

Timing and Factors Associated with Early Antenatal Care Initiation among Adolescent Mothers Attending Maternal Child Health Clinics at Two Urban Health Facilities in Nakawa Division, Kampala District Uganda

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How to cite this paper: Nakato, W.N., Samuel, K., Blair, O., Kwesiga, D. and Waiswa, P. (2025) Timing and Factors Associated with Early Antenatal Care Initiation among Adolescent Mothers Attending Maternal Child Health Clinics at Two Urban Health Facilities in Nakawa Division, Kampala District Uganda. *Open Journal of Obstetrics and Gynecology*, 15, 1579-1591.

<https://doi.org/10.4236/ojog.2025.159131>

Received: August 30, 2025

Accepted: September 22, 2025

Published: September 25, 2025

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Abstract

Background: Maternal health services including antenatal care have been shown to improve reproductive health outcomes of pregnant adolescents. However, most adolescent mothers attend their first antenatal care (ANC) visit later than the recommended time. There is insufficient data regarding the timing of the first antenatal care visit received by the adolescents residing in urban areas. **Objective:** To examine the timing and factors associated with timing of the first ANC visit among adolescent mothers residing in urban slum areas in Uganda. **Methodology:** This was a facility-based study which used quantitative data from 202 adolescent mothers aged 10 - 19 years within the slums of Nakawa division, Kampala district. We selected adolescent mothers who attended ANC clinics at the chosen health facilities using systematic random sampling and who were residents of Nakawa division. We used the modified Poisson model to identify factors associated with timing of ANC. **Results:** Among the pregnant adolescents participating, only about a third (35%) had the first visit to the ANC clinic in the recommended first trimester. Determinant factors for timing of ANC included occupational status of the adolescent mother, the gestation age at which the pregnancy was revealed, staying with the husband/partner and waiting time at the facility. **Conclusion:** To improve

early ANC attendance, adolescent care providers should encourage family members of pregnant adolescents to give the needed emotional and psychological support. Community sensitisation about importance of early ANC should also be integrated within adolescent friendly antenatal care services.

Keywords

Antenatal Care, ANC Timing, Urban Dwellers, Adolescent Mothers, Uganda

1. Introduction

Every year an estimated 21 million girls aged 15 - 19 years in developing regions become pregnant and approximately 12 millions of them give birth [1]. Uganda is ranked amongst the countries with the highest teenage pregnancies, with 25% of adolescents already mothers or pregnant with their first child. This problem is relatively high in urban slum areas within the cities where teenagers are exposed to early sexual debut. A cross-sectional study done among young people residing within the Kampala slums of Makindye and Nakawa division, showed that the mean age at sexual debut was 16 years with 46.6% of them having a sexual encounter between 14 - 17 years, leading to early and unwanted pregnancies [2].

Early and frequent antenatal care (ANC) provides pregnant mothers the opportunity for early detection of pregnancy-related complications and provision of appropriate treatment [3], thus reducing maternal and perinatal morbidity and mortality. It has also been associated with women having a skilled birth attendant at delivery [4].

The revised 2016 WHO ANC guidelines recommend a minimum of eight contacts to reduce perinatal mortality and improve women's experience of care [5]. This new model also recommends that the first contact should be during the first trimester which is the most crucial stage for the baby's development. The model proposes that this is followed by monthly visits within the second trimester (at 20 and 26 weeks) and five visits in the third trimester (at 30, 34, 36, 38 and 40 weeks of gestation).

However, according to this report, only 64% of pregnant women globally attended the WHO-recommended minimum four contacts of ANC in the period 2007-2014.

In Uganda, the UDHS 2016 showed that only 57% of adolescent mothers who attended ANC for their most recent live birth made the first ANC visit in the first trimester. It also showed that urban areas had lower antenatal attendance rates compared to rural areas which had higher attendance rates. Within the slums of Kampala, only 65.8% had the mandatory 4 antenatal visits while only 39% attended their first antenatal visit before the fourth month of pregnancy [6].

However, many other studies that have compared initiation of ANC among adolescent and adult mothers have shown a mixed picture [4] [7]-[9].

Antenatal care improves reproductive health outcomes of pregnant adolescents. However, its full utilisation is still low in most countries, including Uganda.

African urbanisation has resulted in the growth of slums and unplanned settlements at the periphery of most African cities and Kampala is no exception. Urban areas were once thought to have better access to maternal and child health services compared to rural areas. However, recent studies have shown that the “urban advantage” of proximity to services, drugs and medical supplies for maternal and child health services is already non-existent in some settings [10]. Residents within urban slums have been found to have inadequate antenatal care services with most having had late initiation of antenatal care [11]. This study determined the timing and factors influencing early ANC initiation amongst adolescents residing within the slums of Nakawa division and attending the selected health facilities.

