

## Postpartum Mental Health and Its Relationship with Mediating Social Determinants of Health in Iran based on the WHO Model: A Systematic Review

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### Abstract

**Background:** Pregnancy is a complex and vulnerable period that causes some challenges including the development of postpartum psychiatric disorders (PPDs) for women. Identifying the factors associated with these disorders can be effective in reducing maternal symptoms and supporting mother, child and family. The aim of this study was to identify the relationship between postpartum mental health and mediating social determinants of health in Iran.

**Methods:** In this systematic review, the Persian and English observational studies in Iran were obtained through advanced search in online databases, such as PubMed, Scopus, EMBASE, SID, Magiran, Psycinfo, and Google Scholar search engine in the period of January 2005 to August 5, 2021 using the following keywords: social determinants, mediating factors, social support, mental health, risk factors, postpartum, Iran, and their English equivalents through Mesh. Articles were selected based on the inclusion and exclusion criteria and quality assessment of articles was performed using the standard Newcastle-Ottawa Scale (NOS).

**Results:** Out of 42 eligible articles (total sample: 39216), 40 articles examined the relationship between postpartum depression and 2 articles studied the relationship of maternal grief with some mediating social determinants. In general, these factors were classified into five categories, including midwifery and pregnancy-related factors, psychosocial conditions, factors related to postpartum status, behavioral factors and material status or conditions, and health care.

**Conclusion:** Mothers' mental health is affected by many underlying factors; Therefore, identifying the risk factors associated with mental disorders in this population based on the model of the WHO (World Health Organization), especially in the mediating area (Material and environmental conditions, Psychosocial, Behavioral factors, Health system) due to the extent of this area is very important.

**Key Words:** Iran, mental health, postpartum, social determinants of health, mediating factors.

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## 1- INTRODUCTION

The postpartum period is associated with some psychological and physical changes in mothers. Mothers in this period experience a range of mental disorders (mild to severe) due to adaptation to their new roles and responsibilities (1). Approximately 15% of mothers suffer from postpartum psychiatric disorders such as depression, anxiety or psychosis (2). According to the WHO, about 10 percent of pregnant women worldwide and 13 percent of women who have just given birth have a mental illness, primarily depression. Common perinatal mental disorders are more prevalent in low- and middle-income countries. 15.6% of women in low- and middle-income countries during pregnancy and 19.8% after childbirth suffer from a mental disorder (3). Most mental disorders are not well diagnosed in the postpartum period and may have far-reaching consequences for the mother's relationship with the child, spouse, and other family members (4). The onset of different symptoms of these disorders leads to interference in the interactive control of the mother's behaviors for the child's wishes and the quality and response of care and less emotional involvement with the baby (2). Numerous studies have shown the effects of maternal psychiatric disorders on postpartum if left untreated (5). In short, postpartum mental disorders significantly jeopardize mothers' ability to interact with their children (6). Premature postpartum mental disorders are classified as follows: Baby blues OR maternity blues (sadness) after childbirth: a stage of emotional disability after childbirth with frequent periods of crying, irritability, confusion, anxiety, etc. It appears during the first few days after delivery (4). A systematic meta-analysis of 26 studies in 2020 reported The prevalence of this disorder to be between 13.7 and 76% (7). Postpartum depression (PPD) is known as the most common

psychological disorder observed during the postpartum period and is mostly associated with negative thoughts related to the baby. This non-psychotic disorder occurs as a major depressive disorder within 4 weeks after delivery (8). In addition, a previous history of postpartum depression, marital conflict, and single child are predictors of postpartum depression (9). Based on studies in the Middle East and the Western world, there is a large difference between 10 and 51.8% has been reported in the prevalence of this disorder (10). A meta-analysis of 41 articles showed an overall prevalence of 25.3% postpartum depression (11). Postpartum psychosis (PP) is a type of postpartum psychiatric emergency that is one of the short-term psychiatric disorders in the spectrum of schizophrenia and other disorders based on the Classification of Mental Disorders (DSM-5). This disorder most often occurs within 2 weeks after delivery and with an average age of 26 years with symptoms such as mood swings, insomnia, hallucinations and obsessive thoughts about the child, etc.(12). Another systematic meta-analysis study on 6 studies in 2020, reported the prevalence of this disorder to be more than 40% (13).

Childbearing is a unique psychosocial event that profoundly affects women physically, socially and emotionally (14). Potential risk factors for common mental disorders in the perinatal period reflect a diverse conceptual framework among different studies (3). In this study, the framework of the WHO Commission has been used to determine the social factors affecting postpartum mental health. The conceptual framework of the WHO for social determinants of health include two structural groups of socioeconomic status and macroeconomic policies, which are referred to as health injustices, and intermediate factors or mediators that are referred to as social determinants of health including biological, behavioral, and

psychosocial factors (15). In recent years, with the increasing prevalence of mental disorders and some psycho-behavioral disorders, attention to the concept of social factors of mental health has become very important (16). The relationship between some structural and mediating determinants of health, including economic, social, cultural and behavioral factors with postpartum mental health has been studied in many studies (17, 18). Given the importance and impact of social health factors on maternal mental health after childbirth, social determinants of health, especially mediating or mediating factors that are known in this model as the main factors affecting health, should be comprehensively examined. In this regard, this study with a systematic review of all studies conducted in Iran was carried out to assess the relationship between mediating social determinants of health with postpartum mental health based on the WHO model.

## 2- MATERIALS AND METHODS

All stages of this study are based on MOOSE (Meta-analysis of Observational Studies in Epidemiology) guidelines for meta-analysis and systematic reviews of observational studies (cross-sectional, case-control, cohort) and P-PARISM (Preferred Reporting Items for Systematic reviews and Meta-Analysis) guidelines (19). And articles published in Persian and English until 5/8/2021 have been studied.

### 2-1. Eligibility criteria

PICO / PECO is a question process guide for formulating and designing systematic relational (causal) review studies (20).

Participant: Mothers and fathers in the postpartum period

Exposure/Intervention: Not Applicable

Comparators: Social Mediating factors of Postpartum Mental Health

Outcome: postpartum mental health (postpartum depression, maternal grief, and postpartum psychosis)

Study design: Relational or Causality

### 2-2. Selection of studies

#### 2-2-1. Inclusion criteria

**Inclusion criteria:** Articles published in Iran in Persian and English in domestic and foreign international databases in the last 15 years (2005 to 5/8/2021); studies conducted only on mediating social determinants; studies whose design is observational-analytical (cross-sectional with at least 25 samples, descriptive correlational, case-control, cohort) and their full text is available; studies that provide accurate estimates of risk scales (odds ratio and relative risk); and studies limited to the three main areas of postpartum mental health in mothers (postpartum depression, maternal grief, postpartum psychosis).

#### 2-2-2. Exclusion criteria

**Exclusion criteria:** Studies that were conducted only on structural social determinants; studies on mental health during pregnancy or other postpartum mental disorders (obsessive-compulsive disorder, post-traumatic stress disorders, eating disorders, etc.); studies that did not report the size of the effect; studies whose design did not meet the criteria for inclusion in our study (intervention, review, qualitative, case report, series of cases and posters and editorial letters); and studies that their full text could not be retrieved, or were duplicate and irrelevant reports of the results of other articles.

