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## Factors Associated with First Antenatal Care Booking among Pregnant Women at a Reproductive Health Clinic in Tanzania: A Cross Sectional Study

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### Abstract

**Background:** Antenatal care (ANC) is a key basic intervention targeting maternal and perinatal morbidity and mortality. The World Health Organization (WHO) recommends the first ANC booking before 12 weeks of gestation. This enhances positive maternal and fetal outcomes through early detection of complications, prompt treatment, referral, and management of expected physiological changes. Despite high ANC coverage (98%), free contacts, and easy accessibility, little is known why few (24%) pregnant women in Tanzania book their first ANC-visit early. This study aimed to identify factors associated with first ANC booking among pregnant women in a Tanzanian reproductive health clinic.

**Methods:** Systematic random sampling was used to recruit 311 eligible pregnant women. Study data were collected using a structured interviewer-administered questionnaire containing 22 closed ended questions. Data were analyzed using descriptive statistics. Frequency distribution tables and figures were generated. Multivariate analysis was used to assess the influence of the independent variables on the dependent variable. A p-value < 0.05 was considered statistically significant.

**Results:** In total, 311 pregnant women were interviewed; 31.2% (n = 97) booked their first ANC-visit within 12 weeks of gestation and 68.8% (n = 214) after 12 weeks of gestation. Early ANC booking was associated with tertiary education, planned pregnancy, earlier pregnancy recognition, and experience or presence of any complications. Commonly reported barriers to early ANC booking included not knowing the recommended time to initiate booking (37.6%), waiting for the fetus to move (28.6%), and previous experience of waiting a long time (15.8%).

**Conclusion:** Most pregnant women booked their first ANC visit later than WHO and national recommendations. Women thus miss accurate early pregnancy assessment for better positive pregnancy outcomes.

**Keywords:** Antenatal Care; First Antenatal Booking; Early ANC Booking; Late ANC Booking; Pregnant Women

### Abbreviations

ANC: Antenatal Care; WHO: World Health Organization; TDHS: Tanzania Demographic Health Survey

### Background

Globally, around 830 women die daily from pregnancy-related complications (e.g. postpartum haemorrhage, antepartum hemorrhage, sepsis, pre-eclampsia, and eclampsia), most of which are preventable [1-3]. Antenatal care (ANC) is an effective healthcare intervention provided for pregnant women. The primary aim of ANC is prevention, detection, and treatment of modifiable pre-existing medical conditions and pregnancy-related complications to reduce potential maternal and fetal risks [4]. The World health organization (WHO) defines first ANC booking as to a pregnant woman's first attendance for ANC services [3]. WHO released new guidelines of a minimum of eight

contacts for antenatal care to reduce perinatal deaths as a step towards implementation of the Sustainable Development Goal 3 (SDG). With the first contact recommended before 12 weeks of gestation, with subsequent contacts at 20, 24, 28, 32, 36, 38 and 40 weeks of gestation [3]. However, in Tanzania, the first ANC booking is recommended to begin before 16 weeks, a second visit between 20 - 24 weeks, a third visit between 28-32 weeks, and a fourth visit at 36 weeks only when there are no complications [5].

Several studies recommend early ANC booking for positive maternal and infant health outcomes. However, reported barriers to early attendance and frequent use of ANC services are: a history of not having any obstetric complications, no formal woman's employment, low partner's education level and woman's education level, woman's exposure to social media, household income, ANC services availability, and cost [5,9]. Early ANC booking is a strong predictor of positive maternal and fetal outcomes through promoting health information, early detection, prompt treatment and management of complications during labor, delivery, and post-partum [3-5,17]. Early ANC also facilitates prompt referral, which has a significant impact in reducing potential risks for maternal and perinatal mortality [3-5,17]. Early and prompt diagnosis is important to reduce the numbers of preventable maternal deaths [11].

