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Status of Perceived Stress and Associated Factors among Pregnant Women during Coronavirus Pandemic in Antenatal Care at Gondar Town, Northwest, Ethiopia: A Cross-Sectional Study

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Abstract

Background: Stress during pregnancy has serious adverse effects on both the mother and new-born. Pregnancy is an emotional, physical, and stressful event in a woman's life that needs a huge psychological adjustment. However, this problem doesn't get adequate attention during antenatal care in Ethiopia. Thus, this study is aimed to assess the status of perceived stress and associated factors among pregnant women during antenatal care at Gondar town governmental health institutions, northeast, Ethiopia.

Methods: A cross-sectional study was employed among 425 pregnant mothers from October 25 to December 30, 2020. A systematic random sampling was used to select participants. The status of perceived stress of participants is assessed by 11 perceived stress scales (PSS 11). Data were collected using a structured pretested questionnaire. Data were entered into Epi-Data version 4.6 and exported to SPSS version 20 software for further analysis. Bivariate and multivariable logistic regressions were used to identify factors associated with the status of perceived stress during pregnancy.

Findings: The prevalence of perceived stress during pregnancy was 27.1% (95% CI; 68.6- 77.2)). Antenatal care follow-up <16 weeks of 42 gestation (AOR: 4.35, 95% CI; (2.66-7.12)), not having family emotional support (AOR: 2.38, 95% CI; (1.38-4.10)), recent family death participants' family members (AOR: 2.06, 95% CI; (1.17-3.60)) and fear of exposure to coronavirus (AOR: 1.93, 95% CI; (1.22-3.32)) were factors that increased perceived stress during the pregnancy.

Conclusions: The prevalence of perceived stress during pregnancy was high in the study area. Therefore, it is crucial for the ministry of health to incorporate screening the status of pregnancy perceived stress into basic antenatal care in assessment tools. Assessing the level of perceived stress and provision of emotional support for pregnant women is very crucial. Pregnant women who had a positive screening test were link to a psychiatrist for re-evaluation and management

Keywords: Antenatal care; Ethiopia; Gondar city; Perceived Stress

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Introduction

Perceived stress during pregnancy is defined as the imbalance a pregnant woman feels when she cannot cope with her demands [1]. These stressful events in a woman's life need enormous psychological and behavioural adjustment [2] and necessary screening and appropriate support during antenatal follow-up by healthcare providers [3, 4]. Since physiological enlargement of the endocrine gland occurs during pregnancy which produces hormonal responses to both the hypothalamic- pituitary adrenal

(HPA) axis and the sympathetic nervous system [5]. Changes hormone during pregnancy which predispose increasing psychological disorders [6, 7]. The psychological disorders were stress, depression, anxiety, and obsessive-compulsive disorders [8, 9]. Moreover, pregnant women encounter mixed feelings of imbalance between the desire for external support from healthcare providers during coronavirus pandemics and the demands of pregnancy life [10]. The effects of psychological stress on pregnancy were preterm birth, low birth weight, neonatal asphyxia, premature rupture of membrane (PROM),

and maternal-fetal compromise [11, 12]. It also delays in mental and physical development, vision and hearing impairments [13, 14].

There have been few reports of the prevalence and associated factors of pregnant women's perceived stress. Among these studies, the prevalence of perceived stress during pregnancy ranged from 5.5% to 35% [15] yet, three studies in the Democratic Republic of the Congo, Nigeria, and Ghana revealed that the prevalence of perceived stress during pregnancy were 57.1%, 46.7%, and 28.6%, respectively [4, 16, 17]. Some contributing factors to perceived stress during pregnancy were age, marital status, educational status, occupation, religion, fear of obstetric related complications, and poor family support, a past history of depression, domestic violence, and poor interpersonal skills of healthcare providers [8, 18-20]. Important factors among them were a believed that compromised quality of healthcare services because of fear of acquiring national pandemic coronavirus [19]. This national pandemic coronavirus may be associated with increased risks of preeclampsia, preterm birth and other adverse pregnancy outcomes [20]. The variety of these factors depends on population, sample size, stress-screening tool, and cultural context [13].

