

## Perceived stress and associated factors in pregnant women: a cross-sectional study nested within a population-based cohort

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### Abstract

*Objectives: to estimate the prevalence of perceived stress and verify the associated factors in pregnant women assisted by Family Health teams in Montes Claros, Minas Gerais - Brazil.*

*Methods: epidemiological, cross-sectional, and analytical study, nested in a population-based cohort. Sociodemographic and obstetric characteristics and physical and mental health conditions were assessed. The stress level was estimated by the Perceived Stress Scale (PSS-14). Descriptive and bivariate analyses were conducted, followed by the Poisson Regression model with robust variance.*

*Results: a total of 1,279 pregnant women participated. The prevalence of high-stress levels was 23.5% (CI95%=20.8%-26.2%). The outcome was more prevalent among pregnant women aged above 35 years (PR=1.38; CI95%=1.09-1.74) and less than or equal to 19 (PR=1.41; CI95%=1.13-1.77); without a partner (PR=1.33; CI95%=1.09-1.62); with low social support (PR=1.42; CI95%=1.18-1.70); multiparous (PR=1.30; CI95%=1.02-1.66); with current unplanned pregnancy (PR=1.23; CI95%=1.00-1.52); urinary tract infection (PR=1.35; CI95%=1.12-1.62); high level of anxiety symptoms (PR=1.42; CI95%=1.18-1.71); severe (PR=4.74; CI95%=3.60-6.26) and moderate (PR=3.19; CI95%=2.31-4.39) symptoms of depression; and neurological complaints (PR=1.77; CI95%=1.27-2.47).*

*Conclusion: there was a significant prevalence of high perceived stress among pregnant women, an outcome associated with sociodemographic, clinical, obstetric, and emotional factors, which demonstrates the need for comprehensive care of pregnant women's health.*

**Key words** *Pregnancy, Pregnant women, Stress psychological, Primary health care, Health surveys*



## Introduction

Stress is related to the individual's capacity for adaptation and coping in the management of internal and external stress factors. When it exceeds human resistance and alters the body's homeostasis, it can cause deleterious effects on physical and mental health. The way each individual perceives stress is unique and several factors can trigger it, reducing their quality of life and social well-being.<sup>1-3</sup>

The gestational period is permeated by physical, emotional, and sometimes social changes and adaptations typical of this phase, which can lead to stress in women.<sup>2-5</sup> Its high levels can generate a variety of adverse outcomes to maternal and child health. There is an increased risk of miscarriage, preterm labor, low birth weight, short-term neonatal morbidities, long-term complications, preeclampsia, and psychiatric comorbidities.<sup>2-4</sup> Stress can also contribute to the adoption of behavioral patterns of health risks by pregnant women.<sup>1,6</sup> After birth, during the child's childhood, there is the possibility of developmental abnormalities such as growth retardation, behavioral problems, and neurodevelopmental disorders.<sup>2-4</sup>

Another aspect to be considered is the fear of fetal malformations, commonly observed in pregnant women. Upon receiving a poor fetal prognosis, parents seem to lose self-confidence in how to care for their child and may develop feelings of hopelessness, lack of control, and fantasies of death and resurrection. A condition that poses risk to the pregnancy can lead the pregnant woman to feel inferior to other women, which compromises her self-esteem and can damage the emotional bond with the fetus. Therefore, there are several disorders and consequences that the news of fetal malformation entails,<sup>7</sup> including increased stress.

The prevalence of gestational stress is significant in the international<sup>2-4</sup> and national<sup>5,8</sup> scenarios. The main risk factors for stress during pregnancy are multiparity, mental disorders, financial difficulties, alcoholism, smoking, sedentary lifestyle, low education, unemployment, lack of social support, addiction to illicit substances, domestic violence, presence of comorbidities, unplanned pregnancy, and non-acceptance of pregnancy,<sup>1,2,4</sup> besides the fear of fetal malformations.<sup>7</sup>

The prevalence of stress during pregnancy and its harmful effects in this period show the importance of early detection of this condition, to establish actions to prevent and control this health problem.<sup>4</sup> The Family Health Strategy (FHS), through prenatal care, can contribute to minimizing the impact of stressors on health and unsatisfactory psychosocial outcomes during pregnancy.<sup>9,10</sup>

Pregnant women assisted by the FHS, to a certain extent, may experience social and health situations that presumably provide vulnerability, which enhances

the effects of stress in this population. The literature on prenatal stress in the sociocultural context of developing countries is scarce,<sup>2,4,5</sup> indicating the need for epidemiological research on this theme for a better understanding of its predictive factors.

Therefore, this study aimed to estimate the prevalence of perceived stress and verify the associated factors in pregnant women assisted by Family Health teams in Montes Claros, Minas Gerais (MG) – Brazil.

## Methods

The present study is part of the research entitled “Estudo ALGE - Avaliação das condições de saúde das gestantes de Montes Claros - MG: estudo longitudinal”. This is a population-based observational epidemiological survey, with cross-sectional and analytical design, nested within the ALGE cohort.<sup>11</sup>

The municipality where this study was carried out is located in the northern region of the state of MG - Brazil. It is a hub in the region where it is located and has a population of 417,478 inhabitants. It is a reference in the service, commerce, education, and health sectors. The Montes Claros FHS services were implemented in the 1990s and are currently organized in 15 poles. These poles contained a total of 135 family health teams at the time of the research (2018-2019), making coverage of 100% of the population.

