

Original Research

Perceptions of Stress Due to the COVID-19 Pandemic among Slovenian Pregnant Women: Results from an Online Survey Using the Pandemic-Related Pregnancy Stress Scale (PREPS)

Ema Gaber¹, Anita Jug Došler¹, Ana Polona Mivšek^{1,*}¹Midwifery Department, Faculty of Health Sciences, University of Ljubljana, 1000 Ljubljana, Slovenia*Correspondence: polona.mivsek@zf.uni-lj.si (Ana Polona Mivšek)

Academic Editor: Michael H. Dahan

Submitted: 17 July 2023 Revised: 25 October 2023 Accepted: 20 November 2023 Published: 15 January 2024

Abstract

Background: Pregnant women are said to have higher stress levels than non-pregnant women, but as non US studies have shown, stress increased during the pandemic due to the unique circumstances of unpredictability, fear of infection, limited access to health services, and financial uncertainty. The aim of this study was to determine the extent of stress associated with the coronavirus disease 2019 (COVID-19) pandemic among pregnant women in Slovenia and to determine in which areas they experienced the greatest stress. **Methods:** A descriptive and causal non-experimental method of empirical research was used. The research approach was based on quantitative research, and a validated questionnaire—Pandemic-Related Pregnancy Stress Scale (PREPS) was used as the research instrument. Eleven hundred and four pregnant women participated in the study. **Results:** We found that more than one-third of the participants experienced high levels of stress during the COVID-19 pandemic. The data demonstrated that those who were pregnant for the first time, had a high-risk pregnancy, experienced income loss, and were in their second or third trimester had higher levels of stress. The highest stress level was reported due to concern about infection. More specifically, 54.4% of pregnant women experienced high levels of stress related to fear of infection and in 47% high stress levels were related to fear with regard to childbirth. **Conclusions:** Respondents reported a range of mild to severe stress. They worried about the baby, about the need for isolation during labor and delivery, and about losing their social network in the postpartum period. It is important to know that stress during pregnancy also affects the fetus. We suggest that it would be useful to screen pregnant women for stress, with PREPS being used for this purpose. All women with high stress levels should be offered interventions, e.g., online stress reduction counselling.

Keywords: pandemic; COVID-19; stress; prenatal period

1. Introduction

Pregnancy in itself triggers anxiety in women, but during the coronavirus disease 2019 (COVID-19) pandemic, stress levels increased due to changing circumstances, adjusting to constraints, and unpredictability [1]. The virus spread rapidly and there was little information about its effects on pregnancy and the fetus. Public health recommendations changed daily and impacted social life enormously. Routine pregnancy examinations were reduced, the presence of the partner at examinations and during labor was restricted or even prohibited, and postpartum visits were abolished. Health care workers wore protective equipment that did not help create a home-like atmosphere, which is emphasized as an element of a relaxed environment for childbirth. All of these factors added stress to pregnant women.

1.1 Stress

Stress is a process in which the demands of the environment exceed the adaptive capacity of the organism. This leads to psychological and biological changes that can (over the long term) lead to disease [2]. Such a negative response to a stressor is referred to as distress. However, in some cases, stress can be perceived as a challenge and can

promote motivation. In these circumstances, it can have a positive effect on a person's mood, which we refer to as eustress. In this case, the stress is perceived as tolerable and the person can cope with it effectively [3]. Depending on its duration, stress is classified as acute (short-term) or chronic (long term). Both types can lead to symptoms, although only chronic stress ultimately affects overall physical health [4–6].

The most common stressors during pregnancy include concerns about the baby's health, the delivery process, and accepting the role of a parent [1,7,8]. Although the pregnant woman experiences such stress and worry, it does not affect the health of the fetus. However, long-term high stress leading to anxiety can lead to alternate stimulation of the hypothalamic-pituitary-adrenal (HPA) axis, which causes high cortisol levels that can negatively affect the unborn child [9,10].

Stressors that cause chronic stress also include situations that greatly change the pregnant woman's life, such as divorce, loss of job or home, financial problems, depression, violence, or death in the family. The COVID-19 pandemic was also one of the triggers for such a chronic stress response.



1.2 Pandemic COVID-19 in the Period from 2020 to 2022

The World Health Organization (WHO) declared the outbreak of the new coronavirus (SARS 2-CoV) as a global pandemic on 11 March 2020 [11]. The virus named SARS 2-CoV (Severe Acute Respiratory Syndrome Corona Virus Type 2) caused the disease named COVID-19, which rapidly spread worldwide.

Slovenia declared a pandemic on 12 March 2020, and several measures were taken to stop the spread of infection, including lockdowns to limit social contact. Pregnant women (more vulnerable than the general population), were therefore exposed to more stress. They needed to have monthly examinations in hospital settings and were afraid to be infected with Covid. At that time, the impact of COVID-19 on the fetus was not known. The recommendations with regard to vaccination of pregnant women were changing and that added to overall frustration.

Many criticisms stem from the way the preventive measures were communicated with the lay public. Policymakers demanded the full cooperation of the media, so numerous media freedom warnings were issued during the pandemic. Some disagreed with the political decisions regarding the pandemic restrictions, emphasizing that other democratic countries had approached the issue on the basis of recommendations, while Slovenia had presented them as strict rules. Such a point of view even strengthened the perceived stress for the public. The parallels could be drawn with some Eastern European countries with similar political regimes in the past. We believe that stress levels with regard to infection could be therefore higher in Slovenia, than it would be for example in Sweden. The results of the study could also show what approach policymakers should use in order to relieve additional stress when communicating preventive measures with the public in case of a future pandemic.