The Tanzania demographic survey 2016 and a study conducted by Njiku, *et al.* 2017 in Tanzania have shown that at least 94% of pregnant women book once for ANC services and only 16% book early [11,12]. A study from South-Eastern Tanzania showed that only 29% of pregnant women booked early for ANC services, despite 67% of these women being aware of the recommended timing for the first ANC booking [6]. Another study conducted in Dodoma revealed a low proportion (12.4%) of pregnant women who booked their first ANC early [13].

Late ANC booking is more likely associated with compromised perinatal health outcomes as it increases maternal and perinatal mortality and morbidity [14]. Many studies suggest that pregnant women tend to book their first ANC visit late, especially in low and middle income countries [10]. Little is known why relatively few (24%) pregnant women book ANC early, despite high ANC coverage in Tanzania (98%) [12].

## **Aim of the Study**

The study aimed to determine factors associated with first ANC booking among pregnant women attending a reproductive health clinic in Tanzania.

## **Methods**

### **Study design and setting**

A descriptive cross-sectional study design was used to determine factors associated with first ANC booking among pregnant women in a reproductive health clinic in Tanzania. This study was conducted between April and May 2018 in Dar es Salaam, Tanzania.

### **Study population**

All pregnant women registered for their first ANC services in the studied reproductive health clinic. The expected number of pregnant women who book ANC clinic for the first time per day were 50 and they have 2 days in a week (50 pregnant women in a day x 2 days in a week = 100 in one week). Data was collected within 4 weeks (8 days x 50 pregnant women = 400) of the 311 pregnant women who participated in the study, primigravidae were 83.

### **Sampling method**

A systematic random sampling method was used to recruit 311 eligible pregnant women to participate in the study and ensured some degree of precision in estimating some population parameters by giving every study population a chance to participate in the study thus reducing sampling error. This is whereby every  $k^{\text{th}}$  (i.e.  $k = N/n$ ), pregnant woman booking for first ANC was selected for the study. The proposed sample size was 311 pregnant women. The expected number of pregnant women who book ANC clinic for the first time per month was 400 (50 pregnant women in a day x 2 days in a week). The sampling interval was established by dividing the estimated population of pregnant women per month by the proposed study sample size as follows:  $k = 400/311 = 1.29 =$  every other interval. The first pregnant woman who arrived for first ANC at the clinic's waiting area and met the eligibility criteria was selected randomly as the first candidate for the study to start data collection. Thereafter, every (sampling interval 1.29) pregnant woman who booked the clinic for first ANC was approached to participate in the study until the total sample size of 311 for this study was obtained.

**Sample size**

The necessary sample size was calculated using a single standard proportion [15]. This was derived from the proportion of women that had an early first ANC booking (24%) as reported in the 2016 Tanzania demographic health survey (TDHS).

**Data collection process**

A structured interviewer-administered questionnaire was used for data collection, which included 22 closed ended questions. This was a researcher structured questionnaire. The content validity of the data collection tool was assessed by three experts with experience in nursing and midwifery profession from MUHAS school of Nursing. The adjustment was done where necessary prior to data collection. This enhanced validity of the tool. To attain this, the questionnaire was formulated in English and translated in to Kiswahili. Research assistants were recruited and trained to conduct the interviews. Monitoring of the interviews occurred frequently through the principal investigator working closely with the research assistants and ensuring completion of all questionnaires.

**Data analysis**

Data entry, cleaning, and analysis was performed using SPSS version 20, followed by generation of frequency distribution tables and figures. Multivariate analysis was used to determine if the independent variables influenced the dependent variable. A p-value <0.05 was considered statistically significant.

**Results**

Of the 311 study participants, most (92.3%) were aged ≥ 20 years, 45.7% had a primary education level, 86.2% were unemployed, 74.0% were married, 73.0% lived with their partner/husband and 78.1% lived ≥ 5 kilometers from the clinic (Table 1).