Although there is ample research that links stress and pregnancy, there is still a paucity of evidence on pregnancy-related perceived stress and its contributing factors in the Amhara regional state of Ethiopia, particularly in the study setting. Understanding antenatal perceived stress is important for institutions to create strategies and guidelines for treating pregnant women's stress. The results of this study also provide further evidence for the management of pregnant women's perceived stress and prevention of adverse maternal and neonatal outcomes. Therefore, our study is aimed at exploring the prevalence of perceived stress and associated factors among pregnant women during antenatal care in Gondar town, Ethiopia.

Materials and methods

Study setting

This study was conducted in public health facilities in Gondar town, Amhara Regional State, Northwest Ethiopia. The town is located in the Central Gondar Zone, Amhara Regional State, and is at 748 km northwest of Addis Ababa, the capital of Ethiopia. According to the Ethiopian central statistics agency projected total population of Gondar town in the year 2021 is 378,000. The annual population growth rate and total fertility rate of the region are -2.2 and 4.2 respectively. It has eight public health centers, one public teaching comprehensive specialized referral hospital, and two private hospitals providing health services to the population.

Study design and period: A quantitative research method on institutional data was conducted from October 25 to December 30, 2020

Participants

All pregnant women who attended antenatal care (ANC) follow-up services were the source population while all pregnant women

who attended antenatal care (ANC) follow-up service during the study period were study population. All pregnant women attended ANC follow-up in public health facilities that have been living in Gondar town for at least six month were included the study. All pregnant women attended ANC follow-up who had a history of psychiatric illnesses current pregnancy complications, intellectual disability were excluded from the study.

Sample size determinations

The sample size (n) was determined by using a single population proportion formula by considering the following statistical assumptions: A previous study in the Bale zone, southeast Ethiopia, using the same study setting and perceived stress measurement tool as this study, found that the prevalence of perceived stress in pregnant women was 21.4% [9]. The powers of 80% and a level of confidence of 95% were applied to determine the difference between groups, adding a non-response rate of 10%, d = 5% margin of error and a 1.5 design effect. After multiplying by the design effect of 1.5, it gave 425 samples.

Sampling procedures

In Gondar town, there are eight public health centers and one public comprehensive specialized referral hospital. Of these, Gondar comprehensive specialized referral hospital, Gondar Poly, Maraki, Azezo and Teda health centers were selected by simple random sampling technique. The allocation of the sample to each health facility was made proportionally based on the average number of pregnant women who had attended ANC follow-up services in the month proceeding the data collection period. Study participants were selected systematically from the ANC follow-up room. The first participant was selected by lottery method from their order of discharge registrations. To determine the interval of participants at the exit of the ANC follow-up in selected health facility, Kth value was used. As reported, the annual number of ANC participants recorded at Gondar town public health facilities were 5,450.

Data collection tools

Data collected using a structured and pre-tested questionnaire were employed. Data were collected through face-to-face interviews which developed from different literatures [8, 11, and 16]. The questionnaire was prepared first in English from related published articles and then translated into Amharic (a local language) to ensure consistency. Five midwives data collectors and two supervisors were recruited for the study.

Study variables and measurements

The outcome variable was the prevalence of pregnant women's perceived stress while socio-demographic variables (age, religion marital status, educational status of mother and partner, mother's occupational status, husband's occupation, family income), personal behaviours smoking, and alcohol drinking), obstetrics variables (pregnancy intention, parity, gestational age, and initiation of ANC follow-up); and serious life events (recent death of close relatives, physical/psychological trauma from death of the relative family members, suicidal idea/suicidal attempts, intimate partner violence, and fear of exposure to

COVID 19 infection during ANC were independent variables.

The status of perceived stress level was measured using a perceived stress scale (PSS). The PSS was originally developed by Cohen et al in 1983 [31]. The PSS used in this study was customized to an 11-item version (PSS-11) from the original 14-item version (PSS-14) 14 measure for all general populations. Since 11-item version (PSS-11) was more appropriate and easy-to-administer self-assessment tools for measuring perceived stress in pregnant women [2]. It has 11-item, evaluated by a 5-point Likert-type scale ranging from 0 (never) to 4 (very often), representing how often participants had perceived stress symptoms within the past month. The sum of all the 11 items was calculated for the PSS-11 score. The perceived stress scale is scored by summing across all scale (PSS 11) items. Assessment total scores ranged from 0 to 44 with higher scores of $\geq 27.1\%$ indicating pregnant women perceived stress symptoms.