1.3 Stress and Pandemic COVID-19

With the increasing number of infections, insecurity and anxiety, people were exposed to high stress. Exhaustion and deterioration of mental health as a result of long-term stress have been reported [1,12,13]. Pregnant women are considered a particularly vulnerable group, as mental health problems are more prevalent at this stage of life [14]. The preventive measures taken to curb the spread of COVID-19 changed people's daily lives. Reductions in social contact shrank their social support network. Access to health services became more difficult, and strict regulations were imposed. Patients were afraid to get infected in the hospital settings. All of this led to additional stress [15–18]. Researchers found higher levels of depression, anxiety, post-traumatic stress disorder, and suicidal ideation in pregnant women during this time [19,20].

Several studies have been conducted on the mental health of pregnant women during the pandemic [13,21–25]. Preis *et al.* [5] developed a specific scale to measure stress

during a pandemic and named it the Pandemic-Related Pregnancy Stress Scale (PREPS). The first study to validate the research instrument was conducted in the United States of America (USA) [5]. Later, the questionnaire was translated, validated, and used elsewhere [18,26,27]. Because of the good validity results, we also used PREPS to estimate stress rates among pregnant women in Slovenia during the pandemic.

2. Methods

The study approach was based on quantitative research. A descriptive and causal non-experimental empirical research method was used [28].

The aim of the study was to find out what level of stress pregnant women in Slovenia experience in relation to the COVID-19 pandemic and whether our results are comparable to those of other countries. The study contributes to filling a gap related to the issue of social importance, namely women's perception of stress during a pandemic. We also aimed to find out in which areas Slovenian pregnant women experienced higher levels of stress due to the COVID-19 pandemic. We hypothesized 4 outcomes (H).

H1: One-third of participants would estimate their level of stress as high and caused by the COVID-19 pandemic.

H2: Pregnant women in Slovenia experienced the highest level of stress during the COVID-19 pandemic due to concerns about infection.

H3: The results of a survey on the stress experience of pregnant women in Slovenia during the COVID-19 pandemic will be consistent with the results of surveys conducted in the USA and Germany [5,18].

H4: During the pandemic, those who were pregnant for the first time, had a high-risk pregnancy, experienced income loss, were in their second or third trimester, and those who had already recovered from COVID-19 experienced higher levels of stress.

The research instrument used was a validated questionnaire—PREPS [5]. We obtained permission to use it in our study.

2.1 Participants

Our sample consisted of women who were pregnant at the time of the survey, were of legal age, lived in Slovenia, and spoke the Slovenian language. We distributed the questionnaire to pregnant women through social networks. By the questionnaire submission deadline (7 January 2022), 1221 questionnaires were properly completed, and 1104 questionnaires were completed by the end. Taking into account the average number of births in the last five years, which is 18,980 live births, we covered approximately 5% of the population [29]. The largest proportion of participants was between 25 and 30 years old (44.1%). Sixty one percent were expecting their first child; 52.3% in the third trimester of pregnancy. 54% did not have COVID-

19; 32.3% of participants recovered from COVID-19 which was confirmed by polymerase chain reaction (PCR) test; and 13.7% believed they had recovered from COVID-19, but this was not confirmed.

2.2 Procedures

We used the PREPS scale as a research tool because we were only interested in the stress caused by the COVID-19 pandemic. This is the only scale developed during the COVID-19 pandemic to measure the stress caused by the pandemic in pregnant women. The study with the mentioned questionnaire was first conducted in the USA [5]. Later, another study was conducted in Poland, Italy, and Germany [18,26,27,30]. We collected data using the open-source web application 1KA [31], which allowed us to conduct online surveys and export the data to IBM SPSS, version 22.0 (SPSS Inc., Chicago, IL, USA) [32], where we performed data analysis. Before responding to the survey, participants confirmed that they agreed to participate in the study. The survey was conducted in accordance with the principles of research ethics and the principles of the Helsinki-Tokyo Declaration. During the survey, we informed participants that completion of the questionnaire was voluntary and that they could leave the survey at any time. The research design and ethical measures of the study were approved by the faculty departmental committee (3/15_6_22).

2.3 Measures

The questionnaire was validated by four countries. They conducted what is known as confirmatory factor analysis, which includes three indices: RMSEA, CFI, and TLI. RMSEA is the Root Mean Square Error of Approximation, a measure of the mean of variance and covariance. Adequate RMSEA values were equal to or less than 0.08. CFI is the comparative fit index, which analyzes the fit of the model, and TLI is the Tucker-Lewis index, which is an incremental index (Table 1). CFI and TLI values ranged from 0 to 1, with values above 0.90 considered indicators of adequate or sufficient and values above 0.95 considered good [33]. The Cronbach's alpha coefficient used by countries to measure the reliability or internal consistency of the questionnaire was also calculated [34]. All countries (USA, Poland, Germany and Italy) obtained corresponding values for each of the indicators [5,18,26,27]. Thus, the PREPS scale has been shown to be valid and useful for assessing stress associated with pandemic COVID-19. Table 1 shows the results of the validations and internal consistency for each country.

The questionnaire contained 14 questions. Of these, 11 are closed type questions that can only be answered with a pre-given response, and 3 questions were asked in the form of a five-point Likert scale for agreement. The rating scale contains 15 statements that describe the worries, thoughts, and feelings that pregnant women might have be-

Table 1. Results of validations and country-by-country internal consistency.

	Validation			Internal consistency (Cronbach Alpha test)
	RMSEA	TLI	CFI	
USA	0.07	0.93	0.93	0.783
Germany	0.073	0.920	0.920	0.793
Italy	0.060	0.991	0.991	0.788
Poland	0.054	0.979	0.979	0.799

RMSEA, Root Mean Square Error of Approximation; TLI, Tucker-Lewis index; CFI; comparative fit index.

cause of the COVID-19 pandemic. The scale assesses three dimensions of stress: stress due to infection (5 statements), stress related to preparation for childbirth (7 statements), and positive stress (3 statements). The first condition for completing the questionnaire allowed only women to answer the survey. The second condition allowed only women who were 18 years and older to complete the questionnaire. The third condition allowed only women who were pregnant at the time of the survey to continue to complete the questionnaire. We also calculated the Cronbach's alpha coefficient. We obtained a result of 0.84, which supported that the questionnaire was reliable and internally consistent [34].

