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Assessing the Consistency of Antenatal Care Visits, Their Determinants, and Health Outcomes Among Post-Natal Women Admitted in Maternity Wards in Selected Health Facilities in Ifakara Town: A Cross-Sectional Study

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ABSTRACT

Introduction: Consistent antenatal care (ANC) attendance is crucial for positive maternal and neonatal outcomes, yet inconsistencies remain a concern in low-resource settings with limited research on determinants and outcomes of ANC visit consistency. This study aimed to determine the proportion of consistent ANC attendance (≥ 4 visits), their determinants, and maternal and neonatal outcomes among postnatal women in Ifakara Town, Tanzania.

Methodology: An analytical cross-sectional study was conducted between August and September 2024, enrolling 396 postnatal women within 7 days of delivery at St. Francis Referral Hospital and Kibaoni Health Center. Data were collected using structured questionnaires and a structured checklist that collected information from the Reproductive and Child Health cards. Data analysis involved Chi-square tests and multivariable logistic regression using SPSS version 26. The level of significance was set at a *p*-value below 0.05.

Results: Good ANC consistency (≥ 4 visits) was observed in 66.2% of participants. Adjusted analysis showed women < 23 years had higher odds of consistency (aOR = 2.732, $p = 0.01$) than those > 30 years. Health insurance was associated with greater consistency compared to out-of-pocket payment (bivariate $p = 0.009$; aOR = 2.434). A positive provider relationship also predicted consistency (aOR = 0.278, $p < 0.001$). While a higher proportion of women with maternal complications had consistent ANC (77.61% vs. 63.83%, bivariate $p = 0.03$), logistic regression indicated lower odds of complications with < 4 visits (OR = 0.509, $p = 0.03$). No significant differences in neonatal outcomes were linked to ANC consistency.

Conclusion: ANC consistency was acceptably high. Younger age, health insurance, and positive provider relationships significantly influenced consistent ANC attendance. The maternal complication finding suggests consistent ANC might be reactive, but overall reduces risk. Future efforts should address financial barriers, promote respectful care, and further explore ANC's complex link with maternal complications prospectively.

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1 | Introduction

Antenatal care (ANC) is defined as the care provided by skilled health-care professionals to pregnant women to ensure the best health conditions for both mother and baby during pregnancy. The components of ANC include identifying potential risks, preventing and caring for pregnancy-related illnesses, and providing health education and health promotion [1]. Consistent attendance to ANC visits, helps the pregnant women to receive the following interventions: (1) Nutritional interventions include advice on maintaining a healthy diet during pregnancy and the postpartum phase, as well as suggestions for taking iron and folic acid supplements to prevent anomalies in the neural tubes and maternal anemia, which will enhance both the mother's and the newborn's health; (2) Assessment of the progress of the mother and fetus; and (3) Investigations such as full blood count, urinalysis, protein in urine, HIV testing, syphilis testing, blood sugar level, symphysis – fundal height measurement – are all conducted during antenatal visits [2].

In 2002, the World Health Organization (WHO) designated a focus ANC that required at least four visits [1]. Later in 2016, WHO suggested increasing the number of ANC visits with qualified practitioners and changing the timing and quality of services, recommending four to eight ANC visits [1, 3]. According to UNICEF, the percentage of women who receive four or more ANC visits varies widely between countries; it is low, ranging from 24% in sub-Saharan Africa to over 90% in nations across Latin America, the Caribbean, and Europe [4]. Globally, about 69% of pregnant women make at least four ANC visits [4]. A study from Nigeria showed that the average ANC utilization rate is 61%, of which 81% of them had more than four visits [5]. Similarly, a study done in Ethiopia reported that 15.2% of women had attended the recommended number of more than four ANC visits [6].

