

ORIGINAL ARTICLE

Prevalence and Associated Factors of Depression and Anxiety Among Pregnant Women Attending Tertiary Care Hospitals: A Multicentre Cross-Sectional Study

JAVERIA SALEEM¹, MEHWISH SYED², AFRA AMAAN³¹Assistant Professor, Department of Obstetrics and Gynecology, MTI Nowshera Medical College (NMC), Nowshera, KP – Pakistan²Assistant Professor, Department of Obstetrics and Gynecology, MTI Nowshera Medical College (NMC), Nowshera, KP – Pakistan.³Assistant Professor, Department of Obstetrics and Gynaecology, Kuwait Teaching Hospital, Peshawar, KP – Pakistan.Correspondence to: Dr. Mehwish Syed, Email: Mehwishsyed2@gmail.com

ABSTRACT

Background: Depression and anxiety are among the most prevalent yet under-recognized mental health problems during pregnancy, with a particularly high burden reported in low- and middle-income countries, including Pakistan.

Objective: To estimate the prevalence of probable antenatal depression and anxiety and identify sociodemographic, obstetric, and psychosocial factors independently associated with these outcomes among pregnant women attending tertiary-care hospitals.

Materials and Methods: This multicentre analytical cross-sectional study was conducted over six months in the Obstetrics and Gynaecology outpatient departments of two tertiary-care teaching hospitals in Khyber Pakhtunkhwa, Pakistan: Qazi Hussain Ahmed Medical Complex, Nowshera, and Kuwait Teaching Hospital, Peshawar. A total of 450 consenting pregnant women were recruited using non-probability consecutive sampling, with 225 participants enrolled from each centre. Questionnaires were available in Urdu, English, and Pashto and were completed with assistance from doctors according to each participant's language preference and feasibility. Probable depression and anxiety were assessed using the Edinburgh Postnatal Depression Scale (EPDS; cut-off ≥ 13) and Generalized Anxiety Disorder-7 scale (GAD-7; cut-off ≥ 10), respectively. Chi-square tests and ridge-penalized multivariable logistic regression with bootstrap 95% confidence intervals were used for analysis; $p < 0.05$ was considered statistically significant.

Among the 450 participants, 25.3% screened positive for both probable depression and anxiety, 6.4% for probable depression only, 12.9% for probable anxiety only, while 55.3% screened negative for both conditions (Figure 1).

Conclusion: Probable antenatal depression and anxiety were common among pregnant women attending the two tertiary-care hospitals. Positive screening results were strongly associated with psychosocial factors, particularly lifetime partner violence within marriage, unplanned pregnancy, and poor spousal/family support. These findings support consideration of routine antenatal mental health screening together with appropriate psychosocial assessment, support, and referral pathways in tertiary-care settings.

Keywords: antenatal depression; anxiety; pregnancy; tertiary care; cross-sectional study; associated factors.

INTRODUCTION

The period of pregnancy represents a time of great physiological and psychosocial change and depression and anxiety are among the commonest yet least recognised problems of the antenatal period.¹ Prevalence of antenatal depression is higher in low- and middle-income countries; recent systematic reviews suggest that approximately one in four women are affected,^{2,3} while up to one in five pregnant women experience clinically significant anxiety, with higher rates reported in low- and middle-income countries than in high-income countries.^{4,5}

Perinatal mental morbidity is especially high in South Asia, where approximately one in four pregnant women experience antenatal depression and social determinants such as poverty, low education and gender-based violence are prominent.^{3,6} A meta-analysis of studies from Pakistan reported a pooled prevalence of maternal perinatal depression of more than 30%,⁷ and hospital-based surveys conducted during the COVID-19 pandemic found antenatal anxiety and depression to be common among Pakistani women.⁸ Similar findings have been reported from India,⁹ and partner violence has emerged as a major correlate of perinatal mental disorders across low- and lower-middle-income countries.¹⁰

