530)*	0.0004
Husband education				
No education	1		1	
Primary	1.052(1.010, 1.096)*	0.015	0.625(0.542, 0.721)*	0.0001
Secondary and above	1.085(1.031, 1.142)*	0.002	0.666(0.532, 0.836)*	0.0001
Age of mother (year)				
15-24	1			
25-29	1.060(1.016, 1.104)*	0.006		
30 and above	1.067(1.024, 1.111)*	0.002		
Marital status				
Never married	1			
Married	1.187(1.087, 1.296)*	0.0001		
Divorced/widowed	1.083(0.990, 1.184)	0.0811		
Pregnancy complications				
No	1			
Yes	1.203(1.165, 1.242)*	0.0001		
Occupation of mother				
Housewife	1			
Working	0.982(0.950, 1.016)	0.294		
Terminated pregnancy				
No	1			
Yes	1.039(0.986,1.094)	0.151		

Note: 1 = reference category of the categorical variable.

* Significant at 5% level of significance

The Bernoulli or logit part used to show the likelihood of ANC visit (AOR) on the household level. The odd of the number of ANC visit becomes zero with husbands who have worked was decreased by 24% (AOR = 0.76; 95%CI: 0.66, 0.88) as compared to fathers without work. The estimated odds that the number of ANC visit becomes zero with woman's who have primary education we were 0.45 times (AOR =0.45; 95%CI: 0.39, 0.53) less than non-educated woman's. The estimated odds that the number of ANC visit becomes zero with women who have secondary and above education was 0.39 times(AOR = 0.39; 95%CI: 0.29, 0.53) less than the non-educated women. The estimated odds that the number of ANC visit

becomes zero with husbands who have primary education was decreased by 37 percent (AOR = 0.63; 95%CI: 0.54, 0.72) as compared to non-educated husbands. The estimated odds that the number of ANC visit becomes zero with husbands who have secondary and above education are decreased by 33 percent (AOR = 0.67; 95% CI: 0.53, 0.84) as compared to non-educated husbands. The estimated odds that the number of ANC visit becomes zero for use of mass media was 0.61 times (AOR = 0.61; 95%CI: 0.53, 0.71) lower compared to those not to use of mass media. The estimated odds that the number of ANC visits becomes zero for women who had wanted pregnancy was 0.79 times (AOR = 0.79; 95%CI: 0.69, 0.92) lower than as compared to unwanted pregnancy.

The estimated odds that the number of ANC visits becomes zero for the rural woman were 2.25 times (AOR = 2.25; 95%CI: 1.78, 2.86) higher than the urban woman. The estimated odds that the number of ANC visits becomes zero for medium wealth index would be 0.59 times (AOR = 0.59; 95%CI: 0.50, 0.70) lower than the poor wealth index. Similarly, the estimated odds that the number of ANC visits becomes zero for rich wealth index would be 0.57 times (AOR = 0.57; 95%CI: 0.48, 0.67) lower than the poor wealth index (Table 3).

Discussion

ANC is important in helping to ensure that women and newborn babies survive pregnancy and childbirth. Therefore, this study assessed factors that determinate of ANC visits among pregnant women in Ethiopia. The findings of this study revealed that education had a positive relationship with ANC visit, that is, the number of ANC visit increase with the increase in woman's and husband's education level. The study shows a similar result with other studies [11, 14, 19] which revealed that non-educated women were less ANC attendants than those who have educated women. This study also showed that marital status was found to be significantly affecting ANC visits. The number of ANC visits to married women was higher compared to never-married women. This is consistent with the study done in Tigray, Ethiopia [11]

Wealth index and husbands' occupation was positively associated with ANC visit. The study showed that poor women were less ANC attendants than those of middle and rich women. Studies elsewhere have also documented a positive relationship between economic status and the number of ANC visits [13, 15, 16, 19]. The number of ANC visit with husbands who have worked was lower than as compared to fathers without work. These findings are in agreement with [11].

The result of this study indicated that residence and access to mass media significantly associated with the number of ANC visits. The ANC visit of rural women was lower than the urban woman. This is consistent with the study done in Amhara and South West Shoa, Ethiopia [12, 13]. The number of ANC visits for women being the use of mass media higher than not the use of mass media. It is also supported by [13, 17]. Besides, women who had seen signs of pregnancy complications were a higher number of ANC visits than women who had no signs of pregnancy complications. This finding is consistent with [12, 18].

Moreover, the desire for the pregnancy and age of women were also significantly associated with the number of ANC visit. Women who had planned pregnancy were a higher number of ANC visits than an unplanned pregnancy. This finding is supported by [16-18]. Similarly, women in the age group 30 and above are more likely to use ANC service than women in the age group of 15–19. Several studies found out that women's age plays a significant role in the utilization of maternal health care[8, 14].

Limitations of the study

Some variables are not included because of many missing values like parity and health insurance.

Conclusion

Only 45% percent of women in with a live birth received at least four ANC visits during the length of their pregnancy. ANC visit in Ethiopia is very low and below average as compared to the minimum requirement of ANC visit recommended by WHO. The study rural women, poor wealth index, uneducated mother, uneducated husband, not having access to mass media, unmarried women, have not pregnancy complication was significantly associated with less number of antenatal care visit. Therefore, efforts are needed to advance the socioeconomic status of women, increasing the educational level of women and their husbands. The concerned body also should be made maternal health-care programs should be stretched and intensified in rural areas.

