Knowledge, Attitudes, and Practices toward Antenatal Care among Pregnant Women in the City of Kigali

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Abstract: **This research study assessed knowledge, attitudes, and practices (KAP) toward antenatal care (ANC) among pregnant women attending Masaka, Muhima, and Kibagabaga District Hospitals in Kigali, Rwanda. Although ANC is vital for preventing complications during pregnancy, global and local gaps in adequate ANC attendance persist. In Rwanda, while nearly all pregnant women attend at least one ANC visit, less than half complete the recommended four visits. Using a cross-sectional design and systematic sampling, 420 women participated through structured face-to-face interviews. Results showed that 61.2% had adequate knowledge and 56.4% held positive attitudes toward ANC, yet only 23.1% demonstrated good practices. Women aged 26–40, those employed, and those making joint decisions with spouses were more likely to have better knowledge and attitudes. Secondary education was strongly linked to good practices. Despite generally good awareness and perceptions, actual ANC practices were inadequate. The study concludes that improving knowledge alone is insufficient; targeted interventions, improved service access, and promoting shared household decision-making are essential to increase full ANC attendance and enhance maternal and child health outcomes in Rwanda's urban settings.**

Keywords: **KAP, Antenatal Care, Pregnant Women, City of Kigali.**

I.   INTRODUCTION

Antenatal care (ANC) is a crucial health service provided to pregnant women by skilled healthcare professionals to enhance and maintain the health of both mothers and newborns throughout pregnancy. This service is mainly dedicated to promoting, preventing, early detecting, and managing pregnancy and birth-related complications (Tunçalp et al., 2017). Worldwide, the mortality rate among pregnant women, lactating mothers, and newborns remains unacceptably high. In 2020, approximately 287,000 women died during pregnancy or shortly after childbirth, equivalent to about 800 deaths per day (WHO, 2023). Women in low- and middle-income countries (LMICs), where the majority of maternal deaths occur from preventable causes, are disproportionately affected by maternal mortality (Ozimek & Kilpatrick, 2018). Sub-Saharan Africa had 545 maternal deaths per 100,000 live births in 2020, compared to only 4 in Australia and New Zealand. Additionally, 70% of global maternal fatalities occurred in sub-Saharan Africa (WHO, 2023). Despite high global awareness about antenatal care (ANC), KAP related to the ANC visits remain suboptimal.

In 2021, around 60% of pregnant women worldwide demonstrated adequate knowledge and a positive attitude by receiving at least four ANC visits. However, practices in Sub-Saharan Africa reflect significant gaps, with only 53% of expectant mothers practicing ANC visits (UNICEF, 2021). In Asian countries such as Pakistan, India, China, and Qatar majority of pregnant women demonstrated adequate knowledge about antenatal care (ANC) (Habte et al., 2024). However, the attitude towards ANC was very low, with only 38.43% in rural areas and 31% in urban areas exhibiting a positive attitude (Tabassam et al., 2020). Another study highlighted significant gaps in both the attitude towards and practice of ANC, where only 57.3% adhered to the recommended visits despite a high level of knowledge among 83.5% of women participants (Noh et al.,

2019). In India, a study revealed that almost all (96% and 98%) pregnant women had adequate knowledge and positive attitudes respectively with only 58.5% having good practices towards ANC (Bashir et al., 2023). Additionally, in China, while a significant proportion of women had good knowledge about ANC, the practices and attitudes were less than optimal, with only a small percentage of women adhering to the recommended frequency of ANC visits, demonstrating gaps in both attitude and practice (Hu et al., 2021).

In a study done in sub-Saharan Africa, the authors emphasized that healthcare providers need to be trained to provide culturally sensitive and patient-centered care to meet the diverse needs of pregnant women (Babalola & Moodley, 2020). A study in South Africa revealed that the way pregnant women behave toward antenatal care is significantly influenced by their knowledge and prior experiences with healthcare services (Drigo et al., 2020). In Eritrea, although a majority of mothers exhibited high levels of knowledge (84.1%) and positive attitudes (99%) toward antenatal care (ANC), their practice of ANC was notably poor, with only 45% adhering to recommended practices (Gebremariam et al., 2023). In Sudan, a study emphasized that the awareness, behaviors, and actions of healthcare providers significantly impact the quality of antenatal care services provided to pregnant women. This underscores the crucial role that healthcare providers' knowledge, attitudes, and practices play in ensuring the effective utilization of antenatal care by pregnant women (Al-Kasseh et al., 2022).

Locally, significant progress has been made by the Rwandan government in the improvement of maternal and child health outcomes. However, despite advancements in maternal health initiatives, some areas, even in urban settings, still face disparities in understanding and practicing ANC services. In 2020, the Rwanda DHS found that while 98% of pregnant women in Rwanda attend at least one ANC visit with a skilled provider, 47% had four or more contacts with skilled and this demonstrated that less than a half had adequate knowledge, attitudes, and practices regarding the importance of attending the recommended ANC (NISR, 2020).

The Rwandan maternal mortality rate was 203 per 100,000 live births, and the neonatal mortality rate was 19 per 1,000 live births and major causes include severe bleeding, infection, unsafe abortion, and high blood pressure during pregnancy (Schmidt et al., 2021). Enhanced understanding and positive attitudes toward ANC and appropriate practices are crucial for ensuring timely and adequate care, ultimately reducing maternal and neonatal mortality (WHO Africa, 2023). This study aimed to assess the knowledge, attitudes, and practices (KAP) toward antenatal care among pregnant women attending public hospitals in the City of Kigali, Rwanda. The results of this study could be utilized to create interventions that enhance the use of antenatal care in urban areas of Rwanda.

II. METHODOLOGY

Research Design

For this study, we have chosen a cross-sectional research design. This design involves collecting data from a diverse group of individuals at a single point in time, allowing for the observation and analysis of variables without any influence or manipulation (Thomas, 2020).

Research Area

This study was conducted in Muhima, Masaka, and Kibagabaga District Hospitals of the city of Kigali. The City of Kigali, the capital of Rwanda, is situated at the geographical center of the country. Covering an area of 730 km², it lies at a latitude of 1°58' S and a longitude of 30°07' E.

Target Population

The study was conducted on pregnant women aged between 15 and 49 years attending Masaka, Muhima, and Kibagabaga District Hospitals of Kigali City either before or after giving birth and are exclusively from the city of Kigali, the capital of Rwanda.

