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Factors Associated with Antenatal Care Attendance in the First Trimester of Pregnancy in Rulindo District, Rwanda

Muyirukazi Yvette

Mount Kenya University of Rwanda, School of public Health

Abstract

Timely initiation of antenatal care (ANC) is a critical component of maternal health, as it enables early detection and management of pregnancy-related complications, provision of preventive interventions, and promotion of healthy behaviors. The World Health Organization recommends that pregnant women initiate ANC within the first trimester (before 12 weeks of gestation). Despite improvements in maternal health services in Rwanda, evidence indicates that a significant proportion of women still delay the initiation of ANC, particularly in rural districts. However, there is limited district-level evidence regarding factors influencing early ANC attendance in Rulindo District. This study aimed to assess the prevalence of first-trimester ANC attendance and identify associated factors among pregnant women in Rulindo District, Rwanda. An institution-based cross-sectional study was conducted among 384 pregnant women attending ANC services. A systematic sampling technique was used to recruit participants. Data were collected using a pretested structured questionnaire and analyzed using SPSS version 21.0 Both bivariate and multivariate logistic regression analyses were performed to identify factors associated with early ANC attendance, with statistical significance set at $p < 0.05$. A total of 384 pregnant women participated in the study. The majority were aged 25–34 years (44.0%), married (83.3%), and had primary education (53.6%), with most engaged in farming (54.7%) and living in low-income households. Obstetric characteristics showed that most women were multigravida (55.7%) and had 1–3 children (56.3%), with 64.6% reporting planned pregnancies. Although 66.1% of respondents attended antenatal care (ANC) in the first trimester, a considerable proportion (33.9%) initiated ANC late. Bivariate analysis showed that education level ($p = 0.002$), transport cost ($p = 0.015$), pregnancy planning ($p = 0.001$), gravidity ($p = 0.002$), and parity ($p = 0.001$) were significantly associated with early ANC attendance. Multivariate analysis revealed that only planned pregnancy remained a strong predictor of early ANC initiation (AOR = 3.719; 95% CI: 1.610–8.586; $p = 0.002$), while other socio-demographic and obstetric factors were not statistically significant.

Keywords: Antenatal care (ANC), First-trimester ANC attendance, Early ANC initiation, Planned pregnancy, Pregnant women, Maternal health, Associated factors, Cross-sectional study, Rwanda, Rulindo District

Background

Antenatal care (ANC) refers to the care provided by skilled health professionals to pregnant women and adolescent girls to ensure the best possible health outcomes for both mother and baby during pregnancy . The antenatal period is a critical time for providing health education, addressing maternal concerns, and

promoting healthy behaviors that contribute to positive pregnancy outcomes. Appropriate care during pregnancy and childbirth is essential for reducing maternal and neonatal morbidity and mortality(Geltore & Anore, 2021). ANC serves as an important public health intervention aimed at preventing complications, detecting abnormalities early, and preparing women and families for safe childbirth and parenthood(Geltore & Anore, 2021). Furthermore, timely ANC enhances women's linkage to the health system, increasing the likelihood of skilled birth attendance and improved maternal and neonatal health outcomes(Hagos et al., 2025) .

The World Health Organization (WHO) recommends that pregnant women initiate ANC within the first trimester (before 12 weeks of gestation) and complete a minimum of eight contacts throughout pregnancy(*WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience*, n.d.). This updated model replaced the previous recommendation of four visits and aims to improve maternal and perinatal outcomes by increasing opportunities for early detection and management of complications. Early ANC provides essential services such as screening for infections, anemia, and chronic conditions; provision of iron and folic acid supplementation; immunization; and counseling on nutrition and birth preparedness(Alem et al., 2022) Initiating ANC in the first trimester is particularly important as it allows for timely interventions that can prevent complications such as neural tube defects, hypertensive disorders, and infectious diseases(*WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience*, n.d.). Failure to initiate ANC early disrupts the continuum of care and may negatively affect both maternal and neonatal outcomes(Alem et al., 2022)