Initially, 1033 articles were obtained by searching the mentioned databases. After deleting duplicates by ENDNOTE NOTEX9 software (Bld12062), 647 articles were studied by title and abstract (screening) and omitted for reasons such as duplication, poor relevance or irrelevance to the purpose of the present study. If it

was not possible to decide whether or not to include the article in the study based on the title and abstract of the articles, the full text of the article was referred to for a more detailed evaluation. In order to ensure the retrieval of all documents and

information, the list of references of articles was also reviewed. 380 articles were selected, and after investigating the inclusion and exclusion criteria, finally 105 eligible articles were included for qualitative analysis (Fig. 1).

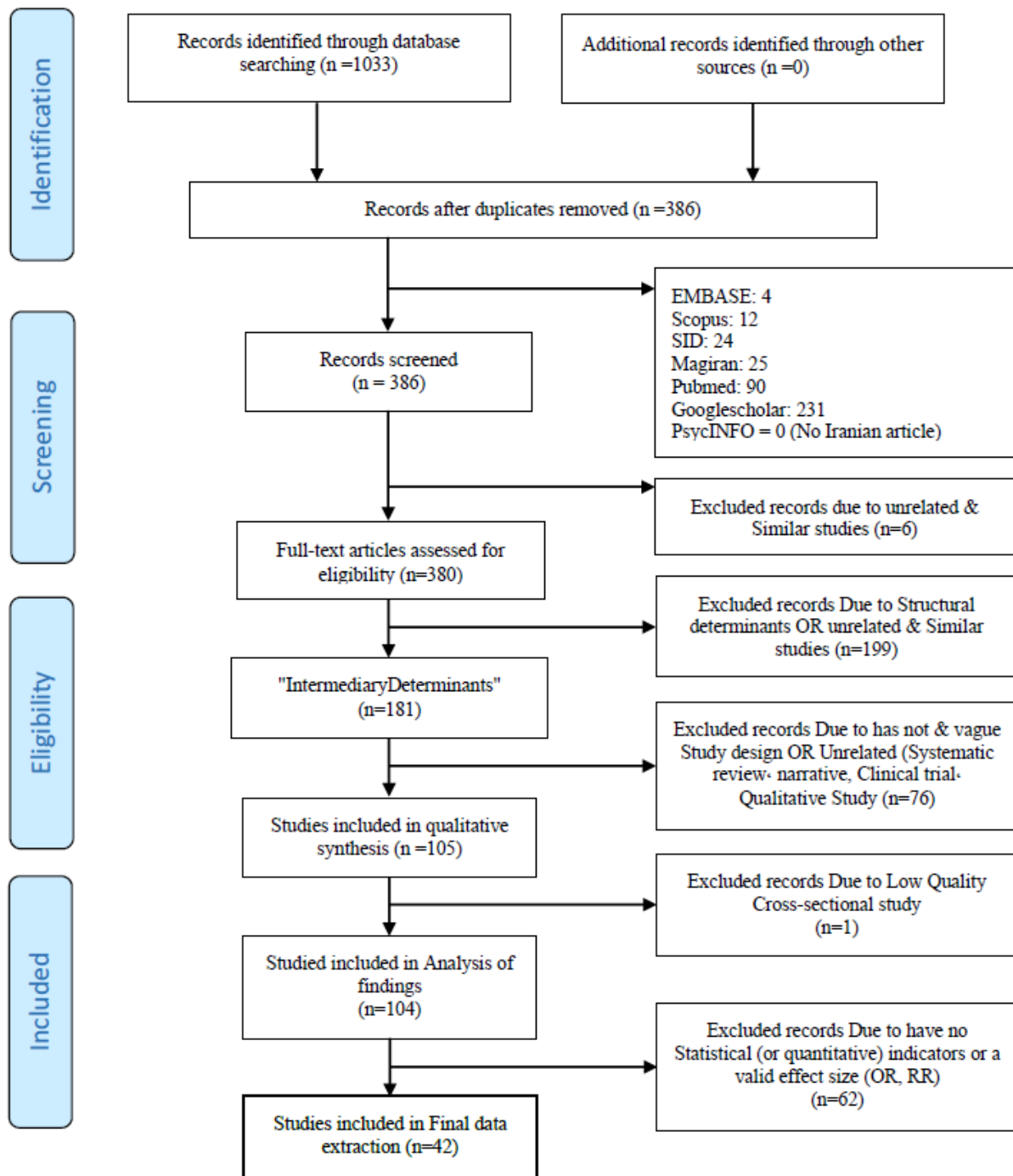


Fig.1: Flowchart for selection of studies

### 2-3. Information sources

The research population of the present systematic study included articles on the relationship between mediating social determinants of health and postpartum mental health in Iran, which were indexed in one of the domestic and foreign Internet datasets. PubMed, Scopus, EMBASE, SID, Magiran, and Psycinfo were searched as international databases and the Google Scholar search engine was searched in Persian and English during 2005 to 5/8/2021.

### 2-4. Keywords and search strategy

In order to observe the principle of search comprehensiveness, the related articles in English language databases were selected based on the topics of medical subjects (Mesh), Emtree, and Text words, which include Mental health, Social Determinants of Health, Social Support, postpartum period combined by AND and OR operators. English keywords used to search databases include as follows:

“Social determinants of health, intermediate determinants of health, psychosocial factors, social support, perceived social support, social exclusion, social isolation, Unhealthy behaviors: smoking, substance abuse, Illegal Drugs: violence, Family Conflict, Adverse Childhood Experience, Life events: lifestyle, nutrition, exercise, Marital dissatisfaction, Unwanted Pregnancy: Gravidity, Food Access, Residence Characteristic, Delivery of Health Care, Insurance coverage, Marriage Family Characteristic, mental health, Psychological Stress, Anxiety: postpartum, risk factors, Postpartum depression, postpartum blues, Postpartum psychosis, Iran.”

### 2-5. Quality control

In order to achieve the maximum quality competence of the eligible articles and

evaluate the risk of bias, the quality evaluation was performed independently by two collaborating researchers. Any disagreement between the researchers was resolved through discussion at each stage. In this study, the Newcastle-Ottawa scale (NOS) was used for each type of observational study (cross-sectional, cohort, case-control). This tool is widely used in medical studies due to its simple design, easy to understand content and ease of use in qualitative evaluation of observational studies (21). The tool items are answered in a star way. This scale evaluates articles in terms of selection process (including four sections: sample clarity, sample size, non-response and measurement tools), comparability (one section: control of confounders) and other influencing factors and results (two aspects: evaluation of results and statistical tests) (22).

Based on this scale, articles are rated from zero (the weakest study) to 10 (the strongest study). Many studies have evaluated the validity of this tool (23). In this review study, articles with a score higher than 4 are considered as high quality studies, so one descriptive analytical article due to low quality (score 4) was excluded from the study. 62 articles were excluded from the study due to lack of indicators or statistical scales, and finally 42 articles were qualitatively analyzed and the required information was extracted (Table 2).

