

Late initiation of antenatal care and associated factors among women attending Itojo hospital, southwestern Uganda: a facility-based cross-sectional study.

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Abstract

Background and Objective

Late initiation of antenatal care remains a concern in Uganda. This study determined the prevalence of late ANC initiation and identified factors associated with late initiation among women attending Itojo Hospital, Ntungamo District, southwestern Uganda.

Methods

A facility-based cross-sectional study was conducted among 356 women attending ANC, maternity and labour services at Itojo Hospital. Participants were enrolled consecutively. Data were collected using a structured interviewer-administered questionnaire and analysed using descriptive, bivariate and multivariable methods. Crude and adjusted prevalence ratios (cPRs and aPRs) with 95% confidence intervals (CIs) were estimated, with statistical significance at $p < 0.05$.

Results

Among the 356 women, 109 (30.6%) initiated ANC after 12 weeks of gestation. Late initiation was independently associated with age, education, occupation, travel time and distance from the health facility. Women aged 30–34 years (aPR=1.77, 95% CI: 1.17–2.68) and 40–44 years (aPR=2.90, 95% CI: 1.48–5.68), those with primary education (aPR=3.66, 95% CI: 1.57–8.52), and students (aPR=2.47, 95% CI: 1.09–5.60) had higher prevalence of late initiation. Longer travel time was also associated with higher prevalence. Partner decision-making was associated with lower prevalence (aPR=0.20, 95% CI: 0.11–0.34), whereas family influence and requiring permission to attend ANC were associated with higher prevalence. Perceived facility accessibility (aPR=0.47, 95% CI: 0.32–0.70) and affordability (aPR=0.53, 95% CI: 0.30–0.93) were associated with lower prevalence.

Conclusion

Nearly one in three women initiated ANC late, indicating a substantial gap in timely ANC initiation. The hospital and district authorities should strengthen early pregnancy identification, community education, supportive household involvement and measures addressing physical and financial barriers to ANC.

Keywords: Antenatal care initiation; late ANC initiation; first trimester; maternal health; pregnancy; Uganda; Ntungamo District.

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Introduction

Antenatal care (ANC) provides an important opportunity to assess pregnancy, detect complications, provide preventive interventions, offer nutritional and health education, and prepare women for childbirth. Initiating ANC early allows timely identification and management of pregnancy-related risks and provides an opportunity for interventions such as infection screening and iron–folic acid supplementation. The World Health Organization recommends that the first ANC contact occur within the first 12 weeks of pregnancy, followed by seven additional contacts during pregnancy [1]. Uganda incorporated this recommendation into its national maternal health guidelines [2]. Despite these recommendations, late ANC initiation remains common in low- and middle-income

countries. A systematic review and meta-analysis of studies from 19 African countries found that only **37.15%** of women initiated ANC during the first trimester [3]. In Uganda, **37%** of women initiated ANC within the first trimester according to the 2022 Uganda Demographic and Health Survey, while analysis of the 2016 survey reported first-trimester initiation of approximately 30% [4,5]. Studies from Uganda have also documented substantial variation across settings, including **36.1% first-trimester attendance in Lira City** [6]. The timing of ANC initiation is influenced by multiple and interrelated factors. Lower educational attainment, financial constraints, transport difficulties and limited physical access to health facilities have been associated with delayed initiation [3,7]. Household and socio-cultural factors, including partner or family influence, decision-making and pregnancy disclosure, may also affect when women seek care [8,9]. Health-system

characteristics, including accessibility and affordability of services, may further shape timely use of ANC [6]. In southwestern Uganda, geographical and transport-related challenges may affect access to maternal health services, particularly for women living in rural communities. Itojo Hospital provides ANC and maternity services to women from surrounding communities, yet there is limited facility-specific evidence on the magnitude of late ANC initiation and the factors associated with it. Understanding these factors is important for developing interventions that are responsive to the local context. Therefore, this study determined the prevalence of late ANC initiation and assessed the socio-demographic, socio-cultural and health-system factors associated with late initiation among women attending Itojo Hospital, Ntungamo District, Uganda.

Methods

Study design and setting

A facility-based cross-sectional study was conducted from 14 August to 4 September 2026 among women attending Itojo Hospital in Ntungamo District, southwestern Uganda. The hospital is a public general hospital located in Itojo Sub-county along the Mbarara–Kabale highway. It provides antenatal care (ANC), maternity, emergency obstetric, inpatient and outpatient services to populations from surrounding rural and semi-urban communities.

Study population

The study included women aged 18–49 years attending ANC, maternity or labour services at Itojo Hospital during the study period. Postpartum women within six weeks after delivery who had received ANC during their most recent pregnancy at the hospital were also eligible. Eligible women were recruited consecutively as they presented to the ANC, maternity or labour services during the study period. Information on the timing of the first ANC visit was obtained primarily from ANC records and maternal health cards and, where documentation was unavailable or incomplete, supplemented using participants' recall of their last normal menstrual period (LNMP).

