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Examining the Multifaceted Determinants of Antenatal Care Utilization in Ghana Using Structural Equation Modelling

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Abstract

Introductions: Maternal and newborn mortality remains a critical global public health challenge, especially in middle- and lower-income countries. One of the most effective strategies for reducing these mortality rates is the adequate utilization of antenatal care (ANC). This study investigated the determinants influencing ANC utilization and aimed to predict the demographic characteristics that impact ANC attendance using Structural Equation Modelling (SEM). **Methods**: A cross-sectional analytical study was conducted with 254 pregnant women at St. Lucas Hospital in Ghana. Data were collected using a structured questionnaire. SEM and Chi-square analysis were employed to model and examine the determinants influencing antenatal care utilization. **Results**: The findings revealed that the majority (72%) of postpartum mothers had four or more ANC contacts during their most recent pregnancy, with 47.6% initiating ANC attendance in the first trimester. ANC usage was significantly associated with maternal education level (P = 0.000), occupational status (P = 0.000), age (P = 0.030), marital status (P = 0.034), religious affiliation (P = 0.000), husband's education (P = 0.000), and husband's occupation (P = 0.000).. Furthermore, SEM analysis showed that community factors (P = 0.005) and health provider factors (P =

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0.000) were important in ANC utilization. This study identified significant demographic factors, such as maternal and husband's education and occupation, and highlighted the critical roles of health providers and community factors in ANC utilization. **Conclusions**: This study established some essential determinants such as health provider and community factors in the utilization of ANC contacts. The study also revealed some demographic characteristics as crucial determinants of ANC attendance.

Keywords: Antenatal care utilization, maternal and newborn mortality, postpartum mothers, cross-sectional analytical study, structural equation modeling

Introduction

Antenatal care (ANC) is crucial for reducing maternal morbidity and mortality and ensuring a positive pregnancy experience (Bolarinwa et al., 2021). The health of pregnant women and their unborn children is paramount, and as United Nations Secretary-General Ban Ki-moon stated in an overview of WHO guidelines on antenatal care: "To achieve every Woman Every Child vision and the Global Strategy for Women's, Children's, and Adolescents' Health, we need innovative, evidence-based approaches to antenatal care" (WHO, 2016). Maternal health, with a focus on ANC, is a priority for public health organizations, the World Health Organization, the Ghana Health Service, and non-governmental organizations [as these entities] strive to improve life in communities, regions, countries, and globally. The death of a pregnant woman poses a significant burden and loss to the family and community, [particularly because] two lives are at risk. Therefore, maternal health issues, particularly antenatal care, require prompt attention in health and research fields.

According to the World Health Organization (WHO), estimates indicate that between 1990 and 2015, about 303,000 women died (WHO, 2016). Senah (2003) observed that all women of childbearing age are at risk of losing their lives during pregnancy, regardless of their race, level of education, marital status, or line of work. Moreover, Alvarez et al. (2009) suggested that there is no single effective way to lower maternal mortality. Despite notable progress in areas like Asia and North Africa, the global maternal mortality ratio (MMR) decreased by just 2.3% per year between 1990 and 2015 (WHO, 2016).

Available data indicate that approximately 529,000 maternal deaths occur annually (Ronsmans & Graham, 2006). Around 585,000 women die each year due to pregnancy-related complications, with developing nations such as Sub-Saharan Africa, accounting for 99% of these deaths (UNICEF, 2019). Women face numerous challenges, including pregnancy complications,

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that frequently result in maternal mortality (Ikhtiar, 2015). Poor nutrition, poverty, inadequate sanitation, lack of education, and limited access to healthcare significantly impact women's health during pregnancy and delivery, making them more vulnerable (Ronsmans & Graham, 2006). Maternal mortality began to decline more rapidly starting in 2000, achieving a reduction rate of 5.5% (WHO, 2016). There has been extensive international collaboration to reduce maternal mortality significantly (WHO, 2016).

