Magnitude of Timely Antenatal Care Booking and Associated Factors among Pregnant Women Attending Public Health Facilities in Ethiopia

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Abstract

Background: Early initiations to antenatal care and delivered at health facilities with skilled health professionals are relevant components to reduce maternal and neonatal mortality as well as provides an opportunity to identify the potential risk of pregnancy and time management. This study aims to assess the magnitude of timely antenatal care booking and associated factors among pregnant women attending public health facilities in Gondar city on the first visit.

Method: A cross-sectional study was conducted from public health facilities in Gondar city. A stratified random sampling method was used to select health centers and systematic random sampling was used during the selection of study units. Data were collected by face to face interviews administer the questionnaire. The collected data were entered into EPI info-7. Later on, exported to SPSS-20 for analysis. The proportion was used to estimate the magnitude of timely ANC booking. Bi-variable and multivariable analyses were done to perceive factors associated with timely ANC booking.

Results: The proportion of timely booking on ANC at the first visit is (75.3%, 95% CI, 71-79.3). Factors that are significantly associated on timely antenatal care booking in the multivariable logistic analysis are; being an urban resident((AOR=2.20, 95% CI, 1.10-4.78), richest wealth quintile (AOR=3.17, 95% CI, 1.32-7.63), having good knowledge on the importance of ANC (AOR=1.85,95% CI, 1.14-3.02), Perceived time of booking before 16 weeks (AOR=3.92,95% CI,1.40 11.12), and having a medical problem in current pregnancy (AOR=5.09, 95% CI, 1.26-22.32).

Conclusion: In this study, a large proportion, three-fourth of pregnant women had a timely ANC booking. Health worker should work on improving public perception and increasing the knowledge of pregnant women may help to increase timely booking on ANC.

Keywords: Timely booking; Antenatal care; Pregnant women; Ethiopia

Abbreviations: ANC: Antenatal Care; AOR: Adjusted Odds Ratio; CI: Confidence Interval; COR: Crude Odds Ratio; EDHS: Ethiopian Demographic and Health Survey; GDM: Gestational Diabetes Mellitus; IPTP: Intermittent Preventive Treatment in Pregnancy; ITN: Insecticide Treated Net; MMR: Maternal Mortality Ratio; SDG: Sustainable Developmental Goal; SPSS: Statistical Package for Social Science; SSA: Sub Sahara Africa; WHO: World Health Organization; UN: United Nation.

Introduction

Globally Ante Natal Care (ANC) remains one of the pillars of safe motherhood initiative to promote and establish good health for women and their children during pregnancy. Quality Antenatal care provides an opportunity for women to connect with their healthcare provider and enhance the chance of using institutional delivery for safe birth outcomes [1]. Early initiations to Ante Natal Care (ANC), and frequent ANC contacts are relevant components to reduce maternal and neonatal mortality as well as provide an opportunity to identify the potential risk of pregnancy and timely management. Receiving early antenatal care increases the likelihood of receiving effective health promotion and preventive maternal health interventions, strongly recommended by the World Health Organization (WHO) within 12 weeks of gestation for optimal health outcomes of women and their children [2]. However, many African countries are still struggling to achieve high coverage of timely ANC visits. Timely ANC visits stimulate the health of women and provide the opportunity to facilitate early diagnosis of hypertension, pre-eclampsia, malaria, sexually transmitted disease, nutritional deficiencies, and anemia that helps to administer treatments early for such disease [3]. Despite the advantages of timely ANC booking, delayed ANC and home delivery are still common among women in developing countries. Also, an international and national effort to promote maternal health care, timely initiation to an ANC remains a significant challenge in many developing countries

including Ethiopia [4]. Most importantly, timely initiation to ANC provides a relevant role to optimize quality health outcomes women their bay, but all pregnant women did not access timely and quality ANC service in Ethiopia due to cultural, economic, geographical, and social circumstances. An effort has been made in scaling up coverage of timely ANC initiation service and regular visits in Ethiopia.

