BMJ Open

Perceived stress and associated factors among pregnant women during COVID-19 pandemic period in Northwest Ethiopia, 2020: a cross-sectional study

Mengesha Srahbzu Biresaw ![ORCID], Girmaw Medfu Takelle ![ORCID], Enguday Tirfeneh Gebeyehu

Department of Psychiatry, University of Gondar College of Medicine and Health Sciences, Gondar, Ethiopia

Correspondence to
Mengesha Srahbzu Biresaw; mengusew@gmail.com

ABSTRACT

Objective This study aimed to determine the prevalence and associated factors of perceived stress among pregnant women during the COVID-19 pandemic period in Northwest Ethiopia.

Method A cross-sectional study.

Setting University of Gondar Comprehensive Specialized Hospital, Gondar, Ethiopia.

Participants A total of 415 pregnant women were recruited by using a systematic random sampling technique from 28 April 2020 to 12 June 2020.

Measurement The required data were collected through face-to-face interviews. The Perceived Stress Scale was used to assess perceived stress. The Edinburgh Postnatal Depression Scale and Oslo Social Support Scale 3 were used for associated factors. The data were analysed by using SPSS V.20. We also included sociodemographic, obstetrical and gynaecology, substance use and intimate partner-related factors. Logistic regression analysis was used to identify associated factors with perceived stress. Bivariate and multivariable logistic regression analyses were used to identify the effect of each independent variable with the outcome variable. A p value of less than 0.05 was considered to be statistically significant.

Results A total of 415 pregnant women participated in the study with response rate of 98.57%. The prevalence of perceived stress is found to be 13.7% (95% CI=10.4% to 17.1%). According to the multivariable logistic regression result, being a student (adjusted OR (AOR)=9.67, 95% CI=2.739 to 34.183), being at the first and third trimesters of gestational age (AOR=3.56, 95% CI=1.065 to 11.885; AOR=4.80, 95% CI=1.851 to 14.479, respectively), and having antenatal depression (AOR=3.51, 95% CI=1.628 to 7.563) were factors positively associated with perceived stress.

Conclusion The prevalence of perceived stress among pregnant people was relatively high. This study recommends that all pregnant people should be screened and treated for perceived stress particularly during the first and third trimesters. Emphasis should be given to early detection and treatment of antenatal depression. Pregnant students must be strongly evaluated and intervened for perceived stress.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The Perceived Stress Scale, which is validated and has high sensitivity and specificity, has been used to assess the outcome variable of perceived stress among pregnant women.

⇒ Due to the nature of cross-sectional study design, it could not report the temporal cause and effect relationship between perceived stress and associated factors.

⇒ Participants with minimal level of perceived stress may have less motivation to recall earlier exposure than those with moderate level and above.

INTRODUCTION

Although stress is an integral part of one's life, its occurrence during a period of pregnancy may surpass its level of normality and become problematic. High stress during pregnancy may affect the mother's sleep quality, appetite, emotion and daily activity performance.[1 2] The emergence of high stress during pregnancy is an indicator of accepting the pregnancy and the unborn baby, preparing for labour and motherhood, fear of unpleasant birth outcomes and a negative impact on the child's early development.[3–5] A number of research studies have shown that perceived stress during pregnancy may result in preterm birth, low birth weight, risk of gestational hypertension, and adverse health and behavioural outcomes for the unborn baby later.[6 7] In addition, recent research studies have shown that perception of stress and anxiety is correlated with adverse effects on the mother and unborn baby, such as heart defects in the unborn baby, neurodevelopmental disorders later in the child and being small for gestational age.[8–11]

Even though research studies conducted to determine the magnitude of high stress during pregnancy are limited, some studies report that it ranges from 5.5 to 78%.[12–18] A study conducted in Ireland reported 75.6% of women experienced perceived stress during pregnancy.[19] Similarly, it has been reported to be 6%, 5.5%, 33.4%, 33.3%, 34.2%, 28.6%, and 11.6% and 23.1% in studies conducted in the USA,[17] Iran,[20] Saudi Arabia,[18] India,[21] Nepal,[12] Ghana[22] and Ethiopia,[23 24] respectively.