### 2-6. Data extraction

To reduce reporting bias and data collection errors, the two reviewers extracted the data independently using a pre-piloted form designed by the research team; any disagreements were resolved through discussion with a third reviewer. Information about each study is presented in the form of separate tables related to mediating factors affecting postpartum mental health specified by author's name and year of publication, study location,

sample size, number of patients and healthy individuals, mean age, Factors related to postpartum mental health,

statistical index used, confidence limits and comments (**Tables 3-5**).

**Table-1:** Keywords for search in Medline database (via PubMed).

Mesh Term	Synonyms(Entry Terms) AND syntax of PubMed
Mental health	("Mental health"[mh] OR "Mental health"[tiab] OR (Health[tiab] AND Mental[tiab]) OR "Mental Hygiene"[tiab] OR (Hygiene[tiab] AND Mental[tiab]))
Social Determinants of Health	("Social Determinants of Health" [mh] OR Social Determinants of Health[tiab] OR "Health Social Determinant" [tiab] OR "Health Social Determinants" [tiab])
Social Support	("Social Support"[mh] OR "Social Support"[tiab] OR (Support[tiab] AND Social[tiab]) OR "Online Social Support*"[tiab] OR ("Social Support*"[tiab] AND Online[tiab]) OR (Support[tiab] AND "Online Social"[tiab]) OR "Psychosocial Support System"[tiab] OR ( "Support System*"[tiab] AND Psychosocial[tiab]) OR "Social Support System*"[tiab] OR ("Support System*"[tiab] AND Social[tiab]) OR (System*[tiab] AND "Social Support"[tiab]) OR "Psychological Support System*"[tiab] OR ("Support System*"[tiab] AND Psychological[tiab]) OR (System*[tiab] AND "Psychological Support"[tiab]) OR( Factor*[tiab] AND Sociological[tiab]) OR "Sociological Factor"[tiab] OR "Sociological Phenomena"[tiab] OR (Phenomena[tiab] AND Sociological[tiab]) OR "Social Characteristics"[tiab] OR (Characteristics[tiab] AND Social[tiab]) OR "Social Trait*"[tiab] OR (Trait*[tiab] AND Social[tiab]) OR "Sociological Characteristic*"[tiab] OR (Characteristic*[tiab] AND Sociological[tiab]) OR "Social Attribute*"[tiab] OR (Attribute*[tiab] AND Social[tiab]))
Postpartum Period	("Postpartum period" [mh] OR "Postpartum period" [tiab] OR (Period[tiab] AND Postpartum[tiab]) OR Postpartum[tiab] OR "Postpartum Women" [tiab] OR (Women[tiab] AND Postpartum[tiab]) OR Puerperium[tiab] OR Lactation[tiab] OR "Milk Secretion*" [tiab] OR (Lactation*[tiab] AND Prolonged[tiab]) OR "Prolonged Lactation*" [tiab] OR "Milk Ejection" [tiab] OR (Ejection[tiab] AND Milk[tiab]) OR "Milk Let-down" [tiab] OR "Milk Let down" [tiab])
Iran	"Iran"[mh] OR iran[tiab] OR Islamic Republic of Iran[tiab]

**Table-2:** Quality assessment of the included studies based on Ottawa-Newcastle scale (NOS)

Author; year	Selection (Maximum 5 stars)	Comparability (Maximum 2 star)	Outcome/exposure (Maximum 3 star)	Overall score
Abbaszadeh; 2011	**	*	**	Satisfactory
Abdollahi& Zarghami ; 2014	**	**	**	Good
Abdollahi & Zarghami; 2015	**	**	**	Good
Abdollahi & Zarghami; 2016	**	**	**	Good
Abdollahi& Rohani; 2014	**	**	**	Good
Abdollahi & Aghajani; 2016	**	**	**	Good
Abedi et al; 2018	****/4a	**/a,b	**/2a	Good
Akbarzadeh; 2009	****/4a	**/a,b	*/1a	Good
Akbarzadeh; 2012	*****		**	Good
Aaflakseir; 2014	**	**	**	Fair
Afshari; 2019	**	**	**	Satisfactory
Ali Kamali; 2020	**	**	**	Satisfactory
Alipour; 2012	**	**	**	Fair
Amini; 2019	*****/4a	**/a,b	**/a,b	Good
Beiranvand; 2021	*****	*/a	**/2a	Good
Dolatian; 2010	****	**	***	Good
Ezzeddin; 2018	****	-	**	satisfactory
Goshtasbi; 2013	****	**	***	Good
Gholizadeh Shamasbi; 2020	***	*	**	Satisfactory
HAJIPOOR; 2021	**	**	**	satisfactory
Heidari; 2021	***	**	*	satisfactory
Iran pour; 2016	****	-	**	satisfactory
Iran pour; 2017	****	*	**	Good
Kamran pour; 2012	***	**	**	Good
Kheirabadi; 2009	****	-	**	satisfactory
Kheirabadi; 2010	**	*	***	Fair
Khorramirad; 2010	****	-	**	satisfactory
Matinnia; 2018	***	-	**	Satisfactory
Maracy; 2014	****	-	**	satisfactory
Mahmoodi; 2017	***	-	**	Satisfactory
Mousavi; 2011	***	-	**	satisfactory
Najafi-Sharjabad; 2021	****	*	**	Good
Nehbandan; 2016	*****	**	***	Good
Nehbandan; 2017	*****	**	***	Good
Pour Khaleghi a; 2017	****	-	**	Satisfactory
Pour Khaleghi b; 2017	***	-	**	Satisfactory

Rezaei; 2016	****	-	**	satisfactory
Sadat; 2014	***	**	***	Good
Salehi-Pourmehr; 2018	**	**	***	Fair
Taherifard; 2013	***	-	**	Satisfactory
Vaezi; 2019	***	-	**	Satisfactory
Zarghami; 2019	*****	**	***	Good

(\*), Number of stars earned from each section (selection, comparability and outcome / exposure); - No star

**Note1:** A study can be awarded a maximum of one star (\*) for each numbered item within the Selection and Exposure categories. A maximum of two stars can be given for Comparability (NOS for CASE-CONTROL Studies).

**Note2:** A study can be given a maximum of one star (\*) for each numbered item within the Selection and Outcome categories. A maximum of two stars can be given for Comparability (NOS for Cohort Studies: good, fair, and poor).

**Note3:** A study can be given a maximum of one star (\*) for each numbered item within the Selection and Outcome Categories, Except Part A in Question 4 For Selection and Part B in Question 1 For Outcome. A maximum of two stars can be given for Comparability (NOS for cross sectional Studies: Very Good, Good, Satisfactory and Unsatisfactory).

### 2-7. Synthesis of results

The most important challenge faced by the researchers in this study was the impossibility of meta-analysis to combine the quantitative results of studies to provide more accurate results. In fact, the authors' intention at the beginning of this research was to perform an accurate statistical technique to obtain stronger evidence in the subject matter; however, it was not possible due to the existence of very severe methodological heterogeneity and lack of quantitative information in some studies, along with the heterogeneity and potential reasons for these differences.

