# Timing and quality of antenatal care among adolescent mothers in Luuka district, Uganda

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# Abstract

## Background

Effective Antenatal Care (ANC) is dependent on timely initiation of the first visit and quality care to mitigate risk factors in pregnancy. However, most adolescent mothers attend their first visit later than the recommended time while others do not receive all the required components of care. This study sought to examine the predictors associated with timing of the first ANC visit and receipt of the recommended components of care among adolescent mothers in Luuka district.

## Methods

The study was carried out between March and May 2021 among 248 adolescent mothers aged 10-19 years from Luuka district, who were either pregnant or postpartum with infants aged 0-3 months. Data analyses were done using descriptive techniques, Pearson chi-square and Fisher's exact tests of independence were done at bivariate level and thereafter binary logistic regression.

## Results

Findings showed that majority of the adolescent mothers (82%) attended ANC for their most recent pregnancy or birth. Still, only 47% had timely ANC visit while 36% had all the recommended components of care. Having knowledge on dangers signs in pregnancy was a determinant of both receipt of all components of ANC (AOR = 6.57, 95%CI = 1.75 - 24.65) and early timing of the first visit (AOR = 0.35, 95%CI = 0.12 − 0.97). Further, the odds of making the first visit after the first trimester were highest among adolescent mothers who had ever given birth (AOR = 3.67, 95%CI:1.68 - 8.02) and those without independent decisions on health care (AOR = 3.45, 95%CI:1.04 - 11.42).

## Conclusion

Knowledge of obstetric pregnancy danger signs, having ever given birth and decision making on health care seeking are pivotal determinants of adolescent mothers' timing of the first ANC visit and uptake of the recommended components of care. We therefore recommend the need to sensitize adolescent mothers through different channels of media on the benefits of ANC. Also, ensuring accessibility and affordability of these services among health facilities will significantly increase the uptake and early timing of the antenatal care services among adolescent mothers in rural communities.

## Background

Adolescent pregnancy is a serious public health issue. Recent estimates show that 42 births globally and 109 births in Sub-Saharan Africa occur among every 1000 girls aged 15-19 years [1]. In Uganda, 25% of

adolescents have either given birth or are pregnant [2]. Adolescent pregnancy is associated with a greater risk of maternal death especially among mothers below the age of 15 years [3]. Additionally, the incidence of low birth weight and preterm delivery is highest among babies born to adolescent mothers [3]. Furthermore, fetal mortality and neonatal mortality are also associated with adolescent pregnancy [4]. The risk of these maternal related health problems could be easily detected and minimized through timely access to quality antenatal care (ANC) [5, 6].

It has been shown that ANC contributes to desired motherhood outcomes such as increasing skilled birth attendance; reducing maternal, neonatal and perinatal morbidity and mortality [7–9]. Critical to achievement of those outcomes however is the timing at which ANC is initiated and the quality of care. The World Health Organization (WHO) recommends a minimum of eight ANC contacts of which the first should be made in the first trimester of pregnancy [9]. Timely initiation of ANC contacts offers mothers the opportunity of early detection of Human Immuno Virus (HIV) and Sexually Transmitted Diseases (STDs), malaria and anaemia prophylaxis, health education and treatment or prevention of complications [5]. Despite the benefits of antenatal care, most adolescent mothers are less likely to use ANC services compared to older women [10]. Moreover, they are more likely to seek ANC later [3]. It has been documented that low utilization of ANC by adolescents is attributed to unplanned pregnancies, limited financial and social support, reproductive health services which are unprepared to handle adolescents, distance to ANC services, adolescents' satisfaction with ANC services and unwillingness to wait for ANC services for a long time [10, 11]. These factors make it challenging for adolescents to have timely and quality ANC. Quality ANC necessitates that during health facility ANC visits, pregnant mothers should receive a core set of services recommended by the WHO [12]. These include blood pressure and weight measurement, fetal growth monitoring, urine testing, iron-folic acid supplementation, tetanus vaccination, at least three doses of Intermittent Preventive Treatment with Sulphadoxine-pyrimethamine (IPTp-SP), deworming after the first trimester, blood group typing if never done, HIV and syphilis testing [9, 13].

Luuka district contributes a significant proportion to the burden of teenage pregnancy in Uganda, with teenage child bearing rates high at 11.2% and 18.1% among girls aged 12-17 years and 12-19 years, respectively [14]. However, findings on ANC utilization in the region where the district is located indicate low utilization rates among adolescent mothers. Even though it is expected that a pregnant mother should receive all the components of care, Demographic and Health survey findings of adolescent mothers (15-19 years) in Busoga region who attended ANC for their most recent live birth report otherwise. Further weighted analysis of the 2016 UDHS data reveals varying proportions in receipt of these components with 81% having been weighed, 52% had their blood pressure taken, 26% had a urine sample taken, 87% had a blood sample drawn, 88% took/bought iron tablets, 54% received Sulphadoxine-pyrimethamine/Fansidar for prevention of malaria while 46% took deworming tablets. Non receipt of some components like blood pressure measurement, urine sample testing, SP/Fansidar and deworming tablets makes adolescent mothers in the region vulnerable to health risks attributable to urinary tract infections, gestational diabetes, preterm labor, low birth weight, pre-eclampsia, malaria, chronic and gestational hypertension [8]. Additionally, up to 57% of adolescent mothers who attended ANC for their most recent live birth made the first ANC visit in the second trimester.

Studies conducted on ANC utilization show that family size, financial constraints [15], long distance to health facility [15, 16], occupation [16], education level [16, 17], and religion [17] are associated with timing of the first ANC visit. In addition, a study conducted in Tanzania [18] also found out that earlier ANC attendance was associated with gravida of pregnancy and history of pregnancy related problems. Women of gravida 1 and those who had ever experienced a miscarriage or still birth were more likely to initiate the first ANC visit early. With regard to receipt of the components of care, earlier studies [8, 19] show that age of woman, ANC location, ANC provider cadre, number of ANC visits attended, maternal education, access to media, history of pregnancy related problems, household economic status, timing of the first ANC visit and family planning use were associated with receipt of the ANC components of care. A study in India [20] found that among adolescent women, those working were more likely to have their weight monitored, those with family planning knowledge were less likely to have their weight monitored, those with power to make decisions regarding major household purchases were more likely to receive tetanus injection and deworming tablets and those of higher education levels were more likely to receive calcium tablets.

In Uganda, studies on ANC utilization have been conducted by [5, 6, 8, 16, 19, 21–24]. Of these, only studies by [8, 19] and [5, 16] investigated ANC utilization with respect to components of care received during ANC visits and timing of the first ANC visit, respectively. However, these concentrated on women of the entire reproductive age group (15-49 years). Regarding ANC utilization among adolescent mothers, few studies have been conducted in Uganda [11, 25]. Rukundo et al assessed stakeholders' views concerning factors affecting availability, accessibility and utilization of teenager friendly ANC services in Mbarara Municipality, Western Uganda [11]. Nansubuga on the other hand investigated factors associated with ANC utilization (frequency of ANC attendance, duration of attendance, ANC provider and services received during ANC visit) [25]. However, these studies had limitations including: firstly, adolescents' views concerning utilization of ANC services were not put into consideration [11]. Secondly, bivariate analysis techniques were applied [25]. Hence not putting into consideration other possible confounders of ANC utilization. This implies therefore that there is still a scarcity of information on factors associated with ANC utilization among adolescent mothers in Uganda. Consequently, adequate ANC service provision and utilization among this special group of mothers may continue being challenged.

