

Factors Associated with Failure to Complete Recommended Antenatal Consultation Among Women Delivering at Kirinda District Hospital, Rwanda

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ABSTRACT

Background: The improvement of maternal health necessitates antenatal care to ensure the safety of both the newborn and the mother. The overall objective of this study is to identify factors associated with failure to complete recommended antenatal consultation among women delivered at Kirinda District Hospital, Karongi District.

Methods: An institutional cross-sectional was employed among a sample of 378 women who delivered at Kirinda District Hospital and its catchment area. Data was collected using a questionnaire developed according to World Health Organization model. Questionnaire was provided after 12 hours post spontaneous vaginal delivery, 24 hours post cesarean section, and ethical consideration was taken into account. Descriptive and analytic analyses were computed. All significant variables in bivariate logistic analyses were exported in multivariate logistic regression models for examining associated factors of fail to attend ANC visits. We considered 95% for confidence intervals and 5% for statistical significance.

Results: Among selected 378 women, 90(23.8%) were aged between 30-34 years old, 214 (56.6%) of women who participated in the study had only primary education, farmers women dominated the study with 251 (66.4%), 246(65.1%) study participants were married. The result shows that 59.8% failed to complete at least 4 recommended antenatal care visits and 63.5% women failed to timely attend first ANC. In the multivariable analyses middle-aged women (44+ years) were more likely to fail to complete recommended ANC [AOR=22, 95%CI: 7.13-72.03, p<0.001]. Compared to women with no formal education, women with primary education were less likely to fail to complete recommended ANC [AOR=0.10, 95%CI: 0.065-0.183, p<0.001]. Married women were less likely to fail to attend recommended antenatal care consultation when compared to single respondent [AOR=0.20, 95%CI: 0.126-0.331, p<0.001]. Women in category one of social class were more likely to fail to complete recommended ANC when compared with women from third socio-class [OR=17.28, 95%CI: 8.10-36.851, P<0.001]. Women who experienced vaginal bleeding in the previous pregnancies were more likely to complete at least four recommend ANC when compared to those with no previous pregnancies problem [AOR=0.13, 95%CI: 0.057-0.335, p<0.001].

Conclusion: Mother's age, education, marital status, number of living children, health insurance, distance to nearest health facility and previous maternal complications were risk factors associated with failure to attend at least four recommended antenatal care visits. It is crucial to continue the implementation of outreach programs to explain the benefits of attending at least four ANC for both mother and a newborn.

Keywords: New-Born; Antenatal Care; Failure

Abbreviations: DH: District Hospital; HC: Health Center; MMI: Military Medical Insurance; RSSB: Rwanda Social Security Board

Introduction

Antenatal care (ANC) serves to prevent, detect and/or manage a condition affecting the result of pregnancy, for either the mother, the newborn or both. ANC should be made available to projected women when pregnancy was detected before the onset of labor. A 2002 focused ANC model of World Health Organization [1] propose at least four visits for ANC for women in developing countries [2]. The ANC visits help to early diagnose and treat in advance problems such as infection, HIV, anemia, malaria, vaginal bleeding and syphilis in the mother and prevent them in the newborn [1]. Globally only 64% of women worldwide obtain ANC at least four times during their pregnancy. The WHO reports that the number of deaths and diseases is still unreasonably high that only in 2015 there was about 303 000 women dead from pregnancy-related conditions [1]. In addition, 2.7 million newborn died before the completion of 28 days of life, and there were 2.6 million stillborn babies [1]. However, In Africa, only 65% of women attend full antenatal care while In Nigeria, only 69% of women receive antenatal care [3]. A reproductive health study by Villar et al. showed that 69% of mothers had at least four antenatal visits, as compared to 6.3% who made less than four visits and 6.3% who had no visit at all. According to the study conducted in Malawi, only 46% mothers meet the recommendation [2]. The IMR in South African rural areas stands at 52.6 per 1000, while in urban areas it stands at 36.6 per 1000 births [4] and according to Saving Mothers Report 2011–2013, the lack of attendance to Antenatal care is among the cause of maternal death in South Africa [5].

According to Malachi et al in Kenya, non-attendees had an NMR of 42.6 per 1000 live births, 4 times higher number of women who completed 4 and more recommended ANC [6]. In addition, factors influencing ANC utilization include: age, level of education, parity, ethnicity, and birth order and interval [7]. Some studies have shown that the age of the mother is one of that factors that prevent suitable prenatal care visit. Moreover, women with less than 9 years educational attainment are fewer in using prenatal care services and when they do, it's not timely and they pay less attention [7]. According to a study conducted in Cameroun, factors associated with low utilization of ANC include education of the woman and spouse, marital status, household income, employment of the woman, exposure to media, history of obstetrical complications, parity, age, religion, cultural beliefs and perceptions of the pregnancy. The level of attendance of ANC increase with education as 60% of women with no education received antenatal care while they are pregnant with their youngest baby and this number increase from 89% and 98% respectively between female who have attended primary school and those who attended secondary schools or tertiary education [8]. According to Rwanda Demographic health survey, in Rwanda, 99% attend at least one antenatal care but only 44% of them fulfill all 4 indicated visits and 2/3 of them fail to start their attendance ahead of time [9]. According to Manzi et al, the share of women who make ANC visits within 3 months of pregnancy stands at just 38% in Rwanda [10] and this was

highly associated with factors such as many babies, displeasure with a long distance to the health facility and unwanted pregnancy.

