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Knowledge and Practice of Antenatal Care Among Pregnant Women Attending Rajshahi Medical College Hospital, Rajshahi, Bangladesh: A Cross-Sectional Study

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ABSTRACT

Antenatal care (ANC) plays an important role to increased maternal and neonatal health outcomes. Although it is recognized as one of the crucial effective maternal health interventions and the utilization of recommended ANC services in Bangladesh remains suboptimal. According to national data, only 41% of pregnant women were finished four antenatal care visits in 2022. Looking women's knowledge and self-care practices is essential for strengthening maternal healthcare services. This study focused to evaluate the knowledge and self-care practices related to antenatal care among pregnant women attending at Rajshahi Medical College Hospital (RMCH), examine the association between knowledge and practice and determine the sociodemographic factors enhancing these outcomes. A descriptive cross-sectional study was carried out among 100 pregnant women attending the outpatient department of RMCH. Participants were recruited by using convenience sampling. Data were collected through a structured interviewer-administered questionnaire that included sociodemographic characteristics, a 20-item knowledge scale and a 25-item self-care practice scale. Data were analyzed by using multiple methods such as SPSS descriptive statistics, Pearson's correlation, chi-square test, one-way ANOVA and multiple linear regression. The findings showed that 96.0% of the participants had good knowledge and 86.0% showed good antenatal care practices, in where poor knowledge and poor practice were observed in 4.0% of respondents each. Knowledge scores were positively associated with practice scores ($r = 0.732$, $p < 0.01$). Age and educational level were significantly related to both knowledge and practice ($p < 0.05$), while occupation and monthly family income were not significantly associated. Regression analysis shows that age and occupation essentially predicted knowledge scores, whereas age, education, and occupation were significant predictors of practice scores, accounting for 16.2% of the variation in practice. Foremost, pregnant women attending RMCH showed satisfactory knowledge and self-care practices regarding antenatal care. On the other hand, deficiencies remained in early first-trimester ANC registration, awareness of pre-eclampsia and regular follow-up visits. Targeted health education and counseling for women with lower educational qualification and younger age groups, together with strengthened community-based maternal health promotion, may further improve ANC utilization in accordance with WHO recommendations.

INTRODUCTION

Maternal mortality remains a demanding global health concern. In 2023, an estimate 260,000 women died worldwide from causes related to pregnancy and childbirth, comparable to approximately 712 deaths daily, with 92% of these deaths occurring in low and lower-middle-income countries (WHO, 2025; WHO *et al.*, 2025). Hypertensive disorders and hemorrhage both are responsible for a substantial proportion of these deaths, most of which are preventable, quality antenatal care (ANC) (WHO, 2025; WHO, 2016). To identification of this, the World Health Organization (WHO) revised its ANC guidance in 2016, replacing the earlier four-visit with a minimum of eight antenatal check-up, reduces perinatal mortality and improves women's experience of care (WHO, 2016; Tunçalp *et al.*, 2017).

Bangladesh has made quantifiable progress in maternal health over the past two decades, still ANC coverage remains below the international targets. According to the

Bangladesh Demographic and Health Survey (BDHS) 2022, only 41% of women received the recommended four or more ANC visits during pregnancy, a figure that had actually reduced from 48% in the 2017-2018 survey round and only about 21% of women received care meeting all defined quality criteria (NIPORT & ICF, 2024; Barna *et al.*, 2025; Salman *et al.*, 2026). Coverage of eight or more contacts fell even further, from 12% to 5% over the same period (Barna *et al.*, 2025). Determinants identified in these national analyses include maternal and paternal education, household wealth, urban residence, and employment status (Barna *et al.*, 2025; Prantik *et al.*, 2026). In coastal and working communities, additional barriers such as poor system readiness, geographic inaccessibility, income constraints, and limited availability of health facilities have been documented as major deterrents to ANC utilization (Al-Mamun *et al.*, 2025). Knowledge, attitude and practice (KAP) studies conducted in hospital settings across South Asia in the