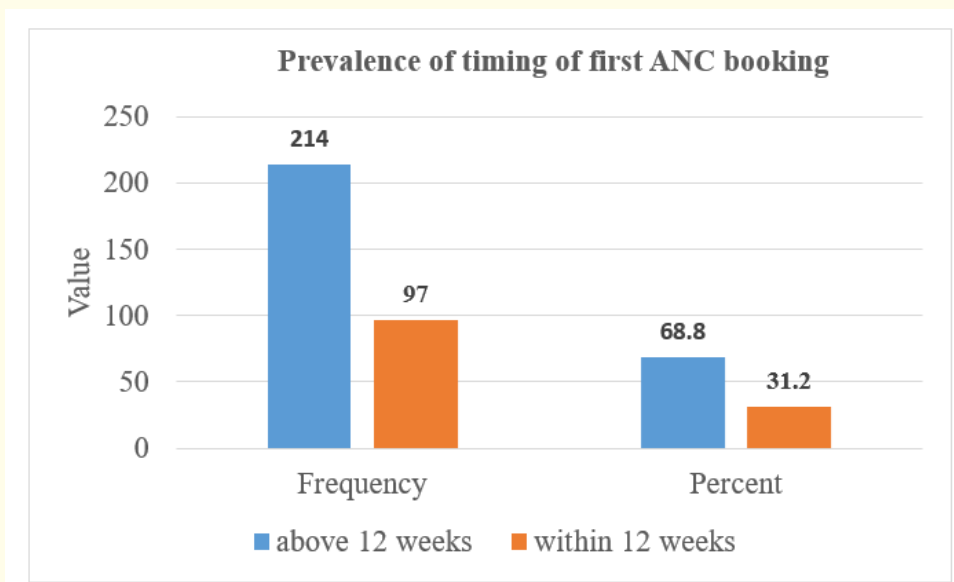
<b>Variables (n = 311)</b>	<b>n (%)</b>
<b>Age (years)</b>	
15 - 19	24 (7.7%)
20 - 24	60 (19.3%)
25 - 29	114 (36.7%)
30 - 34	65 (20.9%)
35 and above	48 (15.4%)
<b>Education</b>	
No formal education	14 (4.5%)
Primary education	142 (45.7%)
Secondary education	130 (41.8%)
Tertiary education	25 (8.0%)
<b>Employment status</b>	
Unemployed	268 (86.2%)
Employed	43 (13.8%)
<b>Marital status</b>	
Unmarried	81 (26.0%)
Married	230 (74.0%)
<b>Living with</b>	
Other relatives	84 (27.0%)
Partner/husband	227 (73.0%)
<b>Distance from the clinic</b>	
< 5 km	68 (21.9%)
≥ 5 km	243 (78.1%)

*Table 1: Participants' sociodemographic characteristics.*

Ninety-seven (31.2%) women had booked ANC early (within 12 weeks of gestation) and the remainder (68.8%) had booked after 12 weeks of gestation (Table 2).

Timing of first ANC booking	Frequency	Percent
Above 12 weeks	214	68.8
Within 12 weeks	97	31.2
Total	311	100

**Table 2:** Proportion of pregnant women’s timing for ANC booking.



**Figure 1:** Prevalence of pregnant women’s timing for ANC booking.

The chi square test of independent was carried out to determine association between explainable variables (such as age, education level, source of income, marital status, company living with, the number of living, planned pregnancy and recognition of pregnancy) and outcome variable (timing of First ANC booking) among pregnant women who attend Amtullabai Karimjee clinic for antenatal care services between April and August 2018.

Result of this study shows that education level ( $p = .013$ ), occupation ( $p = .05$ ), number of living children ( $p = .018$ ), planning for pregnancy ( $p = .023$ ) and early recognition of pregnancy ( $p < .001$ ) are significantly associated to the pregnant women likelihood to book for antenatal care services earlier within their first 12 weeks of gestation.