A number of studies have also reported that pregnant women have an increased risk of adverse pregnancy outcomes in specified subgroups of women, such as women from low socioeconomic status, who were smokers and were underweight.[25 26]

Because pregnancy causes a number of physiological and physical changes, women are more likely to experience the onset and recurrence of high stress and emotional disorders.[27] Particularly in the developing world, these conditions are highly correlated with factors including poverty,[28] low social support,[29 30] domestic violence,[31–33] HIV/AIDS,[34] and reproductive health outcomes and behaviours such as high parity, unwanted pregnancy, unsafe abortion, infertility, and pregnancy complications.[35 36]

Even though stress is a potential risk, not all pregnant women who develop stress have adverse complications.[37] Besides, there is variability between studies regarding factors reported to increase the risk of perceived stress among women during pregnancy. For example, marital status has been reported to have significant associations with perceived stress in a study conducted in urban Thailand,[38] which is not in agreement with previously conducted studies in Canada[39] and Ethiopia.[40] Another discrepancy between different studies was regarding psychosocial factors such as intimate partner violence or marital conflict, which were reported to have a significant association with perceived stress among pregnant women in a study done in Thailand[38] and Canada[39] but not in a study conducted in Ethiopia.[40] As a result, the purpose of this study was to delve deeper into the factors that make pregnant women more vulnerable to high stress. Besides, this study aimed to assess COVID-19 determinants of perceived stress among pregnant women.

OBJECTIVES OF THE STUDY
This study aimed to assess the prevalence of perceived stress and associated factors among pregnant women during the COVID-19 pandemic period in Northwest Ethiopia.

METHODS
Study design and period
An institutional-based cross-sectional study was conducted from 28 April to 12 June 2020.

Study area
This study was conducted at the University of Gondar Comprehensive Specialized Hospital (UoGCSH) antenatal care (ANC) clinic, Gondar, Amhara, Northwest Ethiopia. ANC service in the hospital has been given by obstetricians, gynaecologists and midwives in the outpatient departments. Approximately 11 000 pregnant women have been taking ANC service per year.

Eligibility criteria
All pregnant women 18 years of age and older attending the ANC clinic at UoGCSH were included in the study. The study excluded severely ill pregnant women and those who had difficulty communicating for interviews during the data collection period.

Sample size determination
The sample size (n) was determined by using a single-population proportion formula by taking the following considerations: margin of error 5%, level of confidence (95%), the value of 'p' 50% and adding 10% non-response rate. Therefore, the final sample size was taken to 423.

Sampling technique and procedure
The total sample size was 423 with a non-response of 4. A systematic random sampling technique was employed for the selection of the sampling units. The value of 'K' was calculated by using the average pregnant population who had a visit in 1 month, which were 924 per month. Then 'K'=924/423=2.182. Hence, the sample interval was 2. Therefore, individuals were chosen at regular intervals (every two) and the first participant was selected by daily sequences in the ANC clinic follow-up visit and the first study participant was selected by lottery method from the first two. The selected pregnant woman was directed by the facilitator to the place where the data collectors were working. A systematic random sampling technique was employed for all participants who fulfilled the inclusion criteria.

Data collection tool and procedure
Data were collected from study subjects using validated and pretested structured questionnaires. The data were collected by four BSc psychiatry professionals after 1-day training had been given and facilitated by the principal investigator.

The interview structure consists of eight parts:

Demographic characteristics: demographic data, which gave baseline information, were obtained from the participants, including age, ethnicity, religion, education, occupation, marital status and residency.

Obstetrics and gynaecological characteristics: information such as gestational age, parity, gravidity, abortion experience, type of pregnancy, and other comorbid illnesses such as pregnancy-related hypertension, gestational diabetes mellitus, and other illnesses was obtained from participants and their medical records.

Perceived stress characteristics: perceived stress resulting from perceptions of difficulty in control or ability to cope with life events during the last 1 month was measured by the 10-item Perceived Stress Scale (PSS).[32] Responses are rated on a 5-point scale from 0 (never) to 4 (very often).

Some of PSS scores are obtained by reversing responses (eg, 0=4, 1=3, 2=2, 3=1 and 4=0) to the four positively stated items (items 4, 5, 7 and 8) and then summed across all scale items. Scores range from 0 to 40, with higher scores indicating perceived higher stress. The Cronbach's α for this instrument is between 0.84 and 0.86,[33] and the Cronbach's α of this study was 0.89.

Substance-related characteristics: behavioural factors including use of alcohol, use of tobacco, khat chewing and consumption of caffeinated substances were assessed by using structured questionnaires adapted from WHO ASSIST V.3.[26] Participants who used substances such as tobacco, khat and alcohol only for non-medical purposes during their lifetime were considered ever substance users, whereas pregnant women who used substances such as tobacco, khat and alcohol only for non-medical purposes during the previous 3 months were considered current substance users.[26]

Caffeinated substance use: if one has consumed one or more of the following substances in the last month: coffee, tea or coca-cola.

