

# Evaluating the Utilization of Antenatal Services and Birth Preparedness Among Pregnant Women in Remote Areas: A Cross-Sectional Study

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## ABSTRACT

**Background:** Antenatal care (ANC) and birth preparedness are essential components of safe motherhood, helping to reduce maternal and neonatal morbidity and mortality. However, in remote areas, the utilization of these services remains inadequate due to a range of sociodemographic and structural barriers.

**Objective:** To evaluate the utilization of antenatal services and the level of birth preparedness among pregnant women residing in remote areas, and to identify key factors influencing maternal care-seeking behavior.

**Methods:** A cross-sectional study was conducted at Sandeman Provincial Hospital, Quetta, from January 2022 to January 2023. Ninety pregnant women from remote rural regions in their third trimester were enrolled. Data were collected through a structured, interviewer-administered questionnaire assessing ANC visits, service components received, knowledge of danger signs, and birth preparedness indicators. Statistical analysis included descriptive measures and logistic regression to identify significant predictors.

**Results:** Only 40% of women completed four or more ANC visits, and just 36.7% were adequately prepared for birth. Awareness of obstetric danger signs was low (28.9%). Maternal education and proximity to a healthcare facility were significantly associated with both ANC utilization ( $p = 0.034$  and  $p = 0.011$ , respectively) and birth preparedness ( $p = 0.042$ ). Most participants lacked financial planning and transport arrangements for delivery.

**Conclusion:** ANC utilization and birth preparedness remain suboptimal in remote areas due to limited education, poor access, and lack of awareness. Strengthening community-based education, improving healthcare accessibility, and empowering women are critical to enhancing maternal outcomes in underserved populations.

**Keywords:** Antenatal care, birth preparedness, maternal health, remote areas, pregnancy, healthcare access, Pakistan, obstetric danger signs, health education.

## INTRODUCTION

Maternal and neonatal health remain fundamental indicators of a nation's development and healthcare effectiveness. Globally, an estimated 287,000 women died from pregnancy and childbirth-related complications in 2020, with 94% of these deaths occurring in low- and middle-income countries (LMICs), particularly in sub-Saharan Africa and South Asia<sup>1</sup>. A substantial proportion of these deaths are preventable through timely and adequate antenatal care (ANC) and delivery by skilled birth attendants. Antenatal care serves as a critical intervention for monitoring the progress of pregnancy, identifying high-risk conditions, providing nutritional supplementation, administering immunizations, and promoting maternal health education. It is also a vital entry point for raising awareness about Birth Preparedness and Complication Readiness (BPCR), which includes arranging for skilled care at delivery, identifying a birth location, arranging emergency transportation, and saving money for unforeseen expenses<sup>2,3</sup>.

The World Health Organization (WHO) recommends a minimum of four focused ANC visits for low-risk pregnancies, with updated guidelines now advocating for eight contacts to optimize maternal and fetal outcomes. These visits are essential for delivering health education, monitoring fetal growth, and ensuring early detection of complications such as gestational hypertension, diabetes, anemia, and infections<sup>4</sup>. Concurrently, BPCR strategies are instrumental in enhancing women's autonomy, improving timely healthcare access, and reducing the first and second delays in the "Three Delays Model" of maternal mortality. However, despite global awareness and the proven effectiveness of these interventions, many women, particularly in remote and underserved regions, do not benefit from them due to deeply entrenched structural and sociocultural barriers<sup>5</sup>.

In Pakistan, the maternal mortality ratio remains a pressing concern, estimated at 186 deaths per 100,000 live births, with significantly higher rates in rural and geographically isolated

regions. The disparity between urban and remote areas is fueled by uneven healthcare infrastructure, shortage of trained personnel, poor transportation networks, and a general lack of awareness about the importance of routine ANC visits and institutional deliveries<sup>6</sup>. Furthermore, traditional beliefs, patriarchal norms, and gender-based restrictions often limit women's mobility and decision-making power, thereby affecting their ability to access maternal health services independently. Health services, where available, may be underutilized due to mistrust in the healthcare system, perceived poor quality of care, or lack of culturally appropriate services<sup>7</sup>.