The reasons behind the inconsistency of ANC visits may include a lack of awareness of pregnancy signs and prenatal care schedules, challenges with finances, longer travel times to the health facility, different traditional and religious views regarding pregnancy, delayed ANC bookings, and the standard of care received [7–9]. Existing evidence reports that a variety of factors influence the consistency of ANC visits. Sociodemographic characteristics significantly affect ANC attendance [10–13]. Health system factors include the availability and accessibility of healthcare facilities, the quality of care provided, and the attitude of healthcare providers [14]. Women who perceive healthcare services as welcoming and supportive are more likely to attend regular ANC visits. Conversely, long distances to health facilities and poor quality of care can deter women from seeking ANC services regularly [11]. The negative outcome of pregnancy complications may be lowered by effective ANC use, as evidenced by a Rwandan study that found frequent ANC visits are linked to improved newborn outcomes [15]. It may also protect women from the direct causes of maternal and neonatal deaths linked to obstetric difficulties [15]. It follows that inconsistent ANC visits lead to poor maternal and neonatal outcomes, including anemia and hypertensive disorders, as well as reducing complications during pregnancy and delivery and maternal mortality [2, 12, 16]. Studies done in Indonesia and Namibia showed that consistent ANC visits influence neonatal birth weight, APGAR score, and neonatal infections [15, 17, 18].

In Tanzania, the proportion of utilization of ANC services in rural areas is 39.1%, whereas in urban areas, the utilization is 54.8% [19, 20]. A study conducted in Lushoto found that only 16% of women followed the 2016 WHO ANC visit recommendations [21]. This signifies that there is still a problem despite the guidelines that entail what should be fully done as per the number of visits [22]. Therefore, this study aimed to determine the proportion of consistent ANC attendance (≥ 4 visits) and associated determinants, and maternal and neonatal outcomes among postnatal women in Ifakara Town, Tanzania.

2 | Methodology

2.1 | Study Setting

This study was conducted at St. Francis Referral Hospital and Kibaoni Health Center, found in Ifakara Town Council, situated within the Kilombero District of the Morogoro Region in southeastern Tanzania [23]. Healthcare services for the study population are primarily delivered through a tiered system that includes both facility-based and community-based initiatives. Facility-based maternal and child health (MCH) care is a central component, with St. Francis Referral Hospital serving as the highest level of care within the study area, offering comprehensive services including ANC, labor and delivery services, postnatal care (PNC), and specialized care for complicated pregnancies and newborns. Kibaoni Health Center provides a more primary level of facility-based MCH care, offering routine ANC services, normal deliveries, basic PNC, and referrals for more complex cases to St. Francis Referral Hospital. Complementing these facility-based services are vital community-based MCH care delivery mechanisms. Outreach programs and mobile clinics are periodically organized to extend essential MCH services to more geographically remote or underserved populations within the Kilombero district. These initiatives often provide ANC check-ups, health education, immunizations, and basic postnatal support in locations more accessible to community members. Furthermore, Community Health Workers (CHWs) play a crucial role in providing continuous follow-up care within the community. They conduct home visits to pregnant women and new mothers, offering health education on topics such as nutrition, breastfeeding, and newborn care, as well as promoting adherence to recommended ANC and PNC schedules. CHWs also facilitate linkages between the community and health facilities, encouraging timely attendance for facility-based services and identifying potential health issues that require professional attention. This integrated approach of facility-based services, outreach initiatives, and continuous community-based follow-up by CHWs forms the framework for maternal and child healthcare delivery in Ifakara Town Council and the broader Kilombero district.

2.2 | Study Design

An analytical cross-sectional study design was employed to collect and analyze information with the aim of determining the association between consistency of ANC visits, determinants, and maternal and neonatal outcomes.

2.3 | Study Population

The study population consisted of women who had recently given birth (within 7 days) and were admitted to the maternity wards of St. Francis Referral Hospital and Kibaoni Health Centers, between August and September 2024.

2.4 | Sample Size and Sampling Procedures

The desired sample size was calculated by using Kish Leslie's formula for cross-sectional studies at a 95% confidence interval (CI) and a marginal error of 5% [24].