Untreated antenatal depression and anxiety go beyond simple mood swings, and are consistently linked to a chain of negative outcomes to the mother and baby. Antenatal psychological morbidity has been associated with preterm birth, low birth weight and adverse child developmental outcomes,^{11–13} as well as with metabolic complications such as gestational diabetes mellitus.^{14,15}

The evidence from other resource-constrained contexts, such as Rwanda¹⁶ and China,¹⁷ together with meta-analytic evidence on the protective role of social support,¹⁸ also suggests

this interactive relationship between psychosocial, obstetric and biological risk factors for mental morbidity in pregnancy. Despite this, most of the available data in Pakistan (and in the region) is from single centre studies with small and non-representative samples,¹⁹ and this restricts the generalizability of the findings to the broader antenatal population in tertiary care settings.

This knowledge led to the design of the present multicentre cross-sectional study to estimate the prevalence of probable depression and anxiety and to identify the sociodemographic, obstetric, and psychosocial factors independently associated with these outcomes among pregnant women attending tertiary-care hospitals, with the aim of informing antenatal mental health screening and support strategies.

MATERIAL AND METHODS

STUDY DESIGN, SETTING AND DURATION: This was an analytical multicentre cross-sectional study conducted in the Obstetrics and Gynaecology outpatient departments of two tertiary-care teaching hospitals in Khyber Pakhtunkhwa, Pakistan: Qazi Hussain Ahmed Medical Complex, Nowshera, and Kuwait Teaching Hospital, Peshawar. The study was conducted over six months, from January 2023 to June 2023, following ethical approval from the relevant institutional ethics review committees.

Ethical considerations: Ethical approval was obtained from the relevant institutional ethics review committees before data collection. Participation was voluntary, and informed consent was obtained from all participants before enrolment. Participant information was handled confidentially.

Sample size and sampling technique: The minimum sample size was estimated using the formula $n = Z^2pq/d^2$, with an anticipated prevalence (p) of 33.5%, $Z = 1.96$ for a 95% confidence level, and a 5% margin of error. This gives a minimum requirement of approximately 342 participants. The achieved sample was 450 women, exceeding the minimum calculated requirement, with equal recruitment from the two participating centres (225

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participants per centre). Participants were recruited using non-probability consecutive sampling.

The inclusion criteria were pregnant women aged ≥ 18 years, in any trimester of pregnancy, attending the antenatal outpatient clinic and consenting to participate. As in comparable tertiary-care antenatal mental health surveys,^{8,20} women with a pre-existing clinically diagnosed psychiatric disorder, major fetal anomaly, multiple gestation, or cognitive/communication impairment preventing completion of the questionnaire were excluded.

Data collection tool and definitions: A structured, pretested data-collection proforma recorded sociodemographic, obstetric, and psychosocial characteristics. Probable depression was assessed using the 10-item Edinburgh Postnatal Depression Scale (EPDS), with a cut-off score of ≥ 13 ,²¹ and probable anxiety using the 7-item Generalized Anxiety Disorder-7 (GAD-7), with a cut-off score of ≥ 10 . The instruments have been widely applied in antenatal populations in South Asia.^{3,8} Questionnaires were available in Urdu, English, and Pashto. They were completed with assistance from doctors according to each participant's language preference and feasibility, thereby accommodating differences in literacy and language. Partner's violence was assessed by asking participants whether they had ever experienced violence within their marriage. An affirmative response included physical and/or sexual violence and referred to lifetime experience during marriage rather than violence limited to the current pregnancy.

Statistical analysis: Data were cleaned and analyzed using Python (pandas v², SciPy v¹, scikit-learn v¹). Categorical variables were summarized as frequencies and percentages, and continuous EPDS and GAD-7 scores as mean $\pm$ SD. Chi-square tests were used to examine unadjusted associations between the nine candidate factors shown in Table 2 and probable depression/anxiety status. Because several candidate factors, particularly partner violence and poor spousal/family support, showed strong relationships with anxiety status and standard maximum-likelihood logistic regression demonstrated quasi-complete separation, ridge-penalized multivariable logistic regression (L^2 , $C = 0.3$) was fitted separately for each outcome. The nine factors evaluated in Table 2 were entered into the multivariable models. Bootstrap 95% confidence intervals and two-sided p-values were obtained using 2,000 resamples. Adjusted odds ratios (aORs) are reported with 95% confidence intervals; $p < 0.05$ was considered statistically significant.