Quality control of the data

To assure the quality of the data, training was given to the data collectors and supervisors about the collection tools, data collection techniques, and ethical issues during the selection of the study participants and collection of the data. Pre-test of the questionnaires was conducted on 10% of the sample size, on 42 participants, in at health facility where the study was not undertaken. The pre-test was part of the training and its findings were discussed during the training day and all the concerns were clarified. Every day after data collection, filled questionnaires were reviewed by supervisors and the principal investigators to ensure the completeness of the questionnaires' data. Appropriate modifications such as wording, changing terms, rephrasing for better understanding, discarding the incomplete, and adding some information for clarity were made on the questionnaires accordingly. Data collections were closely monitored by investigators and supervisors. Moreover, quality of the collected data was assured by using statistical parameters. A Hosmer and Leme show goodness of fit test was conducted to test the model's fitness, and the model was adequate ($p=0.405$). Multicollinearity was checked by using VIF and it was < 5 . The study concluded that the PSS-11 had excellent goodness-of-fit, good reliability and high validity for assessing the stress perception level within cultural context of northwest part of the Ethiopia.

Data processing and analysis

Data completeness and consistencies were checked by Epi-Data version 4.6. It was used for data entry and the data was exported to SPSS version 20 software. Logistic regression analysis was applied to identify the association between perceived stress and independent variables. Each variable that has a p-value less than 0.25 was added to the final model to control the confounders. A significant association was declared at $p < 0.05$. The results were presented in text and tables with an adjusted odds ratio (AOR) and the corresponding 95% confidence interval.

Results

Socio-demographic characteristics

A total of 421 pregnant participants, participated in this study,

giving a response rate of 99.05%. The mean (mean \pm SD) age of the participants was $32.8 \pm (1.17)$ years. Among the total participants, 208 (49.6%) of the participants were orthodox Christians and 255 (60.6%) of the participants were married. Of the total participants, 148 (35.2%) had diplomas and above education, while 160 (38.0%) of participants' partners had no formal the educational background. Regarding occupational status, 170 (40.7%) were housewives and family income of 290 (68.9%) participants was earned monthly at 2500 EBR. Nearly two-thirds of the partners, 120 (28.5%), were employees in occupational status. About 229 (50.8%) of the husbands had attended secondary school and above. Besides, the majority of the respondents' husbands 173 (38.4%), were government employees (Table 1).

Obstetric characteristics

Of the total pregnant participants involved in this study, 267 (63.4%) of them were multigravida. About 380 (90.3%) of the participants got intentionally pregnant, and 377 (89.5%) of the pregnancies were planned and supported. More than half of the participants, 276 (65.6%), were antenatal care attendees before 16 weeks of gestation age, and about 201 (47.7%) of the current gestational age of participants were in second trimesters during interviews. During the current pregnancy or previous pregnancy,

Table 1. Socio-demographic characteristics of pregnant women during antenatal care in Gondar town at public health facility, northwest, Ethiopia, 2020, (n = 421).

Variables	Category	Frequency	Percent (%)
Maternal Age	≤ 24	110	26.1
	25-34	238	56.5
	≥ 35	73	17.3
Marital status	Single	78	18.5
	Married	255	60.6
	Divorced	72	17.1
	Windowed	16	3.8
Religion	Orthodox	209	49.6
	Muslim	96	22.3
	Catholic	60	14.3
	Protestant	56	13.8
Mother's education	No formal education	66	15.7
	Primary school	114	27.1
	Secondary school	91	21.6
	Diploma and above	150	35.6
Mother's occupation	Unemployed or student	216	51.3
	Private employee	114	27.1
	Governmental employee	91	21.6
Partner's education	No formal education	160	38
	Primary school	95	22.6
	Secondary school	63	15
	Diploma and above	103	24.5
Partner's occupation	Unemployed or driver	211	50.1
	Private employee	90	21.4
	Governmental employee	120	28.5
Family income	≤ 1500	65	15.4
	1501-2500	66	15.7
	≥ 2501	290	68.9

237 (56.3%) of the study subjects reported that they didn't face any type of obstetric complications (**Table 2**).

