Original Article

# First Trimester Antenatal Care Utilization and Associated Factors among Adolescent Mothers in Rwanda

Theogene Kubahoniyesu[1*,2], Clemence Nishimwe[3], Michael Habtu[4]

[1]*Public Health, College of Health Sciences, Mount Kenya University, Kigali, Rwanda*
[2]*African Center of Excellence in Data Science, College of Business and Economics, University of Rwanda, Kigali, Rwanda*
[3]*Nursing, College of Health Sciences, Mount Kenya University, Kigali, Rwanda*
[4]*Department of Community Health, School of Public Health, College of Medicine and Health Sciences, University of Rwanda, Kigali, Rwanda*

***Corresponding author:** Theogene Kubahoniyesu. Public Health, College of Health Sciences, Mount Kenya University, Kigali, Rwanda. Email:theogenek9@gmail.com

## Abstract

**Background**
First trimester antenatal care (ANC) initiation has been shown to improve the health outcomes for both mothers and unborn children. This study aimed at determining the prevalence of first trimester ANC use and associated factors among adolescent mothers in Rwanda.

**Methods**
This study was a cross-sectional study and analyzed the data of 6th Rwanda demographic and health survey (RDHS 2019-2020). Proportion, bivariate and multivariable analysis were employed to identify factors associated with first ANC use.

**Results**
The prevalence of first trimester antenatal care utilization among 354 adolescent mothers was 46%. Advanced age (AOR=1.82; 95%CI = 1.096-2.305), secondary education level (AOR=1.36; 95%CI = 1.080 - 1.960), coming to rich family (AOR = 2.10; 95%CI = 1.830 – 5.162), residing near health facility (AOR=1.17; 95%CI= 1.065 - 2.011), permitted to go to health facility (AOR=2.13; 95%CI = 1.857 – 3.363) were positively associated with ANC services use. However, the negative association was found with later pregnancy desire (AOR = 0.42; 95%CI = 0.149 – 0.781).

**Conclusion**
The prevalence of first trimester ANC was low. In view of that, more effort should be made to increase adolescent mothers' knowledge regarding the ANC services utilization and timely booking.

*Rwanda J Med Health Sci 2023;6(2):239-250*

**Keywords:** Antenatal care; Adolescent mothers; Prevalence; Rwanda

## Introduction

Maternal health has recently become a priority on the agenda of global public health, particularly in lower and middle income countries (LMIC), as the number of maternal and child deaths during pregnancy has steadily increased.[1] In 2017, it was reported that 295,000 mothers died as a result of pregnancy globally, with roughly 67% of those maternal deaths (196,000) being observed from Sub-Saharan Africa. Every year, adolescent pregnancies contribute to eight percent of all births globally.[2]

Pregnancy-related complications are the top risk factors of death among adolescent girls worldwide and are twice as likely to die during pregnancy and childbirth as those aged 20 years and above.[3] These complications among adolescent mothers' accounts for 99% of maternal deaths in low and middle income countries (LMC), in addition 3.9 million unsafe abortions that occur among adolescent girls contribute for maternal mortality and morbidity and as result, adolescent mothers are more likely to have premature infants with worrisome concentration in younger adolescents.[4] When it comes to unplanned pregnancy, adolescents face a significant challenge because they are relatively immature to handle pregnancy and are unprepared to raising children, which increases their risk of experiencing pregnancies related complications and adverse pregnancy outcomes, specifically, low birth weight, prematurity, eclampsia, neonatal, post neonatal, infant mortality, mental health and maternal deaths).[5]

ANC is essential reproductive care given to every pregnant woman to protect both her life and of her unborn child. ANC services provide pregnant women with a point of access to the healthcare system by offering appropriate screening, diagnostic tests, and treatment throughout pregnancy, as well as detecting the presence of pregnancy-related risks and complications as early as possible. Moreover, ANC is an opportunity to encourage the utilization of skilled attendance at birth and hygienic labor and delivery practices.[6,7] WHO antenatal care model recommends 8 standard ANC visits and estimates that the pregnant women should make the first. ANC visit first 3 months of pregnancy at the first visit, a health care professional performs a full physical examination, including weight and blood pressure checks, as well as a breast and pelvic examination, screening for cervical cancer and any sexually transmitted infections.[8]

Based on the study conducted , it is reported that 65% of pregnant women adhere to the recommended four routine visits.[9] Additionally, approximately 86% of these women have access to ANC provided by qualified healthcare providers at least once. [9] However, the utilization of ANC in sub-Saharan Africa (SSA) is comparatively lower than the global average. In 2019, more than half (52%) of the women in the region had at least 4 ANC visits, while around 13% of pregnant. women did not utilize ANC services, It is noteworthy that the utilization rate is relatively higher among women aged 25-34 years, reaching 53.9%.[10]

Health care services to adolescents have been said to be in particular poorly coordinated, which in addition to their biological immaturity, lack of knowledge on ANC, stigma, cultural beliefs, lack of family support and reduced decision-making autonomy, increase the risk to poor attendance for ANC among adolescent mothers.[2]