2. Methods

2.1. Study Setting and Design

This study was conducted at Kiswa HCIII & China-Uganda Friendship Hospital-Naguru located within Nakawa division, Kampala and are the biggest public health facilities offering maternity services for adolescents including those residing within this division. These facilities attend to more than 100 adolescent mothers on a monthly basis. These were purposively selected due to their strategic location as catchment areas for adolescent mothers within this area to receive maternal health services. This was a facility-based descriptive cross-sectional study. We included all adolescent mothers aged 10 - 19 years attending the antenatal clinics of the selected health facilities and were residents of Nakawa division.

Adolescent mothers who were sick and unable to give information at the time of the study were excluded.

2.2. Sample Size Determination and Sampling

We used systematic random sampling to enroll eligible adolescent mothers in the two facilities. Probability proportionate to size sampling was used to determine the required respondents for each facility. The sampling interval was calculated based on the facility's recent quarterly report of pregnant adolescent attendees. In both facilities, the 2nd mother of the day was interviewed only after determining the first by simple random sampling. A facility-based sampling frame was chosen to efficiently capture pregnant adolescents already engaged in ANC services at these high-volume public facilities serving urban slums, enabling direct assessment of care timing and related factors among service users. However, this approach could limit generalizability of these findings to all slum-dwelling adolescents in Kampala, as it excludes those not attending these facilities (e.g., due to barriers like stigma or distance) or using private/non-selected providers.

Sample size estimation was done using the Kish Leslie formula basing on a prior study by Atusiimire *et al.* to assess determinants of facility-based deliveries within urban slums in Kampala district [6]. Using the Kish-Leslie formula ($n = Z^2 * p * (1$

– p/d^2) parameters were based on a prior study, as mentioned above, estimating a 39% prevalence ($p = 0.39$) of early ANC initiation in Kampala slums, with $Z = 1.96$ (95% confidence level) and $d = 0.05$ (5% margin of error). This resulted in an initial sample size of 366, which was adjusted downward for a finite population of approximately 365 adolescent attendees (from Jan 2022 to April 2022) across the two facilities (using finite population correction) to 183. It was then further increased by 10% to account for non-response, resulting in the final sample size 202.

3. Data Collection

Data was collected from November 2022 to April 2023 using a pre-tested questionnaire to gather information on the sociodemographic characteristics and factors associated with the timing of ANC visits among adolescent mothers. The interviews were conducted face-to-face by a team of research assistants. The questionnaires were adapted from a similar study conducted in South—Eastern Tanzania [4]. Data editing was done in the field for entries that required clarification from the antenatal registers and antenatal cards.

3.1. Outcome Variables

The main outcome variable was timing of ANC initiation which was categorised as early (<12 weeks of gestation) or late (≥ 12 weeks of gestation). This was based on the adolescent mother's responses to the question—At what gestational age did you first visit the ANC clinic for antenatal care?

3.2. Explanatory Variables

The study analysed independent variables including socio-demographic variables like mother's age, education, parity, religion, wealth index, employment status, husband/partner's education, exposure to mass media, and individual perceptions of danger signs during pregnancy. It also assessed obstetric factors like gestation age, parity, expected delivery date, number of children, age at first childbirth, and complications in the last pregnancy.

Health system factors assessed included distance to health facility, waiting time and quality of care.

3.3. Data Analyses

Data analyses were done at three levels: univariate, bivariate and multivariate levels.

Univariate analyses generated frequency counts and percentage distributions.

Bivariate analyses tested the association between the variables using the Pearson chi-square and Fisher's exact tests, while the t-test compared age between groups. P -value < 0.05 was considered statistically significant. The modified Poisson model was used to identify significant variables with a p -value of 0.2 or less for the multivariate model. The significant variables included religion, education level of the respondent and partner, partner employment status, marital status, living

with the partner, gestation age, and waiting time at the ANC clinic. In addition, parity, quality of care, age, and persons that advised the adolescent mothers to start ANC.

We used a modified Poisson regression model to identify which variables predict the likelihood of an adolescent mother making the first antenatal care (ANC) visit in the first trimester. The model had robust standard errors and was fitted at the multivariate level. The modified Poisson regression with robust standard errors was preferred over binary logistic regression because the outcome (early ANC initiation) was not rare (>20% prevalence), making odds ratios from logistic models prone to overestimating prevalence ratios for common binary outcomes. For bivariate and multivariate analyses, the level of statistical significance was set at $p \leq 0.2$ and $p < 0.05$ respectively.