2.4 Data Analyses

We collected data using a questionnaire in the 1KA [22] application from 7 November 2021 to 7 January 2022. We exported the data from the 1KA application to the IBM SPSS program 22.0 [32]. We analyzed the data using descriptive statistics and calculated frequencies, percentages, and means (average, standard deviation).

3. Results

The results are presented according to the hypotheses. For H1 (one-third of participants estimated that they were exposed to a high level of stress during the pandemic due to COVID-19), the criterion for a high level of stress was established when women marked the statements "agree" or "strongly agree". As shown in Table 2, 64.5% of pregnant women who participated in the study agreed or strongly agreed with the statement "I am concerned that COVID-19 infection may affect my pregnancy". The second statement, "I am worried that COVID-19 infection could harm my baby", was agreed or strongly agreed by 71.9% of participants. The third statement, "I am worried that I could become infected with COVID-19 when I go to the hospital for delivery", was agreed or strongly agreed by 41.9% of respondents.

The fourth statement, "I worry about my baby being infected with COVID-19 in the hospital after birth" was agreed or fully agreed by 54.2%, and the last statement, "I worry about having to go to prenatal care appointments because of COVID-19", was agreed or fully agreed by 39.8%

Table 2. Self-rated level of perinatal infection stress.

Statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I am concerned that a COVID-19 infection could harm my pregnancy ¹ .	6.90% (N = 76)	10.20% (N = 112)	18.50% (N = 204)	37.80% (N = 417)	26.70% (N = 295)
I am concerned that a COVID-19 infection could harm my baby.	5.70% (N = 63)	8.30% (N = 92)	14.20% (N = 156)	41.40% (N = 457)	30.50% (N = 336)
I am worried that I might get COVID-19 when I go to the hospital to deliver.	11.20% (N = 123)	23.60% (N = 261)	23.40% (N = 258)	28.90% (N = 319)	13.00% (N = 143)
I am worried that my baby could get COVID-19 at the hospital after birth.	9.20% (N = 101)	17.70% (N = 195)	18.90% (N = 209)	35.20% (N = 389)	19.00% (N = 210)
I am concerned about going to prenatal care appointments due to COVID-19.	19.80% (N = 218)	23.30% (N = 257)	17.10% (N = 189)	28.60% (N = 316)	11.20% (N = 124)

¹Such as miscarriage or preterm birth. COVID-19, coronavirus disease 2019.

Table 3. Self-rated level of preparedness stress.

Statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I am concerned that people won't be able to help me care for my baby after birth.	14.0% (N = 155)	24.3% (N = 268)	13.8% (N = 152)	29.0% (N = 320)	18.9% (N = 209)
I am concerned about being separated from my baby after the delivery because of the pandemic.	13.6% (N = 150)	24.4% (N = 270)	14.7% (N = 162)	28.0% (N = 309)	19.3% (N = 213)
I am worried that the pandemic could ruin my birth plans.	13.2% (N = 146)	23.1% (N = 255)	20.9% (N = 231)	27.9% (N = 308)	14.9% (N = 164)
I am worried I will not be prepared for the birth due to the pandemic restrictions.	18.4% (N = 203)	30.5% (N = 337)	19.9% (N = 220)	21.1% (N = 233)	10.1% (N = 111)
I am concerned that I am not getting enough healthy food or sleep or exercise because of COVID-19 restrictions.	24.8% (N = 274)	36.1% (N = 399)	19.1% (N = 212)	13.3% (N = 147)	6.5% (N = 72)
I am worried I will not be able to have someone with me during the delivery.	2.4% (N = 27)	4.5% (N = 50)	4.9% (N = 54)	27.6% (N = 305)	60.5% (N = 668)
I am concerned that I won't get the prenatal care I need because of COVID-19.	9.5% (N = 105)	22.9% (N = 253)	15.8% (N = 174)	33.3% (N = 368)	18.5% (N = 204)

Table 4. Self-rated level of positive appraisal.

Statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I think about having a baby help me get through the pandemic hardships.	10.4% (N = 115)	16.1% (N = 178)	20.4% (N = 225)	36.6% (N = 404)	16.5% (N = 182)
I feel that being pregnant is giving me strength during the pandemic.	16.1% (N = 178)	22.6% (N = 250)	24.3% (N = 268)	29.0% (N = 320)	8.0% (N = 88)
I feel that COVID-19 is helping me appreciate my pregnancy more.	27.1% (N = 299)	30.6% (N = 338)	24.7% (N = 273)	14.6% (N = 161)	3.0% (N = 33)

of participants. The highest stressor for participants was the fear that infection with COVID-19 would harm their pregnancy or unborn child.

Table 3 presents the results on self-assessed stress levels related to childbirth preparation. This stress category was measured by 7 statements. As can be seen, 47.9% of participants agreed or strongly agreed with the statement “I worry that people won’t be able to help me take care of my baby after birth”. The second statement, “I worry that I’ll be separated from my baby after delivery because of the pandemic”, was agreed to by 47.3%, and the third statement, “I worry that the pandemic will ruin my birth plans”, was agreed to by 42.8% of pregnant women.

The fourth statement, “I worry that I will not be prepared for childbirth because of pandemic restrictions”, was agreed or strongly agreed by 31.2%. The fifth statement, “I worry that I will not get enough healthy food, sleep, or exercise because of COVID-19 restrictions”, was agreed or strongly agreed by 19.8%. The sixth statement, “I worry that I will not be able to have anyone with me during childbirth”, was agreed or strongly agreed by 88.1% of participants. The last statement, “I worry that I will not get the prenatal care I need because of COVID-19”, was agreed or strongly agreed with by 51.8% of pregnant women. The greatest concern appeared to be that their partner would not be able to attend the birth and that they would not receive adequate care because of the pandemic (Table 3).