According to the 2019–20 Rwanda DHS, 98% of mothers had successfully attended one ANC visit, compared to 47% who fully completed the necessary 4 ANC visits. As women age, they are more likely to utilize perinatal care services compared to adolescent mothers. This trend can be attributed to various social and demographic disparities, including differences in education, employment, income, residential location, regional variations, and previous pregnancy experiences.[11]

Investigating ANC use among pregnant adolescent women in the first trimester may help identify discrepancies and impediments and provide practical ways to ANC service utilization increase. Thus, the purpose of this research was to indicate the factors linked to the first ANC utilization among adolescent mothers in Rwanda using Rwanda. Demographic and housing survey of 2019-2020.

## Methods and Materials

### Study design and sampling method

This research used a cross-sectional study design utilizing the data from RDHS 2019-2020. A cross-sectional study refers to the observational study design through which a researcher measures the both exposure and outcome.[12]

The sample for this study were 354 adolescent women identified from the recent DHS of 2019-2020. RDHS employed a multi-stage sampling technique to enable the estimation of national indicators. In that survey, households were selected at each sample point to achieve an optimal sample size of 13,000 households. From these households, only adolescent mothers with live births were included in our study.

The dataset of RDHS (2019-2020) was requested from DHS Program through the website (www.dhsprogram.com). The extracted data were socio-demographic characteristics of eligible participants, the maternal factors and institution-based factors which were assessed to explore their association with ANC utilization among adolescent mothers during the first trimester of pregnancy.

### Data analysis

The researcher downloaded RDHS dataset in STATA format. The dataset undergone data cleaning, weighting and analysis using STATA version 17. To ensure the representativeness of the sample, it was weighted throughout the Analysis; weighted variable (v005/1000000) was created, using STATA commands. Descriptive analysis was done to describe the respondents' characteristics and prevalence of ANC; Bivariate analysis was conducted to analyze the association of independent variables such as socio-demographic characteristics of respondents, maternal and institutional based information with the utilization of first trimester ANC service as an outcome variable. Logistic regression was used to control the confounding variables in reduced model and adjusted odds ratio were constructed with significant independent variables. The findings were presented using tables, graphs and charts.

### Ethical consideration

The DHS survey protocol is approved by ICF IRB which ensures that the survey is conducted in accordance with ethical standards and that the human rights are protected. The ICF IRB assesses the participant privacy, informed consent procedures, data protection, and any potential risks associated with the survey.

## Results

### Socio-demographic and maternal characteristics of adolescent mothers

In the study of 354 adolescent mothers, the results as indicated in (Table 1) show that the average age was 17.1 years. A majority (66.4%) had completed at least primary education, while 3.1% did not attend school. Most respondents (85.3%) had never been in a union, with 8% having separated from their husbands. Approximately 47.2% identified as Protestant, 34.7% as Catholic, and 4.9% followed other religions. The majority (83.9%) lived in rural areas, and 67.2% had a male household head. Wealth variation showed that 23.4% were from middle-income households, 23.2% from the poorest households, and only 15.8% from the richest families. Limited access to media was observed, with 39.8% having a radio and 10.7% having a television. Around 80% of respondents had health insurance coverage.The findings also revealed that a significant proportion (62.4%) had their first sexual intercourse between the ages of 15 and 17. The majority of households (69.5%) where these mothers lived had one child under the age of five, while 4.8% had more than three children in that age group. Approximately 3.7% of the respondents had experienced a terminated pregnancy, and 82.5% had made efforts to avoid pregnancy. Around 49.2% of the respondents desired the pregnancy but at a later time, while only 6.2% did not desire to become pregnant at all.

The majority (64.4%) reported having only one lifetime sexual partner, while 5.4% had more than three partners. Most respondents (78.5%) did not find distance to the health facility to be a significant problem, and 96% indicated that they could easily obtain permission to access healthcare. However, 46.9% expressed challenges in affording medical treatment without individual or family support.