Eligibility criteria

Women were eligible if they were aged 18–49 years, were attending ANC for the first visit in the current pregnancy or had attended ANC during their most recent pregnancy, and provided informed consent. Women were excluded if they were severely ill and unable to participate, had initiated ANC elsewhere before referral to Itojo Hospital, had communication difficulties that prevented effective participation, or declined participation.

Sample size and sampling

The sample size was calculated using the Kish–Leslie formula for estimating a single population proportion, assuming a 30% prevalence of first-trimester ANC attendance, a 95% confidence level and a 5% margin of error. After allowing for 10% non-response, the required sample size was 355 participants. A total of 356 eligible women participated in the study. Participants were recruited consecutively as they presented to the ANC, maternity and labour services until the required sample size was reached.

Bias

Potential sources of bias were addressed through several measures. Selection bias was minimized by recruiting eligible participants consecutively as they presented to the ANC, maternity and labour services during the study period. Interviewer bias was minimized through training of research assistants, pretesting of the questionnaire and use of standardized interviewer-administered procedures. Recall bias regarding the timing of ANC initiation was minimized by obtaining information primarily from ANC records and maternal health cards, with participants' recall of their last normal menstrual period (LNMP) used where documentation was unavailable or incomplete. Interviews were conducted privately to reduce the potential for social desirability bias.

Data collection

Data were collected using a structured interviewer-administered questionnaire developed according to the study objectives. The questionnaire assessed socio-demographic and socio-economic characteristics, obstetric history, knowledge of ANC, socio-cultural and household factors, and health-system factors.

The questionnaire was prepared in English, translated into Runyankore/Rukiga and back-translated into English to ensure consistency. It was pre-tested at Rubaare Health Centre IV in Ntungamo District and revised based on the pre-test findings. Trained research assistants conducted face-to-face interviews in a private setting. Participants were approached after completing their routine clinical procedures to minimize disruption of care.

Study variables and outcome measurement

The primary outcome was late ANC initiation, defined as attending the first ANC visit after 12 completed weeks of gestation. Early ANC initiation was defined as attendance at or before 12 completed weeks. Gestational age at first ANC attendance was determined from ANC cards where available and supplemented by LNMP recall when necessary.

Independent variables included socio-demographic and socio-economic characteristics, obstetric and pregnancy-related factors, socio-cultural and household factors, and health-system characteristics. These included age, education, occupation, marital status, residence, distance and travel time to the facility, transport cost, pregnancy intention, previous ANC experience, partner support and decision-making, family influence, permission to attend ANC, traditional beliefs, facility accessibility, affordability, waiting time, health-worker attitude and perceived quality of care.

Data management and statistical analysis

Completed questionnaires were checked for completeness and consistency before data entry. Data were coded, entered into a computer database and cleaned using range and consistency checks. Descriptive statistics were used to summarize participant characteristics. Categorical variables were presented using frequencies and percentages. At bivariate analysis, associations between explanatory variables and late ANC initiation were assessed using crude prevalence ratios (cPRs), 95% confidence intervals (CIs) and p-values. Variables with $p < 0.20$ at bivariate analysis were considered for inclusion in the multivariable model.

Multivariable analysis was conducted to identify factors independently associated with late ANC initiation while controlling for potential confounding. Adjusted prevalence ratios (aPRs), 95% CIs and p-values were reported. Statistical significance was considered at $p < 0.05$.

Ethical considerations

Ethical approval for the study was obtained from the Bishop Stuart University Research Ethics Committee (BSU-REC) on 24 July 2026 under protocol number BSU-REC-2026-2213. Administrative clearance was obtained from the Ntungamo District Health Office and Itojo Hospital administration. Written informed consent was obtained from all participants. Participation was voluntary, and participants were informed of their right to decline or withdraw without consequences. Confidentiality was maintained through the use of study codes rather than personal identifiers, while completed questionnaires and electronic data were securely stored with access restricted to authorized research team members.

Quality assurance

The questionnaire was pre-tested before the main study, and research assistants were trained on data collection procedures, informed consent, confidentiality and accurate recording of responses. The principal investigator supervised data collection and reviewed completed questionnaires daily for completeness and consistency. Gestational age was verified using ANC cards where available and supplemented by LNMP recall when necessary.

Results

Participant recruitment and flow

Participants were recruited consecutively as they presented to the ANC, maternity and labour services at Itojo Hospital during the study period. A total of 356 eligible women provided informed consent and participated in the study. All 356 participants were included in the analysis.

