

# Review of the Depression Rate among Pregnant Women during the COVID-19 Pandemic

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## Abstract

**Purpose:** To determine the incidence of depression among pregnant women during the coronavirus disease (COVID-19) pandemic. **Methods:** A literature search was conducted on July 2022 through PubMed, CINAHL, MEDLINE, CiNii, and the Japan Medical Abstract Society using the keywords “COVID-19”, “Pregnant Women” and “Depression”. The titles/abstracts were screened based on three selection criteria: 1) inclusion of pregnant women; 2) description of depression; 3) description of COVID-19. **Results:** Of the 213 articles that were extracted, 104 were excluded owing to duplication and 14 were excluded because they comprised other article types, including reviews and commentaries. Finally, 49 were excluded by title, abstract, and full-text screening. Among the 46 articles that met the inclusion criteria, 13 articles (28.3%) were from China, 8 (17.4%) were from Turkey, 4 (8.7%) were from the United States, and 3 (6.5%) were from Japan. The most common scales used to measure depression were the Edinburgh Postnatal Depression Scale (EPDS) used in 18 articles (39.1%), followed by the Patient Health Questionnaire (PHQ-9) used in 11 articles (23.9%). Furthermore, 46 sources reported a suspected depression rate of 30.0% (20,338/67,860 pregnant women). The rate of depression was 15.1% - 33.5% using EPDS  $\geq 9$  in three articles and 12.0% - 43.2% using EPDS  $\geq 13$  in nine articles. The five articles using PHQ-9  $\geq 5$  reported 25.8% - 48.7%, and seven articles reported 5.3% - 59.2% using PHQ-9  $\geq 10$ . **Conclusion:** Depression was a concern for one out of every three to four pregnant women during the COVID-19 pandemic. This suggests that depression among pregnant women during COVID-19 might have worsened, highlighting the need for mental health support for them.

## Keywords

COVID-19, Pregnant Women, Depression, EPDS, PHQ-9

## 1. Introduction

Perinatal depression is a major issue in maternal and child health. Depression affects mother-baby bonding, child development, and family health [1] [2]. The most severe consequence of depression is maternal suicide [3]. In Japan, the Tokyo Metropolitan Medical Examiner's Office reported 63 suicide victims (8.7/100,000 live births) among the unusual maternal deaths that occurred during pregnancy, or less than one year postpartum, between 2005 and 2014 in Tokyo, an incidence rate higher than that in both the United Kingdom and Sweden [4].

According to some studies [5] [6], the COVID-19 pandemic has increased depressive symptoms among pregnant women compared to their state before the pandemic. However, there is some contradicting data, as can be seen in Overbeck *et al.* [7]. Depression rates among pregnant women were reviewed from December 2019 to February 2021. Consequently, the study reported that depression was a concern for 25.6% of a total of 47,677 pregnant women based on data from 37 previous studies [8]. Notably, COVID-19 has persisted even after 2021. Furthermore, the domestic and international rates of depression among pregnant women during COVID-19 have been investigated. However, the actual status of depression among pregnant women has not been determined since Tomfohr-Madsen *et al.*'s study [8]. Therefore, this study determined the rates of pregnant women suspected to have depression or depressive symptoms during the COVID-19 pandemic.

## 2. Methods

### 2.1. Data Collection

A literature search was conducted in July 2022 (last search July 19, 2022) through Pub-Med, CINAHL, MEDLINE, CiNii, and the Japan Medical Abstract Society. The keywords used were "COVID-19", "Pregnant Women" and "Depression". The search terms and formulas for the database and search results are shown in [Table 1](#).

### 2.2. Inclusion and Exclusion Criteria

The literature selection process for this study is illustrated in [Figure 1](#). The literature search yielded 213 references, of which 104 duplicates were excluded while 14 were excluded due to reviews, commentaries, protocols, and introductions to initiatives.

Title screening was based on three selection criteria: 1) Inclusion of pregnant women; 2) Description of mental health; 3) Description of COVID-19. Consequently, one article was excluded from the literature that targeted postpartum mothers rather than pregnant women. Screening of abstracts was also conducted based on three criteria: 1) Inclusion of studies that exclusively analyzed pregnant women; 2) Description of depression; 3) Description of COVID-19. This process excluded 28 references that did not mention depression. Subsequently, we re-

viewed the text and excluded 19 references that did not clearly describe the number or percentage of people who were suspected of having depression or depressive symptoms, and one reference that did not clearly describe a depression measurement scale.

