

BMJ Open Antenatal depression and its associated factors among women of Godawari Municipality, Lalitpur, Nepal: a cross-sectional study

Anisha Chalise ^{1,2}, Gambhir Shrestha ³, Shishir Paudel ⁴,
Amod Kumar Poudyal¹

To cite: Chalise A, Shrestha G, Paudel S, *et al.* Antenatal depression and its associated factors among women of Godawari Municipality, Lalitpur, Nepal: a cross-sectional study. *BMJ Open* 2022;**12**:e063513. doi:10.1136/bmjopen-2022-063513

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2022-063513>).

Received 04 April 2022

Accepted 24 October 2022



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Central Department of Public Health, Tribhuvan University Institute of Medicine, Kathmandu, Nepal

²Center for Research on Environment, Health and Population Activities (CREHPA), Lalitpur, Nepal

³Department of Community Medicine, Tribhuvan University Institute of Medicine, Maharajgunj, Kathmandu, Nepal

⁴Department of Public Health, Central Institute of Science and Technology (CiST), Kathmandu, Nepal

Correspondence to

Anisha Chalise;
anisha.chalise90@gmail.com

ABSTRACT

Objectives To estimate the prevalence of antenatal depression and identify its associated factors among pregnant women of Godawari Municipality, Lalitpur, Nepal.

Design Community-based cross-sectional study.

Setting Godawari Municipality, Lalitpur, Nepal, between September and November 2021.

Participants 250 randomly selected pregnant women of Godawari Municipality, Lalitpur, Nepal.

Main outcome measures The level of antenatal depression was assessed using Edinburgh Postnatal Depression Scale. χ^2 test and multivariate logistic regression analysis were applied to determine the association between antenatal depression and related variables at 95% level of confidence.

Results The prevalence of antenatal depression was found to be 24.8% (95% CI: 19.2 to 30.7). Multigravida (AOR: 2.219, 95% CI: 1.113 to 4.423), unintended pregnancy (AOR: 2.547, 95% CI: 1.204 to 5.388), male sex preference of child by family (AOR: 2.531, 95% CI: 1.204 to 5.321) and intimate partner violence (AOR: 2.276, 95% CI: 1.116 to 4.640) were found to be the positive predictors of antenatal depression.

Conclusion This study showed a high prevalence of depression among pregnant women. The results suggest a need for mental health assessment during pregnancy. Screening for depression should be part of routine antenatal checkups for early detection and management of mental health concerns during this vulnerable period.

INTRODUCTION

Pregnancy is a time of great joy and positive expectations, and yet it is a time of physical as well as mental stress and difficulties.¹ During pregnancy, a mother experiences a wide range of physiological as well as psychological changes.² This poses a considerably great risk of experiencing mental health problems for all women expecting a baby.³ Mental health disorders comprise a broad range of symptoms and conditions, among which maternal depression is one of the most prevalent psychiatric disorders that prevails during pregnancy as well as after childbirth. Such mental health

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study is one of the few studies assessing the prevalence and predictors of antenatal depression in Nepal.
- ⇒ Validated screening tools were used to assess the level of depression, perceived social support and intimate partner violence.
- ⇒ This is a community-based study, thus includes all pregnant women irrespective of whether they had gone for antenatal care visits.
- ⇒ The COVID-19-related variables and their relationship with antenatal depression were not assessed in this study although the study was conducted at the time of pandemic.

issues can have negative health outcomes for both mother and child, including poor fetal development and long-term deleterious effect on the offspring's neurological and behavioural development.⁴⁻⁶

Depression has been recognised as one of the major public health problems which is twice more likely to occur in women during their reproductive age than in men.^{7 8} It is a common yet often misdiagnosed, least investigated and undertreated disorder that can affect women during the antenatal and postnatal period.^{9 10} Maternal depression is associated with substantial medical and psychological morbidities among mothers as well as their child. The impact of maternal depression can be seen in health, nutritional status, growth as well as overall cognitive, intellectual and socioemotional development of the child. If undiagnosed and untreated, it can lead to various maternal health issues, higher infant mortality and morbidity, infant growth and development issues and child malnutrition. In extreme cases, it may even lead to maternal death due to suicide, hence creating a significant concern in the aspect of maternal and child health.¹¹⁻¹⁴

The characteristic features of antenatal depression include depressed mood, persistent sadness, excessive anxiety, decreased energy, sleep disturbances and insomnia, weight loss, difficulty in thinking and poor concentration along with the inability to feel happiness.¹⁵ Globally, antenatal depression is found to affect 15%–65% of women during pregnancy.¹⁶ In South Asia, the prevalence of antenatal depression is reported to be approximately 25%.¹⁷ The prevalence of antenatal depression in Nepal varies widely from 18% to 33% depending on the screening tool used, assessment time, sample size and sample characteristics.^{18–20}

Depression during pregnancy and the postpartum period is a major public health concern which is often neglected in developing countries like Nepal, in the areas of treatment as well as research.²¹ In Nepal, only a few studies have been published focusing on antenatal depression. Promotion of mental health is one of the prioritised areas of Sustainable Development Goals, yet, it is still a neglected aspect in the primary healthcare system of Nepal. Furthermore, the rates of depressive symptoms during pregnancy as well as its associated risk factors are not well known in Nepal, due to a lack of adequate information in this aspect of maternal health. Hence, this study was undertaken to assess the prevalence and predictors of depression among pregnant women of Godawari Municipality, Lalitpur, Nepal.