Moreover, timely ANC visits and maternal health service utilization are encouraged by health extension workers and health professionals from urban and rural areas in Ethiopia, and all governmental health institutions providing ANC services for all pregnant women free of charge.

However, Ethiopia still struggling to attain a high percentage of timely ANC visits and maternal health care service Utilization. Identifying the timing of the first ANC visit and its determinant factors among pregnant women remains a vital task in Ethiopia, to promote maternal and child health. This paper aims to determine the magnitude of timely ANC booking and its factors attending public health facilities in Gondar city [5].

Materials and Methods

Study setting

The study was conducted in Gondar city public health facilities. An institution-based cross-sectional study was conducted from in public health facilities of Gondar city. Gondar city is found in Amhara regional state, which is located, 741 km to the Northwest of Addis Ababa and180 km from the regional capital Bahir Dar city [6].

In the city, there are eight health centers and one referral hospital owned by the government. The city has 13 urban and 11 rural kebele (smallest administrative unit) with a projected total population of 33,864. In the year 2017/2018, of which 16, 864 were females and annually estimated 11,412 women, were pregnant (Data from Gondar city Woreda administration bureau). All pregnant mothers who were attending ANC in public Health facilities in Gondar city were included for this study, while women who do not aware of their menstrual period and did not check by ultrasound, those who are seriously ill, and who were referred from other institution during our study period were excluded [7].

Sample size determination and sampling procedure

The sample size was determined using single population proportion formula with the assumptions of prevalence timely ANC booking were, 47.4% the marginal error of 5%, type I error 0.05, and non-response rate 10% was used to obtain a sample size of 465. All public health centers and one referral Hospital were included for this study [8]. Stratified random sampling was applied to select study participants from each Health Facilities in Gondar city. The total number of sample sizes was allocated to each health facility using proportional allocation based on the number of pregnant women attended over the last month before the data collection period. Finally, systematic random sampling was employed to select study participants from each health facility (Figure 1).

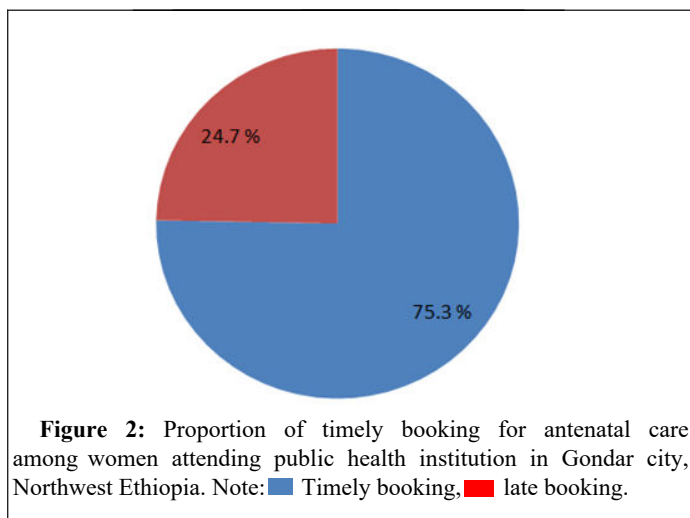**Figure 1:** Schematic presentation of sampling techniques for participants.
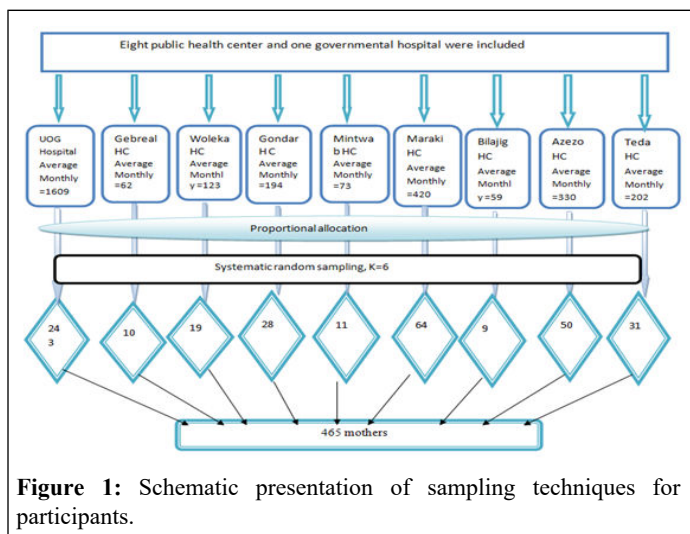
Variables and measurement