### 2-8. Ethical consideration

The Research Council of SBMU under the ethics code of IR.SBMU.RETECH.REC. 1399. 177 approved this study.

### 3- RESULTS

In this study, a systematic review was conducted on articles published between 2005 and September 2021. After evaluating the quality of articles and reviewing the studies in terms of their eligibility to enter the final stage of

information extraction, finally 42 studies were qualitatively analyzed. Among these articles, 19 were cross-sectional, 15 cohort, 5 case-control and 3 descriptive correlational studies. The total number of samples in the present study was 39216 people. In total, the mediating factors fell into five general categories, including factors related to obstetrics, pregnancy, and childbirth; psychosocial conditions; factors related to postpartum status; behavioral factors; material status or conditions and health care.

#### a) Factors related to obstetrics, pregnancy, and childbirth

Factors such as type of pregnancy, presence of disease in pregnancy, history of postpartum depression, type of delivery, pre-pregnancy obesity, sex of the baby (gender disappointment), complications of puerperium, place of delivery (public and private center), fear of childbirth and medication therapy during pregnancy were included in this category., The results of studies that have pointed out the relationship between these factors and postpartum mental health are reported in the following (Table 3).



**Table-3:** Characteristics of studies on obstetrics, pregnancy and childbirth factors related to postpartum mental health in Iran (2005-2021)

study	Type	Sample Size	Mean Age	Factors related to postpartum mental health	OR/RR (95% CI)	Comment
Abdollahi& Zarghami et al., (2014); Mazandaran (36)	cohort	2279	25.2 ± 5.2	Unwanted Pregnancy	2.5 (1.69-3.7)	-Unwanted pregnancy increases the chance of PPD. GDM increases the chance of PPD.-
				Gestational diabetes	2.93 (1.46-5.88)	
Abdollahi& Rohani et al.,(2014); Mazandaran (25)	cohort	2083	26.07 ± 5.21	Non-planned Pregnancy	1.55 (1.20-1.99)	-Unplanned pregnancy increases the chance of PPD. - In general, the history of some diseases were considered as independent predictors of PPD. -A history of postpartum depression is an independent predictor of current PPD probability. -Complications of the postpartum period increase the likelihood of PPD within 8 w postpartum.
				Obstetrics complications	1.64 (1.15-2.34)	
				Recurrent UTI	1.55 (1.14-2.11)	
				Anemia	1.61 (1.16-2.24)	
				Medical diseases	1.39 (1.02-1.89)	
				History of PPD	2.7 (1.57-4.62)	
				Puerperal complications	1.58 (1.26-1.99)	
Abdollahi & Aghajani et al., (2016); Mazandaran (51)	cohort	837	23.5 ± 4.1	Place of delivery	1.91 (1.14-3.20)	Delivery in a private hospital predicts an increased risk of PPD with a higher chance.
Abedi et al., (2018); Izeh (28)	case-control	120	Case: 26.43±4.27,Control: 27.6±4.73	Unwanted Pregnancy	4.80 (1.11-20.61)	The chance of PPD in women with wanted pregnancies is 4 times less.

Afshari et al., (2020); Ahvaz (43)	cross-sectional	505	27	History of PPD	2.61 (1.53-4.44)	A history of postpartum depression significantly increases the chance of PPD.
Akbarzadeh et al., (2009); Shiraz (24)	case-control	400	19-29 (60.5%)	Unwanted Pregnancy	2.3(1.53-36)	-The type of pregnancy has a significant effect on the incidence of MB. -Some complications during pregnancy are significantly associated with the chance of developing MB.
				Dysuria Or Frequency	1.9(1.3-2.9)	
				Headache	1.9 (1.2-2.9)	
Akbarzadeh et al., (2012); Shiraz (34)	retrospective cross-sectional	400	32 ± 3.78	Unwanted Pregnancy	2.3 (1.53-3.6)	This type of pregnancy is effective in the prevalence of psychological problems.
Alikamali et al., (2020); Zarand (28)	cross sectional	400	NR	Unintended Pregnancy	1.65 (1.37-2.00)	- Unwanted pregnancy increases the chance of PPD. -Cesarean section increases the chance of PPD. -Dissatisfaction with the sex of the baby increases the likelihood of the mother experiencing PPD symptoms.
				Mode of Delivery( C/S)	1.31 (1.14-1.150)	
				Interest in sex of newborn	1.10 (0.98-1.23)	
Beiranvand et al., (2021); Dezfoul (45)	descriptive-analytical/ case-control	1424	27.47±5.40	Mode of Delivery (C/S)	1.67 (1.27-2.19)	Cesarean section significantly increases the chance of PPD compared to normal delivery.
Ezzeddin et al., (2018); Tehran (38)	cross sectional	325	28.62 ±5.67	pregnancy complications	1.853 (1.083-3.170)	Pregnancy problems are significantly associated with the chance of developing PPD.
Goshtasebi et al., (2013); Sari (39)	cohort	2081	26.6±4.0	Anemia (Hb <11 g/dL)	4.64 (1.33-16.8)	Low maternal anemia at delivery increases the chance of PPD.

Gholizadeh Shamasbi et al., (2020); Tabriz (50)	cross-sectional	530	27.0 (5.4)	Interest in sex of newborn	Only mother	-0.78 (-10.5 to 9.0)	Parents' dissatisfaction with the baby's gender increases the likelihood of postpartum mental health disorders; But in general, it has no significant relationship with maternal performance.
					Both mother and her husband	4.13 (-3.4to 11.7)	
					None	-0.67 (-9.3 to 8.0)	
Khorramirad et al., (2010); Qom (44)	Cross-sectional	300	26.5 ± 5.2	History of PPD		1.2 (1.1-4.7)	A history of postpartum depression has a significant relationship with the chance of developing PPD.
Kheirabadi et al., (2009); Isfahan (29)	cross-sectional	6627	26.03 (5.1)	Desired Pregnancy but bad timing		1.64 (1.40-1.91)	<p>- Wanted pregnancies at the wrong time and unwanted pregnancies increase the chances of PPD in rural women.</p> <p>-In general, parents' attitudes toward child gender (dissatisfaction) are a high risk factor for PPD symptoms in rural women.</p>
				Undesired		1.55 (1.30-1.86)	
				Interest in sex of newborn/Parental attitude to child's sex	Severe/ Moderate vs. Mild/Non depressed Yes	1.9 (1.07)	
					Severe/ Moderate vs. Mild/Non depressed NO	1.71 (1.44-2.02)	
Severe vs. Others yes	1.23 (1.07-1.42)						