METHODS AND MATERIALS

Study design

A community-based cross-sectional study was conducted among pregnant women of Godawari Municipality, Lalitpur, Nepal, between September and November 2021.

Participants

All pregnant women who had been residing at Godawari Municipality for at least 6 months prior to data collection were considered as the study population. Those pregnant women with any physical disability or cognitive problems such as hearing disability, speech impairment, history of early onset dementia and traumatic brain injury, which may limit their ability to provide informed consent as well as information required for data collection, were placed under exclusion criteria for the study.

Sample size determination and sampling technique

The sample size was determined using the Cochran's formula for estimation of proportion, $n = z^2 pq / d^2$, where p is the prevalence of antenatal depression, q is $1 - p$ and d is the allowable error. A study conducted in Kathmandu, in 2017, reported 18% of the pregnant women to be depressed.¹⁸ Taking this prevalence at 95% CI and 5% allowable error (d), the sample size was estimated to be 227, which was optimised to 250 considering 10% non-response rate.

For this study, the samples were drawn in multiple stages. Initially, among 14 wards of Godawari Municipality,

5 wards were selected at random using lottery method. Then, the required number of samples to be drawn from each ward was calculated based on the proportion of pregnant women in that ward. The expected number of pregnant women per ward of Godawari Municipality was obtained from the municipal office.

The sample frame was created listing the name, address and age of the pregnant mothers residing in the selected wards with the help of Health Facility Staff and Female Community Health Volunteers. In the final stage, the pregnant women were selected using systematic random sampling technique, where every third woman listed in the sample frame was approached for data collection.

Data collection

Face-to-face interview technique was applied for data collection. The selected pregnant women were approached and provided with the study details. The interview was then conducted after obtaining written informed consent from the women. All the required information from the participants was obtained in a single interview session.

The structured interview schedule used for data collection consisted of Edinburgh Postnatal Depression Scale (EPDS)²² to assess antenatal depression, Multidimensional Scale of Perceived Social Support (MSPSS)²³ to assess the level of perceived social support and Extended Hurt, Insult, Threaten, Scream (E-HITS)²⁴ tool to screen for intimate partner violence, along with questions regarding participants sociodemographic profile and other characteristics. The participants were also asked whether they and/or their spouses consumed any form of alcohol and tobacco products in the past or at present.

The EPDS consists of 10 items scored on a four-point Likert scale to assess the emotional experiences of women in the past 7 days. The total score ranges between 0 and 30, with the cut-off score for depression being ≥ 10 .²² Although EPDS is primarily used to assess depression during the postpartum period, several studies have suggested that this tool is valid and reliable for screening antenatal depression.^{25 26} The EPDS cut-off score of ≥ 10 is proposed for assessing depressive symptoms among pregnant women.^{27 28} A few studies have been conducted in Nepal for the validation of EPDS as a screening tool for postnatal depression.^{29 30} Studies assessing antenatal depression using EPDS scale in Nepal have used a cut-off score of ≥ 10 to report antenatal depression.^{18 31 32}

The MSPSS has been translated to and validated in various languages, including Nepali language. The MSPSS tool measures the perceived social support in three major domains—family, friends and significant other. It consists of 12 items scored on a seven-point Likert scale. The total mean score ranges between 1 and 7, with a higher score meaning greater perceived social support. A mean score ranging from 1 to 2.9 is considered low support, a score from 3 to 5 is considered moderate support and a score from 5.1 to 7 is considered high support.²³ The Nepalese

version of the tool showed good internal consistency, given by Cronbach's alpha value of 0.90.³³

The E-HITS tool consists of five items to assess intimate partner violence, scored on a five-point Likert scale with scores ranging from 5 to 25. The cut-off score for intimate partner violence is ≥ 7 .²⁴

A validated screening tool was used to assess the status of antenatal depression among pregnant women. Translation and back translation (English–Nepali–English) of the questions was performed. To enhance the validity and reliability of the tool, the data collection tool was pretested among 25 (10% of the total sample) pregnant women of the non-sampled ward of Godawari Municipality. The internal consistency of the EPDS tool was assessed through the calculation of Cronbach's alpha, which was 0.86 in this study.

Data processing, management and analysis

The collected data were carefully reviewed for accuracy and completeness and coded on the same day of the interview. For data entry, data-entry marks were created, and EpiData software V.3.1 was used. A total of 10% of the randomly selected data were manually rechecked for accuracy. The entered data was exported to Statistical Package for the Social Sciences V.20 for statistical analysis. The data were summarised in terms of frequency, percentage, mean and SD.

The χ^2 test and unadjusted odds ratio were calculated at 5% level of significance to identify the factors associated with antenatal depression, and the significant variables ($p < 0.05$) were included in the final model for multiple logistic regression (for Adjusted odds ratio (AOR)). The multicollinearity among independent variables was tested using variance inflation factor (VIF). The independent predictors of antenatal depression were identified through multivariate binary logistic regression analysis at 95% confidence level and $p < 0.05$. Hosmer and Lemeshow goodness of fit test was used to assess the goodness of fit of the model.

Patient and public involvement

None.