The outcome variable for this study was timely booking for the first ANC attendance in the recommended time, while the explanatory variables are Socio-demographic factors, obstetric history, knowledge related factors, state of pregnancy (intended or unintended), perceived starting time, and several ANC visits, Accessibility, and affordability of service (distance, transportation, waiting time, source of information and advice).

Operational definitions

Timely booking of first ANC-booking first ANC within the recommended time according to focused antenatal care visit schedule which is within 16 weeks of gestation. Knowledge of ANC-implies that women were seen as well informed and that they responded to the timing of the first ANC visit and the importance of ANC correctly under WHO recommendation [9]. Those who respond to the median and above scores from 28 ANC related "yes"/ "no" questions correctly were considered as knowledgeable, but those who answered below the median were not considered as knowledgeable (Figure 2).

Figure 2: Proportion of timely booking for antenatal care among women attending public health institution in Gondar city, Northwest Ethiopia. Note: ■ Timely booking, ■ late booking.

Data collection instruments and procedures

The data was collected using a pretested structured questionnaire through a face to face interview and the time of ANC booking was checked from the mothers' chart. The questionnaire was developed from different literature [10]. The questioner firstly prepared in English and translated into Amharic (local language), later on, translated back into English to check its consistency. The local language version of the questionnaire was used to collect the data. Nine data collectors and three supervisors were hired during the data collection period; all of them are health professionals who had experience in data collection [11].

Data quality assurance

The quality of data was assured by giving two days of training for data collectors and supervisors regarding the purpose of study, data collection process, study tools, and handling of collected data [12]. Throughout the data collection period, close supervision was made daily basis by supervisors and investigators.

Data management and analysis

The completeness and consistency of the data were checked, coded, and entered into the Epi info 7.2.1.0 then exported to Statistical Package for Social Science (SPSS)-20 for further analysis. Descriptive analysis was used to describe the study variables using frequency, mean, and percentage. Bi-variable logistic regression was applied using the Odds Ratio (OR) and 95% CI to assess the association of the independent variable with the response separately. Variables which were significant at p-value <0.2 in the bi-variable logistic regression analysis were included into a multivariable logistic regression analysis to look the association of independent variable with an early booking to adjust the effect of confounders and those variables with p-value <0.05 was considered as significantly associated to timely booking in the multivariable model. The crude and adjusted odds ratios together with their corresponding 95% confidence intervals were computed and interpreted accordingly [13]. The principal component analysis method was used to analyze for participants' wealth status and multicollinearity was checked among the independent variables using the Variance Inflation Factor (VIF) and value above 10 was deliberated as determining the presence of multicollinearity. Model Goodness of fit test during logistic regression analysis was checked using Hosmer and Lemeshow goodness of fit test statistic. Finally, the results of the study were presented using tables, figures, and texts based on the data obtained [14].