Multiple national programs such as the Lady Health Worker (LHW) Program and the Maternal, Neonatal and Child Health (MNCH) initiative have aimed to expand access to essential health services in rural Pakistan. Nevertheless, evidence suggests that these programs have not fully bridged the access gap in remote areas, where healthcare facilities are either non-functional or too distant. Moreover, few studies have thoroughly examined how women in these communities engage with ANC and how prepared they are for childbirth, both physically and logistically. There is a paucity of localized data that highlights the unique challenges faced by pregnant women in mountainous and border-adjacent areas of the country<sup>8</sup>.

Given this context, it becomes imperative to systematically investigate the level of ANC utilization and the extent of birth preparedness among pregnant women residing in remote areas. Understanding the determinants of maternal health-seeking behavior in these communities such as educational attainment, socioeconomic status, proximity to health facilities, parity, and prior obstetric experiences can help inform the development of targeted interventions that are both effective and sustainable. Furthermore, exploring knowledge, attitudes, and practices related to ANC and BPCR can assist in tailoring health messages and community mobilization strategies that resonate with the lived realities of these women<sup>9,10</sup>.

This cross-sectional study was designed to evaluate the utilization patterns of antenatal services and the degree of birth

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preparedness among pregnant women living in remote regions. It also aims to identify key sociodemographic, logistical, and informational factors influencing these practices. By focusing on this vulnerable subset of the population, the study hopes to generate context-specific evidence that can guide policymakers, public health officials, and non-governmental organizations in strengthening maternal healthcare delivery systems. Ultimately, the goal is to reduce preventable maternal and neonatal morbidity and mortality by ensuring that even the most geographically isolated women receive the care and support they need for a safe pregnancy and childbirth experience<sup>11</sup>.

## MATERIALS AND METHODS

**Study Design and Setting:** This descriptive cross-sectional study was conducted to evaluate the utilization of antenatal care (ANC) services and the level of birth preparedness among pregnant women residing in remote regions. The study was carried out at the Obstetrics and Gynecology Department of Sandeman Provincial Hospital, Quetta, which is a tertiary care center catering to a wide population, including those from underserved and geographically isolated areas of Balochistan. The study was conducted over a one-year period, from January 2022 to January 2023, and specifically targeted women from remote rural communities who attended the antenatal clinic during the study duration.

**Study Population and Sampling Technique:** The study population comprised pregnant women in their third trimester who visited the hospital's antenatal clinic and who were permanent residents of remote or rural areas outside the urban limits of Quetta city. Women were included if they were between 18 and 45 years of age, had a confirmed third-trimester pregnancy, had resided in a designated remote area for a minimum of one year, and provided informed written consent. Women with known psychiatric disorders, cognitive impairment, or communication barriers, and those who declined participation, were excluded. A purposive sampling strategy was used to recruit eligible participants from the outpatient antenatal department, ensuring representation from distant, underserved areas.

**Sample Size:** A total of 90 pregnant women were included in this study. The sample size was determined based on practical feasibility, availability of eligible participants from remote areas during the study period, and logistical considerations. Although limited in size, the sample was adequate for descriptive and exploratory statistical analysis focused on ANC practices and birth preparedness within the target population.

**Data Collection Tool and Procedure:** Data were collected through a structured, interviewer-administered questionnaire that was adapted from the World Health Organization's Safe Motherhood Needs Assessment format. The tool was translated into Urdu, Balochi, and Pashto to ensure cultural and linguistic appropriateness. Female interviewers with prior training in qualitative interviewing and maternal health conducted face-to-face interviews in private areas of the hospital to maintain participant confidentiality and comfort.