					Severe vs. Others NO	1.79 (1.48-2.18)	
Kheirabadi et al., (2010);Isfahan (35)	prospective cohort	1291	NR	Unwanted Pregnancy		1.26 (0.85-1.87)	Wanted pregnancies at the wrong time and unwanted pregnancies increase the chance of PPD (both measurement tools).
				Desired but not at that time		1.34 (0.87-2.06)	
Kamran pour et al. (2012); Rasht (46)	Cohort	310	C/S:27.44(5/01) NVD: 26.24(5/66)	Mode of Delivery (C/S)		2.53 (0.93-6.88)	The chance of PPD in cesarean section women is higher than normal delivery.
Matinnia et al., (2018); Hamadan (30)	cross sectional	451	25	Unplanned Pregnancy		0.07 (0.01-0.33)	-Unwanted and unplanned pregnancies were significantly associated with PPD. -Dissatisfaction with the sex of the baby Non-significantly increases the chances of PPD in the mother. -In general, the type of delivery (C / s) had a significant relationship with the chance of developing PPD. -Fear of pregnancy increases the chances of PPD in mothers.
				Interest in sex of newborn		1.42 (0.99-2)	
				Mode of Delivery (C/S)	Elective C/S	1.41 (1.03-1.96)	
					Emergency C/S	1.82 (1.03-1.96)	
Fear of childbirth		1.82 (1.26-2.60)					
Mahmoodi et al., (2017); Saqqez (47)	cross-sectional	306	NR	Mode of Delivery	Somatic symptoms	0.08 (-2.05 to -0.49)	In general, the type of maternal delivery is a significant predictor of three different dimensions in PPD.
					Severe depression	0.02 (-1.53 to -0.3)	
					Psychological distress	0.12 / -5.13to -2.07)	
Najafi-Sharjabad et al., (2021); Bushehr (31)	cross-sectional	290	28.48 ± 5.50	Desired Pregnancy		0.62 (0.01-0.33)	The tendency to become pregnant reduces the chance of PPD (Protective effect)

Nehbandani et al., (2016); Zaboul (40)	cohort	262	GDM group: 31.50±5.42 Control: 31.25±5.87	Gestational diabetes		RR: 1.79 (1.37-2.20)	GDM is a potential risk factor for PPD.
Nehbandani et al., (2017); Zaboul (37)	cohort	262	GDM group: 31.50±5.42 Control: 31.25±5.87	Gestational diabetes		RR: 1.88 (1.53-2.22)	GDM is a potential risk factor for MB.
Rezaei et al., (2016); Ilam (41)	cross sectional	380	29.81 (5.5).	History of disease in pregnancy		10.43 (2.32-46.92)	A history of disease in pregnancy is an independent predictor of PPD.
Pour Khaleghi et al., (2017 a); Kerman (48)	Correlational descriptive	205	25.95 ± 4.09	Mode of Delivery		24.86 (7.41-83.32)	PPD is significantly higher in women with C / S than in NVD.
Sadat et al., (2014); Kashan (35)	prospective	300	NR	Unwanted Pregnancy		6.702 1.295- 34.676)(	Unwanted pregnancy significantly increases the chance of PPD.
Salehi-Pourmehr et al., (2018); Tabriz (49)	cohort	307	Normal: 25.38(5.58) Class 2–3 obese: 28.95 (5.02)	pre-pregnancy obesity	6-8weeks of postpartum	7.46 (3.30-16.89)	In general, pre-pregnancy obesity increases the risk of PPD many times during pregnancy and the postpartum period.
					1 year after birth	1.83 (0.67-5.02)	
Taherifard et al. (2013); Ilam (33)	Cross-sectional	197	27.9 ± 5.2	Unplanned Pregnancy		2.11 (1.44-2.56)	-Unplanned pregnancies significantly increase the risk of PPD. -Cesarean delivery significantly increases the chance of PPD.
				Mode of Delivery (C/S)		1.66 (1.09-2.0)	
Vaezi et al., (2019); Tehran (52)	cross-sectional	200	28± 4.38	Medication in pregnancy		2.126 (1.205-5.238)	Drug use during pregnancy is significantly associated with the risk of PPD.
Zarghami et al., (2019); Mazandaran (42)	cohort	2279	25.05 ± 5.2	Medical diseases		1.99 (1.03-3.85)	In general, PPD is more likely to occur in rural women with medical conditions and GDM.
				Gestational diabetes		0.42 (0.19-0.95)	

Factors such as type of pregnancy (12 studies) (24-35), unplanned pregnancy (3 studies) (25, 30, 33), presence of disease in pregnancy (9 studies) (24, 25, 36-42), history of postpartum depression (3 studies) (25, 43, 44), type of delivery (7 studies) (28, 30, 33, 45-48), pre-pregnancy obesity (1 study)(49), sex of the baby (gender disappointment) (4 studies)(28-30, 50), complications of puerperium (25), place of delivery (public and private center) (51), fear of childbirth(30) and medication therapy during pregnancy(52) were included in this category.

#### **b) Psychosocial status:**

Factors such as marital status and relationships, history of depression in pregnancy, anxiety in pregnancy, general health status, parental self-efficacy, social support, social isolation, adverse life events, type of attitude towards spouse, history of previous depression or family history of depression, maternal cognitive-emotional strategies, mother-child bond, and relationships with others were also factors associated with postpartum mental health (**Table 4**).

Factors such as marital status and relationships (8 studies)(24, 31, 34, 36, 44, 51, 53, 54), history of depression in pregnancy (6 studies) (25, 26, 30, 33, 44, 53), anxiety in pregnancy (3 studies) (25, 37, 55), psychological pressure, daily stress, and poor general health (6 studies) (25, 26, 30, 36, 42, 53), parental self-efficacy (6 studies), social support (11 studies) (25, 26, 30, 31, 33, 34, 36, 44, 48, 53, 56), social isolation (5 studies) (25, 26, 42, 51, 53), adverse life events (5 studies) (25, 32, 37, 44, 45), type of attitude towards spouse (2 studies) (24, 34), history of previous depression (7 studies)(29, 31, 35, 43, 44, 52, 54) or family history of depression (3 studies) (25, 26, 53), maternal cognitive-emotional strategies (57), mother-child bond (58), and relationships with others (2 studies) (33,

54) were also factors associated with postpartum mental health.

#### **c) Behavioral factors**

Husband's Drug abuse, domestic violence or harassment, physical activity, and sleep quality were among the other mediating factors in this category (**Table 5**).

Drug abuse by husbands (2studies) (59, 60), domestic violence or harassment (3studies) (59-61), physical activity (60), and sleep quality (62) were among the mediating factors in this category.

#### **d) Factors related to postpartum status:**

Neonatal abnormalities, low Apgar score, birth weight, neonatal problems, maternal support in infant care, and infant illness after delivery are other mediating factors associated with postpartum mental health (**Table 5**).

Neonatal abnormalities (2studies)(43, 45), low Apgar score (24), maternal support in infant care (50), and infant illness after delivery (52) are other mediating factors associated with postpartum mental health.

#### **e) Material status and health care:**

Delays in receiving prenatal care, nutritional status, and access to food were some other mediating factors reviewed in some studies (**Table 5**).

Delays in receiving prenatal care (25), nutritional status (4studies) (27, 63-65), and food insecurity (2studies) (28, 38) were some other mediating factors reviewed in some studies.

