Texila International Journal | Open Access | Peer Reviewed

Journal: Texila International Journal of Academic Research
https://doi.org/10.21522/TIJAR.2014.13.03.Art023

ISSN: 2520-3088
Volume 13 Issue 3, 2026

Household, Faith, and Community Support as Enablers of Antenatal Care Completion in a Fragile Urban Setting of Eastern Democratic Republic of Congo

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Cite this article as: Kaseke DM, Mastaki JK, Tshialala DM. Household, faith, and community support as enablers of antenatal care completion in a fragile urban setting of Eastern Democratic Republic of Congo. Texila Int J Acad Res. 2026;13(3). **https://doi.org/10.21522/TIJAR.2014.13.03.Art023**

Received: 26.05.2026
Accepted: 06.07.2026
Published: 31.07.2026

Abstract *Antenatal care (ANC) completion is influenced by health-service factors as well as household and community support systems. This study examined whether partner encouragement, faith-leader messages, religious activities and participation in women's or community groups were associated with ANC completion among host community women in Karisimbi. A cross-sectional analysis was conducted using data from 715 eligible women who had given birth in the past 12 months and were selected through multistage household sampling. The main outcome were completion of at least four ANC contacts (ANC4+) and a minimum of eight ANC contacts (ANC8+). Key explanatory variables included partner encouragement, exposure to faith-leader messages promoting ANC, frequency of religious activities and participation in women's or community groups. Multivariable logistic regression models were used, adjusting for maternal age, education, household assets, and access-related barriers. ANC4+ completion was 65.8%, while ANC8+ completion was 6.0%. In adjusted models, partner encouragement was associated with higher odds of ANC4+ completion (AOR 3.66; 95% CI 2.32-5.77), as was exposure to faith-leader ANC messages (AOR 2.03; 95% CI 1.13-3.63). Women/community group participation was positively but not significantly associated with ANC8+ completion (AOR 2.27; 95% CI 0.71-7.28). Partner encouragement and faith-leader communication may serve as practical entry points for improving ANC continuity in Karisimbi. Maternal health interventions in fragile urban settings should strengthen household and faith-community engagement to support sustained ANC attendance.*

Keywords *Antenatal Care Completion, Community Engagement, Democratic Republic of Congo, Faith Leaders, Partner Encouragement, Women's Groups.*

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https://doi.org/10.21522/TIJAR.2014.13.03.Art023

Introduction

Maternal mortality Antenatal care (ANC) is a foundational public health intervention because it creates repeated opportunities to detect pregnancy complications, prevent avoidable morbidity, provide counselling, link women to skilled birth care and enhance compliance of women in pregnancy. The global policy change from the former four-visit (ANC4+) approach to a minimum of eight contacts (ANC8+) was not only a numerical change; it reflected accumulated evidence that respectful, timely and clinically meaningful contact during pregnancy can improve perinatal outcomes and strengthen women's confidence in care [1–3].

The DRC remains a high-priority maternal health context because global maternal mortality has become increasingly concentrated in sub-Saharan Africa and in countries experiencing conflict, institutional fragility and constrained health systems. The 2025 inter-agency estimates report that approximately 260,000 women passed away around the world from gestation or childbirth-related causes in 2023. Many of these fatalities occurred in sub-Saharan Africa which show fragile settings carrying disproportionate risk. Such estimates justify local epidemiological studies that move beyond national averages to identify modifiable determinants within specific health zones [4–6].

Karisimbi Health Zone is a valuable site for studying household and community enablers because the setting combines urban density, population mobility, recurrent insecurity, informal household economies and crowded health services. Host-community women may not be registered in formal internally displaced-person camps, yet they are exposed to many of the same pressures that shape care seeking in humanitarian environments: uncertain income, transport constraints, safety concerns, health-worker workload and commodity shortages. These conditions make it essential to distinguish between first contact with ANC and sustained continuity of care [4, 7, 8].

In settings where religious affiliation and participation are socially important, faith-based networks can influence maternal health behavior by using trusted leaders, congregational platforms, household outreach, counselling, and repeated health education messages to promote antenatal care and facility delivery [9–12].