Sample Design

Determination of Sample Size

The calculation of sample size was based on Fisher's formula which is expressed as:

$n = \frac{Z^2.p.(1-p)}{E^2}$, n = 382 pregnant women, where **n** is the required sample size, **Z** is the Z-score associated with the desired 95% confidence level (often obtained from normal distribution tables, and Z-score is 1.96, which represents the critical

value for a 95% confidence interval), **P** is an estimated proportion or probability of an event occurring in the population (prevalence of antenatal care attendance in Kigali city is 46.2%), and **E** is an acceptable margin of error (expressed as a proportion, such as 0.05 for a 5% margin of error). By adding 10% of the required sample size to cover non-respondent subjects, the sample size used totaled 420 participants.

Sampling Technique

In this study, a systematic sampling technique was employed to ensure a representative sample. The sample size was allocated proportionally across hospitals using the population of the sample size. Specifically, 23% in Kibagabaga DH from Gasabo District, 41% in Muhima DH from Nyarugenge District, and 36% in Masaka DH from Kicukiro District.

Table 1: Showing A Proportional Sampling Across Hospitals Used in the Study

Hospital	Population size (N)	Sample size(n)
Masaka DH	735	36% (151)
Muhima DH	838	41% (172)
Kibagabaga DH	467	23% (97)
Total	2,040	420

This deliberate selection strategy aimed to collectively represent the diverse knowledge, attitudes, and practices of pregnant women towards ANC in the City of Kigali catchment area.

Data Collection Methods

Data Collection Instruments

Data was collected and answers were obtained from the participants using a structured questionnaire made of closed-ended questions. The questions were translated into Kinyarwanda and the participants who did not know how to read and write Kinyarwanda were assisted right away. The structured questionnaire helped to assess the socio-demographic profiles, knowledge, attitudes, and practices toward antenatal care as well as other factors influencing antenatal care utilization such as accessibility and quality of antenatal care services. The used questionnaire was adopted from other studies done in LMICs in which it was a bit modified to be comparable with the Rwandan context (Dusingizimana et al., 2023).

Procedures of Data Collection

Data was collected from term pregnant women, women with multiple pregnancies, and recently delivered women mothers who were present at Masaka, Muhima, and Kibagabaga DHs during data collection. A structured questionnaire was used in a face-to-face interview and given answers were written on the same questionnaire. Each respondent was offered a confidential code that was put on the questionnaire after signing a consent form.

III.   RESEARCH FINDINGS

Description of Clinical and Socio-demographics Characteristics

Respondents were requested to provide a socio-demographic profile, and the clinical characteristics are summarized in Table 2. This includes age, place of delivery, education, Religion, occupation, decision makers for ANC use, and clinical factors.

Table 2: Description of Socio-demographics and clinical characteristics (N=420)

Variables	Frequency(n)	Percentage (%)
Age in years		
<18	24	5.7
19-25	118	28.1
26-40	212	50.5
41+	66	15.7
Place of Delivery of the Last Baby		
Home	6	1.4
Hospital	410	97.6
Other	4	1

Education		
No education	174	41.4
Primary	82	19.5
Secondary	76	18.1
University	88	21
Religion		
Christian	142	33.8
Muslim	138	32.9
Others	140	33.3
Occupation		
Employed	257	61.2
Unemployed	163	38.8
Decision Maker for ANC Use		
Husband	141	33.6
Jointly with spouse	155	36.9
Others (In-laws)	124	29.5
Clinical Factors		
Gravidity		
1 (First pregnancy)	129	30.7
2 - 3	204	48.6
4 or more	87	20.7
Parity		
0 (No live births)	172	41
1 - 2	160	38.1
3 or more	88	21
Previous Pregnancy Complications		
Gestational diabetes	30	7.1
None	318	75.7
Other (please specify)	30	7.1
Pre-eclampsia	25	6
Preterm labor	17	4
Pre-existing Medical Conditions		
Diabetes	25	6
Hypertension	36	8.6
None	326	77.6
Other (please specify)	33	7.9
Family Planning Before Pregnancy		
Condoms	48	11.4
Intrauterine device (IUD)	79	18.8
None	174	41.4
Oral contraceptives	81	19.3
Other (please specify)	38	9

Source: Primary data

As in Table 2, the clinical and socio-demographic characteristics of the 420 participants reveal that the majority are aged 26-40 years (50.5%) with a high reliance on hospital-based deliveries (97.6%). Education levels vary, with 41.4% having no formal education, and a relatively high employment rate of 61.2%. Decision-making for antenatal care (ANC) is largely joint with spouses (36.9%). Clinically, nearly half (48.6%) have had 2-3 pregnancies, and 41% have no live births. Most

participants reported no previous pregnancy complications (75.7%) or pre-existing medical conditions (77.6%). Family planning methods are varied, with 41.4% using no contraception before pregnancy, highlighting the need for accessible reproductive health services.

Presentation of Findings

This section shows the levels of knowledge, attitudes, and practice related to antenatal care among pregnant women attending ANC in Urban Health facilities of Kigali.

Level of Knowledge regarding Antenatal Care

The distribution of knowledge related to ANC is presented in Table 3.

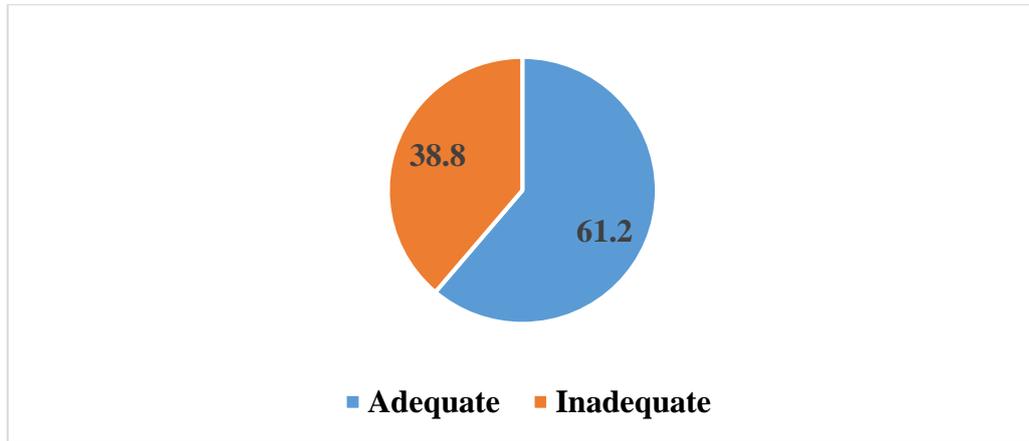**Table 3: Level of Knowledge regarding Antenatal Care**