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last five years consistently report that ANC-attending women illustrate reasonable awareness of basic antenatal recommendations, yet important gaps persist in recognition of specific obstetric danger signs and consistency of follow-up visits (Bashir *et al.*, 2023; Al Jaziri *et al.*, 2025). A hospital-based study among pregnant women reported that socio demographic factors such as age, education, and parity were significantly associated with overall KAP scores (Bashir *et al.*, 2023). Similarly, physician-focused and patient-focused KAP studies published in 2024-2025 have shown that even among populations already engaged with the health system, knowledge of specific complications-such as pre-eclampsia and gestational diabetes-can lag behind knowledge of general ANC benefits (Al Jaziri *et al.*, 2025; Verma *et al.*, 2025). Machine-learning-based spatial analyses of Bangladeshi DHS data further indicate that quality-adjusted ANC coverage is unevenly distributed, with substantial blind spots even in areas with nominally high visit-based coverage (Chakraborty, 2025).

Objectives

The general objective of this study was to assess the level of knowledge and self-care practice regarding antenatal care among pregnant women attending RMCH.

The specific objectives were:

(i) To describe the socio demographic characteristics of the study population (ii) To assess domain wise knowledge and practice regarding antenatal care (iii) To determine the correlation between knowledge and practice scores and (iv) To identify socio demographic determinants of knowledge and practice using bivariate and multivariable analyses.

Hypotheses

H1: There is a significant positive correlation between knowledge and practice scores regarding antenatal care.

H2: Socio-demographic characteristics which includes (age, educational qualification, occupation, and monthly family income) are significantly associated with knowledge and practice categories.

MATERIALS AND METHODS

Study Design

A descriptive cross-sectional study design. Study setting: This was a study done at the Rajshahi Medical College Hospital, Rajshahi a tertiary level government hospital.

Study Population

The study population consists of pregnant women attending at ANC outpatient department of Rajshahi Medical College Hospital, Rajshahi during the period of data collection.

Sampling Technique

The researcher non-probability convenience sampling techniques was used to collect data. This was done until we had participants.

Sample Size Calculation

To find out how participants we needed we used a formula.

The formula is:

$$n = Z^2 \times p(1-p) / d^2$$

Here

- n is the number of participants needed
- Z is 1.96, which's a standard number for studies like this
- p is 0.50, which is a guess of how many women have good knowledge about antenatal care,
- and d is 0.10, which is how much error we can accept.

Using the numbers:

$$\begin{aligned} n &= (1.96)^2 \times 0.50 \times 0.50 / (0.10)^2 \\ &= 3.8416 \times 0.25 / 0.01 \\ &= 96.04 \end{aligned}$$

We rounded this up to 97. We then decided to have 100 participants. We did this for a reasons. Firstly, an additional buffer of approximately 3-4% was added to compensate for anticipated incomplete or spoiled questionnaires and non-response during data collection, a standard and widely reported adjustment in hospital-based cross-sectional studies (Bashir *et al.*, 2023; Cochran, 1977). Secondly, a round sample of 100 simplifies percentage calculation and facilitates direct comparability with the many similarly designed hospital-based KAP studies in Bangladesh and neighboring countries that have used samples in the 100-150 range under comparable time and resource constraints (Bashir *et al.*, 2023; Cochran, 1977; Institute for Health Metrics and Evaluation, 2026). Thirdly, a sample of 100 provides adequate statistical power (>80% at $\alpha = 0.05$) to detect medium-sized associations (Cramer's $V \approx 0.30$) in the chi-square and correlation analyses that were the primary planned inferential tests for this thesis, without requiring resources beyond what was feasible for a single-investigator, single-site descriptive study conducted within a fixed academic timeframe. N = 100 was therefore adopted as a practical, statistically justified, and precedented sample size for this study, while the convenience sampling technique and single- centre design are explicitly acknowledged as limitations to generalizability.

Data Collection Tools

Data were be gathered by using a structured, interviewer administered questionnaire which is consist of three sections such as (i) Socio demographic characteristics which includes (age, religion, educational qualification, occupation and monthly family income). (ii) A 20 item knowledge scale covering four domains such as control of antenatal care, danger signs during pregnancy, advantage of antenatal care and complications during pregnancy scored as correct/incorrect and (iii) A 25 item four point practice scale (never/sometimes/frequently/always) covering nine domains including; registration and early ANC booking, regular ANC visits and follow-up, nutrition and dietary practice, supplement intake, personal hygiene and daily activities, tetanus toxoid and

immunization practice, health education and counselling practice, lifestyle practices during pregnancy and delivery and postnatal care preparation.