RESULTS

A total of 250 pregnant women were enrolled in this study.

Prevalence of antenatal depression

Out of 250 participants, 62 were found to be depressed based on the EPDS cut-off point of ≥ 10 , indicating the prevalence of antenatal depression at 24.8% (95% CI: 19.2 to 30.7). The mean EPDS score was 6.5 (SD \pm 5.5) with minimum and maximum scores of 0 and 28, respectively. Among 250 pregnant women, 5 (2.0%) of them had ever had suicidal thoughts during their pregnancy, reported through EPDS.

Factors associated with antenatal depression

The age of the participants in the study ranged from 18 to 40 years with a mean age of 26.6 \pm 4.6 years. Almost half

of the participants (48.0%) were unemployed and/or homemakers. Around 1 in 10 (11.2%) pregnant women had perceived a low level of perceived social support from their family, friends and significant other. The bivariate analysis of sociodemographic variables with antenatal depression performed through χ^2 test revealed that sociodemographic variables such as age, ethnicity, family type, educational level of participants and their spouse and occupation of participants did not have any statistically significant relationship with antenatal depression. However, occupation of spouse, perceived level of social support and sex preference of the child by the participants' families were found to be associated with antenatal depression (table 1).

Among the total participants, more than half (54.4%) were pregnant for the first time. Majority of the participants did not face any problems or complications with their current (90.7%) or previous (80.7%) pregnancies. Among the various obstetric factors, gravida and intent of pregnancy were found to be significantly associated with antenatal depression under bivariate analysis (table 2).

In context of psychological and behavioural factors, one-third of the participants (33.2%) reported intimate partner violence. Likewise, one-fourth (20.4%) had experienced a stressful life event in the past 12 months. Nearly 1 in 10 pregnant women (8.4%) were currently consuming alcoholic drinks within the past 1 month. Bivariate analysis revealed that the variables such as intimate partner violence, stressful life events and tobacco and alcohol consumption status of spouse were found to have a statistically significant association with antenatal depression (table 3).

The independent variables found to have statistically significant relationship with antenatal depression in χ^2 test were included in the final model for multiple logistic regression analysis. The multicollinearity among independent variables in the model was tested using VIF. No multicollinearity was observed among any of the independent variables as the highest VIF reported was 1.879. The Hosmer-Lemeshow test for goodness of fit suggested that this model was a good fit ($p = 0.240$). The Nagelkerke R^2 value was noted to be 0.316. In multivariate analysis, four variables were found to be the independent predictors of antenatal depression, which included gravida, intent of pregnancy, sex preference of child by participant's family and intimate partner violence, keeping other variables constant.

The participants who experienced multiple gravida were twice (AOR: 2.219, 95% CI: 1.113 to 4.423) more likely to be depressed than those who were pregnant for the first time. Likewise, as compared with the participants who had an intended pregnancy, the participants who had unintended pregnancy had twofold increase in odds (AOR: 2.547, 95% CI: 1.204 to 5.388) of depression. Similarly, the sex preference of the child by the participants' families was noted as one of the important predictors of antenatal depression as the odds of depression increased by twofold (AOR: 2.531, 95% CI: 1.204 to

Table 1 Sociodemographic factors and its association with antenatal depression (n=250)

Characteristics	n (%)	Antenatal depression		χ^2	P value
		Presence n (%)	Absence n (%)		
Age					
<20 years	14 (5.6)	6 (42.9)	8 (57.1)	2.755	0.252
20–30 years	198 (79.2)	46 (23.2)	152 (76.8)		
>30 years	38 (15.2)	10 (26.3)	28 (73.7)		
Ethnicity					
Dalit	24 (9.6)	11 (45.8)	13 (54.2)	7.400	0.060
Disadvantaged janajatis	99 (39.6)	23 (23.2)	76 (76.8)		
Relatively advantaged janajatis	52 (20.8)	9 (17.3)	43 (82.7)		
Brahmin/Chhetris	75 (30.0)	19 (25.3)	56 (74.7)		
Family type					
Joint/Extended	65 (26.0)	45 (24.3)	140 (75.7)	0.086	0.769
Nuclear	185 (74.0)	17 (26.2)	48 (73.8)		
Education of participants					
Primary education	54 (21.6)	19 (35.2)	35 (64.8)	6.685	0.083
Secondary education	67 (26.8)	18 (26.9)	49 (73.1)		
Higher secondary education	73 (29.2)	17 (23.3)	56 (76.7)		
Undergraduate and above	56 (22.4)	8 (14.3)	48 (85.7)		
Education of spouse					
Primary education	27 (10.8)	8 (29.6)	19 (70.4)	3.082	0.379
Secondary education	81 (32.4)	24 (29.6)	57 (70.4)		
Higher secondary education	75 (30.0)	18 (24.0)	57 (76.0)		
Undergraduate and above	67 (26.8)	12 (17.9)	55 (82.1)		
Occupation of participants					
Agriculture	19 (7.6)	8 (42.1)	11 (57.9)	6.853*	0.144
Homemaker/Unemployed	122 (48.0)	31 (25.4)	91 (74.6)		
Daily wage labourer	15 (6.0)	6 (40.0)	9 (60.0)		
Own business	45 (18.0)	8 (17.8)	37 (82.2)		
Service (govt./private)	49 (19.6)	9 (18.4)	40 (81.6)		
Occupation of spouse					
Agriculture	29 (11.6)	10 (34.5)	19 (65.5)	13.079	0.023†
Unemployed	18 (7.2)	7 (38.9)	11 (61.1)		
Daily wage labourer	28 (11.2)	12 (39.3)	16 (57.1)		
Own business	42 (16.8)	8 (19.0)	34 (81.0)		
Overseas employment	12 (4.8)	4 (33.3)	8 (66.7)		
Service (govt./private)	121 (48.4)	21 (17.4)	100 (82.6)		
Perceived social support					
Low support	28 (11.2)	12 (42.9)	16 (57.1)	9.796	0.007†
Moderate support	117 (46.8)	33 (28.2)	84 (71.8)		
High support	105 (42.0)	17 (16.2)	88 (83.8)		
Sex preference of child (participant)					
Male	64 (25.6)	22 (34.4)	42 (65.6)	4.271	0.118
Female	35 (14.0)	8 (22.9)	27 (77.1)		
No sex preference	151 (60.4)	32 (21.2)	119 (78.8)		
Sex preference of child (family)					
Male	110 (44.0)	39 (35.5)	71 (64.5)	13.705	0.001†
Female	17 (6.8)	5 (29.4)	12 (70.6)		
No sex preference	123 (49.2)	18 (14.6)	105 (85.4)		

