Pregnant Women's Well-being and Worry During the COVID-19 Pandemic: A Comparative Study

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Abstract

Background: COVID-19 caused some worries among pregnant women. Worries during pregnancy can affect women's well-being. We investigated worry and well-being and associated factors among pregnant women during the COVID-19 epidemic.

Methods: This descriptive cross-sectional study was conducted on 484 pregnant women using an online questionnaire. Sampling was performed in a period between May 5 and Aug 5, 2020. Inclusion criteria were having a single healthy fetus and having no significant psychological disorder. We collected the data using the Persian versions of the World Health Organization's well-being Index (WHO-5 well-being index) and the Cambridge worry scale.

Results: The mean total scores of the WHO-5 well-being index and the rate of WHO-5 score < 50 were 64.9 ± 29.0 and 24.4%, respectively. Predictors of women's worry are the increased level of fear of COVID-19, a low family income, employment situation, nulliparity, and having no close family member with chronic disease (p < 0.05). The results of logistic regression analysis on well-being scores showed that the worry about fetus health (OR = 1.081, p = 0.005), women's own health and relationships (OR = 1.055, p = 0.047), and having an infected person with COVID-19 among relatives (OR = 2.095, p = 0.039) could predict the well-being in pregnant women. The mean score of worry about fetus health in the current study was lower than that of the previous study (p = 0.024). The mean score of socio-economic worry in the current study was higher than that of the previous cross-sectional study (p = 0.025). The result indicates that the percentage of participants with a low level of well-being did not differ by the two periods under study (chi-square = 0.099, p = 0.753) (table 7).

Conclusions: The percentage of women experiencing a low well-being state was relatively high. This result is worthy of attention by health care providers and policy makers. To decrease women's socio economic concerns, governments and charities should expand programs providing financial support to pregnant women in low-income families. Providing care and support to pregnant women should have high priority during the COVID-19 pandemic.

Background

Pregnancy has been described as one of the most pleasant and critical periods in the most women's lives which involves new emotions and experiences. Unfortunately, since the COVID-19 epidemic, pregnancy and childbirth for women are taking place in difficult conditions. Several issues have contributed to increasing concerns among people and in particular in pregnant women including the stressful news of the number of infected individuals and the death toll, the diverse symptoms and complications caused by the disease [1], and the spreading of 'fake news' and conflicting information on social networks [2].

Iran is among the countries that has been severely affected by this Pandemic. In addition to concerns about COVID-19 disease, severe economic problems stemming from sanctions imposed on the country have had very harmful effects on the livelihood of the people [3].

Pregnant women have been severely affected by previous epidemics [4]; so, some researchers predicted that COVID-19 might have similar impact on pregnant women. So far, many questions relating to COVID-19 in pregnant women remain without clear and satisfactory answers. These include questions about the probability of the increased risk of getting COVID-19 or presenting severe complications, the possibility of women-to-child transmission, the effect of COVID-19 on the fetus, the best childbirth method, and the risk of death in infected pregnant women [4]. The level of anxiety and fear among pregnant women increased during the COVID-19 pandemic. This is attributable to a number of factors including, the adverse effects of the disease on pregnant women, the uncertainty about the effectiveness of the available treatments and timely vaccine production, and our limited knowledge about the disease [5].

Under normal circumstances, 80% of women's main concerns about pregnancy and childbirth are nothing extraordinary and unusual. Only about 20% of pregnant women experience excessive concern about future events in pregnancy [6]. A study on Indian obstetricians showed that during COVID-19 pandemic the level of fear and worry were increased in pregnant women [7]. Fear, worry, and anxiety during pregnancy has negative physical and psychological health consequences for pregnant women. Previous studies suggest that pregnancy stress may lead to mother-infant relationship disorder, antenatal and postpartum depression, increased physical problems [8, 9] and an increased risk of pre-eclampsia [10]. Rashidi and his colleague have reported an increased preference for cesarean during the COVID-19 epidemic in Tehran [11].

In addition to worry about COVID-19, pregnancy brings specific worries to women. COVID-19 related worries may elevate some pregnancy specific worries such as worry about fetus health or mother's own health and worry about going to hospital. Several studies have attempted to understand the nature of worries in pregnant women and have developed scales to measure the nature and the extent of pregnant women's worries. Results of these studies indicate that pregnant women's worries originate from different sources. These sources can be classified as socio-medical, socio-economic, the health of the fetus, mother's own health and relational issues [12, 13].

Well-being is considered to consist of two components: feeling healthy and relatively robust and being able to carry out ones job and other tasks satisfactorily. There are two sides to wellbeing: a psychological and an emotional one [14, 15]. Psychological well-being involve reflexive consideration and appraisals of one's own life. Emotional well-being is more a matter experiencing positive and life enhancing emotions such as security, joy and contentment [16]. The World Health Organization-5 Well-Being Index (WHO-5) has been developed to screen for depressive symptoms. It has been also used to monitor emotional well-being and psychological well-being [17].

