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Early initiation of antenatal care and its associated factors among pregnant women attending antenatal care at public health centres in Bahir Dar Zuria zone, Northwest Ethiopia, 2021: a cross-sectional study

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ABSTRACT

Objectives This study aimed to assess the prevalence of, and factors associated with, early initiation of antenatal care (ANC) follow-up among pregnant women attending ANC services at Bahir Dar Zuria zone public health centres (HCs), Bahir Dar, Northwest Ethiopia.

Design An institution-based, cross-sectional study was conducted from 15 December 2020 to 1 March 2021. A systematic random sampling technique was applied to select the study participants.

Setting Five public HCs (Han HC, Shimbit HC, Dagmawi Minilik HC, Shumabo HC and Meshentie HC) in Bahir Dar Zuria zone.

Participants Pregnant mothers who were attending their ANC service during the data collection period were enrolled in this study. A total of 592 mothers were interviewed for the study.

Outcome measure Early initiation of ANC services (within 16 weeks of gestation).

Results 48.6% (95% CI 41.6% to 53.5%) of participants began their first ANC service before 16 weeks of gestation. Family size less than five (adjusted OR 2.0, 95% CI 1.25 to 3.25), urban residence (3.0, 1.48 to 6.17), secondary education (2.1, 1.3 to 3.6), college-level education and above (3.5, 1.8 to 6.8), primigravida (2.6, 1.65 to 4.14), planned pregnancy (3.5, 1.5 to 8.1) and knowledge about early initiation of ANC (1.7, 1.14 to 2.55) were significantly associated with early initiation of ANC.

Conclusion A substantial number of participants had not received ANC services in a timely manner. Sociodemographic and obstetric characteristics of the respondents were associated with timely booking of ANC services. Dissemination of information about recommended time to initiate ANC services and efforts to improve women's educational status to increase knowledge about early initiation of ANC are needed in the region.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Pretest was carried out prior to actual data collection to assess the validity of the questionnaire used in the study.
⇒ Training was given for data collectors and supervisors to ensure the quality of the data obtained.
⇒ The study uses self-reported data from women attending their antenatal care service in the study area; therefore, there is a possibility of social desirability and recall bias.
⇒ The findings of this study were not triangulated with relevant qualitative data.

complications are sometimes difficult to differentiate. Pregnancy-related complications are risky health conditions that occur during pregnancy. It can involve the mother's and the child's health.[1 2]

To avert pregnancy-related complications, various maternal healthcare services are being provided. Among those services, antenatal care (ANC) service is one of the essential and key strategies to reduce maternal and neonatal morbidity and mortality directly through the detection and treatment of pregnancy-related illnesses.[2–4]

According to WHO recommendation, pregnant women in developing countries have to get at least eight ANC visits and initiate early ANC follow-up, which helps to early detect and manage complications that occur during pregnancy.[2] As per the 2016 WHO recommendation, Ethiopia replaced the previous four-visit focused ANC model with the new ANC eight-contact model.[5]

Huge progress has been made globally; however, maternal health is still a global agenda. The WHO 2019 report shows that

INTRODUCTION

The physiological symptoms of pregnancy and the symptoms of pregnancy-related

about 295 000 maternal deaths occurred in the globe due to pregnancy and childbirth-related complications.[1 6] Sub-Saharan Africa and Southern Asia accounted for approximately 86% of the estimated global maternal deaths in 2017.[6]

Early ANC attendance during the first 3 months of gestation plays a major role in detecting and treating complications that occur during pregnancy.[7] In Ethiopia, 412 maternal deaths per 100 000 live births occur in 2016 due to pregnancy or childbirth-related complications, and targeted reduction to 199/100 000 live births by 2020.[4]

Despite ANC being provided free of charge and with increased accessibility, early initiation of ANC is still a major problem.[8] In Ethiopia, only 28% of women had their first ANC during the first trimester, while 43% of women in urban areas receive ANC within their first trimester of pregnancy, compared with 22% of those in rural areas.[9] Maternal education, history of early booking, maternal age and perception of the frequency of ANC visits per pregnancy were significantly associated with the early ANC visit; thus, awareness creation and strengthening the importance of early ANC visit need to be emphasised at the time of service provision.[10 11]

A number of activities were done by the government to improve the early initiation of ANC in Ethiopia. Among those activities, enhanced coordination of health extension workers, health development army and extended supportive supervision systems at national, regional, zonal, woreda, primary healthcare unit and community levels on maternal health services including early ANC initiation were the major activities.[12]

However, the factors associated with early initiation of ANC are not the same across different cultures, socioeconomic status and distance/access to health institutions within society. Thus, assessing the factors associated with early initiation of ANC follow-up in different set-ups is key to improving maternal health services. Therefore, this study aimed to determine the magnitude and identify factors associated with it among pregnant women attending ANC in public health centres (HCs) in Bahir Dar Zuria zone, Northwest Ethiopia.