Data Analysis

Data were entered and analyzed by using SPSS (Version 26). Descriptive statistics such as (frequency, percentage, mean, standard deviation) were summarized socio demographic characteristics and domain scores. Knowledge and practice scores were each categorized as poor (<60%), moderate (60-70%), or good (>80%) by using Bloom's cut-off criteria. Pearson's correlation co-efficient assessed the relationship between total knowledge and total practice scores. Chi-square tests (with Fisher's exact test where cell counts were small) and one-way ANOVA examined associations between socio demographic variables and knowledge/

practice categories. Multiple linear regression identified independent predictors of knowledge and practice scores. A p-value<0.05 was showed statistically significant.

Ethical Considerations

Ethical clearance was achieved from the institutional ethical reviewer committee prior to data collection. Written informed consent was achieved from all participants after explaining the study's purpose, voluntary nature and confidentiality. Participants subduced the right to withdraw at any stage without consequence, and all data were anonymized prior to analysis.

RESULTS AND DISCUSSION

Sociodemographic Characteristics

All respondents (100%) were of Muslim religion.

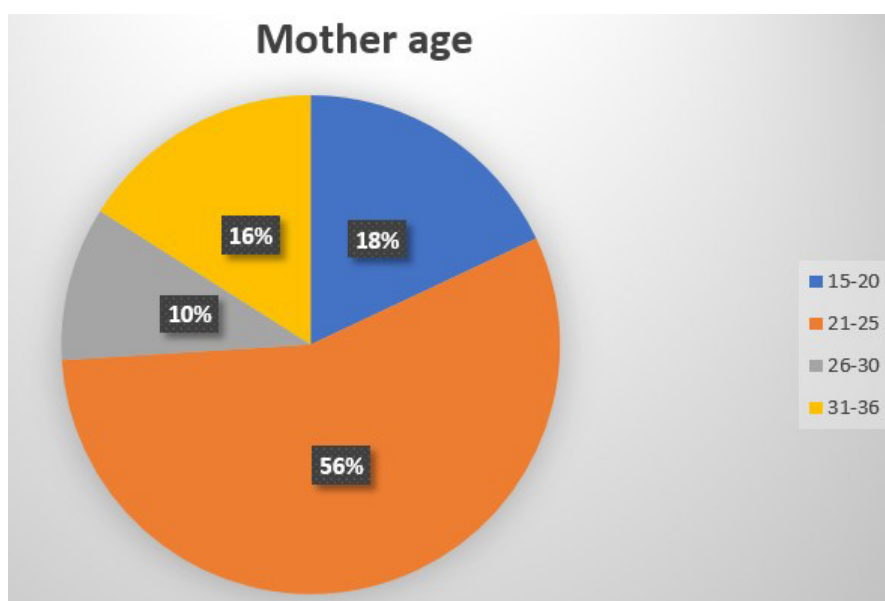


Figure 1: Distribution of respondents by age (N = 100)