$N = \frac{Z^2P(1-P)}{e^2}$: where N = number of sample size, $Z = Z$-value, which is 1.96, P = prevalence of women attending ANC, e = margin of error. Taking $p = 50\%$, the minimum sample size was estimated to be 384 participants. We recruited participants in the study using a consecutive sampling procedure, enrolling women who delivered within 7 days. We excluded patients who were unable to provide informed consent due to severe illness or mental impairment.

2.5 | Data Collection Tools and Procedures

Designed close-ended questionnaires were administered to the sampled respondents containing demographic information, obstetric history, ANC visits, determinants of ANC visits, consistency of ANC visits, and health outcomes. The questionnaire consisted of yes or no, Likert scale questions with responses ranging from three (agree, uncertain, disagree). We translated the questionnaire from English to Swahili (the First language in Tanzania) and then back to English to verify that the meaning is preserved, and administered the Swahili Version of the questionnaire to facilitate understanding of the items by the participants. To ensure the validity and reliability of the questionnaire, the final draft of the prepared questionnaire was given to experts to see whether the questions had enough content and validity assessment. Moreover, the reliability of the questionnaire was tested during data collection, whereby 10% of subjects were asked to fill in the same questionnaire during the main study, and after 2 weeks, the paired data were analyzed to ascertain the degree of correlation. Data were collected by experienced research assistants.

2.6 | Data Analysis

2.6.1 | Variables and Measures

2.6.1.1 | Dependent Variables. Consistency of pregnant women attending ANC visits was measured by frequency of attendance of ANC (>4 visits and <4 visits) from the Reproductive and Child Health (RCH 4) card. Pregnant women who attended >4 were considered as having consistent ANC visits in line with the WHO's 2016 recommendations and Tanzania's 2018 ANC Guidelines. This variable was chosen because ANC visit consistency is essential for monitoring maternal and fetal well-being, preventing complications, and ensuring early interventions when necessary.

2.6.1.2 | Independent Variables. Determinants of attending ANC visits, including sociodemographic determinants measured: age (years), marital status (single, married, divorced, widowed), education level (primary, secondary, tertiary, no formal education), occupation (unemployed, employed, self-employed, merchant), household index, and parity (primigravida, multigravida, grand multipara). Health system factors, including the modality of payment of the ANC services (out of pocket, insurance), relationship with the health care providers, from the questions on Respectful Maternity Care of ANC (Respect and dignity, client autonomy, confidentiality and privacy, nondiscrimination, and overall experience will categorize whether it is good or bad). Health-related factors (any previous pregnancy or current pregnancy complications as YES, and no previous pregnancy complication or current pregnancy complication as NO). Health outcome of both mothers and neonates, was checked from the antenatal (RCH 4) and noted in the questionnaire, including mode of delivery (vaginal delivery or cesarean section), maternal complications during delivery if any (anemia, infections, edema, proteinuria, preterm premature rupture of membrane), categorized as YES for any complication and NO for no complication, birthweight of newborn (2.5–4 kg as normal, <2.5 kg low birthweight, and >4 kg as big baby), Apgar score at fifth minute that will be scaled (7–10 normal, 4–6 moderate asphyxia, and 0–3 severe asphyxia), and neonatal complications if any (pre-term birth, neonatal infections, hypoglycemia, congenital anomalies); YES if any, NO if no complication.

2.7 | Statistical Analysis

Data was entered in Microsoft Excel software for cleaning and coding, then exported to SPSS software for Windows version 26 for analysis. Descriptive statistics (frequency distribution, mean, mode, and median) were used to describe the characteristics of the study population and the number of contacts of ANC visits. Bivariate analysis using a chi-square test was used to evaluate the association between consistency of ANC visits and maternal and neonatal outcomes (e.g., presence of maternal complications, neonatal complications). Also, to assess the association between determinants (e.g., marital status, education level) and consistency of ANC visits, logistic regression was performed to identify independent predictors. Variables with a significant value in the bivariate analysis, or those considered a priori to be clinically important, were included in the initial multivariable model. A backward elimination strategy was used to build the final model. Logistic regression was also used for binary outcomes (maternal complications, neonatal complications).