RESULTS

A total of 450 pregnant women were recruited, with 225 participants (50.0%) enrolled from Qazi Hussain Ahmed Medical

Complex, Nowshera, and 225 (50.0%) from Kuwait Teaching Hospital, Peshawar. The prevalence of positive depression and anxiety screens and the overall participant characteristics were comparable across the two centres. Table 1 summarizes the sociodemographic and obstetric characteristics of the combined study sample. Half of the participants (50.9%) were aged 20–29 years, 63.6% lived in urban areas, and 18.4% were illiterate. Approximately one-third (30.2%) reported an unplanned pregnancy, 27.8% had a history of pregnancy loss, 45.3% had a monthly household income below PKR 40,000, and 21.8% reported a lifetime history of partner violence within marriage.

Among the 450 participants, 25.3% screened positive for both probable depression and anxiety, 6.4% for probable depression only, 12.9% for probable anxiety only, while 55.3% screened negative for both conditions (Figure 1).

Compared with women with planned pregnancies, the proportions screening positive for depression and anxiety were significantly higher among women reporting an unplanned pregnancy, poor spousal/family support, previous pregnancy loss, low household income, a history of partner violence, and third-trimester gestation (all $p < 0.05$) (Table 2). On univariable analysis, anxiety was significantly associated with gestational diabetes mellitus (GDM) ($p = 0.035$), whereas depression was not ($p = 0.380$). Primigravidity and illiteracy were not significantly associated with either outcome in the univariable analysis.

In multivariable ridge-penalized logistic regression including all nine candidate factors, partner violence demonstrated the strongest independent association with both probable depression (aOR 8.61, 95% CI 5.98–12.66; $p < 0.001$) and probable anxiety (aOR 15.86, 95% CI 11.88–20.27; $p < 0.001$). Unplanned pregnancy was associated with probable depression (aOR 4.02, 95% CI 2.80–5.93; $p < 0.001$) and probable anxiety (aOR 12.30, 95% CI 9.53–15.75; $p < 0.001$), while poor spousal/family support was associated with probable depression (aOR 4.76, 95% CI 3.41–6.74; $p < 0.001$) and probable anxiety (aOR 10.94, 95% CI 8.53–13.64; $p < 0.001$). Previous pregnancy loss, low household income, and third-trimester gestation remained independently associated with both outcomes. GDM was independently associated with probable anxiety (aOR 2.46, 95% CI 1.68–3.49; $p < 0.001$) but not probable depression (aOR 1.51, 95% CI 0.96–2.27; $p = 0.080$). Primigravidity (aOR 1.66, 95% CI 1.23–2.20; $p < 0.001$) and illiteracy (aOR 1.45, 95% CI 1.03–1.99; $p = 0.033$) were independently associated with probable anxiety but not with probable depression (Table 3, Figure 3).

Table 1. Sociodemographic and obstetric characteristics of participants (n = 450).

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	< 20	35	7.8
	20–29	229	50.9
	30–39	163	36.2
	≥ 40	23	5.1
Residence	Urban	286	63.6
	Rural	164	36.4
Education	Illiterate	83	18.4
	Primary–Secondary	198	44.0
	Higher secondary & above	169	37.6
Monthly household income	< PKR 40,000	204	45.3
	$\geq$ PKR 40,000	246	54.7
Family system	Joint	240	53.3
	Nuclear	210	46.7
Gravidity	Primigravida	167	37.1
	Multigravida	283	62.9
Trimester	First	92	20.4
	Second	158	35.1
	Third	200	44.4
Planned pregnancy	Yes	314	69.8
	No	136	30.2
History of pregnancy loss	Yes	125	27.8
	No	325	72.2

Table 2. Univariable (chi-square) analysis of factors associated with probable antenatal depression and anxiety (n = 450). Percentages represent the proportion screening positive for probable depression or anxiety among participants with versus without each specified factor. Comparisons were performed using the chi-square test.