The population of this research consisted of 1,661 pregnant women registered in the ESF teams, in the urban area of the municipality of Montes Claros, in the year 2018. For logistical reasons and access difficulties, it was not possible to include pregnant women living in rural areas.

The sample size was established aiming to estimate population parameters with a prevalence of 50% (to maximize the sample size and due to the original project contemplating several events), a 95% confidence interval (CI95%), and an accuracy level of 2.0%. A correction was made for a finite population (N=1,661 pregnant women) and an additional 20% was also established to compensate for possible non-responses and losses. The calculations showed the need for the participation of at least 1.180 pregnant women, distributed among the 15 FHS poles in the municipality. The number of pregnant women defined for the sample of each center was proportional to its representativeness in the total population of registered pregnant women. At first, all the pregnant women registered in the poles were invited to participate in the study, and then there was a simple random draw.

We inform you that the sample interviewed in this research included 1,279 pregnant women, a quantity higher than the minimum quantity indicated in the

sample calculation. Therefore, most of the population was analyzed, which ensured greater sample representativeness.

The collection took place between October 2018 and November 2019, in the ESF health units or the homes of the participants, according to their availability. A multi-professional team formed by health professionals and undergraduate students was responsible for the interviews, which occurred face-to-face at a previously defined place and time with the pregnant woman, with an average duration of one hour.

As for the inclusion and exclusion criteria, we included pregnant women who were registered in the urban area FHS team, at any gestational age. The exclusion criterion was being pregnant with twins and/or presenting some cognitive impairment, as informed by the family and/or the FHS team.

Before data collection, interviewers were trained, as well as a pilot study with pregnant women registered in an FHS unit (who were not included in the study analysis), to standardize the research procedures.

For data collection, a structured questionnaire with questions elaborated by the authors and with validated instruments was used, which contemplated sociodemographic and obstetric characteristics, physical and mental health conditions, besides complaints during the gestational period.

In the present investigation, the following sociodemographic characteristics of pregnant women were analyzed age range (up to 19 years, 20 to 35 years, over 35 years); marital status (lives without or with a partner); education (elementary school, high school, and college); family income (up to two minimum wages or more than two minimum wages); receives assistance from the *Bolsa Família* Program - a federal government program conditioned to transfer income to families, to help combat social vulnerability (no or yes);<sup>12</sup> family functioning (dysfunctional or functional family); social support (high social support or low social support).

To examine the pregnant woman's perception of family functioning, we applied the instrument named APGAR Family,<sup>13</sup> which signals the fulfillment of basic parameters defined by the acronym APGAR: A – Adaptation (Adaptação); P – Participation (Participação); G – Growth (Crescimento); A - Affection (Afeição); R – Resolution (Resolução). The questionnaire presents five questions with three possible answers each, and scores ranging from zero to two points - never (0), sometimes (1), and always (2). Thus, the sum of zero to ten points is given, and the higher the score, the better the participant's satisfaction. A categorization into “functional family” (scores of 7-10) and “dysfunctional family” (<6) was performed.<sup>13</sup>

The presence of social support was measured using the Brazilian version of the Medical Outcome

Study (MOS) Social Support Scale,<sup>14</sup> composed of 19 questions comprising five dimensions: material, affective, emotional, positive social interaction, and information. For each item, the participant indicates how often he/she considers each type of support, using a Likert-type scale: never (1), rarely (2), sometimes (3), almost always (4), and always (5). The closer the final score is to 100, the better the perceived social support. The overall score of the scale was calculated by the total sum of the 19 items and a score above 66, which corresponds to the second tertile, was considered high social support.<sup>14</sup>

The obstetric characteristics investigated were gestational trimester (1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup>), current pregnancy planning (yes or no), and parity (nulliparous, primiparous, or multiparous). The following self-reported health conditions were ascertained: urinary tract infection, gestational diabetes, anemia, hemorrhage, pregnancy hypertensive syndromes (PGS), and migraine. The presence of the main complaints during pregnancy was also investigated: sleep-related; cardiovascular (edema, epistaxis, hemorrhoids, palpitation, bleeding gums, varicose veins); cutaneous (chloasmas, stretch marks); gastrointestinal (constipation, abdominal pain, eructation, nausea, heartburn, vomiting, salivation); breast (mastalgia); musculoskeletal (cramps, low back pain); neurological (headache, paresthesias); respiratory (shortness of breath, nasal obstruction); weakness, dizziness, and fainting. Such conditions and complaints were addressed for being among the main risk conditions in pregnancy, based on recommendations of the Brazilian Ministry of Health for low-risk prenatal care in Primary Health Care (PHC).<sup>15</sup>

The mental health conditions examined were anxiety symptoms (low or high level), depression symptoms (no symptoms, moderate symptoms, or severe symptoms), and stress level (low level and high level). To analyze the anxiety level we used the short version of the Brazilian State-Trait Anxiety Inventory (STAI) - “*Inventário de Ansiedade Traço-Estado*” (IDATE) in its Brazilian Portuguese validated version.<sup>16</sup> To track depressive symptoms we used the Center for Epidemiologic Studies Depression Scale (CES-D), also validated in Brazil.<sup>17</sup>