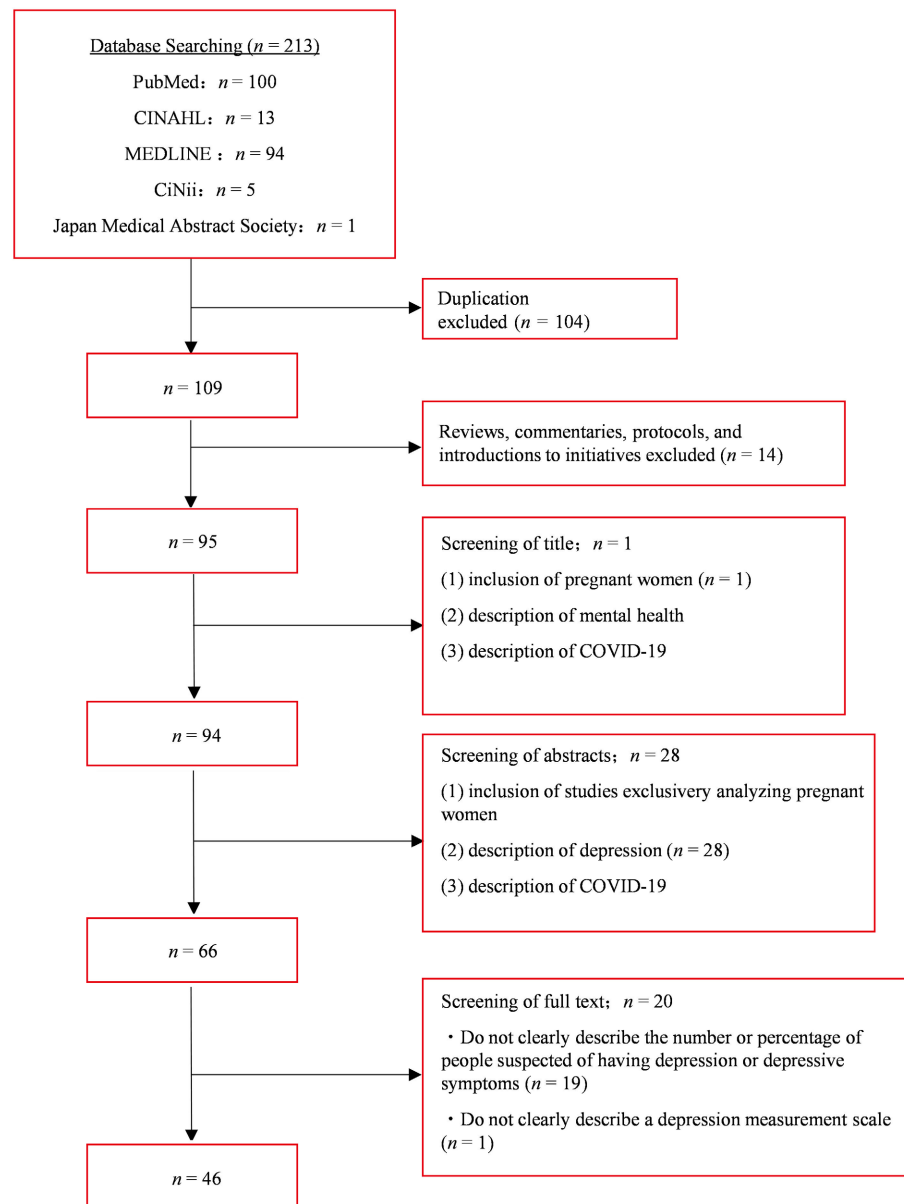
### 2.3. Statistical Analysis

The number of references by country and the scales used to measure depression among pregnant women were tabulated. We also extracted the cut-off values for the scales that are used to measure depression among pregnant women, the number of pregnant women, and the number and percentage of pregnant women with suspected depression or depressive symptoms for each cut-off value. However, each cut-off value is presented individually for studies using different values.

**Table 1.** The search results yielded from the search terms and formulas used for the database search results.

Database		Search Terms and Formulas	Number of results	Search Date
PubMed	#1	COVID-19[MH]	172,767	2022.7.19
	#2	Pregnant Women[MH]	12,492	
	#3	Depression[MH]	245,907	
	#4	#1 and #2 and #3	107	
	#5	(#4) and Abstract, English	100	
CINAHL	#1	MH “COVID-19+”	34,313	2022.7.19
	#2	MH “Expectant Mothers” or Pregnant Women	48,757	
	#3	MH “Depression+”	129,450	
	#4	#1 and #2 and #3	15	
	#5	(#4) and Abstract, English	13	
MEDLINE	#1	MH “COVID-19”	168,669	2022.7.19
	#2	MH “Pregnant Women”	12,380	
	#3	MH “Depression”	141,609	
	#4	#1 and #2 and #3	102	
	#5	(#4) and Abstract, English	94	
CiNii	#1	COVID-19	23,673	2022.7.19
	#2	Pregnant Women	11,087	
	#3	Depression	100,092	
	#4	#1 and #2 and #3	5	
Japan Medical Abstract Society	#1	COVID-19/TH or COVID-19/AL	27,783	2022.7.19
	#2	Pregnant Women/TH or Pregnant Women/AL	44,593	
	#3	Depression/TH	24,330	
	#4	#1 and #2 and #3	5	
	#5	(#4) and (AB=Y)	1	

*Note.* Abbreviations: MH = Medical Subject Headings; TH = Thesaurus Headings; AL = All Headings.



**Figure 1.** The literature selection process for this study.

The total number of pregnant women with suspected depression or depressive symptoms in the selected literature was divided by the total number of pregnant women and subsequently multiplied by 100 to calculate the percentage. Additionally, we focused on the most frequently used scales to examine the actual state of depression among pregnant women.

### 3. Results

The current study identified 46 references that met the current objectives, all of which were in English. In total, 17 countries were reported: 13 references from China (28.3%), 8 from Turkey (17.4%), 4 from the United States (US; 8.7%), and 3 from Japan (6.5%; **Table 2**).

**Table 2.** Number of references by country.

Country	Number of references	%
China	13	28.3
Turkey	8	17.4
America	4	8.7
Japan	3	6.5
Canada	2	4.3
Iran	2	4.3
Netherlands	2	4.3
Spain	2	4.3
Australia	1	2.2
Belgium	1	2.2
Brazil	1	2.2
Israel	1	2.2
Italy	1	2.2
Singapore	1	2.2
Sri Lanka	1	2.2
Sweden	1	2.2
	46	100

### 3.1. Measuring Depression among Pregnant Women during the COVID-19 Pandemic

A total of 12 instruments were used to measure depression among pregnant women during the COVID-19 pandemic (**Table 3**).