Factor	Depression: factor present vs absent (%)	p-value	Anxiety: factor present vs absent (%)	p-value
Unplanned pregnancy	51.5 vs 23.2	<0.001	71.3 vs 23.9	<0.001
Poor spousal/family support	46.8 vs 21.2	<0.001	59.1 vs 23.5	<0.001
Previous pregnancy loss	41.6 vs 28.0	0.006	54.4 vs 32.0	<0.001
Low household income (<PKR 40,000)	39.2 vs 25.6	0.002	45.1 vs 32.5	0.006
History of partner's violence	68.4 vs 21.6	<0.001	77.6 vs 27.3	<0.001
Gestational diabetes mellitus	36.8 vs 31.0	0.380	50.9 vs 36.4	0.035
Third-trimester gestation	37.0 vs 27.6	0.033	45.0 vs 32.8	0.008
Primigravida	31.7 vs 31.8	0.988	40.7 vs 36.7	0.403

Table 3: Multivariable ridge-penalized logistic regression: adjusted odds ratios (aOR) with bootstrap 95% CI for antenatal depression and anxiety (n = 450). aOR = adjusted odds ratio; CI = confidence interval.

Factor	aOR (95% CI) — Depression	p-value	aOR (95% CI) — Anxiety	p-value
Unplanned pregnancy	4.02 (2.80–5.93)	<0.001	12.30 (9.53–15.75)	<0.001
Poor spousal/family support	4.76 (3.41–6.74)	<0.001	10.94 (8.53–13.64)	<0.001
Previous pregnancy loss	1.82 (1.21–2.73)	0.004	3.48 (2.57–4.63)	<0.001
Low household income (<PKR 40,000)	2.42 (1.66–3.43)	<0.001	2.72 (2.03–3.57)	<0.001
History of partner's violence	8.61 (5.98–12.66)	<0.001	15.86 (11.88–20.27)	<0.001
Gestational diabetes mellitus	1.51 (0.96–2.27)	0.080	2.46 (1.68–3.49)	<0.001
Third-trimester gestation	1.52 (1.07–2.19)	0.028	1.79 (1.36–2.40)	<0.001
Primigravida	1.29 (0.88–1.93)	0.168	1.66 (1.23–2.20)	<0.001
Illiteracy	1.37 (0.89–2.03)	0.156	1.45 (1.03–1.99)	0.033

Figure 1. Distribution of Participants by Psychological Status

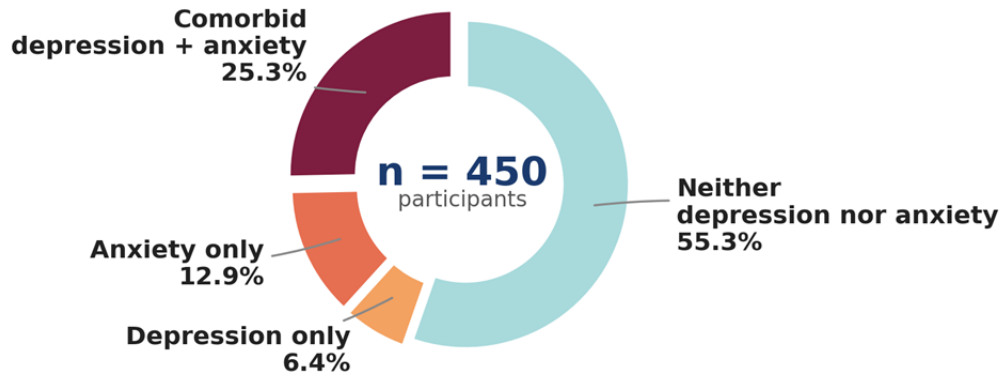


Figure 1. Distribution of participants by psychological status (n = 450).