Clinical-related characteristics: antenatal depression was assessed with the Edinburgh Postnatal Depression Scale (EPDS), which consists of 10 items. EPDS has been used successfully across diverse cultural settings. The EPDS questionnaire has been validated as effective in measuring prenatal depression.[24] Items are rated on a 4-point scale from 0 (not at all) to 3 (yes, most of the time). Total scores range from 0 to 30. The screening tool has been validated for detecting depression in antepartum and postpartum samples in many countries. The instrument was validated in public health centres in Addis Ababa for postpartum women and showed a sensitivity of 84.6% and specificity of 77.0% at the cut-off score of 7/8 and a Cronbach's α of 0.71.[24] The cut-off point of EPDS among pregnant women is usually higher than postpartum women.[27] Like other studies conducted globally and in Ethiopia, in this study, a cut-off point of 13 was used to identify pregnant women with depressive symptoms.[28–30] Those pregnant women who scored 13 and above were categorised as having depression, while those who scored below 13 were non-depressed,[29] and the Cronbach's α of this study was 0.74.

Social support-related characteristics: consist of a 3-item questionnaire to determine the status of social support, which was assessed by using the Oslo Social Support Scale 3 validated tool. The Oslo 3-item Social Support Scale has a sum score scale ranging from 3 to 14 with three broad categories: 'poor social support' (3–8), 'moderate social support' (9–11) and 'strong social support' (12–14) with Cronbach's α=0.88, and 86% sensitivity and 67% specificity.[31]

Intimate partner violence-related characteristics: consist of five questions to determine the status of intimate partner violence. The questionnaire was developed from a WHO multicountry study on violence against women; and if any questions on the screen were answered yes, the participant was considered positive for abuse.[34]

Data quality control

Face-to-face interviews with a structured questionnaire were used to collect data. The study subjects were informed about the general information on the study objectives as well as the opportunities or benefits that this study could bring. Finally, the filled questionnaires were checked for consistency and completeness daily. To assure the data quality, high emphasis was given in designing data collection instruments. The questionnaire was prepared in English and translated to Amharic and back to English to maintain consistency. The Amharic version of the questionnaire was used to collect information. One-day training was given for data collectors and supervisors by the principal investigator on the methods of data collection. The questionnaire was pretested 1 week before the actual data collection on 5% of the total sample size that was not included in the main survey.

Data processing and analysis

Data were coded and entered into Epidata software V.4.6.0.0 before being exported and analysed in SPSS V.20. Questionnaires that were incomplete were considered non-response. Then, the data were analysed to generate descriptive statistics such as means, medians, frequency, percentages and SD, using SPSS V.20. The goodness of fit was checked by Hosmer and Lemeshow (p=0.52). Multicollinearity (the values of variance inflation factor were <1.2) and X^2 assumptions were made. Logistic regression analysis was used to calculate adjusted ORs to control for confounding variables with a 95% CI. Variables with a p value less than 0.2 in bivariate logistic regression analysis were entered into multivariable logistic regression to detect if there was a significant association. Outcome and independent variables were entered into bivariate one by one to detect association and into multivariable logistic regression to show the presence and strength of association. Statistical significance was determined at a p value of less than 0.05.

Patient and public involvement

In this study, participants were pregnant women who were attending ANC at UoGCSH. Seriously sick patients were excluded. We did not involve participants in designing the study and the recruitment process. The result of this study has been submitted to the Department of Psychiatry, University of Gondar, and the UoGCSH.

RESULTS

A total of 415 pregnant women participated in the study, with a response rate of 98.57%. From those participants, the prevalence of perceived stress was 13.7%, with a 95% CI of 10.4 to 17.1. The mean age of the participants was 28 years (SD±5.46), while in age classification, more than half (54.2%) were within the range of 26–35 years old. Most of the participants (391, or 94.2%) were married and nearly three-fourths (72.8%) were Orthodox by religion. More than one-third (156, 37.6%) of the

Table 1 Sociodemographic characteristics of pregnant women attending antenatal care clinic at UoGCSH, Gondar, Northwest Ethiopia, 2020 (n=415)

Variables	Category	Frequency (%)
Age in years	18–25	144 (34.7)
	26–35	225 (54.2)
	36–45	46 (11.1)
Marital status	Married	391 (94.2)
	Single	15 (3.6)
	Others*	9 (2.2)
Educational status	No formal education	49 (11.8)
	Primary education	156 (37.6)
	Secondary education	92 (22.2)
	Diploma and above	118 (28.4)
Occupation	Government employed	37 (8.9)
	Unemployed	23 (5.5)
	Student	168 (40.5)
	Housewife	83 (20)
	Self-employed	104 (25.1)
Religion	Orthodox	302 (72.8)
	Muslim	65 (15.7)
	Protestant	31 (7.5)
	Catholic	14 (3.4)
	Others†	3 (0.7)
Residence	Urban	391 (94.2)
	Rural	24 (5.8)
Ethnicity	Amhara	406 (97.8)
	Others‡	9 (2.2)