To address this gap, this study set out to: (i) examine the timing to first ANC visit, (ii) examine the components of care received during ANC visits, and (iii) establish the predictors of timing to first ANC visit and receipt of components of care among adolescent mothers aged 10-19 years in Luuka district. The study intends to inform ANC service improvement and provision among adolescent mothers not only in the district but in the whole country.

# Data And Methods

# Study setting

The study was conducted between March and May 2021 in Eastern Uganda, specifically Luuka district. The adolescent population in the district constitutes 28.3% of the district total population [14].

# Study design, population and data collection

This study was cross-sectional and employed quantitative data collection methods. The data were collected by a team of well-trained research assistants. The team of research assistants comprised those proficient in the use of the major local language spoken in the Eastern region of Uganda. The data were collected by means of structured interviews held in either English or the local language. The data were captured electronically on a tablet using Open Data Kit (ODK) software. The structured questionnaire collected information on socio-demographic characteristics (for both adolescent mother and partner), sexual activity, reproduction, pre and postnatal care, and knowledge and awareness about: - pre/postnatal, newborn care practices and danger signs in pregnancy.  Eligible study participants included adolescent mothers aged between 10 and 19 years who were either pregnant or had infants aged 0-3 months and consented to participate in the study.

# Sample size and sampling

In this study, the Kish formula was used to estimate the sample size from:

$$n = \frac{z(\alpha/2)^2 p(1-p)}{d^2}$$

Where: $n$= Sample size, $Z$ ($\alpha$/2) = confidence interval (95%), $P$= proportion of young females who were currently pregnant or had a birth (25%), $d$ =margin of error assumed at 8.0%. In order to cater for the non-response and missing values, the sample size was oversampled by 10% with a design effect of 2.0. The final sample size for the study was 248 adolescent mothers. Adolescent mothers were drawn from three sub counties with the highest rates of teenage pregnancy. These included Bukanga, Waibhuga, and Ikumbya. In each subcounty, adolescent mothers were drawn from three parishes with the highest rates of teenage pregnancies. The sub counties and respective parishes with the highest rates of teenage pregnancy were purposively included in the study. To determine how many adolescent mothers to collect data from in each parish of a selected sub county, the Probability Proportional to Size (PPS) approach was used to distribute the minimum sample size across the selected sub counties and respective selected parishes. The snowball sampling technique was used to identify households with eligible adolescent mothers for interview. If a household had more than one eligible adolescent mother, only one was interviewed.

# Variables

For this study, two outcome variables were considered. These were receipt of the recommended components of the ANC visit and timing of the first ANC visit. The first outcome variable points to receipt of the WHO recommended core set of services [12] that pregnant women are expected to receive when they visit a health facility for Antenatal care. In this study, eight components were considered. These include blood pressure measurement, urine sample testing, blood sample testing, weight measurement, tetanus toxoid vaccination, iron tablet supplementation, receipt of drugs for intestinal worms and receipt of SP/Fansidar drugs for malaria prevention. The variable was coded into a binary variable based on the number of ANC components received by an adolescent mother during ANC visit for their most recent birth or pregnancy. Adolescent mothers who received less than eight components comprised the category "All ANC components not received" while those who received all the eight components comprised the category "All ANC components received." The second outcome variable points to the gestational age (in months) of current pregnancy or pregnancy for the most recent birth at which first ANC visit was made by the adolescent mother. This variable was coded into a binary variable based on adolescent mothers' responses to the question - How many months pregnant were you when you first received antenatal care for this pregnancy? Adolescent mothers whose first ANC visit was in the first trimester (0-3 months of pregnancy) comprised the category "In the first trimester" while those whose first ANC visit was after the first trimester (from 4 months of pregnancy) comprised the category "After the first trimester."

The explanatory variables were: - adolescent mother's age (Below 18 and 18-19), partner's age (same age and older), having ever given birth (Yes and No), number of children ever born (0-1 and More than 1), adolescent mother's highest education level (Primary and Secondary), marital status (Unmarried and Married/cohabiting), partner presence (Staying with partner and Not staying with partner), distance to nearest health facility (Less than 1 km and 1 km or more), religion (Christian and Moslem; where Christian includes Catholics, Protestants, Pentecostals and Seventh Day Adventists), social support (Received no support and Received support; where receipt of social support refers to being accompanied to the health facility for ANC visits by either friends or family members), decisions on health care seeking (self, husband/partner, relatives/in-laws and jointly with husband/partner), pregnancy wanted (Wanted and Not wanted), Adolescent mother's working status (Working and Not working), daily earnings (Earn nothing and Earn some money), knowledge of obstetric pregnancy dangers signs (Has knowledge and No knowledge), knowledge of family planning methods (Has knowledge and No knowledge), ANC provider cadre (Skilled and Unskilled) and type of health facility (Government, Private and Own home/TBA's home).

# Data Analysis

Data analyses were done at univariate, bivariate and multivariate levels of analyses. At the univariate level, frequencies and percentage distributions describing the sample of adolescent mothers with respect to the study variables were generated. At the bivariate level, the association between the explanatory variables and outcome variables was examined. The statistical significance of the association was tested for using the Pearson chi-square ($\chi^2$) and Fisher's exact tests of independence. At multivariate

level, binary logistic regression models were fitted to ascertain which explanatory variables predict the likelihood of an adolescent mother receiving all the recommended components of the ANC visit and the likelihood of an adolescent mother making the first ANC visit after the first trimester. The models were tested for goodness of fit using the link test and the Hosmer Lemeshow test. Multicollinearity between the predictor variables was checked for using the Variance Inflation Factors (VIF). The VIF gives an indication of how much of the inflation of the standard error is caused by multicollinearity. A very large VIF (10 or greater) for any given variable shows that the variable is closely related to one or more variables. Therefore, predictor variables with a VIF of 10 or greater were excluded from the models. For both bivariate and multivariate levels of analyses, the level of statistical significance was set at $p<0.05$.

# Results

## Distribution of the adolescent mothers

Table 1 shows the distribution of adolescent mothers with respect to the study variables. More than half of the adolescent mothers (56%) were older adolescents aged 18-19 years. Half of the adolescent mothers (51%) were pregnant at the time of the study. Adolescent mothers who had ever given birth constituted 49% of all adolescent mothers in this study. Of these, almost nine out of ten (86%) had given birth to one child. Majority (89%) of the adolescent mothers were younger than their partners. All adolescent mothers in this study had attained a certain level of education. Close to three quarters of the mothers (72%) had attained primary level as their highest level of education. In this study, six out of ten (60%) adolescent mothers were either married or in a union as if married (cohabiting).