Abbreviations

ANC:Antenatal Care; AOR:Adjusted Odd Ratio; EDHS:Ethiopian Demographic and Health Survey; HSTP:Health Sector Transformation Plan; IRR:Incidence Rate Ratio; SDG:Sustainable development Goal; WHO:World Health Organization; ZIP:Zero-inflated Poisson

Declarations

Ethics approval and consent to participate

This study is a secondary data analysis of the EDHS, which is publicly available, approval was sought from MEASURE DHS/ICF International and permission was granted for this use. The original DHS data were collected in conformity with international and national ethical guidelines. Ethical clearance was provided by the Ethiopian Public Health Institute (EPHI) (formerly the Ethiopian Health and Nutrition Research Institute (EHNRI) Review Board, the National Research Ethics Review Committee (NRERC) at the Ministry of Science and Technology, the Institutional Review Board of ICF International, and the United States Centers for Disease Control and Prevention (CDC). Written consent was obtained from mothers/caregivers and data were recorded anonymously at the time of data collection during the EDHS 2016

Consent for publication

Not applicable.

Availability of data and materials

The survey datasets used in this study was based on a publicly available dataset that is freely available online with no participant's identity from <http://www.dhsprogram.com/data/available-datasets.cfm>. Approval was sought from MEASURE DHS/ICF International and permission was granted for this use.

Competing Interests

The authors declare that no competing interests exist.

Funding

None.

Authors' contribution

SM drafted the proposal, did the analysis, wrote the results and prepared the manuscript. The authors read and approved the final manuscript.

Acknowledgments

I would like to thank the Ministry of Health and Central Statistical Agency, Government of Ethiopia, for making the data freely available for research purposes.

References

1. WHO, *Maternal mortality*. 2018.
2. Organization, W.H. and UNICEF, *Trends in maternal mortality: 1990-2015: estimates from WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division*. 2015.
3. EDHS, *Ethiopia Demographic and Health Survey 2016* 2016.
4. Carroli, G., C. Rooney, and J. Villar, *How effective is antenatal care in preventing maternal mortality and serious morbidity? An overview of the evidence*. *Paediatric and perinatal Epidemiology*, 2001. **15**: p. 1-42.
5. WHO, *WHO recommendations on antenatal care for a positive pregnancy experience*. 2016.
6. UNICEF, W.a., *Trends in maternal mortality: 1990 to 2015: Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division: executive summary*. 2016.
7. FMOH, *Federal Democratic Republic of Ethiopia Ministry of Health. HSTP: Health Sector Transformation Plan (2015/16-2019/20)*. 2015.
8. Abosse, Z., M. Woldie, and S. Ololo, *Factors influencing antenatal care service utilization in hadiya zone*. *Ethiopian Journal of Health Sciences*, 2010. **20**(2).

9. Akibu, M., et al., *Prevalence and Determinants of Complete Postnatal Care Service Utilization in Northern Shoa, Ethiopia*. Journal of pregnancy, 2018. **2018**.
10. Tiruaynet, K. and K.F. Muchie, *Determinants of utilization of antenatal care services in Benishangul Gumuz Region, Western Ethiopia: a study based on demographic and health survey*. BMC pregnancy and childbirth, 2019. **19**(1): p. 115.
11. Tsegay, Y., et al., *Determinants of antenatal and delivery care utilization in Tigray region, Ethiopia: a cross-sectional study*. International journal for equity in health, 2013. **12**(1): p. 30.
12. Wilunda, C., et al., *Determinants of utilisation of antenatal care and skilled birth attendant at delivery in South West Shoa Zone, Ethiopia: a cross sectional study*. Reproductive health, 2015. **12**(1): p. 74.
13. Workie, M.S. and A.M. Lakew, *Bayesian count regression analysis for determinants of antenatal care service visits among pregnant women in Amhara regional state, Ethiopia*. Journal of Big Data, 2018. **5**(1): p. 7.
14. Ayalew, T.W. and A.M. Nigatu, *Focused antenatal care utilization and associated factors in Debre Tabor Town, northwest Ethiopia, 2017*. BMC research notes, 2018. **11**(1): p. 819.
15. Beeckman, K., F. Louckx, and K. Putman, *Determinants of the number of antenatal visits in a metropolitan region*. BMC Public Health, 2010. **10**(1): p. 527.
16. Fekadu, E., et al., *Prevalence of domestic violence and associated factors among pregnant women attending antenatal care service at University of Gondar Referral Hospital, Northwest Ethiopia*. BMC women's health, 2018. **18**(1): p. 138.
17. Birmeta, K., Y. Dibaba, and D. Woldeyohannes, *Determinants of maternal health care utilization in Holeta town, central Ethiopia*. BMC health services research, 2013. **13**(1): p. 256.
18. Hijazi, H.H., et al., *Determinants of antenatal care attendance among women residing in highly disadvantaged communities in northern Jordan: a cross-sectional study*. Reproductive health, 2018. **15**(1): p. 106.
19. Gedefaw, M., B. Muche, and M. Aychiluhem, *Current status of antenatal care utilization in the context of data conflict: the case of Dembecha District, Northwest Ethiopia*. Open Journal of Epidemiology, 2014. **4**(04): p. 208.