Variables	Frequency(n)	Percentage (%)
Do you think ANC is valuable? (Yes)	207	49.3
Is it necessary to go for ANC even if o complications? (Yes)	192	45.7
Do you know when to start the first ANC visit? (Yes)	219	52.1
Do you think ANC can prevent complications? (Yes)	226	53.8
Do you believe pregnant women may have problems without ANC? (Yes)	210	50
Regular ANC promotes child growth. (Yes)	214	51
Starting ANC early is important? (Yes)	218	51.9
Do you know the recommended frequency of ANC visits? (Yes)	218	51.9
Optimum ANC? (Yes)	201	47.9
ANC regardless of complications? (Yes)	207	49.3
Tetanus Toxoid injection required during pregnancy? (Yes)	214	51
Are iron/Folic Acid supplements required? (Yes)	200	47.6
Is USG required to assess fetal well-being? (Yes)	214	51
Is weight measurement required at every ANC? (Yes)	220	52.4
Is BP measurement required at every ANC? (Yes)	210	50
Is hemoglobin test required during pregnancy? (Yes)	204	48.6
Knowledge of obstetric danger signs? (Yes)	188	44.8
What are the danger signs of pregnancy? (Yes)	215	51.2
What to do in case of danger signs? (Yes)	215	51.2
Is blood sugar test required during pregnancy? (Yes)	210	50

Source: **Primary data**

As given in Table 3, The level of knowledge of antenatal care (ANC) among participants shows a varied understanding of its importance and requirements. Almost half of the respondents (49.3%) believe that ANC is valuable, while 45.7% think it is necessary even in the absence of complications. A little over half (52.1%) know when to start the first ANC visit, and 53.8% recognize its role in preventing complications. Awareness of the benefits of regular ANC promoting child growth stands at 51%, and 51.9% acknowledge the importance of starting ANC early. Similarly, 51.9% know the recommended frequency of ANC visits, and 47.9% are aware of the concept of optimum ANC.

Regarding specific medical interventions during ANC, 51% believe tetanus toxoid injections are required, 47.6% understand the need for iron/folic acid supplements, 51% think ultrasounds are necessary to assess fetal well-being, and 52.4% recognize the importance of weight measurement at every ANC visit. Blood pressure checks and hemoglobin tests during pregnancy are acknowledged by 50% and 48.6% of participants, respectively, while 44.8% are knowledgeable about obstetric danger signs. Furthermore, 51.2% can identify pregnancy danger signs and know what actions to take, with 50% recognizing the need for blood sugar tests during pregnancy.

Level of knowledge regarding the antenatal care (n=420)

Figure 1: Level of knowledge

As indicated in Figure 1 Majority of the participants had adequate knowledge 61.2% while 38.8% had adequate knowledge.

Level of attitude regarding the antenatal care

Table 4 shows the levels of attitude related to antenatal care.

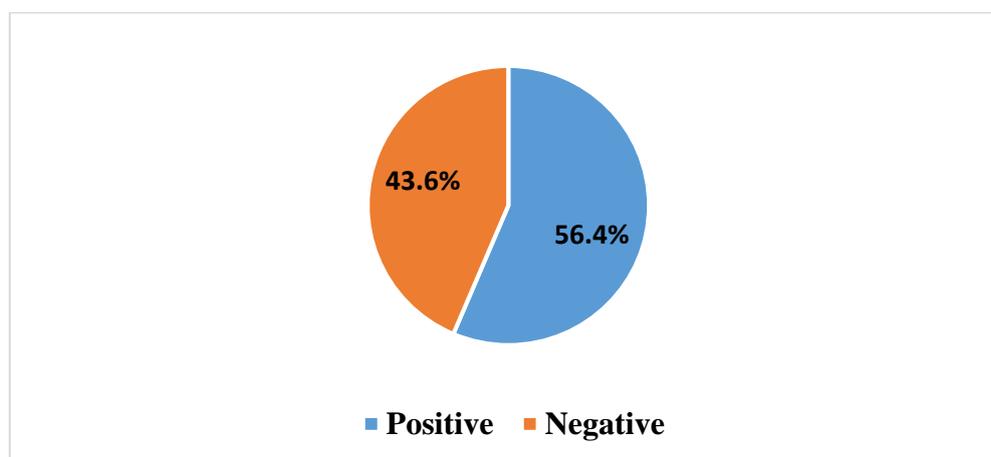**Table 4: Level of Attitude regarding the antenatal care**

Variables	Frequency (n)	Percentage (n)
Antenatal check-ups are necessary after pregnancy		
Strongly Disagree	81	19.3
Disagree	76	18.1
Neutral	88	21
Agree	97	23.1
strongly agree	78	18.6
Antenatal booking before the third month of pregnancy		
Strongly Disagree	80	19
Disagree	86	20.5
Neutral	85	20.2
Agree	79	18.8
strongly agree	90	21.4
Screening of blood for infections during ANC?		
Strongly Disagree	78	18.6
Disagree	75	17.9
Neutral	71	16.9
Agree	103	24.5
strongly agree	93	22.1
Dietary habits change during pregnancy		
Strongly Disagree	77	18.3
Disagree	88	21
Neutral	81	19.3
Agree	78	18.6

strongly agree	96	22.9
Taking iron & folic acid tablets		
Strongly Disagree	81	19.3
Disagree	73	17.4
Neutral	79	18.8
Agree	83	19.8
strongly agree	104	24.8
Follow-up decreases complications?		
Strongly Disagree	92	21.9
Disagree	72	17.1
Neutral	88	21
Agree	75	17.9
strongly agree	93	22.1
Is hospital delivery better than home?		
Strongly Disagree	84	20
Disagree	77	18.3
Neutral	86	20.5
Agree	88	21
strongly agree	85	20.2

Source: Primary data

The participants' attitudes towards antenatal care (ANC) reveal a diverse range of opinions. For antenatal check-ups, 23.1% agree and 18.6% strongly agree on their necessity, while 19.3% strongly disagree. Early ANC booking is favored by 21.4%, though 19% strongly disagree. Screening for infections during ANC is supported by 46.6%, while 36.5% oppose or remain neutral. Dietary changes during pregnancy and taking iron/folic acid tablets are also supported by 22.9% and 24.8%, respectively, though nearly 40% disagree or are neutral. Hospital delivery over home delivery is agreed upon by 41.2%, while 38.3% oppose this preference. Lastly, reliance on healthcare professionals for prenatal care has low strong support, with only 16% strongly agreeing and 26% strongly disagreeing.

Level of attitude regarding the antenatal care (n=420)

Figure 2 Level of attitude toward antennal care

As indicated in Figure 2 Majority of the participants had a positive attitude of 56.4% while 43.6% had a negative attitude**.**

Level of Practice Regarding Antenatal Care

Table 5 shows the levels of practice related to antenatal care.