Table 1: Distribution of adolescent mothers by study variables

| Variable | Frequency (n=248) | Percent (%) |
|---|---|---|
| Adolescent mother's age group | | |
| Below 18 | 108 | 43.6 |
| 18-19 | 140 | 56.5 |
| Partner's age | | |
| Same age | 24 | 10.6 |
| Older | 202 | 89.4 |
| Ever given birth | | |
| Yes | 118 | 49.0 |
| No | 123 | 51.0 |
| Children ever born | | |
| 0-1 | 101 | 86.3 |
| More than 1 | 16 | 13.7 |
| Education level | | |
| Primary | 177 | 71.7 |
| Secondary | 70 | 28.3 |
| Marital status | | |
| Married/Cohabiting | 147 | 60.0 |
| Unmarried | 98 | 40.0 |
| Religion[1] | | |
| Christian | 178 | 72.1 |
| Muslim | 68 | 27.5 |
| Partner presence | | |
| Staying with partner | 148 | 60.9 |
| Not staying with partner | 95 | 39.1 |
| Social support | | |
| Received no support | 147 | 65.0 |
| Received support | 79 | 35.0 |
| Daily earnings | | |

| | | |
|---|---|---|
| Earn nothing | 197 | 80.1 |
| Earn some money | 49 | 19.9 |
| Distance to HF | | |
| Less than 1 km | 53 | 27.6 |
| 1km or more | 139 | 72.4 |
| Decisions on Healthcare | | |
| Self | 111 | 46.1 |
| Husband | 63 | 26.1 |
| Relatives or in-laws | 49 | 20.3 |
| Jointly with partner | 18 | 7.5 |
| Pregnancy wanted | | |
| Wanted | 119 | 49.4 |
| Not wanted | 122 | 50.6 |
| Working status | | |
| Not working | 168 | 68.0 |
| Working | 79 | 32.0 |

Note: [1] One adolescent mother (0.4%) belonged to no religion

With regard to religion, nearly three quarters (72%) of the adolescent mothers were Christians. Most of the adolescent mothers were currently living with their partners or father of the child (61%) and reported having received no social support during their most recent pregnancy or birth (65%). The majority (80%) of adolescent mothers reported earning no daily income. This is not surprising since the highest proportion (68%) of the adolescent mothers were not working.

Notably, most adolescent mothers in this study stayed quite far away from the nearest health facility. Almost 4 out of 5 (72%) adolescent mothers were staying one kilometer away from the nearest health facility. Most of the adolescent mothers made their own decisions regarding seeking health care. The results in Table 1 show that more than two fifths (46%) of the adolescent mothers made their own decisions on seeking health care. However, a similar proportion of the adolescent mothers had their decisions on seeking health care made by other people (26% by husbands/partners and 20% by relatives/in-laws). Furthermore, slightly more than half of the mothers (51%) had mistimed pregnancies. That is, they did not want to get pregnant at the time they conceived their current pregnancy or the pregnancy for their most recent birth.

## Knowledge about pregnancy danger signs and family planning methods

The results presented in Figure 1 show the distribution of adolescent mothers by their knowledge about obstetric pregnancy danger signs and family planning methods. Adolescent mothers who were knowledgeable about pregnancy danger signs and family planning methods constituted the majority (83% and 91% respectively).

## Utilization of ANC

Table 2 presents results on utilization of ANC by the adolescent mothers. ANC attendance among adolescent mothers was high. Overall, the majority (82%) of the adolescent mothers attended ANC for their most recent pregnancy or birth. However, more than half (53%) did not complete the recommended minimum of four visits, with 13% attending ANC once, 16% attending twice and 24% attending thrice. Only 22% of adolescent mothers who attended ANC completed the recommended minimum number of four visits while slightly more than a quarter (26%) made more than the recommended four ANC visits. The results in Table 2 further indicate that almost all adolescent mothers who attended ANC during their last pregnancy or birth received ANC from a government facility (91%) and from a skilled provider (98%). However, majority of the adolescent mothers delayed their first ANC visit. More than half (53%) of those who went for ANC made their first visit after the first trimester. This is further supported by the finding that adolescent mothers who attended ANC made their first ANC visit half way through the gestation period since the median gestation age, at the time they made the first ANC visit, was four months.

**Table 2: Distribution of adolescent mothers by ANC attendance, provider, providing facility, initiation, and number of visits**

| Variable | Frequency (n=196)** | Percent (%) |
|---|---|---|
| ANC attendance | | |
| Attended | 196 | 81.7 |
| Did not attend | 44 | 18.3 |
| ANC provider | | |
| Skilled provider[1] | 191 | 97.5 |
| Unskilled provider | 5 | 2.6 |
| Type of health facility | | |
| Government | 178 | 90.8 |
| Private | 13 | 6.6 |
| Own home or TBA's home | 5 | 2.6 |
| Timing of first ANC visit | | |
| In 1st Trimester[2] | 92 | 47.2 |
| After 1st Trimester[3] | 103 | 52.8 |
| Number of ANC visits | | |
| One | 25 | 12.8 |
| Two | 32 | 16.4 |
| Three | 46 | 23.6 |
| Four | 42 | 21.5 |
| More than four | 50 | 25.6 |
| Mean number of ANC visits | 196 | 3.5 ± 1.8 |

Note: ** Frequency of adolescent mothers who attended ANC; [1] Doctor, Nurse/midwife, Medical/Clinical officer, Nursing assistant; [2] 0-12 weeks of pregnancy; [3] 13 weeks of pregnancy and beyond

Components of the ANC visit received

The components of the package of care for pregnant women who attend ANC include a set of WHO recommended services such as: - blood pressure measurement, urine and blood sample testing, weight measurement, tetanus vaccination, giving pregnant women iron tablets/syrup, drugs for intestinal worms and intermittent preventive treatment (IPTp) of malaria by giving pregnant women Sulfadoxine-Pyrimethamine (SP) (World Health Organization, 2016). Receipt or uptake of these services informs the

quality of ANC received by women who attend ANC. The results presented in Figure 2 show the percentage of adolescent mothers (those that attended ANC during their current pregnancy or the pregnancy for their most recent birth) who received each of these services. The majority of the adolescent mothers had their blood sample drawn (96%), weight measured (86%), received a tetanus injection (88%) and received or were able to buy themselves iron tablets/syrup (87%). More than three quarters (78%) of the adolescent mothers had their blood pressure measured while seven out of ten mothers (70%) had their urine samples taken. Nearly three quarters (74%) of the adolescent mothers took antimalarial drugs during their current pregnancy or the pregnancy for their most recent birth and close to two thirds (65%) took drugs for intestinal worms.

Figure 3 below presents the percentage distribution of adolescent mothers who attended ANC by the number of ANC components of care received during those visits. The results were based on a nine-item index ranging between zero and eight. The index was adapted from a study by [19]. Items including whether the mother had her blood pressure and weight measured, urine and blood samples taken, received a tetanus injection, received iron tablets, took drugs for intestinal worms and SP/Fansidar drugs comprise the index. On the index, zero indicates all adolescent mothers who received none of the components during their ANC visit (None) while eight indicates adolescent mothers who received all the components (All). As per the WHO guidelines, it is expected that pregnant women should receive all the recommended components of the package of care when they attend ANC. For the recommended components of the package of care considered in this study, the results in Figure 3 show that almost all (97%) adolescent mothers who attended ANC received at least one of the components during ANC visits for their current pregnancy or most recent birth. However, receipt of all the recommended components of care was low with slightly more than one third (36%) of the adolescent mothers who attended ANC reporting receipt of all the components. Important to note is that there was a small proportion of adolescent mothers (3%) who attended ANC and yet did not receive any of the recommended components of care. On average, adolescent mothers who attended ANC received five components out of all the recommended eight components.

## Factors associated with receipt of the recommended components of the ANC visit and timing of the first ANC visit

Table 3 presents results on the association between the independent variables and the outcome variables. The results indicate that having ever given birth (p<0.05) and having knowledge about the pregnancy danger signs (p<0.05) were the only factors significantly associated with receipt of the recommended components of the ANC visit. A significantly higher proportion (60%) of mothers who received all the ANC components were mothers who had ever given birth. Similarly, the majority (93%) of adolescent mothers who received all the recommended components during their ANC visit were mothers who knew about the obstetric pregnancy danger signs.