The STAI provides a reliable measure for two components of anxiety: state and trait. In the IDATE state the person describes how he/she feels “now, right now” regarding six items presented on a four-point Likert scale: 1. absolutely not; 2. a little; 3. a lot; 4. very much. In the STAI-trait the participant responds how he/she “usually feels” for the remaining six items, which are arranged according to a new four-point Likert scale: 1. rarely; 2. sometimes; 3. frequently; 4. almost always. The scores of the positive questions are reversed, ie, 1, 3, and 5 in the STAI-state and 1, 3, and 6 in the STAI-trait. The scores

are obtained by the sum of the answers, where 6 is the minimum score and 24 is the maximum, both for state and trait.<sup>16</sup> Since there is no cutoff point for the reduced form, and because the mean and median of the STAI-trait, in the present study, have approximate values, this variable was dichotomized by the median, because it is an integer. Those pregnant women with a value below it were classified as “low anxiety level” and above as “high anxiety level”.

The CES-D is composed of 20 items, of which four are positive, in which the respondent reports the frequency of occurrence of symptoms in the last week. Each response can involve four increasing degrees of intensity on a Likert scale - never or rarely, sometimes, often, and always - with scores corresponding to 0, 1, 2, and 3. The score of the four positive items is inverted and added to the scores of the others, giving a final result ranging from zero to 60 points. We proceeded to categorize into: absent/light depressive symptoms (score <16), moderate (score  $\geq 16$  or  $\leq 21$ ), and severe symptoms (score  $\geq 22$ ).<sup>17</sup>

The level of stress (outcome variable) was ascertained through the Perceived Stress Scale (PSS-14),<sup>18</sup> translated and validated for the Brazilian population, which identifies situations in the individual's life assessed as stressful, establishing levels of intensity. This scale is composed of 14 items that evaluate the frequency in which certain feelings and thoughts occurred in the last month, with answers ranging from zero (never) to four (always). The PSS-14 scale score is obtained by reversing the scores of the positive items and summing the responses of the 14 items, with the total score ranging from zero (no stress symptoms) to 56 (symptoms of extreme stress). To classify pregnant women regarding their level of perceived stress, the PSS-14 scale scores were dichotomized into <28 and  $\geq 28$ , with the cutoff point defined by the 75<sup>th</sup> percentile. Pregnant women with scores <28 were classified with low-stress levels and those with scores  $\geq 28$  with high stress level.<sup>18</sup>

The data collected were typed, organized, and analyzed in the Statistical Package for the Social Sciences (SPSS) statistical software, version 23.0 for Windows®. Descriptive analyses were performed through absolute and relative frequency of all categorical variables, as well as descriptive measures (mean, standard deviation, minimum and maximum) of the PSS-14 scale scores and histogram construction.

The association between the outcome variable (level of stress) and the independent variables (socio-demographic and obstetric characteristics, physical health conditions, anxiety, and depression symptoms) was measured using the chi-square test. Variables that presented a descriptive level (*p*-value) up to 0.20 were selected for multiple analyses. The Poisson regression model with robust variance was adopted in the multiple analysis. Prevalence ratios (PR) with their respective

CI95% were estimated. The backward stepwise method was used to adjust the model; in this step, the significance level adopted was  $p \leq 0.05$ . The Deviance test was used to verify the quality of the model adjustment.

The study was approved by the Research Ethics Committee of the University of Montes Claros through the consubstantiated opinions no. 2.483.623/2018 and 3.724.531/2019 of November 25, 2019 (CAAE 80957817.5.0000.5146). Authorization was obtained for conducting the research in the ESF teams, through the Institution's Term of Agreement for Participation in Research and Letter, signed by the Coordination of PHC of the Municipal Health Secretariat of Montes Claros. Participants aged 18 years or older signed the Informed Consent Form (ICF); those younger than 18 years and their guardians signed, respectively, the Informed Consent Form (TALE) and the ICF.

## Results

Figure 1 shows the flowchart of the intake of the pregnant women participating in the study.

A total of 1,279 pregnant women participated in the study, and the majority (40.3%) were in the second gestational trimester, aged 20 to 35 years (70.9%), lived with a partner (77.2%) and had complete high school education (63.6%). The other sociodemographic and obstetric characteristics, health conditions, and complaints during pregnancy are described in Table 1.