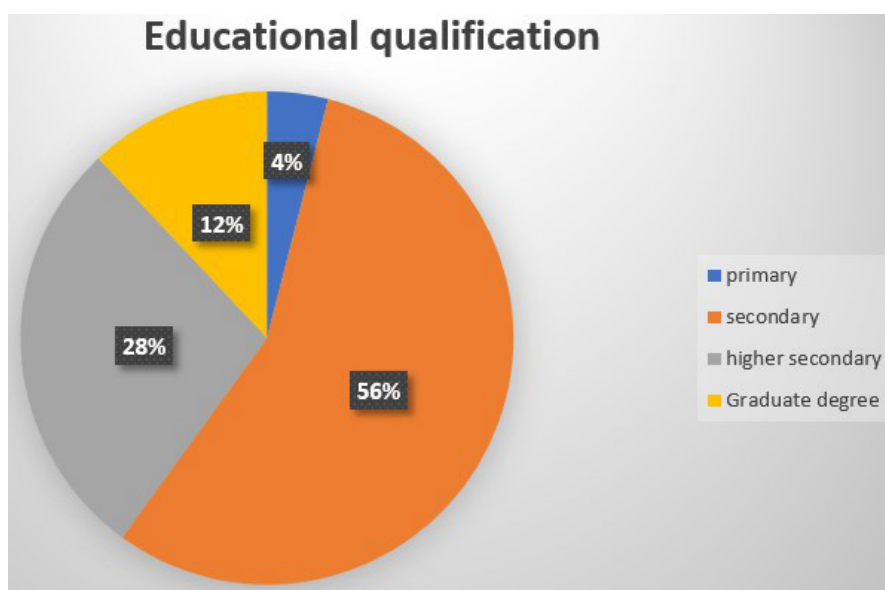


Figure 2: Distribution of respondents by educational qualification (N = 100)

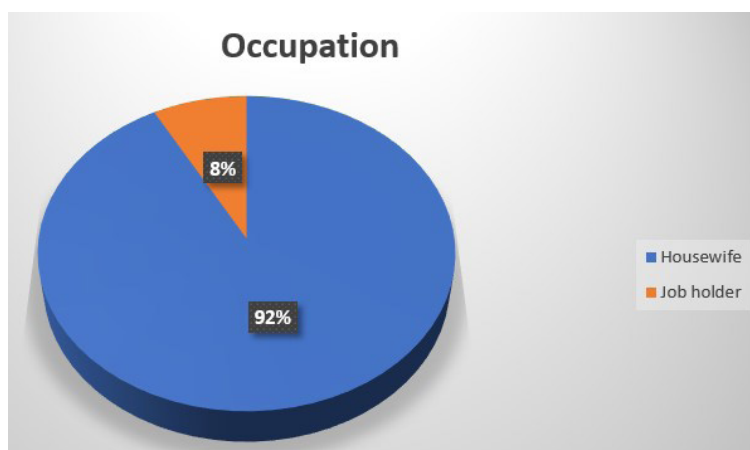


Figure 3: Distribution of respondents by occupation (N = 100)

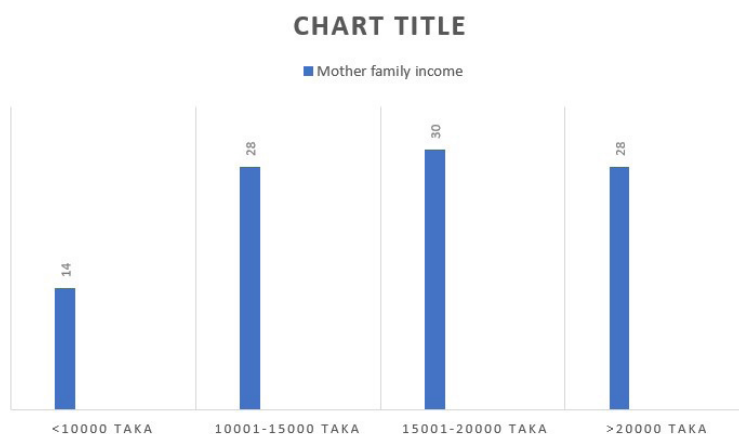


Figure 4: Distribution of respondents by monthly family income (N = 100)

Table 1: Distribution of respondents by knowledge domains (N = 100)

Knowledge domain	Mean	SD
Control of antenatal care	2.98	1.42
Danger sign during pregnancy	4.34	2.5
Benefits of antenatal care	5.42	2.49
Complications during pregnancy	5.54	1.58

Table 2: Distribution of respondents by practice domains (N = 100)

Practice domain	Mean	SD
Registration and early ANC booking	6.42	5.28
Regular ANC visits and follow-up	10.56	4.7
Nutrition and dietary practice	6.3	1.89
Supplement intake	9.82	3.0
Personal hygiene and daily activities	10.16	2.59
Tetanus toxoid and immunization practice	11.22	2.18
Health education and counselling practice	10.74	2.53
Lifestyle practices during pregnancy	10.62	2.46
Delivery and postnatal care preparation	10.88	2.48

