Late Initiation of Antenatal Care and Its Associated Factors among Pregnant Women in Dire Dawa, Eastern Ethiopia

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Abstract

Background: The timing of the first antenatal care visit is paramount for optimal health outcomes for women and newborns. The World Health Organization recommends a minimum of four antenatal care visits for any pregnancy to promote the health of the fetus and the mother, and then improve the birth outcome. However, there is a paucity of data on the time of initiation of antenatal care among pregnant women in this study setting. Hence, this study aimed to assess the magnitude and factors associated with late initiation of antenatal care among pregnant women in Dire Dawa City, eastern Ethiopia.

Methods: An institutional-based cross-sectional study was conducted on 406 pregnant women selected using a systematic sampling method in Dire Dawa City from February 1-30, 2017. Data were collected using a pre-tested face-to-face interviewer-administered questionnaire. Data were analyzed using Statistical Package for Social Science Version 22.0. Logistic regression was used to examine the factors associated with late initiation of antenatal care. P-value<0.05 was considered statistically significant.

Results: The magnitude of late initiation of antenatal care was 55.9% (95% CL: 51.1, 60.8%). Women aged 25 years and above (AOR=1.77; 95% CL: 1.12, 2.78), unemployment (AOR=2.07; 95% CL:1.3, 3.27), poor knowledge about antenatal care (AOR=2.47; 95% CL: 1.54, 3.96), advised to start ANC visits (AOR=1.87; 95% CL:1.20,2.91), decision-making power to initiate antenatal care (AOR=0.36;95% CI:0.16, 0.78) and history of stillbirth (AOR=0.37; 95% CI: 0.17,0.78) were factors associated with late initiation of antenatal care.

Conclusion: More than half of the pregnant women initiated antenatal care late. Those factors associated with late initiation of antenatal care visits were maternal age, employment status, decision-making power, knowledge about antenatal care, received counseling on time of antenatal care, and history of stillbirth. Therefore, the concerned body should give due attention to strengthening the promotion of health education, empowering women, and giving appropriate advice on pregnancy. In addition, intervention strategies aimed at reducing the late initiation of antenatal care should target on the identified factors.

Keywords: *Antenatal care, late initiation, pregnant women, Dire Dawa, Ethiopia*

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Introduction

The timing of antenatal care (ANC) visits is paramount to ensure optimal health outcomes for women and infants (WHO, 2016; Moller *et al*., 2017). Antenatal care is an effective intervention for the prevention of any complications, emergency preparedness, birth planning, satisfactory nutritional, social, emotional, and physical needs of pregnant women (FMOH, 2010; FMOH, 2017).

In 2015, an estimated 303 000 women died during pregnancy and childbirth. Almost all maternal deaths, approximately 95% occurred in low- and middle-income countries, and 65% occurred in the African region (WHO, 2019a). Countries should accelerate their actions, including the timely initiation and use of ANC in order to achieve sustainable development goals (SDGs) in the reduction of maternal mortality ratio(MMR) to less than 70 deaths per 100,000 live

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births by 2030 (WHO, 2012; UNICEF, 2015). To meet the SDG target, Ethiopia's Health Sector Development Plan target was to reduce MMR from 420 to 199 per 100,000 live births by 2020, but the country's progress seems unable to meet this target (African Union, 2015; WHO, 2015; FMOH, 2015; CSA, 2016; WHO, 2019b).

Early initiation of ANC is important for the timely detection and management of pregnancy-related complications. It is among the key indicators for monitoring the progress of maternal outcomes (Tesfaye *et al*., 2017, Trinh and Rubin, 2006). The World Health Organization (WHO) recommended that all pregnant women in developing countries should initiate ANC within the first trimester of pregnancy (WHO, 2016). However, majority of pregnant women in developing countries starts the first ANC visit by their second and third trimesters (Oladokun *et al*., 2010; Weldemariam *et al*., 2018).