Multinomial regression was used to find the association between the consistency of ANC visits and the birth weights of the newborn (low birth weight, normal weight, and big baby). A p-value of less than 0.05 will be considered statistically significant. Model assumptions and reporting: Multicollinearity (VIF) and model fit (Hosmer–Lemeshow test) were checked. All statistical tests were two-sided, and the results are reported using adjusted odds ratios (aOR) and 95% CIs, with p-values reported according to standard conventions.

2.8 | Ethical Consideration

Ethical approval for the study was secured from the SFUCHAS Research and Ethical Committee. Authorization to access the study site was sought from St. Francis Referral Hospital. Each participant was provided informed consent and informed of their right to refuse to answer any questions or withdraw from the study at any time. Confidentiality was maintained; participants were identified by numbers, not names. Participants' data was kept confidential and not disclosed to unauthorized individuals without the prior consent of the participants and the research team.

3 | Results

3.1 | Demographic Information of the Participants

As shown in Table 1 below, a total of 396 postnatal women participated in this study. The age of participants ranged from 17 to 41 years, with the 23–29-year age group being the most represented (38.4%, $n = 152$), followed by those aged 30 years and above (38.1%, $n = 151$), and those under 23 years (23.5%, $n = 93$). The median age of the participants was 27 years. The majority of participants were married (78.5%, $n = 311$), while 20.5% ($n = 81$) were single and 1.0% ($n = 4$) were divorced. Regarding education level, nearly half had attained primary education (48.2%, $n = 191$), followed by secondary education (39.1%, $n = 155$), no formal education (11.6%, $n = 46$), and tertiary education (1.0%, $n = 4$). In terms of occupation, self-employment was the most common (48.0%, $n = 190$), followed by employment (32.6%, $n = 129$), unemployment (16.9%, $n = 67$), and being a merchant (2.5%, $n = 10$). Based on parity, 50.0% ($n = 198$) were multiparous (2–4 pregnancies), 39.1% ($n = 155$) were primigravida, and 10.9% ($n = 43$) were grand multipara. Just over half of the participants reported a low income (53.3%, $n = 211$), while 46.7% ($n = 185$) reported a high income.

TABLE 1 | Demographic information of the participants.

	Frequency	Percent
Age		
< 23	93	23.5
23–29	152	38.4
> 30	151	38.1
Marital status		
Single	81	20.5
Married	311	78.5
Divorced	4	1.0
Education level		
No formal education	46	11.6
Primary education	191	48.2
Secondary education	155	39.1
Tertiary education	4	1.0
Occupation		
Unemployed	67	16.9
Employed	129	32.6
Self employed	190	48.0
Merchant	10	2.5
Parity		
Primigravida	155	39.1
Multipara	198	50.0
Grand multipara	43	10.9
Income level		
Low	211	53.3
High	185	46.7

3.2 | Proportion of Consistent ANC Visits

Overall, 66.2% ($n = 262$) of the postnatal women in this study demonstrated good consistency in ANC attendance, defined as attending four or more ANC visits.

3.3 | Determinants of Consistent ANC Visits

3.3.1 | Social Demographic Factors

In Table 2a, bivariate analysis revealed a significant association between age and ANC consistency ($p = 0.03$), with younger women (< 23 years) showing the highest proportion of consistent attendance (77.41%). Income level was also significantly associated in the bivariate analysis ($p = 0.02$). However, in the adjusted logistic regression analysis (Table 2b), only younger age remained a significant independent predictor of consistent ANC attendance (aOR = 2.732, $p = 0.01$).

3.3.2 | Health System Factors

In Table 3a, both the modality of payment for ANC services and the relationship with healthcare providers were significantly associated with ANC consistency in the bivariate analysis ($p = 0.009$ and $p < 0.001$, respectively). As shown in Table 3b, multivariate analysis confirmed these findings, showing that having health insurance significantly increased the odds of consistent ANC attendance (aOR = 2.434, $p = 0.004$), while a poor relationship with healthcare providers significantly decreased these odds (aOR = 0.278, $p < 0.001$).