**Table 1. Socio-demographic and maternal characteristics of adolescent mothers**

| Socio-demographic characteristics | Frequency (n=354) | Percent (%) |
|---|---|---|
| **Age of respondent** | | |
| 15 | 62 | 17.5 |
| 16 | 74 | 20.9 |
| 17 | 72 | 20.3 |
| 18 | 58 | 16.4 |
| 19 | 88 | 24.9 |
| **Education Level** | | |
| No education | 11 | 3.1 |
| Primary | 235 | 66.4 |
| Secondary | 108 | 30.5 |
| **Marital Status** | | |
| Never in union | 302 | 85.3 |
| Married | 1 | 0.3 |
| Living with partner | 48 | 13.6 |
| Separated | 3 | 0.8 |
| **Religion** | | |
| Catholic | 123 | 34.7 |
| Protestant | 167 | 47.2 |
| Adventist | 47 | 13.3 |
| Muslim | 14 | 4 |
| Jehovah witness | 1 | 0.3 |
| No religion | 2 | 0.6 |
| **Residence area** | | |
| Urban | 57 | 16.1 |
| Rural | 297 | 83.9 |
| **Household head sex** | | |
| Male | 238 | 67.2 |
| Female | 116 | 32.8 |
| **Wealth status** | | |
| Poorest | 82 | 23.2 |
| Poorer | 75 | 21.2 |
| Middle | 83 | 23.4 |
| Richer | 58 | 16.4 |
| Richest | 56 | 15.8 |
| **Have a Radio** | | |
| No | 213 | 60.2 |
| Yes | 141 | 39.8 |
| **Have a Television** | | |
| No | 316 | 89.3 |
| Yes | 38 | 10.7 |
| **Have a health insurance** | | |
| No | 71 | 20.1 |
| Yes | 283 | 79.9 |
| Less than 15 | 17 | 4.8 |
| Between 15-17 | 221 | 62.4 |
| Between 17-19 | 116 | 32.8 |
| **Number of under 5 children in the household** | | |
| 0 | 29 | 8.2 |
| 1 | 246 | 69.5 |
| 2 | 62 | 17.5 |
| 3 | 13 | 3.7 |
| 4 | 3 | 0.8 |
| 5 | 1 | 0.3 |
| **Ever had a terminated pregnancy** | | |
| Yes | 13 | 3.7 |
| No | 341 | 96.3 |
| **Pregnancy desire** | | |
| Then | 158 | 44.6 |
| Later | 174 | 49.2 |
| No more | 22 | 6.2 |
| **Life time sexual partners** | | |
| 1 | 228 | 64.4 |
| 2 | 78 | 22 |
| 3 | 29 | 8.2 |
| More than 3 | 19 | 5.4 |
| **Ever tried to avoid pregnancy** | | |
| No | 62 | 17.5 |
| Yes | 292 | 82.5 |
| **Distance to health facility** | | |
| Big problem | 76 | 21.5 |
| No problem | 278 | 78.5 |
| **Permission to go to health facility** | | |
| Big problem | 14 | 4 |
| No problem | 340 | 96 |
| **Health facility visited** | | |
| Yes | 87 | 24.6 |
| No | 58 | 16.4 |
| **Family support for health care services** | | |
| Big problem | 166 | 46.9 |
| No problem | 188 | 53.1 |

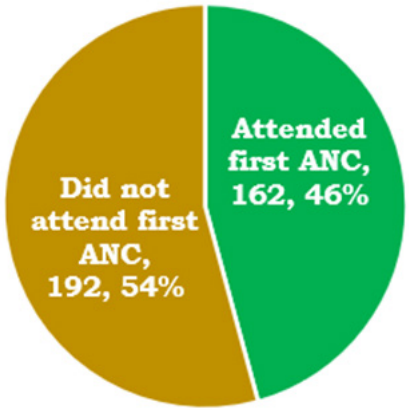
Source: Author's analysis of RDHS

**Table1**

Source: Author's analysis of RDHS

**Prevalence of first ANC utilization among adolescent mothers in Rwanda**

According to the findings, out of 354 adolescent mothers, 162 (46%) sought their first antenatal care (ANC) visits during the first trimester of their pregnancy, while the remaining 192 (54%) did not attend their first ANC visit during this period. (Figure 1)




Source: Author's analysis of RDHS 2019-2020

**Figure 1. Prevalence of ANC services among adolescent mothers in the first trimester of pregnancy**

**Socio-demographic factors associated with the first ANC utilization among adolescent mothers.**

The results as indicated in (Table 2) showed the association of socio-demographic variables of adolescent mothers with their first antenatal care utilization. The mean age of adolescent mothers who attended ANC visits during the first trimester was 17.7 years (SD = 0.84), whereas the participants who did not attend had a lower mean age of 16.3 years (SD = 1.08). This age difference was found to be statistically significant (P < 0.001). Education level emerged as a crucial factor in ANC utilization. Among adolescent mothers with no education, only 27.3% attended ANC visits during the first trimester, while a higher percentage (72.7%) did not. This difference was highly significant (P < 0.001). Wealth status was also significantly associated with ANC utilization. Among the poorest adolescent mothers, 45.9% did not attend ANC visits during the first trimester, compared to 54.1% who did attend.