Figure 2. Severity of Depressive Symptoms (EPDS) among All Participants (n = 450)

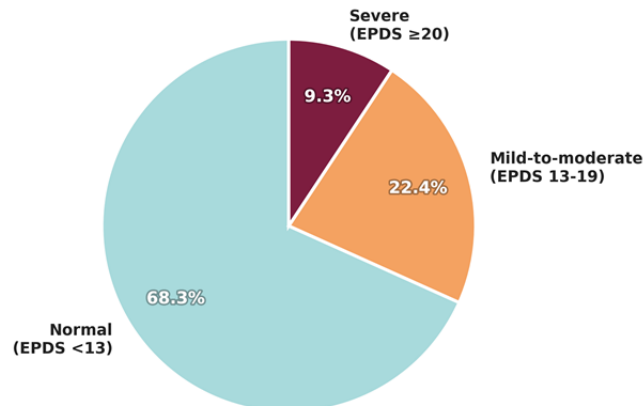


Figure 2. Distribution of EPDS scores among participants: <13, 13–19, and ≥20 (n = 450).

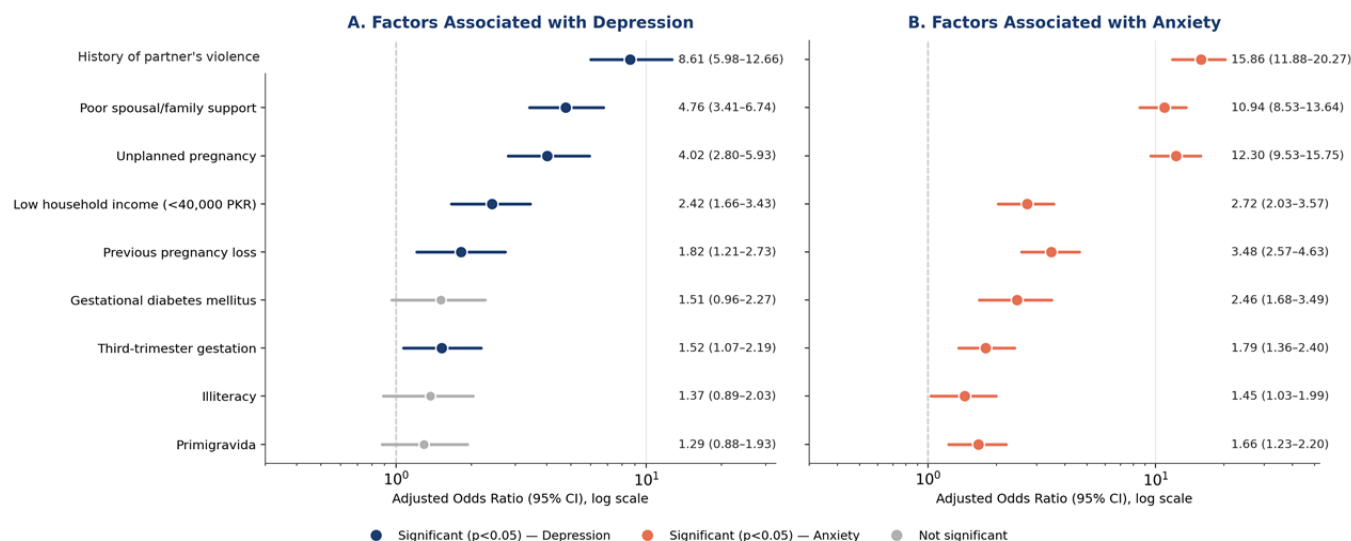
Figure 3. Multivariable-Adjusted Odds Ratios for Antenatal Depression and Anxiety (Ridge-penalized logistic regression, bootstrap 95% CI; n = 450)

Figure 3: Forest plot of multivariable-adjusted odds ratios for antenatal depression (panel A) and anxiety (panel B), with bootstrap 95% confidence intervals (n = 450).