METHODS
Study design and setting
An institution-based cross-sectional study was conducted in Bahir Dar Zuria zone from 15 December 2020 to 1 March 2021. The total population of Bahir Dar city is estimated to be 345 084, and 81 371 of the total population are women of reproductive age. The city currently has 3 governmental hospitals, 4 private hospitals, 10 governmental health centres (HCs), 10 health posts and more than 39 private clinics. There are more than 405 healthcare providers including health extension workers at HCs of Bahir Dar city administration, among those 47 are midwives. According to the 2020 G C annual zonal report, the antenatal coverage in the study area was 100%.[3 4 13]

This study was conducted in five public HCs (Han HC, Shimbit HC, Dagmawi Minilik HC, Shumabo HC and Meshentie HC).

Study variables
Dependent variable
ANC initiation–early (<16 weeks of gestation)/late (≥16 weeks of gestation).

Independent variables
Sociodemographic and economic factors: maternal age, educational status, occupation, marital status, ethnicity, religion, income, family size, residence and husband's education.

Pregnancy and maternal-related factors: gravidity, history of abortion, the health status of present pregnancy/danger sign, plan of pregnancy/unwanted pregnancy, the experience of ANC utilisation, knowledge and awareness of the time of first ANC, and previous pregnancy complication.

Behavioural factors: information access, free of pain, access to media and distance of health facilities.

Study population
All pregnant women attending their ANC service in public HCs of Bahir Dar Zuria zone during the data collection period.

Inclusion criteria
Pregnant women attending ANC service were included in the study.

Exclusion criteria
Women who have either unknown gestational age or do not have ultrasound results or are without known physical examination, and pregnant women who had danger signs of pregnancy/were seriously ill were excluded from this study.

Sampling procedures
To select participants, a systematic random sampling technique was applied. The total sample size was proportionally allocated from the randomly selected five HCs based on their ANC loads. By considering N (total pregnant women who came for their first ANC visit in the previous 2 months in five HCs=971), n (calculated sample size=610) and k-interval K=N/n=971/610=2, the first client was selected by lottery method among the first two ANC service users in each HC. n=sample size allocated to each HC, N=number of ANC clients in an HC in the previous 2 month's performance (Han HC=349, Shimbit HC=200, Dagmawi Minilik HC=251, Shumabo HC=98 and Meshentie HC=73). Then, the final sample size was proportionally allocated for each HC.

Sample size determination
The sample size was calculated using single population proportion formula, taking 46.8% prevalence of early initiation of ANC from previous study,[14] with an assumption

of 95% CI (z=1.96), 5% margin of error (d=0.05), 10% non-response rate and 1.5 design effect.

$$n = (Z\alpha/2)^2 \ P \ (1 - P) \ /d^2$$

$$n = (1.96)^2 \ 0.468 \ (1 - 0.468) \ /0.05^2 = 381$$

Where, n=sample size; $Z\alpha/2$=Z value at 95% level of confidence (1.96); P is the proportion of early initiation of ANC; d=the margin of error at 95% CI.

By considering the 10% non-response rate 381×10/100=38, the final sample size was 381×1.5+38=610.

Operational definitions

ANC is pregnancy-related services given by skilled healthcare providers starting from conception up to the onset of labour.[2 15 16]

Early ANC is the first ANC received as soon as the pregnancy is suspected until 16 weeks of gestation.[17–19]

Data collection

Data related to sociodemographic, economic, pregnancy-related, maternal-related and behavioural factors were collected by using a pretested and semistructured questionnaire (see online supplemental appendix 1). The questionnaire was first developed in English, translated into Amharic and finally retranslated to English to check its consistency. Training was provided for the supervisors and data collectors for 2 days by the principal investigator on the details of the questionnaire. The interview was conducted in Amharic by four midwives with eligible mothers at antenatal clinic, and supervised by two health professionals with degrees. Information related to gestational age was taken from the mother's ultrasound result.