The use of antenatal care is a key factor in determining favourable outcomes for both the mother and the newborn, as demonstrated by Moos et al. (2008), who confirmed that it contributes to safer deliveries and better maternal health. ANC makes it possible to identify and manage possible dangers and consequences early (UNESCO, 2013). However, inadequate ANC attendance makes it more difficult to identify high-risk pregnancies (Flenady et al., 2011), contributing to a 63% higher risk of pregnancy complications (Coria-Soto et al., 1996; Magadi et al., 2000). Effective pregnancy management and the welfare of the unborn child depend on the knowledge and interventions that ANC offers, even though it may not be able to completely avert obstetric emergencies on its own (Coria-Soto et al., 1996; Magadi et al., 2000). Despite its importance, the determinants influencing ANC utilization in Ghana remain multifaceted and complex, necessitating a robust approach, such as Structural Equation Modelling, to explore these determinants comprehensively.

In Ghana, the situation is similar, as antenatal coverage has declined over the years due to factors beyond biological and individual influences, including education, wealth, and ethnicity (Ministry of Health, 2016). The provision of basic obstetric and antenatal care in Ghana is managed by key players within the health system, including Community-based Health Planning and Services (CHPS), health centres, private faith-based facilities, and private midwifery homes (Witter et al., 2009). The Ghana Health Service (GHS) operates district and regional hospitals, as well as tertiary hospitals, which provide emergency and comprehensive obstetric care. Many mission health facilities are located in remote areas, where Traditional Birth Attendants (TBAs) are sometimes trained to assist in deliveries and refer complex cases to hospitals. Meanwhile, Ghana, through the National Health Insurance Scheme (NHIS), has adopted the WHO recommendation of at least four antenatal care visits, although eight are advised (Witter et al., 2009; WHO, 2016; NHIS, 2017).

Although limited studies on antenatal care service use have been conducted in Ghana, none have extensively applied Structural Equation Modelling to investigate the factors influencing ANC utilization among pregnant women, particularly in northern Ghana. This knowledge gap can hinder the planning and delivery of effective reproductive and maternal

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healthcare services. Thus, understanding the determinants affecting ANC utilization could be a vital step in developing strategies to improve ANC service usage at both the local and national levels in Ghana. This study aims to explore the determinants associated with ANC service utilization among postpartum mothers, [with the goal of contributing] to policies that reduce maternal deaths and improve neonatal outcomes.

Methods

Study Area, Design, and Period

A cross-sectional analytical study was conducted to evaluate the impact of antenatal care utilization among pregnant women. The study took place in Yesobsa Central, a suburb of the Wiaga sub-district, located in the Builsa North District of the Upper East Region, Ghana. The sub-district had a population of 2,931 in the year 2023. The inhabitants of the community were predominantly Christians. The occupations of the people included farming, trading, and civil service. The sub-district had only St. Lucas Hospital as the primary-level hospital and a few other community-based health planning and services (CHPS) facilities.

The sample size was determined using Yamane's formula with a population size of 703 and a 5% margin of error. This study recruited 254 pregnant women through purposive sampling. Because the study had limited resources and time, purposive sampling was used to choose a sample that would provide the most insightful information on ANC usage. The study aimed to comprehend the intricate, context-specific aspects impacting ANC, which could be best captured by focusing on a carefully chosen set of people with relevant experiences. To meet the inclusion criteria, a sampling frame was developed, including a list of all pregnant women who had enrolled and were attending the postnatal care (PNC) clinic on the data collection day. The postnatal clinic provided information on the average number of postnatal mothers seen every other day, and a total of 254 mothers were interviewed.

The questionnaire was carefully reviewed in relation to the body of available literature. It was specifically designed to meet the research goals. The questions thoroughly investigated the variables affecting antenatal care utilization. A self-developed, structured questionnaire with four sections was eventually employed: The first and second sections focused on demographic factors such as age, marital status, religion, occupation, educational level, income level, health status, and pregnancy intention that could affect ANC utilization. The third section examined community factors, such as family support and cultural influences, affecting ANC use. The final section addressed service provider characteristics, such as facility accessibility, medication availability, and healthcare professional attitudes, impacting ANC utilization. The questionnaires were self-administered and completed face-to-

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face. The level of antenatal care utilization was used as the dependent variable, while factors such as patient characteristics, health system influences, socio-cultural factors, and quality of care were considered independent variables.