Table 5: Level of practice regarding the antenatal care

Variables	Frequency(n)	Percentage (%)
Regular ANC		
No	217	51.7
Yes	203	48.3
The main factor for a regular visit		
Advised by Doctor	68	33.5
For care of Baby	71	34.9
To know about any medical problem	64	31.5
Reason for Irregular Visit		
Did not feel like	63	29
Family refusal	43	19.8
Not in station	53	24.4
Transport problem	58	26.7
First ANC visit duration		
2-3rd month	110	26.2
3-4th month	115	27.4
Between 1st and 2nd month	105	25
Other	90	21.4
Regular ANC visits		
No	217	51.7
Yes	203	48.3
Main factor regular visits		
Advised by doctor	68	33.5
For care of baby	71	35
To know about any medical problem	64	31.5
Number ANC visits		
Fifth times	56	13.3
Fourth times	87	20.7
More than fifth times	74	17.6
Once	69	16.4
Thrice	72	17.1
Twice	62	14.8
Number TT doses		
More than two	111	26.4
None	112	26.7
One	103	24.5
Two	94	22.4
Taking iron folic acid tablets		
No	196	46.7
Yes	224	53.3

Source: primary data

The level of practice regarding antenatal care (ANC) shows that 51.7% of participants did not attend regular ANC, while 48.3% did. The main reasons for regular visits were for baby care (34.9%) and advice from a doctor (33.5%). Irregular visits were due to lack of motivation (29%), transport issues (26.7%), and not being in the area (24.4%). Most first ANC visits occurred in the 3rd-4th month (27.4%). Regarding the number of ANC visits, 20.7% attended four times, while 17.6% attended more than five times. About 26.7% did not receive any Tetanus Toxoid (TT) doses, while 26.4% received more than two doses. For iron and folic acid supplementation, 53.3% took the tablets, while 46.7% did not.

Level of practice regarding the antenatal care (n=420)

Association of socio-demographics & clinical factors with the level of Knowledge toward antennal care

Association of socio-demographics & clinical factors with KAP of ANC care

Table 6. Shows the association of knowledge and socio-demographics & clinical factors.

Table 6: Association of socio-demographics & clinical factors with Level of Knowledge

Variables	Knowledge(N=420)		
	Poor, n (%)	Good, n (%)	p-value
Age in years			**0.0064***
<18	7(29.2)	17(70.8)	
19-25	43 (36.4)	75 (63.6)	
26-40	87 (41)	125 (59)	
41+	26 (39.4)	40 (60.6)	
Place of Delivery of the Last Baby			0.727
Home	3 (50)	3 (50)	
Hospital	159 (38.8)	251 (61.2)	
Other	1 (25)	3 (75)	
Education level			0.573
No education	61 (35.1)	113 (64.9)	
Primary	34 (41.5)	48 (58.5)	
Secondary	30 (39.5)	46 (60.5)	
University	38 (43.2)	50 (56.8)	
Religion			0.726
Christian	54 (38)	88 (62)	
Muslim	51 (37)	87 (63)	
Others	58 (41.4)	82 (58.6)	
Occupation			0.381
Employed	104 (40.5)	153 (59.5)	
Not employed	59 (36.2)	104 (63.8)	
Decision Maker for ANC Use			0.603
Husband	52 (36.9)	89 (63.1)	
Jointly with spouse	65 (41.9)	90 (58.1)	
Others (In-laws)	46 (37.1)	78 (62.9)	
Gravidity			0.347
1 (First pregnancy)	51 (39.5)	78 (60.5)	
2 - 3	84 (41.2)	120 (58.8)	
4 or more	28 (32.2)	59 (67.8)	
Parity			0.484
0 (No live births)	65 (37.8)	107 (62.2)	
1 - 2	59 (36.9)	101 (63.1)	
3 or more	39 (44.3)	49 (55.7)	

Source: Primary data

Table 7: Association of socio-demographics & clinical factors with Level of Knowledge cont.

Variables	Knowledge(N=420)		
	Poor, n (%)	Good, n (%)	p-value
Previous Pregnancy Complications			0.33
Gestational diabetes	16 (53.3)	14 (46.7)	
None	122 (38.4)	196 (61.6)	
Other (please specify)	8 (26.7)	22 (73.3)	
Pre-eclampsia	10 (40)	15 (60)	
Preterm labor	7 (41.2)	10 (58.8)	
Pre-existing Medical Conditions			0.066
Diabetes	13 (52)	12 (48)	
Hypertension	16 (44.4)	20 (55.6)	
None	116 (35.6)	210 (64.4)	
Other	18 (54.5)	15 (45.5)	
Family Planning Before Pregnancy			0.963
Condoms	17 (35.4)	31 (64.6)	
Intrauterine device (IUD)	33 (41.8)	46 (58.2)	
None	68 (39.1)	106 (60.9)	
Oral contraceptives	31 (38.3)	50 (61.7)	
Other (please specify)	14 (36.8)	24 (63.2)	

Source: Primary data

As indicated in Table 7, the bivariate analysis of socio-demographics and knowledge highlights that age was the only statistically significant factor influencing knowledge regarding antenatal care (p=0.0064). Participants aged 19-25 exhibited good knowledge in 63.6% of cases, while those aged 26-40 had 59% good knowledge. In contrast, participants under 18 showed the lowest proportion of good knowledge at 29.2%. No significant associations were found for other variables such as place of delivery, education level, religion, occupation, or gravidity, with all p-values exceeding the threshold of significance (p > 0.05). Therefore, age appears to be the most important factor in determining knowledge of antenatal care in this study.

Clinical & Socio-demographics factors associated with attitude towards antenatal care

Table 8. Shows the association of Attitude and socio-demographics & clinical factors.