Antenatal consultation has been proven effective to detect and prevent maternal mortality at 60%. There is a high number of women who fail to complete recommended antenatal consultation worldwide and in Rwanda as well. In Sub-Saharan African (SSA) countries like Rwanda, data on factors influencing full antenatal care are scarce. During antenatal consultation, some elements are addressed such nutritional interventions like dietary interventions (iron and folic acid supplements, calcium, Vitamin A, zinc supplements), maternal follow up (anemia, diabetes, tobacco utilization, drug addiction, ingredient and substance use, HIV control, Tuberculosis, and Hypertension) and fetal assessment (dairy fetal movement counting, fetal heart rate, symphysio-fundal heights measurements and ultrasound scan) [1]. There are some factors associated with failure to complete recommended ANC including age, level of education, health insurance, those factors can be addressed, and special solutions can be taken in order to raise the percentage of women attending antenatal consultation. A study conducted in Indian region observed in rural settings that female were not familiar in visiting ANC services compared to those inhabiting urban areas (60.8% versus 77.6%) [11]. In Rwanda, only 44% complete all four indicated visits [9] and approximately 54% of pregnant women hadn't made the suggested number of four ANC visits [12]. In Rwanda, studies show that approximately 60% of all maternal deaths can be prevented by antenatal visits [13]. The Rwanda Demographic Health Survey [9] there is no data regarding number of women who attended recommended [4] antenatal consultation in Karongi District and as the same there is no information about factors associated with failure to complete recommended ANC, therefore, this study aims to identify those factors in at Kirinda District Hospital, Karongi District.

Method

Study Design

This research was a descriptive cross sectional research design using quantitative approach to identify factors associated with failure to complete recommended antenatal consultation among women who delivered at Kirinda District Hospital. Quantitative methods allowed researcher to collect data from a large sample of women and study findings was generalized for all women in Karongi District and data was used to help district level while planning for child and maternal health interventions. As quantitative study, also the outcome was limited, as answer was not investigating all details associated with failure to complete recommended ANC.

Study Target Population

In this study, target population comprised women who delivered at Kirinda District Hospital during 2 months around 408 women according to HMIS.

Sample Size

For this study, the following (Cochran formula, 1977) formula was adopted to calculate sample size:

$$N = \frac{Z^2 p(1 - p)}{e^2}$$

- Where:
- N is sample size
 - Z value, which corresponds to 95% level of confidence (1.96)
 - e expected degree of precision (e: 5% equal to 0.05)
 - p projected number of women failed to complete recommended ANC and according to RDHS, the proportion of women who failed to complete recommended ANC is 56%.

Thus:

$$n0 = \frac{(1.96)^2 0.56(1 - 0.56)}{(0.05)^2} = 378$$

Sampling Technique

A non-probability convenience sampling techniques was used to select participants of this study where available women who delivered to each health facility per two months and meeting inclusion criteria were selected. According to Health Management Information System (HMIS), Kirinda District Hospital has six health centers (Kirinda, Mwendo, Rugabano, Birambo, Bigugu and Munzanga) and the number of women who delivered to each health facility per two months is illustrated in the Table 1. The interviewer administered questionnaire approach was used to identify the number of desired women from each health facility in the present study.

Table 1: Number of women delivered at Kirinda DH and its catchment area in 2 months (n=408).

Health facility	Number of Deliveries	Number of Women Per Facility
Kirinda DH	157	146
Kirinda HC	30	28
Mwendo HC	15	14
Birambo HC	82	76
Rugabano HC	54	50
Biguhu HC	36	33
Munzanga HC	34	31

Data Collection Instruments

Data collection was done using questionnaire on factors associated with failure to complete recommended antenatal consultation. The questionnaire was developed using WHO framework on antenatal consultation about factors influencing antenatal consultation. Questions included following components: Biodata and sociodemographic information, Knowledge of possible complications associated with pregnancy. Questions were close-ended. It also included scaling of feelings such as strongly agree to strongly disagree, the questions included some enumerations only for short answers and long answer excluded and data was entered in the computer application via excel sheet and scrutinized via the Statistical Package for Social Sciences (SPSS) version 21.

Administration of Data Collection Instruments

A written letter from the Hospital Director was requested helped to have access to patients in the hospital and in health centers in order to start the work. The research contacted head of department of maternity in order to inform women who delivered at Hospital and health centers. A researcher trained one nurse and one midwife at each health facility who assisted him to administer questionnaire to women after delivery. After being explained about the research delimitation, purpose, it was expected that voluntarily participants sign consent form before starting the interview. Questionnaire was made and translated in local language (Kinyarwanda) in order to acquire all responses including those from low level of education. For those who have not attended school, questions were read and oral answers were accepted in a safe environment to the participant. The researcher and trained health care providers administered questionnaires to each participants12 hours after normal delivery and 24 hours after cesarean section. After receiving questionnaire, all participants were given 10 minutes to read and understand questions and also to get explained any misunderstood information. Then, they were allowed to sign voluntary consent form before starting answering. Each participant received 20 to 30 minutes to answer question and after a researcher and trained healthcare provider collected all questionnaire from the participants and he kept all collected information confidential. The name of participant did not appear on the answer sheet.

Reliability and Validity

In this study, reliability was ensured by using an adapted and structured questionnaire according to a validity sample questionnaire on factors influencing antenatal care according to WHO framework. Reliability was dignified by applying Cronbach’s Alpha coefficient. It measured the consistency of research tools and variables.

