



## Socioeconomic factors influencing antenatal care utilization among pregnant women: A cross-sectional study.

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### Abstract

#### Background:

Antenatal care (ANC) plays a pivotal role in improving maternal and neonatal outcomes. However, its utilization is often influenced by socioeconomic and demographic disparities. Understanding these determinants is crucial for strengthening maternal health services.

#### Objectives:

To assess the utilization of antenatal care services among pregnant women and to examine the association of socioeconomic factors with ANC utilization.

#### Methods:

This cross-sectional study was conducted among 100 pregnant women attending a tertiary care hospital. Data on demographic characteristics, socioeconomic status, education, occupation, and ANC utilization were collected using a pretested structured questionnaire. ANC utilization was categorized as adequate ( $\geq 4$  visits) or inadequate ( $< 4$  trips). Statistical analysis was performed using chi-square tests to assess associations between socioeconomic factors and ANC utilization.

#### Results:

The mean age of participants was 24.8 years, with 46% aged 21–25 years. A majority (64%) resided in rural areas. Socioeconomic assessment revealed that 34% belonged to the middle class, while 18% of women were illiterate. Adequate ANC utilization was reported by 68% of participants, whereas 32% had inadequate visits. Education, socioeconomic class, and place of residence showed statistically significant associations with ANC utilization ( $p < 0.05$ ). Women with secondary or higher education (82%) and those from upper socioeconomic strata (84%) reported greater ANC attendance compared to illiterate women (39%) and those from lower classes (52%). Employment status demonstrated a positive but non-significant association.

#### Conclusion:

Maternal education, socioeconomic class, and urban residence were significant predictors of ANC utilization. Targeted interventions focusing on disadvantaged groups are crucial to ensure equitable maternal healthcare access.

#### Recommendations:

Strengthen maternal health education, enhance rural healthcare access, subsidize antenatal services for disadvantaged groups, and implement targeted awareness campaigns to promote equitable ANC utilization.

**Keywords:** antenatal care, socioeconomic status, maternal education, pregnancy, healthcare utilization

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### Introduction

Antenatal care (ANC) is widely recognized as a cornerstone of maternal and child health, aiming to identify pregnancy-

related complications early, promote maternal well-being, and ensure favorable neonatal outcomes. The World Health Organization (WHO) recommends a minimum of four ANC



visits, highlighting that early and adequate utilization significantly reduces maternal and neonatal morbidity and mortality [1]. However, ANC coverage continues to demonstrate wide disparities across different socioeconomic and demographic groups, particularly in low- and middle-income countries.

Evidence from South Asia and Sub-Saharan Africa suggests that maternal education, household income, occupation, and place of residence strongly influence ANC utilization [2–4]. Women with higher education and belonging to wealthier households are more likely to seek recommended ANC services, while those from poorer, rural backgrounds remain disadvantaged. Similar patterns have been reported in Central Nepal, where socioeconomic and demographic inequalities played a critical role in ANC service uptake [1]. A recent study from Bangladesh further emphasized that working mothers often face unique challenges in balancing employment with healthcare utilization, limiting their ability to access recommended ANC visits [3]. Decomposition analyses across five South Asian nations revealed that socioeconomic inequalities remain a major barrier to universal maternal health coverage [4].

In India, despite initiatives such as Janani Suraksha Yojana and Pradhan Mantri Surakshit Matritva Abhiyan, inequities in maternal healthcare persist. Studies from urban poor areas of Uttarakhand revealed that low education, poor socioeconomic status, and limited awareness restricted ANC utilization even where services were available [5].

Understanding the role of socioeconomic determinants in ANC utilization is vital for strengthening maternal healthcare policies and designing targeted interventions. This study was undertaken to assess the pattern of ANC utilization among pregnant women and to explore the association of socioeconomic factors such as education, occupation, residence, and income class with adequacy of antenatal care.