## Table 3: Factors associated with receipt of ANC components and Timing of the first ANC visit

| Variable | Receipt of ANC components[1] | | | Timing of first ANC visit | | |
|---|---|---|---|---|---|---|
| | Did not receive all (%) | Received all (%) | *p-value* | In first trimester (%) | After first trimester (%) | *p-value* |
| Adolescent mother's age | | | | | | |
| Below 18 | 46.8 | 34.3 | 0.077 | 35.9 | 47.6 | 0.098 |
| 18-19 | 53.3 | 65.7 | | 64.1 | 52.4 | |
| Partner's age | | | | | | |
| Same age | 10.3 | 11.9 | 0.71 | 3.5 | 12.6 | 0.027 |
| Older | 89.7 | 88.1 | | 96.5 | 87.4 | |
| Ever given birth | | | | | | |
| Yes | 44.1 | 60.0 | 0.025* | 45.7 | 60.2 | 0.042 |
| No | 56.0 | 40.0 | | 54.4 | 39.8 | |
| Children ever born | | | | | | |
| 0-1 | 90.5 | 78.6 | 0.072 | 76.2 | 90.3 | 0.058 |
| More than 1 | 9.5 | 21.4 | | 23.8 | 9.7 | |
| Education level | | | | | | |
| Primary | 69.8 | 77.1 | 0.252 | 77.2 | 68.0 | 0.151 |
| Secondary | 30.2 | 22.9 | | 22.8 | 32.0 | |
| Marital status | | | | | | |
| Unmarried | 41.9 | 34.3 | 0.273 | 33.0 | 47.1 | 0.046* |
| Married/Cohabiting | 58.1 | 65.7 | | 67.0 | 52.9 | |
| Religion | | | | | | |
| Christian | 71.0 | 76.8 | 0.362 | 70.7 | 72.6 | 0.770 |
| Muslim | 29.0 | 23.2 | | 29.4 | 27.5 | |
| Distance to HF[2] | | | | | | |
| Less than 1 km | 25.0 | 32.4 | 0.276 | 31.1 | 24.8 | 0.327 |
| 1km or more | 75.0 | 67.7 | | 68.9 | 75.3 | |
| Partner presence | | | | | | |
| Staying with partner | 59.8 | 64.3 | 0.514 | 70.7 | 51.5 | 0.006* |

| | | | | | | |
|---|---|---|---|---|---|---|
| Not staying with partner | 40.2 | 35.7 | | 29.4 | 48.5 | |
| **Social support** | | | | | | |
| Received no support | 69.0 | 55.7 | 0.053 | 59.8 | 65.1 | 0.448 |
| Received support | 31.0 | 44.3 | | 40.2 | 35.0 | |
| **Decisions on Healthcare** | | | | | | |
| Self | 49.4 | 37.1 | 0.138 | 42.4 | 38.8 | 0.101 |
| Husband | 25.0 | 28.6 | | 33.7 | 23.3 | |
| Relatives or in-laws | 20.2 | 21.4 | | 15.2 | 29.1 | |
| Jointly with partner | 5.4 | 12.9 | | 8.7 | 8.7 | |
| **Pregnancy wanted** | | | | | | |
| Wanted | 47.0 | 54.3 | 0.307 | 53.3 | 44.7 | 0.230 |
| Not wanted | 53.0 | 45.7 | | 46.7 | 55.3 | |
| **Working status** | | | | | | |
| Not working | 70.4 | 61.4 | 0.176 | 58.7 | 77.7 | 0.004* |
| Working | 29.6 | 38.6 | | 41.3 | 22.3 | |
| **Daily earnings** | | | | | | |
| Earn nothing | 81.0 | 77.1 | 0.505 | 69.2 | 91.3 | 0.000* |
| Earn some money | 19.1 | 22.9 | | 30.8 | 8.7 | |
| **Knowledge of pregnancy danger signs** | | | | | | |
| Has knowledge | 78.6 | 92.9 | 0.008* | 90.2 | 77.7 | 0.018* |
| No knowledge | 21.4 | 7.1 | | 9.8 | 22.3 | |
| **Knowledge of family planning methods** | | | | | | |
| Has knowledge | 92.3 | 88.6 | 0.360 | 93.5 | 91.2 | 0.600 |
| No knowledge | 7.7 | 11.4 | | 6.5 | 8.8 | |
| **Provider cadre** | | | | | | |
| Skilled provider | 96.8 | 98.6 | 0.657 | 98.9 | 96.1 | 0.373 |
| Unskilled provider | 3.2 | 1.4 | | 1.1 | 3.9 | |
| **Type of health facility** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Government | 88.9 | 94.3 | 0.546 | 90.2 | 91.3 | 0.925 |
| Private | 7.9 | 4.3 | | 7.6 | 5.8 | |
| Own home or TBA's home | 3.2 | 1.4 | | 2.2 | 2.9 | |

Note: [1] Components of the ANC visit; [2] HF = Health facility; *Significant at p<0.05

However, partner's age, ever given birth, marital status, partner presence, working status, daily earnings and knowledge about obstetric pregnancy danger signs (p<0.05) were the only factors significantly associated with timing of the first ANC visit (Table 3). Almost all mothers (97%) who made the first ANC visit in the first trimester were younger than their partners in terms of age. Majority of the mothers who made the first ANC visit in the first trimester were those who had never given birth while three fifths (60%) of mothers who made the first ANC visit after the first trimester were those who had ever given birth to a child. More than two thirds of mothers (67%) who made the first ANC visit in the first trimester were married or cohabiting. Similarly, this group of mothers constituted the majority (53%) among those who made the first visit after the first trimester. Mothers staying with their partners constituted the majority of those who made the first ANC visit in the first trimester as well as after the first trimester. About seven in ten mothers (71%) who made the first visit in the first trimester and more than half (52%) of those whose first visit was after the first trimester were mothers staying with their partners or father of the child. More than three quarters (78%) of mothers who made the first ANC visit after the first trimester were not working and were not earning any money (91%). Out of every ten adolescent mothers who made their first visit in the first trimester, nine were knowledgeable about or aware of the obstetric pregnancy danger signs.

## Determinants of timing of first ANC visit and Receipt of components of the ANC visit

Multivariate analysis results from Binary logistic regression, on factors associated with - an adolescent mother receiving all the components of the ANC visit and timing of the first ANC visit are presented in Table 4 and Table 5, respectively. From the bivariate analysis, partner's age, ever given birth, partner presence, daily earnings and knowledge of obstetric pregnancy danger signs were significantly associated with utilization of ANC. Marital status and working status were also significantly associated with utilization of ANC at bivariate analysis level. However, these were excluded from the regression models, along with children ever born, religion and provider cadre due to multicollinearity. Partner presence was considered over marital status because of the following reason. Partner presence is associated with physical support for the adolescent mother in terms of – escorting her to the health facility for ANC, reminding her about the next ANC visit and reminding her to swallow (if necessary) drugs during pregnancy. However, being married or in-union does not imply that the partner is always present. There is evidence that adolescent mothers are more likely to be rejected by partners [26]. There is a possibility that this could negatively affect their uptake of health services including ANC. This makes partner presence a more important variable to investigate than just marital status. Similarly, daily earning

was considered over working status because of the following reason. Financial constraints have implications for the uptake of health services [26]. Without money, meeting transport costs to the health facility or even purchasing health commodities such as drugs may be challenged. Furthermore, adolescent mothers are less likely to find a decent paying job. This implies they are highly likely to be financially constrained. It is therefore possible that being financially constrained could hinder them from utilizing ANC services. Variables including mother's age, mother's education level, distance to nearest health facility, social support, decision maker on seeking health care, pregnancy wanted (intendedness of pregnancy), and type of health facility were included in the regression analysis even though they were not significant at bivariate level. This is because of their documented importance, in literature, in influencing ANC utilization. The regression models contained thirteen variables including - Adolescent mother's age, partner's age, ever given birth, education level, partner presence, distance to health facility, social support, decisions on health care, pregnancy wanted, daily earnings, knowledge of pregnancy danger signs, knowledge of family planning methods, type of health facility.