Pregnant women who start the first ANC visit in the latter would be at greater risk of maternal and fetal complications such as hypertension, diabetes, anemia, antepartum hemorrhage, preterm labor, and intrauterine fetal death. Moreover, missing folic acid in the first trimester increases the risk of developing congenital anomalies, low birth weight, preterm birth, and severe developmental delay. Besides, the transmission of syphilis and human immunodeficiency virus (HIV) to the fetus is high in the early stage of pregnancy unless the pregnant woman is screened early and receives appropriate interventions (Roth *et al*., 2011; Amna, 2015).

Evidence has revealed that there is variation in the timing of ANC initiation across sub-Saharan African countries. Only 16% in Nigeria, 55% in Ghana, 12% in Kenya, and 15% in Malawi started ANC visits in the first 12 weeks (Pell *et al.*, 2013). Other studies have revealed that the majority of ANC attendants in Nigeria (82.6%), Zambia (68.6%), and Australia (52.6%) have initiated in the late stages of pregnancy (Trinh and Rubin, 2006; Banda *et al.*, 2012; Aung *et al*., 2016).

The Ethiopian government has built a health extension program to improve the health of mothers through health extension workers (Koblinsky *et al*., 2010; WHO, 2010). However, only 18% (13.2-31.2%) of pregnant women initiated ANC in a timely manner based on WHO recommendations (Damme, 2015; CSA, 2014; Tesfaye *et al*., 2017; Koblinsky *et al.,* 2010; WHO, 2010).

Several studies have reported that different factors were associated with late initiation of ANC. Some of them were socio-demographic variables, parity, media exposure, lack of social support, and cultural factors (Pacagnella *et al*., 2012; Solarin and Black, 2013; Yaya, 2017). For ANC to be effective, factors affecting its timing, ANC initiation should be examined and used for planning appropriate interventions. However, there are variations among studies on time for ANC initiation and its associated factors (Pell *et al*., 2013; Trinh and Rubin, 2006; Banda *et al*., 2012; Aung *et al.*, 2016; Pacagnella *et al*., 2012; Solarin and Black, 2013). There is also a paucity of data on the time of initiation of antenatal care among pregnant women in Dire Dawa, Ethiopia. Therefore, this study aimed to assess the magnitude and factors associated with late initiation of antenatal care among pregnant women in Dire Dawa City, Eastern Ethiopia**.**

Materials and Methods

Study setting and period

Dire Dawa City Administration is located 515 km east from Addis Ababa, the capital of Ethiopia. According to the Central Statistical Agency, population projections report of 2017, Dire Dawa had an estimated total population of 466,000. Of these, 234,000 and 232,000 were male and female, respectively (CSA, 2017). The city administration had 6 hospitals (two governmental and four private hospitals) and eight health centers. This study was conducted in three selected hospitals and three health centers in the Dire Dawa City Administration, eastern Ethiopia, from February 1-30, 2017.

Study design and population

A quantitative institutional-based, cross-sectional study was conducted among pregnant women attending ANC at a selected health facility in Dire Dawa Administration town. The source population was all pregnant women attending all health facilities in the City. Those pregnant women who were severely ill and who needed emergency interventions were excluded.

Sample size and sampling procedure

The sample size was determined using a single population proportion formula by considering the proportion of late antenatal care initiation, which was 59.8% in Addis Ababa (Tariku *et al*., 2010), 95% significance level, 5% margin of error, and 10% of non-response rate. The final sample size was 406. A simple random sampling technique was used to select three hospitals and three health centers from 6 hospitals and 8 health centers in the city. The final sample size was allocated proportionally to the selected health facilities based on the monthly total number of ANC attendants in the last year's quarter report of the same periods. Then, the study participants were selected from the ANC attendants using a systematic sampling technique. A sampling interval (k=2) was used for each health facility to select pregnant women, where the first pregnant woman was selected randomly.