Trained religious leaders have been shown to improve maternal health service utilization when their messages are linked to formal health services: in Ethiopia, faith leader engagement increased optimal ANC/ANC4+ use and institutional delivery, while another cluster-randomized trial pairing Orthodox priests with community health workers increased ANC4+ and facility deliveries [9, 10].

These effects appear to operate through several mechanisms, including trust in religious authority, community mobilization, home visits, dialogue with families, referral encouragement, and the ability of faith actors to translate biomedical recommendations into locally acceptable messages [9–12].

However, religious influence should not be treated as automatically beneficial, because available evidence shows that religion itself may be minimally associated with ANC barriers in some contexts, while in others religious or cultural expectations, gender norms, provider preferences, or advice from religious/traditional authorities may contribute to delayed or constrained care-seeking [13].

For this reason, examining faith-based influence together with household and community support is important for understanding socially embedded enablers of ANC completion in fragile urban settings, where women's care-seeking is shaped not only by service availability but also by trust, family decision-making, social norms, mobility constraints and community-level mediation [11, 12].

Global monitoring often reports ANC4+ because household-survey data for at least four contacts are more widely available than

comparable ANC8+ data. However, ANC4+ does not measure technical quality, content of care, provider competence, respectful communication or facility readiness. Recent effective-coverage work shows that contact coverage may be high while readiness-adjusted and quality-adjusted coverage are substantially lower; therefore, a woman's reported number of contacts should be interpreted as an entry point into quality analysis rather than as proof of adequate care [5, 14, 15].

The analytical contribution of the present study is its explicit continuum framing. Rather than treating ANC as a single binary outcome, the analysis examines timely initiation, ANC4+ and ANC8+ as related but distinct outcomes. This matters because early initiation creates the calendar space for later contacts, ANC4+ remains a useful historical and programmatic benchmark, and ANC8+ reflects current world health organization (WHO) guidance. However, few studies have examined ANC completion across this continuum while simultaneously assessing household support, faith-based influence and community participation in fragile urban settings of eastern DRC [2, 5, 16]. This study therefore assesses household, faith and community support as enablers of ANC completion among host-community women in Karisimbi Health Zone, Goma. By integrating these interconnected social domains, the study aims to generate locally grounded evidence for maternal health interventions that combine quality ANC services with trusted social support systems.

Materials and Methods

Study Design

In the host community of Karisimbi Health Zone, this study relied on an analytical cross-sectional household survey plan to evaluate factors related to antenatal care (ANC) attendance among recently delivered women. The analysis examined three ANC outcomes timely ANC initiation, completion of at least four ANC contacts (ANC4+), and completion of minimum eight ANC contacts (ANC8+) with particular attention to household support, faith-based exposure, and community participation.

Study Setting and Period

We run this study from 1st to 10th May 2026 in the Karisimbi Health Zone of Goma, North Kivu Province, eastern DRC. Karisimbi is an urban health zone with an estimated population of 701,509 inhabitants. The zone faces several contextual challenges, including frequent population movement, reliance on informal livelihoods, growing demand for health services, and persistent insecurity [17, 18].

Study Population

The source population comprised women aged 18-49 years residing in the host community of Karisimbi Health Zone who gave birth within the 12 months prior the survey. Women have been included if they were aged 18 to 49 years, had delivered during the recall period of 12 months, lived in the host community and gave informed permission. Women were excluded if they declined or did not consent, were classified as internally displaced persons for this host-community analysis or had duplicate or irreconcilably inconsistent records. The cleaned dataset contained 717 imported records; after exclusion of two ineligible records, 715 women were included in the final analysis.

Sampling Frame and Sample Size

The health-area population served as the sampling frame and was used as the best available denominator for proportional allocation because reliable pre-field estimates of pregnant or recently delivered women were unavailable. The minimum size of sample was calculated with a 95% confidence level, 5% margin of error, presumed prevalence of 50%, design effect of 1.5 and 10% compensation for non-response. The first estimate of sample was made using:

$$n_0 = \frac{Z^2\, p\, (1-p)}{d^2}$$

where $Z = 1.96$, $p = 0.50$, and $d = 0.05$. This produced a minimum simple random sample of approximately 384 participants. After applying the design effect and expected no-answer adjustment, the required sample increased to approximately 642 participants. The achieved analytic sample of 715 women exceeded this minimum.