## Determinants of receipt of all components of the ANC visit

As shown in Table 4, distance to nearest health facility, knowledge of obstetric pregnancy danger signs and knowledge of family planning methods were the only statistically significant factors associated with receipt of components of the ANC visit for adolescent mothers. The odds of receiving all components of the ANC visit were lower for mothers staying at least one kilometer away from the nearest health facility *(OR=0.424, P=0.038, CI: 0.189, 0.952)* compared with those staying less than one kilometer away. Similarly, mothers who had knowledge on family planning methods had lower odds of receiving all components of the ANC visit *(OR=0.262, P=0.047, CI: 0.070, 0.982)* compared with those who had no such knowledge. Mothers who were knowledgeable about the obstetric pregnancy danger signs were found to be 6.6 times more likely to receive all components of the ANC visit *(OR=6.567, P=0.005, CI: 1.750, 24.648)* compared with those who were not knowledgeable about these signs.

## Table 4: Logistic Regression Analysis results of determinants of receipt of all components of the ANC visit

| Variable | Adjusted OR | p-values | 95% CI |
|---|---|---|---|
| Adolescent mother's age group | | | |
| Below 18 (rc) | 1.00 | | |
| 18-19 | 1.317 | 0.462 | 0.63-2.74 |
| Partner's age | | | |
| Same age (rc) | 1.00 | | |
| Older | 0.357 | 0.094 | 0.11-1.19 |
| Ever given birth | | | |
| No (rc) | 1.00 | | |
| Yes | 1.495 | 0.277 | 0.72-3.08 |
| Education level | | | |
| Primary (rc) | 1.00 | | |
| Secondary | 0.715 | 0.423 | 0.32-1.62 |
| Partner presence | | | |
| Not staying with partner (rc) | 1.00 | | |
| Staying with partner | 1.188 | 0.700 | 0.49-2.86 |
| Distance to HF | | | |
| Less than 1 km (rc) | 1.00 | | |
| 1km or more | 0.424 | 0.038* | 0.19-0.95 |
| Social support | | | |
| Received no support (rc) | 1.00 | | |
| Received support | 1.793 | 0.129 | 0.84-3.81 |
| Decisions on Healthcare | | | |
| Self (rc) | 1.00 | | |
| Husband | 0.822 | 0.676 | 0.33-2.07 |
| Jointly with partner | 1.633 | 0.431 | 0.48-5.53 |
| Relatives or in-laws | 0.747 | 0.605 | 0.25-2.26 |
| **Pregnancy wanted** | | | |
| Not wanted (rc) | 1.00 | | |

| | | | |
|---|---|---|---|
| Wanted | 0.898 | 0.774 | 0.43-1.88 |
| Daily earnings | | | |
| Earn nothing (rc) | 1.00 | | |
| Earn some money | 1.536 | 0.330 | 0.65-3.64 |
| Knowledge of pregnancy danger signs | | | |
| No knowledge (rc) | 1.00 | | |
| Has knowledge | 6.567 | 0.005* | 1.75-24.65 |
| Knowledge of family planning methods | | | |
| No knowledge (rc) | 1.00 | | |
| Has knowledge | 0.262 | 0.047* | 0.07-0.98 |
| **Type of health facility** | | | |
| Government (rc) | 1.00 | | |
| Private | 0.349 | 0.170 | 0.08-1.57 |
| Own home or TBA's home | 0.781 | 0.843 | 0.07-9.04 |

Note: The model was statistically significant ($\chi^2_{(16, 0.05)}$ = 30.55, p = 0.0153) and correctly classified 69.3% of the respondents; **\*** Significant at p<0.05; rc – Reference Category; OR – Odds Ratio

## Determinants of timing of the first ANC visit

Results presented in Table 5 show that, adolescent mother's age, partner's age, ever given birth, decision maker on seeking healthcare, daily earnings and knowledge of obstetric pregnancy danger signs were the only factors statistically significantly associated with timing of the first ANC visit. The odds of making the first ANC visit after the first trimester were highest for mothers who had ever given birth and those whose decisions on seeking health care were made by relatives or in-laws. Mothers who had ever given birth were 3.7 times more likely to go for the first ANC visit after the first trimester *(OR=3.669, P=0.001, CI: 1.678, 8.023)* compared with mothers who had never given birth. Compared with mothers whose decisions on seeking health care were made by themselves, mothers whose decisions on seeking health care were made by relatives or in-laws were 3.4 times more likely to make the first ANC visit after the first trimester *(OR=3.449, P=0.043, CI: 1.041, 11.424).* Older adolescent mothers (18-19 years) were less likely to make the first ANC visit after the first trimester *(OR=0.471, P=0.046, CI: 0.224, 0.987)* compared with the young mothers (Below 18 years). Mothers who were younger (14-17 years) than their partners had lower odds of making the first ANC visit after the first trimester *(OR=0.231, P=0.041, CI: 0.056, 0.942)* compared with those whose age was the same as their partner's. The odds of going for the first ANC visit after the first trimester were lower for mothers who earned some money from their work *(OR=0.254, P=0.004, CI: 0.099, 0.653)* compared to those who earned nothing. Similarly, having

knowledge of the obstetric pregnancy danger signs was associated with lower odds of making the first ANC visit after the first trimester *(OR=0.346, P=0.043, CI: 0.124, 0.966)* compared to having no such knowledge.

**Table 5: Logistic Regression Analysis results of determinants of timing of the first ANC visit**

| Variable | Adjusted OR | p-values | 95% CI |
|---|---|---|---|
| **Age group** | | | |
| Below 18 (rc) | | | |
| 18-19 | 0.471 | 0.046* | 0.22-0.99 |
| **Partner's age** | | | |
| Same age (rc) | | | |
| Older | 0.231 | 0.041* | 0.06-0.94 |
| **Ever given birth** | | | |
| No (rc) | | | |
| Yes | 3.669 | 0.001* | 1.68-8.02 |
| **Education level** | | | |
| Primary (rc) | | | |
| Secondary | 1.631 | 0.260 | 0.70-3.82 |
| **Partner presence** | | | |
| Not staying with partner (rc) | | | |
| Staying with partner | 0.618 | 0.280 | 0.26-1.48 |
| **Distance to HF** | | | |
| Less than 1 km (rc) | | | |
| 1km or more | 1.730 | 0.201 | 0.75-4.01 |
| **Social support** | | | |
| Received no support (rc) | | | |
| Received support | 1.195 | 0.657 | 0.55-2.62 |
| **Decisions on Healthcare** | | | |
| Self (rc) | | | |
| Husband | 0.840 | 0.708 | 0.34-2.09 |
| Jointly with partner | 1.823 | 0.360 | 0.50-6.60 |
| Relatives or in-laws | 3.449 | 0.043* | 1.04-11.42 |
| **Pregnancy wanted** | | | |
| Not wanted (rc) | | | |

| | | | |
|---|---|---|---|
| Wanted | 0.857 | 0.679 | 0.41-1.78 |
| **Daily earnings** | | | |
| Earn nothing (rc) | | | |
| Earn some money | 0.254 | 0.004* | 0.10-0.65 |
| **Knowledge of pregnancy danger signs** | | | |
| No knowledge (rc) | | | |
| Has knowledge | 0.346 | 0.043* | 0.12-0.97 |
| **Knowledge of family planning methods** | | | |
| No knowledge (rc) | | | |
| Has knowledge | 0.961 | 0.953 | 0.26-3.61 |
| **Type of health facility** | | | |
| Government (rc) | | | |
| Private | 1.271 | 0.743 | 0.30-5.32 |
| Own home or TBA's home | 6.300 | 0.149 | 0.52-76.85 |

Note: The model was statistically significant ($\chi^2_{(16, 0.05)}$ = 45.79, p = 0.0001) and correctly classified 72.6% of the respondents. **\*** Significant at p<0.05; rc − Reference Category; OR − Odds Ratio

# Discussion

This study sought to examine timing of the first ANC visit, receipt of ANC components of care and associated predictors among adolescent mothers in Luuka district. Understanding these aspects of ANC utilization particularly among this special group of mothers is pertinent to the efforts of the district health office and other stakeholders involved in designing interventions to improve utilization of maternal health services.