With regard to the stress and concerns of pregnant women that were reported above, we wanted to explore the extent that these concerns and fears had negative effect on maternal wellbeing. Therefore, the aim of this study is to investigate wellbeing of pregnant women and its associated factors during the COVID-19 epidemic. We also aimed to compare well-being and worries during this period with those reported in studies conducted before the pandemic.

Methods

We conducted this descriptive cross-sectional study on pregnant women who were registered in health centers affiliated to Sabzevar University of Medical Sciences during the COVID-19 pandemic. We collected the data using an online questionnaire. Midwives working in health centers affiliated to Sabzevar University of Medical Sciences used text messages to invite pregnant women registered with them to participate in the study. Those who responded to the invitation received an informed consent form, and then were provided with the link for the online questionnaire. Furthermore, we invited the participants in virtual childbirth preparatory classes to participate in the study. Overall, 484 women responded to the invitation and participated in the study. Sampling was performed between May 5 and Aug 5, 2020. Inclusion criteria were being pregnant at the time of the study, having a single healthy fetus, informed consent to participate in the study, and having no significant psychological disorder. To determine the sample size, we considered the percentage of women in a previous study whose worry score was less than 38.5 (the mean score of the worry scale) [13] and also the percentage of women in another study whose well-being score was less than 50 [18]. These percentages were 45% and 34.5%, respectively. We calculated the sample size using Cochran's formula (pqz2/d2) with the confidence level of 95% and a margin of error of 5%. The minimum sample size estimate is 347. We collected the data using the Persian versions of the WHO-5 well-being index [18] and the Cambridge worry scale (CWS) [13]. In addition, we developed a questionnaire to investigate socio-demographic and obstetric information (supplementary file).

Instruments

We collected the data on maternal socio-demographic and obstetric information (such as age, level of education, employment status, monthly family income, gestational age, parity, having a chronic disease or pregnancy complication, having at least one COVID-19 infected person in their relatives, and having at least one death due to COVID-19 in relatives). To measure the fear of COVID-19, we designed one question with a likert-type scale ranging from "not at all" (1) to "severe" (5) and asked women to rate their fear (supplementary file).

Cambridge worry scale (CWS)

Green and colleagues developed the Cambridge worry scale (CWS) with 17 items [12] to measure worry content among individuals. Scores are ranged from "not a worry" (0) to "major worry" (5). The total score of the CWS ranges from zero to 85, with a higher score representing the severity of worries. The CWS includes four subscales as follow: socio-medical, own health, socio-economic, and relational. The reliability of the CWS was aceptable (Cronbach's alpha = 0.76). We translated the scale into Persian and confirmed its validity among pregnant women. The Persian version consists of 23 items and 4 factors including the socio medical (10 item)(such as "Having nobody in delivery ward", "Giving birth", "Whether midwives provide good care in labor", "Going to hospital", "Crowded delivery ward"), health of

mother/other & Relationships (4 items)(i.e., "Your own health", "The health of someone closes to you", "Your relationship with your husband", "Your relationship with your family and friends"), fetus health (3 items)(i.e., "The possibility of miscarriage", "The possibility of fetal death, disease or anomaly", "The probability of going into labor too early") and socio-demographic factor (6 items)(such as "Money problems", "Employment problems"). The Cronbach's alpha value for the 23 items of the Persian CWS was 0.886 [13]. We used the Persian version of the CWS for investigating pregnant women's worries during the COVID-19 pandemic because we believe its items are relevant to the pregnant women's worries during the pandemic.

The World Health Organization's well-being Index (*WHO-5 well-being index*)

The World Health Organization's well-being Index (*WHO-5 well-being index*) was designed to assess the well-being of individuals over the past two weeks [19]. It consists of five positively worded items with a 6-point Likert scale (such as "I have felt cheerful and in good spirits"). Each item is rated from zero to five. Zero indicates experiencing good feelings at no time and five indicates experiencing good feelings all the time. The minimum and maximum score of the scale are 0 and 25 respectively. The total score are usually transformed to a scale of 0 to 100. The cut-off point of 50 was considered for screening for depression. Individuals with scores less than fifty are referred for further evaluations. The World Health organization translated the scale into several languages including Persian [19]. Mortazavi and Colleagues investigated the validity and reliability of the Persian version in pregnant women and the results indicates that the scale is unidimentionl with excellent reliability (Cronbach's alpha = 0.85) [18].

Data Analysis

We analyzed the data using SPSS software (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.). We used chi-square test of independence to investigate the relationships between categorical variables. We used t-test to compare the mean scores of the Cambridge worry factors classified according to the levels of the WHO-5 well-being scores and also according to the dichotomous socio-demographic and obstetric variables.