*Likelihood ratio.

†Statistical significance at $p < 0.05$.

Table 2 Obstetric factors and its association with antenatal depression (n=250)

Characteristics	n (%)	Antenatal depression		χ^2	P value
		Presence n (%)	Absence n (%)		
Risk group (age)					
Non-risk age group	217 (86.8)	50 (23.0)	167 (77.0)	2.726	0.099
Risk age group	33 (13.2)	12 (36.4)	21 (63.6)		
Gestational age					
First trimester	13 (5.2)	3 (23.1)	10 (76.9)	1.380	0.502
Second trimester	124 (49.6)	27 (21.8)	97 (78.2)		
Third trimester	113 (45.2)	32 (28.3)	81 (71.7)		
Gravida					
Primigravida	136 (54.4)	22 (16.2)	114 (83.8)	11.893	0.001*
Multigravida	114 (45.6)	40 (35.1)	74 (64.9)		
Intent of pregnancy					
Yes	174 (69.6)	29 (16.7)	145 (83.3)	20.302	<0.001*
No	76 (30.4)	33 (43.4)	43 (56.6)		
ANC visit					
Yes	226 (90.4)	55 (24.3)	171 (75.7)	0.271	0.602
No	24 (9.6)	7 (29.2)	17 (70.8)		
Current pregnancy complications identified during ANC (n=226)					
Yes	21 (9.3)	8 (38.1)	13 (61.9)	2.380	0.123
No	205 (90.7)	47 (22.9)	158 (77.1)		
Complications in past pregnancy (n=114)					
Yes	22 (19.3)	5 (22.7)	17 (77.3)	1.829	0.176
No	92 (80.7)	35 (38.0)	57 (62.0)		
History of pregnancy loss					
Yes	29 (11.6)	10 (34.5)	19 (65.5)	1.649	0.199
No	221 (88.4)	52 (23.5)	169 (76.5)		

*Statistical significance at $p < 0.05$
ANC, antenatal care.

5.321) among participants whose family wished to have a male child as compared with the participants whose family had no sex preference of the unborn child. In the same way, the participants who had experienced intimate partner violence were twice (AOR: 2.276, 95% CI: 1.116 to 4.640) more likely to experience depressive symptoms in comparison to their counterparts (table 4).

DISCUSSION

The prevalence of depression among pregnant women was found to be 24.8%, which is similar to the estimate of antenatal depression suggested for South Asia by a meta-analysis, approximated at 25.0%.¹⁷ The observed prevalence rate of antenatal depression is similar to a cross-sectional study from Sindhupalchowk district, Nepal, where 23.8% of pregnant women were found to be depressed in the year 2015.¹⁹ However, the current prevalence is higher than the prevalence of antenatal depression noted among the women visiting public health facilities for antenatal checkups in Kathmandu, which

was 18% in the year 2017.¹⁸ In context of this study area, a community-based study from 2017 noted that 19% of postpartum women were depressed in Godawari Municipality, Nepal.³⁴ Thus, despite the slight variations in the prevalence of maternal depression which might be due to variations in the assessment time, method of assessment and study setting, all of these studies reveal a prominent risk of depression during pregnancy.