Women presenting to ANC, maternity and labour services at Itojo Hospital

↓

Eligibility assessment and consecutive recruitment

↓

356 eligible women provided informed consent and participated

↓

356 participants included in the analysis

Figure 1: Flow of participant recruitment and inclusion in the study

Participant characteristics

A total of 356 women participated in the study. The largest proportion were aged 25–29 years (30.3%), followed by those aged 30–34 years (28.7%). Most participants were married or cohabiting (81.2%), had secondary education (55.6%), and were engaged in business (51.4%). More than half lived in urban or trading areas (57.3%). **Table 1**

Table 1: Socio-Demographic and Socio-Economic Characteristics of Study Participants

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	<20	5	1.4
	20–24	62	17.4
	25–29	108	30.3
	30–34	102	28.7
	35–39	64	18.0
	40–44	15	4.2
Marital status	Married/Cohabiting	289	81.2
	Single	28	7.9
	Divorced/Separated	24	6.7
	Widowed	15	4.2
Education level	Secondary	198	55.6
	Tertiary/University	87	24.4
	Primary	61	17.1
	No formal education	10	2.8
Occupation	Farmer	73	20.5
	Other (specify)	1	0.3
	Business	183	51.4
	Civil servant	81	22.8
	Student	7	2.0
	Not employed	11	3.1
Religion	Protestant	124	34.8
	Catholic	141	39.6
	Pentecostal	52	14.6
	Muslim	25	7.0
	SDA	14	3.9
Residence	Rural	152	42.7
	Urban/Trading center	204	57.3
Household head	Husband/Partner	295	82.9
	Self	56	15.7
	Parent	5	1.4
Distance from home to health facility	≤15 km	126	35.4
	16–30 km	134	37.6
	>30 km	96	27.0
Travel time to health facility	≤30 minutes	127	35.7
	31–50 minutes	111	31.2
	>50 minutes	118	33.1
Transport cost per visit	≤ UGX 4,000	144	40.4
	UGX 5,000–6,000	100	28.1
	> UGX 6,000	112	31.5
Monthly household income	<UGX 100,000	51	14.3
	UGX 100,000–300,000	101	28.4
	>UGX 300,000	204	57.3
Source of personal income	No	103	28.9
	Yes	253	71.1

*Note. * N = 356. Percentages are based on the total number of participants.

Prevalence of late ANC initiation

Of the 356 women enrolled, 109 (30.6%; 95% CI: 26.1–35.6%) initiated ANC after 12 weeks of gestation, while 247 (69.4%) initiated ANC within the first 12 weeks. Late

initiation varied across age groups, ranging from 25.8% among women aged 20–24 years to 80.0% among those aged 15–19 years; however, the difference was not statistically significant ($p=0.059$). Table 2, Figure 2

Table 2: Prevalence of Late ANC Initiation by Age Category Among Study Participants

Variable	N	N	Late initiation, % (95% CI)	ANC (95%)	p-value
Overall late ANC initiation	356	109	30.6 (26.1–35.6)	—	—
Age category					0.059
15–19	5	4	80.0 (37.6–96.4)		
20–24	62	16	25.8 (16.6–37.9)		
25–29	108	28	25.9 (18.6–34.9)		
30–34	102	37	36.3 (27.6–45.9)		
≥35	79	24	30.4 (21.3–41.2)		

*Note. * N = 356. ANC = antenatal care; CI = confidence interval. Percentages and 95% confidence intervals are based on the number of participants in each age category.