The models were tested for goodness of fit using the link test and the Hosmer-Lemeshow test. Multicollinearity was checked using the Variance Inflation Factors (VIF), and any predictor variables with a VIF of 10 or greater were excluded from the models.

3.4. Ethical Considerations

Informed consent was obtained from the study participants before enrolment into the study. Although some of the study participants were below 18 years of age, they were considered emancipated minors and as such consent was obtained in line with UNCST guidelines [12]. Approval to conduct the study was obtained from Makerere University School of Public Health IRB protocol number 117.

4. Results

Table 1 displays the socio-demographic characteristics of adolescent mothers attending antenatal care clinics at the two health facilities. Only 35% of the 202 participants had their first ANC visit during the recommended first trimester.

Table 1. Socio-demographic characteristics.

| Characteristic | Frequency |
|--------------------------------------|----------------|
| Age (completed years), mean \pm SD | 17.6 \pm 1.3 |
| Residence* | |
| Kinawataka | 13 |
| Butabika | 32 |
| Naguru | 23 |
| Mbuya | 34 |
| Mutungo | 26 |
| Kitintale | 15 |
| Others | 58 |
| Duration in residence* | |

Continued

| | |
|----------------------------------|-----|
| <1 year | 107 |
| ≥1 year | 94 |
| Religion* | |
| Christian | 161 |
| Muslim | 40 |
| Level of education of respondent | |
| No formal education | 2 |
| Primary | 91 |
| Secondary | 106 |
| Tertiary | 2 |
| Occupation status | |
| Employed | 53 |
| Not employed | 148 |
| Type of employment (n = 51)* | |
| Self (selling groceries etc) | 29 |
| Casual | 12 |
| Salaried | 10 |
| Source of income | |
| Self | 39 |
| Spouse | 147 |
| Parents/guardian | 22 |
| Other | 11 |
| Parity | |
| Low parity (<5 pregnancies) | 169 |
| High parity (≥5 pregnancies) | 28 |

Note: *missing data.

Over 60% of the adolescent mothers did not know when to start ANC. Most (91%) revealed their pregnancy at 4 weeks to a family member or father of the child.

Out of the 79 who thought mothers should start at less than 12 weeks, only 35.9% attended ANC in their first trimester. Many in this study did not know when to start ANC but 40.5% of those who were unsure attended ANC in the first 3 months. 0.5% attended ANC in the first 3 months of the gestation.

At the bivariate level, the person who advised one to start ANC ($X^2 = 20.622$, $p = 0.001$) was found to be significantly associated with timing of ANC initiation as shown in **Table 2** below.

Table 2. Bivariate analysis of the association between obstetric and health system factors and timing of ANC initiation.

| Obstetric factors | Early (<12 weeks) | Late (>12 weeks) | Chi square (χ^2) | P-value |
|---|-------------------|------------------|-------------------------|----------------|
| Parity (total pregnancies) | | | | |
| Low (<5) | 57 | 112 | 0.879 | 0.348 |
| High (>5) | 12 | 16 | | |
| History of complication in previous pregnancy (n = 2) | | | | |
| Yes | 1 | 3 | 0.188 | 0.665 |
| No | 3 | 5 | | |
| Knowledge of danger signs of pregnancy | | | | |
| Yes | 41 | 80 | 0.085 | 0.771 |
| No | 28 | 50 | | |
| Told someone about the pregnancy | | | | |
| Yes | 67 | 11 | 2.922 | 0.087 |
| No | 3 | 15 | | |
| Received advice to go to the ANC clinic | | | | |
| Yes | 57 | 104 | 0.001 | 0.975 |
| No | 13 | 24 | | |
| Individual who advised her to start ANC | | | | |
| Husband | 42 | 40 | 20.622 | 0.001** |
| Mother | 6 | 31 | | |
| Others | 9 | 32 | | |
| Attended ANC with someone | | | | |
| Yes | 26 | 42 | 0.424 | 0.515 |
| No | 44 | 87 | | |
| Health system factors | | | | |
| Waiting time | | | | |
| Short | 21 | 47 | 1.342 | 0.511 |
| Long | 6 | 15 | | |
| Optimum/Short | 11 | 15 | | |
| Transport means to ANC clinic | | | | |
| By foot | 5 | 16 | | |
| By bicycle | 1 | 3 | 1.788 | 0.617 |
| By motorcycle | 42 | 77 | | |
| Car/bus | 22 | 34 | | |

In the final model of the modified Poisson multivariate analysis, the four vari-

ables that were significantly associated with initiating ANC in the first trimester were occupational status of the adolescent mother, the gestation age at which the pregnancy was revealed, staying with the husband/partner and waiting time at the facility. The adolescents who were not employed were 98% more likely to start antenatal care early when compared to those who were employed (IRR = 1.98, $p = 0.045$, 95% CI: 1.01 - 3.88) as shown in **Table 3** below.