The sociodemographic factors such as participant's age, ethnicity, family type, education, nature of occupation and spouse's education were not found to have any statistically significant relationship with antenatal depression. These findings were in line with similar studies conducted in India³⁵ and Nepal.¹⁸ Although women's occupational status was not significantly associated with depression, her spouse's unemployment was significantly associated with depression. In line with our findings, some studies have suggested that, in Asian settings, having an unemployed husband increases the probability of depression.^{36 37} In this society where the husband's income is usually the

Table 3 Behavioural and psychological factors and its association with antenatal depression (n=250)

Characteristics	n (%)	Antenatal depression		χ^2	P value
		Presence n (%)	Absence n (%)		
Intimate partner violence					
Presence	83 (33.2)	36 (43.4)	47 (56.6)	22.984	<0.001*
Absence	167 (66.8)	26 (15.6)	141 (84.4)		
Stressful life events					
Presence	51 (20.4)	20 (39.2)	31 (60.8)	7.139	0.008*
Absence	199 (79.6)	42 (21.1)	157 (78.9)		
History of mental distress					
Yes	7 (2.8)	3 (42.9)	4 (57.1)	1.259	0.369
No	243 (97.2)	59 (24.3)	184 (75.7)		
Participant's tobacco consumption status					
Never consumed	223 (89.2)	52 (23.3)	171 (76.7)	2.430	0.155
Consumed in past	27 (10.8)	10 (37.0)	17 (63.0)		
Tobacco consumption status of spouse					
Never consumed	160 (64.0)	27 (16.9)	133 (83.1)	15.340	<0.001*
Consumed in past	18 (7.2)	6 (33.3)	12 (66.7)		
Currently consuming	72 (28.8)	29 (40.3)	43 (59.7)		
Participant's alcohol consumption status					
Never consumed	186 (74.4)	40 (21.5)	146 (78.5)	5.435	0.066
Consumed in past	43 (17.2)	13 (30.2)	30 (69.8)		
Currently consuming	21 (8.4)	9 (42.9)	12 (57.1)		
Alcohol consumption status of spouse					
Never consumed	116 (46.4)	19 (16.4)	97 (83.6)	9.466	0.009*
Consumed in past	22 (8.8)	5 (22.7)	17 (77.3)		
Currently consuming	112 (44.8)	38 (33.9)	74 (66.1)		

*Statistical significance at p<0.05

primary household income, it seems reasonable that depression would be closely related to the husband's occupational status.³⁸

In comparison to the women who had intended or planned pregnancy before conception, women having unintended pregnancies were found to be at higher odds of antenatal depression. This is in line with the study from Sindhupalchowk district of Nepal where women with unplanned pregnancy were found to have three-fold increase in odds of depression (AOR: 3.43, 95% CI: 1.78 to 6.62) as compared with women with planned pregnancy.¹⁹ Similarly, another study from Pakistan also shared a similar finding, where women with unintended pregnancy had almost twice the odds (AOR: 1.94, 95% CI: 1.40 to 2.69) of depression.³⁸ Likewise, a study from Ethiopia also revealed that pregnant women who had not planned their pregnancy were six times more likely to be depressed than those who planned their pregnancy.³⁹ Similar observations were also made by studies conducted in India.^{40,41} Unintended pregnancy can be considered an important predictor of antenatal depression since women can find it more challenging to deal with an unforeseen

and undesired event and thus, making them more vulnerable to experience depressive symptoms.¹

The male child preference by the participants' family is noted as an important predictor of antenatal depression. This is in line with another study conducted in Nepal, where the preference for a male child by the family was found to have almost fourfold increase in odds of depression (AOR: 3.7, 95% CI: 1.2 to 11.6) among pregnant women.¹⁸ Likewise, a study from rural Maharashtra, India, also shared a similar finding where the pregnant women whose families preferred to have a male child were thrice more at odds (AOR: 3.0, 95% CI: 1.4 to 6.5) of depression.⁴² Another study from South India noted that the family pressure for a male child could result in 11-fold increase in the odds of depression among pregnant women.⁴³ The women in Nepalese society are under family and social pressure to have a male child, as a son is considered a symbol of prestige and someone who will preserve the family name and legacy.¹⁸ This might be the reason that the sex of the unborn child is influencing mothers' psychological well-being.

Table 4 Predictors of antenatal depression

Characteristics	Binary logistic regression			Multivariate logistic regression		
	P value	UOR	95% CI	P value	AOR	95% CI
Occupation of spouse						
Agriculture	0.045	2.506	1.020 to 6.156	0.405	1.594	0.533 to 4.772
Unemployed	0.040	3.030	1.052 to 8.729	0.530	1.512	0.416 to 5.494
Daily wage labourer	0.005	3.571	1.475 to 8.645	0.685	1.261	0.411 to 3.866
Own business	0.805	1.120	0.454 to 2.763	0.537	0.725	0.261 to 2.013
Overseas employment	0.187	2.381	0.656 to 8.642	0.416	1.853	0.420 to 8.180
Service (govt./private)		Ref			Ref	
Perceived social support						
Low support	0.004	3.882	1.561 to 9.654	0.268	1.905	0.609 to 5.958
Moderate support	0.034	2.034	1.054 to 3.923	0.243	1.563	0.738 to 3.308
High support		Ref			Ref	
Sex preference of child (family)						
Male	0.000	3.204	1.699 to 6.043	0.014*	2.531	1.204 to 5.321
Female	0.132	2.431	0.764 to 7.729	0.132	2.704	0.741 to 9.873
No sex preference		Ref			Ref	
Gravida						
Primigravida		Ref			Ref	
Multigravida	0.001	2.801	1.542 to 5.088	0.024*	2.219	1.113 to 4.423
Intent of pregnancy						
Yes		Ref			Ref	
No	0.000	3.837	2.098 to 7.019	0.014*	2.547	1.204 to 5.388
Intimate partner violence						
Presence	0.000	4.154	2.273 to 7.590	0.024*	2.276	1.116 to 4.640
Absence		Ref			Ref	
Stressful life events						
Presence	0.009	2.412	1.250 to 4.653	0.921	1.043	0.454 to 2.392
Absence		Ref			Ref	
Spouse's tobacco consumption status						
Never consumed		Ref			Ref	
Consumed in past	0.097	2.463	0.850 to 7.136	0.282	2.212	0.521 to 9.392
Currently consuming	0.000	3.322	1.775 to 6.218	0.082	2.313	0.900 to 9.945
Spouse's alcohol consumption status						
Never consumed		Ref			Ref	
Consumed in past	0.474	1.502	0.494 to 4.564	0.590	0.667	0.153 to 2.913
Currently consuming	0.003	2.622	1.399 to 4.914	0.754	0.857	0.325 to 2.255

*Statistical significance at $p < 0.05$.