Table 3: Distribution of participants by knowledge category (N = 100)

Knowledge category	Frequency (n)	Percentage (%)	Bloom's cut-off
Poor	4	4.0	<60%
Moderate	0	0.0	60-70%
Good	96	96.0	>80%
Total	100	100.0	-

Table 4: Distribution of participants by practice category (N = 100)

Practice category	Frequency (n)	Percentage (%)	Bloom's cut-off
Poor	4	4.0	<60%
Moderate	10	10.0	60-70%
Good	86	86.0	>80%
Total	100	100.0	-

Domain-wise Knowledge and Practice Overall Knowledge and Practice Category Knowledge-Practice Correlation

Total knowledge score was strongly and positively

correlated with total practice score (Pearson's $r = 0.732$, $p < 0.01$, two-tailed), indicating that women with higher ANC knowledge tended to report substantially better self-care practice.

Table 5: Chi-square association between sociodemographic variables and knowledge/practice categories

Variable	Pearson χ^2	df	Fisher's exact	p-value	Interpretation
Age group vs. Knowledge category	12.76	3	10.055	0.004	Significant
Age group vs. Practice category	16.67	6	14.224	0.007	Significant
Education vs. Knowledge category	10.714	3	8.152	0.031	Significant
Education vs. Practice category	18.206	6	14.113	0.01	Significant
Occupation vs. Knowledge category	0.362	1	-	1.0	Not significant
Occupation vs. Practice category	1.416	2	0.514	0.711	Not significant
Income vs. Knowledge category	3.026	3	2.509	0.58	Not significant
Income vs. Practice category	4.231	6	3.929	0.706	Not significant

Table 6: One-way ANOVA for age, education, and occupation against knowledge and practice scores

Comparison	F	df (between, within)	p-value	Result
Age vs. Knowledge	2.926	3, 96	0.038	Significant
Age vs. Practice	4.416	3, 96	0.006	Significant
Education vs. Knowledge	1.606	3, 96	0.193	Not significant
Education vs. Practice	7.132	3, 96	<0.001	Significant
Occupation vs. Knowledge	0.903	1, 98	0.344	Not significant
Occupation vs. Practice	1.563	1, 98	0.214	Not significant

Table 7: Predictors of knowledge score

Predictor	B	Beta	t	p-value
Age	-1.067	-0.218	-2.112	0.037*
Education	-	-0.134	-1.249	0.215
Occupation	3.79	0.227	-	0.043*
Monthly income	-0.489	-0.11	-1.06	0.292
Model summary (practice score): $R = 0.402$, $R^2 = 0.162$, Adjusted $R^2 = 0.127$, $F = 4.585$, $p = 0.002$.				

Table 8: Predictors of practice score

Predictor	B	Beta	t	p-value
Age	-4.402	-0.293	-2.946	0.004*
Education	-4.179	-0.226	-2.185	0.031*
Occupation	15.877	0.309	2.911	0.004*
Monthly income	-1.371	-0.1	-1.005	0.317

Significance level $p < 0.05$.

Sociodemographic Associations

Predictors of Knowledge and Practice (Multiple Linear Regression)

Model summary (knowledge score): $R = 0.303$, $R^2 = 0.092$, Adjusted $R^2 = 0.054$, $F = 2.409$, $p = 0.055$.

Discussion

The finding that 96% of respondents showed good knowledge and 86% showed good practice is markedly higher than the 41% national coverage of four or more ANC visits reported by BDHS 2022 (NIPORT & ICF, 2024; Barna *et al.*, 2025). This divergence is best explained by the sampling frame itself: because participants were recruited from women already attending the ANC outpatient department of a tertiary teaching hospital, the sample is inherently increased with women who have overcome the access barriers-cost, distance and permission that prevent many Bangladeshi women from reaching ANC services at all (Barna *et al.*, 2025; Al-Mamun *et al.*, 2025). Facility based recruitment therefore captures a favorably selected subgroup rather than the general antenatal population, a pattern consistent with other hospital-based KAP studies in the region reporting similarly high knowledge proportions among attendees (Bashir *et al.*, 2023; Al Jaziri *et al.*, 2025). Routine checkup delivered during hospital visits, along with generally higher literacy among women who reach a tertiary facility, likely reinforces this favorable profile.