Table 3. Modified Poisson regression of the variables associated with timing of ANC initiation among adolescents in slums within Nakawa division.

| Variable | Crude prevalence ratio (95% CI) | p-value | Adjusted prevalence ratio (95% CI) | p-value |
|---------------------------------------|---------------------------------|--------------|------------------------------------|--------------|
| Maternal factors | 1.06 (0.81 - 1.37) | 0.673 | | |
| Age | | | 1.08 (0.89 - 1.31) | 0.404 |
| Religion | 1.00 | | | |
| Christian | 0.37 (0.12 - 1.09) | 0.071 | 1.00 | |
| Muslim | | | 0.45 (0.19 - 1.08) | 0.074 |
| Level of education | 1.00 | 0.205 | | |
| No formal education/Primary | 1.61 (0.77 - 3.35) | | 1.00 | |
| Secondary/Tertiary | | | 1.58 (0.80 - 3.09) | 0.185 |
| Occupation status-mother | 1.00 | 0.346 | | |
| Employed | 1.49 (0.67 - 3.40) | | 1.00 | |
| Not employed | | | 1.98 (0.97 - 3.84) | 0.059 |
| Employment-husband | 1.00 | | | |
| None | 1.02 (0.22 - 4.78) | 0.975 | 1.00 | |
| Formal | 1.52 (0.39 - 5.84) | 0.546 | 1.55 (0.48 - 4.85) | 0.468 |
| Informal | 1.54 (0.10 - 23.36) | 0.756 | 2.09 (0.72 - 6.07) | 0.177 |
| Don't know | | | 2.59 (0.46 - 14.58) | 0.279 |
| Marital status | 1.00 | | | |
| Married | 1.69 (0.66 - 4.35) | 0.278 | 1.00 | |
| Not married | | | 1.40 (0.65 - 3.03) | 0.393 |
| Education level (husband) | | | | |
| No formal education | 1.00 | | 1.00 | |
| Primary level | 0.23 (0.05 - 1.02) | 0.061 | 0.24 (0.07 - 0.76) | 0.016 |
| Secondary/Tertiary | 0.32 (0.11 - 0.99) | 0.030 | 0.35 (0.15 - 0.81) | 0.014 |
| Currently living with husband/partner | | | | |
| Yes | 1.00 | | 1.00 | |
| No | 0.35 (0.13 - 0.91) | 0.031 | 0.43 (0.21 - 0.90) | 0.026 |
| Obstetric factors | | | | |
| Parity (total pregnancies) | | | | |

Continued

| | | | | |
|---|--------------------|----------------|--------------------|--------------------|
| Low (<5) | 1.00 | | 1.00 | |
| High (>5) | 0.63 (0.22 - 1.75) | 0.372 | 0.64 (0.26 - 1.57) | 0.332 |
| Gestation age at which pregnancy was revealed | 0.74 (0.63 - 0.89) | 0.001** | 0.73 (0.62 - 0.86) | <0.001** |
| Individual who advised you to start ANC | | | | |
| Husband | 1.00 | | 1.00 | |
| Family member | 0.74 (0.34 - 1.60) | 0.447 | 1.01 (0.53 - 1.87) | 0.994 |
| Others(friend/employer/neighbor) | 0.32 (0.07 - 1.50) | 0.149 | 0.38 (0.12 - 1.35) | 0.141 |
| Health system factors | | | | |
| Waiting time | | | | |
| Long | 1.00 | | 1.00 | |
| Very Long | 0.63 (0.20 - 1.96) | 0.423 | 0.68 (0.27 - 1.74) | 0.424 |
| Short/optimum | 2.32 (1.12 - 4.80) | 0.024 | 2.62 (1.29 - 5.31) | 0.007 |

The second variable was the gestational age at which the adolescent mother revealed that they were pregnant, in that for every unit increase in gestation age in weeks, they were 38% less likely to initiate ANC in the first trimester (IRR = 0.72, $p \leq 0.001$, 95% CI: 0.61 - 0.86).