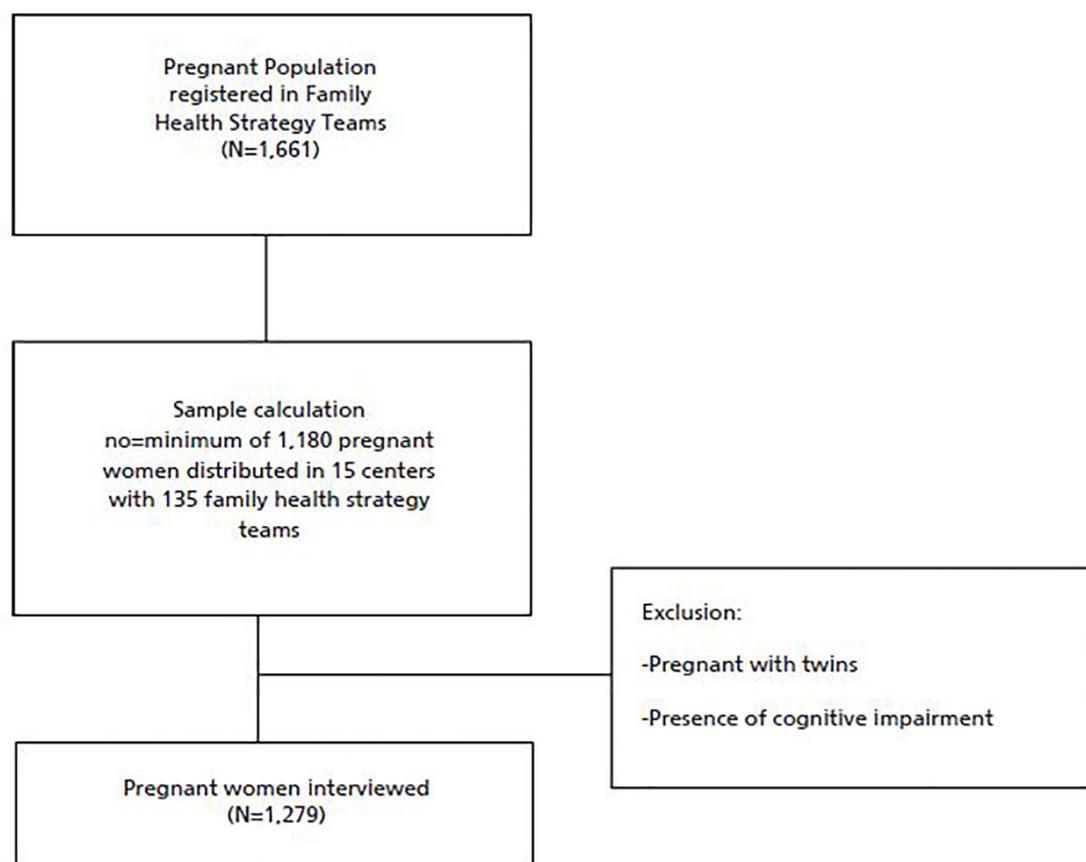
The prevalence of high-stress levels was estimated to be 23.5%, with CI95% = 20.8%-26.2%. The overall mean of the PSS-14 Scale scores in the sample was 24.0, ranging from one to 56 and with a standard deviation of  $\pm 8.6$  (Figure 2).

Table 2 shows the results of the bivariate analysis between stress level and the independent variables evaluated. The variables that presented statistical evidence of association with the outcome, at a 0.20 level, were: age group, education, marital status, receiving Bolsa Familia Program, family functioning, social support, current pregnancy planning, parity, urinary infection, anemia, migraine, anxiety symptoms, depression symptoms, sleep alterations, cardiovascular, genitourinary, neurological, respiratory complaints, weakness, dizziness, and fainting.

The results of the multiple analysis are described in Table 3. The Deviance test indicated that the model showed an adequate quality of fit ( $p=0.840$ ). The high-stress level was more prevalent among pregnant women aged above 35 years (PR=1.38; CI95%=1.09-1.74) and less than or equal to 19 (PR=1.41; CI95%=1.13-1.77); without a partner (PR=1.33; CI95%=1.09-1.62); with low social support (PR=1.42; CI95%=1.18-1.70); multiparous (PR=1.30; CI95%=1.02-1.66) with current unplanned

Figure 1

Flowchart of the selection process of pregnant women participating in the ALGE Study, Montes Claros, MG, Brazil, 2018/2019.



ALGE=Assessment of health conditions of pregnant women in Montes Claros - MG: a longitudinal study.

pregnancy (PR=1.23; CI95%=1.00-1.52); urinary infection (PR=1.35; CI95%=1.12-1.62); high level of anxiety symptoms (PR=1.42; CI95%=1.18-1.71); severe (RP=4.74; CI95%=3.60-6.26) and moderate (RP=3.19; CI95%=2.31-4.39) symptoms of depression; and neurological complaints (RP=1.77; CI95%=1.27-2.47).

## Discussion

This study showed that approximately one-fourth of the pregnant women analyzed presented a high level of stress, an outcome that was associated with sociodemographic factors (age group, marital status, social support), obstetric factors (unplanned pregnancy, multiparity), health problems during pregnancy (urinary tract infection, anxious and depressive symptoms) and gestational complaints (neurological).

In the international scenario, it was observed that in Germany the prevalence of stress was 95% of the surveyed pregnant women,<sup>19</sup> in China at 91.86%,<sup>20</sup> in Thailand at 23.6%<sup>21</sup>, and in Ethiopia at 11.6%.<sup>2</sup> In Suriname, high perceived stress occurred in 27.2% of the participants during the first/second trimester and in 24.7% during the third trimester.<sup>4</sup> In Brazil, the prevalence of stress in pregnant women from Santa Catarina was 93%<sup>4</sup> and 78% in those

from São Paulo.<sup>22</sup> It must be considered that the differences in the prevalence of stress levels in the populations may be related to different methodological criteria used in the screening of this condition, and also to ethnic, demographic, social, economic, and cultural specificities.