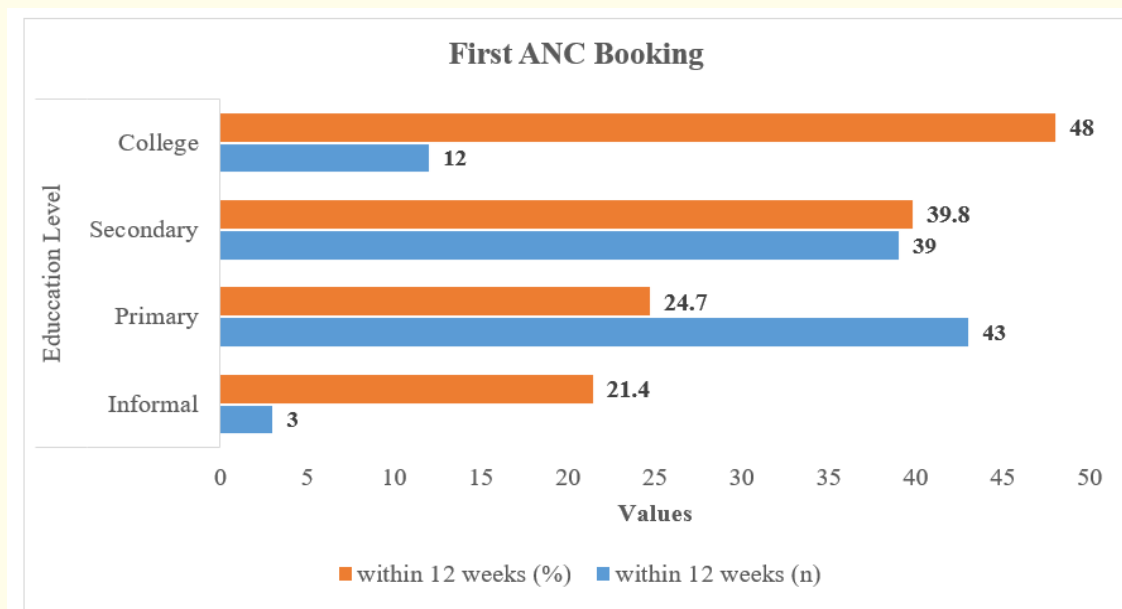
It was further observed that the trend of association between first ANC services booking differs among these factors. For instance, looking at the association between participants’ education level and first ANC booking among pregnant women, it was found that women with higher education levels tend to book ANC services earlier than low level educated women. Considering results in table 3 it shows that among pregnant women who book for ANC services within 12 weeks of their pregnancy 48.0%, 39.8% and 24.7% of them have college, secondary and primary education respectively. However only 21.4% were pregnant who received informal education.

Variables	First ANC booking				Total	X <sup>2</sup>	p-value
	Within 12 Weeks		After 12 Weeks				
	n	%	n	%			
<b>Age</b>							
15 - 19	10	41.7	14	58.3	24	3.02	0.555
20 - 24	18	30.0	42	70.0	60		
25 - 29	36	31.6	78	68.4	114		
30 - 34	22	33.8	43	66.2	65		
35 and above	11	22.9	37	77.1	48		
<b>Education level</b>							
Informal	3	21.4	11	78.6	14	10.697	0.013*
Primary	43	24.7	131	75.3	174		
Secondary	39	39.8	59	60.2	98		
College	12	48.0	13	52.0	25		
<b>Occupation</b>							
H/wife	34	25.0	102	75.0	136	9.472	0.050*
Peasant	0	0.0	1	100.0	1		
Student/pupil	1	50.0	1	50.0	2		
Entrepreneur	41	31.8	88	68.2	129		
Employed	21	48.8	22	51.2	43		
<b>Marital status</b>							
Unmarried	23	32.4	48	67.6	71	2.224	0.527
Divorced/separated	1	11.1	8	88.9	9		
Widow	0	0.0	1	100.0	1		
Married	73	31.7	157	68.3	230		
<b>Company living with</b>							
other relatives	24	28.6	60	71.4	84	0.368	0.544
partner/husband	73	32.2	154	67.8	227		
<b>Number of living</b>							
≤ 2 children	91	33.6	180	66.4	271	5.606	0.018*
< 2 children	6	15.0	34	85.0	40		
<b>Distance to ANC facility</b>							
< 5 km	22	32.4	46	67.6	68	0.055	0.815
≥ 5 km	75	30.9	168	69.1	243		
<b>Planned pregnancy</b>							
No	13	19.7	53	80.3	66	5.156	0.023*
Yes	84	34.3	161	65.7	245		
<b>Recognition of pregnancy</b>							
Within 12 weeks	97	43.1	128	56.9	225	53.881	0.000*
After 12 weeks	0	0.0	86	100.0	86		