Inclusion Criteria

1. All postpartum clinic attendees between the ages of 15 and 49 were included
2. Women who attended antenatal care services at St. Lucas Hospital and provided informed consent to participate in the study were included.

Exclusion Criteria

1. Participants' records that were not complete were excluded.
2. Women who attended the hospital for emergency or non-antenatal care purposes were excluded.
3. Pregnant women who did consent to the study were all excluded

Data Processing and Analysis

Data were collected, coded, and entered into Excel, then transferred to the Statistical Package for Social Sciences (SPSS) Version 22 and STATA Version 14 for statistical analysis. Descriptive statistics such as frequencies and percentages were performed. The Chi-square test was used to explore relationships among variables. Additionally, a Structural Equation Model (SEM) was employed to test the hypothesis that patient characteristics, health system factors, socio-cultural influences, and quality of care directly impact antenatal care utilization. The significance threshold for associations between variables was set at $P < 0.05$.

Ethical Considerations and Approval

Ethical clearance was obtained, and the hospital gave its approval to conduct the study. When participants were fully informed about the study, they signed or thumb-printed a consent form to provide written informed consent. All patients' privacy and confidentiality were strictly safeguarded.

SEM Assumptions

The following assumptions were met as requirements for the SEM analysis:

1. To verify the linear associations between observed variables and latent constructs, a scatterplot was performed, assuming the relationships among variables were linear.
2. As a normality requirement for SEM analysis, the Shapiro-Wilk test was used. Log transformation was applied to skewed distributions.
3. An adequate sample size was employed in our study for SEM parameter estimation. The sample size of 254 exceeded the minimum requirements, ensuring sufficient power for model estimation.

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4. Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR) were used to evaluate model fit. The acceptable model fit cutoff values were: CFI > 0.90, RMSEA < 0.06, and SRMR < 0.08.
5. The multicollinearity assumption for SEM analysis was assessed using Variance Inflation Factors (VIFs). No significant multicollinearity issues were found, as all VIFs were below the threshold of 5.

Results

Socio-demographic characteristics of respondents

The main characteristics are detailed in Table 1. The majority of respondents were between the ages of 26–30 years, accounting for 100 (39.4%) of the sample while those over 35 years (13.8%) accounted for the minority. Most respondents had a body mass index (BMI) classified as overweight, with 137 (53.9%), while 84 (33.1%) had a healthy weight, and 33 (13.0%) were classified as obese. A large proportion of respondents were married, totaling 247 (97.2%), with the highest education level being Junior High for 107 (42.1%), and 67 (26.4%) having no formal education. In terms of employment, most respondents were self-employed (115 or 45.3%), followed by traders (67 or 26.4%), unemployed individuals (43 or 16.6%), and government workers (29 or 11.4%). Table 1 also shows that the majority of respondents identified as Christians, with 206 (81.1%), while 31 (12.2%) were Muslims, and 17 (6.7%) practiced traditional religions. Most husbands were traders, with 146 (57.5%), while 47 (18.5%) were unemployed.

Table 1: Socio-demographic characteristics of respondents

Variables	Category	Frequency	Percentage
Ages	18- 25	70	27.6
	26-30	100	39.4
	31-35	49	19.3
	>35	35	13.8
BMI	Healthy weight	84	33.1
	Overweight	137	53.9
	Obese	33	13.0
Marital Status	Married	247	97.2
	Single	7	2.8
Educational Level of Mother	No education	42	16.5
	Primary	76	29.9
	Junior high	107	42.1
	Senior high	29	11.4
Occupation of Mother	Unemployed	43	16.9
	Trader	67	26.4
	Self-employed	115	45.3
	Government worker	29	11.4
Educational Level of Husband	No education	67	26.4

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	Primary	53	20.9
	Junior high	13	5.1
	Senior high	41	16.1
	Tertiary and above	80	31.5
Occupation of Husband	Unemployed	47	18.5
	Trader	146	57.5
	Self employed	29	11.4
	Government worker	32	12.6
Religious Affiliation	Christian	206	81.1
	Islam	31	12.2
	Traditional	17	6.7

Individual, Community and Health provider factors influencing the utilization of ANC