Given the expressive prevalence of high levels of stress perceived among the women surveyed, it is worth pointing out that pregnancy demands from women a series of adaptations and experiences that propitiate a greater emotional vulnerability to psychosocial conditions.<sup>2,10</sup> Stress emerges in everyday life and can be identified in daily relationships. It is linked to the changes of pregnancy itself and the different confrontations related to the roles played socially, with greater overload and maternal responsibility in the pregnancy cycle. Added to daily stress are the tensions about pregnancy and childbirth, the need to plan the tasks of caring for the unborn baby, in addition to the difficulty to perform work, domestic, and social activities.<sup>10</sup> Therefore, family health professionals need to pay attention to the screening of stress during pregnancy, to reduce the probability of worsening the clinical picture and to avoid compromising mental health,<sup>1,2,5,10</sup> recognizing that pregnancy goes beyond the biological dimension.

**Table 1**

Sociodemographic and obstetric characteristics and health conditions of pregnant women assisted in the basic health units of Montes Claros, MG, Brazil, 2018/2019 (n=1,279).

Variables	n*	%
<i>Sociodemographic characteristics</i>		
Age group (years)		
Up to 19	194	16.1
20-35	873	72.4
Over 36	138	11.5
Marital status		
Without partner	297	23.3
With partner	979	76.7
Education		
Elementary school incomplete	121	9.5
Elementary school complete	73	5.7
High School incomplete	200	15.7
High School Complete	629	49.3
Higher education incomplete	89	7.0
Higher education complete	165	12.9
Family income (minimum wage)		
Above two salaries	431	35.2
One to two salaries	479	39.1
Below one salary	316	25.7
Receives Bolsa Familia assistance		
Yes	268	21.0
No	1009	79.0
Family functioning		
Dysfunctional family	211	16.6
Functional family	1062	83.4
Social Support		
Low social support	237	18.8
High social support	1024	81.2
<i>Obstetric Characteristics</i>		
Gestational trimester		
Third trimester	422	33.0
Second trimester	515	40.3
First trimester	341	26.7
Current pregnancy planning		
Yes	503	40.0
No	754	60.0
Parity		
Nullipara	607	48.6
Primipara	392	31.4
Multiparous	249	20.0
<i>Health conditions</i>		
Urinary Infection		
Yes	254	20.0
No	1017	80.0
Gestational diabetes		
Yes	69	5.4
No	1204	94.6
Anemia		
Yes	147	11.6
No	1125	88.4
Bleeding		
Yes	40	3.1
No	1233	96.9
Pregnancy hypertensive syndromes		
Yes	49	3.8
No	1225	96.2
Migraine		
Yes	166	13.1
No	1100	86.9
Stress level		
High-Stress Level	304	24.2
Low-stress level	954	75.8
Anxiety symptoms		
High anxiety level	547	45.4
Low level of anxiety	657	54.6
Depression symptoms		
Major depressive symptoms	314	25.3

Moderate depressive symptoms	201	16.2
No depressive symptoms	728	58.6
<i>Main complaints</i>		
Sleep alterations		
Yes	914	71.6
No	362	28.4
Cardiovascular		
Yes	839	65.6
No	440	34.4
Cutaneous		
Yes	602	47.1
No	677	52.9
Gastrointestinal		
Yes	1225	95.8
No	54	4.2
Genitourinary		
Yes	997	78.0
No	282	22.0
Mammary		
Yes	715	56.2
No	558	43.8
Musculoskeletal		
Yes	1001	78.3
No	278	21.7
Neurological		
Yes	1017	79.5
No	262	20.5
Respiratory		
Yes	752	59.8
No	506	40.2
Weakness/dizziness/fainting		
Yes	923	72.2
No	356	27.8

Minimum wage: R\$ 954.00; \*Totals vary due to missing information.

As for the factors associated with high-stress levels, age was positively associated with the occurrence of this outcome: it was more prevalent among pregnant women aged less than or equal to 19 years and over 35 years. A study conducted in Iran found higher stress scores in older women.<sup>23</sup> Pregnancy after 35 years of age is considered high-risk, which possibly causes women to experience this period with worry, fear, and stress.<sup>24</sup> As for younger pregnant women, among whom are the adolescents in this survey, a possible explanation for the relationship with the researched event stems from the challenges faced in pregnancy during adolescence. It is worth noting that teenage pregnant women may present greater emotional, socioeconomic, and family vulnerability,<sup>11,25</sup> which favors the occurrence of stress during a phase of greater accountability because of the challenges and new demands of the transition to motherhood. Adolescence is a critical phase of the life cycle in which several social, physical, biological, and psychological changes occur, as well as the pregnancy period. Pregnant adolescents may experience feelings of shame and stigmatization, which result in loneliness, school dropout, and lack of family and social support.<sup>25</sup>

The highest prevalence of high levels of stress was seen among pregnant women living without a partner. In Thai pregnant women, stress symptoms were found to be significantly associated with divorce and separation from a spouse.<sup>21</sup> Research in Nigeria also found that