The researcher prevented the use of complicated terms in data collection in order to measure what is supposed to be measured by controlling internal validity. The questionnaire included terms, which are easily understood, it prevented the use of medical terms and other professional terms. Questions were translated in Kinyarwanda for easy understanding. Also with the help of research supervisor, questionnaire was intended to be based on Context Valid Index (CVI) i.e. measurement advanced by calculating and evaluating pertinent items in questionnaires though ensuring that they are clear and meaningful in accordance with specified objectives and distributing with entire number of objectives (Denise, 2006). This passed to the supervisor for further scrutiny before commencement of fieldwork.

Data Analysis Procedure

Information was scrutinized, provided and understood relying on objectives. From the gathered data, coding, rating, ranking and categorization was done and finally entered into SPSS program. The frequency, percentage, mean and standard deviation, distribution, OR of 95% CI, multivariate analysis and cross tabulation with the use of Chi-square in the descriptive statistics to measure association between sociodemographic factors and antenatal consultation of women who delivered at Kirinda Hospital. Data was presented in a summary according to the study variables. Frequency table, percentage, means, histogram, table was used to summarize the data. Data was analyzed using SPSS 21.

Ethical Consideration

This study was reviewed and approved by the research ethics committee of Mount Kenya University through the school of health sciences (reference number:...). Three aspects in the human research were considered together with respectfulness, truthfulness and integrity. In fact, respondent's right was protected and names of participants were kept safely for confidential reasons. Participation was voluntary and participants were well informed that they were allowed to take out of research based on their willingness to continue or discontinue. Permissions in form of written and signed document were obtained from the Director of the Hospital to conduct a survey at Kirinda district hospital and its catchment area.

Results

Socio-Demographic Characteristics of Respondents

Socio-demographic characteristics including maternal age, education level, marital status, partner education, occupation, health insurance, socio-class (Ubudehe), parity, number of living children, and number of abortion. The results on all these variables are presented in Table 2. There were 378 participants of which 90 (23.8%) were aged between 30-34 years old, 89 (23.5%) were aged 15-19 years, small number 32 (8.5%) were aged 44 years and above. The majority 214 (56.6%) of women who participated in the study had only primary education, followed that those with no formal education 115 (30.4%), women with secondary school education were only 13.0%. Regarding the occupation of respondent, farmers women dominated the study with 251 (66.4%), 84 (22.2%) were students, 31 (8.1%) were employed, 12 (3.2%) were unemployed. Concerning marital status, 246 (65.1%) were married, 109 (28.8%) were single but live with partners, 6 (1.6%) were divorced. Regarding the parity, 149 (39.4%) had parity of two, 83 (22.0%) had parity of three, 73 (19.3%) had parity of four and more. Regarding the abortion status, the majority of participants 226 (59.8%) have not experienced any abortion, 77 (20.4%) have had only one abortion, 75 (19.8%) have had two abortion or more. Of the 378 participants, 158 (41.8%) had one living child, 80 (21.25%) had 3 living children, 77 (20.4%) had two living children, while 63 (16.7%) had 4 and more living children. Regarding the education level of participants partners, 212 (56.1%) had primary education, 94 (24.9%) had no formal education, and 72 (19.0%) had secondary school education. Respondents were also asked to state whether the pregnancy were planned or not, 249 (65.9%) stated that they planned the pregnancy, and 129 (34.1%) pregnancies were not planned. Regarding the socio-class, 160 (42.3%) were in third category, 112 (29.6%) were in first category, and 106 (28.1%) were in second category. Respondents with community based health insurance dominated the study 279 (73.8%), 80 (21.2%) respondents did not have any health insurance, 10 (2.6%) used RSSB as health insurance, and 9 (2.4%) used MMI as health insurance (Table 2).

Table 2: Socio-demographic of characteristics.

Variables	Categories	Frequency	Percentage
Age	15-19 years	89	23.5
	20-24 years	65	17.2
	25-29 years	58	15.3
	30-34 years	90	23.8
	35-39 years	44	11.6
	44+	32	8.5
Education level	No formal education	115	30.4
	Primary	214	56.6
	Secondary	49	13.0
Occupation	Students	84	22.2
	Famers	251	66.4
	Unemployed	12	3.2
	Employed	31	8.1
Marital Status	Single	109	28.8
	Married	246	65.1
	Divorced	6	1.6
	Widow	17	4.5
Parity	1	149	39.4
	2	73	19.3
	3	83	22.0
	4+	73	19.3
Number of abortion	0	226	59.8
	1	77	20.4
	2+	75	19.8
Number of living children	1	158	41.8
	2	77	20.4
	3	80	21.2
	4+	63	16.7
Partner education level	No formal education	94	24.9
	Primary	212	56.1
	Secondary	72	19.0
Whether the current pregnancy was planned	Yes	249	65.9
	No	129	34.1
Socio-Class	Category 1	112	29.6
	Category 2	106	28.1
	Category 3	160	42.3
Health insurance	Community-based health insurance	279	73.8
	RSSB	10	2.6
	MMI	9	2.4
	None	80	21.2

The Proportion of Women Who Failed to Complete Recommended Antenatal Consultation at Kirinda District Hospital