Maternal behavioural and support characteristics

Three hundred and twenty-two (76.5%) of the participants had family emotional support, and at the same time, 314 (74.6%) of the participants said their husbands/partners helped them and emotionally supported them during their current pregnancies. About 316 (75.1%) of the participants reported that their husbands/partners helped with financial support without conflicts. On the other hand, in terms of serious life events during pregnancy, 339 (80.5%) of the participants had no recent death of close relatives, according to the study.

Among the total of the study participants, 326 (75.1%) had no physical or psychological stressful events from their family, and 339 (80.5%) had suicidal ideas or suicidal attempts. Almost half of the participants (182 (43.2%)) reported being abused by an intimate partner while pregnant. The majority 380 (90.3%) of the participants were never smokers, and 341 (81.1%) were never drinkers. Finally, among the total study participants, 276 (65.6%) had fear of being to be exposed to the national coronavirus (**Table 3**).

Prevalence of pregnant women perceived stress

Overall, the prevalence of perceived stress was 27.1%; 95% CI (68.6%-77.2%).

Factors associated with perceived stress during pregnancy

The association between perceived stress and its associated factors among the pregnant participants was analyzed using binary logistic regression. All factors which have a p-value of <0.25 in bivariate analysis were considered in the multivariable logistic regression model.

Hence, marital status, husband's educational status, participants, occupation, ANC follow-up <16 weeks, gestational age, family emotional support during pregnancy, intimate partner violence

Table 2. Obstetric Characteristics of pregnant women during antenatal care unit of Gondar town at public health facility, northwest, Ethiopia, 2020, (n = 421).

Obstetric Characteristics	Category	Frequency	Percent
Gravidity	Primigravida	154	36.6
	Multigravida	267	63.4
Status of pregnancy	Planned	377	89.3
	Unplanned	44	10.5
Pregnancy intention	Yes	380	90.3
	No	41	9.7
Time of starting of ANC	<16 weeks	145	34.4
	>16 weeks	276	65.6
Current gestational age	First trimesters	115	27.3
	Second trimesters	201	47.7
	Third trimesters	105	24.9
Intimate partner violence during pregnancy	Yes	182	43.2
	No	239	56.8

Table 3. Maternal support distribution among pregnant women during antenatal care in Gondar town at public health facility, northwest, Ethiopia, 2020, (n = 421).

Maternal behavioral and support Characteristic	Category	Frequency	Percent
Family emotional support	Yes	322	23.5
	No	99	76.5
Husband emotional support	Yes	107	25.4
	No	314	74.6
Partner helps by financial support	Yes	105	24.9
	No	316	75.1
Death of close relatives	Yes	82	19.5
	No	339	80.5
Physical /psychological trauma from their family	Yes	105	24.9
	No	316	75.1
Suicidal idea or suicidal attempt	Yes	82	19.5
	No	339	80.5
Intimate partner violence during pregnancy	Yes	182	43.2
	No	239	56.8
Feared of national pandemic corona virus	Yes	145	34.4
	No	276	65.6
Mother drink alcohol	Yes	80	19.9
	No	341	81.1
Mother smoking	Yes	41	9.7
	No	380	90.3

during pregnancy, presence of recent death of close relatives of participants, and fear of exposure to the corona virus were included in the multivariable analysis. After adjusting for confounding effects using multiple logistic regression analysis, ANC follow-up <16 weeks, family emotional support, the presence of recently deceased close relatives, and fear of the coronavirus found to be were significant associated factors.

The odds of having perceived stress among the pregnant participants who started ANC before 16 weeks of gestational age were 4.35 times higher than those mothers who have ANC <16 weeks of gestational age (AOR: 4.35; 95% CI; (2.660-7.122)). Participants who did not receive emotional support from their families during pregnancy reported 2.38 times more stress than their counterparts (AOR: 2.38, 95% CI; (1.384-4.095)).

