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Compliance with WHO-recommended ≥8 antenatal contacts and associated factors among women at primary health facilities in Mbarara district, Uganda

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Abstract

Background: The World Health Organisation (WHO) recommends ≥8 antenatal care (ANC) contacts to improve detection of pregnancy risks and maternal newborn outcomes. However, uptake of the 8-contact model remains low in many low-resource settings. **Objectives:** To assess compliance with the WHO-recommended ≥8 ANC contacts and associated factors among women attending primary health facilities in Mbarara District, south-western Uganda. **Design:** Facility-based cross-sectional study. **Methods:** Postnatal women attending postnatal and immunisation clinics at five randomly selected primary health facilities in Mbarara district were recruited between April and May 2025. Data were collected using interviewer-administered questionnaires and verified with antenatal cards. Data were analysed using Stata version 18 software. Descriptive statistics summarised participant characteristics. Bivariate and multivariable logistic regression analyses identified factors associated with compliance with the WHO-recommended ≥8 ANC contacts. **Results:** Of 433 participants enrolled (median age 27 years; interquartile range 23-31 years), the majority (67%; 290/433) were aged 21-34 years. Overall compliance with WHO-recommended ≥8 ANC Contacts was 15.0% (65/433; 95% CI: 11.8%–18.7%). The factors significantly associated with compliance with the WHO-recommended ≥8 Antenatal Contacts were initiating ANC in the first trimester of the index pregnancy (aOR = 43.08; 95% CI:14.84-124.97; $p<0.001$), staying within a distance of less than 5 km (aOR = 2.00; 95% CI:1.05-3.77; $p=0.034$), and monthly income of ≥100,000 Uganda shillings (aOR = 1.13; 95% CI:1.03-4.33; $p=0.041$). **Conclusion:** Compliance with the WHO-recommended ≥8 ANC contacts was low. Higher compliance was observed among women who initiated ANC early, lived closer to health facilities, and had higher incomes. Future strategies focus on factors associated with compliance, including early ANC initiation, geographic accessibility, and socioeconomic barriers.

Plain language summary

Pregnancy is a critical time when regular contact with health workers can prevent illness and save the lives of mothers and babies. Antenatal care visits allow health providers to detect problems early, offer treatment, and support women to have

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safer pregnancies and deliveries. To improve these outcomes, the World Health Organisation recommends that every pregnant woman should attend at least eight antenatal care contacts. However, in many low-resource settings such as Uganda, women often start care late or do not complete all the recommended visits, putting both mothers and newborns at risk. From April to May 2025, we investigated five primary health facilities in Mbarara District, south-western Uganda, and interviewed 433 women. We also checked their antenatal cards to confirm how many visits they attended during their most recent pregnancy.

We found that only 65 women (about one in seven) completed the recommended eight or more Antenatal care (ANC) contacts. Most women attended fewer visits than recommended. Women were much more likely to complete all eight contacts if they had started ANC early, in the first three months of their most recent pregnancy. Living close to a health facility (within five kilometres) and having a higher monthly income also increased the chance of completing all visits. Our findings show that many women are missing out on the full benefits of antenatal care. Therefore, starting ANC attendance in the first three months of pregnancy, bringing services closer to communities, and supporting women economically could help more mothers complete the recommended visits, leading to healthier pregnancies and good birth outcomes.

Keywords

antenatal care, compliance, WHO 8+ contacts, maternal health, Uganda

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Introduction

In 2023, more than 700 women worldwide died due to preventable pregnancy and childbirth-related causes each day.[1] Sub-Saharan Africa accounts for 70% of all deaths and is home to many of the countries with the highest maternal mortality rates, one of which is Uganda.[1] According to the recent Uganda demographic health survey (UDHS), the maternal mortality ratio in Uganda is 189 deaths per 100,000 live births,[2] which falls short of the Sustainable Development Goal target of reducing MMR to less than 70 deaths per 100,000 live births by 2030.[3] In south-western Uganda, the institutional maternal mortality ratio over five years was reported at 291 deaths per 100,000 live births by 2019, as recorded at Mbarara Regional Referral Hospital.[4]

For better pregnancy outcomes, the use of antenatal Care (ANC) services is a key component.[5] Antenatal care provides a platform for important healthcare functions, including risk identification, prevention, and management of pregnancy-related diseases.[1] The World Health Organisation (WHO) recommended at least four ANC interactions throughout pregnancy before 2016. However, evidence suggested that the four-visit model provided limited opportunities for early detection and management of pregnancy complications and was associated with persistent high rates of adverse maternal and perinatal outcomes, including stillbirths.[6] To provide comprehensive healthcare during pregnancy and childbirth, the WHO increased the number of ANC Contacts from four to eight.[7,8] The shift from four to eight ANC contacts was intended to improve the quality of care, increase opportunities for early detection and management of pregnancy complications, strengthen the provider–client relationship, and enhance women's overall experience of care during pregnancy.[7,8] However, implementation of the eight-contact model has presented challenges in many low- and middle-income countries because of shortages of healthcare workers, limited infrastructure, long travel distances, and financial barriers faced by pregnant women.[5,9] Concerns have also been raised regarding the feasibility of achieving eight ANC contacts in settings where completion of four ANC visits remains suboptimal.[5,9]