We used analysis of variance for comparing the mean scores of the CWS in three categories in each of the following variables: gestational age, income level, and education level. We performed binary univariate logistic regressions analyses using the backward-LR method to investigate if there are significant associations between socio-demographic/obstetric variables and the levels of WHO-5 well-being scores. Then, we entered all seven statistically significant variables into a multiple logistic regression analysis to reveal predictors of the well-being in pregnant women. We performed multiple linear regression analysis using the stepwise method to investigate predictors of the worry in pregnant women. We entered all variables with p<0.25 into the multiple regression analysis. We used t-test to

compare well-being and worry in pregnant women during the COVID-19 pandemic with the previous cross-sectional studies which were conducted on pregnant women in 2016 and 2019.

Results

This descriptive cross-sectional study was conducted on 484 pregnant women participated in the study between May 5 and Aug 5, 2020. Table 1 shows the characteristics of the participating samples. The mean age, gestational age and years of education were 28.3 ± 5.8 year (range: 16–47), 24.3 ± 8.9 weeks (range: 4–40), and 13.6 ± 3.6 year (range: 2–25), respectively. All women were married. Of the 484 women, 234 (48.3%) were nulliparous, 22.9% were employed, 41.1% had a university degree, and 85.4% were in a middle or high-income category. Among women who were employed, 54 women had been working at home since the COVID-19 outbreak.

Table 1
Women's worry by their socio-demographic/obstetric characteristics.

Socio-demographic variables	N (%)	Mean ± SD	P
		Worry scores	
Age (year)			0.005**†
< 20	28 (5.8)	39.2 ± 28.3	
20−30	286 (59.1)	41.1 ± 22.1	
> 30	170 (35.1)	34.0 ± 22.6	
Job			0.002**†
Housewife	373 (77.1)	36.8 ± 22.3	
Employed	111 (22.9)	44.2 ± 23.2	
Education			0.069†
Primary School	26 (5.4)	33.8 ± 27.9	
Diploma	183 (37.8)	36.1 ± 24.2	
University	275 (41.1)	40.5 ± 21.0	
Family income			< 0.001***†
Low income	71 (14.7)	48.3 ± 26.2	
Middle income	401 (82.9)	37.0 ± 21.6	
High income	12 (2.5)	31.4 ± 24.3	
Husband age			0.304
< 30	135 (27.9)	40.2 ± 23.2	
30−40	291(60.1)	38.4 ± 22.4	
> 40	58 (12)	34.7 ± 23.1	
Husband education			0.012*†
Primary School	56 (11.6)	31.5 ± 26.0	
Diploma	201 (41.5)	37.5 ± 23.0	
University	227 (31.8)	41.1 ± 21.2	
Husband job			0.132†
Worker	117 (24.2)	41.9 ± 24.5	

		Worry scores
Clerk	128 (26.4)	38.6 ± 20.8
Self-employed	239 (49.4)	36.7 ± 22.6
Close family member with chronic disease		0.034*†
Yes	85 (17.6)	33.7 ± 20.3
No	399 (82.4)	39.5 ± 23.1
COVID-19 infected person among relatives		0.026*†
Yes	38 (7.9)	46.3 ± 20.5
No	446 (92.1)	37.8 ± 22.8
Death due to COVID-19 among relatives		0. 322
Yes	20 (4.1)	43.4 ± 21.3
No	464 (95.9)	38.3 ± 22.8
Fear of COVID-19		< 0.001***†
Not at all to moderate	272 (70.8)	29.0 ± 21.2
High to Severe	212 (29.2)	50.6 ± 18.2
Period		0.001**
After the first wave of COVID-19	384 (79.3)	40.6 ± 20.8
During the second wave of COVID-19	100 (20.7)	30.2 ± 27.3
Obstetrics variables		
Gestational age (week)		< 0.001***†
First trimester	75 (15.5)	28.5 ± 23.0
Second trimester	187 (38.6)	.9 ± 20.240
Third trimester	222 (45.9)	39.8 ± 23.8
Parity		0.003**†
Nullipara	234 (48.3)	41.6 ± 22.3
Primipara/Multipara	250 (52.7)	35.5 ± 22.7
Abortion history		0.228†
Yes	131 (27.1)	40.5 ± 22.8
No	353 (72.9)	37.7 ± 22.7

	Worry scores	
Pregnancy complication		0.333
Yes	44 (9.1)	41.6 ± 20.1
No	440 (90.9)	38.2 ± 22.9
Poor obstetric history		0.079†
Yes	54 (11.2)	43.0 ± 19.3
No	430 (88.8)	37.9 ± 23.1
*p < 0.05, **p < 0.01, ***p < 0.001, †selected for multiple regression analysis		

Thirty-eight women reported that they had an infected person among their relatives and 20 reported at least one death due to COVID-19 in their extended families. These two groups had a higher level of fear of COVID-19 than their counterparts (p = 0.01 and p = 0.002, respectively). There was no significant difference in fear of COVID-19 between nulliparas and primi/multiparas (p = 0.313). Women in their second and third trimester of pregnancy had a higher level of fear of COVID-19 than those in their first trimester. The mean scores of the WHO-5 well-being index and the CWS were (64.9 ± 29.0) and (38.5 ± 22.7), respectively. Of the 484 women, 111 (24.4%) had a low level of well-being requiring further evaluation.