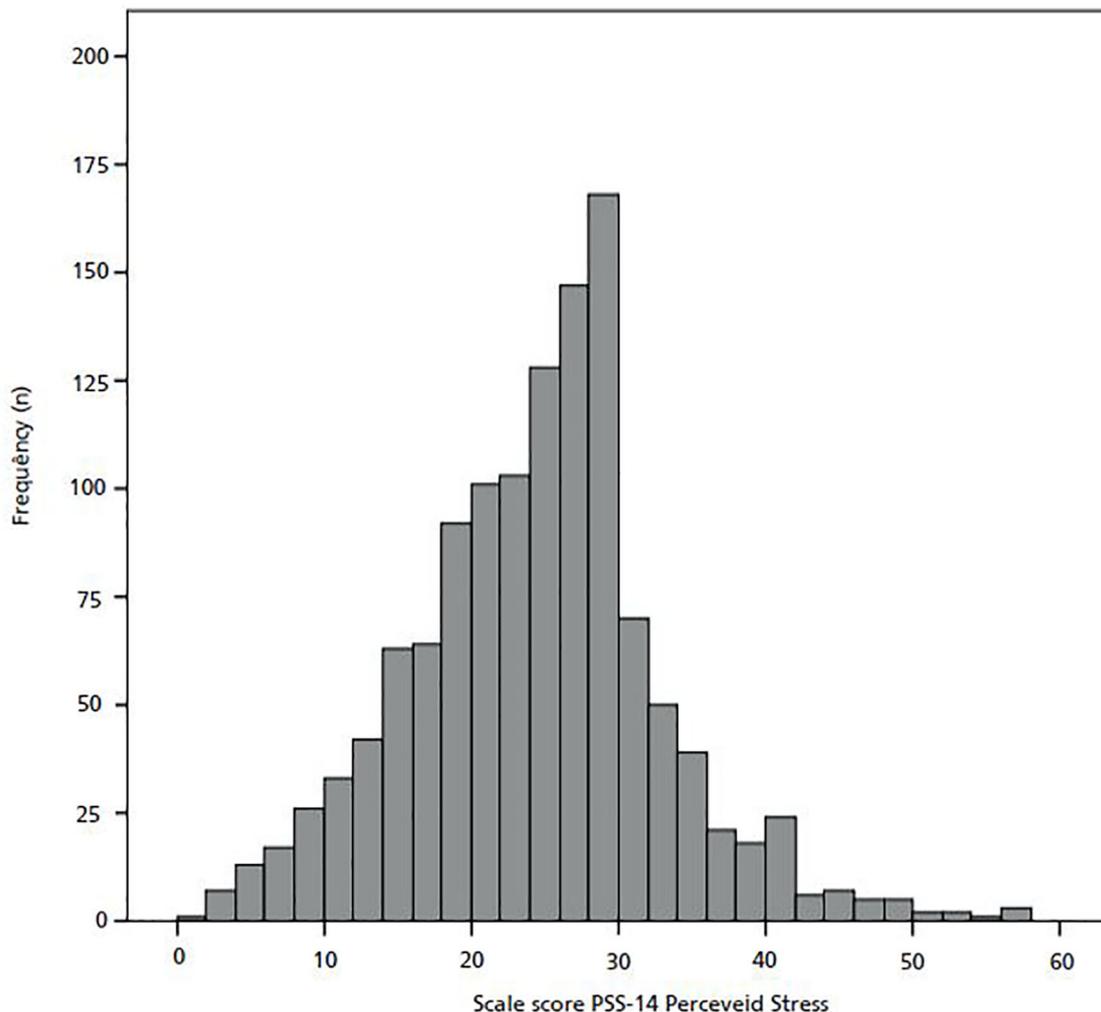
marital status was associated with stress during pregnancy among adolescents.<sup>25</sup> A possible explanation is related to stigmatization and negative feelings that women experience due to cultural values in this condition.<sup>25</sup> Moreover, in the absence of a partner, there is a lack of material, social and emotional support that a partner can offer. With a partner present during pregnancy, the woman can feel supported against adverse situations, which provides a greater bond and emotional support.<sup>10</sup>

Low social support for pregnant women has been associated with the presence of high-stress levels. A study conducted with Chinese pregnant women observed that women with low or moderate levels of social support were more likely to suffer prenatal stress than those with high levels of social support.<sup>20</sup> A study conducted in the interior of São Paulo also observed a moderate and inverse correlation between the variables stress and social support.<sup>8</sup> Social support is a dynamic process and consists of all the support provided by family and friends to provide the pregnant woman with a feeling of support, care, and help in her needs. The pregnancy phase is marked by transformations in the physical, emotional, social, and economic status, therefore the presence of social support can contribute to the necessary comfort for the pregnant woman's wellbeing.<sup>5,8,10</sup>

A higher prevalence of perceived stress has been verified in multiparous women. Research conducted with

**Figure 2**

Scores of the Perceived Stress Scale (PSS-14) in pregnant women assisted in basic health units, Montes Claros, MG, Brazil, 2018-2019 (n=1,279).



pregnant women in Pakistan showed that an increase in the number of children was associated with a higher score on the PSS-14.<sup>26</sup> After experiencing previous pregnancies, women experience pregnancy with less enthusiasm, and become more concerned with problems related to family dynamics, child-rearing, and financial repercussions.<sup>26</sup>

The high level of stress was statistically associated with the absence of pregnancy planning. A similar result was found in a previous study.<sup>26</sup> Lower stress scores were observed in Iranian pregnant women with planned pregnancies.<sup>23</sup> Unplanned pregnancy may leave women with excessive worry and discontent due to restructuring and the need to adapt, anxiety about the health care required at this stage, financial expenses, and lack of social support.<sup>23,26</sup>