*Others: widowed and divorced.
†Others: Seventh Day Adventist and Jehovah.
‡Others: Oromo, Tigre, Wolayta, Benishangul and Afar.
UoGCSH, University of Gondar Comprehensive Specialized Hospital.

participants had primary education and more than a quarter (118, 28.4%) had a diploma or above. Almost all of the (406, 97.8%) study population were Amhara in ethnicity, and 168 (40.5%) were housewives in occupation. Almost all (94.2%) of the participants lived in cities (table 1).

Characteristics of gynaecological, obstetrical and other comorbid illnesses

More than half of the participants (246, 59.3%) were in their third trimester, and more than two-thirds (292, 70.4%) were having their second or subsequent pregnancy. More than one-third (149, 35.9%) had experience of labour two or more times before, and nearly one-third (133, 32%) of the participants had two or more children alive. Around 62 (14.9%) had experienced an abortion in their lifetime and 368 (88.7%) were wanted pregnancies

in the type of current pregnancy. Fifty-eight (14%) of the participants had other comorbid illnesses; and of those, 37 (63%) and 16 (27.6%) had pregnancy-related hypertension/pre-eclampsia and gestational diabetes mellitus, respectively (table 2).

Behavioural and psychosocial characteristics of the participants

Almost all (411, 99%) of the participants had never smoked a cigarette in their lives, and no one had smoked a cigarette in the previous 3 months. About 48 (11.6%) of the study participants used alcohol in their lifetime and 26 (6.3%) used alcohol within the last 3 months. Among those pregnant women who used alcohol during the last 3 months, more than half (53.8%) used tella (local beer). Regarding khat chewing, five (1.2%) of participants ever chewed khat, but there were no chewers reported during the last 3 months.

Mental illness and psychosocial factors

Among study participants, 69 (16.6%) had depression; and of those with social support, 103 (24.8%) had poor and nearly one-third (125, 30.1%) had strong social support. In regard to intimate partner violence, 19 (4.6%) have been abused physically or emotionally during their lifetime; 15 (3.6%) have been slapped, kicked or otherwise physically hurt by someone important to them during the last year; and of those, 9 (60%) have been abused by their husbands. Thirteen (3.1%) of the participants have been hit, slapped, kicked or otherwise physically hurt by someone important to them during their current pregnancy; and of those, 10 (71.4%) were abused by their husband.

COVID-19-related factors

All of the study participants did not test positive for COVID-19 during the data collection period. Six (1.5%) were reported as they were in isolation for 2 weeks. All of participants reported as they did not discontinue their ANC follow-up since the pandemic period. The source of information about COVID-19 for the majority of participants (368, 88.7%) was reported to be mass media, followed by health professionals for 126 (30.4%) of study participants.

Associated factors of perceived stress among pregnant women

Maternal age, marital status, occupational status, residence, gestational age, type of pregnancy, prenatal depression and intimate partner violence were variables that had a p value less than 0.2 in bivariate logistic regression. Of those, being students, first and third trimesters of gestational age and prenatal depression were found to be significantly associated with perceived stress among pregnant women in multivariable logistic regression analysis at a p value of less than 0.05.

The prevalence of perceived stress among pregnant women was found to be 9.6 times higher among pregnant students as compared with housewives (adjusted

Table 2 Gynaecological, obstetrical and other comorbid illness characteristics of pregnant women attending the UoGCSH antenatal care clinic in Gondar, Northwest Ethiopia, 2020 (n=415)

SN	Variables	Category	Frequency	Per cent
1	Gestational age	First trimester	45	10.8
		Second trimester	124	29.9
		Third trimester	246	59.3
2	Gravidity	Primigravida	123	29.6
		Multigravida	292	70.4
3	Parity	Nulliparity	128	30.8
		Parity I	138	33.3
		Parity II or more	149	35.9
4	Number of children alive	Have no children	136	32.8
		Have one child	146	35.2
		Have two or more children	133	32
5	Have you ever had abortion before	Yes	62	14.9
		No	353	85.3
6	Plan for pregnancy	Planned	367	88.4
		Not planned	48	11.6
7	Type of pregnancy	Wanted	368	88.7
		Unwanted	47	11.3
8	Other disease before this pregnancy	No	397	95.7
		Hypertension	8	1.9
		Diabetes mellitus	2	0.5
		HIV	7	1.7
		Others*	1	0.2
9	Other pregnancy-related illnesses	Yes	58	14
		No	357	86
10	Disease due to pregnancy (n=58)	Pregnancy-related hypertension	37	63.8
		Gestational diabetes mellitus	16	27.6
		Others†	5	8.6

*Others: HIV, cancer and cardiovascular disease.
†Others: asthma and anaemia.
UoGCSH, University of Gondar Comprehensive Specialized Hospital.