**Table 3:** Factors associated with timing of first ANC booking (Univariate analysis).

\*: P value significant at .05 level.

Figure 2 shows that tendency of early booking for ANC services among pregnant women increases with education level and results are statistically significant  $\chi^2 (3) = 10.70, p = .013$ .



**Figure 2:** Trend of pregnant women who tend to book for ANC services earlier by their level of education.

Multivariate analysis was conducted using a binary logistic regression to determine factors contributing to first ANC service booking among the pregnant women attending Amtullabai Karimjee clinic for antenatal care services between April and August 2018. Factors which showed significant association in univariate analysis in table 4 were entered into the model for multivariate analysis. Findings revealed that education significantly predict early ANC booking among pregnant women. Looking at results in table 2, it shows that the odds to book for ANC services earlier within 12 weeks’ gestation is 2.554 times higher for pregnant women who hold college education level compared to pregnant women who hold primary education level OR = 2.554, CI 95% (1.037, 6.290). Similarly, probability of pregnant women to book ANC services earlier within the first 12 weeks’ gestation is more by 62.6% for women with secondary education level compared to those who have attained primary education OR = 1.626, CI 95% (0.926, 2.855). However, this finding was not significant (p = .091).

On contrary, it was also revealed that number of living children (parity), planned pregnancy, pregnancy complication history and economic status do not significantly predict early ANC services booking among pregnant women who visit health facility.

**Discussion**

In this study, most (68.8%) pregnant women booked ANC late, with only 31.2% booking early, which was consistent with expectations for low-income countries [6,11,16]. In contrast, a study conducted in Ethiopia showed 58% of women had early ANC booking [10,17]; however, this difference may be explained by the introduction of urban health extension programs and maternal health services improvements in Ethiopia. A recent study from Guatemala [18] also showed a higher rate (42%) of early ANC booking than our study. However, the rate of early ANC booking in our study was higher than the TDHS results for 2016 that showed 24% of women booked ANC early [12]. This difference may be because the present study setting (Dar es Salaam) was urban, and women in this study have better health awareness, better geographical access to maternal health services, a higher level of education (80%), and easy access to the clinic (located in the city center), than women in other parts of the country that were covered by the TDHS.

Factors	n	%	OR	95% CI		p-value
				Lower	Upper	
<b>Living children (parity)</b>						
0 - 2	271	87.14	ref			
< 2	40	12.86	0.457	0.18	1.157	0.098
<b>Planned pregnancy</b>						
No	66	21.22	ref			
Yes	245	78.78	1.682	0.843	3.353	0.14
<b>Pregnancy complication</b>						
No	215	69.13	ref			
Yes	96	30.87	1.577	0.92	2.702	0.098
<b>Education level</b>						
Primary	174	55.95	ref			0.131
Informal	14	4.50	0.874	0.222	3.439	0.847
Secondary	98	31.51	1.626	0.926	2.855	0.091
College	25	8.04	2.554	1.037	6.29	0.041
<b>Socioeconomic status</b>						
Low level	139	44.69	ref			
High level	172	55.31	1.261	0.739	2.151	0.396