The occurrence of UTIs in the pregnant women studied was associated with a high level of stress. The UTI can affect the physical conditions and cause discomfort to the pregnant woman, such as dysuria, increased frequency,

and urgency to urinate, lower abdominal pain, chills, and lower back pain. Moreover, the woman, upon learning that UTI may constitute one of the main risk factors for miscarriage and premature birth, may become fearful and develop stress.<sup>27</sup>

Another important intervening factor in the high level of stress was the presence of anxiety symptoms, as also verified in previous studies in China<sup>20</sup> and Brazil.<sup>8</sup> It must be considered that gestational changes, apprehensions about income, and issues related to pregnancy development and the postpartum phase may cause emotional changes and increased stress, configuring a situation that favors the emergence of anxious symptoms in prenatal care.<sup>20</sup>

Similar to other investigations,<sup>1,4,8</sup> another factor associated with high-stress levels was the presence of severe and moderate depressive symptoms. Perceived stress is an important risk factor for depression during pregnancy.<sup>4</sup> Depression is one of the disorders that can develop during pregnancy, with symptoms that

Table 2

Variables	Stress level				p*
	Down		High		
	n	%	n	%	
<i>Sociodemographic characteristics</i>					
Age group (years)					<0.001
Up to 19	128	67.0	63	33.0	
20-35	681	79.1	180	20.9	
Over 36	91	66.9	45	33.1	
Income (minimum wage)					0.253
Above two salaries	346	81.6	78	18.4	
One to two salaries	355	75.5	115	24.5	
Below one salary	214	68.4	99	31.6	
Education					<0.001
Incomplete elementary school	74	62.7	44	37.3	
Elementary school complete	50	71.4	20	28.6	
High school incomplete	134	68.0	63	32.0	
High school complete	494	79.5	127	20.5	
Higher education incomplete	66	75.9	21	24.1	
Higher education complete	135	82.8	28	17.2	
Marital status					<0.001
Without partner	195	66.8	97	33.2	
With partner	758	78.7	205	21.3	
Receives <i>Bolsa Família</i> assistance					0.015
Yes	183	70.4	77	29.6	
No	769	77.2	227	22.8	
Family functioning					<0.001
Dysfunctional family	112	55.4	90	44.6	
Functional family	837	79.6	214	20.4	
Social Support					<0.001
Low social support	125	53.0	111	47.0	
High social support	947	75.8	302	24.2	
Obstetric Characteristics					
Gestational trimester					0.498
Third trimester	325	77.6	94	22.4	
Second trimester	382	75.6	123	24.4	
First trimester	246	73.9	87	26.1	
Current pregnancy planning					<0.001
Yes	417	83.2	84	16.8	
No	525	71.1	213	28.9	
Parity					0.002
Nullipara	470	78.6	128	21.4	
Primipara	298	77.2	88	22.4	
Multiparous	166	67.2	81	32.8	
Health conditions					
Urinary Infection					0.001
Yes	170	67.7	81	32.3	
No	779	77.8	222	22.2	
Gestational diabetes					0.084
Yes	47		22	31.9	
No	904	76.3	281	23.7	
Anemia					0.012
Yes	99	67.8	47	32.2	
No	851	76.9	255	23.1	
Bleeding					0.079
Yes	26	65.0	14	35.0	
No	925	76.2	289	23.8	
Pregnancy hypertensive syndromes					0.279
Yes	35	71.4	14	28.6	
No	917	76.0	289	24.0	
Migraine					0.010
Yes	110	67.9	52	32.1	
No	835	76.9	251	23.1	
Anxiety symptoms					<0.001

Low level of anxiety	529	80.8	126	19.2	
High level of anxiety	371	68.7	169	31.3	
Depressive symptoms					<0.001
Severe symptoms	138	44.2	174	55.8	
Moderate symptoms	139	69.8	60	30.2	
No symptoms	660	91.3	63	8.7	
Main complaints					
Sleep alterations					<0.001
Yes	655	62.7	246	27.3	
No	298	83.9	57	16.1	
Cardiovascular					0.001
Yes	501	74.3	173	25.7	
No	348	81.1	81	18.9	
Cutaneous					0.025
Yes	432	73.2	158	26.8	
No	522	78.1	146	21.9	
Gastrointestinal					0.138
Yes	910	75.5	295	24.5	
No	44	83.0	9	17.0	
Genitourinary					<0.001
Yes	719	73.1	264	26.9	
No	235	85.5	40	14.5	
Mammary					0.300
Yes	527	74.8	178	25.2	
No	425	77.3	125	22.7	
Musculoskeletal					0.263
Yes	744	75.4	243	24.6	
No	210	77.5	61	22.5	
Neurological					<0.001
Yes	733	73.2	269	26.8	
No	221	86.3	35	13.7	
Respiratory					<0.001
Yes	539	71.7	213	28.3	
No	415	82.0	91	18.0	
Weakness/dizziness/fainting					<0.001
Yes	657	72.1	254	27.9	
No	297	85.6	50	14.4	

Minimum wage: R\$954.00; \*Chi-square test.

