Original Research Article

Beyond biomedical care: the role of psychosocial support in improving birth outcomes in rural Uttar Pradesh

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ABSTRACT

Background: Maternal health encompasses multiple dimensions, including nutritional status, antenatal care (ANC), and psychosocial well-being, all of which significantly influence pregnancy outcomes. While ANC coverage has improved however, Neonatal mortality remains a major concern. Prematurity and low birth weight account for 35% of neonatal deaths, hence it is pertinent to explore the reasons beyond medical care.
Methods: This observational case–control study was conducted in Raebareli district, Uttar Pradesh. A total of 425 women were enrolled, including 212 cases who delivered low birth weight (<2500 g) babies and control group comprised 213 women without LBWs babies.
Results: In the bivariate analysis, a highly significant association was observed between the number of ANC check-ups received and adverse birth outcomes such as low birth weight and preterm birth (χ^2=162.50, p=4.26 × 10^{-34}). Even after excluding women had four or more ANC visits, the psychosocial factors continued to show strong associations with adverse pregnancy outcomes. Women who reported low family support had 3.41 times higher odds of delivering a low-birth-weight or preterm newborn (OR=3.41, 95% CI: 1.91–6.12). Similarly, partner support emerged as another significant psychosocial determinant (OR=2.86, 95% CI: 1.57–5.23; p=0.0006).
Conclusions: This study demonstrates that psychosocial factors play an independent and equally critical role in determining birth outcomes.

Keywords: Antenatal care, Psychosocial factors, Partner violence, Family support, Depression, Pregnancy outcomes, Preterm birth, Low birth weight

INTRODUCTION

Maternal and neonatal health remain critical public health priorities in India, with the maternal mortality ratio (MMR) serving as a key indicator of health system performance and responsiveness. In Uttar Pradesh, low birth weight (LBW) and preterm birth are major contributors to neonatal morbidity and mortality, together accounting for nearly one-third of neonatal deaths. Overall, prematurity and low birth weight contribute to approximately 35% of neonatal mortality.[1] Although national MMR has declined from 320 deaths per 100,000 live births in 2001–03 to 97 in 2019–21, Uttar Pradesh (UP) continues to report an MMR of 151, substantially above the national average.[2] Government programmes such as Janani Suraksha Yojana (JSY), Janani Shishu Suraksha Karyakram (JSSK), and Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) have improved service uptake, with NFHS-5 reporting increases in first-trimester ANC registration (62.5%) and completion of four ANC visits (42.4%), as well as institutional deliveries (83.4%).[3] Yet these improvements in coverage

have not translated into proportional reductions in adverse birth outcomes.

While biomedical factors such as maternal undernutrition, anaemia, early pregnancy, and inadequate ANC are widely recognized, emerging global evidence indicates that psychosocial determinants play an equally critical role.[4] Chronic stress, depression, anxiety, intimate partner violence, and low social support have been established as significant predictors of LBW and preterm birth.[5] Women in rural Uttar Pradesh commonly experience restricted decision-making power, heavy household workloads, marital conflict, and limited emotional and material support from partners or families, exposures that heighten psychological distress and compromise maternal well-being.[6] Despite these risks, routine ANC in India remains predominantly biomedical, with psychosocial assessment and counselling largely absent, and detection of domestic violence seldom integrated into care pathways.[7,8]

The Social Ecological Model provides a useful lens, illustrating how pregnancy outcomes are shaped by interacting factors across multiple levels. These multiple levels are individual level (maternal stress, depressive symptoms, health behaviors), Interpersonal level (family dynamics, partner involvement, emotional and practical support, exposure to violence) and community level (gender norms, social support networks, workload expectations, stigma around mental health). Two more levels are health-system level includes ANC quality, provider responsiveness, availability of psychosocial screening, respectful care and another policy level consists of maternal health programmes that prioritize biomedical risks while neglecting psychosocial components.[9]

These levels collectively influence maternal well-being and fetal development, demonstrating that adverse birth outcomes arise from a complex interplay of biological, psychological, relational, and structural factors. Similarly, the WHO Quality of Care (QoC) Framework emphasizes that high-quality antenatal care must extend beyond clinical interventions to include emotional support, effective communication, respect, and identification of psychosocial vulnerabilities.[10] The absence of these elements in routine ANC compromises its ability to prevent adverse outcomes, particularly in resource-constrained settings like rural UP.