In spite of the high overall proportions, domain level analysis reveals meaningful gaps that a purely aggregate score would conceal. The knowledge domain “control of antenatal care” had the lowest mean score (2.98, SD 1.42), and only 74% of respondents correctly recognized that pre-eclampsia can be detected early. Correspondingly, the practice domain “registration and early ANC booking” had the lowest mean and widest variability (6.42, SD 5.28) among all nine practice domains. These two findings are conceptually linked: both concern the earliest, most time-sensitive phase of antenatal engagement, which is precisely the phase that national data identify as weakest across Bangladesh, where first-trimester initiation and completion of four or more visits remain below target despite improvements in facility delivery and skilled attendance (Barna *et al.*, 2025; Salman *et al.*, 2026; Chakraborty, 2025).

The strong positive correlation between knowledge and practice ($r = 0.732$, $p < 0.01$) supports the general proposition that accurate information is a necessary, though not sufficient, condition for consistent self-care behaviour. Recent KAP literature attributes the residual knowledge-practice gap to at least three mechanisms operating jointly (Prantik *et al.*, 2026; Al-Mamun *et al.*, 2025; Gunawardhana *et al.*, 2024). First, structural and economic constraints-transport cost, distance to the facility, and the need for a household member’s permission to travel-can prevent a well-informed woman from acting on her knowledge, particularly for early, non-urgent visits that are easier to postpone than a visit prompted by acute

symptoms. Second, habituation and complacency may develop among women who have already been pregnant before: knowing what “should” be done is not the same as perceiving personal susceptibility to complications in a pregnancy that, subjectively, feels uneventful. Third, self-efficacy-the confidence to act on health information under real-world constraints of time, transport, and household responsibility-mediates whether knowledge is converted into sustained practice, a mechanism widely discussed in behavioural models of maternal health engagement (Gunawardhana *et al.*, 2024). Together, these mechanisms explain why the knowledge-practice correlation, while strong, still leaves roughly 46% of the variance in practice unexplained by knowledge alone ($r^2 = 0.536$), and why domains requiring one-time, forward-planning action (early registration) lag behind domains requiring simple repeated compliance (immunization, hygiene).

The regression findings add further nuance to this mechanism. Age showed up as a vital negative predictor of both knowledge ($B = -1.067$, $p = 0.037$) and practice ($B = -4.402$, $p = 0.004$) scores, recommending that younger women in this sample scored higher on both outcomes. This pattern is consistent with cohort-level differences in exposure to modern maternal health messaging through mass media, mobile health platforms and community that have expanded substantially in Bangladesh over the past decade and may also reflect a degree of complacency among older, likely multiparous, women who feel already experienced with pregnancy (Barna *et al.*, 2025; Chakraborty, 2025). Education was a significant anticipator of practice ($p = 0.031$) but not of knowledge ($p = 0.215$) in the regression model, even though it was significant for both outcomes in the bivariate chi-square and ANOVA analyses. This divergence suggests that education’s influence on knowledge may operate largely through the sociodemographic factors it correlates with (such as age or income) once those are jointly modelled, whereas its independent contribution to practice-the harder step of converting knowledge into consistent action-remains robust; education appears to function less as an information channel and more as an enabler of health-literacy-driven behaviour, consistent with national findings that maternal education is one of the vital consistent predictors of ANC quality and completion in Bangladesh (Barna *et al.*, 2025; Salman *et al.*, 2026; Prantik *et al.*, 2026). Occupation was also a significant predictor of both outcomes in the regression models; given that housewives constituted 92% of the sample, this result should be interpreted cautiously and warrants confirmation in a larger, more occupationally balanced sample before firm directional conclusions are drawn.

