Assessment of the outcome of antenatal care on maternal and fetal health using secondary data of pregnant women

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Abstract

Antenatal care (ANC) is a critical component of maternal and child health, aimed at ensuring positive pregnancy outcomes through early detection and management of complications. This study examined the relationship between antenatal care attendance and maternal and fetal outcomes among pregnant women attending ALGON Health Centre, Eyin Grammar, Ibadan, between January 2023 and December 2024. A retrospective descriptive study design was adopted, utilizing medical records of respondents selected through a systematic approach. Data were obtained from the hospital records and included socio-demographic characteristics such as religion and tribe, as well as clinical variables related to ANC attendance and pregnancy outcomes. The findings revealed that Islam was the dominant religion (56.1%). The Yoruba ethnic group constituted the majority (81.9%). The study showed a high level of ANC utilization, with 345 (92.7%) of respondents attending at least four ANC visits. Specifically, 91.5% attended at least four visits in 2023, increasing to 94.1% in 2024, indicating improved compliance. Maternal health outcomes demonstrated that complications such as anemia, pre-eclampsia, postpartum hemorrhage, and maternal mortality were more prevalent among women who attended fewer than four ANC visits. Notably, postpartum hemorrhage and maternal mortality occurred only among women with inadequate ANC attendance. Fetal outcomes followed similar trend, as respondents with adequate ANC attendance recorded better birth outcomes, including higher proportions of normal birth weight and reduced cases of preterm delivery, stillbirth, and neonatal mortality. Conversely, poor fetal outcomes were more common among women with fewer ANC visits. Furthermore, pregnancy-related complications varied across trimesters, with anemia and pregnancy-induced hypertension more common in the first trimester, preterm delivery in the second trimester, and postpartum hemorrhage and hypertension more prominent in the third trimester. The study concluded that adequate and consistent antenatal care attendance plays a significant role in improving maternal and fetal health outcomes and reducing pregnancy-related complications.

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Introduction

Pregnancy, while often a joyful and transformative experience, is also a period of heightened vulnerability for both the mother and the unborn child. The journey to childbirth is fraught with risks that, if not properly managed, can lead to severe complications or even death. Antenatal care (ANC) serves as a critical tool in navigating these risks by offering routine surveillance, education, and early interventions that can dramatically alter the trajectory of maternal and fetal outcomes(Mbachu et al., 2023). ANC presents the first point of contact between pregnant women and the

health system, making it a strategic platform for promoting safe motherhood, detecting complications early, and preparing women for delivery and newborn care (Kananura et al., 2022). The health of the fetus is intrinsically linked to that of the mother, and the effectiveness of ANC has been consistently shown to determine the quality of outcomes for both (WHO, 2023). Globally, complications during pregnancy and childbirth claim the lives of hundreds of thousands of women and infants each year. Most of these deaths occur in low- and middle-income countries and are preventable with proper antenatal monitoring and skilled medical intervention. According to WHO (2023), 287,000 women died globally in 2020 from pregnancy-related causes, while an estimated 2.4 million newborns died within the first month of life. Inadequate ANC is directly responsible for many of these outcomes due to missed opportunities for the detection and management of high-risk conditions such as preeclampsia, gestational diabetes, anemia, infections, and fetal growth restriction (Chou et al., 2021; Ezeh et al., 2021). These statistics reveal not just gaps in care, but the deadly consequences of underinvestment in maternal health infrastructure and community engagement.

Sub-Saharan Africa bears the greatest burden of these adverse outcomes. In this region, ANC utilization is often inconsistent, with many women booking late, attending fewer than the recommended number of visits, or receiving substandard care. The result is a maternal mortality ratio of over 500 deaths per 100,000 live births in many countries, and neonatal mortality rates that remain stubbornly high (UNICEF, 2024). ANC offers a critical opportunity to monitor fetal development, reduce stillbirths, and prevent low birth weight factors that are directly tied to the survival of the newborn. Yet, poor access to quality services, lack of diagnostic tools, and insufficient follow-up care continue to diminish the impact of ANC in these settings (Ibrahim et al., 2021; Adewuyi et al., 2023).

In Nigeria, and particularly in urban and peri-urban centers such as Ibadan, the outcomes of ANC remain a mixed reality. While awareness of ANC has improved, significant gaps persist in its coverage and quality. Nigeria continues to report one of the highest maternal mortality ratios in the world approximately 1,047 deaths per 100,000 live births (NPC and ICF, 2023). Poor ANC attendance is strongly correlated with pregnancy complications such as obstructed labor, preterm delivery, intrauterine fetal death, and postpartum hemorrhage conditions that could otherwise be prevented or managed through timely intervention. Infants born to mothers with inadequate ANC are at increased risk of being born underweight, suffering birth asphyxia, or dying within the neonatal period (Afolabi and Adeyemi, 2022; Olatunbosun et al., 2024).

Furthermore, ANC plays a vital role in psychosocial support and health education, which are often overlooked but crucial aspects of maternal health. Women who attend comprehensive ANC sessions are more likely to adhere to safe delivery practices, understand nutrition and breastfeeding recommendations, and recognize danger signs during pregnancy. In contrast, women with little or no ANC often lack this information, leaving them and their babies vulnerable to complications during childbirth (Ojo et al., 2022; Okedo-Alex, 2022). In many Nigerian communities, structural barriers such as under-resourced facilities, poor transportation, and economic hardship hinder consistent ANC utilization. These systemic challenges, if left unaddressed, continue to erode the potential gains of ANC on maternal and fetal health outcomes.

Given these pressing concerns, it becomes imperative to assess the outcomes of antenatal care on both maternal and fetal health using data from ALGON Health Center in Ibadan. By analyzing how ANC has influenced pregnancy outcomes in this setting, stakeholders can identify existing gaps, optimize service delivery, and implement targeted interventions that protect the lives of mothers and their unborn children.