affect the pregnant woman's self-care and adherence to prenatal care. The transition to motherhood, since pregnancy and childbirth can be stressful situations, in addition to socioeconomic, psychosocial, and hormonal determinants, can compromise the biopsychosocial well-being of pregnant women and contribute to the emergence of depressive symptoms. When this occurs, early diagnosis and longitudinal follow-up are necessary.<sup>5,8</sup> It is recommended that the FHS teams establish a more humanized and welcoming relationship in the process of preparing pregnant women and their families for prenatal care and the formation of healthier bonds, going beyond the technical approach to women. With this, the aim is maternal well-being and mental health.<sup>5,10</sup>

This study also showed that the presence of neurological complaints (headaches and paresthesia) during pregnancy was positively associated with the occurrence of a high level of stress. Previous research conducted with women followed by family health teams verified the association between migraine and stress.<sup>28</sup> A systematic review with meta-analysis revealed that a history of migraine presence is associated with an increased risk of adverse pregnancy outcomes, such as preeclampsia and low birth weight.<sup>29</sup>

Therefore, early diagnosis of this condition is important for the life of the mother and fetus,<sup>30</sup> so it should be screened, monitored, and treated in prenatal care in PHC.<sup>29</sup> Preventive medication options are limited, and it may be best to consider the safest interventions, which are lifestyle changes and behavioral treatment for stress control.<sup>30</sup>

The knowledge and awareness about the factors that influence the occurrence of gestational stress are essential for the planning and implementation of measures to prevent, identify, monitor, and control this condition during prenatal care, due to the peculiar characteristics of this period and based on regional and cultural characteristics in which the woman is inserted.<sup>22</sup> The screening of perceived stress should be applied in routine prenatal care, considering the associated factors among pregnant women. The articulated action of family health teams together with families in prenatal care is a strategy for the prevention, early detection, and follow-up of pregnant women with a greater need for qualified listening and mental health care.<sup>4,5,8</sup>

One should consider as a limitation of the study the use of self-report, which may be influenced by memory bias. The validated instruments were used to minimize this situation. The non-inclusion of pregnant women living in rural areas

Table 3

Crude and adjusted prevalence ratios (PR) and 95% confidence interval for high levels of stress according to sociodemographic, obstetric, and health variables, among pregnant women assisted at basic care units in Montes Claros, MG, Brazil, 2018-2019 (n=1,279).

Variables	Stress level		p
	Gross PR (CI95%)	Adjusted PR (CI95%)*	
<i>Sociodemographic characteristics</i>			
Age group (years)			0.001
Over 35	1.58 (1.21-2.08)	1.38 (1.09-1.74)	
Under or equal to 19	1.58 (1.24-2.00)	1.41 (1.13-1.77)	
From 20 to 35	1.00	1.00	
Marital status			0.005
Without partner	1.56 (1.27-1.91)	1.33 (1.09-1.62)	
With partner	1.00	1.00	
Social support			<0.001
Low social support	2.50 (2.07-3.00)	1.42 (1.18-1.70)	
High social support	1.00	1.00	
<i>Obstetric variables</i>			
Planned pregnancy			0.005
No	1.72 (1.37-2.16)	1.23 (1.00-1.52)	
Yes	1.00	1.00	
Parity			0.004
Multi-pair	1.53 (1.21-1.94)	1.30 (1.02-1.66)	
Primipara	1.07 (0.84-1.35)	1.06 (0.85-1.33)	
Nullipara	1.00	1.00	
<i>Health conditions</i>			
Urinary infection			0.001
Yes	1.50 (1.18-1.80)	1.35 (1.12-1.62)	
No	1.00	1.00	
Anxiety symptoms			<0.001
High Anxiety Level	1.63 (1.33-1.99)	1.42 (1.18-1.71)	
Low level of anxiety	1.00	1.00	
Depressive symptoms			<0.001
Severe symptoms	6.40 (4.96-8.27)	4.74 (3.60-6.26)	
Moderate symptoms	3.46 (2.52-4.75)	3.19 (2.31-4.39)	
No symptoms	1.00	1.00	
<i>Main complaints during gestation</i>			
Neurological			<0.001
Yes	1.96 (1.42-2.72)	1.77 (1.27-2.47)	
No	1.00	1.00	

PR = Prevalence ratio; CI95% = 95% confidence interval; \*Poisson regression with robust variance.

is a limitation. The results obtained are valid only for the population of pregnant women assisted in the ESF units of Montes Claros, so extrapolations for other populations are not possible. However, the findings of this study allow a discussion on the theme, which is still incipient in the national scenario. Additionally, this is a population-based survey that provided relevant epidemiological evidence for further research and the promotion of health among pregnant women. It was conducted with a significant sample size, which strengthened the associations found.

It was concluded that the occurrence of perceived stress was identified in a representative part of the pregnant women assisted by the ESF teams in the city of Montes Claros. Pregnant women over 35 years old and younger than or equal to 19 years old, without a partner, with low social support, multiparous, whose current pregnancy was not planned, with urinary infection, with symptoms of anxiety and depression, and with neurological complaints presented higher prevalences of high levels of stress.

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## Authors' contribution

Lopes BCS, Lima CA, Ferreira TSB, Freitas WML, and Ferreira TB: conception and design of the study, data collection, drafting of the manuscript. Pinho L and Brito MFSF: conception and design of the study, supervision of data collection, data analysis and interpretation, critical revision of the manuscript. Silveira MF: conception and design of the study, statistical analysis, and interpretation of data, critical revision of the manuscript. The authors approved the final version of the article and declare no conflict of interest.

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