The likelihood of having perceived stress was about 1.93 times higher for mothers who had feared exposure to a national coronavirus pandemic (AOR: 1.93, 95% CI; (1.215-3.317) as compared to those participants who had not feared exposure to the national pandemic coronavirus. Finally, the odds of developing perceived stress was higher among participants who had a recent death of close relatives (AOR: 2.06, 95% CI; (1.173-3.601) (**Table 4**).

Discussion

The overall status of perceived stress among pregnant women during antenatal care at public health facility in Gondar town was 27.1% (95% CI; (68.6%, 77.2%)). This study's finding was

Table 4. Bivariate and multivariable logistic regressions analysis of factors associated with perceived prenatal stress among pregnant women who attended ANC in Gondar town, public health facility, northwest, Ethiopia, 2020 (n=421).

Types of variable	Perceived stress		COR(95%CI)	AOR(95% CI)	P-value
	Yes	No			
Marital status					
Single	25	53	0.79(0.257-2.405)	1.7(0.478-6.124)	0.43
Married	54	201	0.45(0.156-1.287)	0.97(0.292-3.237)	0.93
Divorced	29	43	1.12(0.368-3.482)	2.8(0.778-10.255)	0.12
Windowed	6	10	Rf	Rf	Rf
Maternal occupational status					
Unemployed or student	53	163	0.70(0.406-1.192)	0.87(0.465-1.619)	0.73
Private employee	32	82	0.83(0.457-1.522)	0.56(0.557-2.227)	0.73
Governmental employee	29	62	Rf	Rf	Rf
Husband educational status					
No formal education	43	117	1.21(0.681-2.150)	0.86(0.446-1.644)	0.66
Primary school	31	64	1.59(0.852-2.982)	1.46(0.721-2.956)	0.34
Secondary school	16	47	1.12(0.541-2.321)	0.89(0.395-2.016)	0.65
Diploma and above	24	79	Rf	Rf	Rf
Husband occupational status					
Unemployed or driver	55	156	0.76(0.465-1.245)	0.86(0.487-1.515)	0.85
Private employee	21	69	0.66(0.353-1.223)	0.75(0.466-1.537)	0.6
Governmental employee	38	82	Rf	Rf	Rf
Week of ANC starting					
>16 weeks	229	47	Rf	Rf	Rf
<16 weeks	78	67	4.19(2.661-6.583)	4.35(2.660-7.122)* *	0
First triministers	51	64	2.30(1.300-4.078)	1.58(0.750-3.340)	0.3
Second triministers	36	165	0.63(0.358-1.111)	1.10(0.532-2.076)	0.96
Third triministers	27	78	Rf	Rf	Rf
Family emotional support					
Yes	247	75	Rf	Rf	Rf
No	60	39	2.14(1.326-3.455)	2.38(1.384-4.095) *	0.002
Death of close relatives					
Yes	237	96	1.58(0.359-1.122)	2.06(1.173-3.601) *	0.012
No	70	18	Rf	Rf	Rf
Fear of corona virus					
Yes	119	26	2,14(1.307-3.511)	1.93(1.215-3.317) *	0.018
No	188	88	Rf	Rf	Rf
Intimate partner violence					
Yes	180	55	1.32(0.858-2.035)	1.25(0.770-2.024)	0.54
No	127	59	Rf	Rf	Rf

also higher than the studies conducted in different countries; in Iran, 12.4% [34], in the United States of America 6% [32], and Canada 17.2% [35], and in urban Thailand 23.6% [2], Tehran, Iran 25.5% [36]. There were differences in terms of socio-cultural, geographical area, economic status, educational level, and life standard across the countries. This inconsistency can also be due to the fact that, in Ethiopia, the communities have good emotional support during pregnancy, and this may decrease stress among pregnant women. The other difference could be explained by the difference in study period, and fear of the coronavirus, which could increase the impact of pregnancy stress on these study participants when compared to the participants of previous studies done before the coronavirus is happen.