OR (AOR)=9.67, 95% CI=2.739 to 34.183). The odds of having perceived stress were 3.5 and 4.8 times higher in the first and third trimesters, respectively, compared with the second trimester (AOR=3.56, 95% CI=1.065 to 11.885; AOR=4.80, 95% CI=1.851 to 14.479). Pregnant women who had prenatal depression were nearly five times more likely to develop perceived stress as compared with pregnant women without prenatal depression (AOR=4.80, 95% CI=1.851 to 14.479) (table 3).

DISCUSSION

From this study, the overall prevalence of perceived stress among pregnant women attending an ANC clinic at the UoGCSH was 13.7% (95% CI=10.4% to 17.1%). The result is in line with a study conducted in Ethiopia (11.6%).[24] The result of this study is higher than studies conducted in the USA (6%)[17] and Iran (5.5%).[20] The higher prevalence in our study result could be attributed to a difference in the study periods. Our study was conducted during the very difficult period of the COVID-19 pandemic. Such pandemic periods have been reported to negatively affect the health of pregnant women. For example, a recent study during the COVID-19 pandemic period indicated that there is increased anxiety and poor quality of sleep levels. This in turn may further aggravate the sleep disturbance caused by the physiological effects of pregnancy, which may increase the stress level of the pregnant woman.[41] Moreover, it might be because of a lack of social support, which is vital in decreasing stress and anxiety in pregnant women during the pandemic period, when lockdowns and curfews were implemented as preventive methods.[42 43] Other possible reasons for this

Table 3 The bivariate and multiple logistic regression analyses of factors associated with perceived stress among pregnant women attending the antenatal care unit at the UoGCSH in Gondar, Northwest Ethiopia, 2020 (n=415)

Variables	Perceived stress symptom		COR (95% CI)	AOR (95% CI)
	Yes	No		
Maternal age in years				
18–25	18	126	1	1
26–35	29	196	1.03 (0.552 to 1.943)	1.34 (0.629 to 2.853)
36–45	10	36	1.94 (0.825 to 4.582)	2.64 (0.916 to 7.615)
Marital status				
Married	49	342	1	1
Single	6	9	4.65 (1.587 to 13.640)	3.37 (0.660 to 17.284)
Others*	2	7	1.99 (0.403 to 9.875)	1.30 (0.190 to 8.954)
Occupational status				
Housewife	20	148	1	1
Student	9	14	4.7 (1.824 to 12.409)	9.67 (2.739 to 34.183)**
Self-employed	11	72	1.1 (0.514 to 2.486)	1.64 (0.667 to 4.049)
Government worker	12	92	0.9 (0.451 to 2.067)	1.43 (0.587 to 3.581)
Unemployed	5	32	1.15 (0.404 to 3.310)	1.89 (0.572 to 6.304)
Residence				
Urban	50	341	1	1
Rural	7	17	2.8 (1.109 to 7.110)	2.74 (0.892 to 8.426)
Gestational age				
1st trimester	9	36	4.98 (1.639 to 14.746)	3.56 (1.065 to 11.885)*
3rd trimester	42	204	4.05 (1.671 to 9.810)	4.80 (1.851 to 14.479)**
2nd trimester	6	118	1	1
Type of pregnancy				
Wanted	47	321	1	1
Unwanted	10	37	1.85 (0.861 to 3.958)	0.60 (0.173 to 2.088)
Prenatal depression				
Not depressed	37	309	1	1
Depressed	20	49	3.41 (1.830 to 6.348)	3.51 (1.628 to 7.563)**
History of intimate partner violence				
Yes	9	20	3.17 (1.830 to 6.348)	1.90 (0.683 to 5.306)
No	48	338	1	1

*P<0.05; **p<0.001; 1 for reference.
*Others: widowed and divorced.
AOR, adjusted OR; COR, crude OR; UoGCSH, University of Gondar Comprehensive Specialized Hospital.

discrepancy might be a difference in the characteristics of the participants, sociocultural lifestyles, sampling techniques and use of different measurement tools for the outcome.[20]