## Methodology

### Study Design and Setting

This hospital-based cross-sectional study was conducted in the Department of Obstetrics and Gynecology at MNR Medical College and Hospital, Sangareddy, Telangana, over six months from November 2024 to April 2025. The institution is a major tertiary-care teaching hospital catering to a large catchment area that includes both rural and semi-urban communities of Sangareddy district. It offers comprehensive antenatal, intrapartum, and postnatal services, supported by well-organized outpatient, inpatient, and emergency obstetric units. The hospital's dedicated Maternal and Child Health wing and an average monthly

antenatal footfall of 500–700 women make it a suitable setting for evaluating patterns of antenatal care utilization.

### Study Size and Rationale

A total of 100 pregnant women were included in the study. The sample size was determined based on feasibility and the average outpatient load, while ensuring adequate representation of women from different socioeconomic backgrounds. Considering an anticipated prevalence of adequate ANC utilization of around 50% from previous regional studies, a minimum sample of 96 was estimated using the formula:

$$n = (Z^2 \times P \times Q) / d^2$$

Assuming:

$Z = 1.96$  (95% confidence)

$P = 0.50$

$Q = 1 - P = 0.50$

$d = 0.10$  (10% precision)

This yielded approximately 96 participants; hence, the sample was rounded to **100** for ease of analysis and to account for minor non-response.

### Study Population and Eligibility Criteria

Pregnant women aged 18–40 years attending the antenatal outpatient department during the study period were approached consecutively.

### Inclusion Criteria

Pregnant women aged 18–40 years

Willing to provide informed consent

Attending the antenatal clinic at MNR Medical College and Hospital

### Exclusion Criteria

Pregnancies requiring immediate emergency referral or advanced specialized care (e.g., severe obstetric complications at presentation)

### Data Collection

Data were collected using a pretested structured questionnaire. Information regarding demographic profile, socioeconomic status (classified as per the Modified BG Prasad scale), education, occupation, and place of residence was obtained. Utilization of antenatal care (ANC) services was assessed and categorized as:

*Adequate ANC*:  $\geq 4$  antenatal visits during pregnancy

*Inadequate ANC*:  $< 4$  antenatal visits



### Bias and Efforts to Minimize It

Multiple measures were taken to reduce potential sources of bias:

**Selection bias:** Consecutive sampling of all eligible pregnant women minimized differential recruitment and ensured representation across socioeconomic groups.

**Recall bias:** Only women currently receiving ANC were included, and records were cross-checked with ANC cards whenever available to improve the accuracy of reported visits.

**Information bias:** A single trained investigator administered questionnaires using uniform instructions to avoid interviewer variability.

**Confounding:** Key socioeconomic variables, education, income class, occupation, and residence, were collected systematically and analyzed to control for their influence on ANC utilization.

### Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee of MNR Medical College and Hospital before

initiation of the study. Written informed consent was obtained from all participants. Confidentiality of responses was ensured.

### Statistical Analysis

Data were entered in Microsoft Excel and analyzed using SPSS version 26.0. Descriptive statistics were presented as frequencies and percentages. Associations between socioeconomic factors and ANC utilization were tested using the chi-square test. A p-value < 0.05 was considered statistically significant.

### Results

#### Participant Flow

During the study period, 100 pregnant women attending the antenatal outpatient department at MNR Medical College and Hospital were approached for participation. All of them met the eligibility criteria, provided informed written consent, and were enrolled. There were no exclusions or dropouts. Thus, a total of 100 pregnant women were included in the study and analyzed (Figure 1).