Sampling Procedure

A multistage sampling design was used. All 20 health areas in Karisimbi Health Zone were included as strata. Within each health area, clusters were chosen using probability proportional to size. The number of participants allocated to each health area was calculated as:

$$n_i = \frac{N_i}{N} \times n$$

where n_i was the allocated sample for health area i, N_i the population of health area i, N the total health-zone population, and n the target sample size. Final allocation was adjusted using the largest remainder method to maintain the total target sample.

Within selected clusters, households were sampled using systematic random sampling when a household list was available. Where no complete household list existed, rapid segmentation and mapping were applied to support probabilistic household selection and reduce interviewer discretion. Eligible women aged 18 to 49 years were chosen in selected households. If more than one eligible woman was present, one respondent was selected using a Kish grid or simple random method. At least two revisits were conducted before replacement when a selected eligible participant was absent. These procedures are consistent with standard household-survey methods intended to reduce selection bias [19, 20].

Data Collection

Data was collected with a structured household questionnaire administered in French or Kiswahili, depending on the respondent's preferred language. The questionnaire captured sociodemographic characteristics, reproductive history, when antenatal care attendance started, how many contact was achieved, partner encouragement, exposure to antenatal care-related messages from faith leaders, participation in women's or community groups, and engagement in religious activities. Prior to field implementation, the tool was pilot tested to assess item clarity, sequencing, and contextual relevance.

Outcome Variables

Three binary ANC outcomes were analyzed. Timely ANC initiation was defined as the first ANC contact in the first trimester. ANC4+ was defined as equal or more than four ANC contacts during the index pregnancy. ANC8+ was defined minimum ANC contacts, consistent with the current WHO ANC model [2].

Independent Variables

Independent variables were selected according to the study objectives, behavioral model of health-services use and prior evidence on ANC utilization in sub-Saharan Africa [21, 22]. Variables included maternal age, education, asset score, parity, partner encouragement, exposure to ANC messages from faith leaders, participation in women's or community groups and religious activity.

Data Management and Variable Construction

Data were input and run through IBM SPSS Statistics version 25. Before analysis, the dataset was reviewed for completeness, internal consistency and plausibility. ANC4+ and ANC8+ indicators were re-derived from the cleaned ANC contact count rather than relying on pre-entered binary variables. Parity values exceeding gravidity were corrected where internally consistent reproductive-history information was available. Because income non-response was high, income was not used as the main socioeconomic adjustment variable;

education and asset score were used as more stable indicators of socioeconomic position.

Statistical Analysis

Descriptive statistics summarized respondent characteristics, exposures and ANC outcomes. Categorical variables were reported as frequencies and percentages. Continuous variables were outlined using averages and standard deviations or medians and interquartile ranges, contingent upon their distribution.

Bivariable analyses described crude associations between independent variables and each ANC outcome.

Multivariable logistic regression estimated adjusted odds ratios, 95% CI and p-values for timely ANC initiation, ANC4+ and ANC8+. Logistic regression was appropriate because the outcomes were binary. Covariate selection was guided by epidemiological plausibility, prior literature review [21]. All models were evaluated for multicollinearity using variance inflation factors (VIF), discrimination assessed via the area under the receiver-operating characteristic curve (AUC), and calibration evaluated using the Hosmer-Lemeshow goodness-of-fit test as needed.

Equations

Separate multivariable logistic regression models were fitted for each ANC outcome: timely ANC initiation, ANC4+ attendance, and ANC8+ attendance. For outcome k, the model was specified as:

$$\text{logit}\{P(Y_k = 1)\} = \log\left(\frac{P(Y_k = 1)}{1 - P(Y_k = 1)}\right) = \beta_{0k} + \beta_k^T \text{X}$$

where:

$$k \in \{1,2,3\}$$
$$Y_1 = \text{timely ANC initiation}$$
$$Y_2 = \text{ANC4+ attendance}$$
$$Y_3 = \text{ANC8+ attendance}$$

and X represents the vector of covariates included in each model:

X = (maternal age, education, household asset score, parity, partner encouragement, faith-leader ANC message exposure, women/community group participation, religious activity).