However, the result of this study is lower than studies conducted in Saudi Arabia (33.4%),[18] India (33.3%),[14] Nepal (34.2%)[12] and Ghana (28.6%).[22] The possible reason for these variations might be sample size and sampling technique used in a study conducted in Ghana,[22] difference in cut-off score for the PSS with that of an Indian study (a higher cut-off score is used for this study)[14] and characteristics of the participants and difference in culture and coping skills.[12 14 18 22]

Regarding factors found to be associated with perceived stress among pregnant women, being a student was among the sociodemographic categories that were associated with perceived stress during pregnancy. The likelihood of developing perceived stress among pregnant women who were students at the time of the study was more than 9.6 times as compared with housewives. The possible reasons might be an unpleasant feeling of tension and anticipated frustration secondary to academic-related demands and expectations from significant others.[44] It might also be because of the increased cortisol release during the examination, which is known to be linked with a change in immunity functioning, which can be checked evidently

with a change in IgA.[45 46] First and third trimester pregnancy terms were significantly associated with perceived stress. Participants who were in their first and third trimesters had the odds of having perceived stress nearly four and five times as compared with being pregnant in their second trimester, respectively. The findings of this study were supported by study findings in Ethiopia[23] and Nepal[12] for first trimester pregnancy. It might be because pregnancy, particularly the first trimester, is a period of enormous biological, psychological, and social challenges for the mother and a time of making significant life changes. These changes might in turn be linked to emotional disturbances and contribute to increased perceived stress in pregnant women.[47] It might also be due to the first trimester being associated with significantly higher levels of nausea, vomiting and fatigue. These have also been linked with higher perceived stress among pregnant women.[48]

Having antenatal depression was another factor found to have a significant association with perceived stress among pregnant women. Pregnant women who had prenatal depression were nearly five times more likely to develop perceived stress as compared with pregnant women without prenatal depression. Even though depression is more serious and long-lasting than stress, disease-related factors like decreased coping skills, poor quality of life and decreased immunity might lead participants to further experience increased stress.[49 50] It might be because depressive symptoms are associated with higher levels of maternal serum inflammatory markers during pregnancy.[51] These inflammatory biomarkers have also been reported to have a significant contribution to the increased release of stress hormones, which in turn contributes to increased perceived stress among pregnant women.[45 46] Moreover, the strong association might also be because of the increased perceived stress from the intra-psychic conflict of women between pleasurable expectations regarding their pregnancy outcome and their own experience of symptoms of depression like sadness and irritability.[52] Moreover, the association might be because of items both in PSS and EPDS assessing similar information, and the effect of multicollinearity might lead to the strong association between perceived stress and prenatal depression.

Limitation of the study

Due to the nature of cross-sectional study design, it was not possible to report the temporal cause and effect relationship between perceived stress and antenatal depression. Participants with a minimal level of stress might be less motivated to recall their exposure than those with a moderate level of stress and above.

CONCLUSIONS AND RECOMMENDATIONS

The prevalence of perceived stress among pregnant people was relatively high. Being a student, first and third trimesters, and antenatal depression were factors significantly associated with perceived stress among pregnant women. This study recommended that all pregnant people should be screened and treated for perceived stress, particularly during the first and third trimesters. Early detection and treatment of antenatal depression should be given emphasis. Pregnant students must be thoroughly evaluated and treated for perceived stress.

ORCID iDs
Mengesha Srahbzu Biresaw http://orcid.org/0000-0002-6486-3732
Girmaw Medfu Takelle http://orcid.org/0000-0001-7444-864X

REFERENCES

1 Hou Q, Li S, Jiang C, *et al*. The associations between maternal lifestyles and antenatal stress and anxiety in Chinese pregnant women: a cross-sectional study. *Sci Rep* 2018;8:10771.
2 Afulani PA, Ongeri L, Kinyua J, *et al*. Psychological and physiological stress and burnout among maternity providers in a rural County in Kenya: individual and situational predictors. *BMC Public Health* 2021;21:453.
3 Staneva A, Bogossian F, Pritchard M, *et al*. The effects of maternal depression, anxiety, and perceived stress during pregnancy on preterm birth: a systematic review. *Women Birth* 2015;28:179–93.
4 Gourounti C, Karpathiotaki N, Vaslamatzis G. Psychosocial stress in high risk pregnancy. *Int Arch Med* 2015;8.
5 Omidvar S, Faramarzi M, Hajian-Tilak K, *et al*. Associations of psychosocial factors with pregnancy healthy life styles. *PLoS One* 2018;13:e0191723.
6 Simcock G, Elgbeili G, Laplante DP, *et al*. The effects of prenatal maternal stress on early temperament: the 2011 Queensland flood study. *J Dev Behav Pediatr* 2017;38:310–21.