Results

In this study, 445 pregnant women included who were attending ANC at a public Health facility in Gondar city with a 95.7% response rate. Among those study participants, two-third 291 (65.4%) were found in the age range of 21 years-29 years with median age 26. A majority, 347 (78%) were urban dwellers. Regarding the level of education, 103 (23.1%) have not formal education and 123 (27.6%) were collage and above graduates. The majority of the study participants, 418 (93.9%) were married and more than half of (61.8%) were with housewife occupation [15]. The majority of 86 (39.3%) of pregnant women were live within the low socio-economic status. Among total study participants, one hundred seventy-four (39.1%) were with gravida one, while the rest were gravida two an above and one hundred ninety-one (42.9%) were nulliparous, the remaining were primiparous and multiparous. Among the study participants, 306 (68.8%) had no under-five children while the rest had one or two under-five children. Also, forty (9%) of study participants had at least one history of abortion. Among the total pregnant women, 228 (52.2%) had a history of ANC experience, while the remaining 48.8% had not ANC experience [16]. Out of 228 pregnant women who had a history of ANC use, 135 (59.2%) had their previous ANC visit at or before 4 months of gestation, while 45 (19.7%) had their first ANC visit after 4 months of gestation and the remaining are not remember their first booking time. Out of two hundred seventy-one (60.9%) who had a history of previous pregnancy in their life, 28 (10.3%) had a history of obstetric complication, those major complications, 12 (42.9%) were Antepartum hemorrhage followed by face and leg edema, postpartum hemorrhage and convulsion and unconsciousness. Also, 46 (10.3%) had reproductive organ surgery in their life; those majorities had cesarean section 36 (80%), followed by ectopic pregnancy and mayoma (Table 1).

Variables		Frequency	Percent (%)
Age of the mother	15-19	16	3.6
	20-24	133	29.9
	25-29	158	35.5
	30-34	71	16
	35-39	56	12.6
	40 and above	11	2.5
Residence	Urban	347	78
	Rural	98	22
The educational level of the mother	No formal education	103	23.1
	Primary school (1-6)	55	12.4
	Junior (7-8)	51	11.5
	Secondary school (9-12)	113	25.4
	Collage and above	123	27.6
Religion	Orthodox Christian	402	90.3
	Other**	8	1.8

Table 1: Socio-demographic and reproductive history characteristics of the respondents in the Gondar city, Northwest Ethiopia (n=445).

	Muslim	35	7.9
Occupation of the mother	Housewife	275	61.8
	Government employee	85	19.1
	Private employee	11	2.5
	Merchant	43	9.7
	Daily laborer	13	2.9
	Others*	18	4
Marital status	Married	418	93.9
	Single	12	2.7
	Divorced	13	2.9
	Widowed	2	0.4
Educational status of the husband	No formal education	83	19.8
	Primary school (1-6)	46	11
	Junior (7-8)	43	10.3
	Secondary school (9-12)	108	25.8
	Collage and above	139	33.2
Cultural barrier	No	370	83.1
	Yes	49	11
	I don't know	26	5.8
Wealth index	Poorest	91	20.4
	Poor	86	39.3
	Middle	95	21.3
Family size (n=445)	44593	193	43.4
	44654	171	38.4
	>5	81	18.2
Number of pregnancy (n=445)	One	174	39.1
	44653	232	52.1
	>5	39	8.8
Number of alive birth/parity (n=445)	Nulliparous	191	42.9
	Primiparous	124	27.9
	Multiparous	130	29.2
Number of alive children aged less than five (n=445)	No under-five children	306	68.8
	One and above	139	31.2
History of abortion (n=445)	No	405	91
	Yes	40	9
History of stillbirth (n=271)	No	248	91.5
	Yes	23	8.5
History of neonatal loss (n=271)	No	267	98.5
	Yes	4	1.5
History of previous ANC use (n=445)	No	217	48.8
	Yes	228	52.2
Time of previous ANC booking (n=228)	>12 weeks	45	19.7
	≤ 12 weeks	135	59.2
	I don't remember	48	21.1
History of obstetric complication (n=271)	No	243	89.7
	Yes	28	10.3
History of reproductive surgery (n=445)	No	399	89.7
	Yes	46	10.3
History of medical disease(n=445)	No	412	92.6
	Yes	33	7.4

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Timing of first ANC attendance