**Table 3** indicates that the most frequently employed instrument was the Edinburgh Postnatal Depression Scale (EPDS) with 18 references (39.1%), followed by Patient Health Questionnaire-9 Items (PHQ-9) in 11 references (23.9%), Beck Depression Inventory (BDI) in 4 references (8.7%), Hospital Anxiety and Depression Scale (HADS) in 3 references (6.5%), and the Depression, Anxiety and Stress Scale-21 Items (DASS-21) in 3 references (6.5%). Particularly, the EPDS and PHQ-9 were used most frequently to measure depression in pregnant women during the COVID-19 pandemic and were found in 29 references (63.0%).

### 3.2. Depression Screened among Pregnant Women during the COVID-19 Pandemic

The scales used to screen depression, the cut-off values for each scale, and the percentage of pregnant women with suspected depression or depressive symptoms are presented in **Table 4**. The total number of pregnant women included in the 46 references [5] [6] [9]-[52] was 67,860, while the number of those with suspected depression or depressive symptoms was 20,338 (**Table 4**). Equation

(1) shows the rate of pregnant women with suspected depression or depressive symptoms being around 30.0%.

$$20,338 \div 67,860 \times 100 = 29.9705276 \quad (1)$$

**Table 3.** Scales used to measure depression among pregnant women during the COVID-19 pandemic.

Scale	Acronym	Number of references	%
Edinburgh Postnatal Depression Scale	EPDS	18	39.1
Patient Health Questionnaire-9	PHQ-9	11	23.9
Beck Depression Inventory	BDI	4	8.7
Hospital Anxiety and Depression Scale	HADS	3	6.5
Depression, Anxiety and Stress Scale-21	DASS-21	3	6.5
Beck Depression Inventory II	BDI-II	2	4.3
Kessler 6 scale (Used with EPDS)	K6	(1)	(2.2)
Center for Epidemiologic Studies Depression Scale	CES-D	1	2.2
Patient Health Questionnaire-2	PHQ-2	1	2.2
Kessler 10 scale	K10	1	2.2
Self-rating Depression Scale	SDS	1	2.2
Symptom Checklist-90-R	SCL-90-R	1	2.2
		46	100

**Table 4.** Cut-off values for each scale and percentage of pregnant women with suspected depression and depressive symptoms.

Scale	Cut-off	Country	Sample Size	Number of Depression	%	References
EPDS	≥9	America	485	73	15.1	[9]
		Japan	359	110	30.6	[10]
		Japan	4798	1607	33.5	[11]
	≥10	China	274	44	16.1	[12]
		China	1285	381	29.6	[6]
		Spain	514	182	35.4	[13]
		Spain	164	62	37.8	[14]
		Italy	78	35	44.9	[15]
		Belgium	341	119	34.9	[16]
	≥12	America	485	40	8.2	[9]
		Iran	318	134	42.1	[17]
		Netherlands	1008	121	12.0	[18]
		Japan	4798	702	14.6	[11]

## Continued

		Japan	1777	302	17.0	[19]
		Spain	514	109	21.3	[13]
		Australia	1219	312	26.5	[20]
		Turkey	260	92	35.4	[21]
		America	715	260	36.4	[22]
		Canada	1764	653	37.0	[23]
		Sweden	470	203	43.2	[24]
	≥15	America	2099	496	23.6	[25]
		China	531	137	25.8	[26]
	≥5	China	751	266	35.4	[27] [28]
		China	19,515	8712	44.6	[29]
		China	4087	1989	48.7	[30]
PHQ-9		China	544	29	5.3	[31]
		China	3434	238	6.9	[32] [33]
	≥10	Vietnam	513	45	8.7	[34]
		China	531	55	10.4	[26]
		China	1483	214	14.4	[35]
		Brazil	79	47	59.2	[36]
	≥10	Turkey	356	129	36.2	[37]
	≥14	Turkey	96	63	64.6	[38]
BDI	≥17	Turkey	269	51	18.9	[39]
		Turkey	336	158	34.2	[40]
	≥20	Turkey	96	21	21.9	[38]
	≥9	Iran	540	28	5.2	[41]
DASS-21	≥10	Singapore	324	59	18.2	[42]
	≥14	Turkey	327	318	97.2	[43]
BDI-II	≥13	United Kingdom	137	64	46.7	[44]
	≥14	Turkey	322	99	30.7	[45]
CES-D	≥23	America	33	8	24.2	[46]
		Netherlands	1102	145	13.2	[47]
HADS	≥8	Sri Lanka	311	84	27.0	[48]
		Turkey	403	227	56.3	[49]
K6	≥10	Japan	4798	632	13.2	[11]
K10	≥30	Canada	1258	137	10.9	[5]
PHQ-2	≥3	Israel	1114	174	15.6	[50]
SDS	≥51	China	156	79	50.6	[51]
SCL-90-R	Depression ≥ 2	China	689	93	13.5	[52]
			67,860	20338	30.0	

### 3.3. Depression Screened Using the EPDS and PHQ-9

The current study focused on EPDS and PHQ-9, which have been used widely to screen depression in pregnant women.

The EPDS was used in 21 references to indicate the percentage of pregnant women with suspected depression, which ranged from 8.2% to 44.9%. The EPDS used different cut-off values, even for references from the same country. Therefore, the percentage of pregnant women with suspected depression is presented for each cut-off value (**Table 4**). EPDS  $\geq 9$  was used in three references (two in Japan and one in the U.S.), while the percentage of suspected depressed pregnant women ranged from 15.1% to 33.5% [9] [10] [11]. Furthermore, EPDS  $\geq 10$  was used in five references (two in China, two in Spain, and one in Italy), with a percentage ranging from 16.1% to 44.9% [6] [12] [13] [14] [15]. A Dutch study with EPDS  $\geq 11$  found a rate of 34.9% in the first trimester and EPDS  $\geq 10$  in the second and third trimesters [16]. Moreover, an Iranian study that used EPDS  $\geq 12.5$  found a rate of 42.1% [17]. For the 9 studies with EPDS  $\geq 13$  (two per country: Japanese literature, Netherlands, Spain, Australia Turkey, the U.S., Canada, and Sweden), the rate ranged from 12.0% to 43.2% [11] [13] [18]-[24]. An American study that used EPDS  $\geq 15$  had a percentage of 23.6% [25].