Our findings revealed that most adolescent mothers delayed initiating the first ANC visit, a finding similar to what was observed among adolescent mothers in Nigeria [17]. Furthermore, even though adolescent mothers received at least one of the recommended core components of care during their ANC visit, only a small proportion were able to receive all the components. This study also revealed that knowledge of obstetric pregnancy danger signs is a determinant of both receipt of all the components of the ANC visit and timing of the first ANC visit among adolescent mothers. These findings show that knowledge on health care services is an important factor in utilization of the services as posited by [27]. Considering that more than three quarters (78%) of the adolescent mothers in this study who made their own decisions on health care seeking were those knowledgeable about the pregnancy danger signs, it is plausible to assert that knowledge on pregnancy danger signs empowers adolescent mothers to confidently make their own decisions on health care seeking. For that reason, they are able to make

timely ANC visits. It is also likely that they are able to consistently attend ANC throughout pregnancy, resulting into receipt of all the recommended components of care. This underscores the importance of equipping adolescent girls in the district with reproductive health information.

This study found that other determinants of receipt of all components of the ANC visit among adolescent mothers in the district were: - distance to nearest health facility and knowledge of family planning methods. According to the 2014 Uganda National Housing and Population census, 22.1% of households in Luuka district are located 5km or more away from the nearest public health facility while 13.2% of households in the same district are 5km or more away from the nearest health facility, irrespective of whether it is public or private [14]. Such long distances away from the nearest health facility have been shown to hinder utilization of maternal health care services [8, 28]. It is therefore not surprising that in this study, adolescent mothers staying at least one kilometer away from the nearest health facility were less likely to receive all the components of the ANC visit. This relationship could be attributed to the fact that staying far from the nearest health facility results into adolescent mothers skipping some ANC visits as they may not be able to walk to the health facility, especially in times when they cannot afford to pay for public transport means. This also possibly explains why most of the adolescent mothers who attended ANC did not complete the minimum number of four ANC visits (Table 2) as recommended, especially for normal uncomplicated pregnancies [22].

Adolescent mothers with knowledge of family planning methods were less likely to receive all the components of the ANC visit than those who had no knowledge of these methods. These findings are akin to those from a study in India [20] which found that adolescent women with family planning knowledge are less likely to have their weight monitored during pregnancy. They however contrast [29] whose findings implied that women who appreciated knowledge of family planning as a health care service were also more likely to appreciate ANC services. Since, in this study, most of the adolescent mothers with knowledge of family planning methods were those educated up to primary level of education, it is possible that they don't appreciate knowledge of family planning and therefore are less likely to appreciate use of ANC services as well.

With regard to timing of first ANC visit, adolescent mother's age, partner's age, having ever given birth, adolescent mother's decision maker on health care seeking, and daily income earnings were found to determine the likelihood that an adolescent mother in Luuka district will make the first ANC visit after the first trimester. Results from this study show that older adolescent mothers (18-19 years) were less likely to make their first ANC visit after the first trimester. This is an indication of early initiation of ANC visits among older adolescent mothers. Interestingly, majority of the adolescent mothers, in this study, who had ever given birth to more than one child were older adolescent mothers. Therefore, early initiation of ANC among older adolescent mothers compared to their younger counterparts (Below 18 years) could be attributed to prior experience with the health care system which might have accorded them an opportunity to understand the importance of initiating ANC in the first trimester.

In this study, adolescent mothers who were younger than their partner were less likely to make the first ANC visit after the first trimester. This result is not surprising given that majority of the adolescent mothers who were escorted for ANC by their partner/husband were those who were younger than the partner. According to [18], without social support from their husbands/partners, pregnant women are more likely to enroll late for ANC. It has also been noted that without sufficient social support, adolescent mothers may not be able to utilize available ANC services [11]. Therefore, the findings by this study indicating early enrollment for ANC by adolescent mothers who were younger than their partners could be attributed to social support from their partners in terms of reminders and advise to attend the ANC clinic, escorting the mother to the ANC clinic, among others.

The likelihood of delaying the first ANC visit past the first trimester was highest among adolescent mothers whose decisions on health care seeking were made by relatives or in-laws rather than themselves. These were three times more likely to delay their first ANC visit. This finding is consistent with [30] whose study revealed that adolescent mothers in Kenya whose decision to start ANC clinic was made by others were less likely to book their first ANC visit in the first trimester compared to those whose decision was made by themselves. This study presumes that the delay in initiating the first ANC visit by adolescent mothers whose decisions on health care seeking are made by relatives or in-laws could be attributed to two issues. Firstly, their younger age compared to that of their relatives or in-laws. Secondly, their dependance for livelihood on the relatives or in-laws. This puts these adolescent mothers in a position of being compliant to the relatives' or in-laws' recommendations on health care matters, including when to start attending the ANC clinic.

Compared to adolescent mothers who had no daily income earnings, the likelihood of making the first ANC visit after the first trimester was lower for adolescent mothers who earned some income on a daily basis. A possible explanation for this finding is that, without income, early initiation of ANC is inhibited as it renders the adolescent mother unbale to meet costs associated with seeking ANC [31–33] such as transport fees and buying some essential medicines - in the event that they are unavailable at the public health facility where majority of the adolescent mothers in this study sought ANC.

This study also found that adolescent mothers who had ever given birth were more likely to attend their first ANC visit after the first trimester compared to those who were yet to give birth (those currently pregnant in this study). These findings agree with Gross et al whose study on timing of antenatal care for adolescent and adult pregnant women in south-eastern Tanzania revealed that being in the first pregnancy was strongly associated with three weeks earlier attendance of ANC [18]. Having known the importance of ANC attendance to a pregnant woman following ANC attendance during previous pregnancy, it would be expected of adolescent mothers who have ever given birth to initiate ANC attendance in the first trimester. However, findings from this study are contrary to this expectation. Notwithstanding other factors that could have prevented adolescent mothers who had ever given birth from attending ANC in the first trimester, this study presumes that delayed initiation of ANC among these mothers could be primarily attributed to their low perceived susceptibility to pregnancy complications and

adverse birth outcomes. This is especially so because majority of the adolescent mothers had never had a stillbirth or miscarriage and had normal vaginal delivery during their previous birth.

# Strengths and Limitations of the study

Information on ANC in this study was collected retrospectively especially for adolescent mothers who had given birth. This implies that these mothers were required to recall events on ANC utilization for the most recent birth or pregnancy carried. However, this study minimized the recall period since information on ANC was collected from adolescent mothers who were currently pregnant then or had just given birth three months ago, at most. For this reason, the data used in this study minimized chances of recall bias and as a result increased accuracy of findings.

One of the limitations of this study is that the sample size is small. For this reason, the results may not be generalizable to similar population groups within the Eastern region. Additionally, being a cross-sectional study, causality cannot be determined. It is important to note however that this study applied appropriate methodological approaches. Therefore, the study findings are reliable and can inform ANC service improvement and provision efforts among adolescent mothers in the district.