3.3.3 | Health Related Factors

In Table 4a, bivariate analysis showed a significant association between both previous and current pregnancy complications and ANC consistency ($p < 0.001$ and $p = 0.001$, respectively). However, in the multivariate analysis (Table 4b), women with no previous pregnancy complications had lower odds of consistent ANC attendance (OR = 0.342, $p < 0.001$), and similarly, women with no current pregnancy complications also had lower odds of consistent ANC attendance (OR = 0.433, $p = 0.001$).

TABLE 2a | Bivariate analysis of sociodemographic factors and ANC consistency.

Variable	Less than four visits, *N* (%)	Four and above visits, *N* (%)	Bivariate *p*-value
Age			
< 23	21 (22.58)	72 (77.41)	0.03
23–29	57 (37.50)	95 (62.50)	
> 30	56 (37.09)	95 (62.91)	
Marital status			
Single	25 (30.9)	56 (69.1)	0.75
Married	108 (34.7)	203 (65.3)	
Divorced	1 (25.0)	3 (75.0)	
Education level			
No formal education	15 (32.6)	31 (67.4)	0.55
Primary education	59 (30.9)	132 (69.1)	
Secondary education	58 (37.4)	97 (62.6)	
Tertiary education	2 (50.0)	2 (50.0)	
Occupation			
Unemployed	21 (31.3)	46 (68.7)	0.26
Employed	47 (36.4)	82 (63.6)	
Self-employed	60 (31.6)	130 (68.4)	
Merchant	6 (60.0)	4 (40.0)	
Parity			
Primiparous	58 (37.4)	97 (62.6)	0.47
Multiparous	63 (31.8)	135 (68.2)	
Grand multipara	13 (30.2)	30 (69.8)	
Income level			
Low	60 (28.44)	151 (71.56)	0.02
High	74 (40.0)	111 (60.0)	

3.3.4 | Consistent ANC Visits and Maternal Outcomes

Bivariate analysis (Table 5a) indicated a significant association between consistent ANC attendance and experiencing maternal complications during delivery ($p = 0.030$), with a higher proportion of women who experienced complications recorded among those having four or more visits. However, no significant association was found with the mode of delivery ($p = 0.598$). Logistic regression analysis (Table 5b) revealed that women with less than four ANC visits had lower odds of experiencing maternal complications (OR = 0.509, $p = 0.032$). The association with mode of delivery remained nonsignificant (OR = 0.880, $p = 0.598$).

3.3.5 | Consistent ANC Visits and Neonatal Outcomes

As in Table 6a, bivariate analysis showed no significant associations between ANC consistency and birth weight ($p = 0.36$), Apgar score ($p = 0.27$), or neonatal complications ($p = 0.67$). Similarly, multivariate logistic regression analysis (Table 6b) did not reveal any statistically significant associations between ANC consistency and these neonatal outcomes.

4 | Discussion

This study aimed to assess the consistency of ANC visits among postnatal women, determine the sociodemographic, health system, and health-related factors influencing ANC attendance, and examine the relationship between ANC visit consistency and maternal and neonatal outcomes. The findings revealed that 66.2% of participants attended at least four ANC visits, indicating relatively good consistency compared to WHO recommendations [1]. Age, health insurance, and relationships with healthcare providers were significantly associated with ANC visit consistency. Moreover, consistent ANC attendance was linked to better maternal health outcomes, though its effect on neonatal outcomes was not statistically significant.

The study revealed that 66.2% of participants attended four or more ANC visits, reflecting relatively good consistency compared to the WHO 2016 guidelines, which recommend up to eight visits [1]. These results are higher than a study done in Lushoto, Tanzania, where 16% of participants had at least four ANC visits [22]. However, this adherence remains consistent with the global average, where 62% attend four or more visits [4]. Conversely, in a study conducted in Rwanda, 54% of

TABLE 2b | Multivariate analysis of sociodemographic factors and ANC consistency.

