Antenatal care booking within the first trimester of pregnancy and its associated factors among pregnant women residing in an urban area: a cross-sectional study in Debre Berhan town, Ethiopia

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ABSTRACT

Objective This study aimed to assess antenatal care (ANC) booking within the first trimester of pregnancy and its associated factors among urban dwellers of pregnant women in Debre Berhan town, Ethiopia.

Design Cross-sectional.

Setting Public and private health facilities that provide ANC services in Debre Berhan town.

Outcome measure First ANC booking within the first trimester of pregnancy.

Participants Urban dwellers of pregnant women in Debre Berhan town (n=384).

Results A total of 387 pregnant women in Debre Berhan town were selected for this study, of which 384 responded giving a response rate of 99.2%. The proportion of pregnant women who had ANC booking within the first trimester of pregnancy was 156 (40.6%; 95% CI: 35.8% to 45.6%). In the multivariable analysis, the odds of first ANC booking within the first trimester was higher among pregnant women who had secondary school (adjusted OR (AOR): 1.84; 95% CI: 1.10 to 3.00) and more than secondary level of education (AOR: 2.26; 95% CI: 1.27 to 4.03) compared with those who had less than a secondary school level of education. Pregnant women who have any ill health with their current pregnancy (AOR: 1.99; 95% CI: 1.21 to 3.27) were more likely to start booking within the first trimester than their counterparts. The odds of ANC booking within the first trimester was threefold higher among women with knowledge of ANC (AOR: 3.05; 95% CI: 1.52 to 6.11) compared with those who had no knowledge about ANC.

Conclusion First ANC booking within the first trimester was found to be low among urban dwellers of Debre Berhan town. Secondary school and more educational level, having ill health during early pregnancy and women’s knowledge about ANC services were statistically associated with ANC booking within the first trimester of pregnancy. Therefore, improving ANC booking according to the WHO recommendation requires due attention. Further qualitative research exploring why early ANC booking remains low among urban dwellers is important to design intervention modalities.

INTRODUCTION

Poor maternal and newborn care remains a significant problem worldwide. Globally, an estimated 303,000 women died from pregnancy-related causes, and about 2.6 million babies were stillborn in 2015. Many of these adverse outcomes can be prevented by commencing ANC follow-up within the early pregnancy period. Within the continuum of care, antenatal care (ANC) provides a platform for critical healthcare functions including health promotion, prevention, screening and diagnosis of diseases. Implementing timely and appropriately, evidence-based interventions during ANC contact can improve maternal and fetal health.

Strengths and limitations of this study

This study used primary data for which missing or data incompleteness is minimal. This study was conducted among urban women, hence findings are not generalisable to other settings. Variables of interest like education of the partner, partner involvement, previous antenatal care use and stillbirth in previous pregnancy had significantly missing data and could not be included in the analysis.

Data availability

The data that support the findings of this study are available from the respective author(s) upon reasonable request.
Table 1  Sociodemographic characteristics of the study participants, Debre Berhan town, Ethiopia, 2018

| Variables                        | Frequency (n=384) | Percentage |
|----------------------------------|-------------------|------------|
| Mother's age at birth (years)    |                   |            |
| 15–24                            | 115               | 30.0       |
| 25–29                            | 164               | 42.7       |
| ≥30                              | 105               | 27.3       |
| Marital status                   |                   |            |
| Married                          | 330               | 85.9       |
| Unmarried                        | 54                | 14.1       |
| Religion                         |                   |            |
| Christian                        | 346               | 90.1       |
| Muslim                           | 38                | 9.9        |
| Education level                  |                   |            |
| Less than secondary              | 126               | 32.8       |
| Secondary                        | 144               | 37.5       |
| More than secondary              | 114               | 29.7       |
| Family size                      |                   |            |
| 1–2                              | 165               | 43.0       |
| 3–4                              | 171               | 44.5       |
| ≥5                               | 48                | 12.5       |
| Gravidia                         |                   |            |
| Primigravida                     | 184               | 47.9       |
| Multigravida                     | 200               | 52.1       |
| Parity                           |                   |            |
| 0                                | 204               | 53.1       |
| ≥1                               | 180               | 46.9       |
| Know ANC services                |                   |            |
| Yes                              | 314               | 81.8       |
| No                               | 70                | 18.2       |
| Pregnancy-related ill health     |                   |            |
| Yes                              | 273               | 71.1       |
| No                               | 111               | 28.9       |

ANC, antenatal care.