Viewed through these frameworks, psychosocial risk factors are not ancillary but essential determinants of maternal and neonatal health. The persistent focus of ANC packages on biomedical measures alone fails to address key upstream influences, such as family support, partner involvement, and exposure to violence, that shape pregnancy experiences and outcomes.[10]

Despite significant improvements in ANC coverage and institutional delivery rates in Uttar Pradesh, adverse birth outcomes such as low birth weight and preterm birth remain unacceptably high, indicating that biomedical service expansion alone is insufficient. Existing ANC packages focus primarily on clinical assessments, while psychosocial risks, such as maternal stress, depression, inadequate family and partner support, and exposure to violence, remain largely unrecognized and unaddressed. Evidence from the Social Ecological Model underscores that pregnancy outcomes are shaped by multilevel factors operating at individual, interpersonal, community, and health-system levels. Similarly, the WHO Quality of Care Framework emphasizes the centrality of emotional support, respectful care, and psychosocial assessment to positive pregnancy experiences.[10] Yet these components are minimally integrated into routine ANC in rural UP. This gap in service design and delivery justifies the need for empirical investigation into how psychosocial determinants independently contribute to adverse birth outcomes, even when ANC utilization is adequate.

Against this conceptual backdrop, the present study investigates the independent association between maternal psychosocial factors, including depression, family support, partner support, and exposure to violence, and adverse birth outcomes in rural Uttar Pradesh.

METHODS

The present study adopted an observational case-control design to explore the relationship between ANC services utilizations and psychosocial factors during pregnancy and low birth weight (LBW) among postpartum women who delivered central Uttar Pradesh.

Study settings

This case-control study was conducted during October 2024 and January 2025, among rural women in the Raebareli district of Uttar Pradesh, India. Raebareli, a centrally located district of Uttar Pradesh, comprises approximately 34.45 lakh residents spread across 18 administrative blocks, making it an ideal site for capturing diverse socio-demographic and ANC services. Raebareli district was purposively selected due to its epidemiological relevance and public health importance. The district represents a predominantly rural population (≈91%) with documented challenges in maternal and newborn health, including a high burden of low birth weight and preterm births. HMIS data indicated consistently high LBW prevalence across multiple blocks, making Raebareli an appropriate setting to investigate psychosocial determinants of adverse pregnancy outcomes.

Additionally, the district has a well-established public health infrastructure with an extensive ASHA network, ensuring reliable identification of recently delivered women and accurate verification of birth outcomes. The socio-economic diversity, rural–urban mix, and variability in access to maternal health services make Raebareli a suitable and informative context for

examining social and psychological inequalities in pregnancy outcomes. This rationale has now been strengthened and clearly articulated in the revised manuscript.
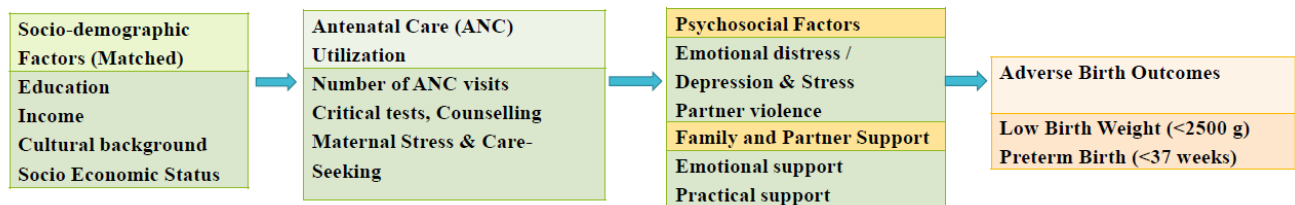
Sample size and sampling procedure

The sample size was calculated using the formula for unmatched case-control studies.[11]

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 \times (p_0 q_0 + p_1 q_1)}{(p_1 - p_0)^2}$$

The sample size for this unmatched case-control study was calculated based on the following assumptions: a 95% confidence level ($Z_1-\alpha/2 = 1.96$), 80% power ($Z_1-\beta = 0.84$), a 1:1 ratio of controls to cases, an expected proportion of exposure among controls (P_0) of 20%, and anticipated odds ratio (OR) of 1.8, indicating a moderate association. The final sample size included 212 participants in the case group and 213 in the control group, resulting in a total sample of 425 participants.