The corresponding predicted probability for each outcome was:

$$P(Y_k = 1) = \frac{\exp\,(\beta_{0k} + \beta_k^T \text{X})}{1 + \exp\,(\beta_{0k} + \beta_k^T \text{X})}$$

Adjusted odds ratios were obtained as:

$$\text{aOR}_{jk} = \exp\,(\beta_{jk})$$

Bias Mitigation

Several procedures were used to reduce bias. Stratification by health area and multistage household sampling improved geographic coverage. Systematic household selection, probabilistic segmentation where household lists were unavailable, and random selection of one eligible respondent per household reduced selection bias. The 12-month recall period limited recall error compared with longer birth-history windows. Standardized questionnaire administration in French or Kiswahili improved comprehension. Data-cleaning procedures reduced misclassification of ANC outcomes and minimized the influence of implausible values. Nevertheless, residual bias may remain because ANC timing, number of contacts and service experience were self-reported. Social-desirability bias may have led to over-reporting of recommended ANC behaviors, and women with difficult pregnancy or delivery experiences may have recalled access barriers differently.

Results

A total of 715 women were included in the analytic sample. A comparatively young reproductive-age population was indicated by the mean maternal age of 29.5 years (SD: standard deviation = 6.3) and the median age of 29 years (IQR: interquartile range 25–34). The average parity among women was 3.3 children (SD = 1.9).

Socioeconomic conditions varied moderately, with a mean household asset score of 2.5 out of 4 (SD = 1.1), and a median of 3. Partner support for antenatal care was relatively

high, with a mean encouragement score of 4.0 (SD = 1.0).

In terms of education, many women had attained at least secondary education (62.1%), while 20.1% had higher education. A smaller proportion had only primary education (13.7%) or no formal education (4.1%).

Slightly more than half of the women (53.6%) reported exposure to antenatal care (ANC) messages delivered by faith leaders. Participation in women's or community groups was also common, reported by 59.2% of participants.

Religious engagement was high in this population, with many women attending religious activities weekly (78.1%), while smaller proportions reported daily (7.7%), rare (11.2%), or no participation (2.9%) "Table 1".

Table 1. Characteristics of Women included in the Analytic Sample (N = 715)

Characteristic	**Non-missing N**	**Mean (SD) or n (%)**	**Median (IQR)**	**Observed Range**
Maternal age (years)	715	29.52 (6.29)	29 (25-34)	18-49
Household asset score (0-4)	715	2.47 (1.10)	3 (2-3)	0-4
Parity (number of live births)	715	3.26 (1.94)	3 (2-4)	0–12
Partner encouragement (Likert scale 1-5)	713	4.01 (1.03)	4 (4-5)	1-5
Education level				
None	715	29 (4.1%)	-	-
Primary	715	98 (13.7%)	-	-
Secondary	715	444 (62.1%)	-	-
Higher	715	144 (20.1%)	-	-
Exposure to ANC messages from faith leaders				
No	713	331 (46.4%)	-	-
Yes	713	382 (53.6%)	-	-
Women/community group participation				
No	714	291 (40.8%)	-	-
Yes	714	423 (59.2%)	-	-
Religious activity				
Never	712	21 (2.9%)	-	-
Rarely	712	80 (11.2%)	-	-
Weekly	712	556 (78.1%)	-	-
Daily	712	55 (7.7%)	-	-

"-" indicate that statistic non applicable.

ANC utilization declined substantially across the continuum from four to eight contacts. Among women with available data, 39.9% initiated ANC during the first trimester (285/714; 95% CI: 36.4-43.6), while 65.8% attended at least four ANC contacts (469/713; 95% CI: 62.2-69.2). However, completion of the WHO-recommended eight-contact schedule was uncommon, with only 6.0% of women achieving ANC8+ (43/713; 95% CI: 4.5-8.0) "Table 2".

Table 2. Prevalence of Antenatal Care Outcomes among Women

Outcome	n/N	% (95% CI)
Timely ANC initiation	285/714	39.9 (36.4–43.6)
≥4 ANC visits	469/713	65.8 (62.2–69.2)
≥8 ANC visits	43/713	6.0 (4.5–8.0)

Note. CI, confidence interval.