Data Collection Method

Data were collected through face-to-face interviews by six diploma nurses and midwifery data collectors using a pretested questionnaire. The questionnaire was developed by adapting from different relevant literature used in the Ethiopian context (Tekelab and Berhanu, 2014; Damme, 2015; Gudayu, 2015; Gebremeskel *et al*., 2015). The questionnaire contained socio-demographic variables, obstetrics history, and knowledge about ANC and health service factors. Gestational age was determined by the last normal menstrual period (LNMP). However, a document review, fundal height measurement, or ultrasound report was used for those study participants who did not remember her LNMP. In this study, late initiation of ANC referred to initiating ANC at or after 16 weeks of gestation (FMOH, 2017). Good knowledge refers to pregnant women who scored greater than or equal to the mean score value of seven knowledge measurement questions about the time and importance of ANC; otherwise, she was labeled as poor knowledge.

Data quality control

The questionnaire was first prepared in English and translated into local languages (Amharic, Affan Oromo, and Somali), and then back into English by language experts to maintain its consistency. One-day training was given to six diploma nurses and midwives as data collectors and three Bachelor of Science in midwifery supervisor. Before conducting the actual data collection, a pretest was carried out on 5% of the sample size (20) at Dire Dawa Health Center, which was not included in the study. Modifications to the questionnaire were made based on the findings of the pre-test. The data collection process was closely supervised, and the completeness of each questionnaire was checked by the investigators and supervisors daily. Finally, double data entry was performed to check the consistency of the data.

Data processing and analysis

Data were coded and entered into EpiData Version 3.1, and then exported to SPSS Version 22 for analysis. Descriptive statistics were used to determine the prevalence of late initiation of ANC, and logistic regression analyses were undertaken to assess the associated factors. Variables with a P-value of less than 0.25 in the bivariate analysis were considered candidates for the multivariable logistic regression analysis. The model fitness was tested by the Hosmer and Leme-show goodness of fit test. In multivariable logistic regression, variables with a P-value of less than 0.05 at the 95% confidence interval (CI) were considered significant factors associated with the late initiation of ANC.

Ethical consideration

Ethical clearance was obtained from the Institutional Health Research Ethics Review Committee of the College of Health and Medical Sciences, Haramaya University. Following the approval, an official letter of cooperation was written to the administration Health Bureau. Then, a permission letter was obtained from the respective officials of the selected health facilities. The purpose and importance of the study were explained and written informed consent was obtained from each study participant and facility heads. To ensure confidentiality, names and other identifiers of the mothers were not recorded on the data collection tools.

Results

Socio-demographic characteristics

In this study, 404 pregnant women participated, with a response rate of 99.5%. The mean (±SD) age of the study participants was 26.3(±5.5) years. One hundred twenty-seven (31.4%) pregnant women did not attend

formal education. Most of the study participants were between 20 and 29 years of age (67.8%), married (95.0%), urban dwellers (87.9%), and unemployed (61.9) (Table 1).

Table 1: Socio-demographic distribution of pregnant women attending antenatal care in selected health facilities at Dire Dawa, eastern Ethiopia, 2017 [n=404].

Variables	Categories	Frequency	Percent
Age (years)	15-19	29	7.2
	20-29	274	67.8
	30-39	86	21.3
	≥40	15	3.7
Marital status	Married	384	95.0
	Single	13	3.3
	Others*	7	1.7
Religion	Muslim	231	57.2
	Orthodox	140	34.7
	Protestant	31	7.7
	Others**	2	0.5
Ethnicity	Oromo	164	40.6
	Amhara	127	31.4
	Somali	103	23.3
	Others***	18	4.7
Educational Status	No formal education	127	31.4
	Primary level	92	22.8
	Secondary level	101	25.0
	College & above	84	20.8
Occupation	Employed	154	38.1
	Unemployed	250	61.9

Divorced, Widowed **Catholic * Tigray, Kembata*

Past obstetric characteristics, antenatal care, and delivery services utilization

Of the total pregnant women, 243 (60.1%) were multigravida mothers, 52 (21.4%) had a history of abortion, 23 (5.7%) child deaths, and 37 (9.2%) had a stillbirth. Among pregnant women who had a previous history of pregnancy, 56 (27.0%) had experienced complications. Among pregnant women who had a history of pregnancy, 199 (81.9%) had ANC service utilization. Of them, 109 (55.3%) had attended ANC follow-up four or more times, 43 (17.7%) had a history of less than two years of birth interval, and 209 (86.0%) delivered in a health facility (Table 2).