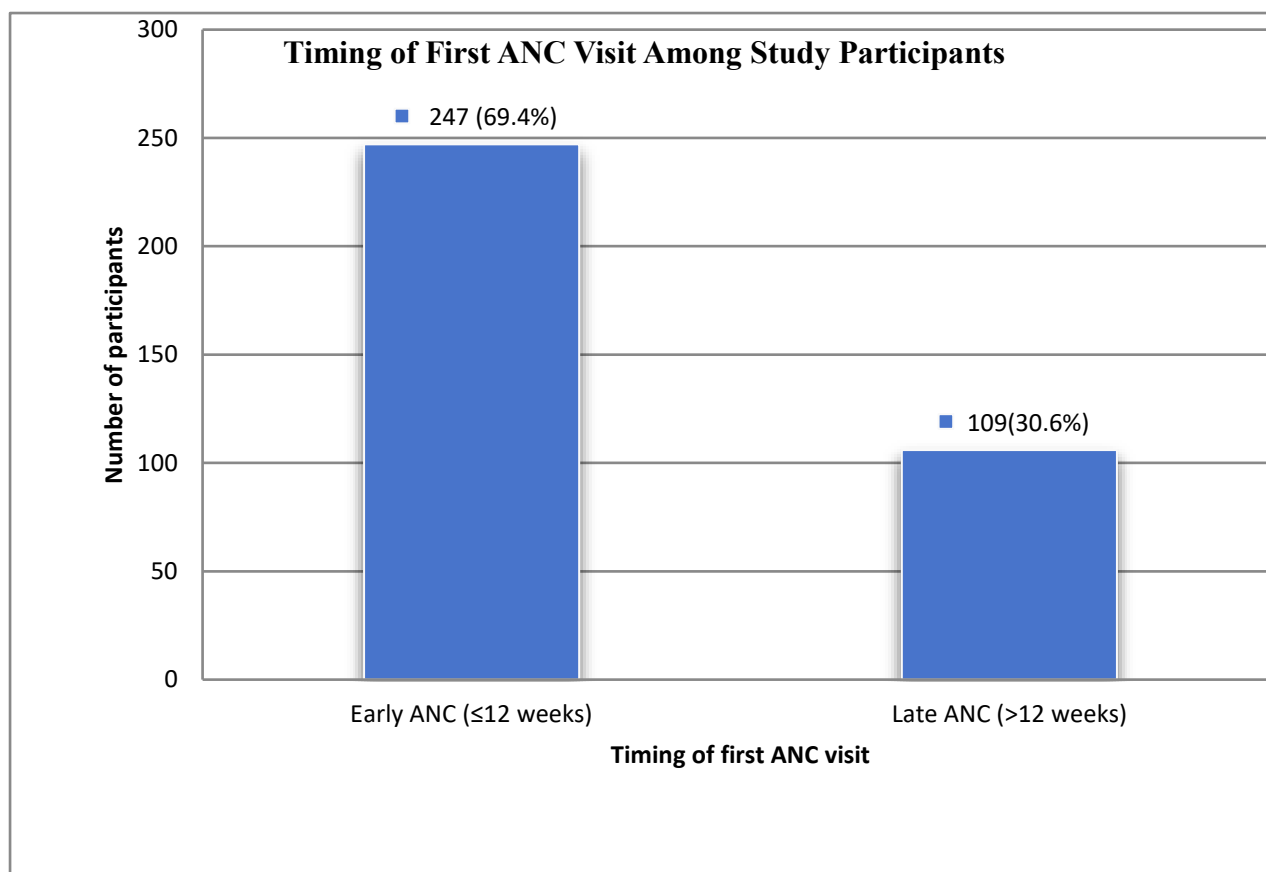


Figure 1: Timing of First ANC

Socio-demographic and socio-economic factors associated with late ANC initiation

At multivariable analysis, age, education level, occupation, distance from the health facility and travel time remained independently associated with late ANC initiation. Compared with women aged 25–29 years, women aged 30–34 years had a higher prevalence of late initiation (aPR=1.77, 95%

CI: 1.17–2.68; p=0.007), as did women aged 40–44 years (aPR=2.90, 95% CI: 1.48–5.68; p=0.002). Women with primary education had a higher prevalence of late initiation than those with tertiary/university education (aPR=3.66, 95% CI: 1.57–8.52; p=0.003). Students also had a higher

prevalence compared with women engaged in business (aPR=2.47, 95% CI: 1.09–5.60; p=0.031). Travel time showed a clear association with late initiation. Women who travelled

31–50 minutes had a higher prevalence of late initiation than those travelling ≤ 30 minutes (aPR=1.94, 95% CI: 1.17–3.22; $p=0.010$), as did those travelling >50 minutes (aPR=2.51, 95% CI: 1.51–4.18; $p<0.001$). In contrast, women reporting a distance of 16–30 km and >30 km had lower adjusted prevalence than those reporting ≤ 15 km (aPR=0.45, 95% CI:

0.29–0.70; $p<0.001$ and aPR=0.55, 95% CI: 0.35–0.88; $p=0.013$, respectively). Marital status, religion, residence, household headship, transport cost, household income and source of personal income were not independently associated with late initiation. (Table 3)

Table 3: Socio-Demographic and Socio-Economic Factors Associated With Late ANC Initiation