**Table-4:** Characteristics of studies on psychosocial factors related to postpartum mental health in Iran (2005-2021)

Study	Type	Sample Size	Mean Age	Factors related to postpartum mental health	OR/RR (95% CI)	Comment	
Abdollahi& Rohani et al., (2014); Mazandaran (25)	cohort	2083	26.07 ± 5.21	Low marital satisfaction	1.6 (1.22-2.1)	<ul style="list-style-type: none"> <li>-Low marital satisfaction during pregnancy increases the chance of PPD.</li> <li>-Poor general health increases the chance of PPD.</li> <li>-Anxiety in the first and second trimesters of pregnancy increases the risk of PPD.</li> <li>-Low social support in pregnancy doubles the chances of PPD.</li> <li>-Family history of depression increases the chance of PPD.</li> <li>-The high number of recent life events increases the chance of PPD significantly.</li> <li>-Social isolation (low / moderate) increases the chance of PPD.</li> <li>-Poor or moderate parental self-efficacy increases the chance of PPD.</li> <li>-A history of maternal depression between 32-42 weeks and the first and second trimesters of pregnancy increases the risk of PPD.</li> </ul>	
				General health status	3.36 (2.66-4.23)		
				Anxiety in pregnancy	2.1 (1.68-2.62)		
				Low Social support	2.009 (1.48-2.71)		
				Family history of depression	2.58 (1.85-3.61)		
				Recently life events	≥4		2.08 (1.59-2.71)
					2-3		1.42 (1.06-1.9)
				Social isolation	Low		1.98 (1.47-2.67)
					Medium		1.15 (0.86-1.53)
				Postnatal parenting self-efficacy	Low		1.62 (1.19-2.19)
					Medium		1.08 (0.82-1.44)
				pregnancy depression	32-42w		1.39 (1.34-1.43)
T1,T2	2.75 (2.08-3.62)						

Abdollahi & Zarghami et al., (2014); Mazandaran (36)	cohort	2279	25.2 ± 5.2	pregnancy depression 1st/2nd trimesters	2.04 (1.39-3.01)	<ul style="list-style-type: none"> <li>-A history of depression in the first two months of pregnancy increases the risk of PPD.</li> <li>-Anxiety during pregnancy increases the risk of PPD.</li> <li>-Poor general health increases the chance of PPD.</li> <li>-Family history of depression increases the chance of PPD.</li> <li>-The high number of recent life events increases the chance of PPD.</li> <li>-Social isolation (low / moderate) increases the chance of PPD.</li> <li>-Low or moderate social support during pregnancy increases the risk of PPD.</li> <li>-Poor parental self-efficacy increases the likelihood of PPD.</li> <li>-Moderate maternal self-efficacy has a protective effect on PPD.</li> </ul>	
				Anxiety in pregnancy	1.65 (1.26-2.17)		
				General health status	2.02 (1.54-2.65)		
				Family history of depression	1.79 (1.1-2.91)		
				Recently life events	≥4		1.49 (1.08-2.05)
					2-3		1.12 (0.8-1.58)
				Social isolation	Low		1.53 (1.06-2.19)
					Medium		1.13 (0.87-1.58)
				Social support	Low		1.58 (1.08-2.3)
					Medium		1.22 (0.87-1.71)
Postnatal parenting self-efficacy	low	1.96 (1.36-2.84)					
	medium	0.7 (0.62-0.78)					
Abdollahi & Zarghami et al., (2015); Mazandaran (53)	cohort	2279	26.37 (5.22): Non-depressed 26.66 (5.40): depressed	poor marital relationship	0.95 (0.91-0.99)	<ul style="list-style-type: none"> <li>- Poor marital relationships in pregnancy are significantly associated with the persistence of depressive symptoms.</li> <li>-Experiencing depression in the first and second months of pregnancy</li> </ul>	
				pregnancy depression 1st/2nd trimesters	1.54 (0.99-2.41)		
				psychological distress	1.03 (1.01-1.05)		



				low maternal and parental self-efficacy	0.88 (0.77-0.99)	<p>increases the risk of PPD.</p> <p>-Psychological distress based on GHQ-28 scores is an independent predictor of the persistence of depressive PPD symptoms.</p> <p>-Low maternal and parental self-efficacy increases the chances of persistent postpartum depressive symptoms.</p> <p>-Poor social support increases the chances of persistent postpartum depression symptoms.</p> <p>-Social isolation in pregnancy increases the chance of PPD.</p> <p>-Family history of depression increases the chances of persistent postpartum depression symptoms.</p>
				Poor Social support during pregnancy	1.03 (1.003-1.07)	
				Social isolation	1.07 (1.02-1.12)	
				History of depression	1.83 (1.08-3.11)	
Abdollahi & Zarghami et al., (2016); Mazandaran (26)	cohort	2279	25.9 ± 5.2	increased marital relationship	0.94 (0.9-0.99)	<p>-Increasing marital satisfaction reduces the likelihood of PPD.</p> <p>-Psychological discomfort in pregnancy predicts PPD within two months of delivery.</p> <p>-The chances of PPD are lower in mothers who have sufficient parenting skills.</p> <p>-Perceived social isolation is associated with the chance of developing PPD.</p> <p>-High social support during pregnancy reduces the chance of PPD to a lesser extent.</p>
				psychiatric distress in pregnancy	1.06 (1.04-1.09)	
				sufficient parenting skills	0.78 (0.69-0.88)	
				Social isolation	1.06 (1.01-1.12)	
				Social support	Medium	
High	1.04 (1.01-1.08)					
Low	1.1 (0.69-1.77)					

Abdollahi & Aghajani et al., (2016); Mazandaran (51)	cohort	837	23.5 ± 4.1	lack of marital satisfaction	0.91 (0.86-0.97)	- Lack of marital satisfaction is significantly associated with PPD. -Parental self-efficacy has a protective effect on the occurrence of PPD.	
				parental self-efficacy	0.74 (0.65-0.85)		
Aaflakseir et al. (2014); shiraz (58)	Correlation	140	33.5 ± 7.04	Mother-child bond Disorder	8.52 (3.34-21.70)	PPD is a significant predictor of Mother-child bond disorder and plays a positive role in all its components.	
Akbarzadeh et al., (2009); Shiraz (24)	case-control	400	Case:200 Control:200	Marital conflicts	1.99 (1.31-3)	- Couples' conflicts increase the chances of MB. -Family support of the mother during pregnancy is associated with the incidence of MB. -Sad life events increase MB's chances. -The attitude of pregnant women towards the ideal of a husband is related to the chance of developing MB.	
				Social support	1.72 (0.99-3)		
				Recently life events	1.9 (1.3-2.9)		
				Attitude toward the spouse	1.6 (1.1-2.6)		
Akbarzadeh et al., (2012); Shiraz (34)	retrospective cross-sectional	400	32 ± 3.78	Marital conflicts	1.99 (1.31-3.0)	-Couples disagreements increase the chances of PPD. -Recent adverse events significantly increase the chances of PPD. - Support from family members and spouses had a significant effect on the incidence of PPD in both groups. -In general, the type of attitude towards the spouse has an important effect on the prevalence of PPD.	
				Recently life events	1.9 (1.3-2.9)		
				Attitude toward the spouse	Ideal		1 (1.3-3.0)
					So-so		1.6 (1.1-2.6)
Social	Family	1.72					