More frequent antenatal contacts provide additional opportunities for early detection and management of maternal and foetal complications, delivery of preventive interventions, health education, nutritional counselling, and timely referral when complications arise. Consequently, increased ANC attendance has been associated with reduced odds of stillbirth and lower perinatal mortality.[10] Furthermore, evidence from Ghana demonstrated that completion of eight or more ANC contacts significantly reduced the risk of adverse pregnancy outcomes, including low birth weight and preterm delivery.[11]

Compliance with the WHO-recommended 8 antenatal care contacts is widely low in many sub-Saharan countries, including Uganda. Additionally, concerns have been raised regarding the feasibility of achieving eight ANC contacts in settings where completion of four ANC visits remains suboptimal.[5,9] According to the recent Uganda Demographic and Health Survey (UDHS), overall, 68% of women had at least four ANC contacts for their most recent live birth or stillbirth, while only 1.9% attended eight or more times.[2] Several factors are attributed to adherence to 8 or more antenatal care contacts, which include: maternal education level, timing of first antenatal care visit, socioeconomic status, cultural beliefs, distance to health care facilities, and quality of antenatal care services offered.[5,12,13] This raises concerns about the feasibility of this model highlighting the need for context-specific evidence to inform implementation strategies.

Although national estimates from the UDHS indicate that only 1.9% of women attended eight or more ANC contacts,[2] there is limited published evidence describing compliance with the 8-contact ANC model and its associated factors in south-western Uganda, particularly in Mbarara District. A recent study conducted in Eastern Uganda reported that 23.4% of postpartum women completed the WHO-recommended eight or more ANC contacts,[14] highlighting substantial regional variation in uptake. Additionally, most studies in Uganda have focused on completion of four or more ANC visits under the previous WHO focused antenatal care model,[15–17] while relatively few studies have assessed compliance with the current WHO recommendation of eight or more ANC contacts.[14] Furthermore, determinants of ANC compliance may vary across settings because of differences in health system organisation, service accessibility, socioeconomic conditions, and sociocultural contexts. Consequently, findings from other regions may not be directly applicable to Mbarara District, highlighting the need for context-specific evidence. Therefore, this study assessed compliance with eight or more ANC contacts and associated factors among women in Mbarara District to generate context-specific evidence that may inform maternal health interventions and policy implementation.

Materials and methods

Study design and setting

This was a facility-based cross-sectional study conducted using quantitative data collection techniques between 1st April and 31st May 2025 at primary health care facilities in Mbarara District. Mbarara district is located in south-western Uganda and comprises one county, Kashari County, which is divided into two constituencies: Kashari North and Kashari South. Kashari County is composed of six sub-counties: Bubaare, Bukiro, Kagongi, Kashare, Rubaya, and Rubindi. The district has an estimated population of 257,222 people, with females constituting 51.7% of the population and the majority being of the Banyankole ethnic group.

Mbarara district has a total of 16 health facilities, including one Health Centre IV, six Health Centre IIIs, and eight Health Centre IIs. In this setting, Health Centre IIs do not provide maternal health services and were therefore excluded from the study. The study was conducted in five primary healthcare facilities in Mbarara District. These facilities comprised one Health Centre IV and four Health Centre III facilities that provide routine antenatal, postnatal, delivery, and immunisation services (Bwizibwera Health Centre IV; Rubaaya, Rubindi, Bubare, and Bukiiro Health Centre III). The inclusion of one Health Centre IV and four Health Centre IIIs captured variation in service capacity within the primary healthcare system, whereas Health Centre IIs were excluded because they do not provide maternal health services relevant to the study outcome.

Anecdotal reports from health facilities and community health workers indicate that many pregnant women do not complete the WHO-recommended eight or more antenatal care contacts. While ANC initiation is common, compliance with the full schedule is low, and there is limited empirical evidence documenting compliance with the WHO-recommended eight or more antenatal care visits and associated factors in this setting. This manuscript was prepared in line with the STROBE guidelines for cross-sectional studies (Supplemental Material 1).[18]

Participants and recruitment

Inclusion criteria: The study included postpartum women aged 15–49 years attending postnatal and immunisation clinics within six weeks after delivery at the selected health facilities. The age range reflects the reproductive-age population accessing maternal health services in the study setting.

Exclusion criteria: Women who were unable to provide coherent responses due to mental or severe health conditions were excluded from the study.