Table 4 presents the results of three statements that measured positive stress. High stress was considered a disagreement with the statements here. The first statement, “I think that the thought of having a baby will help me overcome the difficulties of the pandemic”, was disagreed with by 26.5% of respondents. The statement, “I feel that pregnancy gives me strength during the pandemic”, was disagreed with by 38.7%, and the statement, “I feel that COVID-19 helps me appreciate my pregnancy more”, was disagreed to by 57.7% of respondents.

We divided our H1 into 15 subhypotheses—separately for each statement (data for the first five are in Table 2, the next seven in Table 3, and the last three subhypotheses in Table 4). For 10 out of 12 sub-hypotheses, the sum of agreeing and strongly agreeing responses is more than one third—33.33%. In the case of positive stress measurements, 2 out of 3 sub-hypotheses reached more than one third (33.33%). Therefore, we can confirm H1.

To confirm H2 (pregnant women in Slovenia experienced the highest level of stress due to concern about infection during the COVID-19 pandemic), the criteria were a higher proportion of perceived stress. Table 5 presents the results of self-assessments of stress in relation to COVID-19 in different dimensions as in PREPS. The highest level of stress was perceived in relation to fear of infection with COVID-19; 54.46% of participants rated this type of stress as 4 or 5. Stress in relation to preparation for childbirth

ranked second (47%). In the dimension of positive stress, only 41% of participants rated their own stress level as 4 and 5.

H2 was confirmed because the results showed that women felt the highest levels of stress due to concern about COVID-19 infection (strongest agreement with statements measuring this dimension).

To test H3 (results of a survey of stress experienced by pregnant women in Slovenia during the COVID-19 pandemic are consistent with the results of surveys conducted in the USA and Germany), Fig. 1 was prepared comparing the results of our study, the USA study [5] and the German study [18]. These two studies were the only ones that used PREPS as a research tool. The Italian study and the study in Poland that used PREPS focused more on validating the instrument than on reporting research findings.

All of the studies shown in Fig. 1 involved more than 1000 pregnant women. The results are relatively consistent. Both the USA and Slovenian studies reported the highest level of stress in the fear of perinatal infection category (29.1% of participants in USA and 27.23% in Slovenia rated infection stress high). In contrast, pregnant women in Germany rated stress with regard to birth preparation higher (16% of women rated stress with regard to birth preparation as very high, while infection stress was rated high by only 12%). The average estimate in the preparedness stress dimension ranged from 3 to 4 in all studies, whereas estimates in the infection stress dimension ranged from 2 to 3.

Women in all countries were least likely to agree with statements about positive stress, with the most common estimate being less than 2 (34.4% in USA sample, 48% in the German sample, and 17.9% in the Slovenian sample).

Fig. 1 shows factors that affect higher levels of stress. In all studies, primiparous women, those in their second or third trimester, and those who believed they had had COVID-19 infection but it was never medically confirmed felt higher levels of stress related to birth preparation. In the Slovenian study, women who had been previously treated for infertility, had a high-risk pregnancy, or experienced income loss during the pandemic also felt higher levels of stress.

Factors that influenced infection stress varied by country. In the USA, second-trimester, those who had experienced income loss during the pandemic and those who believed they had COVID-19 but were not medically confirmed, experienced higher levels of stress. In Germany, scores were higher among first-time mothers and women in the first or second trimester, whereas in Slovenia the risk factors were parity (first pregnancy), income loss, high-risk pregnancy, and belief of previous infection with COVID-19 (that was not confirmed). In all countries, higher levels of positive stress were associated with primiparity and income loss.

In general, Slovenian results were similar to the studies from all three countries, allowing us to confirm H3.