Globally, maternal mortality remains a significant public health concern. Although there has been progress in reducing maternal deaths, approximately 287,000 women died in 2020 due to pregnancy and childbirth-related complications, with about 95% of these deaths occurring in low- and middle-income countries, particularly in sub-Saharan Africa(*World Health Statistics 2023*, 2023). Most of these deaths are preventable through timely access to quality maternal health services, including early ANC. Early ANC attendance enables prompt diagnosis and treatment of conditions such as anemia, HIV, and syphilis, which are major contributors to adverse pregnancy outcomes (*World Health Statistics 2023*, 2023)

Despite improvements in ANC coverage globally, the timing of the first ANC visit remains a challenge. In many developing countries, women tend to initiate ANC late, often in the second or third trimester. In sub-Saharan Africa, although approximately 70–90% of women attend at least one ANC visit, only about 40–50% initiate ANC during the first trimester. Delayed initiation of ANC reduces the effectiveness of maternal health interventions and increases the risk of complications during pregnancy, childbirth, and the postpartum period (Alem et al., 2022)

Studies from different regions highlight variations in early ANC attendance. For instance, a study conducted in Papua New Guinea reported that only 23% of women initiated ANC in the first trimester(Alem et al., 2022). In contrast, a study in rural Ghana found that 57% of women initiated ANC during the first trimester, indicating relatively better early attendance (Kubahoniyesu et al., 2023)

In East Africa, including Rwanda, national guidelines recommend early initiation of ANC within the first trimester and completion of the recommended visits. Rwanda has made remarkable progress in improving maternal health service coverage, with over 98% of pregnant women attending at least one ANC visit(*Demographic and Health Survey (2025) | National Institute of Statistics of Rwanda*, n.d.). However, challenges remain in achieving timely initiation and completion of the recommended number of visits. Evidence from recent studies indicates that only about 47% of women in Rwanda initiate ANC during the

first trimester, highlighting a gap in timely utilization of services(Kubahoniyesu et al., 2023). This suggests that although access to ANC services is high, early initiation remains suboptimal.

Several factors influence the timing of ANC initiation. Demand-side factors such as maternal education, household income, parity, knowledge about ANC, and pregnancy intention play a significant role in determining when women seek care(Abdelmola, n.d.). Women with higher education levels and better socioeconomic status are more likely to initiate ANC early, as they are more informed and able to access health services. Conversely, unplanned pregnancies, lack of awareness, and cultural beliefs may delay ANC initiation(Kubahoniyesu et al., 2023)

Supply-side factors also significantly influence ANC utilization. These include distance to health facilities, availability of services, cost of transportation, waiting time, and quality of care. Women living in rural or hard-to-reach areas often face geographical and financial barriers that delay access to ANC services. Additionally, negative experiences with healthcare providers and long waiting times may discourage early attendance(Al-Mamun et al., 2025)

Although several studies have examined ANC utilization in Rwanda, there is limited district-specific evidence on factors influencing early ANC initiation, particularly in Rulindo District(*Demographic and Health Survey (2025) | National Institute of Statistics of Rwanda*, n.d.). Context-specific studies are important because factors affecting healthcare utilization may vary across regions due to differences in socioeconomic conditions, cultural practices, and health system characteristics. Therefore, this study seeks to fill this gap by assessing the prevalence and factors associated with attendance of antenatal care in the first trimester among pregnant women in Rulindo District, Rwanda.

Research Methodology

Descriptive cross-sectional study design to assess the prevalence and factors associated with attendance of antenatal care (ANC) in the first trimester of pregnancy among pregnant women in Rulindo District. This design was appropriate because it allowed data to be collected at a single point in time, making it cost-effective, time-efficient, and suitable for examining associations between variables without requiring follow-up. The study was conducted in Rulindo District, located in the Northern Province of Rwanda. Administratively, the district comprises 17 sectors, and it is served by 18 health centers, which provide antenatal care services.

Target Population

The target population for this study comprised pregnant women attending antenatal care services in Rulindo District during the study period. Based on available demographic estimates, a substantial proportion of women of reproductive age in the district access ANC services at least once during pregnancy (NISR, 2020). The study population specifically included pregnant women who attended ANC services at selected health centers during the data collection period and who met the inclusion criteria, including being residents of Rulindo District and consenting to participate in the study. (National Institute of Statistics of Rwanda, 2026).