**Table 2. Social demographic factors that are linked to the utilization of ANC services among adolescent mothers during the first trimester of pregnancy**

| Variables | first Trimester ANC Visit Utilization | | P-Value |
|---|---|---|---|
| | Attended (%) | Did not attend (%) | |
| **Age of responden** | | | |
| Mean ± SD | 17.7 ± 0.84 | 16.3 ± 1.08 | **<0.001** |
| **Education Level** | | | |
| No formal education | 72.7 | 27.3 | |
| Primary | 54.9 | 45.1 | **<0.001** |
| Secondary | 51.4 | 48.6 | |
| **Marital Status** | | | |
| Single | 44.4 | 55.6 | |
| Married | 59.3 | 40.7 | 0.237 |
| Separated | 72.2 | 27.8 | |
| **Religion** | | | |
| Catholic | 50.8 | 49.2 | |
| Protestant | 58.0 | 42.0 | 0.595 |
| Adventist | 47.8 | 52.2 | |
| Others | 64.3 | 35.7 | |
| **Residence area** | | | |
| Urban | 47.8 | 52.2 | 0.368 |
| Rural | 56.1 | 43.9 | |
| **Household head sex** | | | |
| Male | 57.2 | 42.8 | 0.158 |
| Female | 49.1 | 50.9 | |
| **Wealth status** | | | |
| Poorest | 54.1 | 45.9 | |
| Poorer | 49.3 | 50.7 | |
| Middle | 60.0 | 40.0 | **0.036** |
| Richer | 46.5 | 53.5 | |
| Richest | 61.8 | 38.2 | |
| **Have a Radio** | | | |
| Yes | 55.1 | 44.9 | **0.009** |
| No | 53.2 | 46.8 | |
| **Have a Television** | | | |
| Yes | 64.1 | 35.9 | 0.300 |
| No | 52.6 | 47.4 | |
| **Have a health insurance** | | | |
| Yes | 56.3 | 43.7 | 0.170 |
| No | 47.2 | 52.8 | |

Source: Author's analysis of RDHS

This difference was statistically significant (P = 0.036), indicating that socioeconomic factors, particularly wealth status, play a role in determining ANC utilization among adolescent mothers in Rwanda. Regarding media access, adolescent mothers who had a radio demonstrated a higher ANC attendance rate (55.1%) compared to those without a radio (53.2%). This difference was found to be statistically significant (P = 0.009).

However, some variables were not found to be statistically significant in relation to first trimester ANC utilization. Marital status, religion, residence area (urban or rural), household head sex (male or female), presence of a television, and possession of health insurance did not show significant associations with ANC attendance.

**Maternal and instructional factors influencing ANC utilization among adolescent mothers**

The influence of maternal and institutional factors on first antenatal care utilization among adolescent mothers in Rwanda was assessed and the results are presented in. (Table 3)

The results revealed that age at first sex did not show a statistically significant association with ANC utilization during the first trimester. Regardless of whether adolescent mothers had their first sexual experience before the age of 15, between the ages of 15-17, or at 17 or older, the proportions of ANC attendees and non-attendees were similar.

**Table 3. Maternal and instructional factors influencing ANC utilization among adolescent mothers**

| Variables | First Trimester ANC Visit Utilization | | |
|---|---|---|---|
| | Attended (%) | Did not attend (%) | P-Value |
| **Age at First Sex** | | | |
| Less than 15 | 50.0 | 50.0 | |
| Between 15-17 | 53.8 | 46.2 | 0.633 |
| More than 17 | 56.3 | 43.7 | |
| **Number of under 5 children in the household** | | | |
| 0 | 54.3 | 45.7 | |
| 1 | 85.2 | 14.8 | **0.006** |
| 2 | 44.4 | 55.6 | |
| 3 and more | 53.9 | 46.1 | |
| **Ever had a terminated pregnancy** | | | |
| Yes | 64.3 | 35.7 | 0.448 |
| No | 53.9 | 46.1 | |
| **Pregnancy desire** | | | |
| Then | 62.7 | 37.3 | |
| Later | 49.1 | 50.9 | |
| No more | 38.1 | 61.9 | **0.016** |
| **Life time sexual partners** | | | |
| 1 | 55.1 | 44.9 | |
| 2 | 59.7 | 40.3 | 0.305 |
| 3 | 41.3 | 58.7 | |
| More than 3 | 54.4 | 45.6 | |
| **Ever tried to avoid pregnancy** | | | |
| Yes | 38.6 | 61.4 | **0.013** |
| No | 57.7 | 42.3 | |
| **Distance to health facility a problem** | | | |
| Yes | 47.9 | 52.1 | **0.020** |
| No | 55.1 | 44.9 | |
| **Difficulty to get permission to go to health facility** | | | |
| Yes | 46.6 | 53.4 | **0.041** |
| No | 45.1 | 54.9 | |
| **Difficult to get money for medical treatment** | | | |
| Yes | 50.6 | 49.4 | 0.178 |
| No | 57.8 | 42.2 | |

The Number of under 5 children in the household emerged as a significant factor influencing ANC utilization. Adolescent mothers living in households with one under 5 child had a significantly higher ANC attendance rate (85.2%) compared to those living in households with no under 5 children (54.3%). Pregnancy desire showed a significant association with ANC attendance. Adolescent mothers who desired to become pregnant at some point in their lives had a higher ANC attendance rate (62.7%) compared to those who desired to become pregnant later or no longer desired any more pregnancies.

Adolescent mothers who reported having tried to avoid pregnancy had a lower ANC attendance rate (38.6%) compared to those who did not report trying to avoid pregnancy (57.7%).