Table 1 shows women's worry by their socio-demographic/obstetric characteristics. Women with one of the following attributes had a higher level of worry in comparison with their counterparts: age < 30 years, nulliparous, employed, those with a low family income, those with higher education levels, those who were in the second and third trimester of pregnancy, those with a high level of fear of COVID-19, and those who had at least one COVID-19 infected person in their relatives. Women who had a close family member with chronic disease had a lower level of worry than their counterparts (p = 0.034). Further investigation revealed that the mean score of socio-medical worries was lower in women who had a close family member with chronic disease than their counterparts (p = 0.008). Women who participated in the study during the first wave of the COVID-19 had a higher level of worry than those who registered during the second wave of the disease in Iran (p < 0.001) (Table 1).

The results of multiple logistic regression analysis on worry scores indicates that the predictors of a low level of women's worry are the increased level of fear of COVID-19, a low family income, employment status, nulliparity, and having no close family member with chronic disease (Table 2).

Table 2

Predictors of worry among studied variables (results of multiple regression analysis on worry scores).

Model	Unstandardized Coefficients		Standardized Coefficients			95.0% CI for B	
	B	S.E	Beta	t	P	Lower Bound	Upper Bound
Fear of COVID-19 (low fear vs. high fear)	21.293	1.760	.466	12.096	< 0.001	17.834	24.752
Income (low income vs. middle/high income)	-11.456	2.471	− .179	-4.636	< 0.001	-16.311	-6.600
Job (housewife vs. employed)	8.001	2.087	.148	3.834	< 0.001	3.901	12.102
Parity (nulliparity vs. primi/multiparity)	-5.152	1.762	− .114	-2.924	0.004	-8.614	-1.690
Close family member with chronic disease (yes vs. no)	4.702	2.294	.079	2.050	0.041	.195	9.209
R^2 = 29.5%,							

Table 3 shows women's well-being by their socio-demographic/obstetric characteristics. Women with one of the following attributes had a lower level of well-being in comparison with their counterparts: women with at least one COVID-infected person among relatives, those with at least one death among their relatives due to COVID-19, and women with a high level of fear of COVID-19.

Table 3
Women's well-being by their socio-demographic characteristics.

Socio-demographic variables	N (%)	WHO-5 index < 50	WHO-5 index ≥ 50	P
		118 (24.4)	366 (75.6)	
Age (year)				0.847[ac]
< 20	28 (5.8)	8 (28.6)	20 (71.4)	
20−30	286 (59.1)	68 (23.8)	218 (76.2)	
> 30	170 (35.1)	42 (24.7)	128 (75.3)	
Job				0.441[ac]
Housewife	373 (77.1)	94 (25.2)	279 (74.8)	
Employed	111 (22.9)	24 (21.6)	87 (78.4)	
Education				0.060[ac]
Primary School	26 (5.4)	4 (15.4)	22 (84.6)	
Diploma	183 (37.8)	55 (30.1)	128 (69.9)	
University	275 (41.1)	59 (21.5)	216 (78.5)	
Family income				0.232[ac]
Low	71 (14.7)	23 (32.4)	48 (77.6)	
middle	401 (82.9)	92 (22.9)	309 (77.1)	
High	12 (2.5)	3 (257)	9 (75)	
Husband age				0.313[ac]

[a]Pearson Chi-Square, †Fisher exact test.

[b]Logistic regression: p < 0.05.

[c]Logistic regression: p > 0.05.

	Well-being			
< 30	135 (27.9)	28 (20.7)	107 (79.3)	
30−40	291(60.1)	78 (26.8)	213 (73.2)	
> 40	58 (12)	12 (20.7)	46 (79.3)	
Husband education				0.217[ac]
Primary School	56 (11.6)	13 (23.2)	43 (76.8)	
Diploma	201 (41.5)	57 (28.4)	144 (71.6)	
University	227 (31.8)	48 (21.1)	179 (78.9)	
Husband job				0.167[ac]
Worker	117 (24.2)	35 (29.9)	82 (70.1)	
Clerk	128 (26.4)	25 (19.5)	103 (80.5)	
Self-employed	239 (49.4)	58 (24.3)	181 (75.7)	
Relative with chronic disease				0.300[ac]
Yes	85 (17.6)	17 (20.0)	68 (80.0)	
No	399 (82.4)	101 (25.3)	298 (74.7)	
COVID-19 infected person among relatives				0.008[ab]
Yes	38 (7.9)	16 (42.1)	22 (57.9)	
No	446 (92.1)	102 (22.9)	344 (77.1)	
Death due to COVID-19 among relatives				0.032[†b]
Yes	20 (4.1)	9 (45.0)	11 (55.0)	

[a]Pearson Chi-Square, †Fisher exact test.