Sample Design

Sample Size

The sample size for this study was determined using Fisher's formula for estimating a single population proportion:

$N=Z^2 \cdot p(1-p)/d^2$
Where:
N = required sample size
Z = standard normal deviate at 95% confidence level (1.96)
p = estimated prevalence of early ANC attendance (47%) *(NISR, 2026)*
d = margin of error (0.05)
Substituting the values:
$N= (1.96)^2 \times 0.47 \times (1-0.47)/ (0.05)^2 \approx 384$
Thus, the final sample size for the study was 384 pregnant women.

Sampling Technique
A multistage sampling technique was used to select study participants. First, out of the 17 health center in Rulindo District, health center were selected using simple random sampling to ensure representativeness. Second, the total sample size was proportionally allocated to each selected health center based on their average monthly ANC attendance using probability proportional to size (PPS). Finally, within each selected health facility, participants were selected using a systematic sampling technique, where every *kth* eligible pregnant woman attending ANC services was recruited until the required sample size was achieved. Eligibility criteria included being a resident of Rulindo District, attending ANC during the study period, and providing informed consent.

Data Collection Methods
Data Collection Instrument
Data were collected using a structured questionnaire developed by the researcher based on the study objectives and review of relevant literature. The questionnaire included sections on socio-demographic characteristics, obstetric history, knowledge of ANC, and supply-side factors related to health services. The tool primarily consisted of close-ended questions, which facilitated ease of data collection, consistency, and quantitative analysis. The questionnaire was initially prepared in English and later translated into Kinyarwanda, the local language, to ensure clarity and understanding among respondents.

Data Collection Procedures
A team of trained data collectors conducted the data collection process under the supervision of the researcher. Training was provided on research ethics, interview techniques, and proper administration of the questionnaire. Data were collected through interviewer-administered questionnaires at ANC clinics in the selected health centers. Eligible participants were approached, the purpose of the study was explained, and written informed consent was obtained prior to participation. To ensure data quality: Daily supervision and review of completed questionnaires were conducted, pretesting of the questionnaire was performed prior to actual data collection, confidentiality and privacy were maintained throughout the process.

Reliability and validity of instruments.
During this study, to ensure validity, the questionnaire was reviewed by experts and a pilot study was conducted among a small sample of pregnant women in a health facility outside the study area. Feedback from the pilot study was used to refine the tool and ensure content validity while reliability was ensured

through standardization of the questionnaire, training of data collectors, and pretesting procedures. These measures helped to ensure that the data collected were consistent and reflective of the actual situation.

Data Analysis

Data were coded, entered, and analyzed using SPSS version 21.0 Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize the characteristics of respondents. Inferential analysis was conducted to assess associations between independent variables and early ANC attendance: Chi-square tests were used for bivariate analysis, Variables with p-value < 0.05 were included in multivariate analysis, Binary logistic regression was used to identify independent predictors of early ANC attendance. Results were presented in tables, and figures, and statistical significance was determined at $p < 0.05$.

Ethical Considerations

Ethical approval for the study was obtained from the Mount Kenya University Institutional Review Board (IRB). Permission to conduct the study was also obtained from Rulindo District and selected health facilities. Participation in the study was voluntary, and informed consent was obtained from all participants prior to data collection. Participants were assured of their right to withdraw from the study at any time without any consequences. No personal identifiers (names) were recorded on the questionnaire, Data were securely stored in password-protected electronic files and locked cabinets, Access to data was limited to the research team

RESEARCH FINDINGS AND DISCUSSION

Socio-demographic characteristics of respondents

The table presents the socio-demographic characteristics of the study respondents. A total of 384 pregnant women of reproductive age participated in the study, yielding a response rate of 98%.