Adolescent mothers who reported distance to health facility as a problem had a slightly lower ANC attendance rate (47.9%) compared to those who did not report distance as a problem (P = 0.020).

Adolescent mothers who reported difficulty in obtaining permission had a slightly lower ANC attendance rate (46.6%) compared to those who did not report difficulty (P = 0.041). This highlights the importance of addressing societal and cultural barriers that may hinder adolescent mothers' ability to access ANC services.

**Multivariable analysis for factors associated with first ANC among adolescent mothers.**

**Table 4. Multivariable analysis for factors associated with antenatal care utilization among adolescent mothers during the first trimester of pregnancy**

| Variables | First Trimester ANC Visit Utilization | | | |
|---|---|---|---|---|
| | AOR | [ 95% conf. interval] | | P-Value |
| **Age** | 1.82 | 1.096 | 2.305 | **0.013** |
| **Education level** | | | | |
| No formal education | 1* | | | |
| Primary | 1.49 | 0.614 | 2.113 | 0.343 |
| Secondary | 1.36 | 1.080 | 1.960 | **0.027** |
| **Wealth status** | | | | |
| Poorest | 1* | | | |
| Poorer | 0.82 | 0.394 | 1.592 | 0.514 |
| Middle | 1.34 | 1.064 | 1.721 | **0.045** |
| Richer | 0.81 | 0.348 | 1.843 | 0.601 |
| Richest | 2.10 | 1.830 | 5.162 | **0.012** |
| **Pregnancy desire** | | | | |
| Then | 1* | | | |
| Later | 0.64 | 0.383 | 1.073 | 0.091 |
| No more | 0.42 | 0.149 | 0.781 | **0.001** |
| **Distance to health facility a problem** | | | | |
| Yes | 1* | | | |
| No | 1.17 | 1.065 | 2.011 | **0.000** |
| **Difficult to get permission to go to health facility** | | | | |
| Yes | 1* | | | |
| No | 2.13 | 1.857 | 3.363 | **0.008** |

Source: Author's analysis of RDHS

The results from multivariate analysis indicated the following as the significant factors associated with first ANC utilization among adolescent mothers in Rwanda. The odds of receiving the first ANC increased by 1.82 times for every unit rise in adolescent's mother's age (AOR=1.82; 95%CI = 1.096-2.305, p=0.013). The respondents with secondary education were 36% more likely to use the first ANC than those with no formal education (AOR =1.36; 95% CI = 1.080 - 1.960, p=0.027). The adolescent mothers with wealthy family, either middle or richest increased the likelihood for utilizing the first ANC by 1.3 and 2.1 times (AOR =1.3; 95% CI = 1.064 - 1.721, p = 0.045); (AOR= 2.1; 95% CI = 1.830 – 5.162, p = 0.012) respectively comparing to those from poorest households.

Adolescent mothers who expressed a lack of desire for pregnancy were 0.42 times likely to attend their first ANC (AOR= 0.420; 95% CI = 0.149 – 0.781, p=0.001) than those who desired pregnancy. Furthermore, participants who had convenient access to a health facility had 1.17 times higher odds to attend their first ANC (AOR=1.17; 95% CI = 1.065 - 2.011, p=0.000). Those who had permission to seek healthcare were 2.1 times highly likely to attend their first ANC (AOR = 2.1; 95% CI = 1.857 – 3.363, p=0.008) compared to those who faced challenges obtaining permission to access healthcare facilities. (Table 4)

## Discussion

The study sought to ascertain the use of first ANC among adolescent mothers aged less than 20 years in Rwanda. Prior researches that explored the factors linked to ANC utilization among all women generally paid little attention to the prevalence of first ANC utilization among adolescent mothers and associated factors.

In this study, we found that out of the 354 adolescent mothers identified with a live child in the five years prior to survey period, 46% of them had attended the first antenatal care visit during the first trimester of pregnancy while 54% did not attend their first ANC visit during the first trimester of pregnancy. It is worth noting that this prevalence is slightly higher than the national prevalence of ANC attendance among adolescent mothers attended at least one ANC (43.6%). It is important to highlight that our study specifically focused on the first trimester, regardless of their subsequent attendance in the later trimesters of pregnancy.[11] This result is almost similar to what was observed from the study conducted in Uganda which found that 47% of adolescent mothers completed the first ANC visit during the first trimester of gestation period.[13] This prevalence was also higher than that of Bangladesh (34.1%), This difference can be attributed to the efforts made by Rwanda to enhance awareness among pregnant women about the benefits of ANC utilization.[14]

Age of adolescent mother was found to be associated with her attendance to first trimester ANC utilization, with every year increase in adolescent mother's age being associated with around twofold likelihood to attend the first trimester ANC. This concurred with the study conducted in South Africa on 272 adolescent mothers which showed that an increase of adolescent mother's age increases with 2.11times the chance to attend the first trimester ANC visit. [15] A meta-analysis of demographic and health surveys of 29 countries showed that the more a woman becomes an adult the more she attends the proposed ANC visits (AOR 1.260; 95% CI 1.106, 1.435).[2] This observation may be attributed to the fact that in addition to what most mothers face as setbacks, [16] adolescents have to contend with stigma from society and health providers for early pregnancy, and limited freedom to access finances, as well as lack of family support to visit ANC. [17–20]

According to this study, results revealed that adolescent women who had completed secondary had 1.36 odds to attend their first trimester ANC visit in contrast to those who had no formal education (AOR=1.36, 95%CI: 1.080 - 1.960, p=0.027).