[b]Logistic regression: $p < 0.05$.

[c]Logistic regression: $p > 0.05$.

	Well-being			
No	464 (95.9)	109 (23.5)	355 (76.5)	
Fear of COVID-19				0.016[ab]
Not at all to moderate	272 (70.8)	55 (20.2)	217 (79.8)	
High to Severe	212 (29.2)	63 (29.7)	149 (70.3)	
Period				0.377
After the first wave of COVID-19	384 (79.3)	97 (25.3)	287 (74.7)	
During the second wave of COVID-19	100 (20.7)	21 (21.0)	79 (79.0)	
Obstetrics variables				
Gestational age (week)				0.513[ac]
First trimester	75 (15.5)	21 (28.0)	54 (72.0)	
Second trimester	187 (38.6)	48 (25.7)	139 (74.3)	
Third trimester	222 (45.9)	49 (22.1)	173 (77.9)	
Parity				0.992[ac]
Nullipara	234 (48.3)	57 (24.4)	177 (75.6)	
Primipara/Multipara	250 (52.7)	61 (24.4)	189 (75.6)	
Abortion history				0.823[ac]
Yes	131 (27.1)	31 (23.7)	100 (76.3)	
No	353 (72.9)	87 (24.6)	266 (75.4)	

[a]Pearson Chi-Square, †Fisher exact test.

[b]Logistic regression: $p < 0.05$.

[c]Logistic regression: $p > 0.05$.

	Well-being		
Pregnancy complication			0.920[ac]
Yes	44 (9.1)	11 (25)	33 (75)
No	440 (90.9)	107 (24.3)	333 (75.7)
Poor obstetric history			0.341[ac]
Yes	54 (11.2)	16 (29.6)	38 (70.4)
No	430 (88.8)	102 (23.7)	328 (76.3)
[a]Pearson Chi-Square, †Fisher exact test.			
[b]Logistic regression: p < 0.05.			
[c]Logistic regression: p > 0.05.			

Table 4 indicates that there are statistically significant differences in the mean scores of the Cambridge worry factors for subgroups of women classified according to their WHO-5 well-being score. The results of the logistic regression analysis on well-being scores showed that there is a significant association between the level of well-being in pregnant women with worry about fetus health (OR = 1.081, p = 0.005), worry about their own health and relationships (OR = 1.055, p = .047), and having at least one infected person with COVID-19 among relatives (OR = 2.095, p = 0.039) (Table 5).

Table 4
Differences in the sub-groups of worry by level of psychological well-being.

		Levels of well-being		p
Worry factors		WHO-5 < 50 (n = 118)	WHO-5 ≥ 50 (n = 366)	
Socio Medical	19.9 ± 12.2	7.2 ± 5.8	5.5 ± 5.3	0.002[ab]
Health of mother & Relationships	5.6 ± 4.7	7.3 ± 4.8	5.1 ± 4.5	0.001[ab]
Fetus Health	6.5 ± 4.8	8.3 ± 4.7	5.9 ± 4.6	< 0.001[ab]
Socio Economic	5.9 ± 5.5	23.5 ± 11.7	18.7 ± 12.1	0.091[ac]

[a]Man-Whitney U

[b]Logistic regression: $p < 0.05$.

[c]Logistic regression: $p = 0.055$.

Table 5
Results of multiple logistic regression analysis on well-being scores.

							95% C.I. For B	
Variables	B	S.E.	Wald	P	OR		Lower	Upper
Infected person with COVID-19 among relatives	0.740	0.359	4.246	0.039	2.095		1.037	4.235
Health of mother & Relationships	0.053	0.027	3.937	0.047	1.055		1.001	1.111
Fetus Health	0.078	0.028	7.926	0.005	1.081		1.024	1.141

*p<0.05, **p<0.01, Variables entered the logistic regression analysis as independent variable include infection with COVID–19 in relatives, Death due to COVID–19 in relatives, Fear of COVID, four factors of the worry scale. Method of analysis: Backward LR

Cox & Snell R Square = 0.064, Nagelkerke R Square = 0.096

We compared pregnant women's worries during the COVID-19 pandemic and their worries according to our study conducted in 2016 [13]. The results indicate that the mean scores for the two factors designated as 'worry about the fetus health' and 'socio-economic' are statistically different between the two studies ($p < 0.05$). Fetus health mean score in the current study was lower than that of the previous study ($p = 0.024$). Socio-economic mean score in the current study was higher than that of the previous study ($p = 0.025$) (Table 6).

Table 6
Comparison of pregnant women's worries during the COVID-19 pandemic and the previous study conducted on 2016.