The third variable was staying with the husband/partner, in that those who were not living with the husband/partner are 59% less likely to initiate ANC in the first trimester (IRR = 0.41, $p = 0.026$, 95% CI: 0.18 - 0.90).

In terms of waiting time at the health facility, those who considered it optimum were almost thrice as likely to have initiated ANC in the first trimester when compared to those who considered the waiting time long (IRR = 2.59, $p = 0.008$, 95% CI: 1.28 - 5.22).

4.1. Discussion

The study found that most adolescent mothers delay the initiation of their first antenatal care (ANC) visit, suggesting the need to sensitize pregnant mothers to start antenatal care immediately.

Whereas WHO in 2016 endorsed guidelines that recommends all pregnant women to initiate ANC in the first trimester [13], our findings revealed that most of the adolescent mothers delayed initiating the first ANC visit. The study found that only 35% of the pregnant adolescents started ANC in the first trimester which is lower than other similar studies in this population. Although most studies had shown that ANC initiation amongst adolescents is lower amongst rural dwellers than their urban counterparts; this proportion is lower than the findings from a number of studies conducted amongst adolescents in rural settings. A case in point is a study done in Luuka district by Kayemba *et al.* (2023) that showed that only 47.2% of adolescents attended ANC in the first trimester [14] while a study

done among adolescents in South Africa showed early initiation of ANC among rural adolescents at 46% [15]. Another study in India showed that 63% of pregnant adolescents aged 15 - 19 years registered their pregnancy in the first trimester [16]. The study results are also consistent with another study done in Ethiopia that showed that residents within urban slums have inadequate antenatal care services with most having late initiation of antenatal care [11]. This may be explained by the loss of the urban advantage whereby health services which were presumed to be better off in the urban compared to rural areas are not exactly that [10].

Delayed attendance of ANC exposes adolescent mothers to an increased risk of perinatal mortality, particularly, stillbirth since the potential risks cannot be identified and managed early by skilled health personnel [17]. Although according to the 2022 Uganda Demographic Health Survey, the maternal mortality ratio reduced from 336 to 189 per 100,000 live births, this is still a slow pace to realisation of the sustainable development goal (SDG) target of reducing the ratio to 70 per 100,000 live births by 2030.

This study reveals a significant relationship between the person who advised ANC initiation and timing of initiation highlighting the importance of external support like family members [18]. Similar findings were found in a study done in Bangladesh regarding family influences on health and nutrition practices among pregnant adolescents [19]. This is also consistent with existing literature where family members like grandmothers have a central influence on pregnant women [20]. A recent scoping review conducted in Rwanda also showed that those who lack family support are 70% more likely to delay antenatal care [21].

The study also found that factors such as gestation age, staying with husband/partner, education level of husband/partner and waiting time at the health facility influence early ANC initiation.

Adolescent mothers' gestational age significantly impacts their likelihood of initiating ANC in the first trimester with delayed revealing of unintended pregnancies impacting the utilization of ANC services [22].

Living with a partner boosts early antenatal care (ANC) attendance, while not living with a partner reduces ANC initiation by 57% in the first trimester [23].

Optimal waiting time at health facilities increases the likelihood of initiating antenatal care (ANC) in the first trimester, as it encourages better utilization of ANC. Short waiting time at the antenatal care clinics has been identified as an incentive for better utilisation of ANC [24].

Education of husband/partner significantly impacts adolescent mothers' ANC timing, with 65% less likely to start in the first trimester. Higher education levels lead to better utilization of ANC services, as shown in Ghana [25]. A recent systematic review indicated that several studies have identified low educational attainment of the partner or husband as a barrier to adolescents fully utilizing antenatal care [26].

4.2. Limitations of the Study

The study has limitations, including potential social acceptability bias and recall

bias. To reduce these, research assistants from other departments were used and information was verified using antenatal appointment cards.

This cross-sectional study, limited in its cause-and-effect determination, provided some evidence about antenatal care utilization in urban settings, despite limitations such as selecting only public health facilities, despite being predominantly urban. The study was also subject to potential selection bias, as it excluded adolescents who were too ill to attend and those accessing care outside the selected public facilities. These groups may differ systematically from the study population in terms of health status, health-seeking behavior, and access to care, which could affect the representativeness and generalizability of the findings.

4.3. Conclusion

The study showed low timely initiation of antenatal care (ANC) among pregnant adolescents, indicating the need for increased community awareness and communication structures. Family support and positive health worker attitudes were key facilitators.

Acknowledgements

The study's authors express gratitude to the School of Public Health Makerere University, adolescent mothers, health facility leadership, and data collection assistants for supervision and participation.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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