Variable	Adjusted odds ratio (aOR)	95% Confidence interval	Multivariate *p*-value
Age			0.02
< 23	2.732	1.229–6.074	0.01
23–29	1.084	0.594–1.978	0.79
> 30	1		
Marital status			0.84
Single	0.545	0.046–6.405	0.63
Married	0.621	0.057–5.801	0.70
Divorced	1		
Education level			0.69
No formal education	1.474	0.173–12.540	0.72
Primary education	1.808	0.233–14.047	0.57
Secondary education	1.366	0.177–10.446	0.76
Tertiary education	1		
Occupation			0.94
Unemployed	1.579	0.365–6.829	0.54
Employed	1.452	0.349–6.038	0.61
Self-employed	1.457	0.350–5.987	0.61
Merchant	1		
Parity			0.09
Primiparous	0.489	0.192–1.246	0.13
Multiparous	0.905	0.405–2.022	0.81
Grand multipara	1		
Income level			0.07
Low	1.555	0.966–2.505	0.07
High	1		

TABLE 3a | Bivariate analysis of health system factors and ANC consistency.

Variable	Less than four visits, *N* (%)	Four and above visits, *N* (%)	Bivariate *p*-value
Modality of payment			
Health insurance	16 (21.1)	60 (78.9)	0.009
Out of pocket	118 (36.9)	202 (63.1)	
Relationship with provider			
Poor relationship	114 (41.0)	164 (59.0)	< 0.001
Good relationship	20 (16.95)	98 (83.05)	

participants did not make the recommended four visits to ANC during pregnancy [25]. In Tanzania, ANC attendance rates have steadily increased from 38% in 2010 to 65% in 2022, but adherence to the updated WHO guidelines remains limited [26].

This study found a significant association between younger maternal age and ANC consistency, with women under 23 years having 2.7 times higher odds of having four or more ANC visits than those over 23 years. This is consistent with a study done in eight African countries, which reported that younger women tend to adhere to ANC visits due to first-time pregnancy concerns [16]. However, in the present study, parity did not significantly affect ANC adherence (*p*-value 0.473). This is inconsistent with a study done in Rwanda, which suggested that multiparity often discourages ANC attendance [15]. These discrepancies may be explained by the cultural differences and variations in maternal education across these settings. Moreover, education level did not show a significant relationship

TABLE 3b | Multivariate analysis of health system factors and ANC consistency.

Variable	Less than four visits, *N* (%)	Four and above visits, *N* (%)	Adjusted odds ratio (aOR)	95% Confidence interval	Multivariate *p*-value
Modality of payment					0.004
Health insurance	16 (21.1)	60 (78.9)	2.434	1.323−4.478	0.004
Out of pocket	118 (36.9)	202 (63.1)	1 (reference)		
Relationship with provider					< 0.001
Poor relationship	114 (41.0)	164 (59.0)	0.278	0.161−0.478	< 0.001
Good relationship	20 (16.95)	98 (83.05)	1 (reference)		

TABLE 4a | Bivariate analysis of health-related factors and ANC consistency.

Variable	Less than four visits, *N* (%)	Four and above visits, *N* (%)	Bivariate *p*-value
Previous complications			
No	67 (45.9)	79 (54.1)	< 0.001
Yes	27 (22.5)	93 (77.5)	
Current complications			
No	105 (39.6)	160 (60.4)	0.001
Yes	29 (22.1)	102 (77.9)	

TABLE 4b | Multivariate analysis of health-related factors and ANC consistency.

Variable	Less than four visits, *N* (%)	Four and above visits, *N* (%)	Odds ratio (OR)	95% Confidence interval	Multivariate *p*-value
Previous complications					< 0.001
No	67 (45.9)	79 (54.1)	0.342	0.200−0.586	< 0.001
Yes	27 (22.5)	93 (77.5)	1 (reference)		
Current complications					0.001
No	105 (39.6)	160 (60.4)	0.433	0.268−0.700	0.001
Yes	29 (22.1)	102 (77.9)	1		

TABLE 5a | Consistency of ANC visits with maternal outcomes.