The questionnaire was organized into four main sections. The first section covered sociodemographic characteristics, including age, educational level, occupation, household income, parity, and distance to the nearest healthcare facility. The second section focused on ANC utilization, capturing information on the number and timing of visits, receipt of tetanus toxoid vaccination, iron and folic acid supplementation, blood pressure monitoring, and ultrasound examination. The third section assessed birth preparedness and complication readiness (BPCR), including awareness of pregnancy danger signs, arrangements for transportation, savings for delivery, identification of a birth companion, and planned place of delivery. The fourth section addressed access to healthcare and decision-making autonomy, exploring barriers to service use and the participant's role in health-related decisions.

Prior to the main study, a pilot test was conducted on 10 participants from a nearby but non-study population to assess the clarity, cultural relevance, and reliability of the questionnaire. Necessary adjustments were made based on the pilot results to improve the tool's comprehensibility and accuracy.

**Data Management and Statistical Analysis:** All collected data were checked for completeness and accuracy before being entered into SPSS version 25 for analysis. Descriptive statistics such as means, standard deviations, frequencies, and percentages were used to summarize the demographic and clinical variables. The relationships between independent variables such as maternal education, parity, occupation, and proximity to health facilities, and outcome variables including adequate ANC visits and birth preparedness, were analyzed using Chi-square tests. Variables that showed significant associations ( $p < 0.05$ ) were further analyzed using multivariate logistic regression to identify independent predictors of ANC utilization and BPCR.

**Ethical Considerations:** Ethical approval for the study was obtained from the Institutional Ethics Committee of Sandeman Provincial Hospital, Quetta. All participants were informed about the objectives, methodology, and voluntary nature of the study. Written informed consent was obtained prior to participation. Confidentiality was ensured by anonymizing data and restricting access to only authorized research personnel. Participants were assured that their decision to participate or not would have no impact on the quality of care they received at the hospital.

## RESULTS

The present study included 90 pregnant women from remote areas who attended the antenatal clinic at Sandeman Provincial Hospital, Quetta. The mean age of participants was 27.4 years ( $\pm 5.2$ ), indicating that most women were in the optimal reproductive age range. A significant majority (63.3%) of these women had no formal education, while only 12.2% had attained education at the secondary level or above. This limited educational background suggests a major barrier to awareness and utilization of maternal health services. Most participants (90%) were unemployed housewives, reflecting economic dependence and possibly reduced autonomy in healthcare decision-making. Additionally, 68.9% of participants belonged to households earning less than PKR 25,000 per month, indicating economic vulnerability. Importantly, 71.1% of the participants resided more than 5 kilometers away from the nearest health facility, which is a significant factor contributing to delays in accessing timely antenatal care. Multiparous women accounted for 56.7% of the study sample, suggesting a higher likelihood of prior contact with the healthcare system, though it did not necessarily translate into better preparedness.

Table 1 presents the sociodemographic profile of the study population, highlighting limited educational attainment, widespread unemployment, and long distances from healthcare centers as key determinants of maternal health behavior.

Table 1: Sociodemographic Profile of Participants (n = 90)

Variable	Frequency (n)	Percentage (%)
Age (Mean $\pm$ SD)	27.4 $\pm$ 5.2	–
No formal education	57	63.3%
Primary education	22	24.5%
Secondary or higher education	11	12.2%
Unemployed (housewives)	81	90.0%
Employed	9	10.0%
Household income < PKR 25,000	62	68.9%
Household income $\geq$ PKR 25,000	28	31.1%
Residence $\geq$ 5 km from health facility	64	71.1%
Primiparous	39	43.3%
Multiparous	51	56.7%

With regard to antenatal care utilization, only 36 women (40%) completed four or more ANC visits as per WHO recommendations. Early initiation of ANC was markedly low, with

only 12.2% of women attending their first visit in the first trimester. Iron and folic acid supplementation was received by 42.2% of participants, while tetanus toxoid vaccination was documented in 57.8%. Blood pressure monitoring was reported by 61.1%, indicating moderate uptake of routine screening services, and only 28.9% underwent any obstetric ultrasound. These findings suggest significant gaps in both the timing and quality of ANC services received by the study population.