Study participants and case-control selection

Data collection has involved retrospective interviews with recently delivered women to capture their experiences of ANC services utilization during pregnancy. Line-list data on low birth weight and preterm births were obtained from records maintained by ASHA Facilitators. The study population comprised women who had delivered live-born infants. Participants were divided into two groups:

Cases: Women who delivered a low birth weight (LBW) infant (<2500 grams) and/or had a preterm birth (gestation <37 weeks).

Controls: Women who delivered infants with normal birth weight (≥2500 grams) and term gestation (≥37 weeks).

Controls were matched to cases on key socio-demographic variables (such as education, income, and cultural background) to control for potential confounding effects of these variables (Figure 1).

Inclusion Criteria : Consent Given, BMI >18.5, No High Risk Pregnancy

Exclusion of biological confounders: BMI <18.5, Hb <7 g/dL, GDM, PIH

Figure 1: Conceptual framework of the study.

Variables

ANC services: Number of times ANC Services received, Critical test and counselling; psychological factors; family and partner support.

Outcome measures: LBW and preterm birth.

Inclusion and exclusion criteria

Inclusion criteria

Women who delivered a live-born baby within the past 7 days to 3 months, to ensure recall of ANC services utilization, psychological factors such as family support, partner violence, during pregnancy is relatively recent and accurate.

Exclusion criteria

To reduce biological confounding, the following women were excluded, underweight women (BMI <18.5), severely anaemic women (haemoglobin <7 g/dl), women diagnosed with gestational diabetes mellitus (GDM) (blood glucose >140 mg/dL) and women with pregnancy-induced hypertension (BP >140/90 mmHg). These conditions are independently associated with adverse birth outcomes and could bias the association between ANC services utilization and birth outcomes. Further in analysis also excluded the women who received the 4 or more ANC visits to get the unbiased association of psychosocial factors with adverse birth outcomes.

Study tool

A structured quantitative tool was developed referring Antenatal Psychosocial Health Assessment (ALPHA) and Edinberg Depression Scale (EDS) tool to interview both cases and controls.

The tools were pre-tested after which some modifications were done and the sequencing was changed. Reliability test was conducted for assessing the reliability of the constructed tool. The Cronbach's Alpha score was 0.833, which indicated that the developed tool was acceptable for the study.

RESULTS

A p value <0.05 was considered statistically significant. A bivariate analysis (Chi-square test) was performed to assess the association between categorical variables. First analysed the characteristics of women in the case and control groups to observe the comparability of both groups. The mothers' age distribution in case and control both groups indicated that the majority of participants were young adults in the 22–28-year range. The mean age of cases was 25.16±3.28 years, while controls had a mean age of 25.87±3.62 years. Maternal age does not appear to play a major role in determining adverse birth outcomes in this study population (χ^2=2.95, p=0.23). Similarly, the mean age at marriage among women in both groups was very similar. Women with LBW or preterm births (cases) had a mean marriage age of 22.09 years, while those with normal outcomes (controls) had a mean age of 22.34 years. There was no statistically significant association between age at marriage (χ^2=0.64, p=0.726), maternal education (χ^2=3.25, p=0.20), income source (χ^2=3.05, p=0.22) and socio-economic status (χ^2=1.88, p=0.39) with birth weight categories at the conventional significance level of p<0.05.

Overall, no significant association was found between low birth weight (LBW) or preterm births and maternal age, age at marriage, religion, caste, education, household income, occupation, and socioeconomic status and place of delivery. The lack of significant association across all the variables shows that there is a similar distribution of these occurrences/incidents in both the groups, which establishes their comparability.

Antenatal care services during pregnancy and birth outcomes

The data demonstrated in table 1 investigated the relationship between the number of antenatal care (ANC) services received by pregnant women and the birth outcomes, specifically focusing on the incidence of low birth weight or preterm babies (cases) versus normal birth outcomes (controls). The majority of women who had no ANC visit (23 cases (14%) and 0 in Control group) or only 2–3 ANC visits were predominantly in the case group (low birthweight/preterm) and women who had 4 ANC visits or ≥5 visits were mostly in the control group, indicating better birth outcomes. However, women who received only 2 or 3 ANC visits had a substantially higher proportion of adverse birth outcomes (36% of cases vs just 1% of controls), indicating inadequate ANC as a potential risk factor for low birth weight or preterm birth.