				support	members	(0.99-3)	
					Spouse and family members	1 (1.2-2.3)	
Afshari et al., (2020); Ahvaz (43)	cross-sectional	505	27	Recently life events		4.1 (2.19-7.80)	-The occurrence of accidents in recent years increases the chances of PPD.  -Previous history of depression increases the chance of PPD.
				History of depression		3.26 (1.63-6.49)	
Alipour et al., (2012); Qom (55)	prospective longitudinal	160	22.87	Anxiety in pregnancy	State anxiety(28 w)	3.20 (1.52-6.72)	Both State and trait anxiety increase the chances of PPD.
					State anxiety(38 w)	2.91 (1.33-6.39)	
					trait anxiety(28 w)	3.33 (1.61-6.88)	
					trait anxiety(38 w)	3.30 (1.51-7.22)	
Haji poor et al., (2021); Rasht (56)	cross-sectional	300	29±5.3	Social support	spouse	0.96 (0.94-0.98)	Social support from spouses and parents has a greater protective effect on the occurrence of PPD.
					parents	0.98 (0.97-1)	

					spouse's parents	1 (0.98-1.01)	
					relatives and friends	1.01 (1-1.03)	
Khorramirad et al., (2010); Qom (44)	Cross-sectional	300	26.5 ± 5.2	marital relationship		3.4 (1.1-8.8)	-Low marital satisfaction increases the likelihood of PPD. -A history of depression in a recent pregnancy increases the chance of PPD. -A history of depression after previous deliveries and in recent pregnancies is significantly associated with the occurrence of PPD.
				pregnancy depression		2.9 (1.5-6.8)	
				History of depression		1.7 (0.02-4.7)	
				Social support		1.3 (0.1-3.2)	
				Recently life events	Experienced a crisis in one Last year	3.2 (1.5-6.8)	Experiencing a crisis in the past year increases the chances of PPD.
Loss history Parents at previous ages From 11 years old	0.7 (0.9-2.6)						

Kheirabadi et al., (2009); Isfahan (29)	cross-sectional	6627	26.03 (5.1)	lifetime episode of depression	Severe/ Moderate vs. Mild/Non depressed	2.46 (2.10-2.87)	Overall, a previous history of depression increased the chances of PPD in rural women.
					Severe vs. Others	2.71 (2.29-3.21)	
Kheirabadi et al., (2010); Isfahan (35)	prospective cohort	1291	NR	lifetime episode of depression	Beck-score History of depression	2.07 (1.45-2.97)	A previous history of depression and depression in the current pregnancy increases the chance of PPD.
					EPD-score History of depression	1.87 (1.25-2.79)	
Mousavi et al., (2011); Kashan (54)	cross-sectional	204	NR	marital relationship		4.147 (1.607-10.704)	<ul style="list-style-type: none"> <li>- Low maternal satisfaction with marriage increases the chances of PPD.</li> <li>-Decreased contact with friends and acquaintances increases the chances of PPD.</li> <li>-A history of depression has a significant relationship with the chance of developing PPD.</li> <li>-Proper behavior of the spouse reduces the chances of developing depression.</li> <li>-Intimate relationships with her family reduce chances of developing</li> </ul>
				Poor communication with friends and acquaintances		2.179 (1.181-4.020)	
				history of depression		0.382 (0.197-0.739)	
				Marital status	husband's appropriate behavior	0.166 (0.43-0.645)	
Woman	0.336						

					intimacy with family	(0.147-0.769)	depression.
Matinnia et al., (2018); Hamadan (30)	cross sectional	451	25		pregnancy depression	2.14 (1.69-2.71)	- Pregnancy depression increases the chance of PPD. -Mild perceived stress reduces the likelihood of PPD. -Poor social support increases the chances of PPD.
					LOW Perceived stress	0.96 (0.93-9.81)	
					Perceived social support	1.41 (1.03-1.96)	
Najafi-Sharjabad et al., (2021); Bushehr (31)	cross-sectional	290	28.48 ± 5.50		marital relationship	0.16 (0.02-0.96)	-Satisfaction with marital relationships is less likely to cause PPD. -High social support is associated with lower incidence of PPD (protective effect). -Women with a history of depression are four times more likely to develop PPD.
					Social support	0.92 (0.88-0.95)	
					History of depression	4.47 (1.40-14.24)	
Pourkhaleghi et al., (2017 b); Kerman (57)	Correlational descriptive	205	25.95 ± 4.09	maternal emotional cognitive strategies	Acceptance	1.46 (0.63-1.26)	-PPD can be predicted by some mothers' cognitive-emotional strategies. -The three types of information support - emotional, kindness and interaction - are significant predictors of PPD.
					Re-focus positive	1.24 (1.10-1.39)	
					Focus on planning	0.89 (0.79-0.95)	

Pourkhaleghi et al., (2017 a); Kerman (48)					Self- blame	0.862 (0.77-0.95)	
					Catastrophizing	0.857 (0.75-0.97)	
					Rumination	0.887 (0.81-0.96)	
					Blame others	0.766 (0.69-0.84)	
				Social support	Information, emotional support	1.225 (1.15-1.30)	
					Kind support	1.185 (1.06-1.31)	
					Interaction support	1.163 (1.02-1.31)	
Taherifard et al., (2013); Ilam (33)	Cross-sectional	197	27.9 ± 5.2	pregnancy depression		2.61 (1.67-3.11)	<p>-A history of depression (mild, moderate, severe) increases the risk of PPD.</p> <p>-Women with poor family relationships have a higher chance of PPD in their current family.</p> <p>-Inadequate family support has a significant risk of developing PPD.</p>
				poor family relationships		1.37 (1.07-1.92)	
				Social support	Mild	2.61 (1.67-3.11)	
					Moderate/	2.10	

					severe	(1.37-2.81)	
					No/occasionally	2.02 (1.16-3.31)	
Vaezi et al., (2019); Tehran (52)	cross-sectional	200	28± 4.38	History of depression		5.074 (1.972-13.055)	A previous history of depression and depression in the current pregnancy increases the chance of PPD.
Zarghami et al., (2019); Mazandaran (42)	cohort	2279	25.05 ± 5.2	General health status		1.03 (1.00-1.05)	-Health problems in pregnant women in rural areas increase the chance of PPD compared to urban women. - -Social isolation in urban women compared to rural women predicts the chance of developing PPD. -Parental self-efficacy has a protective effect on the incidence of PPD in urban and rural women.
				Social isolation		1.04 (0.79-0.98)	
				Postnatal parenting self-efficacy	Urban	0.88 (1.00-1.09)	
Rural	0.81 (0.72-0.92)						



**Table-5:** Characteristics of studies on the behavioral status or material condition and Postpartum Factors related to postpartum mental health in Iran (2005-2021)