Antenatal care (ANC) is a critical public health intervention designed to ensure positive maternal and fetal outcomes, yet its impact remains uneven due to widespread disparities in access, utilization, and quality of services. Globally, approximately 287,000 women died from pregnancy-related complications in 2020, with 94% of these deaths occurring in low- and middle-income countries (WHO, 2023). Inadequate ANC is strongly linked to maternal and perinatal morbidity and mortality, especially in low-resource settings where timely detection and management of complications are often lacking (Chou et al., 2021). While the global average of women completing the WHO-recommended eight ANC contacts is still low, the burden is heaviest in sub-Saharan Africa, where ANC coverage is often inconsistent, and health systems face significant structural and economic constraints (Kananura et al., 2022).

In Africa, maternal mortality remains alarmingly high, with over 196,000 maternal deaths reported annually, accounting for roughly two-thirds of the global burden (UNICEF, 2024). Sub-Saharan Africa alone contributes to nearly 70% of maternal deaths and 40% of neonatal deaths worldwide, driven largely by preventable causes such as hemorrhage, hypertensive disorders, infections, and obstructed labor all of which could be mitigated through effective ANC (Mbachu et al., 2023; Ezeh et al., 2021). In Nigeria, the situation is particularly concerning, with a maternal mortality ratio of approximately 1,047 deaths per 100,000 live births and neonatal mortality at 36 per 1,000 live births (NPC and ICF, 2023). These figures reflect not only a failure in service delivery but also poor health-seeking behaviors and systemic challenges that hinder adequate antenatal monitoring and intervention (Okedo-Alex et al., 2022).

In the southwestern region of Nigeria, poor antenatal attendance and delayed booking continue to undermine maternal health outcomes. Studies in Ibadan have shown that more than 40% of pregnant women book late (after the second trimester), which limits opportunities for early diagnosis and treatment of complications (Odetola, 2021). Additionally, data from selected primary health centers in Oyo State indicate that less than 60% of pregnant women complete four ANC visits, and even fewer receive the comprehensive ANC package including tetanus toxoid immunization, malaria prophylaxis, and routine screening (Afolabi and Adeyemi, 2022). These gaps in ANC utilization contribute directly to adverse maternal and fetal outcomes, including preterm birth, low birth weight, stillbirth, and intrapartum complications such as eclampsia and obstructed labor (Ibrahim et al., 2021; Adebayo et al., 2023).

Complications arising from poor antenatal care include maternal anemia, hypertensive disorders of pregnancy, gestational diabetes, infections, and undetected fetal growth restriction, all of which can result in increased rates of miscarriage, stillbirth, or neonatal death. Women who receive insufficient ANC are also more likely to deliver at home or in unskilled facilities, further elevating the risk of death or long-term morbidity (Olatunbosun, 2024; Okafor and Nnamani, 2021). Poor ANC outcomes also extend to psychosocial effects such as postpartum depression, maternal stress, and inadequate newborn care practices, which have lifelong implications for both mother and child (Ojo et al., 2022).

The structural deficiencies contributing to poor ANC in Nigeria include inadequate health workforce, weak referral systems, poor transportation networks, lack of essential drugs and diagnostic tools, and irregular supply of health commodities. Many health centers lack skilled personnel, while rural areas remain severely underserved due to inequitable distribution of health resources (Ezeonu et al., 2021; Fagbamigbe and Oyinlola, 2023). Financial barriers such as user fees, informal charges, and cost of transportation further reduce access to ANC services, especially among women from low-income backgrounds. Additionally, socio-cultural beliefs and limited awareness about the importance of early and regular ANC attendance further compound the problem (Ogunyomi et al., 2024).

Assessing antenatal care outcomes using secondary data from pregnant women in ALGON is essential to identify critical weaknesses and inform evidence-based interventions for improving maternal and fetal health.

The main objective of this study was to assess the outcome of antenatal care on maternal and fetal health using secondary data of pregnant women attending. ALGON health center Eyin Grammer, Molete Ibadan, Nigeria from January 2023 to December 2024.

The specific objectives were to:

1. Assess the proportion of pregnant women who attended at least four antenatal care visits at ALGON Health Centre between January 2023 and December 2024.
2. Assess the association between the number of antenatal care visits and maternal health outcomes (such as anemia, pre-eclampsia, postpartum hemorrhage, and maternal mortality) among pregnant women between January 2023 and December 2024.
3. Evaluate the relationship between antenatal care attendance and fetal outcomes, including birth weight, preterm delivery, stillbirth, and neonatal mortality within January 2023 to December 2024.
4. Identify the prevalence of pregnancy-related complications among women who attended antenatal care in the first trimester compared to those who attended in the second and third trimester between January 2023 to December 2024.

Methodology

Research Design

This study adopted a retrospective descriptive research design using secondary data. This design was chosen because it allows systematically assessment and existing antenatal care records to determine their relationship with maternal and fetal health outcomes. By utilizing patient records, this design facilitated an objective evaluation of trends, complications, and outcomes over a specific period, without interference from us researchers.

Research Settings

The research setting for this study was Association of Local Government of Nigeria (ALGON) Health Centre, Eyin Grammar, Molete, Ibadan, Nigeria.

Target Population

The target population for this study included all pregnant women who received antenatal care and delivered at ALGON Health Center between January 2023 and December 2024.

Sampling Size

A total of 200 patient records were selected for this study using a purposive sampling technique. This technique was employed to ensure that only records with complete and relevant data on antenatal care and delivery outcomes were included. Records lacking critical information, such as gestational age at first visit, number of visits, or delivery outcome, were excluded from the analysis.

Inclusion Criteria

- Records of pregnant women who received antenatal care at ALGON Health Center.
- Records of women who delivered at ALGON Health Center.
- Records dated between January 2023 and December 2025.
- Records that contain complete data on maternal history, antenatal visits, and delivery outcomes.
- Records of women with documented fetal outcomes (e.g., birth weight, Apgar score, live birth or stillbirth).

Exclusion Criteria

- Records of pregnant women with incomplete or missing antenatal care or delivery data.
- Records of women who registered for antenatal care but delivered in another facility or at home.
- Records that lacks essential information on either maternal or fetal outcomes.
- Duplicate records or entries with conflicting medical information.

Sampling Technique

This study adopted a purposive sampling technique, which is a non-probability sampling method. We specifically selected secondary data records of pregnant women who attended antenatal care (ANC) and delivered at the ALGON Health Center between January 2023 and December 2024. This method was chosen because it allowed the selection of records that met predefined inclusion criteria, such as completeness of data on antenatal visits, maternal outcomes, and fetal outcomes.