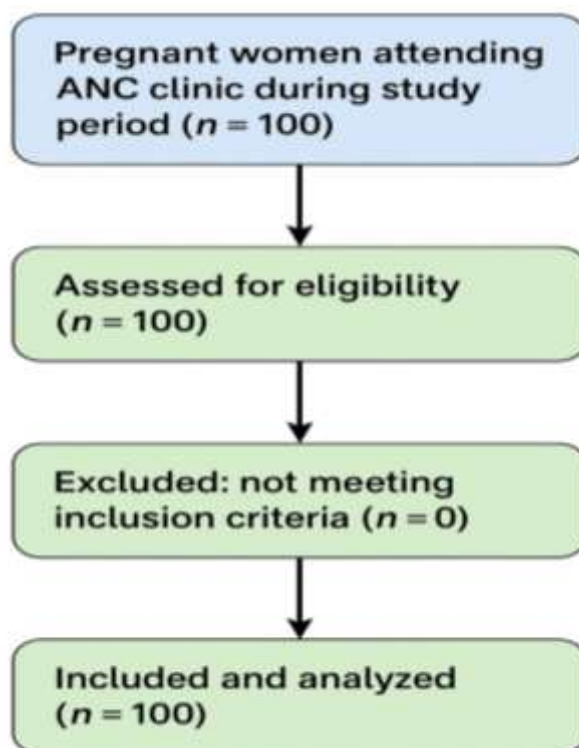


Figure 1. Participant Flow Diagram



A total of 100 pregnant women were included in the study. The mean age of participants was  $24.8 \pm 3.7$  years, with the majority (46%) belonging to the 21–25 years age group, followed by 32% between 26–30 years. Only 8% were

adolescents (<20 years), while 14% were over 30 years of age. Most participants resided in rural areas (64%), whereas 36% were from urban settings (Table 1).

**Table 1. Demographic Characteristics of Study Population (N = 100)**

| Variable    | Category | Frequency (n) | Percentage (%) |
|-------------|----------|---------------|----------------|
| Age (years) | < 20     | 8             | 8.0            |
|             | 21–25    | 46            | 46.0           |
|             | 26–30    | 32            | 32.0           |
|             | > 30     | 14            | 14.0           |
| Residence   | Rural    | 64            | 64.0           |
|             | Urban    | 36            | 36.0           |

Socioeconomic assessment revealed that 34% of women belonged to the middle class, 28% to the upper-middle class, and 20% to the lower-middle class. Only 8% of respondents were from the lower class. Regarding education, 18% were

illiterate, 42% had primary education, 28% attained secondary education, and 12% were graduates. In terms of occupation, the majority were homemakers (74%), while 26% were employed in skilled or unskilled work (Table 2).

**Table 2. Socioeconomic and Educational Characteristics**

| Variable            | Category     | Frequency (n) | Percentage (%) |
|---------------------|--------------|---------------|----------------|
| Socioeconomic Class | Upper        | 10            | 10.0           |
|                     | Upper Middle | 28            | 28.0           |
|                     | Middle       | 34            | 34.0           |
|                     | Lower Middle | 20            | 20.0           |
|                     | Lower        | 8             | 8.0            |
| Education           | Illiterate   | 18            | 18.0           |
|                     | Primary      | 42            | 42.0           |
|                     | Secondary    | 28            | 28.0           |
|                     | Graduate+    | 12            | 12.0           |
| Occupation          | Homemaker    | 74            | 74.0           |
|                     | Employed     | 26            | 26.0           |

With respect to antenatal care (ANC) utilization, 68% of women reported adequate ANC attendance ( $\geq 4$  visits), while 32% had inadequate ANC visits ( $< 4$  visits) (Table 3).

**Table 3. Antenatal Care Utilization**

| ANC Utilization             | Frequency (n) | Percentage (%) |
|-----------------------------|---------------|----------------|
| Adequate ( $\geq 4$ visits) | 68            | 68.0           |
| Inadequate ( $< 4$ visits)  | 32            | 32.0           |

When socioeconomic factors were analyzed in relation to ANC utilization, significant associations were observed for maternal education, socioeconomic status, and place of residence. Women with secondary or higher education reported 82% adequate ANC compared to only 39% among the illiterate group ( $p < 0.05$ ). Similarly, adequate ANC

utilization was markedly higher in the upper and upper-middle socioeconomic groups (84%) compared to lower groups (52%) ( $p < 0.05$ ). Urban women had better ANC attendance (78%) than rural women (62%) ( $p < 0.05$ ). Occupation showed a positive trend, with 77% of employed women utilizing adequate ANC compared to 65% among



homemakers, although the difference was not statistically significant ( $p > 0.05$ ) (Table 4).