Knowledge of antenatal care and pregnancy characteristics

A total of 270 (66.8%) study participants knew that ANC was important for the mother and fetus. Two hundred and sixty-four (65.3%) had awareness of the recommended time of ANC follow-up. Two hundred and sixty-eight (66.3%) of the pregnant women perceived that four or more ANC visits were necessary throughout pregnancy. The mean knowledge score was 4.7 out of 7. Thus, 250 (61.9%) had good knowledge about ANC. Among the pregnant women, 267 (66.1%) had planned pregnancy, and of them, 330 (98.2%) made the plan with their husbands. Only 64 (15.8%) of the study participants decided to attend ANC follow-up by themselves. One hundred and sixty-two (40.1%) had received advice from health extension workers about ANC services before starting the first ANC visit (Table 3).

Initiation timing of first antenatal care for current pregnancy

The magnitude of late initiation of ANC was 55.9% (95% CI: 51.1, 60.8). The mean (±SD) gestational age was (16±6.9) weeks at the first ANC (Figure 1). The main reasons for late initiation of ANC were perceived as appropriate time 120 (53.20%), maternal illness 129 (57.10%), busy schedule 179 (79.30%), and unplanned pregnancy 115 (51.10%) (Figure 2).

Table 2: Past obstetric and perinatal care-related characteristics among pregnant women attending ANC at selected health facilities in Dire Dawa, eastern Ethiopia, 2017.

Variables	Categories	Frequency	Percent
Gravidity	Primigravida	161	39.9
	Multigravida	243	60.1
Parity	Null Para	164	40.9
	Multi Para	240	59.4
Types of abortion (n=52)	Spontaneous	31	59.6
	Induced	21	40.4
History of child death	Yes	23	5.7
	No	381	94.3
History of stillbirth	Yes	37	9.2
	No	367	90.8
Number of children	No child	175	43.3
	One or more children	229	56.7
Antenatal care for last pregnancy (n=243)	Yes	199	81.9
	No	44	18.1
Time of ANC visit for previous pregnancy (n=144)	< 4 months	115	79.9
	≥ 4 months	29	20.1
Number of ANC visit for previous pregnancy(n=197)	One	10	5.1
	Two	23	11.7
	Three	55	27.9
	Four and above	109	55.3
History of pregnancy complication (n=243)	Yes	56	27.0
	No	187	77.0
Institutional delivery for last pregnancy (n=243)	Yes	209	86.0
	No	34	14.0
History of caesarian section (n=243)	Yes	31	12.8
	No	212	87.2