Table 2 below presents the various individual factors influencing respondents' use of antenatal care (ANC) services. The majority of respondents strongly agreed (207 or 81.5%) that their educational level played a role in determining their likelihood of utilizing ANC, with 34 (13.4%) agreeing, 7 (2.8%) feeling neutral, and 6 (2.4%) disagreeing. Most respondents also agreed (167 or 65.7%) that a woman's income influenced their participation in ANC services, with 29 (11.4%) strongly agreeing, 53 (20.9%) feeling neutral, and 5 (2.0%) disagreeing. Additionally, 161 (63.4%) strongly agreed that the overall health status of the mother influenced their use of ANC, 74 (29.1%) agreed, 8 (3.1%) felt neutral, and 6 (2.4%) disagreed. A large majority also agreed (128 or 50.4%) and strongly agreed (109 or 42.9%) that a woman's pregnancy intention affected their use of ANC, while 12 (4.7%) were neutral, 4 (1.6%) disagreed, and 1 (0.4%) strongly disagreed. It is evident that most mothers (94.9%) believed their educational level influenced their utilization of ANC.

Table 2 also shows the results of univariate analysis of health provider factors influencing ANC utilization. Most mothers strongly agreed (213 or 83.9%) that the availability of healthcare facilities influenced their ANC use. A significant proportion also agreed (175 or 68.9%) that affordability affected their decision to utilize ANC. Many respondents (172 or 67.7%) agreed that the accessibility of ANC influenced their decision, with 2 (0.4%) disagreeing. Furthermore, 244 (96.1%) either agreed or strongly agreed that the quality of care influenced their decision to use ANC services, while 2 (0.8%) disagreed.

Additionally, Table 2 includes a univariate analysis of community factors affecting ANC utilization. Cultural beliefs and practices surrounding pregnancy and childbirth were either agreed or strongly agreed upon as influencing ANC use by 243 (95.7%), while 9 (3.6%) either disagreed and or strongly disagreed. Social support from family and community members was strongly agreed or agreed to be influential by 238 (93.7%), with 8 (3.6%) disagreeing or strongly disagreeing. A large majority (249 or 98.1%) strongly

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agreed or agreed that a woman's beliefs and attitudes toward pregnancy and childbirth influenced her use of ANC, with 4 (1.6%) disagreeing or strongly disagreeing. Moreover, 242 (95.2%) agreed or strongly agreed that men's involvement and support in promoting ANC influenced whether a woman utilized antenatal care services, with 4 (1.6%) disagreeing.

Table 2: Individual, Community and Health provider's factors influencing ANC utilization

Characteristics	Category	Frequency	Percentage
Individual Factors			
A woman's educational level influences her likelihood of seeking and utilizing antenatal care services.	Disagree	6	2.4
	Neutral	7	2.8
	Agree	34	13.4
	Strongly agree	207	81.5
A woman's income affects her decision to access antenatal care visits.	Disagree	5	2.0
	Neutral	53	20.9
	Agree	167	65.7
	Strongly agree	29	11.4
It is believed that a woman's health status plays a role in her decision to utilize antenatal care services	Disagree	6	2.4
	Neutral	8	3.1
	Agree	74	29.1
	Strongly agree	161	63.4
A woman's pregnancy intention is in determining her utilization of antenatal care services.	Strongly disagree	1	0.4
	disagree	4	1.6
	Neutral	12	4.7
	Agree	128	50.4
	Strongly agree	109	42.9
Health Provider Factors			
The availability of healthcare facilities and trained healthcare providers influences the utilization of antenatal care services,	Strongly disagree	1	0.4
	Disagree	2	0.8
	Neutral	4	1.6
	Agree	34	13.4
	Strongly agree	213	83.9
The affordability of antenatal care services affects a woman's decision to seek and utilize care.	Disagree	1	0.4
	Neutral	22	8.7
	Agree	175	68.9
	Strongly agree	56	22.0
It is believed that the accessibility of antenatal care services affects women's utilization of care.	Disagree	2	0.8
	Neutral	12	4.7
	Agree	172	67.7
	Strongly agree	68	26.8
The quality of antenatal care services is in determining whether or not women seek and utilize care.	Disagree	2	0.8
	Neutral	8	3.1
	Agree	150	59.1
	Strongly agree	94	37.0
Community Factors			
Cultural beliefs and practices surrounding pregnancy and childbirth affect women's utilization of antenatal care services.	Strongly disagree	7	2.8
	Disagree	2	0.8
	Neutral	2	0.8
	Agree	34	13.4
	Strongly agree	209	82.3