Sample size

The sample size was determined using the formula by Kish and Leslie.[19] The following assumptions were applied in the sample size calculation: 50% prevalence, a non-response rate of 10%, a 95% level of confidence, and a margin of error of 5%, resulting in a final sample size of a minimum of 422 participants. A prevalence of 50% was assumed in the sample size calculation due to the absence of published estimates from south-western Uganda of compliance with the WHO-recommended eight or more antenatal care contacts, as this provides the most conservative estimate and maximises the required sample size to ensure adequate study power.

Sampling procedure

A multistage sampling approach was used to select the study sites and participants. Five health facilities providing maternal and child health services were included in the study: Bwizibwera Health Centre IV, Rubaaya Health Centre III, Rubindi Health Centre III, Bubare Health Centre III, and Bukiiro Health Centre III.

First, the only Health Centre IV in the study area was purposively included because it serves as a major primary healthcare facility and referral centre within the district. Subsequently, four of the six eligible Health Centre III facilities were selected using simple random sampling, resulting in a total of five participating health facilities.

The study sample was allocated proportionately to each facility based on the average monthly attendance at postnatal and child immunisation clinics. Within each selected facility, eligible postpartum women were recruited consecutively during routine postnatal and child immunisation clinic days until the required sample size was attained. If an eligible mother declined participation, the refusal was recorded, and the next immediately available eligible mother was approached as a replacement.

Data collection procedure

Data were collected using a researcher-administered questionnaire developed from previously published studies[14,15] and were modified to fit the context. The English version of the questionnaire is provided as Supplementary Material 2. The questionnaire was reviewed by an experienced maternal health researcher (JN) who has a PhD in maternal health to ensure the relevance and alignment with the study objectives. The questionnaire was pretested among 43 postpartum women (approximately 10% of the calculated sample size) at a health facility outside the study area. Feedback from the pretest informed minor revisions to improve clarity, comprehension, and question flow. Participants involved in the pretest were excluded from the main study. Data were collected by trained research assistants using a data entry questionnaire designed using Kobo Toolbox (Cambridge, Massachusetts, USA).

Five research assistants, all holding Bachelor of Science degrees in Nursing, conducted the interviews after receiving training on the study protocol and ethical conduct of research. Research assistants were physically supervised by the Principal Investigator during the entire data collection process.

Variables

The outcome variable was compliance with the WHO-recommended eight or more antenatal care (ANC) contacts, defined as attendance of at least eight ANC contacts during the most recent pregnancy in accordance with WHO guidelines.[7] To ensure accuracy, we verified this information by physically reviewing the mothers' ANC cards, confirming whether the recommended number of contacts had actually been completed. The outcome was coded as a binary variable: compliant (≥8 ANC contacts) or non-compliant (<8 ANC contacts).

Independent variables were selected a priori based on existing literature and biological plausibility and included sociodemographic, obstetric, and health service–related factors. Sociodemographic variables included maternal age (15–20, 21–34, ≥35 years), marital status (single/separated/widowed or married), education level (none/primary or secondary/tertiary), religion (Christian or Muslim/other), and monthly income (<100,000 or ≥100,000 Ugandan shillings). Obstetric variables included parity (1, 2–4, ≥5) and gestational age at first ANC visit (first trimester or second/third trimester). Gestational age at first ANC visit was defined as the trimester during which the participant initiated antenatal care for the index (most recent) pregnancy and was categorised as first trimester or second/third trimester. Health service–related variables included place of residence (rural or urban); Distance to the nearest health facility (<5 km or ≥5 km) was self-reported by participants and verified by Village Health Teams (VHTs), who were familiar with the community catchment areas and health facility locations; waiting time at the health facility (<1 hour or ≥1 hour); source of information about ANC (health workers or family/friends/relatives/media); and male partner involvement in ANC (yes or no).

Maternal age was collected as a continuous variable and subsequently categorised into clinically relevant age groups for analysis. All other variables were collected as categorical variables during data collection using predefined thresholds informed by clinical relevance, policy benchmarks, and prior literature to facilitate interpretation and consistency with the study objectives.

Statistical analysis

Data collection tools incorporated internal consistency and range checks within Kobo Collect. Data were exported to Microsoft Excel for cleaning and then analysed using STATA version 18 (StataCorp, College Station, TX, USA). Participant

characteristics were summarised using descriptive statistics, including frequencies and proportions for categorical variables and means with standard deviations or medians and interquartile range for continuous variables, as appropriate.

Selection of explanatory variables was informed by existing literature on antenatal care utilisation, biological plausibility, and contextual relevance within the study setting. Bivariable logistic regression analyses were performed to assess crude associations between independent variables and compliance with the WHO-recommended eight or more antenatal care contacts. Variables with p-values <0.20 at bivariable analysis, those with biological plausibility, and a priori confounders were included in the multivariable logistic regression model. Because maternal age is an established determinant of antenatal care utilisation, a sensitivity analysis was performed by fitting an alternative multivariable model that included age regardless of its statistical significance at bivariable analysis. The p-value threshold of <0.20 was used to minimise the risk of excluding potentially important variables that may become significant after adjustment for confounding. A backward modelling approach was used to develop the final multivariable logistic regression model to identify factors independently associated with ANC compliance. Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) were reported, and statistical significance was set at $p < 0.05$.