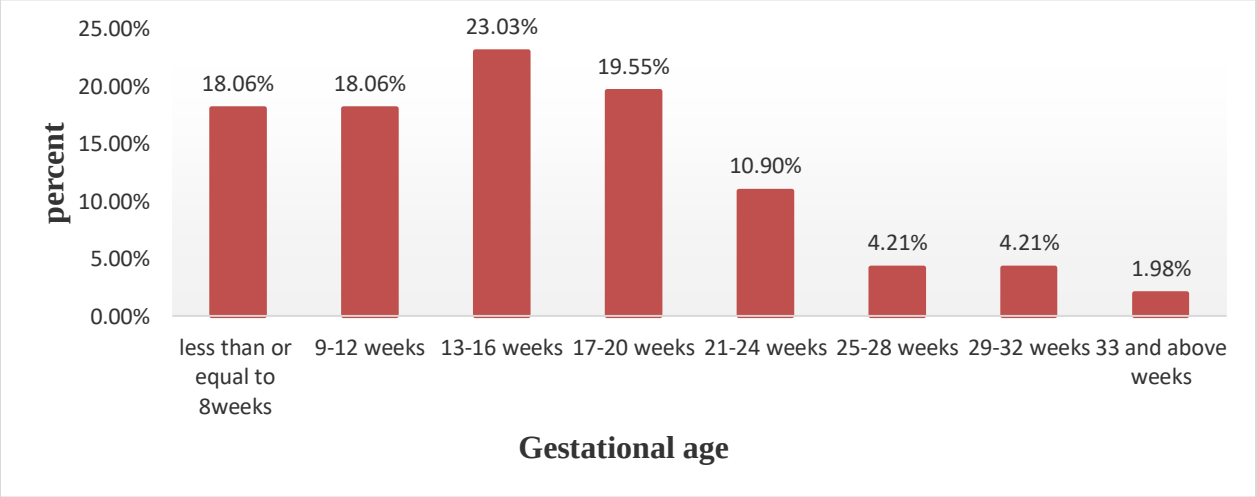

Figure 1: Initiation time of the first ANC follow-up among pregnant women attending ANC at selected health facilities in Dire Dawa, Eastern Ethiopia, 2017[n=404].

Table 3: Distributions of knowledge on antenatal care among pregnant women attending at selected health facilities in Dire Dawa, eastern Ethiopia, 2017.

Variables	Categories	Frequency	Percent
Beneficiaries of ANC	Fetus	70	17.4
	Mothers	64	15.8
	Both	270	66.8
Perceived time of first ANC	Before four months	264	65.3
	At or after four months	140	34.7
Number of ANC visit	Below four	136	133.7
	Four and more	268	66.3
ANC for health promotion and disease prevention	Yes	334	82.7
	No	70	17.3
Healthy pregnant women need to ANC	Yes	368	91.1
	No	36	8.9
Awareness of danger signs of pregnancy	Yes	321	79.5
	No	83	20.5
ANC used for birth preparedness	Yes	333	82.4
	No	71	17.6
Husband involvement (n=336)	Yes	330	98.2
	No	6	1.8
Who decided to initiate ANC	Husband	65	16.1
	Myself	64	15.8
	Family members	8	2.0
	Me and husband	267	66.1
Advised to start the first ANC visit	Yes	162	40.1
	No	242	59.9

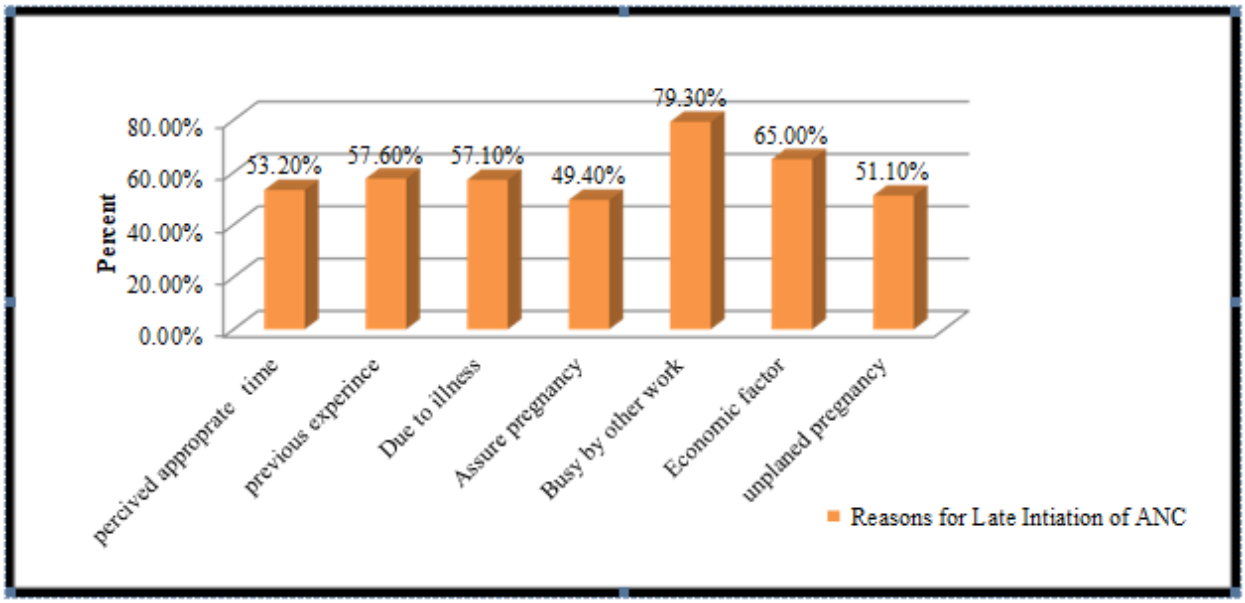

Figure 2: Reasons for late initiation of ANC among pregnant women in Dire Dawa Health facilities, Eastern Ethiopia, 2017[n=226].