	Before COVID-19 pandemic (12) (N = 396)	During COVID-19 pandemic (N = 484)			
Worry scale factors	Mean ± SD	Mean ± SD	t	df	P
Socio Medical	19.92 ± 12.16	20.10 ± 9.73	0.241	878	0.809
Health of mother & Relationships	5.51 ± 4.98	5.61 ± 4.71	0.316	878	0.752
Fetus Health	7.20 ± 4.69	6.47 ± 4.78	**2.266**	878	**0.024***
Socio Economic	5.18 ± 4.45	5.93 ± 5.49	**2.253**	878	**0.025***
Overall score of Worry	37.98 ± 18.41	38.48 ± 22.71	0.359	878	0.719
*p<0.05					

We compared pregnant women's wellbeing scores during the COVID-19 pandemic according to the present study with those reported in another study which was conducted in 2019 [20]. The result indicates that the percentage of participants with a low level of well-being did not differ by the two periods under study (chi-square = 0.099, p = 0.753) (Table 7). The Cronbach's alpha values for the WHO-5 well-being index and for the CWS in the present study are 0.911 and 0.912, respectively.

Table 7
Comparison of pregnant women's well-being during the COVID-19 pandemic and the study conducted on 2019.

	Before COVID-19 pandemic (19) (N = 396)	During COVID-19 pandemic (N = 484)
Well-being levels	N (%)	N (%)
≥ 50	403 (74.8)	366 (75.6)
< 50	136 (25.2)	118 (24.4)
Total	539 (100)	484 (100)
Chi-square = 0,099, p = 0.753		

Discussion

We investigated well-being and worry and associated factors with each one in pregnant women during the COVID-19 epidemic. In addition, we compared the results of our study with those of the previous studies conducted before the COVID-19 pandemic. Our findings show that predictors of women's worry

are the increased level of fear of COVID-19, a low family income, employment status, nulliparity, and having no close family member with chronic disease. Having a close family member with chronic disease caused women to focus less on their own socio-medical worries such as worries about "Having nobody in delivery ward", "Giving birth", "Whether midwives provide good care in labor", "Going to hospital", and "Crowded delivery ward". Lebel and colleagues reported a higher level of pregnancy-related anxiety among Nulliparous than primi/multiparas [21].

Women's concerns about their own health and concerns about relationships and the health of the growing fetus are factors that best predict a woman's level of well-being. Another one our findings was that having a COVID-19 infected relative had a significant relationship with a low level of well-being. Pregnant women are concerned about the health of the fetus in addition to their own health. Even before the COVID-19 outbreak, the possibility of giving birth to an unhealthy baby was the most prevalent causes of worry and anxiety in pregnant women [13, 22].

We found that women's well-being as indicated by the WHO-5 overall scores, did not change from our previous study to the present study. This result is not in agreement with a previous Canadian study carried on 1987 pregnant women conducted on 5–20 March 2020. The Canadian study found an elevated rate of depression and anxiety symptoms among pregnant women in comparison with previous meta analyses [21]. In another study of 5866 pregnant and breastfeeding women during the lockdown period in Belgium, an elevated rate of depression and anxiety symptoms was reported in comparison with reported rates prior to the pandemic [23]. In fact, most studies were conducted in the COVID-19 epidemic early on or in the quarantine period when psychological well-being of pregnant women had been severely affected. We conducted this study in the period after the first wave of the epidemic in Iran when the quarantine period had ended and COVID-19 infection rates and death toll had decreased. These favorable developments might have been interpreted by women as a sign that the pandemic was coming to an end. That may have affected positively pregnant women's feelings and functioning. Furthermore, the percentage of women experiencing a low well-being state was relatively high in comparison with previous studies. These percentages were 9.18% in Mumbai [24] and 19.6% in Osasco, São Paulo [25].

Our results indicate that the level of worry among pregnant women had decreased during the second wave of COVID-19 epidemic compared to its level during the first wave. Our study showed that in comparison with our previous study before the pandemic, women's concerns about fetus health had decreased but women's worries about socio economic matters had increased [13]. The availability of ultrasound scans during recent years may have had a role in decreasing the women's worries about fetus health. The results of a study on postpartum women indicates that on average women receive 5.9 ultrasound scans during pregnancy. Obtaining assurance about fetus health was the first reason given by women for undergoing ultrasound scans [26]. In addition, in 2014, the health transformation plan (HTP) was launched in the Iranian health system. One of the HTP packages had been designed with specific purpose of improving maternal health [27]. The package included several interventions such as holding free childbirth preparatory classes in both hospitals and health centers and providing the option of having a midwife at birth for pregnant women. Women participating in this study had already taken part in the

virtual childbirth preparatory classes. They also had the option of having a midwife at labor. It is possible that these interventions had reduced concerns about fetus health among pregnant women. COVID-19 pandemic has negatively affected the economy almost in all countries [28] leading to increased poverty rate [29]. Therefore, it is not surprising to find that women were experiencing higher levels of worry about household livelihood and expenses.