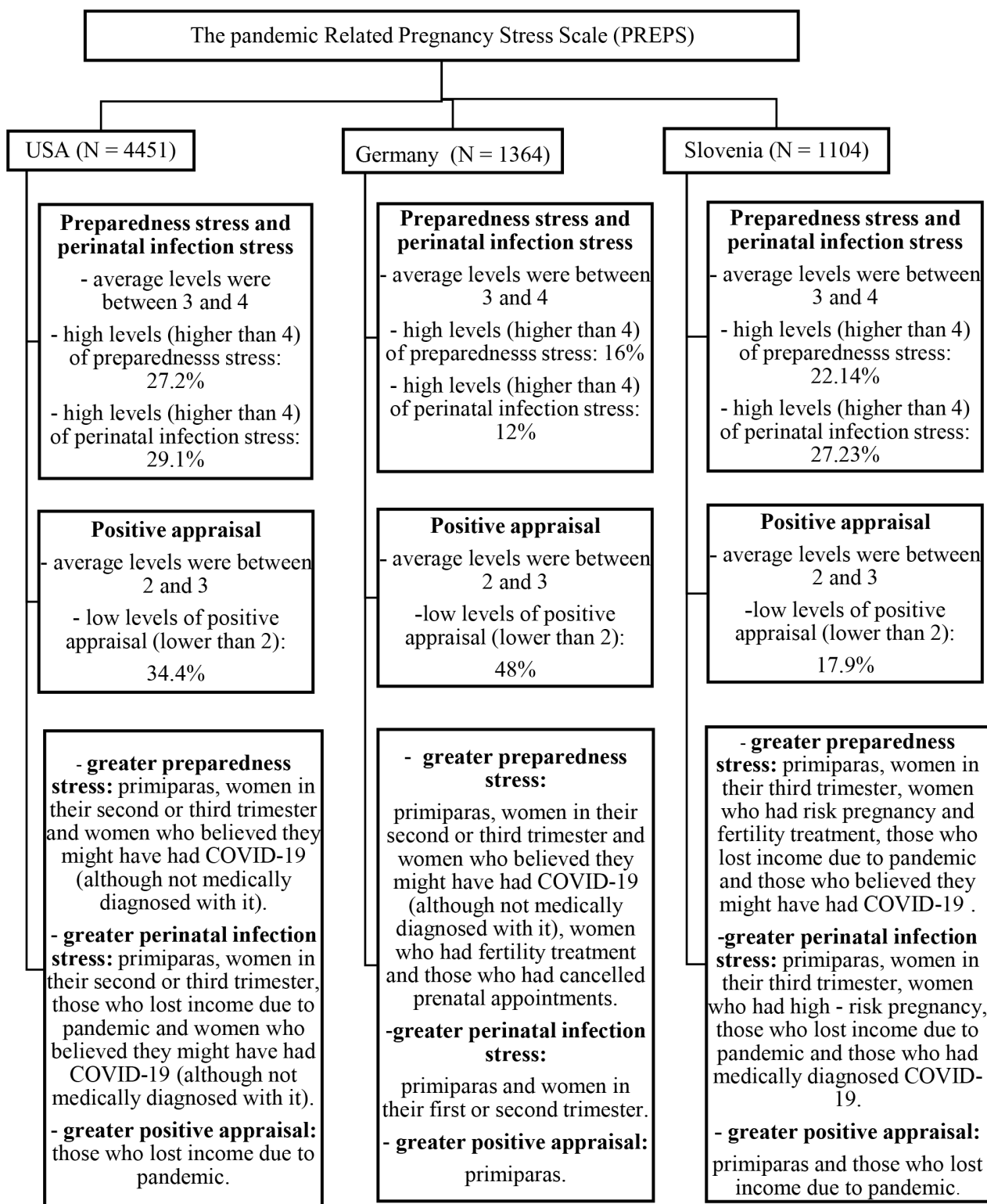


Fig. 1. Comparing the results of the PREPS scale studies among countries.

Tables 6,7 present the results related to H4 (during the COVID-19 pandemic, those who were pregnant for the first time, had a high-risk pregnancy, experienced income loss, were in the second or third trimester, and those who had already recovered from COVID-19 had higher stress levels).

One criterion for confirming H4 was higher mean scores when comparing variables. Table 6 shows the mean scores and standard deviations of self-assessed stress in all PREPS dimensions.

Table 5. Stress levels among pregnant women, according to the PREPS questionnaire categories.

	Perinatal infection stress	Preparedness stress	Positive appraisal
Low level of stress (1)	10.50%	13.7%	9.20%
Medium level of stress (2, 3)	35.04%	39.3%	49.8%
	4: 34.38%	4: 25.7%	4: 23.10%
High level of stress (4, 5)	5: 20.08%	5: 21.3%	5: 17.90%
	Total: 54.46%	Total: 47%	Total: 41%

PREPS, Pandemic-Related Pregnancy Stress Scale.

Table 6. Average self-rated stress level of participating pregnant women.

N (%)	Preparedness stress	Perinatal infection stress	Positive appraisal
1104 (100%)	3.171 ± 1.233	3.368 ± 1.213	2.863 ± 1.185

Table 7 shows a comparison of the mean values with respect to the factors: parity, duration of pregnancy, previous infection with COVID-19, income loss during the pandemic, and course of pregnancy (normal/high-risk).

First, we compared averages by parity. The majority of participants were pregnant for the first time (61.9%), 30.7% were pregnant for the second time, and 7.4% were pregnant for the third time. No major differences were found between these groups in terms of stress perception. A slight difference was seen in stress scores related to preparation for childbirth, where first-time mothers had a mean score of 3.183 and third-time mothers had a slightly lower mean score of 3.067.

The second comparison was made according to the trimester of pregnancy. The majority of participants were in the 3rd trimester (52.3%), 38% were in the 2nd trimester, and 9.7% were in the 1st trimester. The highest ($\bar{x} = 3.2$) stress scores related to prenatal care were reported by women in the third trimester, especially in the infection stress dimension.

We also compared the results according to the course of pregnancy-normal or high-risk. Few participants (13.1%) reported a high-risk pregnancy, but they reported higher stress levels ($\bar{x} = 3.5$) on the dimension of being prepared for birth and even higher stress levels ($\bar{x} = 3.612$) on the dimension of fear of infection.

We also compared stress levels between those who had lost their income during pregnancy (15%) and others who had not. Pregnant women who had lost their jobs reported higher rates of stress related to fear of infection ($\bar{x} = 3.46$) and also higher rates of stress related to being prepared for childbirth ($\bar{x} = 3.59$) compared with the group who had not lost income (infection stress $\bar{x} = 3.38$ and preparation for birth stress $\bar{x} = 3.11$). Positive stress scores also differed. Surprisingly, pregnant women who experienced income loss had higher levels of positive stress ($\bar{x} = 3.001$) compared with the others ($\bar{x} = 2.82$).

Finally, we compared the responses of those who had COVID-19 infection in the past (32.3%), those who thought they had it (13.7%), and those who did not experienced infection by the time of the study (54%). Overall stress was

highest among those who only believed they had an infection ($\bar{x} = 3.356$); however, the infection stress dimension was highest among women who had not yet had an infection ($\bar{x} = 3.410$).

Five items were reviewed in relation to H4. According to the mean scores, we can confirm only four of them. The data show that those who were suspected of having COVID-19 infection in the past but did not have it confirmed felt more stress. Therefore, we can only partially confirm H4.

4. Discussion

With this study, we confirmed that pregnant women were exposed to high levels of stress during the COVID-19 pandemic. Their greatest concern was that the infection would harm their pregnancy and unborn child. They also feared that they would not be properly prepared for delivery, that their partner would not be present during delivery, and that their baby would be taken away from them during hospitalization or that they would both become infected with COVID-19. Similar results have been found in other studies [5,18,26,27]. In particular, first-time mothers and mothers at the end of pregnancy experienced more stress than others. This suggests that it is important to address and manage stress during difficult times. Some of their fears were justified. Childbirth preparation courses, which provide a foundation for preparing for labor and delivery, were offered online during the pandemic. Despite some advantages of online courses, there are also a number of disadvantages (Internet access might not be available for all, less opportunity to practice, lack of individual counseling, shyness to ask questions in the presence of other couples) [23]. Some authors suggested individual counseling sessions [23], but this was hardly possible during the pandemic due to staff shortages. The overwhelming amount of information and advice available on the internet may also contribute to stress. It can be challenging to sort through conflicting information if you are pregnant for a first time and have little experience.