In the multivariable model, timely ANC initiation was positively associated with maternal age, education, household asset score, and partner encouragement, and negatively related with parity and frequency of religious activity. Each additional year of maternal age was associated with higher odds of timely initiation (aOR:1.04; 95% CI: 1.01-1.07; p = 0.024). Higher educational attainment was associated with increased odds of timely initiation (aOR:1.63 per higher category; 95% CI: 1.25-2.13; p < 0.001), as was higher household asset score (aOR:1.21 per unit increase; 95% CI: 1.03-1.42; p = 0.018). In contrast, each additional live birth was related with lower likelihood of timely initiation (aOR: 0.80; 95% CI: 0.71–0.90; p <0.001). Partner encouragement was positively related with timely initiation (aOR: 1.22 per one-point increase; 95% CI: 1.03–1.45; p=0.021), whereas frequency of religious activity was negatively associated with this outcome (aOR: 0.71; 95% CI: 0.52–0.96; p = 0.026).

For ANC4+ attendance, maternal age, education, and partner encouragement remained statistically significant. Each additional year of maternal age was associated with higher odds of ANC4+ attendance (aOR: 1.04; 95% CI: 1.01–1.08; p = 0.022). Higher education was strongly associated with ANC4+ attendance (aOR: 1.79 per higher category; 95% CI: 1.38–2.31; p < 0.001). Partner encouragement was also positively linked with ANC4+ attendance (aOR: 1.60 for every one-point rise; 95% CI: 1.35–1.90; p < 0.001).

For ANC8+ attendance, partner encouragement was the only variable independently associated with the outcome. Each one-point increase in partner encouragement was associated with higher odds of completing minimum eight ANC contacts (aOR: 1.59; 95% CI: 1.03–2.46; p = 0.037). No other covariates showed statistically significant adjusted associations with ANC8+ attendance.

Exposure to ANC-related messages from faith leaders and participation in group activities were not independently associated with timely ANC initiation, ANC4+ attendance, or ANC8+ attendance in the adjusted analyses “Table 3”.

Table 3. Multivariable Logistic Regression Models of Antenatal Care Outcomes

Predictor	Non-missing N	Adjusted OR (95% CI)	p-value
Timely ANC initiation			
Maternal age, years	708	1.04 (1.01-1.07)	0.024
Education level, ordinal; none = 0 to higher = 3	708	1.63 (1.25-2.13)	<0.001
Household asset score, 0–4	708	1.21 (1.03-1.42)	0.018
Parity, live births	708	0.80 (0.71-0.90)	<0.001
Partner encouragement, Likert scale 1–5	708	1.22 (1.03-1.45)	0.021

ANC messages from faith leaders, yes vs no	708	1.37 (0.91-2.04)	0.130
Women/community group participation, yes vs no	708	0.75 (0.50-1.12)	0.155
Religious activity, ordinal; never = 0 to daily = 3	708	0.71 (0.52-0.96)	0.026
ANC4+			
Maternal age, years	707	1.04 (1.01-1.08)	0.022
Education level, ordinal; none = 0 to higher = 3	707	1.79 (1.38–2.31)	<0.001
Household asset score, 0-4	707	0.96 (0.81-1.12)	0.597
Parity, live births	707	0.92 (0.83-1.04)	0.174
Partner encouragement, Likert scale 1–5	707	1.60 (1.35-1.90)	<0.001
ANC messages from faith leaders, yes vs no	707	1.43 (0.94-2.17)	0.092
Women/community group participation, yes vs no	707	0.81 (0.53-1.22)	0.308
Religious activity, ordinal; never = 0 to daily = 3	707	1.11 (0.82-1.51)	0.501
ANC8+			
Maternal age, years	707	1.02 (0.95-1.08)	0.619
Education level, ordinal; none = 0 to higher = 3	707	1.21 (0.73-2.02)	0.462
Household asset score, 0-4	707	1.24 (0.89-1.73)	0.210
Parity, live births	707	0.94 (0.75-1.18)	0.588
Partner encouragement, Likert scale 1-5	707	1.59 (1.03-2.46)	0.037
ANC messages from faith leaders, yes vs no	707	1.47 (0.64-3.33)	0.362
Women/community group participation, yes vs no	707	2.11 (0.84-5.26)	0.111
Religious activity, ordinal; never = 0 to daily = 3	707	0.73 (0.41-1.30)	0.286

Note: Adjusted OR, adjusted odds ratio; CI, confidence interval.