7 Grote NK, Bridge JA, Gavin AR, *et al*. A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. *Arch Gen Psychiatry* 2010;67:1012–24.

8 Zhu JL, Olsen J, Sørensen HT, *et al*. Prenatal maternal bereavement and congenital heart defects in offspring: a registry-based study. *Pediatrics* 2013;131:e1225–30.

9 Keim SA, Daniels JL, Dole N, *et al*. A prospective study of maternal anxiety, perceived stress, and depressive symptoms in relation to infant cognitive development. *Early Hum Dev* 2011;87:373–80.

10 László KD, Liu XQ, Svensson T, *et al*. Psychosocial stress related to the loss of a close relative the year before or during pregnancy and risk of preeclampsia. *Hypertension* 2013;62:183–9.

11 Zhu P, Huang W, Hao J-H, *et al*. Time-Specific effect of prenatal stressful life events on gestational weight gain. *Int J Gynaecol Obstet* 2013;122:207–11.

12 Pantha S*et al*. Prevalence of stress among pregnant women attending antenatal care in a tertiary maternity hospital in Kathmandu. *J Womens Health Care* 2014;03:183.

13 Vijayaselvi R, Beck MM, Abraham A, *et al*. Risk factors for stress during antenatal period among pregnant women in tertiary care hospital of southern India. *J Clin Diagn Res* 2015;9:QC01.

14 Pais M, Pai MV, Kamath A, *et al*. Stress among antenatal women in India. *Int. Jour. of Nurs. Care* 2014;2:63.

15 Lynn FA, Alderdice FA, Crealey GE, *et al*. Associations between maternal characteristics and pregnancy-related stress among low-risk mothers: an observational cross-sectional study. *Int J Nurs Stud* 2011;48:620–7.

16 Iranzad I, Bani S, Hasanpour S, *et al*. Perceived social support and stress among pregnant women at health centers of Iran- Tabriz. *J Caring Sci* 2014;3:287.

17 Woods SM, Melville JL, Guo Y, *et al*. Psychosocial stress during pregnancy. *Am J Obstet Gynecol* 2010;202:61.e1–61.e7.

18 Ahmed AE, Albalawi AN, Alshehri AA, *et al*. Stress and its predictors in pregnant women: a study in Saudi Arabia. *Psychol Res Behav Manag* 2017;10:97.

19 Marcus SM, Flynn HA, Blow FC, *et al*. Depressive symptoms among pregnant women screened in obstetrics settings. *J Womens Health* 2003;12:373–80.

20 Shishehgar S, Dolatian M, Majd HA, *et al*. Perceived pregnancy stress and quality of life amongst Iranian women. *Glob J Health Sci* 2014;6:270.

21 Pais M, Pai MV. Stress among pregnant women: a systematic review. *J Clin Diagn Res* 2018;12:1–4.

22 Boakye-Yiadom A, Shittu SO, Dutt JB, *et al*. Perceived stress and anxiety among Ghanaian pregnant women. *Journal of Medical and Biomedical Sciences* 2015;4:29–37.

23 Bane AD, Madebo WE, Endashaw G. Assessment of perceived stress and associated factors among pregnant women attending antenatal care at Arba Minch town governmental health institutions, southern Ethiopia, 2020. *Research Square* 2020.

24 Hobel CJ, Goldstein A, Barrett ES. Psychosocial stress and pregnancy outcome. *Clin Obstet Gynecol* 2008;51:333–48.

25 Neggers Y, Goldenberg R, Cliver S, *et al*. The relationship between psychosocial profile, health practices, and pregnancy outcomes. *Acta Obstet Gynecol Scand* 2006;85:277–85.

26 St-Laurent J, De Wals P, Moutquin J-M, *et al*. Biopsychosocial determinants of pregnancy length and fetal growth. *Paediatr Perinat Epidemiol* 2008;22:240–8.

27 Smith MV, Shao L, Howell H, *et al*. Perinatal depression and birth outcomes in a healthy start project. *Matern Child Health J* 2011;15:401–9.

28 Ajala E, Olorunsaiye D. An evaluative study of the impact of intervention strategies of non-governmental organisations (ngos) on social well-being economic empowerment and health of the aged in oyo state, Nigeria 2006.

29 Divney AA, Sipsma H, Gordon D, *et al*. Depression during pregnancy among young couples: the effect of personal and partner experiences of stressors and the buffering effects of social relationships. *J Pediatr Adolesc Gynecol* 2012;25:201–7.