In contrast, the findings of this study were lower than those of previous studies done in Saudi Arabia (33.4%) Ghana (50%) [15],

the Democratic Republic of the Congo (57.1%) [4], and Nepal (34%) [37]. these discrepancies can be explained as a difference in socio-cultural status, study period, and lack of community support resulting in a increase prevalence of perceived stress. For example, evidence from Iran study showed that pregnant women with favourable social support had significantly less stress than those with unfavourable social support.

In the current study, than having antenatal care < 16 weeks of gestational age was more likely to cause perceived stress than those having antenatal care after 16 weeks of gestational age. This finding is in contrast with previous studies employed in China and Nepal, which stated that late initiation of antenatal care was significantly associated with a higher level of perceived stress [12, 17]. This finding is contrary to the study employed in China, which states that late initiation of antenatal care is significantly

associated with pregnancy-related perceived stress [19]. Because women in the early period of pregnancy face different hormonal and physiological changes, these changes may expose them to stress. Another possible explanation is a disparity in socio-cultural and living standards status which makes it difficult for mothers to cope with pregnancy and raised stress with limited resources.

In this study, it is found that pregnant women who had no family emotional support during pregnancy had perceived stress compared with pregnant women who had family emotional support. This finding is in line with the studies carried out in Ghana [16] and in the Bale zone of Ethiopia [9]. This consistency may be due to not having social support during pregnancy which may lead the mother to be isolated and may result in perceived stress. This consistency might also be supported by women in the community who feel a dilemma or worry about suicidal attempts during pregnancy. There is also strong evidence from a prior study from Iran that pregnant women with favourable social support had significantly less stress than those with unfavourable social support [19]. Additionally, lack of social support during pregnancy may lead the mother to be isolated and stressed.

According to the finding of this study, a pregnant woman who feared exposure to the coronavirus pandemic during her current pregnancy experienced more perceived stress compared with pregnant women who did not have fear. This association is supported by different previous studies. To have known that a mother had COVID-19 had a greater impact on mental and physical health than not knowing whether or not one had corona infections [20]. Currently, people especially pregnant women are stressed and overloaded with information about the worldwide coronavirus since it has still not been proven to affect mother-to-child transition and adverse birth outcomes. On the other hand, one possible explanation could be fear of exposure to a national coronavirus pandemic, and pregnant women might fear compromised health care services that lead to stress. This finding is also supported by a comparative study.

Finally, the odds of developing perceived stress were 2.06 times more likely among participants who had history of at recent death of close relatives when compared with who had no history of at recent death of close relatives (AOR=2.06; CI(1.173-3.601)). This association was in line with different studies. The possible reasons might be due to the traumatic memories of the death

of their family and the psychological impact on mental health. In that view, in the Ethiopian culture, the death of a family member had a strong effect on emotional status [9, 11].

Limitations of the study

This study was institution-based; hence its findings may not reflect the stress of all the pregnant women in the community. Social desirability bias could also be a concern. The cross-sectional study could not help the researchers establish a cause-effect relationship.

The strength of the study

Many variables were addressed and assessed; it was also possible to conduct a face-to-face interview with maximum precaution rather than a simple email, online or telephone survey to evaluate the real perceptions.

Conclusions

The prevalence of perceived stress during pregnancy was high in study area. Antenatal care follow-up <16 weeks of 42 gestation, participants who haven't family emotional support, recent family death participants' family members and fear of exposure to coronavirus were significantly associated with perceived stress during the pregnancy. Therefore, ministry of health to incorporate screening the status of pregnancy perceived stress into basic antenatal care guidelines to screen for psychosocial stress during pregnancy very important. Assessing the level of perceived stress and provision of emotional support for pregnant women is also very crucial. Pregnant women who had a positive screening test were link to a psychiatrist for re-evaluation and proper management.