Factors associated with late initiation of antenatal care

In bi-variable logistic regression analysis, history of ANC in a previous pregnancy, birth interval, less than four ANC follow-up visits in a previous pregnancy were associated with late initiation of ANC (Table 4). In the multivariable logistic regression analysis,women aged 25 years and above were almost two times more likely to initiate at the late time of pregnancy in the first ANC visit compared with the women <25 years old (AOR=1.77; 95% CI: 1.12, 2.78). Regarding employment status, unemployed pregnant women were two times more likely to initiate ANC at the late time of pregnancy than employed women (AOR=2.07; 95% CI: 1.3, 3.27). Pregnant women who had decision-making power were 64% times less likely to initiate in the late stages of pregnancy compared with their counterparts (AOR=0.36; 95% CI: 0.16, 0.78). Furthermore, the women who had poor knowledge about the time and importance of ANC were 2.47 times more likely to experience late initiation of ANC than those who had good knowledge (AOR=2.47; 95% CI: 1.54, 3.96). Women with a history of stillbirth were less likely to initiate a late time of pregnancy compared to their counterparts (AOR=0.37; 95% CI: 0.17, 0.78). Moreover, women who did not receive counseling on time of ANC follow-up were nearly two times more likely to start at the late time of pregnancy compared to those who received counseling services (AOR=1.87; 95% CI:1.20, 2.91) (Table 5).

Table 4: History of perinatal care and timing of antenatal care among pregnant women attending ANC at selected health facilities in Dire Dawa health facilities, eastern Ethiopia, 2017.

Variables	**Categories**	**Timing of first ANC initiation**		COR (95%CI)	**P-value**
		Early N (%)	**Late N (%)**		
Gravidity (n =404)	Primigravida	69 (42.9)	92 (57.1)	1	
	Multigravida	109 (44.9)	134 (55.1)	0.92 (0.62, 1.38)	0.69
Parity (n =404)	Null Para	69 (42.1)	95 (57.9)	1	
	Multi Para	109 (45.4)	131 (54.6)	0.87 (0.59, 1.30)	0.50
History of ANC for a previous pregnancy	Yes	83 (41.7)	116 (58.3)	1	
	No	26 (59.1)	18 (40.9)	0.50 (0.26 ,0.96)	0.04
Number of ANC visit for previous pregnancy (n=197)	Less than four	36 (35.3)	66 (64.7)	1.87 (1.06, 3.32)	0.03
	Four and above	48 (50.50	47 (49.5)	1	
History of abortion	Yes	24 (46.2)	28 (53.8)	0.94 (0.50, 1.73)	0.83
	No	85 (44.5)	106 (55.5)	1	
Institutional delivery for the last pregnancy	Yes	94 (45.0)	115 (55.0)	0.97 (0.47, 2.00)	0.93
	No	15 (44.1)	19 (55.9)	1	
planned pregnancy (n =404)	Yes	148 (44.0)	188 (56.0)	1	
	No	30 (44.1)	38 (55.9)	0.99 (0.59, 1.69)	0.99
History of pregnancy complication	Yes	27 (49.1)	28 (50.9)	1.30 (0.72, 2.38)	0.38
	No	82 (43.6)	106 (56.4)	1	
Birth Interval in years	Less than two	26 (60.5)	17 (39.5)	2.16 (1.10, 4.23)	0.03
	Two and above	83 (41.5)	177 (58.5)	1	
History of child death (n =404)	Yes	8 (34.8)	15 (65.2)	1.51 (0.62, 3.65)	0.36
	No	170 (44.6)	211 (55.4)	1	
Number of children (n =404)	Yes	77 (44.0)	98 (56.0)	1.00 (0.68, 1.49)	0.98
	No	101 (44.1)	128 (55.9)	1	

Table 5: Factors associated with late initiation of antenatal care among pregnant women attending at selected health facilities in Dire Dawa, Eastern Ethiopia, 2017[n=404].