Table 1: Social Demographic characteristics of study respondents

Variables	Frequency (%)
Age group	
15-24	119(31.0)
25-34	169(44.0)
35 and Above	96 ((25.0)
Marital status	
Single	34(8.9)
Married	320(83.3)
Divorced/separated	18(4.7)
Widowed	12(3.1)
Number of Children	
0-3	262(68.2)
4-6	101(26.3)
>6	21(5.5)
Family size	

1-4	174(45.3)
5-7	165(43.0)
>7	45(11.7)
Number of Under five children at home	
None	82(21.4)
One	174(45.3)
Two or More	128(33.3)
Education level	
No Formal education	79(20.6)
Primary	206(53.6)
Secondary and above	99(25.8)
Occupation	
Farmer	210(54.7)
Employed	48(12.5)
Trader	86(22.4)
Unemployed	40(10.4)
Family's Monthly income	
<=50,000 RWF	124(32.3)
50,000-100,000 RWF	138(35.9)
100,000-150,000 RWF	68(17.7)
150,000-200,000 RWF	36(9.4)
>200,000 RWF	18(4.7)

The findings indicate that the majority of respondents were aged 25–34 years, with 44.0%, followed by those aged 15–24 years (31.0%), showing that most participants were in their prime reproductive age. In terms of marital status, a large majority were married (83.3%), suggesting that most respondents had spousal support. Regarding parity, most women had between 0–3 children (68.2%), indicating relatively low to moderate fertility levels among participants. Family size was fairly distributed, though slightly higher among households with 1–4 members (45.3%), closely followed by those with 5–7 members (43.0%). Concerning the number of under-five children, the majority had one child (45.3%), which may influence healthcare-seeking behavior due to prior maternal experience.

In terms of education, over half of the respondents had attained primary education (53.6%), while a smaller proportion had secondary education and above (25.8%), indicating generally low education levels. Occupationally, the majority were farmers (54.7%), reflecting the rural economic setting of the study area. With regard to income, most respondents fell within the 50,000–100,000 RWF monthly income category (35.9%), followed by those earning less than or equal to 50,000 RWF (32.3%), suggesting that the majority of households had relatively low income levels.

Table 2: obstetric characteristics of study respondents

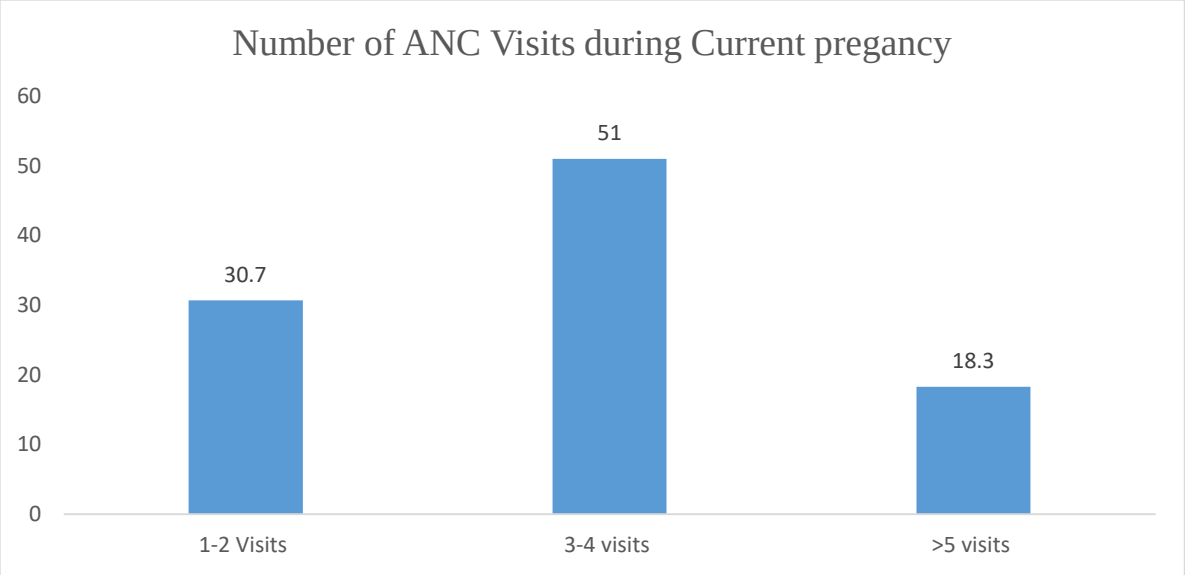
Variable	Frequency (n)	Percentage (%)
Gravidity (number of pregnancies)		
Primigravida (1 pregnancy)	92	24.0