Many concerns relate to the hospital situation and therefore some women considered the option of home birth.

Table 7. Main differences between different groups of pregnant women in self-assessment of stress.

N (%)	Preparedness	Infection	Positive appraisal	Total	
Pregnancy					
First pregnancy	683 (61.9)	3.183 ± 1.026	3.394 ± 1.177	2.897 ± 1.184	3.158
Second pregnancy	339 (30.7)	3.193 ± 1.250	3.342 ± 1.266	2.800 ± 1.1783	3.112
Third pregnancy	82 (7.4)	3.067 ± 1.269	3.282 ± 1.2636	2.850 ± 1.1657	3.066
Trimester					
First	107 (9.7)	3.176 ± 1.253	3.366 ± 1.235	2.707 ± 1.261	3.083
Second	420 (38)	3.153 ± 1.223	3.318 ± 1.204	2.887 ± 1.164	3.119
Third	577 (52.3)	3.200 ± 1.225	3.408 ± 1.205	2.860 ± 1.168	3.156
Course of pregnancy					
High- risk pregnancy	145 (13.1)	3.500 ± 1.203	3.612 ± 1.251	2.797 ± 1.277	3.303
Normal pregnancy	959 (86.9)	3.133 ± 1.223	3.334 ± 1.2014	2.863 ± 1.161	3.110
Lost income due to COVID-19					
Yes	161 (14.6)	3.579 ± 1.228	3.456 ± 1.270	3.001 ± 1.161	3.345
No	943 (85.4)	3.111 ± 1.2091	3.354 ± 1.204	2.820 ± 1.177	3.095
Infection with COVID-19					
I think so, but it has not been medically confirmed	151 (13.7)	3.356 ± 1.176	3.230 ± 1.286	2.933 ± 1.141	3.173
Yes, medically confirmed	357 (32.3)	3.260 ± 1.189	3.366 ± 1.190	2.860 ± 1.172	3.162
No	596 (54)	3.094 ± 1.248	3.410 ± 1.204	2.827 ± 1.186	3.110

Some countries reported a higher proportion of home births during the pandemic [35], including Slovenia [36]. This way, women were less afraid of their baby getting an infection or being separated from the baby in the postpartum period, and their partner could be present during labor and delivery. It is understandable that high-risk pregnant women were more stressed because a home birth was not an option for them. Their concerns might be related to a possible worsening of risks in the event of infection with COVID-19.

Almost half (46%) of pregnant women were in stress due to fear of COVID-19 infection. Moyer *et al.* [37] reported even higher rates (93%) in their study, likely because they conducted their study at the beginning of the pandemic when little was known about the virus and health protocols were changing almost daily. The media reported higher rates of pregnant women requiring mechanical ventilation than the rest of the population, and they reported the presence of the virus in amniotic fluid. No one could reassure the pregnant women, and this uncertainty caused great anxiety. Even after the vaccine was introduced, uncertainty remained. Some doubted its safety and questioned long-term side effects because the vaccine had been developed quickly. Doubts were even greater among pregnant women because pregnant subjects were excluded from the safety studies [38]. As the due date approached, mothers may have increased anxiety about labor and delivery. The pandemic may exacerbate these concerns because of the unpredictability of hospital policies, fear of being infected by the virus in health care settings, and restrictions on presence of partners at birth.

Perhaps it was this uncertainty that led to high stress levels in most women who only believed they had overcome

the infection (COVID-19) but were never medically diagnosed. Preis *et al.* [5] also reached the same conclusions in their study in the USA. However, their study was conducted at a time when routine testing did not exist, whereas our study was conducted later.

As in other studies [5,18] along with ours, higher stress levels were associated with greater gestational age, primiparity, and income loss. This confirms that the impact of the pandemic was global and multidimensional, as other researchers have also noted [19].

Primigravida patients are said to feel more stress even without the pandemic, but the circumstances of COVID-19 exacerbated these tensions [38]. Worries about childbirth also increased because they did not have the opportunity to visit the maternity hospital and meet the medical staff before delivery. Some maternity hospitals have created videos for virtual delivery room visits in response to women's needs, but this cannot replace the in-person visit.

Pregnancy raises numerous concerns, including financial ones, as additional expenses are expected. The pandemic has reduced people's overall financial security. In Johnson's study [39], more than one-third of women lost their job during this period. In our sample, 15% of participants lost income during pandemic COVID-19. Similar results were found in other studies [5,18,26,27,40–44]. Financial worries only contributed to higher stress levels. Surprisingly, women who lost income during the pandemic reported the highest levels of positive stress in our study. Apparently, they found comfort in pregnancy and the thought of having a child.

We expected Slovenian women would experience higher levels of stress during the pandemic as in the USA study, since policymakers and health authorities communi-

cated pandemic restrictions to the Slovenian public in an authoritative manner. However not many differences were found in stress levels. It would be interesting to compare perceived stress of pregnant women with PREPS during the time of pandemic from Scandinavian countries, where policy makers used more soft approaches, i.e., they gave recommendations instead of restrictions.

Implications for Practice, Policy, and Future Research

During pregnancy, women go through a major life change. This already places a certain amount of stress on them. However, experiencing pregnancy during the unstable time of a pandemic can be extremely stressful. In addition, we must also consider the health of the unborn child, who may be exposed to high levels of maternal stress over a long period of time.

In case of next pandemic, the health system needs to develop a plan as how to alleviate stress for pregnant women and offer them psychosocial support.

5. Conclusions

We believe that all people were stressed during the pandemic, but pregnant women are an especially vulnerable group whose stress could also have an impact on their babies. Our findings can be used to advocate for policy changes and provide resources to address various health challenges caused by any future pandemic.