Variables	Less than four visits	Four and above visits	Total	*p*-value
Mode of delivery				0.60
Spontaneous vertex delivery	100 (34.6%)	189 (65.4%)	289	
Cesarian section	34 (31.78%)	73 (68.22%)	107	
Maternal complications during delivery				0.03
No	119 (36.17%)	210 (63.83%)	329	
Yes	15 (22.39%)	52 (77.61%)	67	

(*p*-value 0.687) with ANC visit consistency in the present study with the participants having no formal education, primary and secondary education having higher odds of completing ANC visits, this is consistent with a study done in Ethiopia which found that educational level does not influence completing the recommended eight visits (*p*-value > 0.05) [6]. The lack of association in the present study might be explained by Tanzania's efforts to promote maternal health education across all groups, minimizing the impact of formal education on ANC attendance. Income level was a significant determinant of ANC

TABLE 5b | Logistic regression showing the association between consistent ANC visits and maternal outcomes.

Variables		*p*-value	OR	95% Confidence interval
Mode of delivery	Less than four visits	0.60	0.880	0.548–1.414
Maternal complications		0.03	0.509	0.275–0.943

TABLE 6a | Bivariate analysis of ANC consistency and neonatal outcomes.

Variable	Less than four visits, *N* (%)	Four and above visits, *N* (%)	Bivariate *p*-value
Birth weight			
Low birth weight	32 (40.5)	47 (59.5)	0.36
Normal weight	101 (32.3)	212 (67.7)	
Big baby	1 (25)	3 (75)	
Apgar score			
Moderate score	5 (50)	5 (50)	0.27
Normal score	129 (33.4)	257 (66.6)	
Neonatal complications			
No	65 (32.83)	133 (67.17)	0.67
Yes	69 (34.85)	129 (65.15)	

TABLE 6b | Multivariate analysis of ANC consistency and neonatal outcomes.

Variable	Odds ratio (OR)	95% Confidence interval	Multivariate *p*-value	Statistical test
Birth weight				Multinomial logistic regression
Low birth weight	2.043	0.203−20.522	0.54	
Normal weight	1.429	0.147−13.911	0.76	
Big baby	1 (reference)			
Apgar score (moderate)	0.502	0.143−1.765	0.28	Binary logistic regression
Neonatal complications	1.094	0.722−1.660	0.67	

visit consistency in this study (*p*-value 0.015), with women from lower-income households showing higher consistent ANC visits than those with higher incomes. This finding contrasts with a study conducted in Lushoto, Tanzania, which reported that an increase in income increases the ANC consistency [22]. However, a study in Dodoma, Tanzania, reported that women with lower income had poor consistency of ANC visits [12]. The variation in results may be due to differences in the socioeconomic status of the population across study regions.

Women with health insurance had 2.4 times higher odds of attending ANC visits consistently compared to those paying out-of-pocket; this aligns with a study in Lushoto and Dodoma, which emphasized that financial security is a major facilitator of ANC adherence [12, 22]. Additionally, a positive relationship with healthcare providers was strongly associated with ANC visit consistency (*p*-value 0.000). This aligns with the study done in Bangladesh, Burkina Faso, Ethiopia, and India, which highlighted that provider trust and effective communication enhance ANC attendance [27]. Similarly, a study done in Ethiopia found that even if a woman has positive provider relationships, factors such as overcrowding with the students in training, lack of privacy, and long waiting times at healthcare facilities still negatively impacted ANC consistency [13].

Women with previous pregnancy complications were significantly more likely to attend four or more ANC visits. These findings are consistent with a study done in Ethiopia, which revealed that conditions like high fever influenced recommended ANC visits [6]. In addition, current pregnancy complications, such as anemia, hypertension, and infections, were significantly associated with ANC consistency in the present study. This is consistent with an Ethiopian study, which reported that women experiencing complications during pregnancy are more likely to attend ANC visits due to the need for close monitoring [6]. This highlights the need for better integration of high-risk pregnancy care within ANC services to ensure women receive the necessary medical attention.