Table 1: Antenatal care services during pregnancy and birth outcomes.

Variables	Cases (women with low birth/ preterm) (n=212)		Control (women without low birth/ preterm) (n=213)		Grand total (n=425)		Chi-square (χ^2)	DF	P value
ANC services	N	%	N	%	N	%			
None	23	11	0	0	23	5			
<4 times	107	50	8	4	115	27	161.42	3	9.07×10^{-35}
4 time	59	28	138	65	197	46			
>4 times	23	11	67	31	90	21			
Women's HB done during ANC									
None	29	14	0	0	29	7			
>4 times	167	79	31	15	189	44	262.24	3	1.47×10^{-56}
4 time	11	5	152	71	163	38			
>4 times	5	2	30	14	35	8			
USG done during ANC									
None	78	37	2	1	80	19			
<2 time	63	30	33	15	96	23	143.57	3	6.43×10^{-31}
2 time	61	29	100	47	161	38			
>2 time	10	5	78	37	88	21			
Women's BP measured during ANC									
None	22	10	0	0	22	5			
<4 time	144	68	44	21	188	44	147	3	1.02×10^{-31}
4 time	41	19	133	62	174	41			
>4 times	5	2	36	17	41	10			
Women's weight measured during ANC									
None	22	10	0	0	22	5			
<4 time	140	66	38	18	178	42	150.43	3	2.13×10^{-32}
4 time	42	20	137	64	179	42			
>4 times	8	4	38	18	46	11			

Continued.

Variables	Cases (women with low birth/ preterm) (n=212)		Control (women without low birth/ preterm) (n=213)		Grand total (n=425)		Chi-square (χ²)	DF	P value
Women's abdominal examination during ANC									
None	37	17	0	0	37	9			
<3 time	112	53	23	11	135	32	163.1	3	3.93×10^{-35}
3 time	39	18	87	41	126	30			
>3 time	24	11	103	48	127	30			
Women's urine test done during ANC (as per protocol in each ANC visit)									
None	73	34	0	0	73	17			
<4 time	113	53	88	41	201	47	141.03	3	2.26×10^{-30}
4 time	24	11	114	54	138	32			
>4 times	2	1	11	5	13	3			
Received health counselling									
Yes	97	46	167	78	264	62	46.57	1	8.05×10^{-12}
No	115	54	46	22	161	38			

In contrast, among women who received 4 ANC visits (recommended minimum ANC), had majority of controls (65%) compared to only 28% of cases and ≥5 ANC visits received by 31% of controls and in 11% of cases group, suggesting a protective effect of more frequent ANC. A highly significant association was found between the number of ANC check-ups a woman received and whether she delivered a low birthweight or preterm baby (χ²=162.50, p=4.26 × 10-34) This had provided very strong statistical evidence that, the number of ANC check-ups is significantly associated with the risk of low birthweight or preterm delivery.

During ANC Hb, BP, weight, abdominal examination, and urine test are critical, hence data analyzed for the critical test and counselling also. The analysis suggested that the Hb testing frequency (χ² ≈ 230.8, p<0.001), Ultrasound (USG) examinations (χ²=145.36, p<0.001), weight measurement (χ²=158.7, p<0.001), (BP) measurements (χ²=166.40, p<0.001), urine testing (χ²=166.8, p<0.001) and abdominal examinations (χ²=169.32, p=≈ 1.02 × 10⁻³⁴) were strongly linked with LBW/preterm outcomes. Further, women who received health counselling were significantly more likely to have normal birth outcomes, with 78% of controls receiving counselling compared with only 46% of cases. Conversely, lack of counselling was strongly associated with low birth weight or preterm births, with 54% of cases not receiving counselling versus only 22% of controls. Health counselling likely improved maternal knowledge and adherence to antenatal care practices, nutrition, and timely medical follow-up, thereby reducing the risk of adverse birth outcomes (χ²=61.3, p<0.001) (Table1).

Family-partner support, spouse violence association with birth outcomes

In our study, beyond analysing ANC service utilisation, we also examined the data after controlling for women who had received four or more ANC visits to assess the independent association of psychosocial care without the influence of routine clinical ANC services. This approach allowed us to understand the separate contribution of psychosocial factors such as family and partner support, intimate partner violence, mental health symptoms, and depression, on pregnancy outcomes.