Model diagnostics indicated acceptable performance. The timely ANC initiation model included 708 women and 282 events, with an AUC of 0.671 and no evidence of poor fit based on the Hosmer–Lemeshow test, $\chi^2 = 5.03$, df = 8, p = 0.754. The ANC4+ model included 707 women and 463 events, with an AUC of 0.689 and a non-significant Hosmer-Lemeshow test, $\chi^2 = 12.8$, df = 8, p = 0.119. The ANC8+ model included 707 women and 43 events, with an AUC of 0.702 and no evidence of poor calibration, $\chi^2 = 7.68$, df = 8, p = 0. 465. However, the interpretation of the ANC8+ model must take into account the limited number of events. Variance inflation factors were low across all models, with maximum values ranging from 1.76 to 1.77, indicating no evidence of problematic multicollinearity "Table 4".

Table 4. Discrimination and Calibration of Multi-variable Antenatal Care Outcome Models

Outcome	Complete-case N	Events	AUC	VIF	Hosmer–Lemeshow χ^2	df	p-value
Timely ANC initiation	708	282	0.671	1.77	5.03	8	0.754
ANC4+	707	463	0.689	1.76	12.80	8	0.119
ANC8+	707	43	0.702	1.76	7.68	8	0.465

Note: df: degree of freedom.

Discussion

Principal Findings

This study examined timely antenatal care (ANC) initiation, ANC4+ and ANC8+ among recently delivered host-community women in Karisimbi Health Zone, Goma, a fragile urban setting in eastern Democratic Republic of Congo (DRC). Three findings are particularly important. First, timely ANC initiation was low: Less than fifty percent of women initiated antenatal care within the first twelve week of gestation. Second, ANC4+ coverage was substantially
higher than timely initiation, whereas ANC8+ completion was rare. This pattern indicates that many women eventually enter ANC but do so late and/or do not maintain repeated contact throughout pregnancy. Third, determinants varied across the ANC continuum. Maternal age, education, household assets, parity, partner encouragement and religious activity were associated with timely initiation; age, education and partner encouragement were associated with ANC4+; and partner encouragement was the only factor retaining statistical significance for ANC8+.

The study's main contribution is to show that ANC4+ alone may substantially overestimate progress toward the current WHO ANC model in this fragile urban context [2]. Education, economic position and reproductive history appear more closely related to early entry into care, whereas sustained completion of the eight-contact pathway may depend more strongly on household or relational support [23–25]. However, the specific forms of support were not directly measured, and findings for ANC8+ should be interpreted cautiously because of the small number of women who achieved this outcome.

ANC Initiation, ANC4+ and ANC8+ Patterns

The observed continuum 39.9% timely initiation, 65.8% ANC4+ and 6.0% ANC8+ is consistent with implementation challenges following the transition from the four-visit focused ANC model to minimum eight contact as recommended by WHO. While ANC4+ remains widely used in monitoring systems and household surveys, it no

longer represents the full standard of recommended care [1, 2, 26]. In this study, the relatively high ANC4+ coverage should therefore be interpreted as an intermediate milestone rather than evidence of adequate or optimal ANC.

The very low ANC8+ prevalence is a central finding. It suggests that the principal programmatic challenge is not only whether women make contact with ANC services, but whether they start early enough and remain engaged across pregnancy [24]. Regional findings in sub-Saharan Africa similarly indicate that completion of eight or more ANC contacts remains uncommon and is socially patterned by education, wealth, residence and parity [27, 28]. The Karisimbi estimate is consistent with this broader challenge, although it reflects a particularly low level of completion.

Several explanations are plausible. Late initiation reduces the remaining time available to complete eight contacts. Repeated attendance may also be affected by indirect costs, transport constraints, insecurity, competing household responsibilities and inconsistent communication about the eight-contact schedule [24,28]. However, these mechanisms were not directly assessed in this study and should be treated as hypotheses for future research.

These findings may also be understood in light of the distinction between contact coverage and effective coverage. This study measured the number and timing of ANC contacts, but not the content, technical quality, respectful care, continuity of records or facility readiness. ANC4+ and ANC8+ should therefore be viewed as utilization indicators rather than measures of adequate or effective care [29, 30]. Future work in Karisimbi should combine contact measures with indicators of essential ANC content and quality.