The first objective was to determine the proportion of women who failed to complete recommended antenatal consultation. Respondents were asked to recall and respond to the number of antenatal consultation during the completely pregnant period. Respondents were considered as failed to complete recommended ANC, if she attended less than four ANC during the pregnancy period as defined by WHO. The findings on number of ANC attended by responded is presented in Table 3. Of the 378 participants, 152 (40.2%) participants attended four and more ANC, 80 (21.2%) attended only one ANC, 74 (19.6%) attended three ANC, and 72 (19.0%) attended two ANC in the whole pregnancy period (Table 3). All respondents who attended less than four ANC were grouped as women who failed to complete recommended ANC (Figure 1). Results presented in Figure 1 showed that the majority of respondents 59.8% failed to complete recommended antenatal care consultation. Respondents were also asked to list the main reasons for not completing recommended an-

tenatal care consultation (Table 4). Of the 378 study participants, 74 (32.7%) revealed that they do not complete recommended ANC because of being in state of good health during pregnancy, 54(23.9%) had no information about ANC, 70(31.0%) were too busy to attend ANC, 55(24.3%) said that waiting time is too long at the ANC health facility, 27 (12.0) reported husband disapproval as a reason, 64(28.3%) had no knowledge on when to consult for ANC, 39(17.3%) reported that their previous pregnancies had no problem and 34(15.0) reported that not having health insurance and no money to pay for ANC was a reason for not completing recommended ANC (Table 4).

Table 3: Number of antenatal care consultation.

Number of ANC	Frequency	Percentage
1	80	21.2
2	72	19
3	74	19.6
4+	152	40.2

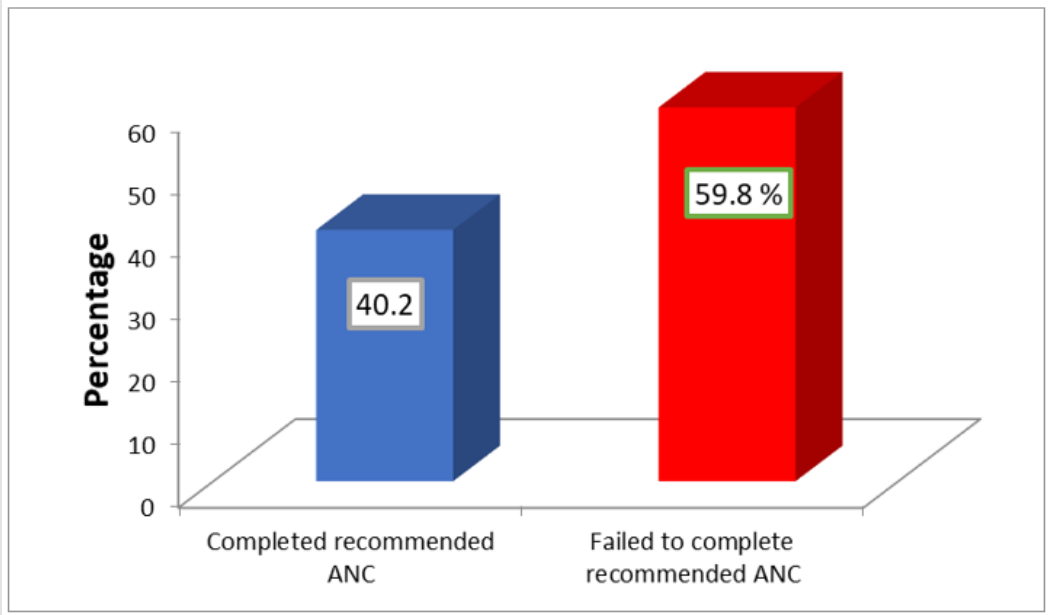


Figure 1: Level of antenatal care consultation.

Table 4: Reasons for not completing recommended antenatal care consultation (n=226).

Reasons	Frequency	Percentage
Being in state of good health	74	32.7
No information about ANC	54	23.9
Too busy to attend ANC	70	31
Waiting time is too long at the ANC clinics	55	24.3
Husband disapproval	27	12
Poor quality of the service	27	12
ANC is far from my home	30	13.3
No insurance and no money to pay for services	34	15
Insurance is present but no money to pay	18	8
All previous my pregnancy had no problem	39	17.3
There was no knowledge on when to consult	64	28.3
There are many children at home to take care of	57	25.2
My religion did not allow me to attend ANC	3	1.3

The Proportion of Women Who Failed to Timely Attend First Antenatal Consultation

The second objective of the study was to determine the proportion of women who failed to timely attend first antenatal consultation. All women who failed to attend ANC between 8-12 weeks of gestational were considered as failed to timely attend the first antenatal consultation. The findings presented in Table 5 showed that near a

half 184(48.7%) of respondents attended first ANC during 24-26 weeks of gestational, 138(36.5%) attended first ANC between 8-12 weeks of gestational age, 50(13.2%) attended first ANC at 32 weeks while only 6(1.6%) attended first ANC at 36-38 weeks of gestational. All the mothers who did not attend first ANC within 8-12 weeks of gestational were considered as failed to attend first ANC (Figure 2). Results presented in Figure 2 revealed that 63.5% participants failed to timely attend first antenatal consultation. Other variables related to timely attendance of ANC were presented in Table 6. The majority of respondents 208(55.0%) did not experienced any pregnancy complication, 89(23.5%) experienced fetal demise, 56(14.8%) experienced painful urination, and 25(6.6%) experienced vaginal bleeding in the previous pregnancies. Regarding place for ANC visit, almost all participated 374(98.9%) reported health center as the first place for ANC, all mothers who visited health center for ANC were received health care from nurses/midwife. Regarding the person accompanied them during first antenatal visit, 249 (65.9%) were accompanied by husband/partner, 89(23.5%) were accompanied by community health workers. Of the study participants, 106(28.0%) said that they can reach nearest health facility in one hour by walking, 86(22.8%) used 4 hours and more to reach at nearest health facility, 75(19.8%) can reach health facility in 2 hours, and only 65(17.2%) used 30minute to arrive at nearest health facility.