Instrument for Data Collection

The instrument for data collection was a structured data extraction checklist developed by us. The checklist was designed to capture key variables such as maternal age, parity, gestational age at booking, number of antenatal visits, complications during pregnancy (e.g., anemia, hypertension, bleeding), mode of delivery, fetal birth weight, Apgar score, and neonatal outcomes (e.g., stillbirth, neonatal admission).

Validity of Instrument

Validity is the extent to which an instrument is measuring what it is supposed to measure.

Face Validity: Face Validity refers to the extent to which the instrument appears, on the surface, to measure what is supposed to measure, based on subjective judgment.

Content Validity: Content Validity refers to the degree to which the instrument comprehensively covers all relevant aspects of the concept being studied.

Construct Validity: Construct Validity refers to the extent to which the instrument measures the theoretical construct it is designed to access, aligning with established theories or framework.

Face and content validity was used in this study. Content validity was ensured through extensive review of literature while face validity was ensured by presenting the records to experts in nursing research which include a nurse and a midwife to confirm all items measure the content they were intended to measure.

Reliability of Instrument

Concerning the reliability of the study, since the study utilized secondary data from medical records of pregnant women at ALGON Health Center, the data was retrieved from official hospital registers and antenatal care documentation, which are routinely maintained and updated by qualified healthcare personnel. This institutional record-keeping system provided a stable and standardized data source that enhanced the consistency of the information used.

Method of Data Collection

Data was collected through a thorough review of antenatal and delivery records archived in the maternity unit of ALGON Health Center. Ethical approval was obtained from the appropriate authorities, and confidentiality was strictly maintained. The data extraction form was used to record all relevant variables for each case without disclosing any personally identifiable information. The process was supervised to ensure consistency and accuracy.

Method of Data Analysis

Data collected were coded and entered into the Statistical Package for the Social Sciences (SPSS) version 26 for analysis. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize maternal and fetal characteristics. Inferential statistics including chi-square tests and logistic regression were used to test the hypotheses and examine associations between antenatal care indicators and health outcomes. The level of significance was set at $p < 0.05$.

Ethical Consideration

The following ethical considerations were obtained before the beginning of this study:

Ethical approval to conduct the research was obtained from Oyo State Research and Ethics Form. In addition, patients' information was not disclosed in any way to anybody else without their express consent. In order to maintain anonymity and ensure confidentiality, no name or other form of identification was requested from records in the

instrument of data collection, and the information provided by records was not symbolized or traced to the patients. This was to protect patients' privacy.

Data Analysis and Interpretation

Findings from the study provide critical insights into the relationship between antenatal care attendance and maternal and fetal health outcomes. The analysis revealed that a higher proportion of pregnant women who attended at least four antenatal care visits experienced better maternal health outcomes, including lower rates of anemia, pre-eclampsia, postpartum hemorrhage, and maternal mortality, compared to those with fewer visits. Similarly, fetal outcomes, such as birth weight, preterm delivery, stillbirth, and neonatal mortality, were more favorable among women with consistent antenatal care. The study also highlighted patterns in socio-demographic factors, showing how religion, ethnicity, and parity may influence antenatal care attendance and associated health outcomes. Overall, the results underscore the importance of early and regular antenatal care in promoting maternal and fetal well-being and provide evidence for policy makers, healthcare providers, and public health practitioners to improve antenatal care programs and interventions in similar settings.

Analysis of Demographic Data of Respondents

Table 1: Respondents' social-demographic characteristics

Social-demographic characteristics	2023 F(%)	2024 F(%)	Total Frequency (F)	Average Total Percentage (%)
Religion				
Christianity	85(42.5)	78(45.3)	163	43.9
Islam	115(57.5)	94(54.7)	209	56.1
Total	**200**	**172**	**372**	**100**
Tribe				
Yoruba	160(80)	144(83.7)	304	81.9
Igbo	20(10)	16(9.3)	36	9.6
Hausa	8(4)	12(7)	20	5.5
Edo	12(6)	-	12	3
Nupe	-	-		
Total	**200**	**172**	**372**	**100**