**Table 4:** Factors influencing first ANC booking among pregnant women (Multivariate analysis).

Several studies have reported a lower rate of early ANC booking in developing countries [19,23,28]. This may be attributable to the time gap between studies and other sociodemographic determinants of early ANC booking. In our study, women with a history of previous or current pregnancy-related complications were more likely to book earlier than others. This was consistent with other reports from low-income countries that pregnant women who had experienced some pregnancy complications (e.g. abortion) tended to book ANC services earlier than those who had not experienced any complications [5].

Early pregnancy recognition was another factor that influenced early ANC booking in this study. In developing countries, pregnant women who discovered their conception before 12 weeks of were more likely to book ANC earlier than those who recognized their pregnancy after 12 weeks of gestation [22]. Having a higher education level (especially college or university) was a factor associated with early booking; this might be because women with a tertiary education may have easier access to health information through reading materials and social media. This finding was consistent with other reports from low-income countries [10,21,26]. In contrast, a recent study conducted in Northern Ethiopia did not find women’s educational status was associated with early ANC booking [24].

A majority (69.1%) of pregnant women knew the right time to book their first ANC, but only 30.9% booked early. This may be attributable to these women not knowing the benefits of booking earlier and suggests that theory does not necessarily translate into practice. A previous study conducted in a low-income country reported that although 73.3% of women knew the right time to book the first ANC visit was within first 12 weeks of pregnancy, no women had actually booked in the first 12 weeks [25]. However, other studies in developing countries have shown that awareness of the right time to initiate first ANC booking was associated with early ANC booking [4,6].

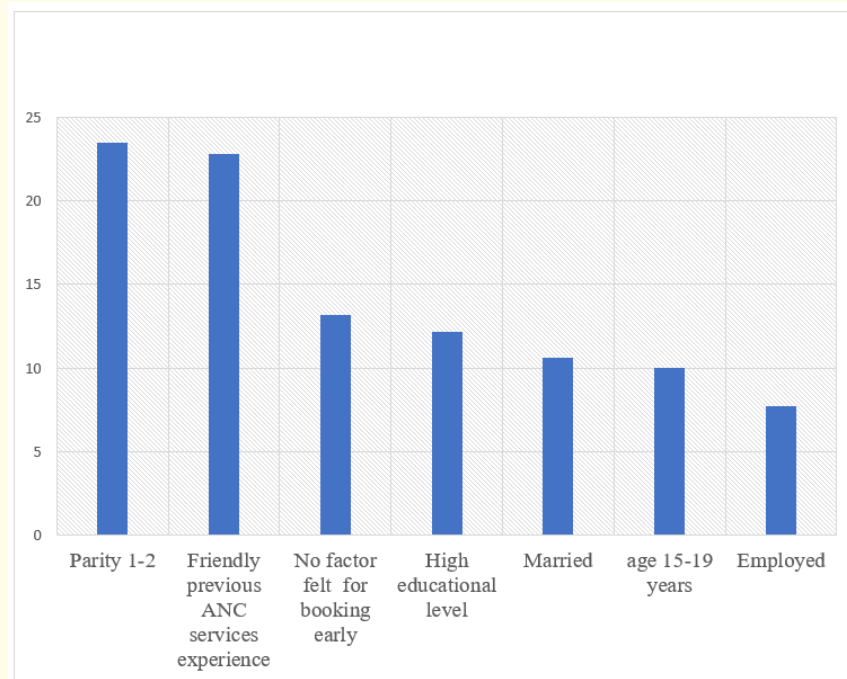
The awareness of timing for first ANC booking in the present study sparked interest in other possible variables that might explain this finding. Other determinants associated with awareness of need to early ANC booking were being age group between 30-34 years and living less than 5 kilometers from the clinic. This supports previous reports from developing countries that women living near to facilities were more likely to book earlier than other women [9,10,20,25].