Table 8: Association of socio-demographics & clinical factors with the **level of attitude**

Variables	Attitude		
	Negative, n (%)	Positive, n (%)	p-value
Age in years			0.431
<18	2 (8.3)	22 (91.7)	
19-25	11 (9.3)	107 (90.7)	
26-40	32 (15.1)	180 (84.9)	
41+	8 (12.1)	58 (87.9)	
Place of Delivery of the Last Baby			0.72
Home	1 (16.7)	5 (83.3)	
Hospital	51 (12.4)	359 (87.6)	
Other	1 (25)	3 (75)	
Education			0.837
No education	25 (14.4)	149 (85.6)	
Primary	9 (11)	73 (89)	
Secondary	9 (11.8)	67 (88.2)	

University	10 (11.4)	78 (88.6)	
Religion			0.583
Christian	21 (14.8)	121 (85.2)	
Muslim	17 (12.3)	121 (87.7)	
Others	15 (10.7)	125 (89.3)	
Occupation			**0.0282***
Employed	36 (14)	221 (86)	
Not employed	17 (10.4)	146 (89.6)	
Decision Maker for ANC Use			**0.0187***
Husband	17 (12.1)	124 (87.9)	
Jointly with spouse	15 (9.7)	140 (90.3)	
Others (In-laws)	21 (16.9)	103 (83.1)	
Gravidity			0.842
1 (First pregnancy)	18 (14)	111 (86)	
2-3	24 (11.8)	180 (88.2)	
4 or more	11 (12.6)	76 (87.4)	
Clinical factors			
Parity			0.721
0 (No live births)	19 (11)	153 (89)	
1-2	22 (13.8)	138 (86.2)	
3 or more	12 (13.6)	76 (86.4)	

Source: Primary data

Table 9: Association of socio-demographics & clinical factors with the **level of attitude cont.''**

	Attitude		
Variables	**Negative, n (%)**	**Positive, n (%)**	**p-value**
Previous Pregnancy Complications			0.235
Gestational diabetes	4 (13.3)	26 (86.7)	
None	36 (11.3)	282 (88.7)	
Other (please specify)	7 (23.3)	23 (76.7)	
Pre-eclampsia	5 (20)	20 (80)	
Preterm labor	1 (5.9)	16 (94.1)	
Pre-existing Medical Conditions			0.272
Diabetes	2 (8)	23 (92)	
Hypertension	8 (22.2)	28 (77.8)	
None	40 (12.3)	286 (87.7)	
Other (please specify)	3 (9.1)	30 (90.9)	
Family Planning Before Pregnancy			0.455
Condoms	3 (6.2)	45 (93.8)	
Intrauterine device (IUD)	8 (10.1)	71 (89.9)	
None	24 (13.8)	150 (86.2)	
Oral contraceptives	11 (13.6)	70 (86.4)	
Other (please specify)	7 (18.4)	31 (81.6)	

Source: Primary data

As indicated in Table 9, the bivariate analysis of socio-demographics and attitude reveals that occupation (p=0.0282) and decision-making for ANC use (p=0.0187) were statistically significant factors influencing participants' attitudes toward antenatal care (ANC). Employed participants showed a slightly poorer attitude (14%) compared to those not employed (10.4%). Regarding decision-making, participants who jointly made decisions with their spouse exhibited a better attitude (90.3%) compared to those whose ANC use was decided by their husbands (87.9%) or in-laws (83.1%).

Clinical & Socio-demographics factors associated with practice towards antenatal care

Table 10 shows the association of Practice and socio-demographics and clinical factors

Table 10: Association of socio-demographics & clinical factors with the level of practice

Variables	Practice		p-value
	Poor, n (%)	Good, n (%)	
Age in years			0.338
<18	17 (70.8)	7 (29.2)	
19-25	85 (72)	33 (28)	
26-40	170 (80.2)	42 (19.8)	
41+	51 (77.3)	15 (22.7)	
Place of Delivery of the Last Baby			0.506
Home	5 (83.3)	1 (16.7)	
Hospital	314 (76.6)	96 (23.4)	
Other	4 (100)	0 (0)	
Education			**0.016***
No education	133 (76.4)	41 (23.6)	
Primary	65 (79.3)	17 (20.7)	
Secondary	52 (68.4)	24 (31.6)	
University	73 (83)	15 (17)	
Religion			0.33
Christian	109 (76.8)	33 (23.2)	
Muslim	101 (73.2)	37 (26.8)	
Others	113 (80.7)	27 (19.3)	
Occupation			**0.0081***
Employed	205 (79.8)	52 (20.2)	
Not employed	118 (72.4)	45 (27.6)	
Decision Maker for ANC Use			0.499
Husband	105 (74.5)	36 (25.5)	
Jointly with spouse	124 (80)	31 (20)	
Others (In-laws)	94 (75.8)	30 (24.2)	
Clinical factors			
Gravidity			0.999
1 (First pregnancy)	99 (76.7)	30 (23.3)	
3-Feb	157 (77)	47 (23)	
4 or more	67 (77)	20 (23)	
Parity			0.921
0 (No live births)	131 (76.2)	41 (23.8)	
2-Jan	123 (76.9)	37 (23.1)	
3 or more	69 (78.4)	19 (21.6)	

Source: Primary data

Table 11: Association of socio-demographics & clinical factors with the level of practice cont.'

Variables	Practice		p-value
	Poor, n (%)	Good, n (%)	
Previous Pregnancy Complications			0.332
Gestational diabetes	25 (83.3)	5 (16.7)	
None	248 (78)	70 (22)	
Other (please specify)	22 (73.3)	8 (26.7)	
Pre-eclampsia	18 (72)	7 (28)	

Preterm labor	10 (58.8)	7 (41.2)
Pre-existing Medical Conditions		0.4
Diabetes	20 (80)	5 (20.0)
Hypertension	26 (72.2)	10 (27.8)
None	248 (76.1)	78 (23.9)
Other (please specify)	29 (87.9)	4 (12.1)
Family Planning Before Pregnancy		0.327
Condoms	34 (70.8)	14 (29.2)
Intrauterine device (IUD)	64 (81)	15 (19)
None	133 (76.4)	41 (23.6)
Oral contraceptives	59 (72.8)	22 (27.2)
Other (please specify)	33 (86.8)	5 (13.2)
Other (please specify)	33 (86.8)	5 (13.2)

Source: Primary data

As indicated in Table 11, the bivariate analysis of socio-demographics and practice shows that education (p=0.016) and occupation (p=0.0081) are statistically significant factors influencing antenatal care (ANC) practices. Participants with secondary education demonstrated better practices (31.6%) compared to those with no education (23.6%) and university-educated individuals (17%). Regarding occupation, employed participants had poorer ANC practices (79.8%) compared to those who were unemployed (72.4%). Other socio-demographic variables, including age, place of delivery, and decision-making for ANC use, did not show significant associations with ANC practices (p > 0.05).