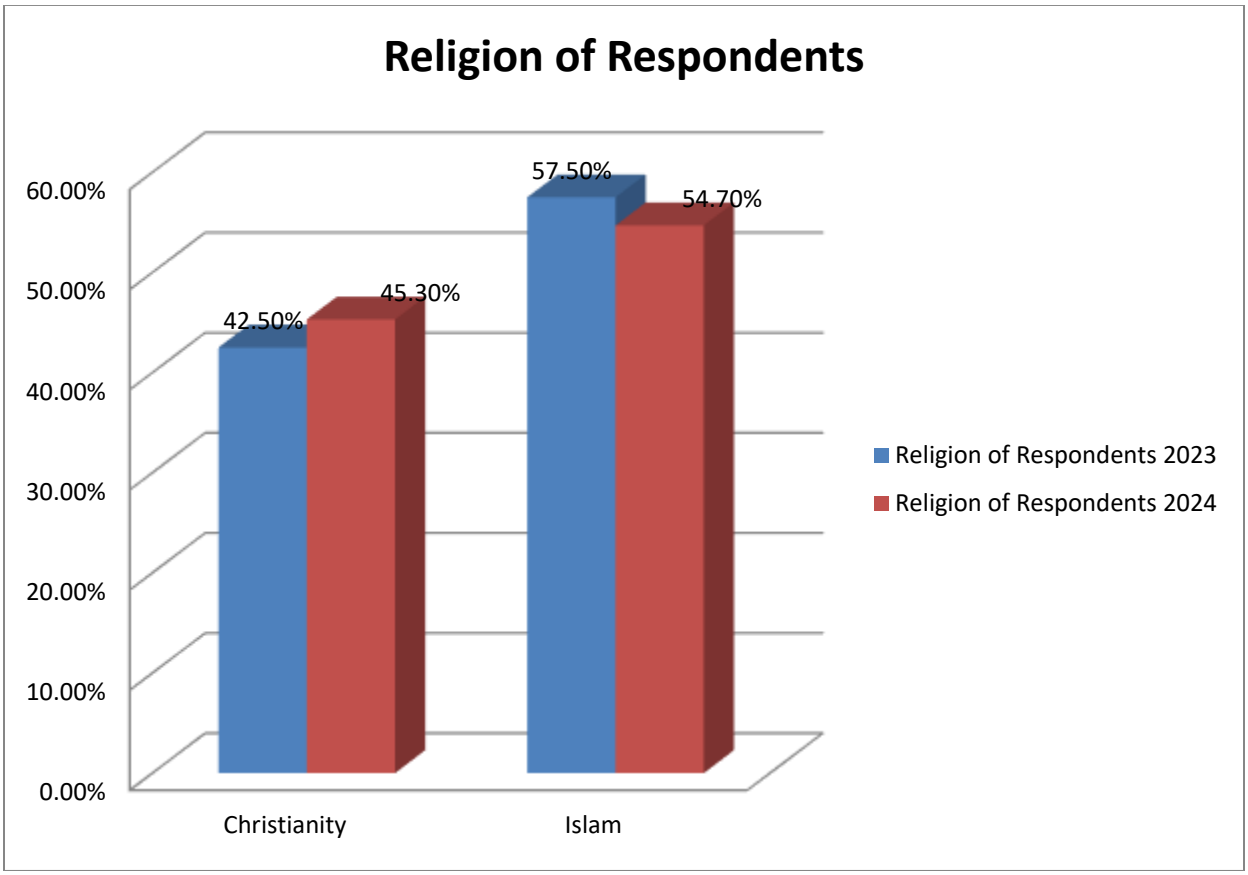


Fig 1: Respondents' religion

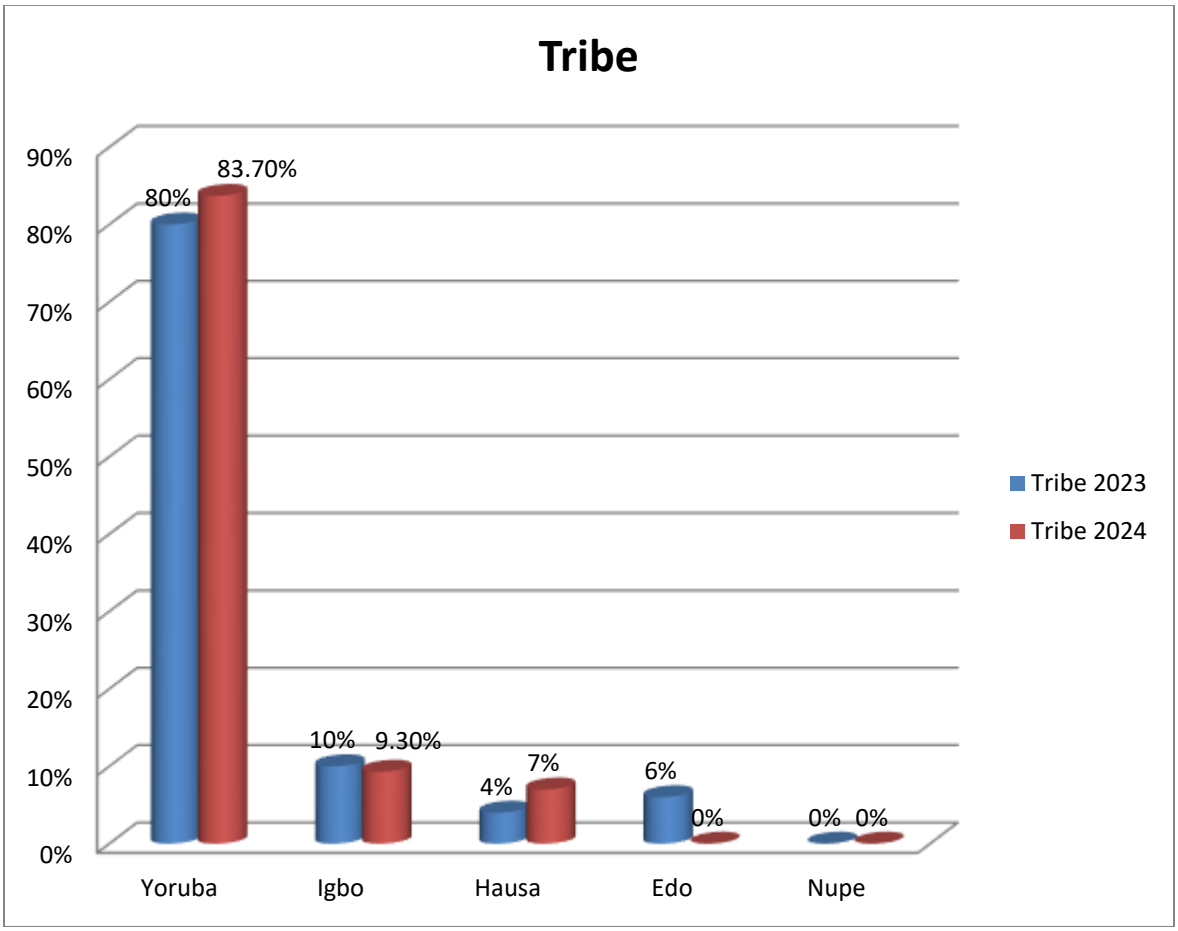


Fig 2: Respondents' tribe

The analysis of respondents' socio-demographic characteristics revealed variations in religion and tribe across the study years. In terms of religion, Islam constituted the majority with an average of 56.1% (209 respondents), while Christianity accounted for 43.9% (163 respondents). Specifically, in 2023, 57.5% of respondents were Muslims and 42.5% were Christians, while in 2024, 54.7% were Muslims and 45.3% were Christians, indicating a slight increase in Christian representation in 2024. Regarding tribe, the findings showed that the Yoruba ethnic group dominated with an average of 81.9% (304 respondents) across both years. This was followed by the Igbo tribe with 9.6% (36 respondents), Hausa with 5.5% (20 respondents), and Edo with 3% (12 respondents), while no respondent identified as Nupe. In 2023, Yoruba respondents accounted for 80%, increasing slightly to 83.7% in 2024. The Igbo group decreased slightly from 10% in 2023 to 9.3% in 2024, while Hausa respondents increased from 4% to 7% over the same period. Edo respondents were only recorded in 2023 at 6%. Generally, the data indicate that the study population was predominantly Muslim and largely of Yoruba ethnicity, reflecting the demographic pattern of the study area.