This study found 12 references (with two duplicates); however, for studies that screened pregnant women for depression using the PHQ-9, the percentage of depressive symptoms varied from 5.3% to 59.2%. Therefore, the proportion of pregnant women with depressive symptoms was also extracted for each cut-off value for PHQ-9. Particularly, PHQ-9  $\geq 5$  was used in five Chinese references, and the percentage of pregnant women with depressive symptoms ranged from 25.8% to 48.7% [26] [27] [28] [29] [30]. Furthermore, PHQ-9  $\geq 10$  was used in seven references (five from China and one each from Vietnam and Brazil), and the rate of depressive symptoms was 5.3% to 59.2% [26] [31]-[36].

## 4. Discussion

The proportion of pregnant women with suspected depression or depressive symptoms during the COVID-19 pandemic was 30.0% in this study, indicating a rate of one in three to four. The rate of depression among pregnant women during the COVID-19 pandemic, from December 2019 to July 2020, until September 2020, and from December 2019 to February 2021 was reportedly 30%, 25%, and 25.6%, respectively [8] [53] [54]. The current results exceeded or equated with that. The factors associated with depression among pregnant women during the COVID-19 pandemic include unemployment during pregnancy, household financial difficulties, and poor perception of general support [55], and it is possible that the prolonged pandemic maintained or increased the rate of depression among pregnant women. Furthermore, the percentage of depression among pregnant women before the COVID-19 pandemic was 16.4% [56], suggesting that the depression rate among pregnant women increased 1.8 times from before the pandemic. Thus, depression rates among pregnant women may



have worsened during the COVID-19 pandemic, suggesting a need for mental health support for this population.

Regarding the cut-off value of the EPDS, which assessed suspected depression in pregnant women, a review of the Japanese literature showed that two different cut-offs were used (*i.e.*, 9 and 13 points). Further accumulation of research is needed on the cut-off value of the EPDS in this context. In the three studies that used  $EPDS \geq 9$ , the percentage of suspected depression among pregnant women ranged from 15.1% to 33.5%. Silverman *et al.* [9] report that 15.1% of their study subjects were pregnant women of low socioeconomic status and about 90% had U.S. government-funded health insurance, as well as observe that depression in the pregnant women population during the COVID-19 pandemic was lower than in the pre-pandemic population. Although social distancing during the COVID-19 pandemic is a factor associated with elevated depressive symptoms [20] [22], it is an interesting finding that social constraints may have had a positive impact on the health and well-being of pregnant women with low economic status. Additionally, Kachi *et al.* [10] reported a 30.6% depression rate from their study, which was limited to employed women and excluded individuals with a history of mental illness. Notably, this low depression rate may indicate a high rate of depression among individuals who are unemployed [19] [24] [32] [50] and have a history of mental illness [5] [13] [14] [20] [39]. Obata *et al.* [11] reported a 33.5% depression rate, 59.6% of all pregnant women were from regions with a high incidence of COVID-19, and the high depression rate among pregnant women in the high epidemic regions [5] [13] [14] [20] [39] may indicate a higher percentage of suspected depression. The percentage of suspected depression in  $EPDS \geq 13$  ranged from 12.0% to 43.2%. Particularly, Vacaru *et al.* [18] reported a depression rate of 12.0% from a study on pregnant women during the lockdown period, from April to May 2020, in the Netherlands. Furthermore, Ho-Fung *et al.* [24] reported a depression rate of 43.2% upon studying pregnant women living in Sweden from May 2020 to February 2021. The researchers considered the possibility that Sweden's loose social constraints may have increased the concern of pregnant women [24].

The PHQ-9 had mixed cut-off values of 5 and 10 points since the  $PHQ-9 \geq 10$  has a sensitivity of 88% and specificity of 88% for major depression [57],  $PHQ-9$  scores of five or higher have mild and 10 or higher have moderate depressive symptoms [57]; both 5 and 10 points were cut-off values. The proportion of suspected depression in  $PHQ-9 \geq 5$  ranged from 25.8% to 48.7%, and in  $PHQ-9 \geq 10$ , from 6.9% to 59.5%. The study population of Wu *et al.* [32] [33], who reported a rate of 6.9%, excluded those with mental illness, which may have indicated a low proportion of pregnant women with depressive symptoms. The study population of Borges *et al.* [36], who reported a depression rate of 59.2%, was limited to pregnant women with hypertension or diabetes mellitus that started before or developed during pregnancy, with a median Body Mass Index of 31.6, and 58.2% of them had psychiatric disorders. The association between

maternal depression and chronic physical illness before pregnancy [55], and that with obesity [1] [23] [58] may explain a higher proportion of pregnant women with depressive symptoms.

As mentioned above, the EPDS and PHQ-9 used various cut-off values and the characteristics of pregnant women were not constant, which may have resulted in a wide range in the proportion of those with depression. The EPDS and PHQ-9, which are widely used to measure depression in pregnant women during the COVID-19 pandemic, have different cut-off values. The data obtained in this study are significant because they can be compared with the depression status before the COVID-19 pandemic and in the future.