A statistically significant association was found between family support during pregnancy and birth outcomes. Women who reported low family support had 3.41 times higher odds of delivering a low-birth-weight or preterm newborn compared with women who reported high family support (OR=3.41, 95% CI: 1.91–6.12).

Similarly, women with low partner support had 2.86 times higher odds of delivering a low-birth-weight or preterm baby compared with women receiving high support (OR=2.86, 95% CI: 1.57–5.23; p=0.0006). Low partner support thus emerges as a significant risk factor for adverse birth outcomes.

Violence during pregnancy also demonstrated a strong association with adverse outcomes. Women who experienced physical abuse (pushing, hitting, slapping) during pregnancy had 4.10 times higher odds of having a low-birth-weight or preterm infant compared with those who were not abused (OR=4.10, 95% CI: 1.68–10.02; p=0.0019). Emotional abuse (insults, humiliation, threats, or scolding) similarly increased risk; emotionally abused women had three times higher odds of adverse birth outcomes (OR=3.02, 95% CI: 1.28–7.16; p=0.0118).

The study also showed that women who felt worried, miserable, or depressed for two or more weeks during pregnancy had 1.70 times higher odds of delivering a low-birth-weight or preterm baby (OR=1.70, 95% CI: 1.01–2.85; p=0.044), indicating that maternal psychological distress is an important risk factor for adverse pregnancy outcomes. However, there was no

significant association between a past history of mental health problems and low-birth-weight or preterm birth (OR=0.97, 95% CI: 0.54–1.76; p=0.92), suggesting that

previous mental health issues did not influence current pregnancy outcomes in this population (Table 2).

Table 2: Social factors during pregnancy and birth outcomes (after controlling the 4 or more ANC).

Characteristics /items	Cases (women with low birth/ preterm) (n=82)		Control (women without low birth/ preterm) (n=205)		Grand total (n=287)		OR	95% CI	Z statistics	P value
	N	%	N	%	N	%				
Supportive family during pregnancy										
Highly supportive	19	23	104	51	123	43	3.41	1.91 – 6.12	4.14	<0.0001
Low supportive	63	77	101	49	164	57				
Partner support and care during pregnancy										
Highly supportive	55	67	175	85	230	80	2.86	1.57 – 5.23	3.43	0.0006
Low support	27	33	30	15	57	20				
Physical abuse (pushed/hit/slapped) by partner during pregnancy										
Yes	13	16	9	4	22	8	4.1	1.68 –10.02	3.10	0.0019
No	69	84	196	96	265	92				
Emotional abuse by partner (humiliated/insulted/scold)										
Yes	12	15	11	5	23	8	3.02	1.28 – 7.16	2.52	0.0118
No	70	85	194	95	264	92				
Women felt worried, miserable or depressed 2 or more weeks during pregnancy										
Yes	46	56	88	43	134	32	1.7	1.01 – 2.85	2.01	0.044
No	36	44	117	57	153	36				
Ever have any history of mental health problems										
Yes	20	24	51	25	71	17	0.97	0.54 – 1.76	-0.1	0.92
No	62	76	154	75	216	51				

Psychological factors and birth outcomes

Further, the psychological factors were analyzed after controlling for women who had received four or more ANC visits to assess the unbiased association between psychological factors and adverse birth outcomes (low birth weight and preterm birth). The proportion of women who reported looking forward to things with enjoyment during pregnancy did not differ significantly between cases and controls (χ^2=3.66, df=3, p=0.30). The data was first analysed on likert scale further dichotomous table (2x2) developed.

Women who reported reduced enjoyment (EPDS score 2–3) had slightly higher odds of having a low birth weight or preterm baby compared to those with normal enjoyment levels (OR=1.07; 95% CI=0.62–1.86); however, this association was not statistically significant.

Similarly, there was no significant difference between cases and controls in the distribution of responses for self-blaming unnecessarily (χ^2=3.87, df=3, p=0.28) and feeling anxious or worried without a clear reason (χ^2=8.09, df=3, p=0.044). Although women who reported self-blame (EPDS score 2–3) had higher odds of adverse birth outcomes (OR=1.77; 95% CI=0.87–3.60) and those

reporting anxiety had slightly higher odds (OR=1.04; 95% CI=0.58–1.87), neither association reached statistical significance when comparing high-risk vs. low-risk categories.