In this study, we found that the proportion of respondents who attend the first ANC booking within the recommended time (at or before 16 weeks of gestation) was 75.3% (95% CI, 71-79.3). The timing of first ANC booking ranges from 3rd weeks to 28th weeks of pregnancy, the peak being at the 12th week of pregnancy (Figure 3).
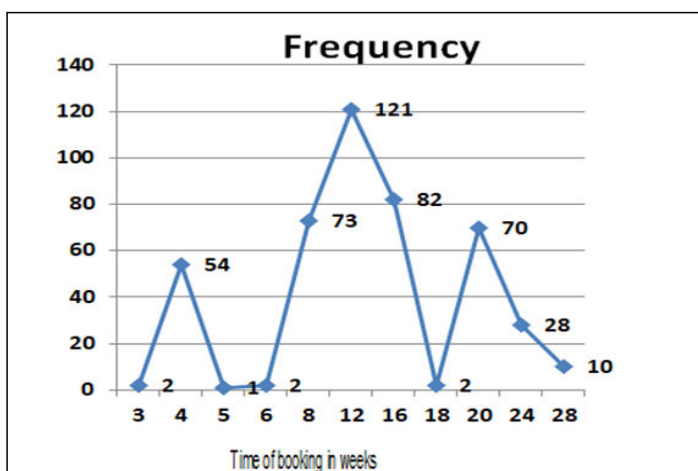

Figure 3: The percentage of respondents' booked first antenatal care from 3rd weeks to 28th weeks of gestation Gondar city, 2019.

Note: ➤➤ Frequency The mean duration of gestational age during the first ANC booking was 13.46 with a standard deviation of 6.07 weeks.

Knowledge perception and decision making power of respondents on the timing of first ANC booking. The majority of respondents 360 (80.9%) recognize their pregnancy by while menses missed and the rest were by a urine test. Three hundred sixty-one (81.1%) had wanted pregnancy.

Among respondents who receive advice 107 (95.5%) were received before four months of gestation, 109 (24.5%) who informed about ANC booking was received from mother and the rest informed from other sources (family other than mother, neighbor, and health care providers).

Two hundred thirty-two (52.1%) had good knowledge about timely ANC booking and the benefits of ANC for the mother and fetus. Similarly, two hundred twenty-two (49.4%) respondents had good knowledge about obstetric danger signs (know at least two obstetric danger signs).

The majority, 423 (95.1%) respondents were perceived first ANC booking before or at 16 weeks of gestation. Similarly, 337 (75.7%) respondents were received four up to seven ANC visits, 60 (13.5%) were perceived eight and above ANC visit, and 48(10.8%) perceived one through three ANC visits. The major source of ANC information 407 (91.5%) was health care workers. And also additional sources were TV/Radio, family, neighbor, formal education, reading, and social media. Four hundred four (96.7%) respondents were approved by their partner (husbands) to use antenatal care. 259 (58.2%) respondents were approved by anyone other than a husband to use ANC [17]. The proportion of respondents 397(89.2%) was decided for booking without their partner's approval, one hundred ninety (45.5%) respondents were accompanied during the first ANC visit. Three hundred fifty-three (79.3) respondents were traveling 30 minutes and below. More than half (56.9%) had travel by car and the majority (71.2%) of respondents were consider not hindering ANC service utilization (Table 2).

Variables		Frequency	Percent (%)
Advise to when to start ANC	No	333	74.8
	Yes	112	25.2
Time of start ANC advised	>12 weeks	5	4.5
	< 12 weeks	107	95.5
Current pregnancy confirmed by	While manses missed	360	80.9
	Urine test	85	19.1
Types of current pregnancy	Wanted	361	81.1
	Unwanted	84	18.9
Knowledge of the importance of ANC	Poor knowledge	213	47.9
	Good knowledge	232	52.1
Knowledge of at least two obstetric danger sign	Poor knowledge	225	50.6
	Good knowledge	220	49.4
Perceived number of ANC visit during pregnancy	44621	48	10.8
	44746	337	75.7
	>8	60	13.5
Source of information	TV/Radio	118	26.5
	Health care provider	407	91.5

Table 2: Knowledge perception, and decision-making power of respondents on the timing of first ANC booking who attending public health facility in Gondar city Northwest Ethiopia.