Future longitudinal observational studies are needed to determine whether pregnant women with suspected depression and depressive symptoms during the COVID-19 pandemic will recover postpartum.

## 5. Conclusion

A review of 46 references in this study indicated the following: The proportion of suspected depression among pregnant women during the COVID-19 pandemic was 30.0% and approximately one in three pregnant women was susceptible to depression. Depression among pregnant women during the COVID-19 pandemic may be worsening, suggesting the increased need for mental health to support them.

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## Complement

This study was partially presented at the 26th East Asia Forum of Nursing Scholars Secretariat 2023.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

- [1] Glasheen, C., Richardson, G.A. and Fabio, A. (2010) A Systematic Review of the Effects of Postnatal Maternal Anxiety on Children. *Archives of Women's Mental Health*, **13**, 61-74. <https://doi.org/10.1007/s00737-009-0109-y>
- [2] O'Connor, T.G., Heron, J., Golding, J., Glover, V. and ALSPAC Study Team. (2003) Maternal Antenatal Anxiety and Behavioral/Emotional Problems in Children: A Test of a Programming Hypothesis. *Journal of Child Psychology and Psychiatry*, **44**, 1025-1036. <https://doi.org/10.1111/1469-7610.00187>
- [3] Orsolini, L., Valchera, A., Vecchiotti, R., Tomasetti, C., Iasevoli, F., Fornaro, M., *et al.* (2016) Suicide during Perinatal Period: Epidemiology, *Risk Factors, and Clinical*

- Correlates. Frontiers in Psychiatry*, 7, Article 138.  
<https://doi.org/10.3389/fpsy.2016.00138>
- [4] Takeda, S. (2016) Challenge to “Zero” Maternal Death. *Acta Obstetrica et Gynaecologica Japonica*, 68, 1815-1822. (In Japanese)  
[https://dl.ndl.go.jp/view/download/digidepo\\_10733753\\_po\\_ART0010600167.pdf?contentNo=1&alternativeNo](https://dl.ndl.go.jp/view/download/digidepo_10733753_po_ART0010600167.pdf?contentNo=1&alternativeNo)
- [5] Berthelot, N., Lemieux, R., Garon-Bissonnette, J., Drouin-Maziade, C., Martel, É. and Maziade, M. (2020) Uptrend in Distress and Psychiatric Symptomatology in Pregnant Women during the Coronavirus Disease 2019 Pandemic. *Acta Obstetrica et Gynaecologica Scandinavica*, 99, 848-855. <https://doi.org/10.1111/aogs.13925>
- [6] Wu, Y., Zhang, C., Liu, H., Duan, C., Li, C., Fan, J., et al. (2020) Perinatal Depressive and Anxiety Symptoms of Pregnant Women during the Coronavirus Disease 2019 Outbreak in China. *American Journal of Obstetrics and Gynecology*, 223, 240.E1-240.E9. <https://doi.org/10.1016/j.ajog.2020.05.009>
- [7] Overbeck, G., Rasmussen, I.S., Siersma, V., Andersen, J.H., Kragstrup, J., Wilson, P., et al. (2021) Depression and Anxiety Symptoms in Pregnant Women in Denmark during COVID-19. *Scandinavian Journal of Public Health*, 49, 721-729. <https://doi.org/10.1177/14034948211013271>
- [8] Tomfohr-Madsen, L.M., Racine, N., Giesbrecht, G.F., Lebel, C. and Madigan, S. (2021) Depression and Anxiety in Pregnancy during COVID-19: A Rapid Review and Meta-Analysis. *Psychiatry Research*, 300, Article ID: 113912. <https://doi.org/10.1016/j.psychres.2021.113912>
- [9] Silverman, M.E., Medeiros, C. and Burgos, L. (2020) Early Pregnancy Mood before and during COVID-19 Community Restrictions among Women of Low Socioeconomic Status in New York City: A Preliminary Study. *Archives of Women's Mental Health*, 23, 779-782. <https://doi.org/10.1007/s00737-020-01061-9>
- [10] Kachi, Y., Fujiwara, T., Eguchi, H., Inoue, A., Baba, S., Ohta, H., et al. (2021) Association between Maternity Harassment and Depression during Pregnancy Amid the COVID-19 State of Emergency. *Journal of Occupational Health*, 63, e12196. <https://doi.org/10.1002/1348-9585.12196>
- [11] Obata, S., Miyagi, E., Haruyama, Y., Umazume, T., Kobashi, G., Yoshimi, A., et al. (2021) Psychological Stress among Pregnant and Puerperal Women in Japan during the Coronavirus Disease 2019 Pandemic. *Journal of Obstetrics and Gynaecology Research*, 47, 2990-3000. <https://doi.org/10.1111/jog.14877>
- [12] Xu, K., Zhang, Y., Zhang, Y., Xu, Q., Lv, L. and Zhang, J. (2021) Mental Health among Pregnant Women under Public Health Interventions during COVID-19 Outbreak in Wuhan, China. *Psychiatry Research*, 301, Article ID: 113977. <https://doi.org/10.1016/j.psychres.2021.113977>
- [13] Lubian Lopez, D.M., Butrón Hinojo, C.A., Arjona Bernal, J.E., Fasero Laiz, M., Alcolea Santiago, J., Guerra Vilches, V., et al. (2021) Resilience and Psychological Distress in Pregnant Women during Quarantine Due to the COVID-19 Outbreak in Spain: A Multicentre Cross-Sectional Online Survey. *Journal of Psychosomatic Obstetrics and Gynecology*, 42, 115-122. <https://doi.org/10.1080/0167482X.2021.1896491>
- [14] Brik, M., Sandonis, M.A., Fernández, S., Suy, A., Parramon-Puig, G., Maiz, N., et al. (2021) Psychological Impact and Social Support in Pregnant Women during Lockdown Due to SARS-CoV2 Pandemic: A Cohort Study. *Acta Obstetrica et Gynaecologica Scandinavica*, 100, 1026-1033. <https://doi.org/10.1111/aogs.14073>
- [15] Smorti, M., Gemignani, A., Bonassi, L., Mauri, G., Carducci, A. and Ionio, C. (2022)