Data management and analysis

The data were entered, coded and cleaned using EpiData V.4.6. After completion of the entry, the data were exported to SPSS V.23 for analysis. Missing data were managed by observing cross-tabulation result percentages. Bivariable logistic regression was used to identify the association between independent variables and dependent variables, and variables with a p value of less than 0.2 were used for multivariable logistic regression analysis to determine various factors on the outcome variable and to control the confounding effect. Adjusted OR (AOR) with a 95% CI was used to identify the independent predictors of early initiation of ANC. P values less than 0.05 were taken as statistically significant. The goodness of fit of the model was assessed using Hosmer-Lemeshow's statistical test; and its value above 5%, which is 0.76, indicates that the model has a good predictive ability. A multicollinearity test was performed for the variables included in the final multivariable model. Hence, the variables had a variance inflation factor value of less than five.

Data quality assurance

To ensure the quality of this research, training was given to data collectors and supervisors. Pretests were carried out in 5% of the sample size before actual data collection out of the study area, to assess the validity of the questionnaire to check the clarity of questions, ambiguity, arrangement of questions, order and options for the questions, and skipping pattern accordingly. The whole data collection procedures were closely supervised by field supervisors and investigators to ensure the completeness and reliability of the gathered information throughout the data collection process.

Patient and public involvement

None.

RESULTS

Sociodemographic characteristics

A total of 592 pregnant women took part in the study. Out of those 48.6% (95% CI 41.6% to 53.5%) of the participants started their first ANC service before 16 weeks of gestation. Of the respondents, 85.7% were followers of the Orthodox Christian religion. The age of the respondents ranged from 17 to 45 years with a mean age of 26.31 (SD 4.72) years. More than three-fourths (476) of them were residing in urban areas. A total of 61.3% (366) of respondents attended secondary and above educational level (table 1).

Obstetric characteristics

Regarding obstetric characteristics of the study participants, 57.6% (341) of respondents were multigravida, 278 (46.8%) had antenatal follow-up in their previous pregnancies and 547 (92.1%) of pregnancies were planned. A total of 13.7% (81) of the respondents had a history of abortion, while 51.5% (305) of the respondents knew the time to intiate antenatal care services. (tables 2 and 3).

Factors associated with initiation of first ANC visit

Bivariable analysis showed that the age of women, residency, educational status of women, occupation of women, monthly income, means of transportation, gravidity, knowledge of initiation of first ANC, family size, plan of pregnancy and minor disorders of current pregnancy were candidate variables for multivariable analysis. On multivariable analysis, family size, gravidity, residence, educational status of women, plan of pregnancy and knowledge of initiation of first ANC were true determinants of early initiation of ANC visit at the p value less than 0.05. The findings showed that those whose family size was less than five were two times more likely to initiate early ANC than those whose family size was greater than five (AOR=2.0, 95% CI: 1.25 to 3.25). Urban residents were three times more likely to initiate early ANC than those who were rural residents (AOR=3.0, 95% CI: 1.48 to 6.17). Respondents with college and above education level were 3.5 times more likely to initiate early ANC as compared with those with primary school education (AOR=3.5, 95% CI: 1.8 to 6.8), and those with secondary education are 2.1 times more likely to initiate ANC than those with primary education (AOR=2.1, 95% CI: 1.3 to

Table 1 Sociodemographic characteristics of pregnant women at selected public health centres in Bahir Dar special zone, 2021(n=592)

Variables	Characteristics	Frequency	Per cent
Age	<25	293	49.5
	≥25	299	50.5
Residence	Urban	476	80.3
	Rural	116	19.6
Religion	Orthodox	508	85.7
	Muslim	67	11.3
	Protestant	17	2.9
Educational status of women	Primary	229	38.7
	Secondary and preparatory	208	35.1
	College and above	155	26.2
Women occupation	Housewife	297	50.2
	Farmer	91	15.4
	Employed government employee/NGO	117	19.8
	Merchant	87	14.7
Monthly income	<2000	100	16.9
	≥2000	492	83.1
Marital status	Married	581	98.1
	Unmarried/cohabitation	11	1.9
Husband educational status	No education	12	2
	Primary	170	28.7
	Secondary and preparatory	199	33.6
	College and above	211	35.6
Means of transportation	On foot	207	35
	Taxi/Bajaj	385	65
Family size	<5	395	66.7
	≥5	197	33.3
Distance to reach HC on foot	≤30 min	186	31.6
	>30 min	21	3.4
Cost of transport	<3 birr	16	2.7
	3–9 birr	220	37.2
	>9 birr	149	25.1

HC, health centre; NGO, non-governmental organisation.