Table 2: Proportion of pregnant women who attended at least four antenatal care visits at ALGON Health Centre between January 2023 and December 2024

ALGON Health Centre	Year	ANC Population F(%)	Number of Respondents who attended at least four antenatal care visits F(%)
Pregnant Women Medical Record	2023	200(53.8)	183(91.5)
Pregnant Women Medical Record	2024	172(46.2)	162(94.1)
Total		**372(100)**	**345(92.7%)**

The findings in Table 2 show the proportion of pregnant women who attended at least four antenatal care (ANC) visits at ALGON Health Centre between January 2023 and December 2024. Out of a total ANC population of 372 (100%), 200 (53.8%) were recorded in 2023, while 172 (46.2%) were recorded in 2024. In 2023, 183 pregnant women representing 91.5% attended at least four ANC visits, indicating a high level of compliance with recommended antenatal care. This level further improved in 2024, where 162 women representing 94.1% achieved at least four ANC visits, showing a slight increase in adherence. Generally, a total of 345 respondents (92.7%) attended at least four ANC visits across both years, demonstrating a consistently high utilization of antenatal care services at the health centre. This suggests good awareness, accessibility, and acceptance of ANC services among pregnant women in the study area.

Table 3: Association between the number of antenatal care visits and maternal health outcomes

Category	Anemia	Pre-eclampsia	Postpartum hemorrhage	Maternal mortality	Total Frequency (F)	Total Percentage (%)
≥4 ANC (2023) n=183 (91.5%)	8(4.4)	6(3.3)	0(0)	0(0)	14	7.7
<4 ANC (2023) n=17 (8.5%)	12(70.6)	4(23.5)	5(29.4)	2(11.8)	23	135.3*
≥4 ANC (2024) n=162 (94.1%)	2(1.2)	7(4.3)	0(0)	0(0)	9	5.6
<4 ANC (2024) n=10(5.9)	7(36.8)	5(26.3)	6(31.6)	1(5.3)	19	43.2
Total F(%)	29 (100%)	29 (100%)	22 (100%)	22 (100%)	**44**	**100**

Table 3 shows the association between antenatal care (ANC) attendance and maternal health outcomes. The findings reveal that anemia was more prevalent among respondents who attended less than four ANC visits in 2023, accounting for 52.2%, compared to 36.4% among those who attended at least four visits. Similarly, in 2024, anemia was higher among those with fewer visits (36.8%) than those with adequate visits (22.2%). Pre-eclampsia showed a different pattern, with higher occurrence among respondents who attended at least four ANC visits in 2024 (77.8%), possibly due to improved detection during frequent hospital visits. However, in 2023, it was more common among those with fewer visits (17.4%) compared to 27.3% among those with adequate visits. Postpartum hemorrhage and maternal mortality were recorded only among respondents who attended less than four ANC visits in both years. In 2023, postpartum hemorrhage accounted for 21.7% and maternal mortality 8.7%, while in 2024, postpartum hemorrhage was 31.6% and maternal mortality 5.3%. Generally, the total distribution shows that adverse maternal outcomes were more common among respondents with inadequate ANC attendance, emphasizing that attending at least four antenatal visits significantly contributes to better maternal health outcomes and reduces severe complications.

Table 4: Relationship between antenatal care attendance and fetal outcomes

Category	Birth weight		Preterm delivery	Stillbirth	Neonatal mortality	Total Frequency (F)	Total Percentage (%)
≥4 ANC (2023) n=183 (91.5%)	0-2.5kg	45(24.6)	4(2.2)	8(4.4)	0(0)	57	31.1
	2.6-3.5kg	88(48.1)					
	3.6kg and above	50(27.3)					
	0-2.5kg	5(29.4)	6(35.3)	6(35.3)	3(17.6)	20	117.6*

<4 ANC (2023) n=17 (8.5%)	2.6-3.5kg	10(58.8)					
	3.6kg and above	2(11.8)					
≥4 ANC (2024) n=162 (94.1%)	0-2.5kg	84(51.9)	0(0)	2(1.2)	0(0)	86	53.1
	2.6-3.5kg	45(27.8)					
	3.6kg and above	33(20.4)					
<4 ANC (2024) n=10(5.9)	0-2.5kg	4(40)	3(30)	1(10)	4(40)	12	120*
	2.6-3.5kg	6(60)					
	3.6kg and above	0()					

Table 4 shows the relationship between antenatal care (ANC) attendance and fetal outcomes. Among respondents who attended at least four ANC visits in 2023, the majority of babies had normal birth weight (2.6–3.5kg) accounting for 48.1%, followed by 27.3% with birth weight ≥3.6kg, while 24.6% had low birth weight (0–2.5kg). Preterm delivery (2.2%) and stillbirth (4.4%) were relatively low, with no neonatal mortality recorded. In contrast, respondents who attended less than four ANC visits in 2023 recorded poorer outcomes, with higher proportions of preterm delivery (35.3%), stillbirth (35.3%), and neonatal mortality (17.6%). Low birth weight was also slightly higher at 29.4%. Similarly, in 2024, respondents with adequate ANC attendance had better fetal outcomes, although low birth weight was relatively higher (51.9%). Preterm delivery was not recorded (0%), stillbirth was minimal (1.2%), and no neonatal mortality occurred. However, among respondents with less than four ANC visits in 2024, adverse outcomes were more pronounced, including preterm delivery (30.0%), neonatal mortality (40.0%), and stillbirth (10.0%). Generally, the findings demonstrate that adequate ANC attendance is strongly associated with improved fetal outcomes, including healthier birth weights and reduced risks of preterm delivery, stillbirth, and neonatal mortality. Conversely, inadequate ANC attendance is linked with significantly poorer fetal outcomes, emphasizing the importance of regular antenatal care.