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References

- 1 Binod Kumar Deo N S, Rajesh Kumar, Dhana Ratna Shakya (2020) A Study on Pregnancy, Perceived Stress and Depression. JBPkHS 3:79-87.
- 2 Wassapol Thongsomboon K K, Nitchawan Kerdcharoen (2020) Perceived Stress and Associated Factors Among Pregnant Women Attending Antenatal Care in Urban Thailand. Dove Medical Press Ltd.
- 3 Heera Shenoy T R K, Sheela Shenoy T (2020) Screening for perceived stress among pregnant women availing antenatal care at a tertiary care teaching institution in Kerala, India. Int J Reprod Contracept Obstet Gynecol 9:3279-3230.
- 4 Reeta Vijayaselvi M M B, Anuja Abraham, Suja Kurian, Annie Regi, Grace Rebekah (2015) Risk factors for stress during antenatal period among pregnant women in tertiary care hospital of southern India. J Clin Diagn Res 910.
- 5 Silvana Andrea Molina Lima R P E D, Meline Rossetto Kron Rodrigues, Guilherme Augusto Rago Ferraz, Ana Claudia Molina (2018) Is the risk of low birth weight or preterm labor greater when maternal stress is experienced during pregnancy? A systematic review and meta-analysis of cohort studies.
- 6 Pickler RH, Reyna MBA, McCain N, Lewis MM, Cone MS et al (2010) A model of neurodevelopmental risk and protection for preterm infants. J Perinat Neonatal Nurs 24:356.
- 7 Barthelemy Tandu-Umba D K D, Gilbert L (2001) Maternal Stress and

- Pregnancy Outcomes. *Open J Obstet Gynaecol* 4:361-370.
- 8 Pais M (2018) Stress among pregnant women: a systematic review. *J Clin Diagn Res.* 12:1-4.
 - 9 Nigus Alemnew Engidaw (2019) Perceived stress and its associated factors among pregnant women in Bale zone Hospitals, Southeast Ethiopia. *BMC Res Notes* 12:356.
 - 10 Tiara C, Willie A P, Trace Kershaw (2016) Stress in the City: Influence of Urban Social Stress and Violence on Pregnancy and Postpartum Quality of Life among Adolescent and Young Mothers 93:1.
 - 11 Danielle N, Rendina M S, Sharon E, Blohowiak M S, Christopher L (2018) Maternal Perceived Stress during Pregnancy Increases Risk for Low Neonatal Iron at Delivery and Depletion of Storage Iron at One Year. *J Pediatr.*
 - 12 Lau Y Y LM (2011) Obstetric variables, perceived stress and health-related quality of life among pregnant women in Macao, China. *Midwifery Open Journal of Obstetrics and Gynaecology* 27:73-125.
 - 13 Vikram Patel A R, K S Jacob, Marcus Hughes (2004) Effect of maternal mental health on infant growth in low income countries: new evidence from South Asia. *BMJ.*
 - 14 Kittikhun Tanpradit KK (2020) the Effect of Perceived Stress during Pregnancy on Preterm Birth. *Dove Press journal: Int J Womens Health.*
 - 15 Woods SM, Guo Y, Fan M-Y, Gavin A (2010) psychosocial stress during pregnancy *Am J Obstet Gynecol* 202:1-7.
 - 16 Boakye-Yiadom A, S.S., Dutt J, Dapare P, Abass A (2020) Perceived stress and anxiety among Ghanaian pregnant women. *J Medical Biomed Sci* 17:4-29.
 - 17 Boakye Yiadom, Dapare A Alhassan (2015) Perceived stress and anxiety among Ghanaian pregnant women. *J Medical Biomed Sci* 4:29-37.
 - 18 Ahmed Waqas M Z, Muhammad Hassan, Majeed, Sadiq Navee (2020) psychosocial predictors of antenatal stress in Pakistan: perspectives from a developing country. *BMC Res Notes.*
 - 19 Sarmasti N AS, Mahmoudi G, Heydarpour S (2019) Comparing Perceived Social Support and Perceived Stress in Healthy Pregnant Women and Pregnant Women with Preeclampsia. *Ethiop J Health Sc* 29:3.
 - 20 Samuel Ginja K J, James J, Newham Emily J, Henderson (2020) Debbie Smart and Raghu Lingam, Rural-urban differences in the mental health of perinatal women: a UK-based cross-sectional study. *BMC Pregnancy and Childbirth* 20:464.