Table 5: Gestational week for first antenatal consultation.

Gestational weeks	Frequency	Percentage
8-12	138	36.5
24-26	184	48.7
32	50	13.2
36-38	6	1.6

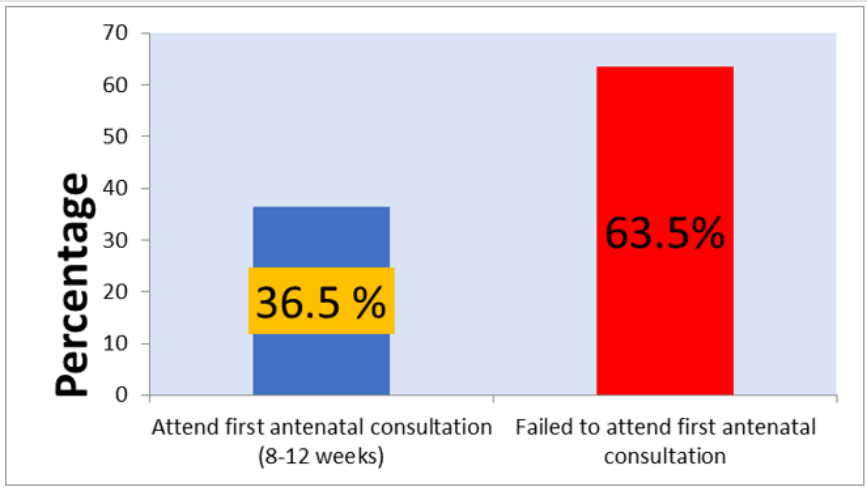


Figure 2: Proportion of mother is who failed to attend first ANC.

Table 6: Other indicators of timely attendance of antenatal consultation.

Variables	Categories	Frequency	Percentage
Problems in the previous pregnancies	Vaginal bleeding	25	6.6
	Intrauterine fetal demise	89	23.5
	Painful urination	46	14.8
	None	208	55
Place for antenatal visit	Health center	374	98.9
	District hospital	4	1.1
Healthcare provider who conducted ANC	Nurse/Midwife	374	98.9
	Medical doctor	4	1.1
Person accompanied during first antenatal visit	None	33	8.7
	Husband/Partner	249	65.9
	Mother/family member	7	1.9
	Community health workers	89	23.5
Time to nearest health facility by walking	30min	65	17.2
	1 hour	106	28
	2 hours	75	19.8
	3 hours	46	12.2
	4 hours and more	86	22.8

Socio-Demographic Factors Associated with Failure to Complete Recommended Antenatal Consultation

Prior to multivariate analysis for factors associated with failure to complete recommended ANC, univariate analysis was performed. Only variables related to antenatal consultation in Univariate analysis were taken to multivariate analysis to examine the association and the relationship between socio-demographic characteristics and antenatal consultation. The relationship between socio-demographic characteristics and status of antenatal consultation is presented in Table 7. Of the 11 demographic variables, 10 were related to ANC

status. With regard to age, 21(9.3%) aged 15-19 attended less than 4 ANC, for those aged 30-34 years old 62 (27.4%) attended less than 4 ANC, 68(44.7) of respondent who attended four and more ANC were aged 15-19 years. Respondent’s age was statistical related with ANC status ($p<0.001$). Regarding to education level, of the respondent who completed four and more ANC, 81(53.3%) had no formal education, 44(28.9%) had only primary education, 27(17.8%) had secondary education; of those who failed to complete recommended ANC, 170(75.2%) had primary education, 34(15.0%) had no formal education and 22(9.7%) had secondary education. Education level was significantly related to antenatal consultation status ($p<0.001$).

Table 7: Relationship between socio-demographic characteristics and antenatal consultation.

Variables	Indicators	Status of ANC		Chi-square	P-Value
		Less than 4 ANC visit n(%)	4 and more ANC visit n(%)		
Age	15-19	21(9.3)	68(44.7)	69.364	<0.001***
	20-24	48(21.2)	17(11.2)		
	25-29	36(15.9)	22(14.5)		
	30-34	62(27.4)	28(18.4)		
	35-39	31(13.7)	13(8.6)		
	44+	28(12.4)	4(2.6)		
Education level	No formal education	34(15.0)	81(53.3)	82.584	<0.001***
	Primary	170(75.2)	44(28.9)		
	Secondary	22(9.7)	27(17.8)		