Model diagnostics were performed to assess the validity and adequacy of the final multivariable logistic regression model. Multicollinearity among independent variables was assessed using the Variance Inflation Factor (VIF), with VIF values <10 considered indicative of the absence of problematic multicollinearity. Model specification was evaluated using the link test, while goodness-of-fit was assessed using the Hosmer–Lemeshow test. A non-significant p-value for both tests was considered indicative of an adequately specified model with good fit to the data.

Results

Participants

All 433 eligible women approached for participation consented and completed the study (100% response rate), and there was no missing data.

Socio-demographic, obstetric, and health service-related characteristics

The participants had a median age of 27 years, interquartile range (IQR): 23-31. A majority were aged between 21 and 34 years (n=290, 67%), identified as Christians (n=398, 92%), earned <100,000 Uganda shillings (UGX) monthly (n=305, 70.4%), had either no or primary education (n=286, 66.1%), resided in rural areas (n=336, 77.6%), and were married (n=381, 88%). Most women were multiparous (n=302, 69.8%), reported awareness about ≥8 ANC contacts (n=426, 98.4%), and reported no male involvement during ANC (n=270, 62.4%). Just over half of the women reported awareness about ANC through family, media, or relatives (n=232, 53.6%) while less than half the women (n=184, 42.5%) lived within 5 kilometres of a health facility and only 37% (n=160) had initiated their index pregnancy's first ANC visit in the first trimester (Table 1).

Compliance with WHO recommended 8+ antenatal contacts among women at primary health facilities in Mbarara district

Out of the 433 participants, 65 had the WHO-recommended 8+ Antenatal Contacts, giving a prevalence of 15.0% (95% CI: 11.8%–18.7%) among the study participants.

Crude analysis for the factors associated with compliance with the WHO-recommended 8+ antenatal contacts among women at primary health facilities in Mbarara district.

In the crude analysis, monthly income showed a significant association with compliance. Women earning at least 100,000 Ugandan shillings per month were twice as likely to complete eight or more ANC contacts compared with those earning less than 100,000 shillings (crude odds ratio (cOR) 2.03, 95% CI 1.18–3.49; $p = 0.011$). Distance to the nearest health facility was strongly associated with compliance. Women residing within five kilometres of a health facility had more than twice the odds of achieving eight or more ANC contacts compared with those living farther away (cOR 2.48, 95% CI 1.45–4.28; $p = 0.001$). Gestational age at first ANC visit was the strongest predictor in the crude analysis. Women who initiated ANC in the first trimester had markedly higher odds of completing eight or more ANC contacts compared with those who initiated in the second or third trimester (cOR 41.43, 95% CI 14.68–116.94; $p < 0.001$). Men's involvement in ANC was also significantly associated with compliance. Women who reported male partner involvement were more than twice as likely to complete eight or more ANC contacts compared with those without male involvement (cOR 2.19, 95% CI 1.28–3.73; $p = 0.004$). ANC waiting time was not significantly associated with compliance (Table 2).

Table 1. Socio-demographic, obstetric, and health service-related characteristics of women at primary health care facilities in Mbarara District, N=433.

Characteristics	Overall (N=433)		Compliance to 8+ANC				p-value
			Non-compliant (n=368)		Compliant (n=65)		
	N	(%)	n	(%)	n	(%)	
Age categories in years							
Median (IQR)	27	(23-31)	26.5	(22.5-31)	28	(23-32)	0.399[a]
15-20	59	(13.6)	52	(88.1)	7	(11.9)	0.767
21-34	290	(67.0)	245	(84.5)	45	(15.5)	
35+	84	(19.4)	71	(84.5)	13	(15.5)	
Religion							0.387Ī
Christians	398	(92.0)	336	(84.4)	62	(15.6)	
Moslems/others	35	(8.0)	32	(91.4)	3	(8.6)	
Marital status							0.987
Single/separated/widowed	52	(12.0)	44	(84.6)	8	(15.4)	
Married	381	(88.0)	344	(85.0)	57	(15.0)	
Monthly income level*							0.015
<100,000 UGX	305	(70.4)	268	(87.9)	37	(12.1)	
≥100,000 UGX	128	(29.6)	100	(78.1)	28	(21.9)	
Location							0.732
Rural	336	(77.6)	284	(84.5)	52	(15.5)	
Urban	97	(22.4)	84	(86.6)	13	(13.4)	
Parity (Deliveries at ≥26 weeks of gestation)							0.974
1	98	(22.6)	84	(84.7)	14	(14.3)	
2-4	302	(69.8)	256	(84.8)	46	(15.2)	
5+	33	(7.6)	28	(84.8)	5	(15.2)	
Distance to nearest health facility							0.001
<5 kilometres	184	(42.5)	144	(78.3)	40	(21.7)	
≥5 kilometres	249	(57.5)	224	(90.0)	25	(10)	
Education level							0.123
None/primary	286	(66.1)	249	(87.1)	37	(12.9)	
Secondary/Tertiary	147	(33.9)	119	(81)	28	(19)	
Source of information about ANC							0.088
Family/friends/relatives/media	232	(53.6)	204	(87.9)	28	(12.1)	
Health workers	201	(46.4)	164	(81.6)	37	(18.4)	
Gestation age at 1st ANC visit for the index pregnancy							<0.001Ī
1st trimester	160	(37.0)	99	(61.9)	61	(38.1)	
2nd/3rd trimester	273	(63.0)	269	(98.5)	4	(1.5)	
Men's involvement in ANC							0.005
No	270	(62.4)	240	(88.9)	30	(11.1)	
Yes	163	(37.6)	128	(78.5)	35	(21.5)	
ANC waiting time							0.478
<1 hour	266	(61.4)	223	(83.8)	43	(16.2)	
>1hour	167	(38.6)	145	(86.8)	22	(13.2)	