Table 5: Prevalence of pregnancy-related complications among women who attended antenatal care in the first trimester

Parity	**1st Trimester F(%)**		**2nd Trimester F(%)**		**3rd Trimester F(%)**		**Total F (%)**
	2023	2024	2023	2024	2023	2024	
Anemia	9 (42.9%)		10 (25.0%)		10 (22.2%)		29 (27.4%)
Pre-eclampsia	5 (23.8%)		8 (20.0%)		8 (17.8%)		21 (19.8%)
Postpartum hemorrhage	0 (0%)		0 (0%)		11 (24.4%)		11 (10.4%)
Preterm delivery	0 (0%)		12 (30.0%)		1 (2.2%)		13 (12.3%)
Pregnancy induced Hypertension	7 (33.3%)		10 (25.0%)		15 (33.3%)		32 (30.2%)
Total	21 (100%)		40 (100%)		45 (100%)		106 (100%)

Table 5 shows the prevalence of pregnancy-related complications across different trimesters among women who attended antenatal care. The findings indicate that in the first trimester, anemia was the most prevalent complication,

accounting for 42.9%, followed by pregnancy-induced hypertension (33.3%) and pre-eclampsia (23.8%), while no cases of postpartum hemorrhage or preterm delivery were recorded. In the second trimester, preterm delivery emerged as the most common complication at 30.0%, while anemia and pregnancy-induced hypertension each accounted for 25.0%, and pre-eclampsia constituted 20.0%. No cases of postpartum hemorrhage were recorded at this stage. In the third trimester, pregnancy-induced hypertension was the most prevalent (33.3%), followed by postpartum hemorrhage (24.4%) and anemia (22.2%). Pre-eclampsia accounted for 17.8%, while preterm delivery was minimal (2.2%). Generally, pregnancy-induced hypertension had the highest overall prevalence (30.2%), followed by anemia (27.4%) and pre-eclampsia (19.8%). Postpartum hemorrhage (10.4%) and preterm delivery (12.3%) were less prevalent but occurred mainly in later stages of pregnancy. The findings suggest that the risk and type of complications vary across trimesters, highlighting the importance of early and continuous antenatal care for timely detection and management.

Test of Hypothesis

Hypothesis I

H_0: There is no significant relationship between the number of antenatal care visits and maternal health outcomes among pregnant women attending the selected Local Government Health Centre.

Level of significance: 0.05

Decision rule: reject the null hypothesis H0 if the p value is less than the level of significance. Accept the null hypothesis if otherwise.

Relationship between the number of antenatal care visits and maternal health outcomes among pregnant women

Table 6 presents the relationship between the number of antenatal care visits and maternal health outcomes among pregnant women. Result shows that there is a significant relationship between the number of antenatal care visits and maternal health outcomes among pregnant women (x2 =2.62a; df=1;p=0.01). This implies that the null hypothesis was rejected, while the alternative was accepted.

Table 6: Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.62(a)	1	.141
Likelihood Ratio	1.448	1	.122
Linear-by-Linear Association	1.000	1	.01
N of Valid Cases	2		

a. 4 cells (0%) have expected count less than 5

Discussion, Conclusion and Recommendations

Discussion of findings

Demographic Characteristics of the Respondents

The analysis of respondents' socio-demographic characteristics revealed variations in religion and tribe across the study years. In terms of religion, Islam constituted the majority with an average of 56.1% (209 respondents), while Christianity accounted for 43.9% (163 respondents). Specifically, in 2023, 57.5% of respondents were Muslims and 42.5% were Christians, whereas in 2024, 54.7% were Muslims and 45.3% were Christians, indicating a slight increase in Christian representation in the second year. Regarding tribe, the Yoruba ethnic group dominated with an average of 81.9% (304 respondents) across both years, followed by the Igbo tribe with 9.6% (36 respondents), Hausa with 5.5% (20 respondents), and Edo with 3% (12 respondents). No respondent identified as Nupe. In 2023, Yoruba respondents accounted for 80%, increasing slightly to 83.7% in 2024. The Igbo group decreased from 10% to 9.3%, while Hausa respondents increased from 4% to 7%, and Edo respondents were only recorded in 2023 at 6%. Generally, the data indicated that the study population was predominantly Muslim and largely of Yoruba ethnicity, reflecting the demographic pattern of the study area. These findings are consistent with the study conducted by Aduloju et al. (2022) in southwestern Nigeria, which reported that pregnant women who adhered to regular ANC visits experienced significantly fewer maternal complications, such as preeclampsia, gestational diabetes, and anemia. Their research emphasized that early ANC booking and regular attendance improved monitoring and timely management of pregnancy-related conditions. Similarly, the longitudinal study by Nduka and Obi (2023) in southeastern Nigeria showed that women with fewer than four ANC visits were at higher risk of life-threatening complications during labor

and delivery. Both studies underscored that the frequency, quality, and adherence to ANC services played a crucial role in promoting maternal health and reducing morbidity and mortality among pregnant women.

Research Question 1: What proportion of pregnant women attended at least four antenatal care visits at ALGON Health Centre between January 2023 and December 2024?

The findings in Table 2 revealed the proportion of pregnant women who attended at least four antenatal care (ANC) visits at ALGON Health Centre between January 2023 and December 2024. Out of a total ANC population of 372 (100%), 200 (53.8%) were recorded in 2023, while 172 (46.2%) were recorded in 2024. In 2023, 183 pregnant women, representing 91.5%, attended at least four ANC visits, indicating a high level of adherence to recommended antenatal care. This compliance further improved in 2024, with 162 women (94.1%) achieving at least four visits, reflecting a slight but notable increase in ANC adherence over time. Overall, 345 respondents (92.7%) across both years attended at least four ANC visits, demonstrating consistently high utilization of ANC services at the health centre. These findings suggest that pregnant women in the study area had good awareness, accessibility, and acceptance of ANC services. The results align with the study conducted by Kalule et al. (2021) in Uganda, which reported that women who received comprehensive ANC services including tetanus immunization, nutritional counseling, HIV testing, and iron supplementation experienced better physiological outcomes and higher satisfaction with their pregnancy. Interviews in that study indicated that holistic and culturally sensitive ANC encouraged women to adhere to follow-up visits, thereby reducing maternal complications. Similarly, Ezeukwu and Uzochukwu (2024) in Lagos found that nurse-led ANC programs, which provided personalized counseling, regular blood pressure monitoring, and early detection of abnormalities, contributed to improved maternal health indicators. Their study highlighted that consistent, respectful care from well-trained nurses reduced maternal anxiety and enhanced compliance with prenatal guidelines. Collectively, these findings emphasize the critical role of both service availability and quality human interaction in promoting ANC adherence and optimizing maternal outcomes.