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Social support from family and community members influences a women's decision to seek and utilize antenatal care services.	Strongly disagree	2	0.8
	Disagree	6	2.4
	Neutral	8	3.1
	Agree	78	30.7
	Strongly agree	160	63.0
It is believed that women's beliefs and attitudes towards pregnancy and childbirth affect their utilization of antenatal care services.	Strongly disagree	1	0.4
	Disagree	3	1.2
	Neutral	1	0.4
	Agree	23	9.1
	Strongly agree	226	89.0
Men's involvement and support in promoting antenatal care utilization is in determining whether or not women access and utilize care.	Disagree	4	1.6
	Neutral	8	3.1
	Agree	59	23.2
	Strongly agree	183	72.0

Quality Care Factors and Level of ANC utilization

Table 3 presents the results of univariate analysis of antenatal care (ANC) utilization among respondents. A majority of respondents, 140 (55.1%), rated the quality of antenatal care they received as satisfactory while 1 (0.4%) rated the quality as poor. Regarding communication between healthcare providers and patients, most respondents (166 or 65.4%) were very satisfied, while 88 (34.6%) found the services merely satisfactory.

Table 3 also shows that 127 (50%) of respondents had at least four ANC contacts, while the other half did not. Among them, 183 (72.0%) had four or more visits, 37 (14.6%) had 0–1 contacts, and 34 (13.4%) had 2–3 visits in their previous pregnancy. A significant number, 121 (47.6%), had their first visit within the first three months while 27 (10.6%) representing the minority had their first visit in the seventh to ninth months. Additionally, 137 (53.9%) responded positively to having their first visit in the first month, while 117 (46.1%) did not have their first visit in the first trimester. Of the respondents, 137 (53.9%) had their first contact between weeks 1 and 12, 76 (29.9%) had it between weeks 13 and 24, and 41 (16.1%) had it between weeks 25 and 36.

Furthermore, 228 (89.8%) of respondents received all the recommended antenatal services, while 26 (10.2%) did not. Most respondents (126 or 49.6%) visited an antenatal care facility more than four times while the minority 46 (18.1%) visited an ANC facility 0–1 times.

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Table 3: Quality of Care and Level of Antenatal utilization

Characteristics	Category	Frequency	Percentage
Level of Antenatal Care			
How many antenatal care visits did you have during your previous pregnancy?	0-1 times	37	14.6
	2-3 times	34	13.4
	4 and above times	183	72.0
When did you first visit an antenatal care facility during your current pregnancy?	1-3 months	121	47.6
	4-6 months	106	41.7
	7-9 months	27	10.6
Did you have your first antenatal care visit in the first trimester of your pregnancy?	Yes	137	53.9
	No	117	46.1
How many weeks pregnant were you when you had your first antenatal care visit?	1-12 weeks	137	53.9
	13-24weeks	76	29.9
	25-36 weeks	41	16.1
Did you receive all of the recommended antenatal care services during your pregnancy?	Yes	228	89.8
	No	26	10.2
How many times have you visited an antenatal care facility during your current pregnancy?	0-1 times	46	18.1
	2-3 times	82	32.3
	4 and above times	126	49.6
Quality Care Factors			
How would you rate the overall quality of the antenatal care you received during your pregnancy?	Poor	1	0.4
	Satisfactory	140	55.1
	Excellent	113	44.5
How satisfied were you with the communication between you and your healthcare provider during your antenatal care visits?	Satisfactory	88	34.6
	Very Satisfactory	166	65.4
Have you had at least four antenatal care visits during your current pregnancy?	Yes	127	50