Multivariable Analysis of Associated Factors with KAP of Utilization of Antenatal Care

Table 12 shows the analysis of the associated factors with KAP Utilization of antenatal care

Table 12: Multivariate analysis of the associated factors with KAP of Utilization of antennal care

	Knowledge		Attitude		Practice	
Variables	**COR (95%CI)**	**P-value**	**AOR (95%CI)**	**P-value**	**AOR (95%CI)**	**P-value**
Age in years						
<18(**Ref**)	1.00					
19-25	0.75(0.28,1.98)	0.568				
26-40	1.59(1.23,1.84)	**0.027***				
41+	0.63(0.22,1.76)	0.384				
Education						
No education					1.41(0.07,2.77)	0.313
Primary					1.20(0.54,2.65)	0.642
Secondary					2.04(1.95,4.40)	**0.0067***
University					1.00	
Occupation						
Employed			1.42(1.32,2.68)	**0.0267***	1.22(1.07,2.29)	**0.0147***
Not Employed (**Ref**)			1.00		1.00	
Decision maker for ANC use						
Husband			0.61(0.30,1.27)	0.191		
Jointly with spouse			1.33(1.07,2.83)	**0.0448***		
Others (In-laws) (**Ref**)			1.00			

Source: Primary data

As indicated in the provided Table 12, several significant factors influence knowledge, attitude, and practice regarding antenatal care (ANC). For knowledge, individuals aged 26-40 were significantly more likely to have better knowledge with an adjusted odds ratio (AOR) of 1.59 (95% CI: 1.23-1.84, p=0.027).

For attitude, education and occupation were significant predictors. Participants with secondary education had a significantly better attitude towards ANC compared to those with no education, with an AOR of 2.04 (95% CI: 0.95-4.40, p=0.0067). Additionally, employed participants were more likely to have a positive attitude (AOR=1.42, 95% CI: 1.32-2.68, p=0.0267), and participants who jointly made decisions with their spouse had a more positive attitude than those where in-laws were the decision-makers (AOR=1.33, 95% CI: 1.07-2.83, p=0.0448).

For practice, occupation also played a significant role, with employed participants more likely to engage in better ANC practices compared to those who were not employed (AOR=1.22, 95% CI: 1.07-2.29, p=0.0147).

IV.   DISCUSSION

The present study assessed the knowledge, attitudes, and practices on the antenatal care among pregnant mothers in Urban Health facilities in Kigali City, Rwanda. Based on our analysis the study showed that knowledge and attitude scores were significantly above the average score while practice was very low compared to the average score. In addition, associated factors participants aged 26 to 40 years were associated with Adequate knowledge, occupation (employed) and jointly with spouse in decision making for ANC use was associated with Positive attitude, then secondary level education and being employed as occupation were also associated with good practice on the antenatal care.

Findings showed that the majority of participants had adequate knowledge about the utilization of antenatal care (ANC), aligning with other research across different regions. In Kupang City, for instance, 86.7% of women demonstrated strong knowledge about the benefits and components of ANC services, such as the importance of tetanus vaccination, iron supplementation, and timely visits throughout pregnancy (Firda Kalzum et al., 2020). Similarly, the NFHS-5 survey in India reported that around 70.55% of women utilized ANC services with adequate quality, highlighting a positive correlation between awareness and service uptake (NFHS-5, 2019-21). These findings emphasize that educated women, especially those with access to information, are more likely to understand and benefit from ANC services, resulting in improved maternal and child health outcomes.

Moreover, these studies also indicate that participants exhibited positive attitudes toward ANC utilization, further reinforcing service engagement. In Zambia, women's satisfaction with ANC quality fostered positive attitudes, encouraging continued use of the services and referrals to others (BMC Pregnancy and Childbirth, 2022). Similarly, in Kupang City, 62.5% of respondents followed the recommended ANC visit schedules, demonstrating the role of favorable attitudes in promoting adherence to health guidelines (Firda Kalzum et al., 2020). These consistent findings underscore that positive attitudes, alongside adequate knowledge, are essential for ensuring comprehensive ANC coverage and achieving optimal health outcomes for both mothers and children.

Study findings showed that pregnant mothers aged 26 to 40 years old were associated with adequate knowledge of the antenatal care. These findings are comparable with the results of other studies. For example, a study by (Awoke et al. (2013) in Ethiopia found that mothers aged 25 and above were more likely to have adequate knowledge about the importance of regular antenatal care visits compared to younger mothers. The study suggested that older mothers may have gained more life experience and perhaps previous pregnancies, allowing them to better understand the importance of following ANC guidelines.

Similarly, research by (Wado et al. (2019) on the determinants of antenatal care uptake in sub-Saharan Africa also showed that older pregnant women (aged 25 to 35) were more informed about ANC visits. The study attributed this to greater access to education and health information as well as previous exposure to healthcare services, which is more likely in older, more experienced mothers. Moreover, a systematic review by (Finlayson and Downe (2013) on barriers and facilitators to antenatal care in low-income countries identified that maternal age and parity played a significant role in the uptake of ANC services. Women in the older age groups (26–40 years) were more likely to attend the recommended four or more visits compared to adolescent mothers. They concluded that older mothers might have had more social and financial stability, allowing them to prioritize their healthcare needs.

Findings showed that pregnant mothers who were employed had a positive attitude toward the antenatal care than those who were unemployed. These findings are consistent with other studies. For instance, (Gebremeskel et al. (2015) conducted a study in Ethiopia and found that employed mothers were significantly more likely to attend the recommended number of ANC visits and had a more positive attitude toward the care received. The study suggested that employment often correlates with better socioeconomic status, which enables women to prioritize their health and access healthcare services more easily.

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Furthermore, employed women are more likely to be informed about the importance of ANC due to greater exposure to educational resources in the workplace and interactions with healthcare systems through health insurance or workplace programs.

Another study by (Mekonnen et al. (2020) in urban Ethiopia reported that women who were employed had a higher likelihood of attending ANC visits and demonstrated a more positive attitude towards these services. This can be attributed to several factors, including the ability to afford transportation costs, access to health insurance, and a greater sense of control over their personal and family health decisions, all of which are associated with employment.

In a cross-sectional study conducted in Ghana, (Amoakoh-Coleman et al. (2015) also found that employed pregnant women were more likely to perceive ANC visits positively. The study suggested that employment may provide pregnant women with better access to health information, financial resources, and social networks that encourage health-seeking behavior, contributing to a more favorable attitude toward ANC.

Concerning the decision maker on ANC use, the study showed that a pregnant mother who decided jointly with a spouse was associated with a positive attitude toward the antenatal care. These findings are consistent with other studies. For example, (Story and Burgard (2012) conducted a study in rural Nepal, revealing that pregnant women who made healthcare decisions jointly with their spouses were more likely to attend ANC visits and had a more positive outlook on the services provided. The study emphasized that spousal involvement not only enhances emotional support but also eases financial and logistical barriers to healthcare access. Joint decision-making fosters better communication between partners about the importance of maternal health and encourages the use of ANC services.