Occupation	Students	27(11.9)	57(37.5)	41.785	<0.001***
	Famers	178(78.8)	73(48.0)		
	Unemployed	6(2.7)	6(3.9)		
	Employed	15(6.6)	16(10.5)		
Marital Status	Single	38(16.8)	71(46.7)	46.879	<0.001***
	Married	178(78.8)	68(44.7)		
	Divorced/widow	10(4.4)	13(8.6)		
Parity	1	52(23.0)	97(63.8)	67.265	<0.001***
	2	51(22.6)	22(14.5)		
	3	70(31.0)	13(8.6)		
	4+	53(23.5)	20(13.2)		
Number of abortion	0	128(56.6)	98(64.5)	2.522	0.283
	1	51(22.6)	26(17.1)		
	2+	47(20.8)	28(18.4)		
Number of living children	1	68(30.1)	90(59.2)	56.556	<0.001***
	2	38(16.8)	39(25.7)		
	3	67(29.6)	13(8.6)		
	4+	53(23.5)	10(6.6)		
Partner education level	No formal education	38(16.8)	56(36.8)	26.259	<0.001***
	Primary	131(58.0)	81(53.3)		
	Secondary	57(25.2)	15(9.9)		
Current pregnancy planned	Yes	121(53.5)	128(84.2)	38.028	<0. 01***
	No	105(46.5)	24(15.8)		
Socio-Class	Category 1	40(17.7)	72(47.4)	69.597	<0.001***
	Category 2	96(42.5)	10(6.6)		
	Category 3	90(39.8)	70(46.1)		
Insurance	Community based health insurance	191(84.5)	88(57.9)	37.371	<0.001***
	RSSB	3(1.3)	7(4.6)		
	MMI	6(2.7)	3(2.0)		
	None	26(11.5)	54(35.5)		

Regarding respondents occupation, 178(78.8%) who attended less than four ANC were farmers, while only 15(6.6%) were employed, generally, respondent's occupation was significantly related to their status of ANC ($p<0.001$). Marital status was statistical related to respondent's antenatal consultation status, of the respondents who attended less than four ANC, 178(78.8%) were married. Parity was significantly related to antenatal care consultation ($p<0.001$), of the women who attended less than four ANC, 70(31.0) had parity of three. Other variables such as number of living children, partner's education level, status of pregnancy, socio-class, and health insurance

were all significantly related to status of antenatal care consultation ($p<0.001$).

Socio-Demographic Factors Associated with Failure to Complete Recommended ANC

All socio-demographic variables with significant relationship in univariate analysis were further analysis in multivariate analysis where odd ratio (OR), 95% confidence interval (95%CI) and p-value were estimated for each indicator. Participants who were aged 44 and above [AOR=22, 95%CI: 7.13-72.03, $p<0.001$], 35-39 years

[AOR=7.72, 95%CI: 3.69-13.90, $p<0.001$], 30-34years [AOR=7.17, 95%CI: 3.69-13.90, $p<0.001$], 25-29 years [AOR=5.29, 95%CI: 2.57-10.90, $p<0.001$] and 20-24 years [AOR=9.14, 95%CI: 4.36-19.13, $p<0.001$] were more likely to fail completing recommended ANC visits. Regarding education background, women who attended primary school [AOR=0.42, 95%CI: 0.255-0.689, $p<0.001$] and secondary school [AOR=0.17, 95%CI: 0.88-0.36, $p<0.001$] were less likely to fail to attend ANC visits compared to those with no formal education. Further, participants who had occupation had lower likelihoods to experience failure to attend ANC visits [AOR=0.38, 95% CI: 0.181-0.818, $p=0.013$] than their counterparts. Furthermore, the presence of occupation had a positive impact on ANC attendance, with participants who were employed having a lower likelihood of failing to attend ANC visits (AOR=0.38, 95% CI: 0.181-0.818, $p=0.013$) than those without employment.

Additionally, marital status also played a role, as married women were less likely to fail to attend recommended ANC visits when compared to single respondents (AOR=0.20, 95% CI: 0.126-0.331, $p<0.001$). The number of children a woman had (parity) was associated with ANC attendance. Women with four or more living children

were ten times more likely to fail to attend recommended ANC compared to women with only one child ($p<0.001$). Women with a parity of two had higher odds of failing to complete recommended ANC visits (AOR=4.94, 95% CI: 2.673-9.141, $p<0.001$). In addition, women with planned pregnancies were less likely to fail to attend recommended ANC when compared to those with unplanned pregnancies (AOR=0.21, 95% CI: 0.130-0.359, $p<0.001$). Social class had an impact on ANC attendance, as women in the first socio-economic class were more likely to fail to complete recommended ANC compared to women in the third socio-economic class (AOR=17.28, 95% CI: 8.10-36.851, $p<0.001$). Lastly, the type of health insurance used also played a role in ANC attendance. Women who used RSSB were less likely to fail to attend recommended ANC when compared to women who used community-based health insurance (AOR=0.22, 95% CI: 0.130-0.378, $p<0.001$). Women who had a history of vaginal bleeding during their pregnancies were actually less likely to fail in completing the recommended ANC visits compared to those who had not experienced any previous pregnancy problems (AOR=0.13, 95% CI: 0.057-0.335, $p<0.001$). It is important to note that encountering issues in previous pregnancies was statistically linked to a decreased likelihood of failing to complete the recommended ANC visits ($p<0.001$) (Table 8).

Table 8: Multivariate analysis of socio-demographic factors associated with failure to complete recommended ANC.