Association between demographic characteristics and utilization of ANC

Table 4 presents the association between various socio-demographic variables and the utilization of antenatal care (ANC) visits, categorized into three groups: 0-1 visits, 2-3 visits, and more than 4 visits. The variables examined include age, Body Mass Index (BMI), marital status, educational level, occupation, husband's educational level, husband's occupation, and religious affiliation. There is a statistically significant association between age and the number of ANC visits ($X^2 = 13.957$, df = 6, p = 0.030). Women aged 26-30 had the highest number of ANC visits (>4), indicating that women in this age group are more likely to utilize ANC services. Marital status also shows a significant association with ANC utilization ($X^2 = 4.476$, df = 1, p = 0.034). Married women are significantly more likely to have higher ANC visits compared to single women, highlighting the role of marital support in ANC attendance. The educational level of the mother has a strong and significant association with ANC utilization ($X^2 = 50.960$, df = 6, p = 0.000).

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Mothers with junior high and senior high education levels are more likely to have more than 4 ANC visits, suggesting that higher education correlates with better ANC attendance. The occupation of the mother is significantly associated with ANC utilization ($X^2 = 43.971$, df = 6, p = 0.000). Government workers and self-employed mothers are more likely to have more than 4 ANC visits, indicating that employment status and possibly income stability are key factors in ANC utilization.

The educational level of the husband is also significantly associated with ANC utilization ($X^2 = 79.865$, df = 8, p = 0.000). Women whose husbands have tertiary education or higher are more likely to have more than 4 ANC visits, suggesting that a husband's education positively influences ANC attendance. The occupation of the husband shows a significant association with ANC utilization ($X^2 = 54.972$, df = 6, p = 0.000). Women whose husbands are traders are more likely to have 2-3 ANC visits, while those with husbands who are government workers are more likely to have more than 4 ANC visits. Religious affiliation is significantly associated with ANC utilization ($X^2 = 24.601$, df = 4, p = 0.000). Christian women are more likely to have more than 4 ANC visits compared to women of other religions, indicating a possible cultural or community support system within religious groups that encourages ANC attendance. Although BMI shows differences in ANC utilization, the association is not statistically significant ($X^2 = 6.510$, df = 4, p = 0.164).

Table 4: Association between socio demographics and utilization of ANC

Variables		**Antenatal care visits**			**X^2**	**df**	**P**
		0-1	2-3	>4			
Ages	18- 25	14	17	39			
	26-30	19	40	41	13.957	6	0.030
	31-35	3	18	28			
	>35	10	7	18			
BMI	Healthy weight	16	27	41	6.510	4	0.164
	Overweight	27	48	62			
	Obese	3	7	23			
Marital status	Married	43	79	125	4.476	1	0.034
	Single	3	3	1			
Educational level of mother	No education	8	6	28	50.960	6	0.000
	Primary	25	36	15			
	Junior high	10	37	60			
	Senior high	3	3	23			
Occupation of mother	Unemployed	7	5	31	43.971	6	0.000
	Trader	14	34	19			
	Self-employed	24	41	50			
	Government worker	1	2	26			
Educational level of husband	No education	15	27	25	79.865	8	0.000
	Primary	21	25	7			
	Junior high	4	5	4			

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	Senior high	5	14	22			
	Tertiary and above	1	11	68			
Occupation of husband	Unemployed	2	9	36	54.972	6	0.000
	Trader	27	69	50			
	Self employed	5	2	22			
	Government worker	12	2	18			
Religious affiliation	Christian	35	60	111	24.601	4	0.000
	Islam	8	8	15			
	Traditional	3	14	0			

Factors influencing utilization of antenatal care using structural equation model

The structural equation model revealed that patient/individual factors ($\beta = -0.114$) and quality care factors ($\beta = -0.103$) had negative effects on antenatal care. However, these effects were not statistically significant (all $P > 0.05$). In contrast, health system factors ($\beta = 0.338$; $P = 0.000$) and socio-cultural factors ($\beta = 0.174$; $P = 0.005$) had significant positive effects on antenatal care (see Appendix A, Table 8, and Fig. 2). Overall, the model fit statistics (see Appendix B) indicate that the structural equation model fits the observed data well, as shown by the low values for the Root Mean Squared Error of Approximation (RMSEA ($P < 0.000$), Pclose = 1.000), the Standardized Root Mean Squared Residual (SRMR ($P < 0.001$)), and the Coefficient of Determination (CD = 15.4%). Additionally, the high values for the Comparative Fit Index (CFI = 1.000) and Tucker-Lewis Index (TLI = 1.000) suggest a good fit. The chi-square statistics also indicate that the model is an excellent fit compared to both the saturated model and the baseline model.