**Table 4. Association of Socioeconomic Factors with ANC Utilization**

| Variable             | Category        | Adequate ANC (%) | Inadequate ANC (%) | p-value |
|----------------------|-----------------|------------------|--------------------|---------|
| Education            | Illiterate      | 39.0             | 61.0               | <0.05   |
|                      | Secondary+      | 82.0             | 18.0               |         |
| Occupation           | Homemaker       | 65.0             | 35.0               | >0.05   |
|                      | Employed        | 77.0             | 23.0               |         |
| Socioeconomic Status | Upper/Upper Mid | 84.0             | 16.0               | <0.05   |
|                      | Lower Groups    | 52.0             | 48.0               |         |
| Residence            | Rural           | 62.0             | 38.0               | <0.05   |
|                      | Urban           | 78.0             | 22.0               |         |

### Association of Socioeconomic Factors with ANC Utilization

The chi-square test was applied to determine the association between socioeconomic characteristics and antenatal care utilization.

**Table 5: Chi-square Test Results for Determinants of ANC Utilization**

| Variable            | Category            | Adequate ANC n (%) | Inadequate ANC n (%) | $\chi^2$ value | df | p-value |
|---------------------|---------------------|--------------------|----------------------|----------------|----|---------|
| Education           | Illiterate          | 7 (36.8%)          | 12 (63.2%)           | 10.24          | 1  | 0.001   |
|                     | Secondary or higher | 45 (81.8%)         | 10 (18.2%)           |                |    |         |
| Socioeconomic Class | Upper/Upper-middle  | 40 (83.3%)         | 8 (16.7%)            | 12.36          | 1  | 0.0004  |
|                     | Lower-middle/Lower  | 23 (50.0%)         | 23 (50.0%)           |                |    |         |
| Residence           | Urban               | 30 (78.9%)         | 8 (21.1%)            | 4.07           | 1  | 0.044   |
|                     | Rural               | 33 (58.9%)         | 23 (41.1%)           |                |    |         |
| Occupation          | Homemaker           | 38 (64.4%)         | 21 (35.6%)           | 1.12           | 1  | 0.289   |
|                     | Employed            | 25 (75.8%)         | 8 (24.2%)            |                |    |         |

Maternal education, socioeconomic class, and place of residence showed statistically significant associations with ANC utilization. Occupation demonstrated a positive trend but was not statistically significant (Table 5).

### Discussion

This cross-sectional study examined the influence of socioeconomic factors on the utilization of antenatal care (ANC) services among pregnant women attending MNR Medical College and Hospital. Adequate ANC attendance was documented in 68% of participants, while 32% received fewer than the recommended four visits. These proportions indicate that, despite the availability of maternal health

programs, a considerable segment of pregnant women continues to face barriers in accessing optimal ANC.

A clear gradient emerged between educational status and ANC utilization. Women with secondary or higher education demonstrated 81.8% adequate attendance, in contrast to only 36.8% among illiterate women. This substantial difference suggests that educational attainment directly shapes awareness, autonomy, and the ability to navigate healthcare systems. Education appears to empower women to recognize the importance of regular ANC and to seek timely consultations.

Socioeconomic status also played a decisive role. Women belonging to the upper and upper-middle classes reported 83.3% adequate ANC visits, whereas those from lower socioeconomic groups recorded only 50%. This disparity



indicates that financial stability not only improves access to transportation and healthcare facilities but may also reduce indirect costs, such as wage loss or childcare burdens, that hinder clinic attendance.

A similar pattern was noted with place of residence. Urban women achieved 78.9% adequate ANC attendance, compared with 58.9% among rural women. These differences highlight persistent challenges in rural healthcare delivery, including limited service availability, transportation constraints, and lower health literacy at the community level.