Figure 1  First ANC booking among urban dwellers of pregnant women in Debre Berhan town, Ethiopia, 2018. ANC, antenatal care.

METHODS
Study area and period
This study was conducted in Debre Berhan town during April 2018. Debre Berhan town is located in North Shoa Zone of Amhara regional state which is about 130 km away from Addis Ababa, the capital city of Ethiopia. According to the 2007 Ethiopian census, this town has a total of 94829 population, of whom the reproductive age...
Table 2  Bivariate and multivariable logistic regression analyses for first ANC booking within the first trimester of pregnancy among urban dwellers of pregnant women in Debre Berhan town, Ethiopia, 2018

| Variables                  | First ANC booking within the first trimester | OR (95% CI) | Unadjusted | Adjusted |
|----------------------------|---------------------------------------------|-------------|------------|----------|
|                            | Yes                                         | No          |            |          |
| Mother's age at birth (years) |                                             |             |            |          |
| 15–24                      | 43                                          | 72          | 1.25 (0.72 to 2.18) | 0.89 (0.44 to 1.78) |
| 25–29                      | 79                                          | 85          | 1.94 (1.16 to 3.24)* | 1.32 (0.74 to 2.36) |
| ≥30                        | 34                                          | 71          | 1          | 1        |
| Marital status             |                                             |             |            |          |
| Married                    | 140                                         | 190         | 1.75 (0.94 to 3.26) | 1.07 (0.53 to 2.16) |
| Unmarried                  | 16                                          | 38          | 1          | 1        |
| Education level            |                                             |             |            |          |
| Less than secondary        | 32                                          | 94          | 1          | 1        |
| Secondary                  | 67                                          | 77          | 2.56 (1.52 to 4.29)* | 1.84 (1.10 to 3.19)* |
| More than secondary        | 57                                          | 57          | 2.94 (1.70 to 5.06)* | 2.26 (1.27 to 4.03)* |
| Family size                |                                             |             |            |          |
| 1–2                        | 75                                          | 90          | 2.24 (1.11 to 4.55)* | 1.71 (0.73 to 3.98) |
| 3–4                        | 68                                          | 103         | 1.77 (0.88 to 3.60)* | 1.35 (0.63 to 2.89) |
| ≥5                         | 13                                          | 35          | 1          | 1        |
| Gravida                    |                                             |             |            |          |
| Primigravida               | 84                                          | 100         | 1.49 (0.99 to 2.50) | 1.49 (0.99 to 2.50) |
| Multigravida               | 72                                          | 128         | 1          | 1        |
| Parity                     |                                             |             |            |          |
| 0                          | 93                                          | 111         | 1.56 (1.03 to 2.35)* | 1.46 (0.95 to 2.25) |
| ≥1                         | 63                                          | 117         | 1          | 1        |
| Know ANC services          |                                             |             |            |          |
| Yes                        | 144                                         | 170         | 4.09 (2.12 to 7.92)* | 3.05 (1.52 to 6.11) |
| No                         | 12                                          | 58          | 1          | 1        |
| Pregnancy-related ill health|                                             |             |            |          |
| Yes                        | 124                                         | 149         | 2.06 (1.28 to 3.30)* | 1.99 (1.21 to 3.27)* |
| No                         | 32                                          | 79          | 1          | 1        |

*Statistically significant at p<0.05.
ANC, antenatal care.

group (15–49 years) is 21 972. There are six health facilities offering ANC services in Debre Berhan town during the study period. These include one referral hospital, one general hospital, three health centres and one medium clinic, of which, the referral hospital and health centres are public health facilities. In our study, we included all health facilities within the town which provide ANC services. All pregnant women residing in this town and aged from 15 to 49 years were considered eligible for this study.

Study design and sample
A cross-sectional study was conducted among 387 urban dwellers of pregnant women attending antenatal clinics at the health facilities of Debre Berhan town from 1 to 24 April 2018. The sample size was determined using a single population proportion formula by considering a 95% confidence level, 5% margin of error, the proportion of timely ANC booking which was 35.4% and a 10% non-response rate.