Variable / Category	cPR (95% CI)	p-value	aPR (95% CI)	p-value
Age group (years)				
<20	1.74 (0.89–3.42)	0.105	2.08 (0.97–4.44)	0.059
20–24	0.81 (0.45–1.46)	0.491	0.73 (0.40–1.34)	0.312
25–29 (Ref.)	1.00	—	1.00	—
30–34	1.63 (1.07–2.47)	0.022	1.77 (1.17–2.68)	0.007
35–39	1.25 (0.76–2.06)	0.380	1.20 (0.74–1.95)	0.451
40–44	2.13 (1.11–4.10)	0.024	2.90 (1.48–5.68)	0.002
Marital status				
Single	1.03 (0.43–2.50)	0.943	1.42 (0.59–3.47)	0.436
Married/Cohabiting (Ref.)	1.00	—	1.00	—
Divorced/Separated	1.02 (0.48–2.15)	0.963	0.90 (0.41–1.98)	0.792
Widowed	0.65 (0.26–1.65)	0.364	0.55 (0.23–1.37)	0.200
Education level				
No formal education	1.86 (0.64–5.39)	0.250	1.16 (0.40–3.39)	0.787
Primary	3.36 (1.97–5.73)	<0.001	3.66 (1.57–8.52)	0.003
Secondary	1.81 (1.07–3.06)	0.028	1.82 (0.81–4.11)	0.146
Tertiary/University (Ref.)	1.00	—	1.00	—
Occupation				
Farmer	1.31 (0.91–1.89)	0.143	0.79 (0.53–1.19)	0.260
Business (Ref.)	1.00	—	1.00	—
Civil servant	0.53 (0.31–0.92)	0.024	0.94 (0.41–2.16)	0.893
Student	1.43 (0.59–3.45)	0.431	2.47 (1.09–5.60)	0.031
Not employed	2.12 (1.29–3.49)	0.003	1.83 (0.82–4.11)	0.142
Other (specify)	2.49 (1.08–5.70)	0.031	—	—
Religion				
Protestant (Ref.)	1.00	—	1.00	—
Catholic	1.40 (0.96–2.03)	0.083	1.19 (0.81–1.75)	0.370
Pentecostal	0.98 (0.56–1.72)	0.955	0.89 (0.52–1.54)	0.687
Muslim	1.73 (1.01–2.96)	0.045	1.10 (0.63–1.91)	0.750
SDA	0.56 (0.15–2.10)	0.392	0.44 (0.13–1.47)	0.181
Residence				
Rural (Ref.)	1.00	—	1.00	—
Urban/Trading center	0.79 (0.52–1.21)	0.281	0.76 (0.51–1.15)	0.197
Household head				
Husband/Partner (Ref.)	1.00	—	1.00	—
Self	1.45 (0.73–2.85)	0.285	1.63 (0.82–3.24)	0.160
Parent	0.71 (0.10–4.89)	0.724	0.81 (0.16–4.19)	0.801
Distance from home to health facility				
≤ 15 km (Ref.)	1.00	—	1.00	—
16–30 km	0.49 (0.31–0.75)	0.001	0.45 (0.29–0.70)	<0.001
>30 km	0.50 (0.31–0.80)	0.004	0.55 (0.35–0.88)	0.013
Travel time to health facility				
≤ 30 minutes (Ref.)	1.00	—	1.00	—
31–50 minutes	1.88 (1.09–3.24)	0.022	1.94 (1.17–3.22)	0.010

>50 minutes	2.96 (1.76–5.00)	<0.001	2.51 (1.51–4.18)	<0.001
Transport cost per visit				
≤ UGX 4,000 (Ref.)	1.00	—	1.00	—
UGX 5,000–6,000	0.85 (0.55–1.30)	0.446	0.77 (0.50–1.18)	0.233
> UGX 6,000	0.85 (0.53–1.36)	0.507	0.88 (0.57–1.36)	0.564
Monthly household income				
<UGX 100,000	1.49 (0.84–2.63)	0.171	1.23 (0.69–2.18)	0.485
UGX 100,000–300,000	1.15 (0.71–1.87)	0.573	1.09 (0.68–1.76)	0.711
>UGX 300,000 (Ref.)	1.00	—	1.00	—
Source of personal income				
No	1.10 (0.69–1.76)	0.680	1.10 (0.69–1.76)	0.692
Yes (Ref.)	1.00	—	1.00	—

Note. cPR = crude prevalence ratio; aPR = adjusted prevalence ratio; CI = confidence interval. Ref. = reference category. — = not estimated.

Partner decision-making, family influence and the need for permission remained independently associated with late ANC initiation after adjustment. Women who agreed that their partner decided when they should start ANC had a lower prevalence of late initiation than those who disagreed (aPR=0.20, 95% CI: 0.11–0.34; p<0.001). Conversely, women who reported that their family influenced their decision on

when to start ANC had a higher prevalence of late initiation (aPR=2.24, 95% CI: 1.25–3.99; p=0.006). Women who required permission from their partner or family to attend ANC also had a higher prevalence of late initiation (aPR=2.16, 95% CI: 1.25–3.74; p=0.006). Partner support and traditional beliefs were not independently associated with late ANC initiation after adjustment. **Table 4**

Table 4: Socio-Cultural Factors Associated With Late ANC Initiation

Socio-cultural factor	Response	cPR (95% CI)	p-value	aPR (95% CI)	p-value
My partner decides when I should start attending ANC	Agree	0.65 (0.46–0.90)	0.011	0.20 (0.11–0.34)	<0.001
	Disagree	1.00	—	1.00	—
My partner supports me to attend ANC early	Agree	0.78 (0.55–1.11)	0.175	0.76 (0.52–1.10)	0.148
	Disagree	1.00	—	1.00	—
My family influences my decision on when to start ANC	Agree	0.76 (0.55–1.06)	0.105	2.24 (1.25–3.99)	0.006
	Disagree	1.00	—	1.00	—
I need permission from my partner/family to attend ANC	Agree	0.77 (0.56–1.07)	0.126	2.16 (1.25–3.74)	0.006
	Disagree	1.00	—	1.00	—
Traditional beliefs influence when pregnant women attend ANC	Agree	0.63 (0.44–0.89)	0.010	0.67 (0.42–1.08)	0.104
	Not sure	1.41 (0.62–3.20)	0.414	1.65 (0.77–3.57)	0.200
	Disagree	1.00	—	1.00	—

Note. ANC = antenatal care; cPR = crude prevalence ratio; aPR = adjusted prevalence ratio; CI = confidence interval. Reference categories are indicated by 1.00.