These results are aligned with result from Nigeria, which reported that educated adolescent mothers had 1.54 odds to attending their first trimester ANC visit (AOR = 1.54; CI = 1.14–2.08).[21] Another study conducted in 29 low- and middle-income countries revealed that highly educated women were approximately 3 times as likely to utilize the first ANC visit as non-formally educated pregnant women (AOR 2.808; 95% CI 2.353–3.351). Similarly, The study conducted in Ethiopian to assess the determinants of ANC utilization among reproductive women discovered that women who completed their school had four times the likelihood of receiving the prescribed prenatal care as women who did not (AOR=4.4, 95%CI: 1.1, 17.3). [22] Increased use of ANC with education level, as explained in other studies,[23] is probably due to increased self-confidence, being more knowledgeable, and aware of benefits of ANC; and are likely to attend better health care facilities. There is therefore a need to ensure that all children who enter primary school complete the 12 years of basic education.[24,25]In addition, more effort should be made to increase information, education and communication dissemination in a focused manner targeting the pregnant adolescent girls.[5]

The utilization of first ANC services was found to have association with the socioeconomic status of the families of adolescent mothers. Our study indicated that belonging to a middle-income household increased the likelihood of attending the first ANC visit by 1.3 times, while coming from the wealthiest families increased the likelihood by 2 times compared to those from the poorest families. Similar results were revealed in a study in Nigeria, which confirmed that coming from a high-income family increased the chance of attending the first ANC visit during the first trimester of pregnancy by nearly 2 times (AOR = 1.88; CI = 1.45–2.43).[26] Furthermore, another study conducted in 29 low and middle income countries revealed that women from wealthier families had around 3 odds to commence first ANC visits (AOR 2.715; 95% CI 2.199, 3.352). Similarly, a study conducted in Ethiopia also confirmed that women in rich wealth quintile are twice as likely to start the ANC (AOR = 1.9,95%CI.: 1.1, 3.2).[22] This is not surprising given that attendance of ANC is associated with transport expenses and long waiting time, which are relatively prohibitive to low income earners, irrespective of waived user fees or use of health insurance.[27,28] The desire for pregnancy was identified as a significant factor associated with attendance at the first ANC visit. This study revealed that adolescent mothers who did not want to become pregnant had 0.42 likelihood to start the first ANC visit (AOR=0.420, 95%CI: 0.149 – 0.781, p=0.001) in contrast to those who desired pregnancy. The findings are consistent with a study conducted in Ethiopia, which found that adolescent women who indicated a desire for the pregnancy had more than twice the odds of attending the ANC visit during the first trimester.[29] As put forward by[29], the motivation to attend ANC among women who had a desire for pregnancy could be linked to their intent to keep their unborn healthy until delivery.

In this study, it was discovered that adolescent mothers who resided near a health facility had 1.17 odds to attend their first ANC visit in contrast to those who had to travel a long distance to access a health facility. (AOR=1.17, 95%CI: 1.065 - 2.011, p<0.001). This. finding is. similar to. the results from a study. conducted in. Nigeria, which reported that traveling a long distance had a negative influence on ANC. utilization among. adolescent. mothers (AOR = 0.61, CI = 0.49–0.75) .[26] Furthermore, a separate study conducted in South Africa supported these findings, demonstrating that a shorter distance to a health facility increased the odds. of. ANC utilization among. adolescent. mothers (AOR=3.38; 95%CI = 1.45-7.87). [30] The plausible explanation for this is that long distances are associated with indirect costs to the adolescent pregnant mother who is already struggling to provide for herself, thereby making it harder for her to visit ANC services due to lack of transport means.

Easily obtaining permission from guardians to visit a health facility boosted the likelihood of attending the first ANC during the first trimester of pregnancy by 2.1 times among young moms according to this study (AOR=2.1, 95%CI: 1.857 – 3.363, p=0.008) comparing to those who faced difficulties in obtaining permission. This similar finding was obtained with a study in Nigeria, which assessed ANC utilization and associated factors among adolescent mothers and found that respondents who had challenges in obtaining. permission to visit a health facility were hardly attending the first ANC visit in the first trimester of pregnancy (AOR = 0.75, CI = 0.57–0.99). [26] Lack of autonomy for adolescents to decide to visit ANC is unlikely to facilitate early visit possibly because more often than not it has implication of seeking financial support from those who decide on her behalf, and without whose consent it is not possible to effect ANC visit.[31] It can therefore be recommended that there is need for strengthening the strategies to empower adolescent pregnant women to be able to manage their own lives and make appropriate decisions with confidence. With ability to decide about use of finances, their health and family planning, and free movement, attendance at ANC is likely to improve considerably among them.