Abbreviations: ANC, antenatal care; UGX, Uganda shillings
*1 US dollar = 3,562.36 UGX as of 17th December 2025
[a]p-value obtained from Wilcoxon rank-sum test
Īp-values from Fisher's exact test, otherwise all other p-values from chi-squared test.

Adjusted analysis for factors associated with compliance with WHO recommended 8+ antenatal contacts among women at primary health facilities in Mbarara district

In the multivariable logistic regression analysis, women earning at least 100,000 Ugandan shillings per month had higher odds of completing eight or more ANC contacts compared with those earning less than 100,000 shillings, after adjusting for other covariates (aOR 1.13, 95% CI 1.03–4.33; p = 0.041). Similarly, women residing within five kilometres of a health

Table 2. Crude analysis for the factors associated Compliance with WHO Recommended 8+ Antenatal Contacts among Women at Primary Health Facilities in Mbarara District, N=433.

Characteristics		8+ ANC contacts (n=65) n/N (%)	cOR (95%CI)	p-value
Age categories in years	15-20	7/59 (11.9)	1	
	21-34	45/290 (15.5)	1.36 (0.58-3.19)	0.474
	35+	13/84 (15.5)	1.36 (0.51-3.65)	0.541
Religion	Christian	62/398 (15.6)	1	
	Moslem/others	3/35 (8.6)	0.51 (0.15-1.71)	0.274
Marital status	Single/separated/widowed	8/52 (15.4)	1	
	Married	57/381 (15.0)	0.97 (0.43-2.16)	0.936
Monthly income level*	<100,000 UGX	37/305 (12.1)	1	
	≥100,000 UGX	28/128 (21.9)	2.03 (1.18-3.49)	0.011
Residence	Rural	52/336 (15.5)	1	
	Urban	13/97 (13.4)	0.85 (0.44-1.63)	0.615
Parity	1	14/98 (14.3)	1	
	2-4	46/302 (15.2)	1.08 (0.56-2.06)	0.820
	5+	5/33 (15.2)	1.07 (0.35-3.24)	0.903
Distance to nearest health facility	<5 kilometres	40/184 (21.7)	2.48 (1.45—4.28)	0.001
	≥5 kilometres	25/249 (10.0)	1	
Education level	None/primary	37/286 (12.9)	1	
	Secondary/Tertiary	28/147 (19.1)	1.58 (0.93-2.71)	0.094
Source of information about ANC	Family/friends/relatives/ media	28/232 (12.1)	1	
	Health workers	37/201 (18.4)	1.64 (0.97-2.80)	0.067
Gestation age at 1st ANC visit for the index pregnancy	1st trimester	61/160 (38.1)	41.43 (14.68-116.94)	<0.001
	2nd/3rd trimester	4/273 (1.5)	1	
Men's involvement in ANC	No	30/270 (11.1)	1	
	Yes	35/163 (21.5)	2.19 (1.28-3.73)	0.004
ANC waiting time	<1 hour	43/266 (16.2)	1	
	≥1 hour	22/167 (13.2)	0.79 (0.45-1.37)	0.397

Abbreviations: ANC, antenatal care; cOR, crude odds ratio; UGX, Uganda shillings.
*1 US dollar = 3,562.36 UGX as of 17th December 2025.

facility were twice as likely to achieve compliance compared with those living five kilometres or more away (aOR 2.00, 95% CI 1.05–3.77; p = 0.034).

Gestational age at first ANC visit for the index pregnancy remained the strongest independent predictor of compliance. Women who initiated ANC in the first trimester had markedly higher odds of completing eight or more ANC contacts compared with those who initiated in the second or third trimester (aOR 43.08, 95% CI 14.84–124.97; p < 0.001) (Table 3).