**Facilitators of early ANC booking**

Women with < 2 children booked ANC services earlier than pregnant women with many children, which was consistent with other reports from low-income countries [6,10,16,26]. Previous experience of a friendly provider of ANC services also facilitated early ANC booking, which was consistent with previous studies [16,26]. In contrast, an Ethiopian study reported that previous ANC experience did not facilitate early ANC booking [27]. Other factors considered to facilitate early ANC booking were high educational level, being married, maternal age between 15 - 19 years old, and being employed. Other studies in low- and middle-income countries reported that women who lacked formal education tended to book ANC late [9,10,22]. However, educational status was not associated with early ANC booking in Ethiopia [4]. Women aged between 15 - 19 years was a factor associated with early ANC booking in our study, which was consistent with expectations in low-income countries where women of younger age tended to book ANC earlier [10]. However, younger age was not a factor associated with early ANC booking in a study conducted in Nigeria [19].

Factors facilitating early ANC booking that were commonly identified among participants included low parity (23.5%) and having previously experienced friendly ANC services (22.8%) (Figure 3).



**Figure 3:** Facilitators of early ANC booking.

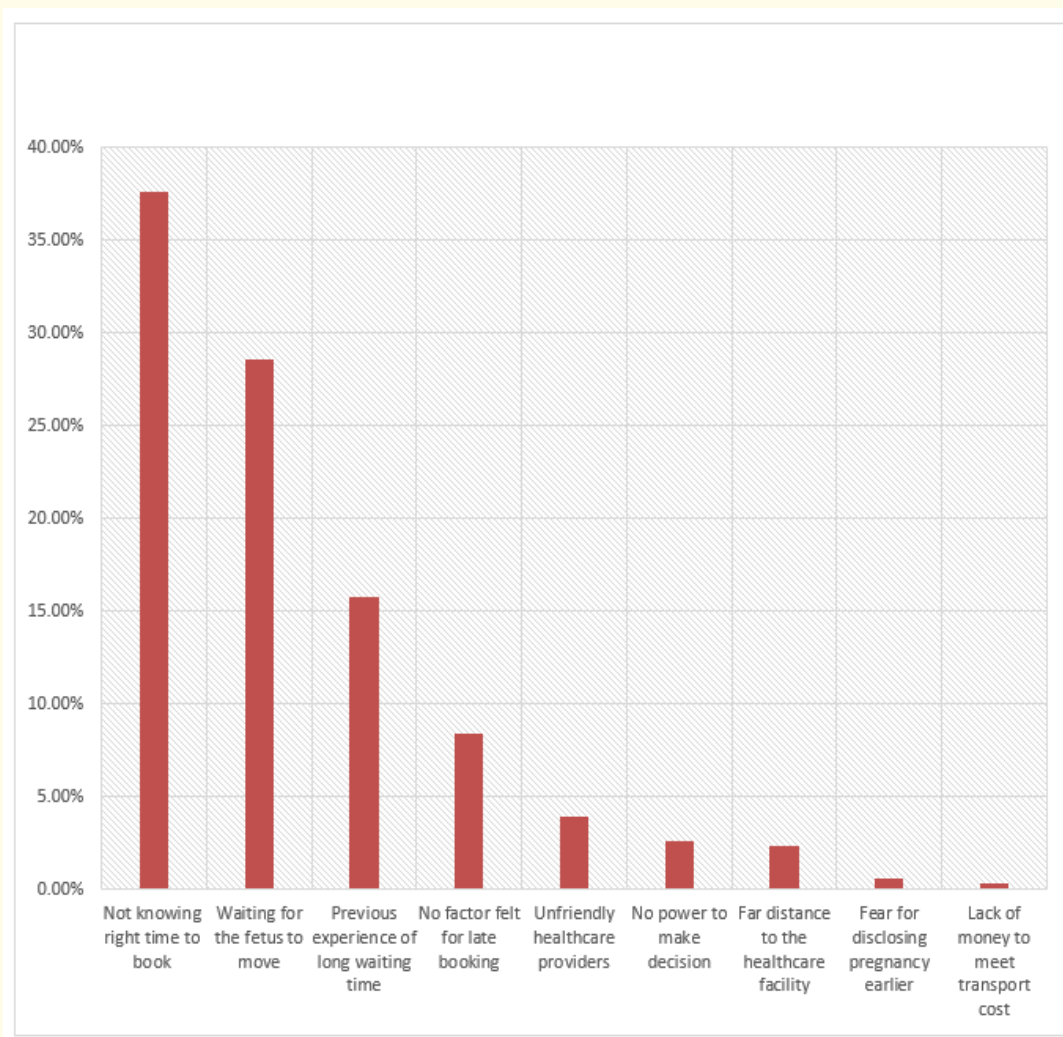
**Barriers to early ANC booking**

Not knowing when book the first ANC and waiting to recognize pregnancy through fetal movement were the most commonly reported reasons for late ANC booking. Not having knowledge of the recommended time to book the first ANC was the factor most strongly associated with ANC booking. This was consistent with other studies from low-income countries that found key barriers to women making early ANC bookings were not having the right information about when to book first ANC services and not knowing if they were pregnant [17].

Waiting to recognize the pregnancy or waiting for fetal movement was identified as a major barrier to early ANC booking. Other studies from low-income countries have highlighted that women who recognized their pregnancy late were more likely to book ANC late [6]. Furthermore, a study conducted in Nepal found that women who lived further than 6 kilometers from the health facility were more likely

to book ANC after 12 weeks of gestation compared with those who lived within 6 kilometers [28]. This could be because women living nearby health facilities have easy access to health information and means of transportation to the facility. Consistent with previous studies conducted in low-income countries [9], we found that late ANC booking was also associated with providers' unfriendly attitude.