3.6). Respondents who were primigravida were 2.6 times more likely to initiate early ANC than those respondents who were multigravida (AOR=2.6, 95% CI: 1.65 to 4.14). Respondents with planned pregnancy were 3.5 times more likely to initiate early ANC than those respondents with an unplanned pregnancy (AOR=3.5, 95% CI: 1.5 to 8.1), and respondents who knew initiation of first ANC were more likely to start early as compared with their counterparts (AOR=1.7, 95% CI: 1.14 to 2.55) (table 4).

Table 2 Obstetric characteristics of pregnant women at selected public health centres of Bahir Dar special zone, 2021 (n=592)

Variables	Description	Frequency	Per cent
Gravida	One	251	42.4
	Two and above	341	57.6
History of abortion	Yes	81	13.7
	No	511	86.3
Minor disorders of pregnancy	Yes	140	23.6
	No	452	76.4

DISCUSSION

This study aimed to assess the proportion of early booking of ANC at public HCs found in Bahir Dar Zuria zone. Additionally, it targeted to identify factors associated with early initiation of ANC across the Bahir Dar Zuria zone. Based on WHO recommendation, pregnant women have to start the first ANC booking within the first trimester. In Ethiopia, due to high governmental effort, the proportion of women who followed the recommended four or more ANC visits increased from 12% in 2005 to 43% in 2019. During this same period, the proportion of women who received ANC in the first trimester increased from 6% to 28%.[9]

In the study area, 48.6% of pregnant women received their first ANC visit within the recommended time frame.

Table 3 Previous pregnancy and knowledge of pregnant women and related factors in public health centres of Bahir Dar special zone, 2021 (n=592)

Variables	Characteristics	Frequency	Per cent
Had ANC follow-up in last pregnancy	Yes	278	46.8
	No	46	7.7
Place of delivery in previous birth	Home	47	7.9
	Health facilities	265	44.8
Rout of delivery of previous birth	SVD	243	41
	C/S	69	11.7
Outcome of last birth	Alive	298	50.3
	Stillbirth	14	2.4
Initiation of first ANC	<16 weeks	304	51.5
	≥16 weeks	288	48.5
Frequencies for ANC follow-up	Once	10	1.7
	2–3	212	35.8
	≥4	353	59.6
ANC service reduced PMTCT	Yes	518	87.5
	No	74	12.5

ANC, antenatal care; C/S, caesarean section; PMTCT, prevention of mother to child transmission; SVD, spontaneous vaginal delivery.

Table 4 Factors associated with early initiation of ANC, public health centres of Bahir Dar special zone, 2021 (n=592)

| Variables | Early initiation of ANC | | OR | |
	Yes	No	COR (95% CI)	AOR (95% CI)
Age of women				
<25	113	180	2.8 (2.0 to 3.9)	1.0 (0.54 to 1.8)
≥25	191	108	1	1
Residence				
Urban	201	275	10.8 (5.9 to 19.8)	3.0 (1.48 to 6.17)**
Rural	103	13	1	1
Education of women				
Primary	177	52	1	1
Secondary	85	123	4.9 (3.25 to 7.45)	2.1 (1.3 to 3.6)**
College/above	42	113	9.1 (5.7 to 14.6)	3.5 (1.8 to 6.8)**
Occupation of women				
Housewife	152	132	0.67 (0.44 to 1.0)	1.1 (0.71 to 2.01)
Farmer	76	27	0.27 (0.1 to 0.48)	0.51 (0.25 to 1.01)
Employed	23	61	2.0 (1.1 to 3.76)	1.3 (0.6 to 2.74)
Merchant	53	68	1	1
Monthly income				
<2000 birr	76	24	1	1
≥2000 birr	228	264	3.6 (2.24 to 5.99)	1.09 (0.57 to 2.07)
Means of transport				
On foot	129	78	1	1
Taxi/Bajaj	175	210	1.98 (1.4 to 2.8)	1.4 (0.93 to 2.13)
Gravida				
One	78	173	4.3 (3.0 to 6.1)	2.6 (1.65 to 4.14)**
Two and above	226	115	1	1
Knowledge of ANC				
Yes	112	175	2.6 (1.4 to 3.79)	1.7 (1.14 to 2.55)**
No	192	113	1	1
Family size				
<5	163	232	3.5 (2.4 to 5.1)	2.0 (1.25 to 3.25)**
≥5	141	56	1	1
Plan of pregnancy				
Yes	268	279	4.1 (1.9 to 8.8)	3.5 (1.5 to 8.1)**
No	36	9	1	1
Minor disorders				
Yes	16	23	1.56 (0.8 to 3.02)	1.3 (0.57 to 3.0)
No	288	265	1	1