	Failure to complete recommended ANC	
	AOR (95%CI)	P-value
Age group		
15-19	Ref.	
20-24	9.14(4.36-19.13)	<0.001***
25-29	5.29(2.57-10.90)	<0.001***
30-34	7.17(3.69-13.90)	<0.001***
35-39	7.72(3.69-13.90)	<0.001***
44+	22(7.13-72.03)	<0.001***
Mother education level		
No formal education	Ref.	
Primary	0.10(0.065-0.183)	<0.01**
Secondary	0.51(0.258-1.028)	0.06
Partner education level		
No formal education	Ref.	
Primary	0.42(0.255-0.689)	<0.001***
Secondary	0.17(0.88-0.36)	<0.001***
Occupation		
Unemployed	Ref	
Farmers	0.93(0.247-3.555)	0.924
Students	0.38(0.181-0.818)	0.013*
Employed	1.97(0.854-4.585)	0.111

Marital status		
Single	Ref	
Married	0.20(0.126-0.331)	<0.001**
Divorced/widow	0.69(0.279-1.735)	0.437
Parity		
1	Ref	
2	4.94(2.673-9.141)	<0.001***
3	4.32(2.367-7.902)	<0.001****
4+	10.04(5.083-19.848)	<0.001***
Number of living children		
1	Ref	
2	1.29(0.747-2.228)	0.362
3	6.82(3.482-13.361)	<0.001***
4+	7.01(3.32-14.784)	<0.001***
Planned pregnancy		
No	Ref	
Yes	0.21(0.130-0.359)	<0.001***
Socio-classes		
Category 3	Ref	
Category 1	17.28(8.10-36.851)	<0.001***
Category 2	2.3(1.408-3.804)	0.001***
Insurance		
Community based health insurance	Ref	
RSSB	0.22(0.130-0.378)	<0.001**
MMI	0.19(0.050-0.782)	0.021*
None	0.92(0.225-3.769)	0.909

Note: AOR: odd ratio, 95%CI: 95% confidence interval.

Further, women who were accompanied by community health workers were less likely to fail in attending the recommended ANC when compared to those who went for ANC alone (AOR=0.242, 95% CI: 0.103-0.565, p=0.001). Additionally, the distance to the nearest health center was also significantly associated with the likelihood of failing to attend recommended ANC. Women who spent one

(AOR=3.92, 95% CI: 1.985-7.760, p=0.001) and two hours (AOR=3.3, 95% CI: 1.599-6.845, p=0.001) were more likely to fail attending required ANC compared to those who spent less than 30 minutes. Contrary, those who spent four and more hours (AOR=0.27, 95% CI: 0.136-0.556, p=0.001) were less likely to fail attending required ANC compared to those who spent less than 30 minutes (Table 9).

Table 9: Multivariate analysis on other factors Associated with Failure to complete recommended ANC.

	Failure to Complete Recommended ANC	
	AOR (95%CI)	P-value
Problems in the previous pregnancies		
None	Ref.	
Vaginal bleeding	0.13(0.057-0.335)	<0.001***
Intrauterine fetal demise	0.13(0.079-0.239)	<0.001***
Painful urination	0.11(0.060-0.224)	<0.001***
Healthcare provider who conducted ANC		
Nurse/Midwife	Ref.	
Medical doctor	0.28(0.087-0.947)	0.040*
Person accompanied during first antenatal visit		
None	Ref.	
Husband/Partner/Family member	1.08(0.500-2.334)	0.844
Community health workers	0.242 (0.103-0.565)	0.01**
Time to nearest health facility by walking		
30 min	Ref.	
1 hour	3.92(1.985-7.760)	<0.001***
2 hours	3.30(1.599-6.845)	0.001***
3 hours	2.00(0.914-4.394)	0.083
4 hours and more	0.27(0.136-0.556)	<0.001***

Discussion

The results revealed that 59.8% of participants failed to attend ANC at least four times. These findings are consistent with findings in other similar studies in Sub-Saharan Africa including that from Rwanda. A recent population based study conducted in Rwanda shows that 54% of participants failed to attend ANC at least four times [12]. Another study conducted in Ethiopia shows 42% of study participants made less than four visits to ANC health facilities during pregnancy [12]. In contrast, a study conducted in Ghana revealed that 86% of study participants had attended ANC at least four times. The present findings shows that being in good health during pregnancy, poor knowledge about recommended ANC, long distance from home to health facility, time spend to ANC clinics and not experienced any problems in the previous pregnancies were the main reasons for not attending at least four ANC visits. Similar findings were reported in a study conducted Ghana, Kenya and Malawi [14]. As stated by WHO, a pregnant woman should commence ANC in the first trimester. Nonetheless, a large number of women from developing countries do not utilize ANC according to the guidelines.

To meet international standards, the timing and number of ANC visits are vital in the detection and management of pregnancy complications. Timing of the first ANC visit is correlated to ANC adequacy.

WHO recommended that women should start ANC early especially by the first trimester to have at least four ANC visits. Early commencement of ANC makes women to have sufficient number of visits and adequate services [7,115]. However, this study further found that 63.5% participants failed to timely attend first antenatal consultation. Similar findings were reported in Ethiopia where, 66.3% of women did not use ANC at first trimester [16]. Another recent study in Northwest Ethiopia reported that 52% of participants booked their first ANC visit after 4 months of pregnancy [17]. Timely ANC is generally acknowledged an effective method of preventing adverse pregnancy outcomes. A recent study in Pakistan reported that women whose first ANC visit occurred within the first 12 weeks of pregnancy received the full range of WHO-recommended content of care [18]. However, women whose first ANC visits occurred late during pregnancy were less likely to receive the full range of services. The present study further examined the factors associated with failure to complete recommended antenatal care consultation. This findings shows that women's age, education level, marital status, parity, number of living children, health insurance, duration to nearest health facilities, previous pregnancy complication were factors associated with failure to attend at least four recommended ANC.