Table 2 outlines the antenatal care utilization pattern, revealing underutilization of essential services even among women who had accessed care.

Table 2: Antenatal Care Utilization (n = 90)

ANC Indicator	Frequency (n)	Percentage (%)
≥ 4 ANC visits	36	40.0%
First ANC visit in 1st trimester	11	12.2%
Iron and folic acid supplementation	38	42.2%
Tetanus toxoid vaccination	52	57.8%
Blood pressure monitoring	55	61.1%
Obstetric ultrasonography	26	28.9%

When assessing birth preparedness and complication readiness (BPCR), the findings were similarly inadequate. Only 36.7% of participants fulfilled three or more of the five key BPCR components, qualifying them as adequately prepared. Among all respondents, 45.6% had identified a health facility as their planned place of delivery, while 40% had arranged transportation. Just 31.1% had saved money for delivery-related expenses, and 43.3% had identified a birth companion. Alarming, only 28.9% were

Table 4: Multivariate Predictors of ANC Utilization and BPCR (n = 90)

Predictor Variable	Outcome	Odds Ratio (OR)	95% Confidence Interval	p-value
Maternal Education (Yes vs. No)	ANC Utilization	2.7	1.1 – 6.6	0.034
Distance < 5 km to health facility	ANC Utilization	3.2	1.3 – 7.9	0.011
Maternal Education	BPCR	2.4	1.0 – 5.9	0.042
Multiparity (vs. primiparity)	BPCR	1.8	0.9 – 3.5	0.085

Together, these results indicate that structural barriers such as poor education and long travel distances significantly compromise both antenatal service utilization and readiness for childbirth among women in remote regions. Targeted health education interventions and community-based maternal care outreach could potentially overcome these limitations and reduce maternal morbidity and mortality.

## DISCUSSION

This study provides important insights into the low levels of antenatal care (ANC) utilization and poor birth preparedness among pregnant women residing in remote areas of Balochistan<sup>12</sup>. The findings revealed that only 40% of participants completed the recommended four or more ANC visits, while just 36.7% were adequately prepared for birth based on key indicators. These findings reflect a pattern of maternal healthcare underutilization that has also been reported in previous studies conducted in other rural regions of Pakistan and similar low-resource settings, where education, poverty, and accessibility significantly influence maternal behavior<sup>13</sup>.

As shown in previous studies, maternal education has a profound impact on healthcare-seeking behavior during pregnancy. In our study, women with formal education were significantly more likely to attend regular ANC visits and demonstrate better birth preparedness<sup>14</sup>. This is consistent with earlier findings which suggest that educated women are more aware of the importance of preventive health measures, are more likely to recognize obstetric danger signs, and often have greater decision-making autonomy within the household. The association between education and increased utilization of maternal health services is well-established and has been highlighted repeatedly as a priority area for maternal health promotion<sup>15</sup>.

aware of at least three obstetric danger signs, underscoring a deficiency in maternal health education and risk perception.

Table 3 summarizes the various dimensions of BPCR, showing critical shortfalls in readiness for safe delivery and emergency care.

Table 3: Birth Preparedness and Complication Readiness (n = 90)

BPCR Component	Frequency (n)	Percentage (%)
Identified place of delivery	41	45.6%
Arranged transportation	36	40.0%
Financial savings for delivery	28	31.1%
Identified birth companion	39	43.3%
Awareness of ≥3 obstetric danger signs	26	28.9%
Adequately prepared (≥3 BPCR components)	33	36.7%

To determine the factors associated with better ANC utilization and BPCR, multivariate logistic regression analysis was performed. It revealed that maternal education and residence within 5 kilometers of a health facility were significantly associated with both outcomes. Educated women were nearly three times more likely to complete adequate ANC (OR = 2.7,  $p = 0.034$ ) and to be prepared for delivery (OR = 2.4,  $p = 0.042$ ). Similarly, those who lived closer to healthcare services were significantly more likely to attend ANC visits (OR = 3.2,  $p = 0.011$ ). Multiparity was positively associated with BPCR but did not reach statistical significance.