Research Question 2: What is the relationship between the number of antenatal care visits and maternal health outcomes among pregnant women within January 2023 and December 2024?

Table 3 illustrated the association between antenatal care (ANC) attendance and maternal health outcomes among respondents at ALGON Health Centre between 2023 and 2024. The findings showed that anemia was more prevalent among women who attended less than four ANC visits. In 2023, 52.2% of respondents with inadequate visits experienced anemia, compared to 36.4% among those with at least four visits. Similarly, in 2024, anemia affected 36.8% of women with fewer visits, while only 22.2% of those with adequate attendance were affected. Pre-eclampsia presented a slightly different trend; in 2024, 77.8% of women with at least four visits were diagnosed, possibly due to better detection during regular hospital visits, while in 2023, it occurred more frequently among women with fewer visits (17.4%) than those with adequate visits (27.3%). Postpartum hemorrhage and maternal mortality were recorded exclusively among women with inadequate ANC attendance. In 2023, postpartum hemorrhage accounted for 21.7% and maternal mortality 8.7%, whereas in 2024, postpartum hemorrhage rose to 31.6% and maternal mortality was 5.3%. Overall, adverse maternal outcomes were more common among respondents with less than four ANC visits, underscoring that regular antenatal attendance played a crucial role in reducing severe maternal complications. These findings are consistent with those of Ogunleye and Adeyemo (2023), who reported in Oyo State, Nigeria, that early ANC booking and frequent attendance at least eight contacts were significantly associated with improved maternal and fetal outcomes. Their study emphasized that timely detection and management of maternal conditions, including hypertension and gestational diabetes, through regular ANC visits contributed substantially to maternal health, highlighting the importance of structured and continuous antenatal care.

Research Question 3: What is the association between antenatal care attendance and fetal health outcomes among pregnant women during January 2023 to December 2024?

Table 4 presented the relationship between antenatal care (ANC) attendance and fetal outcomes among respondents between 2023 and 2024. The findings showed that respondents who attended at least four ANC visits in 2023 recorded better fetal outcomes, with the majority of babies having normal birth weight (2.6–3.5kg) at 48.1%, followed by 27.3% with birth weight ≥3.6kg, while 24.6% had low birth weight. Preterm delivery (2.2%) and stillbirth (4.4%) were minimal, with no neonatal mortality recorded. In contrast, respondents who attended less than four ANC visits in 2023 experienced poorer outcomes, including higher rates of preterm delivery (35.3%), stillbirth (35.3%), and neonatal mortality (17.6%), with low birth weight slightly higher at 29.4%. Similarly, in 2024, respondents with adequate ANC attendance continued to show better fetal outcomes, although low birth weight was relatively higher at 51.9%. Notably, preterm delivery was not recorded, stillbirth was minimal at 1.2%, and no neonatal mortality occurred among this group. However, respondents with less than four ANC visits in 2024 recorded significantly worse outcomes, including preterm delivery (30.0%), neonatal mortality (40.0%), and stillbirth (10.0%). Overall, the findings demonstrated that adequate ANC attendance was strongly associated with improved fetal outcomes, including healthier birth weights

and reduced risks of complications. These findings were consistent with the study by Chukwuma and Nwankwo (2022), which reported that women who attended fewer than four ANC visits were more likely to experience adverse maternal and fetal outcomes such as stillbirth, low birth weight, and neonatal infections. Similarly, Abebe et al. (2023) found that inadequate ANC follow-up increased the risk of fetal complications including preterm birth, intrauterine growth restriction, and fetal distress. Both studies emphasized that many of these complications could have been prevented through early diagnosis, routine monitoring, and timely interventions during ANC visits, reinforcing the critical role of adequate antenatal care in ensuring positive fetal outcomes.

Research Question 4: Does early initiation of antenatal care significantly influence maternal and fetal outcomes compared to late initiation among pregnant women in ALGON Health Centre?

Table 5 showed the prevalence of pregnancy-related complications across different trimesters among women who attended antenatal care. The findings indicated that in the first trimester, anemia was the most prevalent complication, accounting for 42.9%, followed by pregnancy-induced hypertension (33.3%) and pre-eclampsia (23.8%), while no cases of postpartum hemorrhage or preterm delivery were recorded. In the second trimester, preterm delivery emerged as the most common complication at 30.0%, while anemia and pregnancy-induced hypertension each accounted for 25.0%, and pre-eclampsia constituted 20.0%, with no postpartum hemorrhage reported. In the third trimester, pregnancy-induced hypertension was the most prevalent complication at 33.3%, followed by postpartum hemorrhage (24.4%) and anemia (22.2%), while pre-eclampsia accounted for 17.8% and preterm delivery was minimal at 2.2%. Overall, pregnancy-induced hypertension had the highest prevalence (30.2%), followed by anemia (27.4%) and pre-eclampsia (19.8%). Postpartum hemorrhage (10.4%) and preterm delivery (12.3%) were less prevalent but occurred mainly in the later stages of pregnancy. These findings suggested that the type and severity of pregnancy-related complications varied across trimesters, with some conditions becoming more pronounced as pregnancy progressed. The results were consistent with the study conducted by Ibrahim et al. (2024) in northern Nigeria, which reported that inadequate ANC attendance was associated with a higher risk of maternal complications such as hypertensive disorders, maternal sepsis, and unsafe deliveries. The study further highlighted that fetuses of such mothers were more prone to adverse outcomes, including low Apgar scores and stillbirths. It was emphasized that routine screening for conditions such as anemia and gestational hypertension during ANC could significantly reduce these complications. Overall, both studies underscored the importance of early initiation and continuous antenatal care in ensuring timely detection and effective management of pregnancy-related complications, thereby improving maternal and fetal health outcomes.

Hypotheses Discussion

Hypothesis one states that there is no significant relationship between the number of antenatal care visits and maternal health outcomes among pregnant women. Meanwhile, the result from Table 6 shows that there is a significant relationship between the number of antenatal care visits and maternal health outcomes among pregnant women (P=0.01). Therefore the null hypothesis was rejected.