A systematic sampling technique was used for sample selection by considering their order of ANC attendance as a sampling frame. First, the desired sampling interval was determined based on total ANC attendants a month before the actual data collection period (834/387=2). The starting unit was chosen at random from the units corresponding to the first sampling interval and the subsequent units were then selected at this fixed interval. In the same way, another random start was chosen using the same sampling interval on the next day data collection, and this process was repeated until the last day of...
data collection. We used the same sampling interval to ensure probability proportionate to size selection from each health facility. Besides, we included all health facilities within the town which provide ANC services. Therefore, the sample size is representative.

**Patient and public involvement**
No patient involved.

**Data collection tools and procedure**
Data were collected using a structured questionnaire (online supplementary S1 appendix) adopted from the Ethiopian Demographic and Health Survey and a previous study. The questionnaire was designed to gather data on sociodemographic characteristics of the study participants, first ANC booking within the first trimester of pregnancy and factors associated with first ANC booking among pregnant women. The questionnaire was pretested on 5% of the sample size (n=20) in Keyit Health Center, one of the nearby health centre of Debre Berhan town. Based on the result of the pretest, amendments were made on some items of the questionnaire before actual data collection.

The data collectors who are fluent in the local language (in Amharic) and who know the culture of that community were recruited. They were provided training by investigators to familiarise themselves with the data collection tools and the procedure to be followed when collecting data. They are diploma Midwives who had experience in data collection. In short, six data collectors held face-to-face exit interviews with study participants.

**Study variables**
The dependent variable of interest in this study was a binary response of whether a woman initiated the first ANC booking in the first trimester of pregnancy (yes/no), whereas the independent variables were: mother’s age at birth (15–24, 25–29 and ≥30 years); marital status (married and unmarried); religion (Christian and Muslim); education level (less than secondary, secondary school and more than secondary); family size (1–2, 3–4 and ≥5); gravidity (primigravida and multigravida); parity (0 and ≥1); previous ANC use (yes/no); knowledge of ANC services (yes/no); stillbirth in a previous pregnancy (yes/no) and history of current pregnancy-related ill health (yes/no).

**Data analysis**
Data entry and cleaning were carried out using Epi Info 7 and analysed by SPSS V.21. Descriptive analysis was done to determine the proportion of first ANC bookings within the first trimester of pregnancy. Bivariate and multivariable analyses were done using a binary logistic regression model to identify factors associated with the first ANC booking within the first trimester. Bivariate analysis was done first and then followed by multivariable analysis. Backward elimination method was used and variables significantly associated with first ANC booking within the first trimester of pregnancy, at p value <0.05 in the bivariate analysis, were entered into the multivariable model. Adjusted ORs (AORs) with a 95% CI were calculated for all variables taken to the multivariable model.

**RESULTS**

**Sociodemographic characteristics of the study participants**
A total of 387 pregnant women in Debre Berhan town were selected for this study, of which 384 responded giving a response rate of 99.2%. One hundred and sixty-four (42.7%) of them belonged to the 24–29 years age group. A larger proportion of the study participants, 346 (90.1%), were Christian followers by religion. About 144 (37.5%) and 114 (29.7%) of the participants had secondary and more than secondary level of education, respectively. Slightly more than half of the study participants were multigravida (52.1%) and nulliparous (53.1%) (table 1).

**First ANC booking within the first trimester of pregnancy**
In this study, the proportion of pregnant women who had their first ANC booking within the recommended time, that is, within the first trimester, was 156 (40.6%; 95% CI: 35.8% to 45.6%). Slightly more than half of the participants, 207 (53.9%; 95% CI: 48.9% to 58.8%), started their ANC booking during the second trimester and about 21 (5.5%; 95% CI: 3.5% to 8.1%) of the participants booked during the third trimester (figure 1).