Although men's involvement in ANC was significantly associated with compliance with the WHO-recommended eight or more ANC contacts at bivariable analysis, the association was attenuated and no longer statistically significant after adjustment for other covariates in the multivariable model (aOR 1.05, 95% CI: 0.55–1.99; p = 0.881), suggesting that the crude association was influenced by confounding from other factors (Table 3).

Model diagnostics

Assessment of multicollinearity showed no evidence of problematic correlation among the independent variables included in the multivariable logistic regression model. Variance Inflation Factor values ranged from 1.05 to 1.29, with a mean VIF of 1.15.

The link test indicated that the model was correctly specified, as the squared linear predictor was not statistically significant (p = 0.721). The Hosmer–Lemeshow goodness-of-fit test demonstrated adequate agreement between the observed and predicted outcomes (p = 0.602), indicating that the final model provided a good fit to the data.

Table 3. Adjusted analysis for factors associated with Compliance with WHO Recommended 8+ Antenatal Contacts among Women at Primary Health Facilities in Mbarara District.

Characteristic‡		8+ ANC contacts (n=65) n/N (%)	cOR (95% CI)	aOR (95% CI)	p-value
Monthly income level*	<100,000 UGX	37/305 (12.1)	1	1	
	≥100,000 UGX	28/128 (21.9)	2.03 (1.18-3.49)	1.13 (1.03-4.33)	**0.041**
Distance to nearest health facility	≥5 kilometres	25/249 (10.0)	1	1	
	<5 kilometres	40/184 (21.7)	2.48 (1.45—4.28)	2.00 (1.05-3.77)	**0.034**
Education level	None/primary	37/286 (12.9)	1	1	
	Secondary/Tertiary	28/147 (19.1)	1.58 (0.93-2.71)	0.54 (0.26-1.09)	0.087
Source of information about ANC	Family/friends/ relatives/media	28/232 (12.1)	1	1	
	Health workers	37/201 (18.4)	1.64 (0.97-2.90)	1.14 (0.60-2.17)	0.693
Gestation age at 1st ANC visit for the index pregnancy	1st trimester	61/160 (38.1)	41.43 (14.68-116.94)	43.08 (14.84-124.97)	**<0.001**
	2nd/3rd trimester	4/273 (1.5)	1	1	
Men's involvement in ANC	No	30/270 (11.1)	1	1	
	Yes	35/163 (21.5)	2.19 (1.28-3.73)	1.05 (0.55-1.99)	0.881

Abbreviations: ANC, antenatal care; aOR, adjusted odds ratio; cOR, crude odds ratio; CI, confidence interval; UGX, Uganda shillings.
*1 US dollar = 3,562.36 UGX as of 17th December 2025.
‡Variables included in the multivariable model were monthly income, distance to the nearest health facility, education level, source of information about ANC, gestational age at first ANC visit during the index pregnancy, and men's involvement in ANC. Bolded adjusted odds ratios (aORs) indicate variables that were statistically significant at $p < 0.05$ in the multivariable logistic regression model.

Sensitivity analysis

A sensitivity analysis was conducted by including maternal age in the multivariable logistic regression model regardless of its statistical significance at bivariable analysis. Maternal age was not independently associated with compliance with eight or more antenatal care contacts, and inclusion of age did not materially alter the magnitude, direction, or statistical significance of the other covariates in the model.

Discussion

Key results

This study found that only 15.0% of the women attending selected primary health facilities in Mbarara district achieved the WHO-recommended 8 or more ANC contacts. Compliance with the WHO-recommended eight or more ANC contacts was significantly associated with having a monthly income level of at least 100,000 UGX, initiating ANC in the first trimester of the index pregnancy, and staying within a distance of <5km from the health facility.

Comparison with other findings, interpretation and study implications

Compliance with the WHO-recommended eight or more antenatal care (ANC) contacts in this study was low, indicating that most women did not receive the full package of recommended antenatal services intended to improve maternal and neonatal outcomes. This finding is comparable to reports from Eastern Uganda (23.4%),[14] and pooled estimates from systematic reviews conducted in 20 low- and middle-income countries (18.11%)[20] and Ethiopia (18.35%)[21] for eight or more ANC contacts, respectively. However, it is higher than the pooled compliance of 7.7% reported in eight sub-Saharan African countries.[5] The differences in the prevalence of 8 or more ANC contacts could be attributed to the methods used to determine ANC contacts in the different studies and the variations in the demographic characteristics of the participants. The low compliance observed in this study may reflect both individual- and health system-related barriers that limit women's ability to

complete the recommended ANC contacts. In southwestern Uganda, challenges such as delayed initiation of ANC, long distances to health facilities, transportation costs, poverty, competing household responsibilities, and limited awareness regarding the importance of frequent ANC contacts may have hindered consistent attendance.[15,22,23] These findings suggest that, despite global recommendations, the uptake of the recommended number of ANC contacts remains unacceptably low in many settings, highlighting the urgent need for context-specific strategies to overcome barriers to complete ANC utilisation and enhance maternal and neonatal outcomes.