2–4 pregnancies	214	55.7
≥5 pregnancies	78	20.3
Parity (number of births)		
0	96	25.0
1-3	216	56.3
≥4	72	18.7
History of miscarriage/abortion		
Yes	68	17.7
No	316	82.3
Previous pregnancy complications		
Yes	84	21.9
No	300	78.1
Planned pregnancy		
Yes	248	64.6
No	136	35.4
Gestational age at first ANC visit		
≤12 weeks	146	38.0
>12 weeks	238	62.0
Use of family planning before current pregnancy		
Yes	204	53.1
3-4 No	180	46.9

The findings in Table 2 show that the majority of respondents had experienced 2–4 pregnancies (55.7%), indicating that most women were multigravida, while a smaller proportion were primigravida (24.0%) or had five or more pregnancies (20.3%). Similarly, in terms of parity, the majority had 1–3 births (56.3%), while 25.0% had not yet given birth and only 18.7% had four or more children, suggesting moderate childbearing experience among most participants. A large majority of respondents reported no history of miscarriage or abortion (82.3%) and no previous pregnancy complications (78.1%), indicating generally favorable past obstetric outcomes for most women.

Regarding pregnancy intention, most respondents reported that their current pregnancy was planned (64.6%), while 35.4% were unplanned. However, despite this, the majority of women initiated antenatal care late, after 12 weeks of gestation (62.0%), compared to only 38.0% who attended within the first trimester.

Figure 1: Number of ANC visits during her current pregnancy

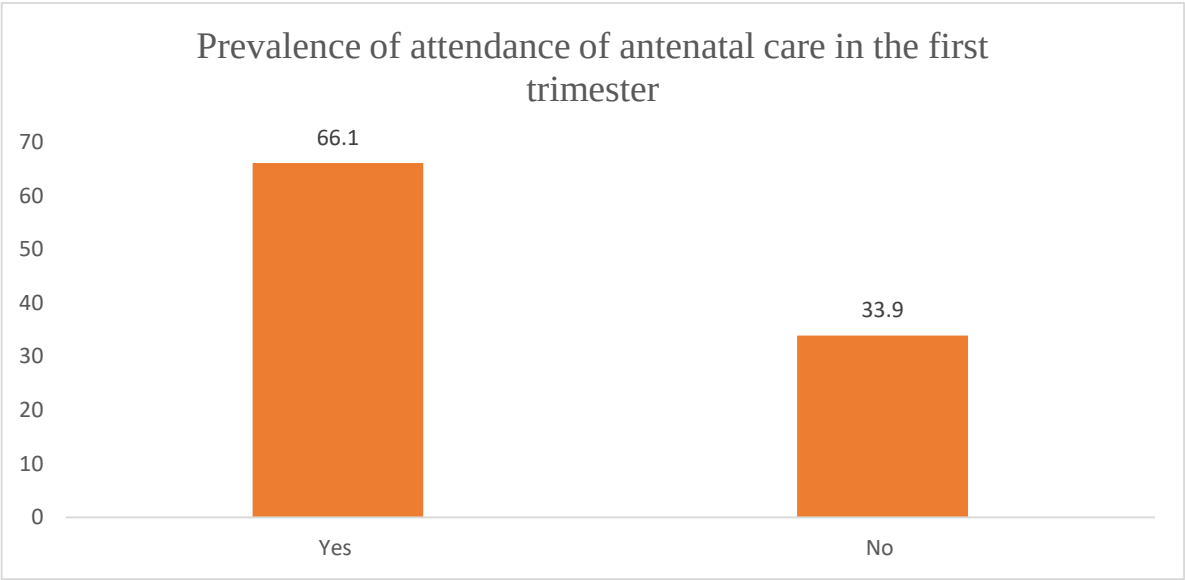


This figure is presenting ANC utilization, most respondents had attended 3–4 visits (51.0%), while fewer had only 1–2 visits (30.7%) or more than five visits (18.3%). Additionally, slightly more than half of the respondents (53.1%).