Variables	Time of first ANC initiation		COR (95% CI)	AOR (95% CI)	P-value
	Late (≥16 weeks)	Early (<16 weeks)			
Marital status					
Unmarried	16 (76.2)	4 (23.8%)	3.31 (1.09,10.10)	1.83 (0.57, 5.90)	0.31
Married	210 (54.8)	174 (45.2)	1	1	
Occupation					
Unemployed	103 (66.7)	51 (33.3)	2.08 (1.37, 3.17)	2.07 (1.3, 3.27)	0.00
Employed	123 (49.4)	127 (50.6)	1	1	
Age in years					
≥ 25	153 (60)	102 (40)	1.56 (1.04, 2.35)	1.77 (1.12, 2.78)	0.01
<25	73 (49)	76 (51)	1	1	
Residence					
Rural	35 (71.4)	14 (28.6)	2.15 (1.11, 4.13)	1.40 (0.66, 2.95)	0.38
Urban	191 (53.8)	164 (46.2)	1	1	
Decision made to initiate ANC					
Husband	45 (69.3)	20 (30.8)	1	1	
Myself	26 (40.6)	38 (59.4)	0.30 (0.15, 0.63)	0.36 (0.16, 0.78)	0.01
Both	155 (56.4)	120 (43.6)	0.55 (0.32, 1.02)	0.69 (0.36, 1.33)	0.27
History of stillbirth					
Yes	14 (37.8)	23 (62.2)	0.45 (0.22, 0.89)	0.37 (0.17,0.78)	0.01
No	212 (57.8)	155 (42.2)	1	1	
Knowledge of ANC					
Poor	107 (68.6)	49 (31.4)	2.36 (1.56, 3.60)	2.47 (1.54, 3.96)	0.00
Good	119 (48.0)	129 (52.0)	1	1	
Advised to start the first ANC visit					
No	153 (63.2)	89 (36.8)	2.10 (1.40, 3.14)	1.87 (1.20, 2.91)	0.00
Yes	73 (45.1)	89 (54.9)	1	1	
Information on danger signs of pregnancy					
No	42 (67.7)	20 (32.3)	1.80 (1.02, 3.20)	0.98 (0.508,1.87)	0.94
Yes	184 (53.8)	158 (66.2)	1	1	

COR= crude odds ratio; AOR= adjusted odds ratio; CI= confidence interval; ANC= antenatal care

Discussion

This study assessed the prevalence of late ANC initiation and its associated factors among pregnant women who attended ANC in Dire Dawa Town health facilities. Unemployed pregnant women, Women age, decision-making power, history of stillbirth, knowledge of ANC, and not receiving advice on time of ANC follow-up were found to be significantly associated with late initiation of ANC.

The WHO recommends that pregnant mothers, especially those who are living in developing countries, should start ANC in the first three months of pregnancy (WHO, 2002; WHO, 2016). Timely initiation and continuous use of ANC is believed to improve maternal health outcomes (Vintzileos, 2002). However, in our study, more than half (55.90%) (95% CI: 51.1, 60.80) of the pregnant women initiated ANC late after the first trimester of pregnancy. The magnitude of late initiation of ANC in this study is nearly consistent with those found in studies conducted in Australia (52.6%) (Trinh and Rubin, 2006) and Addis Ababa, Ethiopia (59.8%) (Tariku *et al*., 2010). However, it is lower than the magnitudes reported in

studies conducted in developing countries. For instance, Ethiopian demographic health survey (82%) (CSA, 2014), studies in Kembata (68.6%) (Tekelab and Berhanu, 2014), Arba Minch (82%) (Gebremeskel *et al*., 2015)], Ambo (86.8%) (Damme, 2015), a systematic review in Ethiopia (64%) (Tesfaye *et al*., 2017), Nigeria (82.6%)(Aung *et al*., 2016), and Zambia (68.6%) (Banda *et al*., 2012). This difference might be due to several socio-cultural, contextual, economic factors, and women's poor decision-making power at the household level due to deeply rooted gender inequality. Moreover, there might be a disparity in the level of awareness about the importance of ANC, and time differences between the studies. One recent study indicates, there is better improvement in awareness about ANC and there is also better access to health facilities than the past times in Ethiopia, particularly in Dire Dawa (Eregata *et al*. 2019).