	Family	61	13.7
	Others*	78	17.5
Husband approval to use ANC (n=418)	No	14	3.3
	Yes	404	96.7
Approval anyone other than a husband to use ANC (n=445)	No	186	41.8
	Yes	259	58.2
Decision power to use ANC without husband approval (n=445)	No	48	10.8
	Yes	397	89.2
Distance	<30 Minutes	353	79.3
	>30 Minutes	92	20.7
Means of travel	On foot	192	43.1
	By car	253	56.9
Waiting time	<1 Hour	116	26.1
	>1 Hour	329	73.9
Feeling about waiting time	Too long	192	43.1
	Average	211	47.4
	I don't remember	5	1.1
Do you think waiting time hinder ANC service utilization	No	317	71.2
	Yes	128	28.8

Factors associated with timely booking

From the analytical analysis residence, educational level of the mother, occupation of the mother, wealth index, family size, number of pregnancy, number of alive birth, presence of under-five children, ANC service experience, Medical problem in the current pregnancy, perceived time of booking, knowledge of the importance of ANC, perceived number of visit, current pregnancy confirmed by, types of current pregnancy and decision power was significantly associated in the bi-variable analysis [18]. In multivariable analysis, residence, wealth index, medical problem, perceived time of ANC booking, and knowledge on the importance of ANC showed statistically significant association on timely booking for the first visit [19]. The study finding reveals that being urban residence increases the odds of timely booking by 2.2 (AOR=2.20, 95% CI, 1.10-4.78) times than rural residents. The odds of timely booking among women from the richest wealth quintile were 3.17 (AOR=3.17, 95% CI, 1.32-7.63) times higher than the poorest. Similarly, the odds of timely booking among women, those who have good knowledge for the importance of ANC and timely booking were 1.85 (AOR=1.85, 95% CI, 1.14-3.02) times higher than those less knowledgeable. Also the odds of timely booking ANC among women who perceived ANC booking time <16 weeks of gestation were 3.92 (AOR=3.92, 95 %CI, 1.40-11.12) times higher than those counterparts and the odds of timely booking among mothers who have medical problems in the current pregnancy were 5.09 (AOR=5.09, 95 % CI,1.26-22.32) times higher than those without medical problems (Table 3).

Variables	Timely booking for				COR (95%CI)	AOR (95%CI)	P-value
	Yes		No				
	No (%)		No (%)				
Residence							
Urban	272 (78.4)		75 (21.6)		2.02 (1.24-3.28)	2.2 (1.10- 4.78)	0.040*
Rural	63 (64.3)		35 (35.7)1				
The educational level of the mother							
No formal education		71 (68.9)	32 (31.1)1				
Primary school (1-6)		37 (67.3)	18 (32.7)		0.93 (0.46-1.87)	0.56 (0.23-1.41)	0.219
Junior (7-8)		36 (70.6)	15 (29.4)		1.08 (0.5-2.25)	0.61 (0.24-1.57)	0.307
Secondary school (9-12)		88 (77.9)	25 (22.1)		1.59 (0.86-2.918)	0.77 (0.37-1.78)	0.536
Collage and above		103 (83.7)	20 (16.3)		2.321 (1.2-4.38)	1.03 (0.44-2.85)	0.954