# Conclusion

This study established that most (52%) adolescent mothers in Luuka district report late for their first ANC visit. Additionally, most do not receive all the recommended components of care. The study also established that: distance to nearest health facility, knowledge of obstetric pregnancy danger signs and knowledge of family planning methods were significant determinants of receipt of all the components of the ANC visit while adolescent mother's age, partner's age, having ever given birth, adolescent mother's decision maker on health care seeking, daily earnings and knowledge of obstetric pregnancy danger signs were significant determinants of timing of the first ANC visit.

In light of the high burden of teenage pregnancy in the district, these findings highlight critical aspects which need to be paid attention to as interventions for improving utilization of ANC services among adolescent mothers in the district are being designed. Firstly, there is need to sensitize adolescent mothers, through different channels of media, on the benefits of ANC. Secondly, there is need to strengthen the capacity of public health facilities in the rural communities to operate from multiple locations as a means of bringing health services including ANC closer to adolescent mothers who are unable to reach the health facilities for various reasons. This will significantly improve the timing and increase uptake of the antenatal care services among adolescent mothers. Finally, there is need to encourage the communities in the district about the need to offer social support to pregnant adolescent girls and what forms of social support to offer.

# Abbreviations

AMNEP

Adolescent Motherhood, Vulnerability Assessment, Maternal and Newborn Care Practices in Eastern Uganda

ANC

Antenatal Care

CAO

Chief Administrative Officer

DHO

District Health Officer

HIV

Human Immuno Virus

IPTp-SP

Intermittent Preventive Treatment with Sulphadoxine-pyrimethamine

MU-REC

Mildmay Uganda Research Ethics Committee

ODK

Open Data Kit

PPS

Probability Proportional to Size

SECA

Supporting Early Career Academics

STDs

Sexually Transmitted Diseases

TBA

Traditional Birth Attendant

UDHS

Uganda Demographic and Health Survey

UNCST

Uganda National Council of Science and Technology

WHO

World Health Organization

# Declarations

### Ethics approval and consent to participate

This study is part of a larger research project titled Adolescent Motherhood, Vulnerability Assessment, Maternal and Newborn Care Practices in Eastern Uganda (AMNEP). AMNEP study was approved by the Uganda National Council of Science and Technology (UNCST) under registration number HS1248ES and Mildmay Uganda Research Ethics Committee (MU-REC) under registration number 0811-2020. AMNEP study also received district clearance from the district health officer (DHO) and the chief administrative

officer (CAO) of Luuka district and sought written informed consent from participants prior to enrolling them into the study.

## Consent for publication

Not applicable

## Competing interests

The authors declare that they have no competing interests

# Funding

# Authors' contributions

The manuscript is a part of VK's final year Master of Science in Population and Reproductive Health thesis supervised by AK and PN. The manuscript is also part of a larger research project – AMNEP; whose principal investigators are AK and PW and on which VK is a graduate fellow. VK carried out the study, did the data analysis and interpretation of the results and wrote the draft manuscript. AK and PN guided the writing of the manuscript. Together with PW and RW, AK and PN were also involved in reviewing, editing and finalizing the manuscript. The final version of the manuscript was read and approved by all the authors.

# Acknowledgements

## Availability of data and materials

The dataset used and analyzed during the current study is available from the Principal Investigator (AK) on reasonable request.

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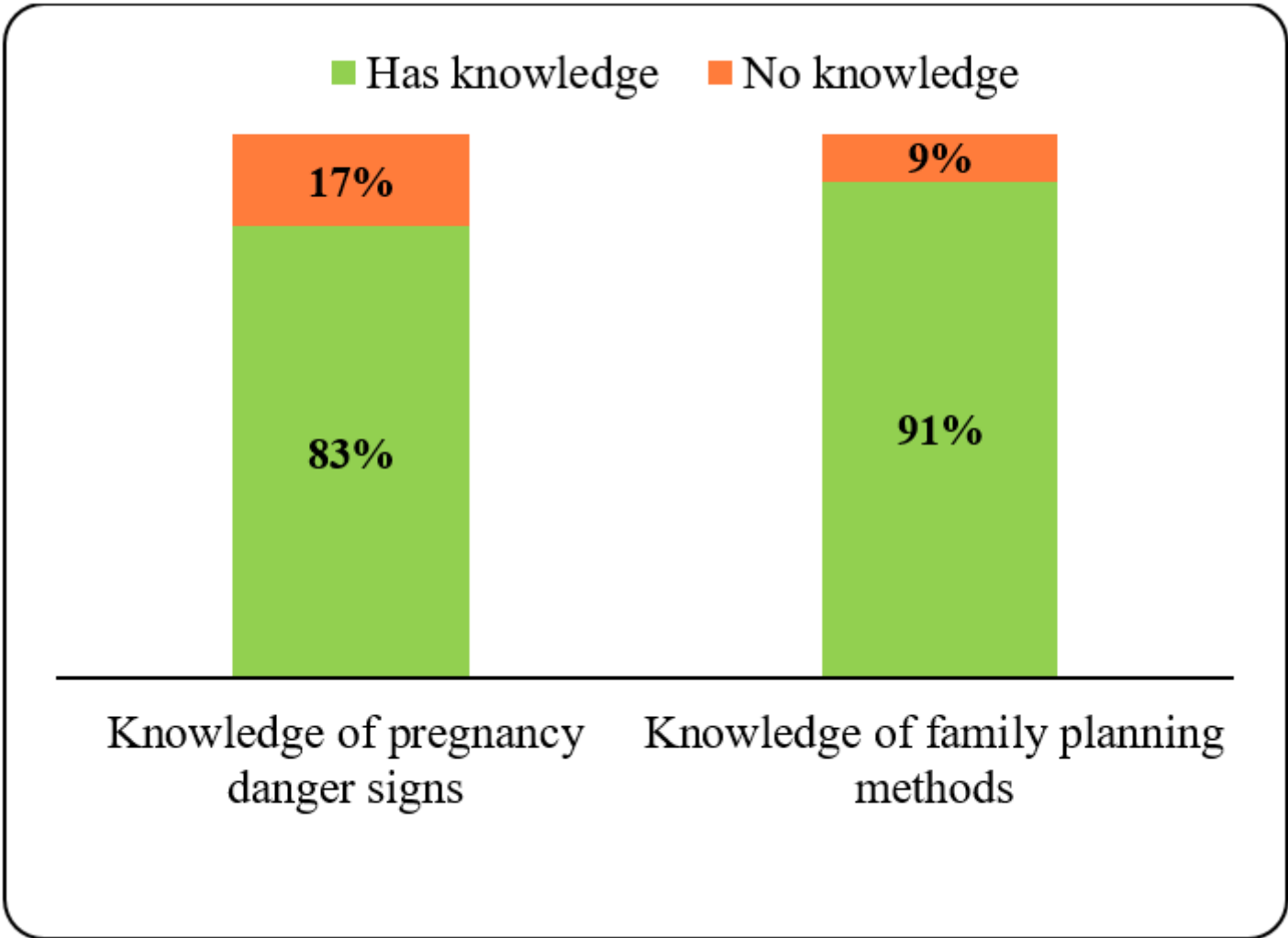
# Figures