Health-system factors associated with late ANC initiation

Perceived accessibility of the health facility and affordability of ANC services remained independently associated with late ANC initiation. Women who considered the health facility easily accessible had a lower prevalence of late ANC initiation

than those who did not (aPR=0.47, 95% CI: 0.32–0.70; $p<0.001$). Similarly, women who considered ANC services affordable had a lower prevalence of late initiation (aPR=0.53, 95% CI: 0.30–0.93; $p=0.028$).

Distance, transport challenges, respectful treatment by health workers and perceived quality of ANC services were not independently associated with late ANC initiation after adjustment ($p>0.05$). **Table 5**

Table 5: Health-System Factors Associated With Late ANC Initiation

Health-system factor	Response	Early ANC ≤ 12 weeks, n (%)	Late ANC >12 weeks, n (%)	aPR (95% CI)	p-value
The health facility is easily accessible	Agree	227 (75.2)	75 (24.8)	0.47 (0.32–0.70)	<0.001
	Disagree	20 (38.5)	32 (61.5)	1.00	—
Distance affects my ANC attendance	Agree	41 (55.4)	33 (44.6)	0.97 (0.56–1.68)	0.912
	Disagree	206 (73.6)	74 (26.4)	1.00	—
Transport challenges delay ANC attendance	Agree	47 (57.3)	35 (42.7)	1.24 (0.75–2.04)	0.408
	Not sure	1 (100.0)	0 (0.0)	—	—
	Disagree	199 (73.4)	72 (26.6)	1.00	—
Health workers treat clients with respect	Agree	233 (70.8)	96 (29.2)	1.77 (0.68–4.64)	0.245
	Not sure	0 (0.0)	1 (100.0)	—	—
	Disagree	14 (58.3)	10 (41.7)	1.00	—
ANC services are affordable	Agree	233 (71.5)	93 (28.5)	0.53 (0.30–0.93)	0.028
	Not sure	1 (50.0)	1 (50.0)	—	—
	Disagree	13 (50.0)	13 (50.0)	1.00	—
Quality of ANC services is good	Agree	242 (71.2)	98 (28.8)	0.59 (0.28–1.21)	0.147
	Disagree	5 (35.7)	9 (64.3)	1.00	—

Note. ANC = antenatal care; aPR = adjusted prevalence ratio; CI = confidence interval. Reference categories are indicated by 1.00. — = not estimated.

Discussion

Prevalence of late ANC initiation

In this study, 30.6% of women initiated ANC after 12 weeks of gestation, meaning that nearly one in three women did not have their first ANC contact within the recommended first trimester. This finding indicates that, although most women attending Itojo Hospital initiated ANC within the recommended period, a substantial proportion still started care late. The prevalence observed at Itojo Hospital is broadly consistent with evidence from Uganda and other African settings. Analysis of the 2016 Uganda Demographic and Health Survey reported first-trimester ANC initiation among approximately 30% of women, while the 2022 Uganda

Demographic and Health Survey reported a higher national level of early initiation. Towongo et al. (2022) also found that 29.7% of women in Uganda initiated ANC during the first trimester^[5]. In Lira City, Northern Uganda, Acup et al. (2023) reported that 36.1% of women attended ANC within 12 weeks, indicating a higher proportion initiating late than in the present study^[6]. At the continental level, Abdo et al. (2023)^[3], in a systematic review and meta-analysis covering 19 African countries, estimated that 37.15% of women initiated ANC during the first trimester. The variation across these studies may reflect differences in study populations, geographical settings, access to health services and measurement of ANC timing. The present study was facility-based and included women attending ANC, maternity and labour services at a single hospital, whereas national surveys capture women across different levels of health-service access. Nevertheless, the finding that almost one-third of women initiated ANC late

demonstrates that delayed initiation remains relevant in the Itojo setting. Late initiation may reduce the time available for early pregnancy assessment, preventive interventions, health education and identification of pregnancy-related risks. The finding therefore supports the need for interventions that promote pregnancy recognition, early care-seeking and timely linkage to ANC services.

Socio-demographic and socio-economic factors

Age was independently associated with late ANC initiation. Women aged 30–34 years and 40–44 years had higher adjusted prevalence of late initiation compared with women aged 25–29 years. The association between maternal age and timing of ANC has also been reported in Uganda, although the direction and magnitude of the association have varied between studies [8].