The researcher found that age was associate with less than four ANC visits, where women aged 44 and plus were more likely to attend

less than four ANC visit. Mixed results were found in previous studies in the context of association of age of the mother with ANC visits, both in terms of timing and frequency. A previous study indicated that late attendance at ANC visits and utilization of less than four ANC visits were associated with younger age group of mothers. More so, findings similar to the current study and indicated that age of the mother at delivery was significantly associated with timing and frequency of ANC visit [19]. In line with the present findings, a study conducted in Tanzania found that pregnant women in the age of 15-19 years were more likely to seek ANC care services compared to those between 35 and 39 years [12]. Education was also found to be associated with failure to attend at least four recommended ANC. It is well known that higher educational level implied that the women would register early for ANC visits and complete at least four ANC visits. This might be directly related to the knowledge about the importance of ANC visits gained through formal education. However, factors such as increased autonomy for women, more access to health education and improved financial status due to possibly increased employment might all be of importance. For example, one previous study has specifically concluded to focus on educating girls beyond secondary level and increase media penetration of the importance of ANC visits [20].

Wealth category was significantly associated with failure to complete at least four recommended ANC, where women in lowest wealth index were more likely to not attend at least four ANC during pregnant. Similar findings were reported in study conducted in Ethiopia where the poorest were more likely than other categories to have delayed initiation of ANC visits and less than the minimum required ANC visits [16]. This study further reported that married women were more likely to attend at least four recommended ANC compared to single mothers. Many studies show similar findings, the relationship between marital status and ANC utilization has been inconclusive. A survey of 2199 respondents in Nigeria showed that married women were less likely to seek antenatal care services than their single counterparts were. One of the reasons that have been suggested is that married or cohabitating women are not financially independent and might have to seek permission from their spouses and partners to visit ANC services [6]. The reason for married women to make more visits to ANC maybe explained by the support married and cohabitating women in Rwanda get from their husbands or partners because of ANC attendance sensitization campaign, which equally targets men and encourage them to follow their wife/partner to the clinic.

The researcher found that parity is significantly associated with failure to attend at least four recommended ANC. Similar findings were reported in previous literature. The literature review showed that multiparous women are less likely to use prenatal care services. Previous investigation revealed, primiparous women start receiving prenatal care earlier than other women do; also, low-parity women are more likely to use both prenatal and neonatal care services [21]. This study revealed that time walking to nearest health facility is significantly associated with failure to complete recommended

ANC. Similarly, previous report indicated a significant association between the use of prenatal care services and distance from facilities and mode of transport, and the waiting time to receive services [7]. Lack of access to services due to long distance and transport-associated problems are among the main reasons for not completing the recommended ANC.

Study Strengths and Limitations

It is important to note that this study is a study with a purpose to explore associated factors of fail to attending recommended ANC in rural areas of Kirinda Hospital where access to ANC services remain low. In addition to that, it is worth emphasizing that our study marks a significant milestone as the first research endeavor in this particular study area, specifically aimed at investigating the factors associated with the failure to attend recommended ANC in the rural environs of Kirinda Hospital, where access to ANC services remains limited. An outstanding feature of our research is the utilization of primary data, signifying the high quality and originality of the outcomes. This sets our study apart from previous inquiries that did not undertake this approach, thereby enhancing the novelty and credibility of our results. Moreover, our study offers valuable insights into associated factors and conducts detailed descriptive analyses, even though it does not have the capability to establish causality. This aspect contributes to a more comprehensive understanding of the research area.

A notable limitation of our study is the inherent inability of its design, cross-sectional design, to establish causality. Our focus remains on identifying associated factors and conducting descriptive analyses, rendering us unable to draw direct causal relationships from the data. The institutional-based nature of our study confines the generalizability of our findings. Our research outcomes may primarily apply to the specific context of Kirinda Hospital, making it challenging to extend these findings to broader populations or settings. Additionally, the relatively modest sample size in our study restricts its generalizability. A larger and more diverse sample would enhance the study's capacity to make broader-reaching inferences and bolster the robustness of the research.

Conclusion

The present study revealed that a majority of women in Karon-gi district still do not complete at least four recommended antenatal care visits. More than a half of women missed the first antenatal care visit in their first trimester. Mother's age, education, marital status, number of living children, health insurance, distance to nearest health facility and previous maternal complications were risk factors associated with failure to attend at least four recommended antenatal care visits. Ministry of Health needs to continue the implementation of outreach programmes to explain the benefits of attending at least four ANC for both mother and a newborn. This study found that women who were economically disadvantaged were less likely to have attended ANC at least four times during pregnancy. It is also crucial for pub-

lic health programmes aimed to raise women understanding about the importance of attending ANC services to target women from poor households. Health professionals should educate pregnant women of low socioeconomic status about the benefits of the timely attendance of ANC services. Community health workers should be encouraged to establish support systems to assist socioeconomically vulnerable women in accessing maternal health services. The emphasis should further be on supporting women of older age, single, lower education level to follow the recommendations of antenatal care consultations. Time spend to ANC clinics should reasonable to allow women to perform other activities after ANC visits. Future directions A prospective study on the factors associated with antenatal care consultation attendance is highly recommended. The proposed study should include women from both rural and urban areas and large sample size.

Declarations

Ethics Approval and Consent to Participate

The Ethical Clearance was obtained from the Institutional Review Board, Mount Kenya University (MKU) with reference number Consent forms were obtained from the participants. All methods were conducted in respect of the regulations and principles of the Helsinki Declaration.

Consent for Publication

Consent for publication was obtained from the study participants.

Availability of Data and Materials

All relevant data are included in this manuscript. Data may be shared upon a reasonable request is provided to the corresponding author.

Competing Interests

The authors declare no conflicts of interests.

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Authors' Contribution

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agreed to be accountable for all aspects of the work.

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