Similarly, research by (Kabakyenga et al. (2012) in Uganda found that women who reported joint decision-making with their husbands had significantly higher odds of attending four or more ANC visits. The study suggested that in settings where patriarchal norms are prevalent, involving spouses in maternal health decisions helps mitigate gender-related barriers. When husbands are part of the decision-making process, they are more likely to support ANC visits, financially and emotionally, resulting in more positive attitudes toward these services.

Study findings showed that secondary school as an education level possessed a positive association with good practice and these findings are comparable with other scientific literature findings like a study by (Rahman et al. (2017) in Bangladesh demonstrated that women with at least a secondary school education were significantly more likely to follow good maternal health practices, including regular ANC visits and adherence to healthcare advice. The study highlighted that secondary education often equips women with better knowledge of health issues, empowers them to make informed decisions, and increases their awareness of the benefits of seeking healthcare during pregnancy. Again, a study conducted by (Kabir et al. (2020) also found that in India, secondary education significantly influenced good maternal health practices. Women with secondary education were more likely to engage in health-promoting behaviors, such as maintaining regular ANC visits, adhering to medical advice, and preparing for childbirth. The study concluded that education enhances health literacy, which in turn leads to better health outcomes for both mothers and their children.

Similarly, the employed pregnant mothers were positively associated with good practice on the antenatal care visits and these findings are similar to the studies like a study by (Rahman et al. (2017) in Bangladesh demonstrated that employed women were more likely to engage in good maternal health practices, such as regular ANC attendance and following health advice given during visits. The study proposed that employment enhances women's decision-making power and autonomy, enabling them to prioritize their health and make timely visits to healthcare facilities. The study further noted that workplaces often provide better access to information and healthcare-related benefits, which in turn supports women in practicing good maternal health behaviors.

In another study conducted in Kenya, (Afulani et al. (2019) found that employed pregnant women exhibited better adherence to ANC visit schedules and were more likely to practice good maternal healthcare behaviors compared to their unemployed counterparts. The researchers suggested that employment contributes to financial security, which reduces the economic barriers often faced by unemployed women. Additionally, employed women may be more empowered to make independent decisions regarding their healthcare, including attending the required ANC visits.

Study strengths and limitations. This study has potential strength as the study used primary data and exhaustive data collection approaches to gather all needed information. The study further had limitations as it only captured data from Kigali city, which it can't be generalized to all populations.

V. CONCLUSION

In conclusion, this study highlights that the levels of knowledge and attitudes toward antenatal care (ANC) among pregnant mothers attending public hospitals in the City of Kigali were above average, indicating a generally good understanding and positive perception of ANC services. However, despite this promising level of knowledge and attitudes, actual practices remained inadequate, with less than half of the participants adhering to the recommended ANC visits. The study further revealed that key sociodemographic factors such as age, employment status, educational level, and joint decision-making with a spouse played significant roles in shaping the levels of knowledge, attitudes, and practices related to ANC. Participants aged between 26-40 years, those who were employed, and those who made decisions jointly with their spouses demonstrated better knowledge and attitudes. Similarly, employment and higher education levels were positively linked with improved ANC practices.

VI. ETHICAL CONSIDERATION

This study adhered to ethical principles, including respect, non-maleficence, beneficence, and justice, with a focus on maintaining confidentiality. Approval for the study was obtained from the Mount Kenya University Rwanda Ethical Review Board. Written consent was obtained from participants, and those who declined were excluded from the study. Participant selection was unbiased, and sources were acknowledged to avoid plagiarism. The permission to collect data was granted by the City of Kigali. Necessary permissions from relevant offices of the hospitals were also secured. Finally, research materials and data were securely stored by the researcher.

REFERENCES

[1] Abera, A., Asseffa, N., Obssa, M., Balla, E., & Koyira, M. (2019). Utilization of focused antenatal care service and associated factors among women in Southern Ethiopia. International Journal of Advanced Medical and Health Research, 6(2), 56. https://doi.org/10.4103/ijamr.ijamr_53_19

[2] Alemayehu, M., Gebrehiwot, T. G., Medhanyie, A. A., Desta, A., Alemu, T., Abrha, A., & Godefy, H. (2020). Utilization and factors associated with antenatal, delivery and postnatal Care Services in Tigray Region, Ethiopia: A community-based cross-sectional study. BMC Pregnancy and Childbirth, 20(1), 1–13. https://doi.org/10.1186/s12884-020-03031-6

[3] Al-Kasseh, A., Jarad, S. K., Shnaina, Y. A., & Albelbeisi, A. (2022). Knowledge, Attitude, and Practice among Palestinian Mothers Attending the Governmental Primary Health Care Centers Regarding Preconception Care Services. Israa University Journal of Applied Science, 6(1), 106–117. https://doi.org/10.52865/REKK2942

[4] Awasthi, M. S., Awasthi, K. R., Thapa, H. S., Saud, B., Pradhan, S., & Khatry, R. A. (2018). Utilization of antenatal care services in dalit communities in gorkha, Nepal: A cross-sectional study. Journal of Pregnancy, 2018. https://doi.org/10.1155/2018/3467308

[5] Babalola, T. K., & Moodley, I. (2020). Assessing the Efficiency of Health-care Facilities in Sub-Saharan Africa: A Systematic Review. Health Services Research and Managerial Epidemiology, 7, 233339282091960. https://doi.org/10.1177/2333392820919604

[6] Baffoe, G., Malonza, J., Manirakiza, V., Mugabe, L., & Uk. (2020). Linking theory with practice: Understanding 2 neighborhood typologies in Kigali, Rwanda 3.