It is important to clearly understand the overall level of late initiation of ANC and its associated factors to improve maternal outcomes through adequate utilization of ANC. According to this study, maternal age is an influencing factor for the late initiation of the first ANC visits. Women aged 25 years and above were two times more likely to initiate their first ANC follow-up late. This is consistent with studies conducted in northern and central Ethiopia (Tekelab and Berhanu, 2014; Gudayu, 2015; Tesfaye *et al*., 2017). This might be due to younger women are more educated than older women and have awareness of the timing and importance of early initiation of ANC. This may also be due to younger women being able to easily accept the information that was given through different media and health care workers than older women.

Regarding employment status, unemployed pregnant women were more likely to initiate ANC at the late time of pregnancy, which is in agreement with the findings of studies in Ambo, Gondar and systematic review conducted on Ethiopia (Belayneh *et al*., 2014; Damme, 2015; Tesfaye *et al*., 2017). The possible reason could be that unemployed pregnant women might have a busy schedule. Thus, understanding the daily lives of women in these communities is needed to better inform interventions to assure early presentation for ANC services.

In the present study, poor knowledge about ANC was positively associated with the late initiation of ANC. This is in agreement with the results of studies conducted in Ethiopia and Zambia (Banda *et al*., 2012; Zegeye *et al*., 2013). Women with information regarding ANC are more likely to initiate early compared to women who do not have information. It is known that well-informed women are more likely to make wise choices regarding the utilization of ANC. Pregnant women who did not receive counseling on ANC were more likely to initiate in the late time of pregnancy compared to their counterparts. This is similar to the study conducted in Arba Minch city (Zegeye *et al*., 2013). This shows that counseling might increase women's awareness of ANC.

This study revealed that women who have decision-making power have a significant association with late initiation of ANC. Autonomous women were less likely to initiate their first ANC later than their counterparts. This finding is consistent with systematic reviews in developing countries and Ethiopia (Hajizadeh *et al*., 2016; Tesfaye *et al*., 2017), where non-empowered pregnant women were more likely to delay the initiation time of ANC, because they were under the influence of their partner or family members, restricted to complying with family norms, had a lack of family or social support, and a partner who refused to accompany them. Moreover, women with a history of stillbirth have less chance of initiating ANC early, which is supported by different studies (Gupta and Talukdar, 2017; Tilahun and Assefa, 2017; Mozooni *et al*., 2020). This probable suggests that early initiation of ANC and engagement with prenatal care are interventions that prevent or may reduce the risk of stillbirth.

This study was not without certain limitations. First, the cross-sectional nature of the study temporal relationship may not be assured. Second, it used self-reporting (interview response), which might have a social desirability bias. Some questions also required participants to recall, which could have affected the results. To minimize the above biases, we cross-checked the study subjects' medical records.

Conclusion

More than half of the pregnant women initiated ANC after 16 weeks of gestation. It remained a public health concern in the present study area. The factors associated with late initiation of ANC visits were maternal age, employment status, decision-making power, knowledge about ANC, received counseling on the time of ANC, and history of stillbirth. Therefore, the concerned body should give due attention to strengthening the promotion of health education, empowering women, giving appropriate advice on pregnancy, and timely ANC follow-up to reduce late initiation of ANC. In addition, intervention strategies to improve the early initiation of ANC in Dire Dawa require targeting the identified factors.

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Authors' contributions

AS and YB conceived the study and made a substantial contribution to the development of the protocol, statistical analysis, and interpretation of the findings. All authors were also involved in the statistical analysis and interpretation of the findings and provided critical intellectual contributions. AS and AD were involved in preparing the manuscript draft and critically reviewed the manuscript. All authors have read and approved the final manuscript.

Competing interests

All authors declare that they have no competing interests.

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