For nursing and midwifery practice, the findings support two concrete actions. First, counselling at the very first ANC contact should place explicit emphasis on early registration and the specific danger signs of pre-eclampsia-severe headache, blurred vision, and swelling of the feet-since these were the items with the lowest recognition rates (74-86%) despite otherwise high overall

knowledge. Structuring counselling around the WHO eight-contact model, with defined content at each contact rather than generic advice, would directly target the weakest domains identified here (WHO, 2016; Tunçalp *et al.*, 2017). Second, because age and parity appear to influence both knowledge and practice, individualized rather than uniform counselling is warranted: older and multiparous women may benefit from a deliberate “re-orientation” conversation that counters complacency, rather than an assumption that prior pregnancy experience is an adequate substitute for current-pregnancy vigilance. At the policy level, the persistent weakness in early registration observed even among hospital-attending women mirrors the national decline in four-or-more-visit coverage from 48% (2017-2018) to 41% (2022) documented by BDHS (NIPORT & ICF, 2024; Barna *et al.*, 2025; Salman *et al.*, 2026). This suggests that facility-based counselling alone is unlikely to close the gap; community-level interventions-household and community mobilization, community health worker home visits, and women-held ANC case notes, all explicitly recommended in the WHO 2016 ANC guideline-are needed to reach women before their first facility contact, when the registration decision is actually made (WHO, 2016; Tunçalp *et al.*, 2017). Given that economic and geographic barriers have been identified as principal deterrents to ANC utilization in other Bangladeshi settings, policies that decrease out-of-pocket transport and opportunity costs for first-trimester attendance (for example, targeted transport vouchers or workplace linked ANC leave provisions) could plausibly shift more women into early registration even where knowledge is already adequate (Barna *et al.*, 2025; Al-Mamun *et al.*, 2025).

From a population health perspective, hypertensive disorders of pregnancy and hemorrhage together account for a substantial share of the 260,000 maternal deaths recorded globally in 2023, and early ANC contact is the principal opportunity to detect and manage these conditions before they become emergencies (WHO, 2025; WHO *et al.*, 2025). The observed gap in pre-eclampsia-related knowledge (74% correct) and in the “control of antenatal care” domain, if representative of a wider pattern beyond this single facility, implies that even as Bangladesh approaches universal basic ANC contact, quality- and content-specific gaps may continue to constrain progress toward the Sustainable Development Goal target of a maternal mortality ratio below 70 per 100,000 live births by 2030 (WHO, 2025; WHO *et al.*, 2025; Salman *et al.*, 2026). Public health messaging campaigns that move beyond promoting ANC attendance in general, toward specifically promoting first-trimester registration and danger-sign recognition, may therefore yield disproportionate returns relative to their cost.

Limitations

This study has few limitations that should be considered when interpreting the findings. Firstly, the non-probability

convenience sampling technique and single-centre, hospital-based setting limit the generalizability of the results to the broader population of pregnant women in Rajshahi or Bangladesh, particularly to women who never get a tertiary facility. Secondly, the cross-sectional design precludes any causal inference regarding the observed associations between sociodemographic variables and knowledge/practice. Thirdly, practice was assessed through self-report, which is susceptible to recall bias and social desirability bias, potentially inflating reported adherence. Fourthly, the relatively modest sample size ($N = 100$), while statistically justified for the primary planned analyses, limited statistical power for detecting smaller effect sizes and for regression models with multiple predictors, as reflected in the modest R^2 values obtained. Finally, the study did not employ a validated, previously published KAP instrument, which may limit direct comparability with some other studies in the literature.

CONCLUSION

Pregnant women attending the antenatal clinic of Rajshahi Medical College Hospital showed good knowledge (96%) and good practice (86%) regarding antenatal care, with a strong positive correlation between the two ($r = 0.732$, $p < 0.01$). Age and educational qualification showed as vital determinants of both knowledge and practice, while specific gaps in early ANC registration and recognition of pre-eclampsia warning signs were identified in spite of the generally favorable overall picture. These findings support targeted, age and education-sensitive counselling technique, alignment of facility-based care with the WHO eight-contact ANC model and community-level interventions to address the barriers that prevent knowledge from translating fully into early and consistent antenatal care-seeking behavior.

Declarations

Ethical approval: Obtained from the relevant institutional ethical review committee prior to data collection.

Informed consent: Written informed consent was obtained from all participants.

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Conflict of interest: The author declares no conflict of interest.

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