### Study limitation

The study considered the participants aged 15-19 years old considered in the RDHS survey of 2019-2020, the research was limited to female adolescent age group. The recall bias resulted from considering some months had passed since they were required to attend ANC services was another limitation to this study.

## Conclusion

This study aimed at finding out the utilization of ANC services during the first trimester of pregnancy among adolescent mothers in Rwanda. The results indicated that 46% of them started the first ANC visit in the first trimester of pregnancy, which reflects a relatively high utilization rate compared to the national prevalence of ANC among adolescent mothers who completed at least one ANC (43.6%). Several factors were identified as influencing the ANC utilization, including the age of the mother, level of education, wealth status, desire for pregnancy, proximity to the health facility, and permission to seek care from guardians. Older age, higher education, wealthier status, desired pregnancy, easier access to the health facility, and permission to visit the facility were all found to increase the chance of attending the first ANC visit. These findings underscore the importance of addressing socio-demographic factors and improving the accessibility of ANC services in order to enhance early utilization among adolescent mothers.

### Authors' contribution

The study was conceptualized by TK, who also designed the methods, did data analysis, and drafted the manuscript. MH and CN provided supervision for the study, made significant contributions to the research protocol design and participated in the review of the documents.

### Conflict of interest declaration

The authors declare that the research was conducted without any affiliations or associations that may give rise to conflicts of interest. They all reached a consensus to submit the study to the present journal, taking full responsibility for all aspects of the work, and granted their final approval for the publication of the manuscript.

## References


1. WHO. Pregnancy-related complications [Internet]. 2022 [cited 2023 Feb 15]. Available from: *https://www.who.int/teams/integrated-health-services/clinical-services-and-systems/surgical-care/pregnancy-related-complications*
2. Rahman M, Hossain F, Islam R, Jung J, Mahmud SR, Hashizume M. Equity in antenatal care visits among adolescent mothers: An analysis of 54 country levels trend and projection of coverage from 2000 to 2030. *J Glob Health*. 2022;12:04016.
3. Odejimi O, Bellingham-Young D. Teenage pregnancy in Africa: Trend and Determinants in the 21 st Century. *academia*. 2016;12–20.
4. Neal S, Mahendra S, Bose K, Camacho AV, Mathai M, Nove A. The causes of maternal mortality in adolescents in low and middle income countries : a systematic review of the literature. *BMC Pregnancy Childbirth* [Internet]. 2016; Available from: http://dx.doi.org/10.1186/s12884-016-1120-8
5. Fulpagare PH, Saraswat A, Dinachandra K, Surani N, Parhi RN, Bhattacharjee S, et al. Antenatal Care Service Utilization Among Adolescent Pregnant Women–Evidence From Swabhimaan Programme in India. *Front Public Heal*. 2019;7.
6. Tirsit Mehari A, Waju Beyene S, Negalign BB. Evaluation of the Quality of Antenatal Care (ANC) Service at Higher 2 Health Center in Jimma, South West Ethiopia. *Open Access Library Journal*. 2015;
7. Uwizeye D, Muhayiteto R, Kantarama E, Wiehler S, Murangwa Y. Prevalence of teenage pregnancy and the associated contextual correlates in Rwanda. *Heliyon*. 2020;6(10):e05037. https://doi.org/10.1016/j.heliyon.2020.e05037
8. WHO. WHO Recommendation on Antenatal Care for a Positive Pregnancy Experience: Summary Highlights and Key Messages from the World Health Organization's 2016 Global Recommendations for Routine Antenatal Care. *Lancet* [Internet]. 2018;387:1–10. Available from: https://apps.who.int/iris/bitstream/handle/10665/259947/WHO-RHR-18.02-eng.pdf
9. UNICEF. Antenatal Care [Internet]. 2022. Available from: *https://data.unicef.org/topic/maternal-health/antenatal-care/* Accessed in 23 July 2023
10. Adedokun ST, Yaya S. Correlates of antenatal care utilization among women of reproductive age in sub-Saharan Africa: evidence from multinomial analysis of demographic and health surveys (2010–2018) from 31 countries. *Arch Public Heal*. 2020;78:134. https://doi.org/10.1186/s13690-020-00516-w
11. RDHS. 6th Rwanda Demographic and Health Survey 2019-2020 (RDHS - VI). Kigali; 2020.
12. Setia MS. Methodology Series Module 3: Cross-sectional Studies. *Indian J Dermatol* [Internet]. 2016;16:261–4. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4885177/
13. Kayemba V, Kabagenyi A, Ndugga P, Wasswa R, Waiswa P. Timing and Quality of Antenatal Care Among Adolescent Mothers in a Rural Community, Uganda. *Adolesc Health Med Ther* [Internet]. 2023; 14:45–61. Available from: https://www.dovepress.com/timing-and-quality-of-antenatal-care-among-adolescent-mothers-in-a-rur-peer-reviewed-fulltext-article-AHMT
14. Ahmed MS. Trend in the utilization of antenatal care during pregnancy among the adolescents in Bangladesh: Evidence from national survey data 2012/2013 and 2019. *Lifestyle Med*. 2021;2 (3): e42. https://doi.org/10.1002/lim2.42
15. Gumboh E. Examining the application of deterrence in sentencing in Malawi. *Potchefstroom Electron Law J*. 2017;20. https://www.saflii.org/za/journals/PER/2017/49.html
16. Nyathi L, Tugli AK, Tshitangano TG, Mpofu M. Investigating the accessibility factors that influence antenatal care services utilisation in Mangwe district, Zimbabwe. *African J Prim Heal Care Fam Med*. 2017;9:3–7.
17. Smithbattle L. Walking on Eggshells: An Update on the Stigmatizing of Teen Mothers. *MCN Am J Matern Nurs*. 2020;45:322–7.