Objective (1) To determine the prevalence of first-trimester antenatal care attendance among pregnant women in Rulindo District, Rwanda

This figure is presenting the prevalence of attendance of ANC in the first trimester of pregnancy among pregnancy women.

Figure 2: Attendance of Antenatal care in the first trimester of pregnancy among pregnant women



The Figure shown that only 254(66.1%) of pregnant women attended antenatal care during the first trimester (≤12 weeks), while 130 (33.9%) of our study respondents reported to initiate ANC after the first trimester (>12 weeks).

Objective (2) To identify associated factors between socio-demographic and economic with first-trimester antenatal care attendance among pregnant women in Rulindo District, Rwanda using bi-variate and multivariate logistic regression analysis

This table is presenting the demand factors associated with the attendance of antenatal care in the first trimester among pregnancy women in Rulindo district, Rwanda using Bivariate analysis based on their prevalence of ANC visit in their first trimester.

Table 3: Bivariate Analysis related on the factors on the demand side associated with ANC in first trimester

Variables	Attended ANC in the First Tri-mester		P-Value
	Yes n(%)	No n(%)	
Age group			0.057
15-24	75(29.5)	44(33.9)	
25-34	105(41.3)	64(49.3)	
35-44	74(30.0)	22(16.8)	
Marital status			0.528
Single	26(10.2)	8(6.2)	
Married	207(81.5)	113(86.9)	
Divorced/separated	13(5.1)	5(3.8)	
Widowed	8(3.1)	4(3.1)	
Education level			0.002
No Formal education	60(23.6)	19(14.6)	
Primary	120(47.2)	86(66.2)	
Secondary and above	74(29.1)	25(19.2)	

The bivariate analysis examined the association between selected factors and attendance of antenatal care (ANC) in the first trimester. Age group showed a borderline association (p = 0.057), with women aged 25–34 years comprising 41.3% of early ANC attendees and 49.2% of non-attendees, while those aged 35–44 years were more represented among early attendees (26.0%) compared to non-attendees (13.8%). Marital status was not significantly associated with early ANC attendance (p = 0.528), as the majority of both attendees (81.5%) and non-attendees (86.9%) were married. However, education level was significantly associated (p = 0.002), with women having secondary education and above more likely to attend early ANC (29.1%) compared to those who did not (19.2%), while primary education was more common among non-attendees (66.2%).

Table 4: Multivariate analysis related to Social Economic factors associated with ANC visit at the first trimester

Variables	AOR	95%CI	P-Value
Education level			
No Formal education	1.196	0.517-2.768	0.675
Primary	0.950	0.460-1.962	0.890

Secondary and above	Ref.		

The multivariate logistic regression analysis showed that, after adjusting for other factors, pregnancy planning was the only variable significantly associated with attendance of antenatal care (ANC) in the first trimester. Women who had a planned pregnancy were 3.7 times more likely to attend ANC early compared to those with unplanned pregnancies (AOR = 3.719; 95% CI: 1.610–8.586; p = 0.002), indicating a strong and statistically significant relationship. In contrast, education level was not significantly associated with early ANC attendance, as women with no formal education (AOR = 1.196; 95% CI: 0.517–2.768; p = 0.675) and those with primary education (AOR = 0.950; 95% CI: 0.460–1.962; p = 0.890) did not differ significantly from those with secondary education and above.