In addition to individual-level barriers, the low compliance observed may also reflect challenges in implementing the WHO-recommended eight-contact ANC model within resource-constrained health systems. The transition from the previous four-visit model requires adequate health workforce capacity, consistent availability of maternal health services, effective communication of the revised ANC schedule, and sustained community engagement. In settings where the four-visit model was implemented for many years, both healthcare providers and pregnant women may still perceive fewer ANC contacts as sufficient, which could limit uptake of the newer recommendation. These findings underscore the need for health system strengthening initiatives that support effective implementation of the eight-contact ANC model at the primary healthcare level.

Early initiation of ANC was associated with higher compliance with eight or more contacts compared with those who initiated care later. This finding is consistent with evidence from Ethiopia and Eastern Uganda showing that early booking is associated with increased ANC attendance in subsequent pregnancies.[14,24,25] Early initiation may be associated with adequate scheduling and continuity of care across pregnancy. These findings may underscore the importance of interventions that promote first-trimester ANC initiation, including community sensitisation and provider-led encouragement of early booking.[10]

Higher household income was associated with greater compliance with the recommended ANC contacts and may reflect differences in the ability to meet transportation and other indirect costs associated with repeated clinic attendance. This finding aligns with previous studies in Uganda and other settings demonstrating higher ANC utilisation among women with higher income or wealth indices.[16,26–28] These results may highlight the potential role of women's economic empowerment, such as participation in income-generating activities and savings groups, in improving ANC utilisation.[29,30] Strengthening such community-based economic interventions may substantially increase ANC utilisation and ultimately contribute to improved maternal and neonatal outcomes. These findings suggest that interventions aimed at reducing financial barriers, such as women's economic empowerment programmes, community savings groups, and transport support mechanisms, may improve compliance with the recommended ANC contacts.

Geographic accessibility also remained an important determinant. Women living within five kilometres of a health facility had 2.0 times higher odds of complying with the recommended ANC contacts than those residing farther away. This association may reflect lower transportation costs and shorter travel times among women residing closer to health facilities, which could facilitate attendance at ANC contacts. This finding is consistent with evidence from Uganda and other sub-Saharan African settings showing reduced ANC attendance among women facing greater distance to care.[15,31–33] Improved geographic access through community-based outreach, decentralised services, or other accessibility interventions may therefore increase ANC utilisation, particularly in remote areas.[34] Future research should assess the impact of accessibility interventions such as community-based outreach, mobile clinics, and maternity waiting homes on ANC attendance. It should also use spatial analyses to identify service gaps and examine how transport, infrastructure, and seasonal factors affect ANC utilisation.[35] Qualitative research exploring women lived experiences with distance-related barriers would also provide valuable insights for designing context-specific strategies that improve access and encourage consistent ANC attendance among women in remote communities.

While our findings are consistent with several studies demonstrating the importance of early ANC initiation, higher socioeconomic status, and proximity to health facilities, evidence from other settings has not been entirely consistent.[14,36,37] For example, a study from Ethiopia found that compliance with ≥8 ANC contacts was more strongly associated with factors such as parity, male partner involvement, knowledge of pregnancy danger signs, and pregnancy-related medical conditions rather than timing of ANC initiation, household wealth, or geographic accessibility.[37] Similarly, a study from Eastern Uganda identified early ANC initiation, insurance coverage, and parity as important predictors but did not find distance to a health facility to be independently associated with completion of the recommended ANC contacts.[14] These inconsistencies suggest that determinants of ANC utilisation may vary across settings and may be influenced by differences in health-system organisation, service accessibility, financing mechanisms, socioeconomic conditions, and sociocultural factors.[14,36,37]

Strengths and limitations

This study has important strengths that should be considered when interpreting the findings. First, the study was conducted in five primary healthcare facilities in Mbarara District, providing a regionally representative assessment of women attending

maternal health services in rural south-western Uganda. This setting offers valuable insight into antenatal care utilisation in a typical primary healthcare context. In addition, the study assessed compliance with the World Health Organization-recommended eight or more ANC contacts, offering a more current and comprehensive understanding of maternal health-seeking behaviour compared with the earlier four-contact ANC model.