Table 4 presents these predictors in detail, emphasizing the importance of education and physical accessibility in influencing maternal health behaviors.

Distance to health facilities also emerged as a significant determinant of both ANC utilization and birth preparedness. As observed in previous research, women living more than five kilometers from a health center are less likely to receive timely and adequate care due to transportation barriers, high travel costs, and lack of emergency services<sup>16</sup>. Our findings confirm this relationship, as women residing closer to healthcare facilities had significantly better engagement with ANC services and made more comprehensive preparations for childbirth. This further supports the notion that physical accessibility remains a core challenge for maternal health delivery in remote and mountainous regions<sup>17</sup>.

The study also showed that awareness of obstetric danger signs was critically low, with less than one-third of women able to identify three or more warning symptoms. This has also been reported in previous studies, where women from underserved populations demonstrated limited understanding of pregnancy complications such as vaginal bleeding, severe headache, or reduced fetal movement. The absence of this knowledge can delay the recognition of life-threatening conditions and result in poor outcomes for both mother and child. This underscores the need for more effective counseling during ANC visits and stronger community-based education programs<sup>18</sup>.

Another important observation from this study was the lack of financial and logistical preparedness. Only 31.1% of participants had saved money for delivery expenses, and just 40% had arranged transportation. This trend has similarly been noted in earlier investigations, where women from low-income households and isolated areas showed poor planning for childbirth, often resulting in delays in reaching care when complications arise. Despite exposure to prior pregnancies, multiparity did not significantly improve preparedness in this study, though it showed a positive trend, as seen in previous literature<sup>19</sup>.

This study has several limitations. The sample size was relatively small, which limits the generalizability of the findings beyond the study setting. Additionally, the data were collected from a single hospital, meaning that women who could not reach or chose not to attend hospital-based ANC services were not represented. The use of self-reported responses may also have introduced recall or social desirability bias, particularly in questions about danger sign awareness and preparedness components<sup>20</sup>.

Future research should involve larger, community-based studies covering different geographical terrains to build a more complete understanding of maternal care behavior in underserved areas. It is also necessary to explore the role of family dynamics, community health workers, and traditional birth attendants in shaping maternal health decisions. Moreover, evaluating the functionality and outreach of rural health facilities and mobile units can help guide system-level improvements<sup>21</sup>.

There is a clear need for targeted policy interventions. Educational initiatives focused on women, family members, and community influencers are essential for increasing awareness and correcting misconceptions related to pregnancy and delivery. Strengthening local infrastructure, improving rural transport networks, and integrating maternal health services within primary care frameworks are also necessary. Regular training for community health workers and their involvement in birth preparedness counseling can bridge the knowledge-practice gap and ensure timely referrals<sup>22</sup>.

## CONCLUSION

This study concludes that antenatal care utilization and birth preparedness among pregnant women in remote areas of Balochistan remain significantly inadequate, primarily due to low maternal education, poor awareness of obstetric danger signs, financial constraints, and long distances from healthcare facilities. These barriers, as shown in previous studies, contribute to delayed care-seeking and increase the risk of maternal and neonatal complications. To improve outcomes, it is essential to strengthen rural health infrastructure, enhance the outreach and training of community health workers, and implement targeted education programs that promote early ANC attendance and comprehensive birth planning. Addressing these factors through culturally appropriate, community-based strategies can substantially improve maternal health and reduce preventable morbidity and mortality in underserved regions.

**Data Availability Statement:** The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Competing Interests:** The authors declare that they have no competing interests.

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