Table 5 Geographical as associated factors of ANC Visits at the first trimester

Variables	**Attended ANC in the First Trimester**		**P-Value**
	Yes n(%)	**No n(%)**	
Distance to the nearest health facility			0.438
Less than 5 km	134(52.8)	74(56.9)	
More Than 5 km	120(47.2)	56(43.1)	
Transport cost to the nearest heath facility			0.015
Less than 500 RWF	125(49.2)	56(43.1)	
501-1000 RWF	70(27.6)	54(41.5)	
More than 1000 RWF	59(23.2)	20(15.4)	
Waiting time at the heath facility			0.471
Less than 2 hr	131(51.6)	62(47.7)	
More than 2 hr	123(48.4)	68(52.3)	
Privacy (Trust)			0.031
High	139(54.7)	86(66.2)	
Low	115(45.3)	44(33.8)	

The table presents the association between supply-side factors and attendance of antenatal care (ANC) in the first trimester among pregnant women. Distance to the nearest health facility was not significantly associated with early ANC attendance (p = 0.438), as similar proportions of women who attended early ANC lived less than 5 km (52.8%) compared to those who did not (56.9%). However, transport cost showed a statistically significant association (p = 0.015), where women who paid 501–1000 RWF were more represented among non-attendees (41.5%) compared to early attendees (27.6%), suggesting that moderate transport costs may act as a barrier to timely ANC initiation. Waiting time at the health facility was not significantly associated (p = 0.471), with comparable proportions of women attending early ANC experiencing less than 2 hours (51.6%) and more than 2 hours (48.4%), similar to non-attendees. In contrast, privacy (trust) was significantly associated with early ANC attendance (p = 0.031); although a higher proportion of non-attendees reported high privacy (66.2%) compared to early attendees (54.7%).

Objective (3) To determine associated factors between obstetric factors with first-trimester antenatal care attendance among pregnant women in Rulindo District, Rwanda using bivariate and multivariate logistic regression analysis

This table shown here present the factors on Obstetric associated with Attendance of Antenatal care in the first trimester among pregnant women in Rulindo district.

Table 6: Bivariate analysis on the factors on the obstetric associated with ANC in first trimester

Variables	Attended ANC in the First Trimester		P-Value
	Yes n(%)	No n(%)	
Pregnant planned			0.001
Yes	149(58.7)	99(76.2)	
No	105(41.3)	31(23.8)	
History of miscarriage			0.089
Yes	51(20.1)	17(13.1)	
No	203(79.9)	113(86.9)	
Previous pregnant complication			0.052
Yes	63(24.8)	21(16.2)	
No	191(75.2)	109(83.8)	
Gravidity			0.002
1	70(27.6)	22(16.9)	
2-4	125(49.2)	89(68.5)	
5 and above	59(23.2)	19(14.6)	
Parity			0.001
0	73(28.7)	23(17.7)	
1-3	126(49.6)	90(69.2)	
4 and above	55(21.7)	17(13.1)	

This table shown that Pregnancy planning also showed a significant association (p = 0.001), although a higher proportion of non-attendees reported planned pregnancies (76.2%) compared to attendees (58.7%). History of miscarriage was not significantly associated (p = 0.089), with similar distributions between groups. Previous pregnancy complications showed a borderline association (p = 0.052), with 24.8% of early attendees having a history of complications compared to 16.2% among non-attendees. Gravidity was significantly associated (p = 0.002), as women with 2–4 pregnancies were more common among non-attendees (68.5%), while those with one pregnancy (27.6%) or five and above (23.2%) were relatively more represented among early attendees. Similarly, parity was significantly associated (p = 0.001), with women having 1–3 children more common among non-attendees (69.2%), whereas those with no children (28.7%) or four and above (21.7%) were more likely to attend early ANC.

Table 7: Multivariate analysis of Obstetric Characteristics

Variables	AOR	95%CI	P-Value
Pregnant planned			

Yes	3.719	1.610-8.586	0.002
No	Ref.		
Gravidity			
1	1.915	0.099-36.922	0.667
2-4	1.933	0.311-12.034	0.480
5 and above	Ref.		
Parity			
0	1.832	0.100-33.706	0.684
1-3	0.636	0.105-3.845	0.622
4 and above	Ref.		