Experience of intimate partner violence is found to be associated with mental distress among pregnant women. In line with this study, a study from Pokhara, Nepal, noted that women suffering from intimate partner violence could be 11 times more at odds of experiencing depressive symptoms.⁴⁴ Similar findings were also shared by a study from India.⁴² Likewise, in Ethiopia, pregnant women with a history of intimate partner violence had nearly five times (AOR: 4.5, 95% CI: 1.28 to 15.52) more odds of depression during their pregnancy as compared with those without any history.³⁹ Similarly, in a study

from Pakistan, the odds of depression was found to be increased by ninefold (AOR: 9.25, 95% CI: 6.11 to 14.00) among women experiencing physical or sexual abuse and by fourfold (AOR: 4.04, 95% CI: 2.81 to 5.81) among women experiencing verbal abuse in comparison to those women who did not experience any form of abuse.³⁸ Intimate partner violence may cause traumatic stress among women leading to fear and isolation, which consecutively affects women's psychological well-being.⁴⁵

The women who had been pregnant more than once were more likely to be depressed than those who were

pregnant for the first time. A similar study conducted among women visiting the public health facilities of Nepal revealed that women who had primigravida were less likely (OR: 0.32, 95% CI: 0.13 to 0.78) to experience depressive symptoms as compared with their multigravida women.¹⁸ Likewise, a study from Pakistan revealed that women who had multiple pregnancies were twice (OR: 2.3, 95% CI: 1.33 to 3.91) more likely to suffer from antenatal depression.⁴⁶ A similar finding was revealed by a study from India where the women who had multiple pregnancies had twice (AOR: 2.36, 95% CI: 1.19 to 4.66) the odds of depression as compared with women who were pregnant for the first time.⁴⁷ Women in multigravida not only have more exposure to the potential complications associated with pregnancy and childbirth, but they are also more stressed to fulfil the demands of the newborn child while bearing responsibility as a mother to their other children.^{48–49} This might be a reason for more psychological distress among multigravida women as compared with the first-timers.

Despite being one of the few studies to assess the prevalence and risk factors of antenatal depression in Nepal, this study is not free from limitations. Although this study was conducted at the time of COVID-19 pandemic, the COVID-19-related variables and their relationship with antenatal depression were not assessed in this study. Recent studies from Sri Lanka suggested that the pandemic had resulted in an increase in perinatal depression directly as well as indirectly by impacting the antenatal care (ANC) system.^{50–51} Similar observations were also made by studies from Nepal.^{20–32} So, there is a possibility that the prevalence observed by our study might have been influenced by COVID-19. Although design effect is essential for multistage sampling in a community-based study and a large sample size is beneficial, due to resource constraints as well as COVID-19 crisis, we were unable to cover a larger population. The volume of alcohol consumption and tobacco consumption was not assessed during the assessment of tobacco and alcohol consumption status, which might not provide the real extent of influence of such behavioural factors on antenatal depression.

CONCLUSION

This study showed a notably high prevalence of antenatal depression among the women of Godawari Municipality, Lalitpur, Nepal. The association of antenatal depression with multigravida, unplanned pregnancy, male child preference by family members and intimate partner violence indicates the need for attention to these aspects of maternal health. Urgent attention is required to address antenatal depression through screening and early management in ANC visits.

Acknowledgements The authors would like to thank all the pregnant women who participated in this study and provided their valuable time and information. Without their support, this study would not have been possible. The authors would also like to extend their gratitude towards the Female Community Health Volunteers and

health facility staffs of Godawari Municipality for their constant support during data collection.

Contributors AC: Contribution in idea and conception of the study, questionnaire development, guarantor, collection of data, analysis, interpretation of findings and overall write up. GS: Contribution in questionnaire development, interpretation of findings, editing and finalisation of manuscript and supervision. SP: Contribution in preparation, editing and finalisation of the manuscript. AP: Contribution in interpretation of findings and supervision. All the authors have read carefully and approved the final manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and ethical approval for this study was obtained from the institutional review committee, Institute of Medicine [Ref no. – 106(6-11) E2078/079]. Participants gave informed consent to participate in the study before taking part. Approval was acquired from the Godawari Municipality Office to access their data for sampling frame and data collection. Confidentiality of the collected information and participants was maintained, for which identifiers that linked data and respondent's identification were removed. To ensure privacy, the data was collected separately with the participant, in the absence or interaction of their family members or friends.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement The dataset generated and analysed during the current study is available from the corresponding author upon reasonable request.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Anisha Chalise <http://orcid.org/0000-0003-1478-454X>