**Figure 1**

Knowledge about pregnancy danger signs and family planning methods
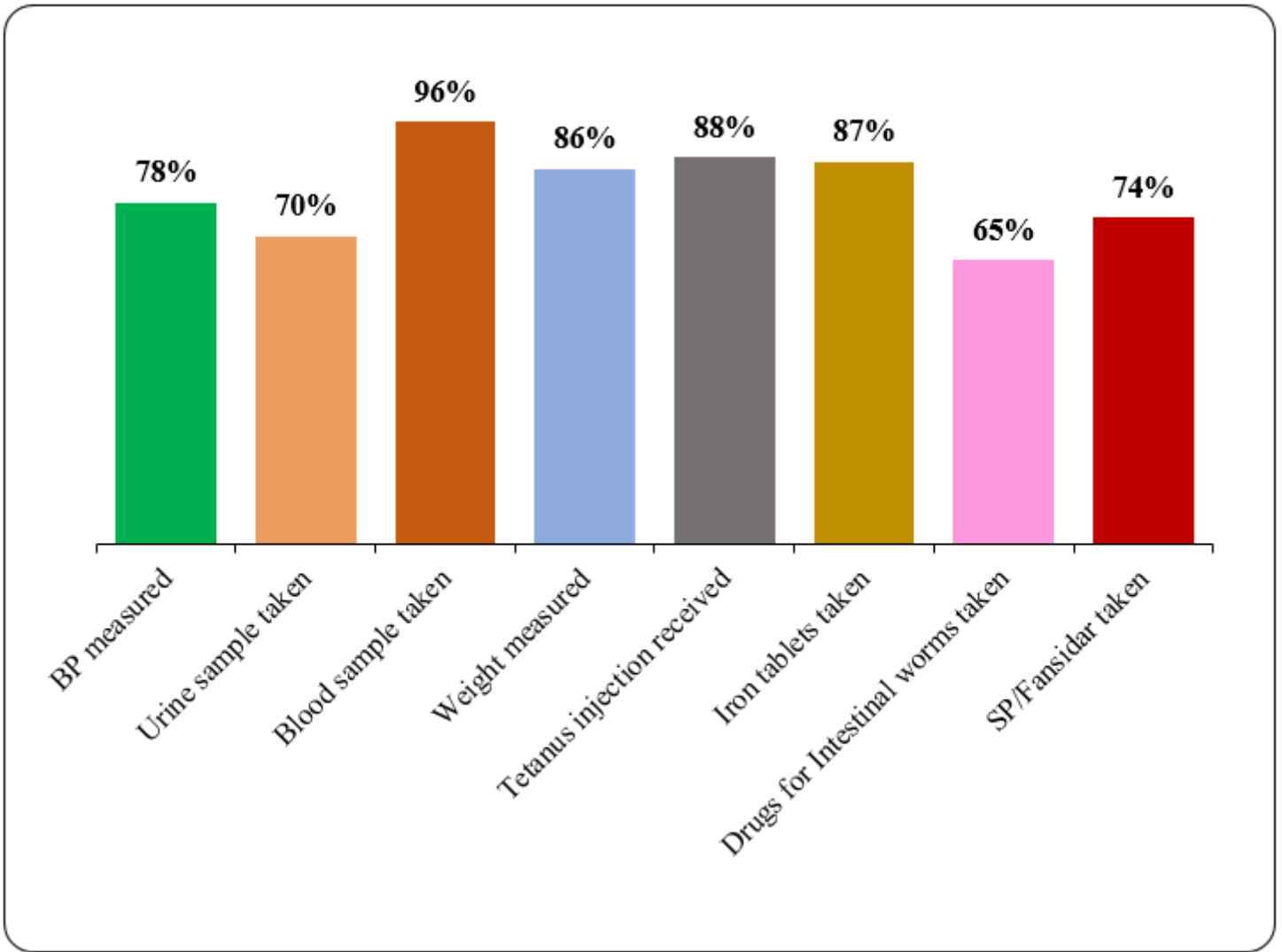
**Figure 2**

Percent of adolescent mothers who received each of the recommended components of care during ANC visits
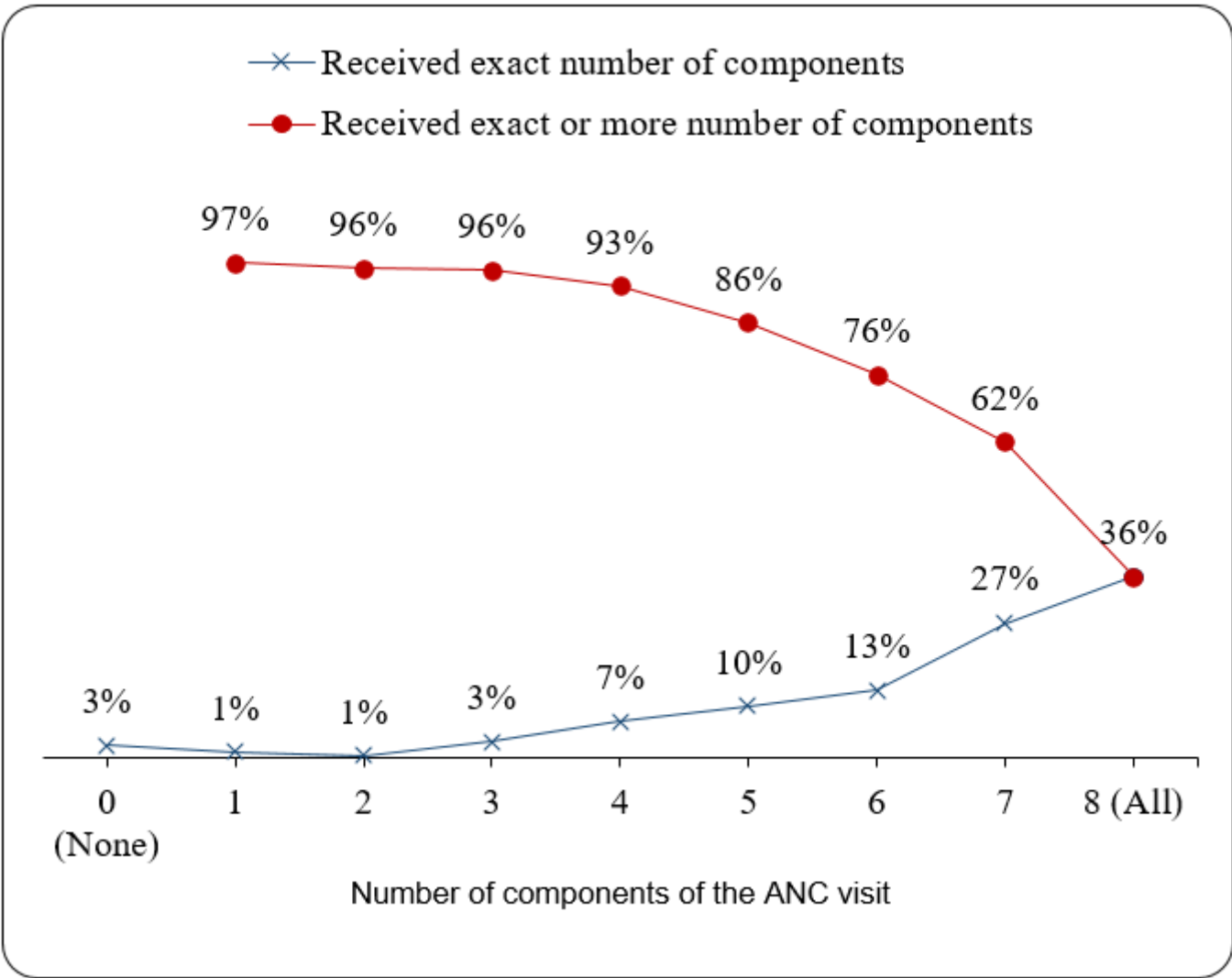
**Figure 3**

Percent distribution of adolescent mothers by number of recommended components of care received