This multivariate analysis shown that gravidity showed no significant association, with women having one pregnancy (AOR = 1.915; 95% CI: 0.099–36.922; p = 0.667) and those with 2–4 pregnancies (AOR = 1.933; 95% CI: 0.311–12.034; p = 0.480) not significantly more likely to attend early ANC compared to those with five or more pregnancies. Parity was also not statistically significant, as women with no children (AOR = 1.832; 95% CI: 0.100–33.706; p = 0.684) and those with 1–3 children (AOR = 0.636; 95% CI: 0.105–3.845; p = 0.622) did not differ significantly from women with four or more children

Discussion

This study assessed the prevalence and factors associated with attendance of antenatal care (ANC) in the first trimester among pregnant women in Rulindo District, Rwanda. Overall, the findings show that a considerable proportion of women-initiated ANC early, although a substantial number still delayed. The study further identified that both demand-side factors (such as pregnancy planning and education) and supply-side factors (such as waiting time and distance) play an important role in determining early ANC attendance. These findings highlight that while progress has been made, barriers to timely ANC utilization persist and are influenced by a combination of individual, socio-economic, and health system-related factors.

The findings of this study revealed that 66.1% of pregnant women attended ANC in the first trimester, while 33.9% initiated ANC late. This prevalence is relatively higher compared to findings from other studies in Sub-Saharan Africa. For instance, a study conducted in Ethiopia reported that only 41% of women initiated ANC within the first trimester(Dansou et al., 2025a).

Regarding on the demand side; the study found that education level, pregnancy planning, gravidity, and parity were significantly associated with early ANC attendance at the bivariate level, while pregnancy planning remained the only significant predictor in multivariate analysis. Women with planned pregnancies were 3.7 times more likely to attend ANC early compared to those with unplanned pregnancies. This finding is consistent with a study conducted in Tanzania, which reported that women with planned pregnancies were about 2.5 times more likely to initiate ANC early(Dansou et al., 2025b). Similarly, research in Ghana found that planned pregnancy increased the likelihood of early ANC attendance by over 3 times(Abuosi et al., 2024).

Gravidity and parity were also significant at the bivariate level, with women having fewer or higher numbers of pregnancies more likely to attend early compared to those with moderate parity (1–3 children). Similar findings were reported in Kenya, where first-time mothers were more likely to initiate ANC early

due to anxiety and lack of experience, while women with multiple pregnancies may rely on prior experience and delay care(Zenbaba et al., 2025)

The findings to the supply side this study showed that transport cost and privacy were significantly associated with early ANC attendance at the bivariate level, while distance and waiting time remained significant predictors in multivariate analysis. Notably, women who experienced shorter waiting times (<2 hours) were 8.5 times more likely to attend ANC early. This finding aligns with a study conducted in Ethiopia, which found that women who spent less time at health facilities were 4 times more likely to utilize maternal health services early(Temesgen & Netangaheni, 2024). Long waiting times may discourage women, especially those with household responsibilities, from seeking early care.

Interestingly, women living less than 5 km from a health facility were less likely to attend early ANC, which is contrary to expectations. Similar unexpected findings were reported in parts of Malawi, where proximity to health facilities sometimes led to complacency and delayed care Women closer to facilities may perceive less urgency, assuming services are always accessible.

Transport cost was also a significant factor at the bivariate level, indicating that financial barriers still influence access to care. This is consistent with findings from Uganda, where transport costs reduced early ANC attendance by over 30% among low-income women (Kigenyi et al., 2021). Although Rwanda has community-based health insurance, indirect costs such as transport remain a barrier.

Conclusion

This study concludes that early antenatal care (ANC) attendance in Rulindo District is relatively high, with many women initiating care within the first trimester. However, a considerable proportion still begin ANC late, indicating that a significant number of women are missing the recommended early booking within the first 12 weeks of pregnancy. On the demand side, several factors were associated with early ANC attendance, including education level, pregnancy planning, gravidity, and parity. After further analysis, pregnancy planning emerged as the most important factor, showing that women with planned pregnancies are more likely to begin ANC early than those with unplanned pregnancies. On health system factors were also found to play a key role in influencing ANC utilization. In particular, distance to health facilities and waiting time affected whether women attended ANC early. Women living closer to health facilities were less likely to start care early, suggesting possible delays related to perception or behavior. In contrast, shorter waiting times at health facilities encouraged early attendance, emphasizing the importance of efficient and responsive healthcare services.

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