18. Kola L, Bennett IM, Bhat A, Ayinde OO, Oladeji BD, Abiona D, et al. Stigma and utilization of treatment for adolescent perinatal depression in Ibadan Nigeria. *BMC Pregnancy Childbirth*. 2020;20:1–8.
19. Pell C, Meñaca A, Were F, Afrah NA, Chatio S, Manda-Taylor L, et al. Factors Affecting Antenatal Care Attendance: Results from Qualitative Studies in Ghana, Kenya and Malawi. *PLoS One*. 2013;8.
20. Chaibva CN, Ehlers VJ, Roos JH. Audits of adolescent prenatal care rendered in Bulawayo, Zimbabwe. *Midwifery* [Internet]. 2011;27:e201–7. Available from: http://dx.doi.org/10.1016/j.midw.2010.07.009
21. Anaba EA, Alor SK, Badzi CD. Utilization of antenatal care among adolescent and young mothers in Ghana; analysis of the 2017/2018 multiple indicator cluster survey. *BMC Pregnancy Childbirth*. 2022;22: 544. https://doi.org/10.1186/s12884-022-04872-z
22. Tsegaye B, Ayalew M. Prevalence and factors associated with antenatal care utilization in Ethiopia: an evidence from demographic health survey 2016. *BMC Pregnancy Childbirth.* 2020;20 :528 https://doi.org/10.1186/s12884-020-03236-9
23. Prasad D. Antenatal care service utilization and contributing factors: a community based study in rural Belgaum, Karnataka, India. *IOSR J Dent Med Sci.* 2013;9:25–31.
24. UNAIDS, UNFPA, UNICEF, UN WOMEN W. International technical guidance on sexuality education [Internet]. *United Nations Educ. Sci. Cult. Organ. SDGs.* 2018. Available from: https://www.unfpa.org/sites/default/files/pub-pdf/ITGSE.pdf
25. Education M. of Republic of Rwanda ministry of education education sector strategic plan 2018/19 to 2023/24. *Sect Strateg Plan.* 2023; https://planipolis.iiep.unesco.org/sites/default/files/ressources/rwanda_esp_2018-19-2023-24.pdf
26. Alex-Ojei CA, Odimegwu CO. Correlates of antenatal care usage among adolescent mothers in Nigeria: a pooled data analysis. *Women Heal.* 2021;61:38–49.
27. Kruk ME, Mbaruku G, Rockers PC, Galea S. User fee exemptions are not enough: Out-of-pocket payments for "free" delivery services in rural Tanzania. *Trop Med Int Heal.* 2008;13:1442–51.
28. Manzi A, Munyaneza F, Mujawase F, Banamwana L, Sayinzoga F, Thomson DR, et al. Assessing predictors of delayed antenatal care visits in Rwanda: A secondary analysis of Rwanda demographic and health survey 2010. *BMC Pregnancy Childbirth.* 2014;14.
29. Alemu Y, Aragaw A. Early initiations of first antenatal care visit and associated factor among mothers who gave birth in the last six months preceding birth in Bahir Dar Zuria Woreda North West. *BMC Reproductive Health*. 2018;15:203. https://doi.org/10.1186/s12978-018-0646-9.
30. Worku EB, Woldesenbet SA. Factors that Influence Teenage Antenatal Care Utilization in John Taolo Gaetsewe (JTG) District of Northern Cape Province, South Africa: Underscoring the Need for Tackling Social Determinants of Health. *Int J Matern Child Heal AIDS*. 2016;5:134–45.
31. Imo CK. Influence of women's decision-making autonomy on antenatal care utilisation and institutional delivery services in Nigeria: evidence from the Nigeria Demographic and Health Survey 2018. *BMC Pregnancy Childbirth* [Internet]. 2022;22:1–12. Available from: https://doi.org/10.1186/s12884-022-04478-5