Occupation of the mother					
Housewife	196 (71.3)	79 (28.7)	1	-	-
Employee	80 (83.3)	16 (16.7)	2.015 (1.11-3.66)	1.11 (0.47-2.64)	0.815
Merchant	35 (81.4)	8(18.6)	1.763 (0.78-3.97)	1.46 (0.59-3.62)	0.418
Others*	24 (70.6)	7 (29.4)	1.382 (0.57-3.34)	1.13 (0.40-3.24)	0.816
Wealth index					
Poorest	63 (92.2)	28 (30.8)	1		
Poor	65 (75.6)	21 (24.4)	1.4 (0.7-2.7)	1.16 (0.56-2.42)	0.693
Middle	73 (76.8)	22 (23.2)	1.5 (0.8-2.8)	1.24 (0.70-2.61)	0.564
Rich	70 (76.1)	22 (23.9)	1.4 (0.7-2.7)	1.52 (0.70-3.29)	0.287
Richest	64 (79)	17 (21)	1.7 (0.8-3.4)	3.17 (1.32-7.63)	<0.010*
Family size					
44593	155 (80.3)	38 (19.8)	1.62 (0.89-2.95)	0.47 (0.15-1.49)	0.198
44654	122 (71.3)	49 (28.7)	0.99 (0.55-1.77)	0.10 (0.21-1.16)	0.104
>=5	58 (71.6)	23 (28.4)	1	-	-
Number of pregnancy					
One	141 (81)	33 (19)	2.67 (1.26-5.6)	1.09 (0.15-7.78)	0.931
44653	170 (73.3)	62 (26.7)	1.714 (0.85-3.48)	1.66 (0.594.65)	0.336
>=5	24 (61.5)	15 (38.5)	1	-	-
Number of alive birth					
Nulliparous	156 (81.7)	35 (18.3)	2.36 (1.41-3.5)	2.16 (0.32-14.68)	0.429
Primiparous	94 (75.8)	30 (24.2)	1.66 (0.96-2.87)	1.46 (0.70-304)	0.316
Multiparous	85 (65.4)	45 (34.6)	1	-	-
Number of alive children aged less than five					
No under-five children	242 (79.1)	64 (20.9)	1.89 (1.21-2.97)	1.25 (0.67-2.35)	0.151
One or more under-five children	93 (66.9)	46 (30.1)	1	-	-
Previous experience of ANC					
Yes	160 (70.2)	68 (29.8)	0.57 (0.36-0.88)	0.59 (0.23-1.48)	0.258
No	175 (80.6)	42 (19.4)		-	-
Decision power to use ANC					
Yes	303 (76.3)	94 (23.7)	1.61 (0.85-3.07)	1.64 (0.77-3.49)	0.198
No	32 (66.7)	16 (33.3)	1	-	-
Medical problem in current pregnancy					
Yes	30 (90.9)	3 (9.1)	3.51 (1.05-11.73)	5.09 (1.26-22.32)	0.031*
No	305 (74)	107 (26)	1	-	-
Perceived time for booking					

Table 3: Factors associated with a timely booking for first antenatal care who attended ANC in a public health facility in Gondar city Northwest, Ethiopia, 2019.

<=16 weeks	325 (76.8)	98 (23.2)	3.9 8(1.67-9.49)	3.92 (1.40-11.12)	0.010*	
>16 weeks	10 (45.5)	12 (54.5)	1	-	-	
Knowledge on the importance of ANC						
Good knowledge	189 (81.5)	43 (18.5)	2.02 (1.3-3.13)	1.85 (1.14-3.02)	0.014*	
Poor knowledge	146 (43.6)	67 (56.4)	1	-	-	
Perceived number of visit						
44621	30 (62.5)	18 (37.5)	1	-	-	
> 4	305 (76.8)	92 (23.2)	1.99 (1.06-3.73)	1.54 (0.74-3.18)	0.247	
Current pregnancy confirmed by						
Urine test	69 (82.1)	15 (17.9)	1.52 (0.84-2.76)	1.34 (0.68-2.56)	0.42	
Manses missed	266 (73.9)	94 (26.1)	1	-	-	
Types of current pregnancy						
Wanted	280 (77.6)	81 (22.4)	1.82 (1.09-3.05)	1.27 (0.70-2.32)	0.438	
Unwanted	55 (65.5)	29 (34.5)	1	-	-	