Common barriers to early ANC booking were not knowing the recommended time to initiate booking (37.6%), waiting for the fetus to move (28.6%), and previous experience of waiting a long time (15.8%) (Figure 4).



**Figure 4:** Barriers to early ANC booking.

### Study Limitations

Interviewer-administered questionnaires may give rise to effective heuristic interviewer bias. To address this, the principle investigator and research assistants were careful to ask the same structured questions and present the same response options in a consistent way to all participants. The research team also made a conscious effort not to be influenced by participants' demeanor or appearance. As this study was quantitative, it could not evaluate women's in-depth feelings. To address this, it would be beneficial to conduct another study on this topic using a qualitative design with community surveys to explore deeper perspectives on benefits of early ANC booking.

## **Conclusion**

Most pregnant women book their first ANC later than recommended by the WHO and national ANC guidelines. This results in women missing accurate early pregnancy assessment for better pregnancy outcomes.

## **Ethics Approval and Consent to Participate**

Approval to conduct this study was granted by the Senate, Research and Publication Committee of Muhimbili University of Health and Allied Sciences. Written informed consent was obtained from study participants to confirm their willingness to participate after the study objectives had been explained to them. Participants' confidentiality and privacy were assured and their anonymity was maintained. Emphasis was placed on voluntary participation and participants' right to withdraw from the study at any time.

## **Consent for Publication**

This manuscript does not contain any individual person's data in the form of image. Therefore, consent for publication is not applicable.

## **Availability of Data and Material**

Data sets used and analyzed during the study will be made available on reasonable request from the corresponding author.

## **Competing Interests**

The authors declare that they have no competing interests.

## **Funding**

This study did not receive any funding from any institution.

## **Authors' Contributions**

LK contributed in the concept development and design of the study, and collection and analysis of the data. She developed and revised the manuscript. SL critically reviewed the manuscript draft versions. Both LK and SL read, reviewed, and agreed on the final version of the manuscript.

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