One possible explanation is that previous pregnancy experience may influence how women perceive the need for early ANC. Women with previous pregnancies may feel more familiar with pregnancy and therefore perceive early attendance as less urgent. However, this explanation should be interpreted cautiously because perceptions of pregnancy risk were not directly measured in the present study. The age finding may also reflect differences in pregnancy circumstances and household responsibilities across age groups. Educational attainment was another important factor. Women with primary education had a substantially higher prevalence of late ANC initiation than those with tertiary or university education (aPR=3.66). This finding is consistent with evidence from Uganda and other African settings showing that higher maternal education is generally associated with earlier ANC initiation [3,7]. Education may improve access to health information and understanding of the recommended timing and benefits of ANC. In Lira City, inadequate knowledge of ANC and its benefits was identified among women attending ANC, highlighting the importance of information and health education in promoting timely attendance [6].

Occupation was also independently associated with late initiation, with students having a higher prevalence than women engaged in business. The study population contained relatively few students, so this finding should be interpreted cautiously. It may reflect competing responsibilities, financial dependence or differences in flexibility to access health services, but these explanations were not directly assessed in the study. The finding may therefore represent characteristics specific to the study population rather than a general occupational effect. Travel time showed a clear gradient. Women who required 31–50 minutes or more than 50 minutes to reach the hospital had higher prevalence of late ANC initiation than those travelling ≤ 30 minutes. This finding is consistent with evidence from Lira City, where longer travel

time was associated with delayed first ANC attendance [6]. Similar evidence from Fort Portal also identified physical access and distance as important factors influencing the timing of ANC [10].

Interestingly, after adjustment, women reporting residence 16–30 km and >30 km from Itojo Hospital had lower prevalence of late initiation than those living within 15 km. This finding differs from the expected pattern and from several studies linking greater distance with delayed ANC. Because travel time remained positively associated with late initiation, distance and travel time may be capturing different aspects of access, such as road conditions, transport availability or the location of communities relative to transport routes. This finding should therefore be interpreted cautiously rather than assuming that greater geographical distance necessarily resulted in better access. Marital status, religion, residence, household headship, transport cost, household income and source of personal income were not independently associated with late ANC initiation after adjustment. This suggests that, within this study population, the timing of ANC was more strongly related to selected individual and access-related characteristics than to these socio-economic measures.

Socio-cultural factors

The study identified important relationships between household decision-making and late ANC initiation. Women who reported that their partner decided when they should start ANC had a lower prevalence of late initiation, whereas women reporting family influence or a need to obtain permission from a partner or family member had higher prevalence of late initiation. The association with permission is consistent with findings among adolescent mothers in Rwanda, where permission to seek care was associated with the timing of ANC initiation [9]. In Uganda, Kisuule et al. also identified household and partner-related factors among the reasons contributing to delayed ANC attendance [8]. Similarly, Nakyazze reported an association between partner involvement and timely ANC attendance in Wakiso District [11].

These findings suggest that household decision-making may influence ANC timing through the degree of autonomy women have in seeking maternal healthcare. However, the present study should not be interpreted as showing that partner involvement itself is harmful. Rather, the findings distinguish between supportive involvement and situations in which women require another person's permission or depend on family decisions before seeking care. Traditional beliefs were associated with late initiation at bivariate analysis but were not independently associated after adjustment. This suggests that their apparent association may have been partly explained by other socio-cultural factors, particularly household decision-making and permission. Partner support was also not independently associated after adjustment. These findings

indicate that socio-cultural influences may operate together rather than as isolated factors.

The findings therefore support approaches that involve partners and families in ANC education while maintaining women's participation and autonomy in decisions about pregnancy care. Community-level education may also help address social norms that delay early disclosure of pregnancy or early care-seeking.

Health-system factors

Perceived accessibility of the health facility and affordability of ANC services remained independently associated with late ANC initiation. Women who considered the facility easily accessible had a lower prevalence of late initiation (aPR=0.47), while those who considered ANC services affordable also had a lower prevalence (aPR=0.53). The finding on accessibility is consistent with Ugandan evidence. Analysis of national survey data found that women with better access to health facilities were more likely to initiate ANC early^[5]. Similarly, Acup et al. found that longer travel time was associated with delayed ANC initiation in Lira City^[6]. Evidence from Fort Portal also linked shorter distance and lower transport costs with timely ANC initiation^[10].

Affordability is similarly supported by previous Ugandan evidence. Financial and transport-related barriers have been identified as important constraints to ANC utilization^[8,12]. The present finding suggests that women's perception of the affordability of ANC services may influence whether they seek care within the recommended period.