1=reference category.
*Significant at p<0.05; **significant at p<0.001.
ANC, antenatal care; AOR, adjusted OR; COR, crude OR.

This finding is in line with prior studies conducted in Southern Ethiopia (49.7%),[13] Adigrat town in Tigray, Ethiopia (48.2%)[20] and Addis Zemen, South Gondar, Ethiopia (47.5%).[21] The proportion of ANC visits initiated early was higher than the report of the Ethiopian Mini-Demographic Health Survey conducted in 2019, which was only 28%. The variation between these findings could be due to the fact that this study was conducted in Bahir Dar Zuria zone where the ANC coverage proportion is relatively high; hence, findings may not be similar to other parts of Ethiopia where there is a low proportion of ANC coverage.[9] A study from Addis Ababa showed

a higher proportion of early ANC initiation than the current study, 58% of the women started their visit within the first trimesters.[22] This difference might be due to the fact that Addis Ababa is the capital of the country and the community there might have better health awareness than the setting of the current study.[9]

Maternal education was the major significant factor in multivariable analysis. Mothers with college degree and above were 3.5 times and mothers with secondary school and above education were 2.1 times more likely to initiate ANC service with the recommended time than mothers with only primary school education. This finding was similar with the studies conducted at Wollita Sodo zone, Ethiopia[18] and Myanmar.[15] This might be because mothers with high level of education may have knowledge about what is necessary during pregnancy, the importance of ANC and importance of early initiation of the service.

Pregnant women who had knowledge of early initiation of ANC were 1.7 times more likely to initiate it early as compared with their counterparts, and this finding was consistent with the studies conducted in Addis Zemen Hospital,[21] central zone of Tigray,[23] Benishangul[24] and Ghana.[25] This might be due to the fact that mothers with poor ANC knowledge may not have enough awareness about the importance of early initiation of ANC and also may not know the time to initiate the service.

Planned pregnancy was also found to be a significant factor for early initiation of ANC. Pregnant women with planned pregnancy were 3.5 times more likely to initiate early ANC than their counterparts. This finding is consistent with studies from eastern zone Tigray[26] and Mandalay, Myanmar.[15] This may be due to the timing of ANC being affected by the decision the women make during pregnancy, so it takes time starting from accepting the pregnancy itself to acknowledging the need for ANC.

Place of residence also has a great impact on time to initiate ANC booking. The study showed that women who reside in urban areas were three times more likely to initiate ANC follow-up compared with women who reside in rural areas. This result is consistent with those studies undertaken in 2019[9] and in Mandalay, Myanmar.[15] The possible reason for this finding is that women who reside in urban areas have the chance to access health facilities nearby than women who reside in rural areas.

The findings of this study were not triangulated with qualitative findings, so we were unable to include qualitative findings because the study was done during the COVID-19 epidemic, which had a substantial impact on our activities. Additionally, the study presented the self-reported data, which were prone to social desirability and recall bias, which we tried to eliminate as much as possible.

CONCLUSIONS

The study found that a significant number of participants had not received ANC services in a timely manner. Sociodemographic and obstetric characteristics of the respondents were the major factors to determine timely booking of ANC services. Family size, residence, educational status of women, gravidity, plan of pregnancy and knowledge of initiation of first ANC were factors significantly associated with early initiation of ANC service. Additionally, dissemination of information about recommended time to initiate ANC services and cooperative efforts to improve women's educational status to increase knowledge about initiation of first ANC have to be conducted by health extension workers, Bahir Dar city administration, and regional and federal health bureaus.

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