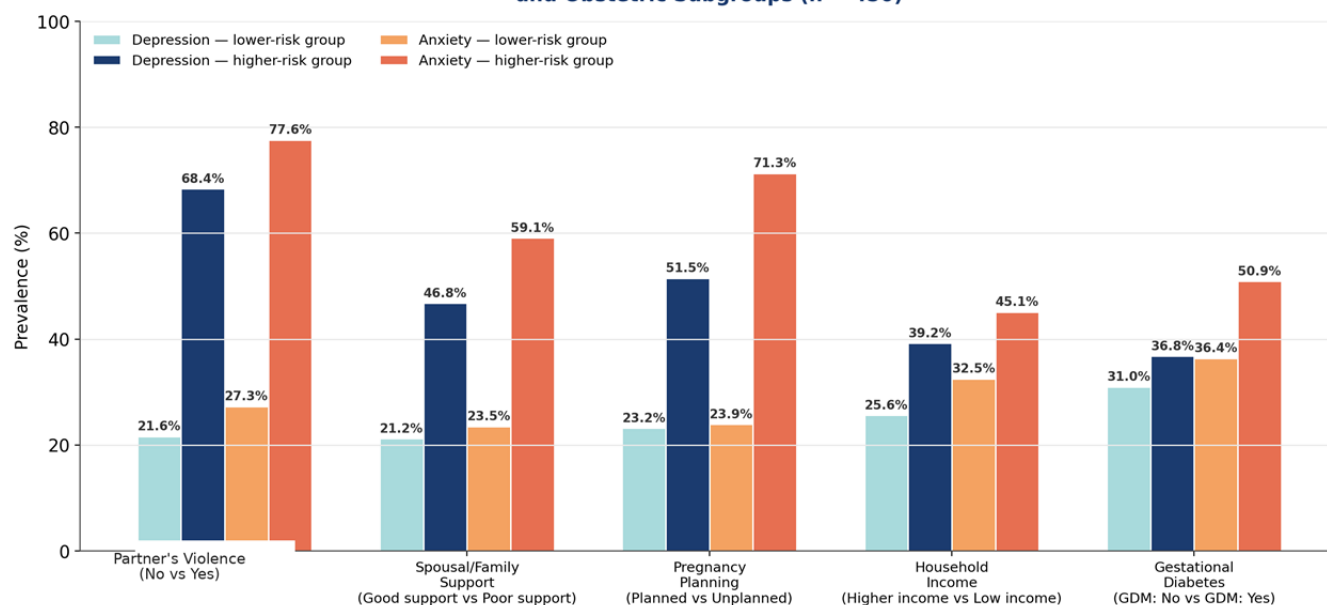
Figure 4. Prevalence of Depression and Anxiety Across Key Psychosocial and Obstetric Subgroups (n = 450)

Figure 4: Prevalence of depression and anxiety across key psychosocial and obstetric subgroups (n = 450).

DISCUSSION

Nearly one-third (31.8%) of pregnant women attending the two tertiary-care hospitals screened positive for probable depression and more than one-third (38.2%) screened positive for probable anxiety, while approximately one in four women (25.3%) screened positive for both. Variation in prevalence estimates has been reported in studies from Pakistan and other settings and may reflect differences in screening tools and thresholds, sampling methods, sociocultural characteristics, and the influence of pandemic-related psychosocial stressors.^{2,3,7,22}

The independent associations identified in this study are broadly consistent with regional and global literature. Partner's

violence demonstrated the strongest adjusted association with both probable depression (aOR 8.61) and probable anxiety (aOR 15.86). In this study, partner's violence represented a self-reported lifetime history of physical and/or sexual violence within marriage and was not restricted to the current pregnancy; this definition should be considered when comparing the estimates with studies using pregnancy-specific or multidomain measures of partner's violence. Unplanned pregnancy and poor spousal/family support were also strongly associated with both outcomes. A South Asian meta-analysis identified poverty, limited autonomy in decision-making, and gender-based violence as important social determinants of antenatal depression and anxiety,⁶ while a

systematic review from low- and lower-middle-income countries identified partner violence during pregnancy as a consistent correlate of perinatal mental disorders.¹⁰ Comparable psychosocial determinants have also been reported in India, China, and Ethiopia.^{9,17,23}

In the current sample, GDM was independently associated with probable anxiety but not with probable depression after multivariable adjustment. This finding is relevant to a growing body of literature describing associations between metabolic complications of pregnancy and perinatal mental health.^{14,15} Antenatal visits for glucose screening and GDM care may therefore provide additional opportunities to identify women experiencing psychological distress and facilitate appropriate assessment and referral.