However, distance, transport challenges, respectful treatment and perceived quality of ANC services did not remain independently associated after adjustment. This differs from some previous facility-based studies, where distance and transport costs were important predictors of delayed ANC^[13]. The differences may reflect variation in how access was measured, differences in study populations, or the influence of other variables in the multivariable model. The lack of an independent association with perceived quality may also be related to the generally positive assessment of services among participants. Most women reported that the facility was accessible, ANC services were affordable and the quality of services was good. This limited variation may have reduced the ability to detect an independent association. Overall, the findings indicate that physical accessibility and affordability remain important components of timely ANC initiation at Itojo Hospital, while other health-system characteristics may be less influential after adjustment.

Taken together, the findings show that late ANC initiation at Itojo Hospital is associated with factors operating at several levels. Individual characteristics, particularly age and

education, were associated with timing of initiation; travel time reflected an important access barrier; household decision-making influenced women's ability to seek care; and perceived accessibility and affordability of services were associated with timely initiation.

These findings support a multi-level approach to improving first-trimester ANC attendance. Interventions focused only on increasing women's knowledge may not be sufficient where women face household decision-making constraints or difficulties reaching and affording services. Similarly, improving physical access without addressing household support and women's participation in decisions may leave other barriers unresolved.

Generalizability

The findings are primarily applicable to women attending Itojo Hospital and may be relevant to similar health facilities in southwestern Uganda. However, generalization to pregnant women in Ntungamo District or Uganda should be made cautiously because the study was conducted at a single hospital and included only women who presented for care during the study period. Women who did not attend Itojo Hospital were not represented.

Conclusion

Late initiation of antenatal care remains an important concern at Itojo Hospital, with 30.6% of women initiating ANC after 12 completed weeks of gestation. Late initiation was associated with selected socio-demographic, socio-cultural and access-related factors, including older age, lower educational attainment, longer travel time, household decision-making and perceived accessibility and affordability of ANC services. These findings highlight the need for interventions that promote early ANC initiation and address individual, household and access-related barriers.

Recommendations

Itojo Hospital should strengthen early pregnancy education, community mobilisation and linkage to antenatal care, with emphasis on initiating ANC within the first 12 weeks. Health workers should encourage supportive involvement of partners and families in ANC while ensuring that women remain actively involved in decisions concerning their pregnancy care. The Ntungamo District Health Office should strengthen VHT-led identification, education and referral of women with early pregnancies, particularly those experiencing difficulties accessing services. District health planners should also strengthen interventions addressing physical and financial barriers to ANC, including challenges related to travel and affordability.

Strengths

This study provides facility-specific evidence from Itojo Hospital on late ANC initiation. Consecutive recruitment enabled inclusion of eligible women presenting to ANC, maternity and labour services during the study period. The study also assessed a broad range of potential factors, including socio-demographic, socio-economic, socio-cultural and health-system characteristics. Use of both bivariate and multivariable analyses allowed assessment of factors independently associated with late ANC initiation.

Limitations

The cross-sectional design limits the ability to establish causal relationships between the identified factors and late ANC initiation. Some information was self-reported and was therefore subject to recall or social desirability bias. Since the study was conducted at a single hospital, the findings may not be generalisable to women receiving ANC elsewhere. In addition, women who did not attend Itojo Hospital during the study period were not represented, which may have excluded women facing more severe barriers to ANC utilisation.

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Author Contributions

List of abbreviations

Abbreviation	Meaning
ANC	Antenatal Care
aPR	Adjusted Prevalence Ratio
BSU	Bishop Stuart University
CI	Confidence Interval
cPR	Crude Prevalence Ratio
DHO	District Health Office
HIV	Human Immunodeficiency Virus
LNMP	Last Normal Menstrual Period
MoH	Ministry of Health
REC	Research Ethics Committee
SDG	Sustainable Development Goal
STATA	Statistics and Data Analysis
UBOS	Uganda Bureau of Statistics

NG conceived the study, collected and analysed the data, and drafted the manuscript. NE contributed to study conceptualisation, data analysis, interpretation of findings and manuscript development. FK and MSJ provided academic supervision, methodological guidance and critical review of the manuscript. All authors reviewed and approved the final manuscript.

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Ethics approval and consent to participate

Ethical approval for the study was obtained from the Bishop Stuart University Research Ethics Committee (BSU-REC 2026-2213). Administrative permission was obtained from the relevant health authorities and Itojo Hospital before data collection. Written informed consent was obtained from all participants before participation. Participation was voluntary, and confidentiality was maintained throughout data collection, analysis and reporting.

Data availability

The datasets generated and/or analysed during the current study are not publicly available because they contain participant-level information but may be made available from the corresponding author on reasonable request and subject to applicable ethical and institutional requirements.

Competing interests

The authors declare that they have no competing interests.

UDHS	Uganda Demographic and Health Survey
UN	United Nations
VHT	Village Health Team
WHO	World Health Organization

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