Availability of Data and Materials

All data points generated or analyzed during this study are included in this article and there are no further underlying data necessary to reproduce the results.

Author Contributions

APM, EG, AJD: conceptualisation and wrote the paper, designed the analysis, collected the data, contributed in analysis. APM, AJD: edited the article and undertaken a critical review and revision – including all stages of publication. All authors have read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

The study was conducted in accordance with the Helsinki-Tokyo Declaration. All participants were assured that the data collected would be used for research and publication purposes. Their participation in the study was voluntary. They also provided written informed consent to participate in the study. The study was approved by the Departmental Faculty Ethics committee (approval number: 3/15_6_2022).

Acknowledgment

We would like to thank all the participants who participated in the study.

Funding

This research received no external funding.

Conflict of Interest

The authors declare no conflict of interest.

References

- [1] Ibrahim SM, Lobel M. Conceptualization, measurement, and effects of pregnancy-specific stress: review of research using the original and revised Prenatal Distress Questionnaire. *Journal of Behavioral Medicine*. 2020; 43: 16–33.
- [2] Cohen S, Gianaros PJ, Manuck SB. A Stage Model of Stress and Disease. *Perspectives on Psychological Science*. 2016; 11: 456–463.
- [3] Kilby CJ, Sherman KA. Delineating the relationship between stress mindset and primary appraisals: preliminary findings. *SpringerPlus*. 2016; 5: 336.
- [4] National Institute of Mental Health (NIMH). 5 things you should know about stress. 2020. Available at: <https://www.nimh.nih.gov/health/publications/stress/index.shtml> (Accessed: 23 October 2023).
- [5] Preis H, Mahaffey B, Lobel M. Psychometric properties of the Pandemic-Related Pregnancy Stress Scale (PREPS). *Journal of Psychosomatic Obstetrics and Gynaecology*. 2020; 41: 191–197.
- [6] Siafaka V, Tsonis O, Christogiannis C, Kontouli KM, Margariti K, Barbalia Z, *et al.* Psychometric properties of the Greek versions of the Pandemic-Related Pregnancy Stress Scale and the Pandemic-Related Postpartum Stress Scale and associated risk factors during the second year of the COVID-19 pandemic. *BJPsych Open*. 2023; 9: e25.
- [7] Riquelme-Gallego B, Martínez-Vázquez S, Caparros-Gonzalez RA. Pandemic-related stress in pregnant women during the first COVID-19 lockdown and neonatal development. *Journal of Reproductive and Infant Psychology*. 2023. (online ahead of print)
- [8] Liebana-Presa C, Martínez-Fernández MC, García-Fernández R, Martín-Vázquez C, Fernández-Martínez E, Hidalgo-Lopezosa P. Self perceived health and stress in the pregnancy during the COVID-19 pandemic. *Frontiers in Psychiatry*. 2023; 14: 1166882.
- [9] Nodoushan RJ, Alimoradi H, Nazari M. Spiritual Health and Stress in Pregnant Women During the Covid-19 Pandemic. *SN Comprehensive Clinical Medicine*. 2020; 2: 2528–2534.
- [10] Lobel M, Dunkel Schetter C. Pregnancy and Prenatal Stress. In Friedman HS (ed.) *Encyclopedia of Mental Health: Second Edition* (pp. 318–329). Elsevier Inc: Amsterdam. 2016.
- [11] World Health Organization. WHO Director-General's opening remarks at the media briefing on COVID-19-18. 2020. Available at: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---18-august-2020> (Accessed: 23 October 2023).
- [12] Almeida M, Shrestha AD, Stojanac D, Miller LJ. The impact of the COVID-19 pandemic on women's mental health. *Archives of Women's Mental Health*. 2020; 23: 741–748.
- [13] Mikolajkow A, Małyszczak K. Stress level and general mental state in Polish pregnant women during COVID-19 pandemic. *Journal of Reproductive and Infant Psychology*. 2023; 41: 165–182.