A greater proportion of women, 77.61% who had recommended ANC visits had maternal complications. This may be due to the fact that they were already diagnosed with the danger signs that require close monitoring in the ANC attendances. This is consistent with a study done in Ethiopia, which reported that 75.1% had good ANC attendance due to pre-existing conditions that require monitoring [18]. Moreover, the present study found no significant association between ANC consistency and mode of delivery, with 68.22% of the participants who had recommended ANC visits delivered through cesarean section. This is consistent with a study done in Rwanda, where the cesarean section rate was high among the women who attended more than four visits [15].

The present study found no significant relationship between the consistency of ANC visits and neonatal outcomes, including birth weight, Apgar scores, and neonatal complications. This is inconsistent with a study done in Indonesia, which found that women who do not achieve the recommended ANC visits have a higher chance of having low birth weight babies [17]. In Rwanda, the study found that consistent ANC visits lead to better postnatal outcomes in newborns and that bad outcomes like low birth weight, admission to NICU, or neonatal death were associated with inconsistent ANC visits [15]. The discrepancy may be due to variations in the quality of ANC services rather than the number of visits between these regions.

The current study used a cross-sectional study design that allows for the assessment of multiple variables simultaneously, providing insights into the association between ANC visit consistency and maternal or neonatal outcomes. We collected data from a sample size of 396 postnatal women, which is sufficient to allow meaningful statistical analysis. Also, the use of RCH cards improved data accuracy and reduced recall bias. This study also has limitations that need to be acknowledged. The cross-sectional nature of the study limits causal links between the exposure and outcomes. The findings may not be generalizable to all postnatal women, especially those not attending the maternity ward at SFRH and Kibaoni or those in different geographic or socioeconomic settings. The possibility of social desirability bias cannot be ruled out, as some participants may have overreported or underreported certain information, such as their economic level or occupation. Also, there is a possibility of recall bias, as participants were required to recall their health-related experiences and previous complications.

5 | Conclusion

The findings of this study indicate that while a majority of postnatal women reported consistent ANC attendance (66.2%), several factors played a significant role in this consistency. Multivariate analysis revealed that younger age was positively associated with consistent ANC, and critical health system factors emerged as key determinants. Specifically, women with health insurance were significantly more likely to attend ANC consistently compared to those paying out-of-pocket, highlighting the impact of financial barriers. Furthermore, a positive relationship with healthcare providers was strongly associated with consistent ANC attendance, while a poor relationship significantly reduced the likelihood of adherence to recommended visit schedules. Interestingly, the initial associations observed in the bivariate analysis between previous and current pregnancy complications and ANC consistency were not sustained in the adjusted models. Regarding health outcomes, consistent ANC attendance was found to significantly decrease the odds of experiencing maternal complications during delivery. However, no statistically significant associations were observed between ANC consistency and the mode of delivery or the neonatal outcomes of birth weight, Apgar score, and neonatal complications in this population.

Moving forward, future studies should investigate the underlying reasons for age-related differences in ANC consistency and explore specific aspects of provider–client interactions that influence attendance. Longitudinal studies with larger and more diverse populations could further investigate the relationship between ANC consistency and a wider range of maternal and neonatal outcomes. Additionally, intervention studies focusing on strategies to improve health insurance coverage among pregnant women and to enhance communication and trust between pregnant women and healthcare providers are warranted to translate these findings into tangible improvements in MCH in this setting and similar contexts.

Author Contributions

Veronica Kennan Ngombe conceived the study design and drafted the manuscript. Ally Kitema carried out the analysis. Majani Edward and Albino Kalolo authored the original draft and revised the manuscript. All authors read and approved the final manuscript.

Ethics Statement

The study protocol was approved by the St. Francis University College of Health and Allied Sciences Ethical Clearance Committee with reference number SFU/Re.Pub/Eth.App/Vol.1/5. This study adhered to the Declaration of Helsinki, and written informed consent was obtained from all participants before their involvement in the study.

Consent

The authors have nothing to report.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data supporting the findings of this study are available upon reasonable request from the corresponding author.

Transparency Statement

The lead author, Majani Edward, affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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