The Akaike Information Criterion (AIC = 1257.046) and Bayesian Information Criterion (BIC = 1327.793) values suggest that the model is reasonably parsimonious, given its fit to the data. This covariance matrix provides important details about the relationships between the latent variables in the structural equation model. The covariances between social culture and quality care, as well as between patient factors and quality care, indicate low associations between these latent variables. Their p-values ($P > 0.05$) suggest that these covariances are not statistically significant, further supporting the idea of a weak relationship. However, the covariances between patient factors and health system factors, patient factors and socio-cultural factors, health system and socio-cultural factors, and health system and quality care factors show significant positive associations between the latent variables (all $P < 0.05$). It should be noted that as one-factor increases, the other tends to increase as well. All the details are presented in Table 5 and Figure 1.

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Table 5: Summary of the factor loadings

Factors	Standard estimate	*P*	Decision
Patient →ANC Visit	-.1137991	0.067	Not significant
Health System →ANC Visit	.3375756	0.000	Significant
Socio Culture →ANC Visit	.1735345	0.005	Significant
Quality Care →ANC Visit	-.1030693	0.079	Not significant

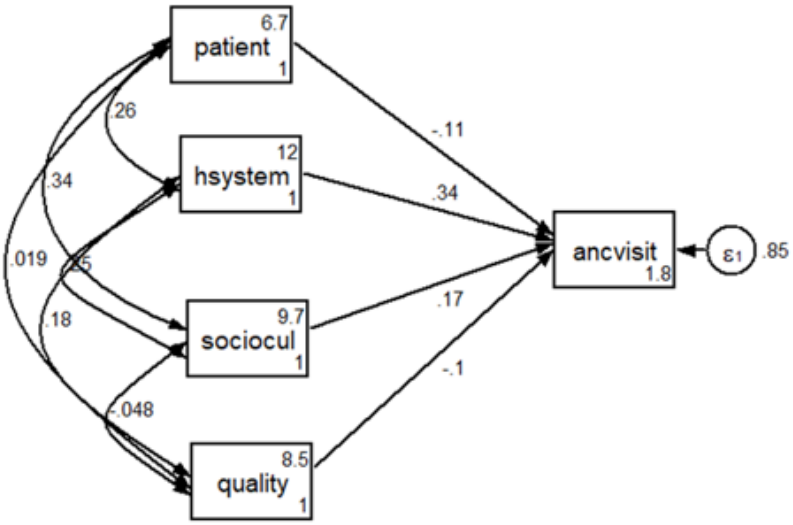

Figure 1: Structure Equation model showing factors influencing the utilization of antenatal care

Discussion

This study aimed to explore the determinants associated with ANC service utilization among postpartum mothers. Regarding individual-level factors, the study found that the majority of respondents strongly agreed that a woman's educational level significantly influences her likelihood of seeking and utilizing antenatal care services. This finding aligns with the study by Simkhada et al. (2008), which also identified educational level as a strong predictor of ANC utilization. The similarity between these studies highlights the critical role education plays in equipping women with knowledge about the benefits of ANC. Additionally, the study revealed that most respondents agreed that a woman's income affects her decision to access antenatal care visits. This finding is consistent with the research by Adukwu (2015), which concluded that income level significantly influences ANC utilization. Higher-income levels often correlate with better access to healthcare services, including ANC.

In terms of healthcare provider factors influencing ANC utilization, the study found that only a few respondents agreed that the availability of healthcare facilities and trained healthcare providers influences the utilization

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of antenatal care services. This finding contrasts with the study by Owino et al. (2009), which reported that the availability of healthcare facilities significantly influenced ANC utilization. The discrepancy between the two studies may be attributed to differences in the availability and accessibility of healthcare services in their respective study areas.

The study found that the majority of respondents agreed that the affordability of antenatal care (ANC) services significantly affects a woman's decision to seek and utilize care. However, this finding contrasts with the study by Lire (2017), which emphasized that the accessibility of medications plays a more significant role in influencing ANC utilization among women.