- [14] Woody CA, Ferrari AJ, Siskind DJ, Whiteford HA, Harris MG. A systematic review and meta-regression of the prevalence and incidence of perinatal depression. *Journal of Affective Disorders*. 2017; 219: 86–92.
- [15] Mirzadeh M, Khedmat L. Pregnant women in the exposure to COVID-19 infection outbreak: the unseen risk factors and preventive healthcare patterns. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2022; 35: 1377–1378.
- [16] Thapa SB, Mainali A, Schwank SE, Acharya G. Maternal mental health in the time of the COVID-19 pandemic. *Acta Obstetrica et Gynecologica Scandinavica*. 2020; 99: 817–818.
- [17] Coxon K, Turienzo CF, Kweekel L, Goodarzi B, Brigante L, Simon A, *et al.* The impact of the coronavirus (COVID-19) pandemic on maternity care in Europe. *Midwifery*. 2020; 88: 102779.
- [18] Schaal NK, Marca-Ghaemmaghami PL, Preis H, Mahaffey B, Lobel M, Amiel Castro R. The German version of the pandemic-related pregnancy stress scale: A validation study. *European Journal of Obstetrics, Gynecology, and Reproductive Biology*. 2021; 256: 40–45.
- [19] Saccone G, Florio A, Aiello F, Venturella R, De Angelis MC, Locci M, *et al.* Psychological impact of coronavirus disease 2019 in pregnant women. *American Journal of Obstetrics and Gynecology*. 2020; 223: 293–295.
- [20] Gladstone ME, Paquin V, McLean MA, Lequertier B, Elgbeili G, Kildea S, *et al.* Prenatal maternal stress was not associated with birthweight or gestational age at birth during COVID-19 restrictions in Australia: The BITTOC longitudinal cohort study. *The Australian & New Zealand Journal of Obstetrics & Gynaecology*. 2023; 63: 509–515.
- [21] Green JM, Kafetsios K, Statham HE, Snowdon CM. Factor structure, validity and reliability of the Cambridge Worry Scale in a pregnant population. *Journal of Health Psychology*. 2003; 8: 753–764.
- [22] Mortazavi F, Ghardashi F. The lived experiences of pregnant women during COVID-19 pandemic: a descriptive phenomenological study. *BMC Pregnancy and Childbirth*. 2021; 21: 193.
- [23] Barbosa-Leiker C, Smith CL, Crespi EJ, Brooks O, Burduli E, Ranjo S, *et al.* Stressors, coping, and resources needed during the COVID-19 pandemic in a sample of perinatal women. *BMC Pregnancy and Childbirth*. 2021; 21: 171.
- [24] Vardi N, Zalsman G, Madjar N, Weizman A, Shoval G. COVID-19 pandemic: Impacts on mothers' and infants' mental health during pregnancy and shortly thereafter. *Clinical Child Psychology and Psychiatry*. 2022; 27: 82–88.
- [25] Mokhtari Zanjani P, Tehranian N, Changizi N, Mohammadi E, Farzinrad B, Kazemnejad A. Maternal mental health concerns during the COVID-19 pandemic in Iran: a content analysis study. *Reproductive Health*. 2023; 20: 102.
- [26] Ilska M, Kołodziej-Zaleska A, Brandt-Salmeri A, Preis H, Lobel M. Pandemic-related pregnancy stress assessment-Psychometric properties of the Polish PREPS and its relationship with childbirth fear. *Midwifery*. 2021; 96: 102940.
- [27] Penengo C, Colli C, Garzitto M, Driul L, Sala A, Degano M, *et al.* Psychometric properties of the Italian version of the Pandemic-Related Pregnancy Stress Scale (PREPS) and its correlation with anxiety and depression. *Journal of Affective Disorders*. 2021; 294: 48–53.
- [28] Harvey M, Land L. *Research Methods for Nurses and Midwives, Theory and Practice*. Sage publications Ltd: London. 2016.
- [29] Statistical Office of the Republic of Slovenia. Fewer than 19,000 live births in 2020. 2021. Available at: <https://www.stat.si/StatWeb/news/Index/9636> (Accessed: 23 October 2023).
- [30] Levinson A, Mahaffey B, Lobel M, Preis H. Development and psychometric properties of the Pandemic-Related Postpartum Stress Scale (PREPS-PP). *Journal of Psychosomatic Obstetrics and Gynaecology*. 2022; 43: 426–432.
- [31] IKA (Version 17.05.02). Ljubljana: Faculty of Social Sciences-University of Ljubljana. 2017. Available at: <https://www.ika.si> (Accessed: 23 October 2023).
- [32] IBM SPSS Statistics for Windows. Version 22.0. IBM Corp. 2020. Available at: <https://www.ibm.com/spss> (Accessed: 23 October 2023).
- [33] Atkinson TM, Rosenfeld BD, Sit L, Mendoza TR, Fruscione M, Lavene D, *et al.* Using confirmatory factor analysis to evaluate construct validity of the Brief Pain Inventory (BPI). *Journal of Pain and Symptom Management*. 2011; 41: 558–565.
- [34] Saidi SS, Siew NM. Investigating the validity and reliability of survey attitude towards statistics instrument among rural secondary school students. *International Journal of Educational Methodology*. 2019; 5: 651–661.
- [35] UNRIC Brussels. Midwives step up to support pregnant women during pandemic. 2020. Available at: <https://www.un.org/en/pregnant-women-are-worried-about-giving-birth-during-pandemic> (Accessed: 23 October 2023).
- [36] Mihevc Ponikvar B. Kazalniki kakovosti obporodne oskrbe. In Grosek Š, Lučovnik M, Smrkolj Š (eds.) *Oskrba ploda med porodom in novorojenčka v porodnišnici*. Društvo za pomoč prezgodaj rojenim otrokom: Ljubljana. 2022. (In Slovenian)
- [37] Moyer CA, Compton SD, Kaselitz E, Muzik M. Pregnancy-related anxiety during COVID-19: a nationwide survey of 2740 pregnant women. *Archives of Women's Mental Health*. 2020; 23: 757–765.
- [38] Botteman H, Vahdat B, Jouault C, Tibi R, Joly L. Becoming a Mother During COVID-19 Pandemic: How to Protect Maternal Mental Health Against Stress Factors. *Frontiers in Psychiatry*. 2022; 12: 764207.
- [39] Johnson L. Exploring factors associated with pregnant women's experiences of material hardship during COVID-19: a cross-sectional Qualtrics survey in the United States. *BMC Pregnancy and Childbirth*. 2021; 21: 755.
- [40] King LS, Feddoes DE, Kirshenbaum JS, Humphreys KL, Gotlib IH. Pregnancy during the pandemic: the impact of COVID-19-related stress on risk for prenatal depression. *Psychological Medicine*. 2023; 53: 170–180.
- [41] Rabinowitz EP, Kutash LA, Richeson AL, Sayer MA, Samii MR, Delahanty DL. Depression, anxiety, and stress in pregnancy and postpartum: A longitudinal study during the COVID-19 pandemic. *Midwifery*. 2023; 121: 103655.
- [42] Davis D, Sheehy A, Nightingale H, de Vitry-Smith S, Taylor J, Cummins A. Anxiety, stress, and depression in Australian pregnant women during the COVID-19 pandemic: A cross sectional study. *Midwifery*. 2023; 119: 103619.
- [43] Preis H, Somers J, Mahaffey B, Lobel M. When pregnancy and pandemic coincide: changes in stress and anxiety over the course of pregnancy. *Journal of Reproductive and Infant Psychology*. 2022. (online ahead of print)
- [44] Schaal NK, Marca-Ghaemmaghami PL, Märthesheimer S, Hepp P, Preis H, Mahaffey B, *et al.* Associations of stress, anxiety, and partner satisfaction with maternal-fetal attachment in women pregnant during the COVID-19 pandemic: an online study. *BMC Pregnancy and Childbirth*. 2023; 23: 483.