In contrast, analysis of women who reported any crying during pregnancy revealed a statistically significant association with adverse birth outcomes (χ^2=8.25, df=3, p=0.041). Women who reported crying at any frequency had 1.88 times higher odds of experiencing low birth weight or preterm birth compared to those who never cried (OR=1.88; 95% CI=1.09–3.26). This suggests that emotional distress during pregnancy, as reflected by crying episodes, may be an important predictor of adverse outcomes.

A strong association was also observed between thoughts of self-harm during pregnancy and adverse birth outcomes. Women who had any thoughts of harming themselves had nearly four times higher odds of having a low birth weight or preterm baby compared to those who never experienced such thoughts (OR=3.97; 95% CI=1.08–14.51). Further analysis of the aggregated 10-item EPDS score showed a statistically significant association between depression and adverse birth outcomes (χ^2=8.46, df=2, p=0.014). Women categorized

as "*Like l have Depression*" were more frequently observed in the case group (32%) than in the control group (17%), whereas women with no depression were more common among controls (75%) than cases (59%).

Women likely to have depression had 2.38 times higher odds of experiencing an adverse birth outcome compared to women with no depression (OR=2.38; 95% CI=1.31–4.35) (Table 3).

Table 3: Psychological factors (after excluding respondents who had received 4 or more ANC visits).

Psychological factors - EDS scale	Cases (women with low birth/ preterm) (n=82)		Control (women without low birth/ preterm) (n=205)		Grand total (n=287)		OR	95%CI	P value
	N	%	N	%	N	%			
Looked forward to things with enjoyment during pregnancy									
Low risk (0–1)	56	68	143	70	199	69	1.07	0.62 – 1.86	0.3
High risk (2–3)	26	32	62	30	88	31			
Self-blaming unnecessarily									
Low risk (0–1)	67	82	182	89	249	87	1.77	0.87 – 3.60	0.28
High risk (2–3)	15	18	23	11	38	13			
Anxious or worried for unclear reason									
Low risk (0–1)	61	74	154	75	215	75	1.04	0.58 – 1.87	0.044
High risk (2–3)	21	26	51	25	72	25			
Unhappy to had difficulty sleeping during pregnancy									
Low risk (0–1)	57	70	157	77	214	75	1.43	0.81 – 2.54	0.173
High risk (2–3)	25	30	48	23	73	25			
Unhappy to had difficulty sleeping during pregnancy									
Low risk (0–1)	57	70	157	77	214	75	1.43	0.81 – 2.54	0.173
High risk (2–3)	25	30	48	23	73	25			
Crying during pregnancy									
No (never)	51	62	155	76	206	72	1.88	1.09 – 3.26	0.041
Yes (any level 1–3)	31	38	50	24	81	28			
Thought of harming herself during pregnancy									
Never	76	93	201	98	277	97	3.97	1.08 – 14.51	0.03
Ever	6	7	4	2	10	3			
Depression status									
Likely depression	26	32	35	17	61	21	2.38	1.31 – 4.35	0.0145
No depression	48	59	154	75	202	70			

Overall, these findings suggest that higher levels of depressive and psychological symptoms during pregnancy significantly increase the likelihood of low birth weight or preterm delivery. This underscores the need for routine screening and timely management of maternal mental health issues during antenatal care to improve newborn outcomes.

DISCUSSION

The study demonstrates that both the coverage and quality of ANC play critical roles in determining birth outcomes in rural Uttar Pradesh. A clear pattern emerged in which women with fewer ANC visits, particularly those limited to two or three contacts, had a higher proportion of adverse birth outcomes, suggesting a potential dose–response relationship. Conversely, women who received five or more ANC visits exhibited the lowest proportion of LBW and preterm births, indicating a possible protective effect, although the association did not reach statistical significance in this analysis. Similar findings have been reported in a Malaysian rural study,

where more than four ANC visits were significantly associated with improved maternal and neonatal outcomes, and all women who did not attend ANC experienced adverse outcomes.[12]

The present findings also underscore the importance of regular monitoring of hemoglobin, blood pressure, and weight during pregnancy. Women whose clinical parameters were assessed four or more times were substantially more likely to deliver normal-birth-weight babies. In contrast, those with adverse birth outcomes commonly had fewer assessments, limiting opportunities for early detection of complications such as anemia. This aligns with evidence from an Indian cohort study, which found a strong association between third-trimester anemia and low birth weight, emphasizing the need for routine hemoglobin monitoring throughout pregnancy.[13]

These results reinforce the broader determinants highlighted in the India Newborn Action Plan, which acknowledges that neonatal health is shaped by an interplay of maternal nutrition, anemia, ANC adequacy,

and sociocultural factors.[14] The findings from the current study therefore reiterate that inadequate ANC utilization, whether due to access barriers, insufficient counselling, or irregular clinical monitoring, constitutes a significant risk factor for LBW and preterm birth.