- The Impact of Covid-19 Restrictions on Depressive Symptoms in Low-Risk and High-Risk Pregnant Women: A Cross-Sectional Study before and during Pandemic. *BMC Pregnancy and Childbirth*, **22**, Article No. 191. <https://doi.org/10.1186/s12884-022-04515-3>
- [16] Kuipers, Y.J., Bleijenbergh, R., Van den Branden, L., van Gils, Y., Rimaux, S., Brosens, C., *et al.* (2022) Psychological Health of Pregnant and Postpartum Women before and during the COVID-19 Pandemic. *PLOS ONE*, **17**, e0267042. <https://doi.org/10.1371/journal.pone.0267042>
- [17] Firouzbakht, M., Rahmani, N., Sharif Nia, H. and Omidvar, S. (2022) Coping Strategies and Depression during the COVID-19 Pandemic in Pregnant Women: A Cross-Sectional Study. *BMC Psychiatry*, **22**, Article No. 153. <https://doi.org/10.1186/s12888-022-03792-8>
- [18] Vacaru, S., Beijers, R., Browne, P.D., Cloin, M., Van Bakel, H., Van Den Heuvel., *et al.* (2021) The Risk and Protective Factors of Heightened Prenatal Anxiety and Depression during the COVID-19 Lockdown. *Scientific Reports*, **11**, Article No. 20261. <https://doi.org/10.1038/s41598-021-99662-6>
- [19] Matsushima, M. and Horiguchi, H. (2022) The COVID-19 Pandemic and Mental Well-Being of Pregnant Women in Japan: Need for Economic and Social Policy Interventions. *Disaster Medicine and Public Health Preparedness*, **16**, 449-454. <https://doi.org/10.1017/dmp.2020.334>
- [20] Lequertier, B., McLean, M.A., Kildea, S., King, S., Keedle, H., Gao, Y., *et al.* (2022) Perinatal Depression in Australian Women during the COVID-19 Pandemic: The Birth in the Time of COVID-19 (BITTOC) Study. *International Journal of Environmental Research and Public Health*, **19**, Article 5062. <https://doi.org/10.3390/ijerph19095062>
- [21] Durankuş, F. and Aksu, E. (2022) Effects of the COVID-19 Pandemic on Anxiety and Depressive Symptoms in Pregnant Women: A Preliminary Study. *The Journal of Maternal-Fetal and Neonatal Medicine*, **35**, 205-211. <https://doi.org/10.1080/14767058.2020.1763946>
- [22] Liu, J., Hung, P., Alberg, A.J., Hair, N.L., Whitaker, K.M., Simon, J., *et al.* (2021) Mental Health among Pregnant Women with COVID-19-Related Stressors and Worries in the United States. *Birth*, **48**, 470-479. <https://doi.org/10.1111/birt.12554>
- [23] Lebel, C., MacKinnon, A., Bagshawe, M., Tomfohr-Madsen, L. and Giesbrecht, G. (2020) Elevated Depression and Anxiety Symptoms among Pregnant Individuals during the COVID-19 Pandemic. *Journal of Affective Disorders*, **277**, 5-13. <https://doi.org/10.1016/j.jad.2020.07.126>
- [24] Chung, H.-F., Andersson, E., Huang, H.-Y., Acharya, G. and Schwank, S. (2022) Self-Reported Mental Health Status of Pregnant Women in Sweden during the COVID-19 Pandemic: A Cross-Sectional Survey. *BMC Pregnancy and Childbirth*, **22**, Article No. 260. <https://doi.org/10.1186/s12884-022-04553-x>
- [25] Thayer, Z.M. and Gildner, T.E. (2021) COVID-19-Related Financial Stress Associated with Higher Likelihood of Depression among Pregnant Women Living in the United States. *American Journal of Human Biology*, **33**, e23508. <https://doi.org/10.1002/ajhb.23508>
- [26] Mei, H., Li, N., Li, J., Zhang, D., Cao, Z., Zhou, Y., *et al.* (2021) Depression, Anxiety, and Stress Symptoms in Pregnant Women before and during the COVID-19 Pandemic. *Journal of Psychosomatic Research*, **149**, Article ID: 110586. <https://doi.org/10.1016/j.jpsychores.2021.110586>
- [27] Lin, W., Wu, B., Chen, B., Lai, G., Huang, S., Li, S., *et al.* (2021) Sleep Conditions