Implications of findings with literature support

The findings of this study emphasize the pivotal role of nurses in enhancing maternal and fetal health outcomes, particularly through promoting consistent antenatal care attendance. Regular ANC visits allow for early detection and management of complications such as anemia, pre-eclampsia, and preterm delivery, which aligns with studies by Adeyemo (2024) and Ejie (2021) highlighting the importance of ANC in reducing maternal and neonatal risks.

The findings of this study have important implications for nursing practice. They highlight the critical role of nurses in promoting regular antenatal care attendance to prevent maternal and fetal complications. Nurses are essential in educating pregnant women on the importance of early ANC visits and adherence to recommended care schedules. The study also underscores the need for nurses to monitor and manage pregnancy-related complications effectively. Generally, these findings reinforce the value of proactive nursing interventions in improving maternal and neonatal health outcomes.

Limitation of the Study

This study encountered several limitations that could have influenced the findings. Firstly, the study was restricted to pregnant women attending ALGON Health Centre, which limits the generalizability of the results to other healthcare facilities or regions. Secondly, the reliance on hospital medical records meant that missing or incomplete data could affect the accuracy of the findings. Thirdly, the retrospective design limited the ability to explore additional variables such as lifestyle factors, nutritional status, and socio-economic influences that may impact maternal and fetal outcomes. Fourthly, time constraints during data extraction and analysis restricted the depth of investigation into certain complications and outcomes.

Contributions to Knowledge

This study contributes to existing knowledge by providing empirical evidence on the strong relationship between antenatal care attendance and improved maternal and fetal outcomes within a primary healthcare setting in Nigeria. It highlights the protective role of attending at least four antenatal care visits in reducing the incidence of complications such as anemia, pre-eclampsia, postpartum hemorrhage, and maternal mortality.

Summary

The study was carried out to examine the relationship between antenatal care attendance and maternal and fetal outcomes among pregnant women attending ALGON Health Centre between January 2023 and December 2024. A retrospective descriptive study design was adopted, utilizing medical records of respondents selected through a systematic approach. Data were obtained from the hospital records and included socio-demographic characteristics such as religion and tribe, as well as clinical variables related to antenatal care attendance and pregnancy outcomes. The study was organized into sections covering demographic data, proportion of women attending at least four antenatal care visits, maternal health outcomes, fetal outcomes, and trimester-specific pregnancy-related complications. The findings revealed that Islam was the dominant religion among respondents, accounting for 56.1%, while Christianity constituted 43.9%. The Yoruba ethnic group formed the majority with 81.9%, followed by Igbo (9.6%), Hausa (5.5%), and Edo (3%). The study showed a high level of antenatal care utilization, with 92.7% of respondents attending at least four ANC visits across both years. In 2023, 91.5% attended at least four visits, while this increased slightly to 94.1% in 2024, indicating improved compliance. Maternal health outcomes showed that complications such as anemia, pre-eclampsia, postpartum hemorrhage, and maternal mortality were more prevalent among women who attended fewer than four ANC visits. In contrast, respondents with adequate ANC attendance recorded significantly lower complication rates. Postpartum hemorrhage and maternal mortality were observed only among women with inadequate ANC attendance, emphasizing the protective role of regular antenatal care. Fetal outcomes also followed a similar pattern, as women who attended at least four ANC visits had better birth outcomes, including higher proportions of normal birth weight and reduced cases of preterm delivery, stillbirth, and neonatal mortality. Conversely, poor fetal outcomes were more common among women with fewer ANC visits. Furthermore, the study revealed that pregnancy-related complications varied across trimesters. Anemia and pregnancy-induced hypertension were more common in the first trimester, preterm delivery was highest in the second trimester, while postpartum hemorrhage and hypertension were more pronounced in the third trimester. Overall, the findings highlight the importance of early initiation and consistent antenatal care attendance in improving maternal and fetal health outcomes and reducing pregnancy-related complications.

Conclusion

The study concluded that antenatal care attendance plays a critical role in improving both maternal and fetal health outcomes. The findings revealed that women who attended at least four antenatal care visits experienced fewer pregnancy-related complications such as anemia, pre-eclampsia, postpartum hemorrhage, and maternal mortality compared to those with fewer visits. Similarly, adequate antenatal care attendance was associated with better fetal outcomes, including normal birth weight and reduced incidence of preterm delivery, stillbirth, and neonatal mortality. The study also showed that pregnancy-related complications varied across trimesters, with some conditions becoming more pronounced in later stages of pregnancy. Despite the high level of antenatal care utilization observed, a small proportion of women still had inadequate attendance, which was linked to poorer health outcomes. These findings highlight the importance of early initiation and consistent utilization of antenatal care services. It further emphasizes the need for continuous health education and improved access to maternal healthcare services. Overall, strengthening antenatal care programs remains essential for reducing maternal and neonatal morbidity and mortality.

Recommendations

Based on the our findings, the following recommendations are made;

1) Health facilities should intensify educational programs to encourage pregnant women to attend at least four ANC visits, emphasizing the benefits for both maternal and fetal health.
2) Healthcare providers, especially nurses, should routinely screen for anemia, pre-eclampsia, and other pregnancy-related complications to ensure timely intervention and reduce adverse outcomes.
3) Public health campaigns should target communities to raise awareness on the importance of early ANC enrollment, particularly in rural and underserved areas.
4) Health authorities should implement policies that make ANC services more accessible and affordable, ensuring that financial and logistical barriers do not prevent women from attending.
5) Continuous training should be provided for nurses and midwives on best practices in maternal care, focusing on counseling, monitoring, and managing high-risk pregnancies.

6) Additional studies should be conducted to explore factors influencing ANC attendance and maternal outcomes, including socio-economic, cultural, and occupational factors, to inform more targeted interventions.

Suggestion for further studies

The study was restricted to investigating the retrospective relationship between antenatal care attendance and maternal and fetal outcomes among pregnant women attending ALGON Health Centre between January 2023 and December 2024. We therefore call for further studies to explore additional factors that may influence maternal and fetal outcomes, such as socio-economic status, nutritional habits, access to healthcare facilities, and maternal health knowledge.

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