Discussion

The study attempted to assess the magnitude of timely ANC booking and factors associated with it in Gondar city. This study presents the magnitude of timely antenatal care booking i.e. before 16 weeks of gestation was 75.3 % (95% CI, 71-79.3) similar to other studies conducted in Addis Ababa (71.8%). This might be due to similar accessibility of transportation, easier accessibility of health facility, and better media exposure on the relevance of timely ANC booking. However, the proportion of women who came timely ANC booking within the recommended time was higher than in other Ethiopian studies. This difference might be due to socio-demographic and economic variation, health services availability, availability of health professionals in the health institution, and improved awareness regarding timely ANC booking because more people live in urban areas. The time gap might be another reason for this difference, the provision of health infrastructure, community education in different perspectives might be upgraded the understanding of timely ANC booking among women during pregnancy. Study participants residing in the urban area increases the odds of timely booking 2.2 times than rural residents in line with the studies [20]. Since urban residents have more opportunities to use health care during pregnancy because women can be crossed the small distance, better educational attainment, and better media exposure contributes to the improvements of timely ANC booking. However, rural residents may have low educational levels, low accessibility of health infrastructure, and poor access to mass media. Also, the most rural residence was walking or traveling a long distance to reach health institutions and low accessibility of transportation that discourages the use of maternal health services Similarly in this study women who are in the richest wealth status increase the odds of timely ANC booking in agreement with another study. This might be due to women who have richer wealth status may be able to afford direct medical costs such as laboratory investigation and non-medical costs for transportation that promotes timely ANC booking and frequent ANC contact while lack of financial access leads to initiate ANC late, limits the number of ANC visit and also poor women may not attend ANC at all in pregnancy.

In this study, the pregnant woman who had good knowledge about timely booking increases the odds of timely booking than poor knowledge in agreement with other studies conducted in different regions of Ethiopia. This implies that knowledge is important to realize the existing information about timely ANC booking and women were well informed about the benefits of timely ANC service utilization and service availability at the recommended time.

According to this study women who perceived the right time, within 16 weeks of gestation were 3.17 times more likely to use timely ANC booking than those who perceived the right time beyond 16 weeks of gestation in agreement with studies conducted in Ethiopia. This could be due to government commitment for the provision of proper community-based information about ANC service utilization and awareness regarding the benefits of timely ANC booking from service providers as well as knowledge and media access may promote timely registration of ANC. Also, women who had medical problems during the current pregnancy had 5.09 times more likely to use timely bookings for the first ANC than without medical problems. Medical illness such as hyperemesis gravidarum contributes to early initiation of ANC booking and women get advice from health professionals regarding the importance of early initiation to ANC. On the other hand, women who have any medical diseases during pregnancy were perceived harm to the fetus in agreement with other studies.

Limitations

The strength of this study was considering all public facilities, increases the representativeness.

Done only in public health facilities despite private health facilities in the city; i.e. the possible difference between those mothers who

attend ANC in public health facilities and those who attend private clinics was not seen. This might have compromised the generalizability of the finding to some degree.

This is a facility-based cross-sectional study, the casual effects may not be observed, may upset our generalizability to the general population

Conclusion

In this study three-fourth of pregnant women was practiced timely ANC booking for first antenatal care. Residence, household wealth status, perception of first antenatal care booking time, Knowledge of ANC importance, and medical problem during the current pregnancy was significantly associated with the timely ANC booking. It is important to improve public perception and knowledge in every pregnant mother about timely ANC booking i.e. before 12 weeks of gestation not only during illness. The government should be strengthened the local information dissemination network on ANC and its right time education and communication to the community. Also, it is important to focus on designing and implementation on improving the use of early ANC booking in rural communities. More emphasis should be given to promote knowledge of women at the right time and quality ANC service. Further research is needed especially focusing on rural communities in Ethiopia.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper Availability of data and materials. The data set analyzed for this study is not publicly available due to restriction in the IRB consent but may be available from the corresponding author based on reasonable request.

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Data Sharing

There is no individual data available in this study

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