- Associated with Anxiety and Depression Symptoms among Pregnant Women during the Epidemic of COVID-19 in Shenzhen. *Journal of Affective Disorders*, **281**, 567-573. <https://doi.org/10.1016/j.jad.2020.11.114>
- [28] Lin, W., Wu, B., Chen, B., Zhong, C., Huang, W., Yuan, S., et al. (2021) Associations of COVID-19 Related Experiences with Maternal Anxiety and Depression: Implications for Mental Health Management of Pregnant Women in the Post-Pandemic Era. *Psychiatry Research*, **304**, Article ID: 114115. <https://doi.org/10.1016/j.psychres.2021.114115>
- [29] Yang, X., Song, B., Wu, A., Mo, P.K., Di, J., Wang, Q., et al. (2021) Social, Cognitive, and eHealth Mechanisms of COVID-19-Related Lockdown and Mandatory Quarantine that Potentially Affect the Mental Health of Pregnant Women in China: Cross-Sectional Survey Study. *Journal of Medical Internet Research*, **23**, e24495. <https://doi.org/10.2196/24495>
- [30] Mo, P.K.H., Fong, V.W.I., Song, B., Di, J., Wang, Q. and Wang, L. (2021) Association of Perceived Threat, Negative Emotions, and Self-Efficacy with Mental Health and Personal Protective Behavior among Chinese Pregnant Women during the COVID-19 Pandemic: Cross-Sectional Survey Study. *Journal of Medical Internet Research*, **23**, e24053. <https://doi.org/10.2196/24053>
- [31] Zhou, Y., Shi, H., Liu, Z., Peng, S., Wang, R., Qi, L., et al. (2020) The Prevalence of Psychiatric Symptoms of Pregnant and Non-Pregnant Women during the COVID-19 Epidemic. *Translational Psychiatry*, **10**, Article No. 319. <https://doi.org/10.1038/s41398-020-01006-x>
- [32] Wu, F., Lin, W., Liu, P., Zhang, M., Huang, S., Chen, C., et al. (2021) Prevalence and Contributory Factors of Anxiety and Depression among Pregnant Women in the Post-Pandemic Era of COVID-19 in Shenzhen, China. *Journal of Affective Disorders*, **291**, 243-251. <https://doi.org/10.1016/j.jad.2021.05.014>
- [33] Wu, F., Zhou, L., Chen, C., Lin, W., Liu, P., Huang, W., et al. (2022) Association between Intimate Partner Violence and Prenatal Anxiety and Depression in Pregnant Women: A Cross-Sectional Survey during the COVID-19 Epidemic in Shenzhen, China. *BMJ Open*, **12**, e055333. <https://doi.org/10.1136/bmjopen-2021-055333>
- [34] Luong, T.C., Pham, T.T., Nguyen, M.H., Do, A.Q., Pham, L.V., Nguyen, H.C., et al. (2021) Fear, Anxiety and Depression among Pregnant Women during COVID-19 Pandemic: Impacts of Healthy Eating Behaviour and Health Literacy. *Annals of Medicine*, **53**, 2120-2131. <https://doi.org/10.1080/07853890.2021.2001044>
- [35] Fan, H.S.L., Choi, E.P.H., Ko, R.W.T., Kwok, J.Y.Y., Wong, J.Y.H., Fong, D.Y.T., et al. (2022) COVID-19 Related Fear and Depression of Pregnant Women and New Mothers. *Public Health Nursing*, **39**, 562-571. <https://doi.org/10.1111/phn.13035>
- [36] de Pádua Borges, R., de Azevedo Jacob Reichelt, A., de Brito, A., Molino, G.O.G. and Schaan, B.D. (2021) Impact of the COVID-19 Pandemic on Mental Health of Pregnant Women with Diabetes Mellitus and Hypertension. *Revista da Associação Médica Brasileira*, **67**, 1268-1273. <https://doi.org/10.1590/1806-9282.20210504>
- [37] Keskin, D.D., Keskin, S. and Bostan, S. (2021) Mental Disorders among Pregnant Women during the COVID-19 Pandemic: A Cross-Sectional Study. *Sao Paulo Medical Journal*, **140**, 87-93. <https://doi.org/10.1590/1516-3180.2021.0356.27052021>
- [38] Denizli, R., Sakin, Ö., Koyuncu, K., Çiçekli, N., Farisoğulları, N. and Özdemir, M. (2021) The Impact of the COVID-19 Pandemic on Depression and Sexual Function: Are Pregnant Women Affected More Adversely? *Revista Brasileira de Ginecologia e Obstetrícia*, **43**, 765-774. <https://doi.org/10.1055/s-0041-1736174>