**Factors associated with first ANC booking within the first trimester of pregnancy**
In the multivariable analysis, mother’s education level was significantly associated with first ANC booking within the first trimester of pregnancy. The odds of first ANC booking within the first trimester was higher among pregnant women who attended secondary school (AOR: 1.84; 95% CI: 1.10 to 3.19) and more than secondary level of education (AOR: 2.26; 95% CI: 1.27 to 4.03). Pregnant women who have pregnancy-related ill health (AOR: 1.99; 95% CI: 1.21 to 3.27) were more likely to start their first booking within the first trimester than their counterparts. The result also indicated that the odds of first ANC booking within the first trimester of pregnancy were threefold higher among women with knowledge of ANC (AOR: 3.05; 95% CI: 1.52 to 6.11) compared with their counterparts. Mother’s age at birth, family size and parity showed no significant association following adjustment for other variables (table 2).

**DISCUSSION**
The new, 2016, WHO ANC model highlights that a woman’s ‘ANC contact’ with healthcare providers should be more than a simple ‘visit’ but should be an opportunity for good quality care. The new model recommends pregnant women to have their first contact within the first 12 weeks’ gestation. In this study, however, only 40.6% of pregnant women had their first ANC booking
within the first trimester which was higher compared with what has been reported by previous studies in Ethiopia.\textsuperscript{19–22} This difference could be that we conducted this study among urban residents, whereas study participants were from both urban and rural residents in the previous studies. Similarly, the finding from this study was higher compared with finding from a study done among urban dwellers of Jimma, Serbo and Agaro.\textsuperscript{23} The reason for the observed differences might be that a study from Jimma, Serbo and Agaro was conducted a long time ago and its finding does not represent the current realities.

In contrast, the finding in this study was lower compared with the findings from six Mesoamerican countries (ie, from Guatemala, Honduras, Mexico, Nicaragua, Panama and El Salvador). Among women who attended at least one ANC, 73\% had their first contact in the first trimester, from a low of 63\% in Panama and Guatemala to a high of 82\% in El Salvador.\textsuperscript{24} This difference might be due to the socioeconomic differences between our study settings and Mesoamerican countries. The difference could also be due to the discrepancy in pregnancy uncertainties between the countries.

The multivariable analysis of this study shows that the higher the educational level of pregnant women, the earlier they start ANC booking within the first trimester. This is consistent with the finding from a study done among urban residents of pregnant women in Zambia.\textsuperscript{25} Likewise, postprimary education level was associated with an increased odds of first ANC contact in the first trimester in Guatemala, Mexico and Nicaragua.\textsuperscript{24} This could be due to the fact that mothers’ knowledge regarding the benefits of early ANC booking increases with their educational level. This, in short, suggests that women’s decision making for early ANC contact by far increases as their education advances.

This study also indicated that the odds of starting first ANC contact within the first trimester of pregnancy was twofold more likely among pregnant women who have any health problem with their current pregnancy than their counterparts. This finding is similar to the study done in Kampala which showed that more than half of the pregnant mothers did not have any problem with their current pregnancy and so they saw no reason to come early for ANC.\textsuperscript{26} The possible explanation might be pregnant women are more concerned to have ANC contact when they feel discomfort with their pregnancy during the first few weeks of gestation.

This study has several limitations. One limitation is that this study is conducted among urban women, hence, findings are not generalisable to other settings. Another limitation is that some variables of interest like educational level of the partner, partner involvement, previous ANC use and stillbirth in previous pregnancy had significantly missing data and could not be included in the analysis.

In conclusion, this study showed that less than half of urban dwellers pregnant women had their first ANC booking within the first trimester of pregnancy in Debre Berhan town. Being attended postprimary education, having health problems during early pregnancy and women’s knowledge regarding ANC services were associated with increased odds of first ANC contact in the first trimester. Qualitative research exploring why early ANC contact remains low among urban dwellers is important to design intervention modalities.

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Competing interests None declared.

Patient consent for publication Not required.

Ethics approval The proposal of this study was approved by the Ethics Review Committee of College of Health Sciences, Debre Berhan University (ref: RCSVP/358/07-11/63). Then the ethical clearance letter was obtained from the college and submitted to the zonal health bureau for permission to undertake the study. Verbal informed consent was obtained from all study participants before the interview. Moreover, study participants were not identified for confidentiality reasons.

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Data availability statement Data are available upon reasonable request. Data set underlying the findings can be found by requesting Tufa Kolola:tufabest@gmail. com.

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