Gambhir Shrestha <http://orcid.org/0000-0002-9975-9804>

Shishir Paudel <http://orcid.org/0000-0003-3077-6697>

REFERENCES

- Biaggi A, Conroy S, Pawlby S, *et al*. Identifying the women at risk of antenatal anxiety and depression: a systematic review. *J Affect Disord* 2016;191:62–77.
- Ayano G, Tesfaw G, Shumet S. Prevalence and determinants of antenatal depression in Ethiopia: a systematic review and meta-analysis. *PLoS One* 2019;14:e0211764.
- Kühner C. [Mental disorders in pregnancy and postpartum : Prevalence, course, and clinical diagnostics]. *Nervenarzt* 2016;87:926–36.
- Bennett HA, Einarson A, Taddio A, *et al*. Prevalence of depression during pregnancy: systematic review. *Obstet Gynecol* 2004;103:698–709.
- Osborne LM, Monk C. Perinatal depression—the fourth inflammatory morbidity of pregnancy?: Theory and literature review. *Psychoneuroendocrinology* 2013;38:1929–52.
- Rusner M, Berg M, Begley C. Bipolar disorder in pregnancy and childbirth: a systematic review of outcomes. *BMC Pregnancy Childbirth* 2016;16:331.
- World Health Organization, Mental Health, Determinants Populations, Team. *Women's mental health : an evidence based review*. Geneva: World Health Organization, 2000. <https://apps.who.int/iris/handle/10665/66539>
- Glavin K, Leahy-Warren P. Postnatal depression is a public health nursing issue: perspectives from Norway and Ireland. *Nurs Res Pract* 2013;2013:813409:1–7.
- Breedlove G, Fryzelka D. Depression screening during pregnancy. *J Midwifery Womens Health* 2011;56:18–25.
- Vigod SN, Wilson CA, Howard LM. Depression in pregnancy. *BMJ* 2016;352:i1547.