The first limitation of our study was that because it was an online survey, women who did not have a smartphone were not able to participate in it. Those women may have different levels of fear, worry, and well-being. Although the two studies, whose results were compared with the present study, were conducted on the same population and in the same community, the samples are not necessarily similar. The sample in the present study consists of women with higher education levels than the study conducted in 2019 [20].

Online surveys have their own strengths and weaknesses. They save time for both participants and investigators. It is possible to design the questionnaire in such a way that participants do not miss any questions or items. Another strength point of this study is that we could perform comparisons between this study, which was conducted during the COVID-19 period and two previous studies which were published in 2019 and 2016. The third strong point of the study is that we used the same scales to measure well-being and worry in all the three studies mentioned above. This enabled us to compare worry and well-being between the studies. This post-quarantine study provided us with an opportunity to examine the impact of this prolonged epidemic on women's well-being and worry.

Conclusions

In this study, we investigated worry and well-being in pregnant women during the COVID-19 pandemic. We also examined whether their worry and the levels of wellbeing had changed when compared with the results of our previous studies before the pandemic. To summarize, our findings call attention to the problems of pregnant women who have one or more of the following characteristics: nulliparous, being in paid employment, low-income, and being severely fearful of COVID-19. We recommend setting up support groups for these women to help them overcome their worries during the pandemic.

Our results indicate a close relationship between worry and well-being in pregnant women. More precisely, pregnant women's worries about the health of their fetus, their own health and about their relationships with their husbands and family members had negative impact on their well-being. These findings call for actions by health care providers and in particular midwives with the aim of supporting pregnant women. In the current circumstances, this can be achieved best by setting up online groups to attend to their concerns and refer those with high levels of worry to counselors.

We also found that pregnant women's concerns about fetus health decreased and their socio economic concerns increased in comparison with the results of our previous study conducted in 2016. It seems that measures introduced in 2016 with the aim of reducing women's worry about childbirth, have been effective and therefore should be continued. To decrease women's socio economic concerns,

governments and charities should expand programs providing financial support to pregnant women in low-income families.

We also found that the percentage of women experiencing a low well-being state was relatively high, a result worthy of attention by health care providers and policy makers. Providing care and support to pregnant women, particularly the more disadvantaged and vulnerable groups should have high priority during the COVID-19 pandemic. Public health authorities should plan for situations like this in advance and should be prepared to adopt appropriate measures to reduce pregnant women's concerns.

Abbreviations

WHO-5 well-being index: World Health Organization's well-being Index

Cambridge worry scale: CWS

COVID-19: Corona Virus Disease-2019

Declarations

Ethics approval and consent to participate

The ethics committee of Sabzevar University of Medical Sciences approved this study (IR.MEDSAB.REC.1399.053). Midwives sent an informed consent form to pregnant women. Those who communicated their consent to participate in the study by responding with a "I consent" text message received the link for the online questionnaire. The ethics committee approved this method.

Consent for Publication

Not applicable

Availability of data and material

The data that support the findings of this study are available from the corresponding author upon a reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

FM conceived and designed the study, wrote the first and final draft of the manuscript, and analyzed the data. MM and RKT wrote the proposal and collected the data. All authors have read and approved the manuscript.

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References

1. Corbett GA, Milne SJ, Hehir MP, Lindow SW, O'connell MP: Health anxiety and behavioural changes of pregnant women during the COVID-19 pandemic. European Journal of Obstetrics & Gynecology and Reproductive Biology 2020, 249:96-97.

2. Depoux A, Martin S, Karafillakis E, Preet R, Wilder-Smith A, Larson H: The pandemic of social media panic travels faster than the COVID-19 outbreak. J Travel Med 2020, 27(3):taaa031.

3. Kokabisaghi F: Assessment of the Effects of Economic Sanctions on Iranians' Right to Health by Using Human Rights Impact Assessment Tool: A Systematic Review. Int J Health Policy Manag 2018, 7(5):374-393.

4. Rasmussen SA, Jamieson DJ: Caring for Women Who Are Planning a Pregnancy, Pregnant, or Postpartum During the COVID-19 Pandemic. JAMA 2020, 324(2):190-191.

5. Di Mascio D, Khalil A, Saccone G, Rizzo G, Buca D, Liberati M, Vecchiet J, Nappi L, Scambia G, Berghella V *et al*: Outcome of coronavirus spectrum infections (SARS, MERS, COVID-19) during pregnancy: a systematic review and meta-analysis. American Journal of Obstetrics & Gynecology MFM 2020, 2(2).

6. Eriksson C, Jansson L, Hamberg K: Women's experiences of intense fear related to childbirth investigated in Swedish qualitative study. Midwifery 2006, 22(3):240-248 doi.org/210.1016/j.midw.2005.1010.1002   PMID:16603282.