- [39] Aba, Y.A., Dulger, O., Sik, B.A. and Ozolcay, O. (2022) Levels and Predictors of Anxiety and Depression in Turkish Pregnant Woman during the Covid-19 Pandemic. *Revista Brasileira de Ginecologia e Obstetrícia*, **44**, 100-108. <https://doi.org/10.1055/s-0041-1741033>
- [40] Durmuş, M., Öztürk, Z., Şener, N. and Eren, S.Y. (2022) The Relationship between the Fear of COVID-19, Depression, and Spiritual Well-Being in Pregnant Women. *Journal of Religion and Health*, **61**, 798-810. <https://doi.org/10.1007/s10943-021-01448-7>
- [41] Maharlouei, N., Keshavarz, P., Salemi, N. and Lankarani, K.B. (2021) Depression and Anxiety among Pregnant Mothers in the Initial Stage of the Coronavirus Disease (COVID-19) Pandemic in the Southwest of Iran. *Reproductive Health*, **18**, Article No. 111. <https://doi.org/10.1186/s12978-021-01167-y>
- [42] Ng, Q.J., Koh, K.M., Tagore, S. and Mathur, M. (2020) Perception and Feelings of Antenatal Women during COVID-19 Pandemic: A Cross-Sectional Survey. *Annals Academy of Medicine Singapore*, **49**, 543-552. <https://annals.edu.sg/pdf/49VolNo8Aug2020/new/V49N8p543.pdf> <https://doi.org/10.47102/annals-acadmedsg.2020295>
- [43] Bakır, N., Irmak Vural, P. and Demir, C. (2021) Relationship of Depression, Anxiety and Stress Levels with Religious Coping Strategies among Turkish Pregnant Women during the COVID-19 Pandemic. *Journal of Religion and Health*, **60**, 3379-3393. <https://doi.org/10.1007/s10943-021-01391-7>
- [44] Filippetti, M.L., Clarke, A.D.F. and Rigato, S. (2022) The Mental Health Crisis of Expectant Women in the UK: Effects of the COVID-19 Pandemic on Prenatal Mental Health, Antenatal Attachment and Social Support. *BMC Pregnancy and Childbirth*, **22**, Article No. 68. <https://doi.org/10.1186/s12884-022-04387-7>
- [45] Geren, A., Birge, Ö., Bakır, M.S., Sakıncı, M. and Sanhal, C.Y. (2021) Does Time Change the Anxiety and Depression Scores for Pregnant Women on Covid-19 Pandemic? *Journal of Obstetrics and Gynaecology Research*, **47**, 3516-3523. <https://doi.org/10.1111/jog.14935>
- [46] Giurgescu, C., Wong, A.C., Rengers, B., Vaughan, S., Nowak, A.L., Price, M., et al. (2022) Loneliness and Depressive Symptoms among Pregnant Black Women during the COVID-19 Pandemic. *Western Journal of Nursing Research*, **44**, 23-30. <https://doi.org/10.1177/01939459211043937>
- [47] Zilver, S.J.M., Broekman, B.F.P., Hendrix, Y.M.G.A., de Leeuw, R.A., Mentzel, S.V., van Pampus, M.G., et al. (2021) Stress, Anxiety and Depression in 1466 Pregnant Women during and before the COVID-19 Pandemic: A Dutch Cohort Study. *Journal of Psychosomatic Obstetrics and Gynecology*, **42**, 108-114. <https://doi.org/10.1080/0167482X.2021.1907338>
- [48] Patabendige, M., Wanniarachchi, D., Weerasinghe, M., Ruwanpathirana, P., Jayasundara, D.M.C.S. and Jayawardane, A. (2022) The Sustained Adverse Impact of COVID-19 Pandemic on Mental Health among Pregnant Women in Sri Lanka: A Reassessment during the Second Wave. *BMC Research Notes*, **15**, Article No. 3. <https://doi.org/10.1186/s13104-021-05893-1>
- [49] Sut, H.K. and Kucukkaya, B. (2021) Anxiety, Depression, and Related Factors in Pregnant Women during the COVID-19 Pandemic in Turkey: A Web-Based Cross-Sectional Study. *Perspectives in Psychiatric Care*, **57**, 860-868. <https://doi.org/10.1111/ppc.12627>
- [50] Yirmiya, K., Yakirevich-Amir, N., Preis, H., Lotan, A., Atzil, S. and Reuveni, I. (2021) Women's Depressive Symptoms during the COVID-19 Pandemic: The Role of Pregnancy. *International Journal of Environmental Research and Public Health*, **18**, Article 4298. <https://doi.org/10.3390/ijerph18084298>



- [51] Dong, H., Hu, R., Lu, C., Huang, D., Cui, D., Huang, G., *et al.* (2021) Investigation on the Mental Health Status of Pregnant Women in China during the Pandemic of COVID-19. *Archives of Gynecology and Obstetrics*, **303**, 463-469. <https://doi.org/10.1007/s00404-020-05805-x>
- [52] Xie, M., Wang, X., Zhang, J. and Wang, Y. (2021) Alteration in the Psychologic Status and Family Environment of Pregnant Women before and during the Covid-19 Pandemic. *International Journal of Gynecology and Obstetrics*, **153**, 71-75. <https://doi.org/10.1002/ijgo.13575>
- [53] Sun, F., Zhu, J., Tao, H., Ma, Y. and Jin, W. (2021) A Systematic Review Involving 11,187 Participants Evaluating the Impact of COVID-19 on Anxiety and Depression in Pregnant Women. *Journal of Psychosomatic Obstetrics and Gynecology*, **42**, 91-99. <https://doi.org/10.1080/0167482X.2020.1857360>
- [54] Fan, S., Guan, J., Cao, L., Wang, M., Zhao, H., Chen, L., *et al.* (2021) Psych Logical Effects Caused by COVID-19 Pandemic on Pregnant Women: A Systematic Review with Meta-Analysis. *Asian Journal of Psychiatry*, **56**, Article ID: 102533. <https://doi.org/10.1016/j.ajp.2020.102533>
- [55] Luo, Y., Zhang, K., Huang, M. and Qiu, C. (2022) Risk Factors for Depression and Anxiety in Pregnant Women during the COVID-19 Pandemic: Evidence from Meta-Analysis. *PLOS ONE*, **17**, e0265021. <https://doi.org/10.1371/journal.pone.0265021>
- [56] Okagbue, H.I., Adamu, P.I., Bishop, S.A., Oguntunde, P.E., Opanuga, A.A. and Akhmetshin, E.M. (2019) Systematic Review of Prevalence of Antepartum Depression during the Trimesters of Pregnancy. *Open Access Macedonian Journal of Medical Sciences*, **7**, 1555-1560. <https://doi.org/10.3889/oamjms.2019.270>
- [57] Kroenke K., Spitzer, R.L. and Williams, J.B. (2001) The PHQ-9: Validity of a Brief Depression Severity Measure. *Journal of General Internal Medicine*, **16**, 606-613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>
- [58] Ayaz, R., Hocaoglu, M., Gunay, T., Yardimci, O.D., Turgut, A. and Karateke, A. (2020) Anxiety and Depression Symptoms in the Same Pregnant Women before and during the COVID-19 Pandemic. *Journal of Perinatal Medicine*, **48**, 965-970. <https://doi.org/10.1515/jpm-2020-0380>