- 11 Priel A, Zeev-Wolf M, Djalovski A, *et al.* Maternal depression impairs child emotion understanding and executive functions: the role of dysregulated maternal care across the first decade of life. *Emotion* 2020;20:1042–58.
- 12 Fariás-Antúnez S, Xavier MO, Santos IS. Effect of maternal postpartum depression on offspring's growth. *J Affect Disord* 2018;228:143–52.
- 13 Jahan N, Went TR, Sultan W, *et al.* Untreated depression during pregnancy and its effect on pregnancy outcomes: a systematic review. *Cureus* 2021;13:e17251.
- 14 Slomian J, Honvo G, Emonts P, *et al.* Consequences of maternal postpartum depression: a systematic review of maternal and infant outcomes. *Womens Health* 2019;15:174550651984404.
- 15 Howard LM, Molyneux E, Dennis C-L, *et al.* Non-psychotic mental disorders in the perinatal period. *Lancet* 2014;384:1775–88.
- 16 Dadi AF, Miller ER, Bisetegn TA, *et al.* Global burden of antenatal depression and its association with adverse birth outcomes: an umbrella review. *BMC Public Health* 2020;20:173.
- 17 Mahendran R, Puthusseri S, Amalan M. Prevalence of antenatal depression in South Asia: a systematic review and meta-analysis. *J Epidemiol Community Health* 2019;73:768–77.
- 18 Joshi D, Shrestha S, Shrestha N. Understanding the antepartum depressive symptoms and its risk factors among the pregnant women visiting public health facilities of Nepal. *PLoS One* 2019;14:e0214992.
- 19 Aryal KK, Alvik A, Thapa N, *et al.* Anxiety and depression among pregnant women and mothers of children under one year in Sindupalchowk district. *J Nepal Health Res Counc* 2018;16:195–204.
- 20 Thapa P, Dhakal B, Shrestha U, *et al.* Pregnant Women's Mental Health Status and its Related Factors Amidst COVID-19: A Cross-Sectional Study. *Journal of Lumbini Medical College* 2021;9.
- 21 Kunwar D, Corey EK, Sharma P, *et al.* Screening for postpartum depression and associated factors among women who deliver at a university Hospital, Nepal. *Kathmandu Univ. Med. J.* 2015;13:44–8.
- 22 Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. development of the 10-item Edinburgh postnatal depression scale. *Br J Psychiatry* 1987;150:782–6.
- 23 Zimet GD, Dahlem NW, Zimet SG, *et al.* The multidimensional scale of perceived social support. *J Pers Assess* 1988;52:30–41.
- 24 Iverson KM, King MW, Gerber MR, *et al.* Accuracy of an intimate partner violence screening tool for female VHA patients: a replication and extension. *J Trauma Stress* 2015;28:79–82.
- 25 Chorwe-Sungani G, Chipps J. A systematic review of screening instruments for depression for use in antenatal services in low resource settings. *BMC Psychiatry* 2017;17:112.
- 26 Tendais I, Costa R, Conde A, *et al.* Screening for depression and anxiety disorders from pregnancy to postpartum with the EPDS and STAI. *Span J Psychol* 2014;17:E7.
- 27 Adewuya AO, Ola BA, Dada AO, *et al.* Validation of the Edinburgh postnatal depression scale as a screening tool for depression in late pregnancy among Nigerian women. *J Psychosom Obstet Gynaecol* 2006;27:267–72.
- 28 Joshi U, Lyngdoh T, Shidhaye R. Validation of Hindi version of Edinburgh postnatal depression scale as a screening tool for antenatal depression. *Asian J Psychiatr* 2020;48:101919.
- 29 Bhusal BR, Bhandari N, Chapagai M, *et al.* Validating the Edinburgh postnatal depression scale as a screening tool for postpartum depression in Kathmandu, Nepal. *Int J Ment Health Syst* 2016;10:71.
- 30 Regmi S, Sligl W, Carter D, *et al.* A controlled study of postpartum depression among Nepalese women: validation of the Edinburgh postpartum depression scale in Kathmandu. *Trop Med Int Health* 2002;7:378–82.
- 31 Khatri GK, Tran TD, Baral S, *et al.* Effect of the 2015 Nepal earthquakes on symptoms of common mental disorders among women who are pregnant. *J Affect Disord* 2018;228:238–47.
- 32 Agrawal Khatri R, Ghimmire N, Maharjan RK, *et al.* Psychological distress during COVID-19 among pregnant women attending antenatal outpatient department at tertiary hospital. *Journal of Patan Academy of Health Sciences* 2021;8:52–60.
- 33 Tonsing K, Zimet GD, Tse S. Assessing social support among South Asians: the multidimensional scale of perceived social support. *Asian J Psychiatr* 2012;5:164–8.
- 34 Chalise A, Bhandari TR. Postpartum depression and its associated factors: a community-based study in Nepal. *J Nepal Health Res Counc* 2019;17:200–5.
- 35 Sheeba B, Nath A, Metgud CS, *et al.* Prenatal depression and its associated risk factors among pregnant women in Bangalore: a hospital based prevalence study. *Front Public Health* 2019;7:108.
- 36 Rahman A, Creed F. Outcome of prenatal depression and risk factors associated with persistence in the first postnatal year: prospective study from Rawalpindi, Pakistan. *J Affect Disord* 2007;100:115–21.
- 37 Babu GR, Murthy GVS, Singh N, *et al.* Sociodemographic and medical risk factors associated with antepartum depression. *Front Public Health* 2018;6:127.
- 38 Karmaliani R, Asad N, Bann CM, *et al.* Prevalence of anxiety, depression and associated factors among pregnant women of Hyderabad, Pakistan. *Int J Soc Psychiatry* 2009;55:414–24.
- 39 Habtamu Belete A, Alemayehu Assega M, Alemu Abajobir A, *et al.* Prevalence of antenatal depression and associated factors among pregnant women in Aneged woreda, North West Ethiopia: a community based cross-sectional study. *BMC Res Notes* 2019;12:713.
- 40 Hegde SS, Pai KK, Sandeep K. Prevalence of antenatal depression and gender preference: a cross sectional study among Mangalore population, Karnataka, India. *J Pharm Biomed Sci* 2013;30:1011–4.
- 41 Ajinkya S, Jadhav PR, Srivastava NN. Depression during pregnancy: prevalence and obstetric risk factors among pregnant women attending a tertiary care hospital in Navi Mumbai. *Ind Psychiatry J* 2013;22:37–40.
- 42 Shidhaye P, Shidhaye R, Phalke V. Association of gender disadvantage factors and gender preference with antenatal depression in women: a cross-sectional study from rural Maharashtra. *Soc Psychiatry Psychiatr Epidemiol* 2017;52:737–48.
- 43 George C, Lalitha ARN, Antony A, *et al.* Antenatal depression in coastal South India: prevalence and risk factors in the community. *Int J Soc Psychiatry* 2016;62:141–7.
- 44 Sharma R, Thapa P, Chakraborty PK, *et al.* Depression in pregnancy: prevalence and clinical correlates. *J Psychiatr Assoc Nepal* 2019;8:30–5.
- 45 García-Moreno C, Pallitto C, Devries K, *et al.* Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence: World Health organization 2013.
- 46 Khan R, Waqas A, Mustehsan ZH, *et al.* Predictors of prenatal depression: a cross-sectional study in rural Pakistan. *Front Psychiatry* 2021;12:584287.
- 47 Sabita P, Prakash M, Sharmila E. A cross sectional study of depression during pregnancy and its risk factors among pregnant women attending a tertiary care hospital in Puducherry, India. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology* 2019;8:1364.
- 48 Condon JT, Esuvaranathan V. The influence of parity on the experience of pregnancy: a comparison of first- and second-time expectant couples. *Br J Med Psychol* 1990;63:369–77.
- 49 Dipietro JA, Costigan KA, Sipsma HL. Continuity in self-report measures of maternal anxiety, stress, and depressive symptoms from pregnancy through two years postpartum. *J Psychosom Obstet Gynaecol* 2008;29:115–24.
- 50 Patabendige M, Gamage MM, Weerasinghe M, *et al.* Psychological impact of the COVID-19 pandemic among pregnant women in Sri Lanka. *Int J Gynaecol Obstet* 2020;151:150–3.
- 51 Patabendige M, Gamage MM, Jayawardane A. The potential impact of COVID-19 pandemic on the antenatal care as perceived by Non-COVID-19 pregnant women: women's experience research brief. *J Patient Exp* 2021;8:237437352199882.