Findings from other low- and middle-income settings also support the importance of social support in antenatal mental health. Studies from Rwanda¹⁶ and Gilgit, Pakistan¹⁹ identified social support as an important protective factor against antenatal and peripartum mental illness, consistent with meta-analytic evidence showing an association between low social support and mental health problems during pregnancy.¹⁸ Studies from tertiary-care hospitals in India and Pakistan have likewise reported a substantial burden of antenatal depression and anxiety, reinforcing the relevance of mental health assessment in obstetric settings.^{8,20}

Direct comparison with international prevalence estimates requires caution because of heterogeneity in study populations, screening instruments, diagnostic thresholds, and study periods. Several higher prevalence estimates from the region were obtained during the COVID-19 pandemic.^{8,20} Meta-analyses conducted during the pandemic reported increased antenatal depression and anxiety and identified pandemic-related concerns among factors associated with psychological distress during pregnancy.^{22,24} These contextual differences should be considered when comparing the present findings with studies conducted during different periods and settings.

This study has several limitations. Its cross-sectional design precludes conclusions about temporality or causality between the identified factors and probable antenatal depression or anxiety. EPDS and GAD-7 are screening tools rather than structured clinical diagnostic interviews; therefore, the outcomes represent probable depression and anxiety rather than confirmed psychiatric diagnoses.²¹ Hospital-based recruitment also limits generalizability to the wider antenatal population, particularly women who do not access tertiary-care services. Partner's violence was measured by questionnaire as a lifetime history of physical and/or sexual violence within marriage rather than by a dedicated multidomain violence scale; recall and reporting bias therefore cannot be excluded, particularly for this sensitive factor. Several psychosocial factors were strongly inter-correlated, and quasi-complete separation occurred in standard maximum-likelihood logistic regression. Ridge-penalized regression with bootstrap confidence intervals was therefore used; nevertheless, the large adjusted associations, particularly for anxiety, should be interpreted cautiously and warrant replication in independent samples. Strengths include the multicentre design, equal recruitment from two tertiary-care centres, an achieved sample exceeding the minimum calculated requirement, and use of established screening instruments for depression and anxiety.

CONCLUSION

Probable antenatal depression and anxiety were common among pregnant women attending the two tertiary-care hospitals and were independently associated with several psychosocial and obstetric factors. Partner's violence showed the strongest association with both outcomes, while unplanned pregnancy and poor spousal/family support were also prominent correlates. GDM, primigravidity, and illiteracy were independently associated with probable anxiety but not probable depression. Because this was a cross-sectional screening study, these findings should be interpreted as associations rather than causal relationships.

Incorporating validated mental health screening instruments such as the EPDS and GAD-7, together with appropriate psychosocial assessment, support, and referral pathways, may help identify women requiring further evaluation during routine antenatal care in tertiary-care settings.

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Conflict of Interest: The authors declare no conflict of interest.

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Data Availability Statement: The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request, subject to institutional and ethical restrictions.

AUTHORS' CONTRIBUTION

Javeria Saleem: Conceptualization, study design, data collection, data analysis and interpretation, manuscript drafting, critical revision, and final approval of the manuscript.

Mehwish Syed: Literature review, data collection, data interpretation, manuscript review and editing, critical revision, and final approval of the manuscript.

Afra Amaan: Data collection at Kuwait Teaching Hospital, Peshawar; manuscript review and final approval of the manuscript. All authors: Agreed to be accountable for all aspects of the work and to ensure the accuracy and integrity of the research.

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