[7] Bashir, S., Ansari, A. H., & Sultana, A. (2023). Knowledge, Attitude, and Practice on Antenatal Care Among Pregnant Women and its Association With Sociodemographic Factors: A Hospital-Based Study. Journal of Patient Experience, 10, 1–11. https://doi.org/10.1177/23743735231183578

[8] Bener, A., Al Maadid, M. G. A., Al-Bast, D. A. E., & Al-Marri, S. (2006). Maternal Knowledge, Attitude and Practice on Folic Acid Intake among Arabian Qatari Women. Reproductive Toxicology, 21(1), 21–25. https://doi.org/10.1016/j.reprotox.2005.07.004

[9] CoK. (2024). KIGALI CITY: Overview. https://www.kigalicity.gov.rw/about/overview

[10] Drigo, L., Luvhengo, M., Lebese, R. T., & Makhado, L. (2020). Attitudes of Pregnant Women Towards Antenatal Care Services Provided in Primary Health Care Facilities of Mbombela Municipality, Mpumalanga Province, South Africa. 13(1). https://doi.org/10.2174/1874944502013010569

[11] Dusingizimana, T., Ramilan, T., Weber, J. L., Iversen, P. O., Mugabowindekwe, M., Ahishakiye, J., & Brough, L. (2023). Predictors for achieving adequate antenatal care visits during pregnancy: A cross-sectional study in rural Northwest Rwanda. BMC Pregnancy and Childbirth, 23(1), 69. https://doi.org/10.1186/s12884-023-05384-0

[12] G Lilungulu, A. (2016). Reported Knowledge, Attitude and Practice of Antenatal Care Services among Women in Dodoma Municipal, Tanzania. Journal of Pediatrics & Neonatal Care, 4(1), 1–8. https://doi.org/10.15406/jpnc.2016.04.00125

[13] Gebremariam, H., Tesfai, B., Tewelde, S., Kiflemariam, Y., & Kibreab, F. (2023). Level of Knowledge, Attitude, and Practice of Pregnant Women on Antenatal Care in Amatere Health Center, Massawa, Eritrea: A Cross-Sectional Study, 2019. Infectious Diseases in Obstetrics and Gynecology, 2023(1), 1912187. https://doi.org/10.1155/2023/1912187

[14] Habte, A., Tamene, A., & Melis, T. (2024). Compliance towards WHO recommendations on antenatal care for a positive pregnancy experience: Timeliness and adequacy of antenatal care visit in Sub-Saharan African countries: Evidence from the most recent Focused Demographic Health Survey data. PLOS ONE, 19(1), e0294981. https://doi.org/10.1371/journal.pone.0294981

[15] Hu, W., Hu, H., Zhao, W., Huang, A., Yang, Q., & Di, J. (2021). Current status of antenatal care of pregnant women—8 provinces in China, 2018. BMC Public Health, 21(1), 1135. https://doi.org/10.1186/s12889-021-11154-4

[16] Ibrahim, H. K., El Borgy, M. D., & Mohammed, H. O. (2014). Knowledge, attitude, and practices of pregnant women towards antenatal care in primary healthcare centers in Benghazi, Libya. Journal of the Egyptian Public Health Association, 89(3), 119–126. https://doi.org/10.1097/01.EPX.0000455673.91730.50

[17] Konje, E. T., Magoma, M. T. N., & Hatfield, J. (2018). Missed opportunities in antenatal care for improving the health of pregnant women and newborns in Geita district. Northwest Tanzania BMC Pregnancy Childbirth, 18. https://doi.org/10.1186/s12884-018-2014-8

[18] Ndayambaje, J. (2022). PREVALENCE AND FACTORS ASSOCIATED WITH LATE INITIATION OF ANTENATAL CARE AMONG PREGNANT WOMEN ATTENDING GITWE HOSPITAL, RWANDA Authors: Janvier Ndayambaje 1 *, Dr. Yves Urayeneza 2 , Mrs. Lucie Uwimana 3. 10(10), 186–210.

[19] NISR. (2020). Rwanda Demographic and Health Survey 2019-20 Final Report. National Institute of Statistics of Rwanda (NISR) [Rwanda], Ministry of Health (MOH) [Rwanda]. https://www.statistics.gov.rw/publication/1724

[20] Noh, J.-W., Kim, Y., Lee, L. J., Akram, N., Shahid, F., Kwon, Y. D., & Stekelenburg, J. (2019). Factors associated with the use of antenatal care in Sindh province, Pakistan: A population-based study. PLOS ONE, 14(4), e0213987. https://doi.org/10.1371/journal.pone.0213987

[21] Ogunba, B. O., & Abiodun, O. (2017). Knowledge and Attitude of Women and Its Influence on Antenatal Care Attendance in Southwestern Nigeria. 207.

[22] Ozimek, J. A., & Kilpatrick, S. J. (2018). Maternal Mortality in the Twenty-First Century. Obstetrics and Gynecology Clinics, 45(2), 175–186. https://doi.org/10.1016/j.ogc.2018.01.004

[23] Pervin, J., Venkateswaran, M., Nu, U. T., Rahman, M., O'Donnell, B. F., Friberg, I. K., Rahman, A., & Frøen, J. F. (2021). Determinants of utilization of antenatal and delivery care at the community level in rural Bangladesh. PLoS ONE, 16(9 September), 1–16. https://doi.org/10.1371/journal.pone.0257782

[24] Region, B., Mohamoud, A. M., Mohamed, S. M., Hussein, A. M., Omar, M. A., Ismail, B. M., & Mohamed, R. A. (2022). Knowledge Attitude and Practice towards Antenatal Care among Pregnant Women Attending for Antenatal Care in SOS Hospital at Hiliwa District ,. 25, 377–391. https://doi.org/10.4236/health.2022.144030

[25] Region, W. H. O. A. (2023). Health and well-being for all in the WHO African Region: A summary. April.

[26] Schmidt, C. N., Butrick, E., Musange, S., Mulindahabi, N., & Walker, D. (2021). Towards stronger antenatal care: Understanding predictors of late presentation to antenatal services and implications for obstetric risk management in Rwanda. PLOS ONE, 16(8), e0256415. https://doi.org/10.1371/journal.pone.0256415

[27] Shrestha, M. S., Shrestha, M. R., Shrestha, T. K., & Erene, P. (2018). Knowledge and Practice of Antenatal Care among Chepang Women from Chitwan, Nepal. ARC Journal of Public Health and Community Medicine, 3(2), 7–11. https://doi.org/10.20431/2456-0596.0302002

[28] Tabassam, F., Amjad, T., Hameed Khan, A., & Jamil, S. (2020). Assessment of Knowledge, Attitude and Practices Regarding Antenatal Care Among Urban and Rural Women of Tehsil Hajira District Poonch: A Comparative Study. Central African Journal of Public Health, 6(5), 237. https://doi.org/10.11648/j.cajph.20200605.11

[29] Thomas, L. (2020, May 8). Cross-Sectional Study | Definition, Uses & Examples. Scribbr. https://www.scribbr.com/methodology/cross-sectional-study/

[30] Tunçalp, Ö., Pena-Rosas, J. P., & Lawrie, T. (2017). WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience; Going Beyond Survival. BJOG, 124. https://doi.org/10.1111/1471-0528.14599

[31] UNICEF. (2021). UNICEF DATA; Antenatal Care. https://data.unicef.org/topic/maternal-health/antenatal-care/

[32] WHO. (2023). Improving maternal and newborn health and survival and reducing stillbirth.