7. Nanjundaswamy MH, Shiva L, Desai G, Ganjekar S, Kishore T, Ram U, Satyanarayana V, Thippeswamy H, Chandra PS: COVID-19-related anxiety and concerns expressed by pregnant and postpartum women—a survey among obstetricians. Archives of Women's Mental Health 2020, DOI: 10.1007/s00737-020-01060-w.

8. Areskog B, Uddenberg N, Kjessler B: Postnatal emotional balance in women with or without antenatal fear of childbirth. J Psychosom Res 1984, 28(3):213-220 http://dx.doi.org/210.1016/0022-3999(1084)90022-90029 PMID: 6545359.

9. Saisto T, Salmela-Aro K, Nurmi J-E, Halmesmäki E: Psychosocial characteristics of women and their partners fearing vaginal childbirth. BJOG: An International Journal of Obstetrics & Gynaecology 2001, 108(5):492-498 http://dx.doi.org/410.1111/j.1471-0528.2001.00122.x PMID: 11368135.

10. Krishnamurti T, Davis A, Simhan H: Worrying yourself sick? Association between pre-eclampsia onset and health-related worry in pregnancy. Pregnancy Hypertension 2019 18:55-57.

11. Rashidi Fakari F, Simbar M: Coronavirus Pandemic and Worries during Pregnancy; a Letter to Editor. Archives of Academic Emergency Medicine 2020, 8(1):e21.

12. Green JM, Kafetsios K, Statham HE, Snowdon CM: Factor structure, validity and reliability of the Cambridge Worry Scale in a pregnant population. J Health Psychol 2003, 8(6):753-764.

13. Mortazavi F, Akaberi A: Worries of Pregnant Women: Testing the Farsi Cambridge Worry Scale. Scientifica 2016, 2016:5791560.

14. Bech P: Measuring the dimensions of psychological general wellbeing by the WHO-5. QoL Newsletter 2004, 32:15-16.

15. Linton M, Dieppe P, Medina-Lara A: Review of 99 selfreport measures for assessing well-being in adults: exploring dimensions of well-being and developments over time. BMJ Open 2016, 6:010641.

16. Ryff C: Happiness is everything, or is it? Explorations on the meaning of psychological well-being. J Pers Soc Psychol 1989, 57:1069-1081.

17. Schneider C, Pilhatsch M, Rifati M, Jost W, Wodarz F, Ebersbach G: Utility of the WHO-Five Well-being Index as a screening tool for depression in Parkinson's disease. Mov Disord 2010, 25:777-783.

18. Mortazavi F, Mousavi SA, Chaman R, Khosravi A: Validation of the World Health Organization-5 Well-Being Index; assessment of maternal well-being and its associated factors. Turk psikiyatri dergisi = Turkish journal of psychiatry 2015, 26(1):1-7.

19. WHO (Five) Well-Being Index [http://www.who-5.org/]

20. Mortazavi F, Borzoee F: Fatigue in Pregnancy: The validity and reliability of the Farsi Multidimensional Assessment of Fatigue scale. Sultan Qaboos University medical journal 2019, 19(1):e44-e50.

21. Lebel C, MacKinnon A, Bagshawe M, Tomfohr-Madsen L, Giesbrecht G: Elevated depression and anxiety symptoms among pregnant individuals during the COVID-19 pandemic. Journal of Affective Disorders 2020, 277:5-13.

22. Mortazavi F, Akaberi A: Validation of the Anxiety Scale for Pregnancy in a Sample of Iranian Women. IJWHR 2018, 6(1):67-74.

23. Ceulemans M, Hompes T, Foulon V: Mental health status of pregnant and breastfeeding women during the COVID-19 pandemic: A call for action. International Journal of Gynecology & Obstetrics 2020, 151(1):146-147.

24. Ajinkya S, Jadhav PR, Srivastava NN: Depression during pregnancy: Prevalence and obstetric risk factors among pregnant women attending a tertiary care hospital in Navi Mumbai. Ind Psychiatry J 2013, 22(1):37-40.

25. Faisal-Cury A, Rossi Menezes P: Prevalence of anxiety and depression during pregnancy in a private setting sample. Arch Womens Ment Health 2007, 10(1):25-32.

26. Ranji A, Dykes AK: Ultrasound screening during pregnancy in Iran: womens' expectations, experiences and number of scans. Midwifery 2012, 28(1):24-29.

27. Moradi-Lakeh M, Vosoogh-Moghaddam A: Health sector evolution plan in Iran; equity and sustainability concerns. Int J Health Policy Manag 2015, 4(10):637-640.

28. Pak A, Adegboye OA, Adekunle AI, Rahman KM, McBryde ES, Eisen DP: Economic Consequences of the COVID-19 Outbreak: the Need for Epidemic Preparedness. Frontiers in Public Health 2020, 8(241).

29. Martin A, Markhvida M, Hallegatte S, Walsh B: Socio-Economic Impacts of COVID-19 on Household Consumption and Poverty. Economics of Disasters and Climate Change 2020, 4(3):453-479.