30 Pearlstein T. Depression during pregnancy. *Best Pract Res Clin Obstet Gynaecol* 2015;29:754–64.

31 Ludermir AB, Lewis G, Valongueiro SA, *et al*. Violence against women by their intimate partner during pregnancy and postnatal depression: a prospective cohort study. *Lancet* 2010;376:903–10.

32 Zhang Y, Zou S, Cao Y, *et al*. Relationship between domestic violence and postnatal depression among pregnant Chinese women. *Int J Gynaecol Obstet* 2012;116:26–30.

33 Ali FA, Israr SM, Ali BS, *et al*. Association of various reproductive rights, domestic violence and marital rape with depression among Pakistani women. *BMC Psychiatry* 2009;9:77.

34 Weissbecker I. Mental health as a human right in the context of recovery after disaster and conflict. *Couns Psychol Q* 2009;22:77–84.

35 Rees DI, Sabia JJ. The relationship between abortion and depression: new evidence from the fragile families and child wellbeing study. *Med Sci Monit* 2007;13:CR430–6.

36 Pedersen W. Abortion and depression: a population-based longitudinal study of young women. *Scand J Public Health* 2008;36:424–8.

37 Pfeiffer J, Avery MD, Benbenek M, *et al*. Maternal and newborn care during disasters: thinking outside the hospital paradigm. *Nurs Clin North Am* 2008;43:449–67.

38 Thongsomboon W, Kaewkiattikun K, Kerdcharoen N. Perceived stress and associated factors among pregnant women attending antenatal care in urban Thailand. *Psychol Res Behav Manag* 2020;13:1115.

39 Kingston D, Heaman M, Fell D, *et al*. Factors associated with perceived stress and stressful life events in pregnant women: findings from the Canadian maternity experiences survey. *Matern Child Health J* 2012;16:158–68.

40 Engidaw NA, Mekonnen AG, Amogne FK. Perceived stress and its associated factors among pregnant women in bale zone hospitals, Southeast Ethiopia: a cross-sectional study. *BMC Res Notes* 2019;12:356.

41 Jacob L, Smith L, Butler L, *et al*. Challenges in the practice of sexual medicine in the time of COVID-19 in the United Kingdom. *J Sex Med* 2020;17:1229–36.

42 Cai H, Tu B, Ma J, *et al*. Psychological Impact and Coping Strategies of Frontline Medical Staff in Hunan Between January and March 2020 During the Outbreak of Coronavirus Disease 2019 (COVID-19) in Hubei, China. *Med Sci Monit* 2020;26:e924171.

43 El-Zoghby SM, Soltan EM, Salama HM. Impact of the COVID-19 pandemic on mental health and social support among adult Egyptians. *J Community Health* 2020;45:689–95.

44 Sarita S. Academic stress among students: role and responsibilities of parents. *International Journal of Applied Research* 2015;1:385–8.

45 Otsuki J, Okada A, Morimoto K, *et al*. The relationship between pregnancy outcome and smooth endoplasmic reticulum clusters in MII human oocytes. *Hum Reprod* 2004;19:1591–7.

46 Takatsuji K, Sugimoto Y, Ishizaki S, *et al*. The effects of examination stress on salivary cortisol, immunoglobulin A, and chromogranin A in nursing students. *Biomed Res* 2008;29:221–4.

47 Bödecs T, Horváth B, Szilágyi E, *et al*. Effects of depression, anxiety, self-esteem, and health behaviour on neonatal outcomes in a population-based Hungarian sample. *Eur J Obstet Gynecol Reprod Biol* 2011;154:45–50.

48 Chou F-H, Kuo S-H, Wang R-H. A longitudinal study of nausea and vomiting, fatigue and perceived stress in, and social support for, pregnant women through the three trimesters. *Kaohsiung J Med Sci* 2008;24:306–14.

49 Lasselin J, Alvarez-Salas E, Grigoleit J-S. Well-Being and immune response: a multi-system perspective. *Curr Opin Pharmacol* 2016;29:34–41.

50 Ghoneim MM, O'Hara MW. Depression and postoperative complications: an overview. *BMC Surg* 2016;16:5.

51 Christian LM, Franco A, Glaser R, *et al*. Depressive symptoms are associated with elevated serum proinflammatory cytokines among pregnant women. *Brain Behav Immun* 2009;23:750–4.

52 Marcus SM. Depression during pregnancy: rates, risks and consequences--Motherisk Update 2008. *Can J Clin Pharmacol* 2009;16:e15–22.