Beyond biomedical care, this study provides compelling evidence for the role of psychosocial determinants. Even after controlling for ANC adequacy, maternal psychological well-being and family support remained significantly associated with birth outcomes. The strong statistical association (p<0.0001) demonstrates that low family support markedly increases the risk of adverse outcomes. This aligns with prior research showing that inadequate social support heightens maternal stress, which is linked to preterm birth and intrauterine growth restriction.[15] The WHO Global Action Report on Preterm Birth, similarly identifies psychosocial stress and poor family support as modifiable risk factors.[16]

Studies further show that women lacking emotional or practical support are more susceptible to anxiety, depression, and high perceived stress, and are less likely to utilize ANC services optimally or adhere to recommended clinical advice.[17,18] These mechanisms may explain the higher prevalence of LBW and preterm birth among women with low support in the current study. The study also highlights intimate partner support as a crucial protective factor. Evidence by found that women with supportive partners were significantly less likely to have a low-birth-weight baby and had reduced odds of pregnancy loss.[19] Similarly, literature from high-income settings demonstrates that exposure to intimate partner violence or lack of partner support substantially increases the risk of adverse birth outcomes.[20] The present findings echo these trends: women with depressive symptoms or inadequate partner support exhibited markedly higher risk, consistent with meta-analytic evidence that untreated antenatal depression increases the likelihood of preterm birth by 56% and low birth weight by 96%.[21]

Collectively, these findings illustrate that improving birth outcomes requires strengthening not only biomedical ANC services but also psychosocial assessment and family engagement. Ensuring regular ANC visits, enhancing clinical monitoring, and integrating screening for stress, depression, and domestic violence into routine ANC could mitigate multiple upstream risk factors. This multidimensional understanding reflects the complexity of pregnancy risks in rural contexts and supports the need for a more holistic ANC model in Uttar Pradesh, one that includes psychological care, family-centered counselling, and early identification of social vulnerabilities.

Strengths and limitations

This study contributes to the growing evidence on the multidimensional determinants of adverse birth outcomes. A key strength lies in its use of primary data and the application of a theory-driven framework to assess the independent effects of family support, partner involvement, and psychological well-being after controlling for ANC adequacy. The study also benefits from standardized data collection and clearly defined outcome measures, enhancing internal validity. However, the limitation of the study is reliance on self-reported psychosocial variables may introduce reporting or recall bias, particularly for sensitive issues such as intimate partner violence. The sample, while contextually relevant, may not fully represent all rural populations in Uttar Pradesh, which may affect generalizability.

CONCLUSION

The study clearly demonstrates that a strong and statistically significant association between ANC utilization and pregnancy outcomes, particularly LBW and preterm births. An adequate and comprehensive ANC services are critical for reducing the risk of LBW and preterm births. Apart from routine ANC, the findings of this study clearly demonstrate that psychosocial factors play a critical role in determining pregnancy outcomes, independent of routine ANC service utilization. Even after controlling for women who had received four or more ANC visits, psychosocial conditions, particularly family support, partner support, and exposure to violence, remained strong and significant predictors of low birth weight and preterm birth.

Low family support was associated with more than threefold higher odds of adverse birth outcomes, while inadequate partner support nearly tripled the risk, underscoring the essential role of emotional and practical support during pregnancy. Furthermore, both physical and emotional violence emerged as powerful predictors of poor neonatal outcomes, with affected women experiencing significantly higher odds of delivering low-birth-weight or preterm infants. These findings highlight that psychosocial adversity, including stress, conflict, and abuse, can influence maternal well-being and fetal development even in the presence of adequate clinical ANC coverage.

Overall, the study concludes that maternal psychosocial well-being is a central determinant of healthy birth outcomes. Strengthening family and partner support, identifying psychosocial risks early, screening for violence, and integrating mental health interventions into routine ANC could substantially improve pregnancy outcomes.

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