Sociodemographic and Socioeconomic Determinants

Older maternal age was associated with timely initiation and ANC4+. This finding is consistent with evidence from Africa indicating that more and more maternal age is often related with greater ANC utilization. One possible explanation is that older women may have greater experience with pregnancy and health services or more negotiating power within households [22, 25, 26]. However, because this study was cross-sectional, the association should not be interpreted causally.

Education was one of the most consistent predictors, being associated with both timely initiation and ANC4+. This aligns with previous reviews and multi-country analyses showing that maternal education is an important determinant of ANC utilization in sub-Saharan Africa [25, 26]. Education may improve women's ability to recognize the benefits of early care, communicate with providers and navigate health services [31].

Household asset score was associated with timely initiation but not with ANC4+ or ANC8+ after adjustment. This pattern may suggest that economic position is especially important for the first step into care, when consultation costs, transport costs, opportunity costs and uncertainty about service requirements may converge. Regional studies continue to show pro-rich and pro-educated inequalities in completion of eight or more ANC contacts [27, 28].

Role of Parity

Parity was negatively associated with timely ANC initiation but not with ANC4+ or ANC8+ in adjusted models. This is epidemiologically plausible and consistent with evidence that higher birth order is often linked with lower chances to comply with required ANC visits. Multiparous women may perceive

pregnancy as familiar, delay care until symptoms arise or face greater childcare and household responsibilities [25-28].

Partner Encouragement and Household Support

Partner encouragement was the most consistent correlate across the ANC continuum, being associated with timely initiation, ANC4+ and ANC8+.The association between partner encouragement and ANC8+ should be interpreted with caution because only a few numbers of women succeeded eight or more contacts. Sparse events may reduce precision and increase the instability of estimates. Even so these support others evidences that male partner involvement can improve uptake of maternal care, including skilled birth attendance, institutional delivery and postnatal care [32, 33].

Religious Activity and Community-based Exposures

Religious activity showed a negative adjusted association with timely ANC initiation, while exposure to ANC-related messages from faith leaders and participation in women's or community groups were not independently associated with ANC outcomes. These findings should be interpreted cautiously. They do not show that religion causes delayed ANC, nor do they imply that faith institutions are barriers to care [9].

The null findings for faith-leader messages and community-group participation are also informative. They suggest that passive exposure to messages may be insufficient to change ANC behavior in this context. Evidence from Ethiopia indicates that trained religious leaders can improve ANC4+ and facility delivery when their role is structured, standardized and linked to community health workers or formal referral pathways [9, 10].

Strengths and Limitations

Taken together, the study demonstrates strong methodological rigor for a cross-sectional household survey and makes an important contribution by analyzing ANC utilization as a continuum in a fragile urban setting. However, the limitations particularly the cross-sectional design, dependance on self-reported data, absence of quality-of-care measures, and limited power for ANC8+ require cautious interpretation. Next research should prioritize longitudinal designs, integration of facility-level quality indicators, and more detailed measurements of household and community influences to strengthen causal inference and program relevance.

Conclusion

This study showed locally grounded evidence on the ANC continuum in a fragile urban setting of eastern DRC. Timely ANC initiation was suboptimal, ANC4+ was relatively common, and ANC8+ completion was rare, indicating that ANC4+ alone substantially overstates progress toward the current WHO ANC model. Education, assets, age and parity were associated mainly with early entry into care, whereas partner encouragement was the most consistent correlate across the continuum, although the ANC8+ finding requires cautious interpretation because of sparse events. Community and faith-based exposures, as measured here, were not independently associated with ANC outcomes.

Programs in Karisimbi should therefore combine early pregnancy identification, equity-oriented access strategies, respectful household engagement, structured community linkages and health-system strengthening to support earlier, more continuous and higher-quality ANC

Conflict of Interest

Non-competing interest exists.

Ethical Approval

The study was reviewed and approved by the Ethics Review Board of the University of Goma in Goma, where the research was conducted (Approval No. 10/ESAPU/UNIGOM).

Author Contributions

David Munganga Kaseke conceptualized the study, coordinated collection, interpretation and prepared the manuscript for journal submission under guidance of Jerome Mastaki Kambale and Didier Mukeba Tchalala.

Acknowledgements

None.

Funding

No funding was received for this study.

Data Availability

The data utilized in this research may be granted upon request, albeit anonymized to safeguard participant privacy.

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