Moreover, the study revealed that 67.7% of respondents agreed that the accessibility of antenatal care services affects women's utilization of care. This finding aligns with the research by Magadi et al. (2000), which also concluded that the accessibility of ANC services is a crucial factor influencing ANC utilization among women. It is important to note that most maternal deaths occur during childbirth, and the presence of trained medical staff could significantly reduce this number. Antenatal care provides an opportunity to promote the benefits of skilled attendance at birth and to encourage women to seek postpartum care for themselves and their newborns. Additionally, ANC is an ideal time to counsel women on the benefits of child spacing. It offers essential health services, including health promotion, disease prevention, screening, and diagnosis.

The study also examined community-level factors that influence ANC utilization. The findings revealed that 82.3% of respondents strongly agreed that cultural beliefs and practices surrounding pregnancy and childbirth affect women's utilization of antenatal care services. This finding is consistent with the study by Adukwu (2015), which also found that cultural factors significantly influenced ANC attendance among pregnant women. Furthermore, the study showed that 63% of respondents strongly agreed that social support from family and community members influences a woman's decision to seek and utilize antenatal care services. This finding aligns with the research by Mpembeni et al. (2007), which found that a husband's decision significantly impacts a woman's access to ANC services.

Regarding the quality of antenatal care received, 55.1% of respondents rated it as satisfactory, while 44.5% rated it as excellent. This finding differs from the study by Senah (2003), where women expressed dissatisfaction with ANC services. Additionally, most respondents (65.4%) were very satisfied with the communication between healthcare providers and patients. Encouraging pregnant women to attend ANC could play a crucial role in linking them with the health system, which, if functioning well, could be critical in saving their lives in the event of complications during labor and childbirth.

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The study examines the demographic factors influencing antenatal care (ANC) attendance among women. It found a significant association between the age of respondents and ANC utilization. This finding is consistent with the study by Mugo et al. (2015), which also identified age as a factor affecting the use of ANC. The similarity between these studies may be attributed to the influence of age on the health-seeking behavior of women in Ghana.

The study also explored the impact of marital status on ANC utilization and found it to be significant. This finding aligns with the research by Tsegay et al. (2013), which revealed that marital status significantly influences ANC visits. The consistency in these findings may be related to the role that family support plays in a woman's decision to utilize ANC services.

Regarding educational level, the study found that both the woman's and her husband's education significantly influenced her likelihood of seeking and utilizing ANC services. This finding is in agreement with Al-Zubayer (2024), which also identified educational level as a strong predictor of ANC utilization. The role of education in increasing knowledge about the benefits of ANC likely explains the similarity between the two studies.

Additionally, the study found that the occupational status of both the woman and her husband influences her likelihood of seeking and utilizing ANC services. This finding is consistent with the research by Fotso et al. (2009), which also identified occupational status as a strong predictor of ANC utilization. It is important to note that a woman's occupation may significantly impact the extent to which she uses antenatal services. It is also important to emphasize that care during pregnancy provides a critical opportunity to deliver interventions that improve maternal health and survival during the period immediately preceding and following birth. Preventing complications for mothers and babies depends on a well-functioning continuum of care including accessible, high-quality services before and during pregnancy, childbirth, and the postnatal period, and good nutrition is equally vital throughout these stages.

Conclusion

The study found that social and cultural factors primarily influence women decision making whether to seek ANC care or not. The study found that at the health facility level, the utilization of ANC among women could be a result of the health education health workers at the study area continue to do concerning ANC attendance and the quality of ANC care they receive. The implication of this is that healthcare providers at the study place could use the findings to provide health education to women to improve their ANC attendance. The study found that there was a significant association between certain demographic data of respondents and utilization of ANC services. The study's findings are applicable to academic, professional, and policy-making

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domains because they highlight the significance of sophisticated analytical techniques like SEM for intricate healthcare research and add to theoretical models on healthcare-seeking behaviors, particularly in relation to maternal health. On a practical level, the insights help healthcare workers create focused interventions, and policymakers can utilize the results to guide data-driven policies that enhance mother and newborn health outcomes and remove obstacles to accessing prenatal care.

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