Although employed women showed a slightly higher proportion of adequate ANC attendance (75.8%) than homemakers (64.4%), the association was not statistically significant. This marginal trend suggests that employment may facilitate healthcare access through financial independence; however, time constraints and work responsibilities may simultaneously restrict clinic visits.

After interpreting the findings within the study context, comparisons with external evidence further strengthen the conclusions. The strong association between education and ANC utilization is consistent with findings from fragile and conflict-affected regions, where limited literacy has been reported as a barrier to maternal healthcare use [6]. Research from Jordan and Somaliland similarly demonstrated that women with higher educational attainment were significantly more likely to complete recommended ANC visits [7,8]. These parallels underscore the universal importance of female education in shaping health-seeking behaviors.

The influence of socioeconomic class echoes evidence from Nigeria, where higher household income was positively correlated with maternal health service utilization [11]. Financial security remains a determinant of both direct and indirect access to healthcare, supporting the patterns observed in this study.

The residence-based disparities align with studies from Ethiopia, where rural women, especially those with adverse pregnancy outcomes, showed markedly lower ANC coverage [9]. Additional evidence from Ethiopian women with disabilities highlights the structural and geographical disadvantages that hinder rural ANC utilization [10]. Similar obstacles have been reported among tribal communities in India, where cultural practices and limited accessibility contribute to underuse of maternal healthcare services [12].

### Generalizability

The findings, though based on a single-center cross-sectional study, provide insights into socioeconomic

determinants of ANC utilization. Results may be cautiously generalized to similar populations, but larger multicentric studies are needed for broader applicability.

### Conclusion

This cross-sectional study highlights the critical role of socioeconomic determinants in influencing antenatal care (ANC) utilization among pregnant women. While 68% of participants achieved adequate ANC visits, significant disparities were evident across educational status, socioeconomic class, and place of residence. Women with higher education, belonging to upper socioeconomic groups, and residing in urban areas were more likely to avail adequate ANC, whereas illiteracy, poverty, and rural residence limited access. Although occupation showed a positive trend, it was not statistically significant. These findings underscore the urgent need for targeted interventions to bridge inequities and strengthen maternal healthcare services for vulnerable populations.

### Limitations

The present study has certain limitations. Being a single-center study with a relatively small sample size of 100 participants, the findings do not fully represent the wider population. The cross-sectional design restricts causal inference, limiting the ability to establish temporal relationships between socioeconomic factors and ANC utilization. Self-reported data on antenatal visits may be subject to recall bias.

### Recommendations

To enhance antenatal care (ANC) utilization, multifaceted strategies are required. First, strengthening maternal health education through community outreach and women's empowerment programs is essential to improve awareness of the importance of ANC. Second, improving accessibility in rural areas by strengthening primary health centers, ensuring transport facilities, and deploying trained healthcare workers can reduce geographic disparities. Third, financial barriers should be addressed by subsidizing ANC services and providing conditional cash incentives for disadvantaged women. Finally, tailored awareness campaigns, integration of digital health tools, and collaborative efforts between government and non-governmental organizations can ensure equitable and sustainable ANC coverage.



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### List of Abbreviations

ANC – Antenatal Care  
NFHS – National Family Health Survey  
WHO – World Health Organization  
OPD – Outpatient Department  
IEC – Institutional Ethics Committee  
SPSS – Statistical Package for the Social Sciences

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### Conflict of interest:

The authors declare no conflict of interest.

### Author contributions:

**SML**-Concept and design of the study, results interpretation, review of literature, and preparing the first draft of the manuscript. Statistical analysis and interpretation, revision of manuscript. **KGR**-Concept and design of the study, results interpretation, review of literature, and preparing the first draft of the manuscript, revision of the manuscript. **YSN**-Review of literature and preparing the first draft of the manuscript. Statistical analysis and interpretation. **KBM**-Concept and design of the study, results interpretation, review of literature, and preparing the first draft of the manuscript. Statistical analysis and interpretation, revision of manuscript.

### Data availability:

Data is available upon request

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