Several limitations should be considered. First, the cross-sectional study design limits the ability to establish temporal or causal relationships between the identified factors and compliance with the WHO-recommended eight or more ANC contacts. Longitudinal studies are needed to confirm the directionality of these associations. Second, recruiting participants from health facilities may have excluded women who face substantial barriers to accessing care and may therefore have resulted in an overestimation of ANC compliance compared with the wider population of postpartum women in the community. Third, recall bias may have occurred because some information was self-reported. Although women within six weeks postpartum were enrolled and ANC attendance information was supplemented using antenatal cards and records from the most recent pregnancy, these records may not have captured informal, undocumented, or privately obtained ANC visits outside the formal healthcare system. Fourth, distance to the nearest health facility was assessed using participant self-report and verified by Village Health Teams familiar with local catchment areas. However, objective geographic measurements such as Global Positioning System (GPS) coordinates were not obtained. Consequently, some degree of misclassification may have occurred, although any such misclassification was likely to be non-differential and may have biased the observed association towards the null. Lastly, the questionnaire used was not a previously validated tool, which may have affected the reliability and comparability of the findings. Nevertheless, the questionnaire was pilot-tested among 10% of the study population to assess its clarity, appropriateness, comprehensibility, and contextual relevance. Feedback obtained during the pilot phase informed refinement of the questionnaire before data collection.

Generalisability

The findings of this study are most applicable to women attending primary healthcare facilities in rural districts of south-western Uganda with similar health system organisation, service availability, and sociodemographic characteristics. The inclusion of multiple facilities across different sub-counties and the use of probability-proportional-to-size sampling enhance the representativeness of women accessing facility-based maternal and child health services within the district. However, because the study employed a facility-based sampling approach, women with the poorest access to healthcare services, who may also have lower utilisation of antenatal care, were likely underrepresented. Consequently, the findings may not be fully generalisable to all postpartum women in the community, particularly those who do not attend postnatal or child immunisation services. Therefore, the results should be interpreted primarily within the context of women utilising facility-based maternal and child health services in similar settings.

Conclusion

Compliance with the WHO-recommended eight or more antenatal care contacts was low, with approximately one in seven women achieving the recommended number of contacts. Higher compliance was observed among women residing within five kilometres of a health facility, those who initiated ANC in the first trimester, and those with higher monthly income. Future strategies should focus on promoting early ANC initiation, improving geographic access, and addressing socioeconomic barriers that were associated with the WHO-recommended eight or more antenatal care contacts.

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Ethical considerations

The study protocol received ethical clearance from the Faculty of Medicine Research Committee and was reviewed and approved by the Mbarara University Research Ethics Committee (MUST-REC 2021-1707). Administrative clearance was obtained from the Chief Administrative Officer of Mbarara district and the District Health Officer and In-charges of the selected health centres. All procedures complied with the 2013 Declaration of Helsinki and relevant national guidelines.

Consent to participate

Written informed consent was obtained from all participants prior to enrolment. Participation was voluntary, and participants could withdraw at any time without affecting the care they received. Written informed consent was obtained from every participant prior to enrolment. Pregnant and postpartum adolescents aged 15–17 years who qualified as emancipated (mature) minors provided independent informed consent in accordance with the approved study protocol and national research ethics guidelines. For participants who were unable to read or write, the participant information sheet and consent form were read aloud in the local language by trained research assistants. Participants who agreed to participate provided a thumbprint on the consent form, and an independent literate witness signed the consent document to confirm informed voluntary participation. Independent literate witnesses were adults who could read and write, were not members of the study team, and were selected from accompanying relatives, attendants, or health facility staff who were not directly involved in participant recruitment or data collection. Participation was voluntary, and participants could withdraw at any time without affecting the care they received. Confidentiality was safeguarded by replacing personal identifiers with unique study codes, storing the linkage file separately on password-protected computers with restricted access, and keeping paper records in locked cabinets.

Author contributions

Racheal Agaba: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft, Writing – Review & Editing; **Henry Ochola:** Conceptualization, Methodology, Formal Analysis, Data Curation, Supervision, Validation, Writing – Original Draft, Writing – Review & Editing, Correspondence; **Abraham Muhwezi:** Formal Analysis, Writing – Original Draft, Methodology, Supervision, Validation, Writing – Review & Editing; **Tom Murungi:** Methodology, Validation, Writing – Original Draft, Writing – Review & Editing; **Sylvester Namanya:** Methodology, Investigation, Validation, Writing – Review & Editing; **Daniel Lule:** Methodology, Formal Analysis, Validation, Writing – Review & Editing; **Brian Turigye:** Investigation, Data Curation, Writing – Review & Editing; **Jerome Kabakyenga:** Conceptualization, Methodology, Supervision, Validation, Writing – Review & Editing. All authors critically reviewed the manuscript, approved the final version for publication, and agree to be accountable for all aspects of the work.

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Data Availability Statement

The de-identified datasets generated and analysed during the current study are available from the corresponding author on reasonable request, in accordance with institutional and national data-sharing policies.

Supplemental material

Supplemental material for this article is available online.

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Appendix

Abbreviations

ANC	Antenatal Care
DHO	District Health Officer
HC	Health Centre
MCH	Maternal and Child Health
MDG	Millennium Development Goals
MOH	Ministry of Health
PPH	Post-Partum Haemorrhage
UBOS	Uganda Bureau of Statistics
UDHS	Uganda Demographic and Health Survey
UNCST	Uganda National Council for Science and Technology
UNICEF	United Nations Children's Fund
WHO	World Health Organisation.