Study	Type	Sam ple Size	Mean Age	Factors related to postpartum mental health	OR/RR (95% CI)	Comment
Abbaszadeh et al., (2011); Kerman (59)	cross sectional	450	27.18	Husband's drug abuse	3.87 (1.69-8.86)	-Drug abuse by a spouse increases the chance of PPD.  -The highest probability / chance of PPD is related to domestic violence.
				domestic violence	4.76 (2.9-7.82)	
Abdollahi& Rohani et al., (2014); Mazandaran (25)	cohort	208 3	26.07 ± 5.21	abuse	1.11 (1.06-1.16)	Abuse against mothers increases the chances of PPD (independent factor).
Dolatian et al., (2010); Marivan (61)	cohort	240	26.02±5.53	Violence	RR=3.30 (2.1-5)	Violent women are more likely to develop PPD than non-violent women.
Heidari et al., (2021); Azarshahr (60)	Case- control	595 4	29.7	Husband's Drug Abuse/Smoking	7.51 (3.29-11.13)	- Mothers with smoking spouses are more likely to be depressed during pregnancy and postpartum than mothers with non-smoking spouses.  -The risk of developing depression during pregnancy and after childbirth increases in mothers who do not have daily physical activity.
				Physical activity	5.15 (3.86-6.73)	
Iran pour et al., (2016); Ardabil (62)	cross sectional	360	26.5±5.2 (PPD) 27.4±5.5 ( No PPD)	Poor Sleep Quality	3.34 (2.04-5.48)	Poor maternal sleep quality increases the chance of PPD.

Afshari et al., (2020); Ahvaz (43)	cross-sectional	505	27	Congenital abnormalities	2.99 (1.44-5.90)	Congenital anomalies increase the chance of PPD.	
Abdollahi& Rohani et al., (2014); Mazandaran (25)	cohort	208 3	26.07 ± 5.21	delayed prenatal care	1.01(1.001-1.03)	Delays in accessing prenatal care increase the risk of PPD in mothers to some extent.	
Abedi et al., (2018); Izeh (27)	case-control	120	Case: 27.6±4.73 Control: 26.43±4.7	Access to food/ Vitamin D	3.3(1.32-8.24)	Women with vitamins D <20 ng / ml are more likely to develop PPD.	
Akbarzadeh et al., (2009); Shiraz (24)	case-control	400	19-29 (60.5%)	Neonatal problems	Apgar score<3	4.9(1-24.2)	A low Apgar score in the fifth minute significantly increases the chances of MB.
					Apgar score:4-7	2.1(1.2-3.4)	
					Baby weight until 1500gr/	11.5 (5.2-25.5)	The weight of the baby at birth has a significant relationship with the chance of MB.
					Baby weight 1501-2500gr/	2.1(1.1-3.7)	
					Baby weight >3500gr	1.9(1.1-3.2)	
					Hospitalization in	3.9(2-7.8)	Neonatal problems increase the chances of MB.

					NICU		
					Meconium aspiration	17.5 (5.3-58.5)	
Alikamali et al., (2020); Zarand (28)	cross sectional	400	NR	Severely food insecure		2.08(2.04-2.13) (P<0.001)	The risk of PPD increases in women with severe food insecurity.
Amini et al., (2019); Ahvaz (63)	case-control	163	Case: 28.4± 6.6 Control: 27.2± 5.6	Access to food (dietary intakes)	riboflavin	0.10(0.02-0.39)	<p>- High intake of fat-soluble vitamins such as vitamin A and some carotenoids, including beta-cryptoxanthin, increase the risk of PPD.</p> <p>-In general, intake of some macronutrients and saturated and unsaturated fatty acids, iron, vitamin B6, have a protective effect on the occurrence of PPD.</p>
					pyridoxine	0.03(0.01-0.32)	
					folate	0.01(0.00-0.01)	
					cobalamin	0.01(0.00-0.01)	
					selenium	0.79(1.36-3.32)	
					iron	0.68(0.24-0.94)	
					iodine	0.36 (1.10-1.38)	
					vitamin A	114.29 (17.85-118.12)	
					beta-cryptoxanthin	4.85(1.49-15.69)	
					total fats	0.01(0.00-0.01)	
					cholesterol	0.06(0.01-0.08)	
thiamine	0.01(0.00-0.01)						
Beiranvand	descriptive-	142	27.47±5.40	newborn's birth defect		2.09	Congenital birth defects are associated with an

et al., (2021); Dezful (45)	analytical/ case-control	4			(1.10-3.94)	increased chance of PPD.
Ezzeddin et al., (2018); Tehran (38)	cross sectional	325	28.62 ±5.67	food insecurity	6.690 (3.118-14.353)	Food insecurity with moderate to severe hunger is a strong predictor of PPD.
Iran pour et al., (2017); Ardabil (64)	cross sectional	360	NR	Access to food/ caffeine	quartile1 1.8(0.9-3.6)	The chance of developing PPD in caffeine consumption in quartile4 is significantly increased.
					quartile3 1.2(0.63-2.4)	
					quartile4 2.1(1.1-4.1)	
Gholizadeh Shamasbi et al., (2020); Tabriz (50)	cross-sectional	530	27.0 (5.4)	Helping mother with baby care/ maternal functioning	4.58 (2.7-6.4)	Mothers' support in caring for the baby contributes to a high level of postpartum mental health.
Maracy et al., (2014); Ardabil (65)	cross sectional	771	NR	Access to food/ Fruit and vegetable pattern	Quarter3 0.60(0.53-1.29)	The dietary pattern of fruits and vegetables reduces the chances of developing PPD.
					Quarter4 0.52(0.32-0.84)	
Vaezi et al., (2019); Tehran(52)	cross-sectional	200	28± 4.38	Infant disease	2.513 (1.205-5.238)	Neonatal illness increases the risk of PPD.

#### 4- DISCUSSION

The current study aimed to systematically review the studies conducted on explaining and identifying the mediating social determinants affecting postpartum mental health and the relationship between these factors as well as the consequences of postpartum mental health in Iran. These factors were extracted from related texts and articles, and were classified into five dimensions within the framework of the WHO model as follows: factors related to obstetrics, pregnancy, and childbirth; psychosocial conditions; factors related to postpartum status; behavioral factors; material status or conditions and health care. Each of the dimensions of the mediating factors included many related variables. The findings confirm the ability of the WHO model in specifying the mediating social determinants of health regarding postpartum mental health.

According to findings, in the category of obstetrics and pregnancy-related factors concerning postpartum mental health, Most of the studies were related to the type of pregnancy (intended and unintended); the majority of these studies evaluated the relationship between this variable and maternal postpartum depression (PPD). Unintended pregnancy is a major public health problem worldwide. It affects not only women, but also their families and society. Globally, 74 million women in low- and middle-income countries have had unintended pregnancies, which includes Mistimed and unwanted pregnancies (66). The results of studies related to this variable showed a significant increase of PPD in women with unintended and unplanned pregnancies. Findings of a path analysis study in Korea showed a statistically significant effect of the unintended pregnancy on maternal depression and parental stress. Maternal depression scores and parental stress scores were explained on average by

marital conflict and fathers' involvement in child care. Efforts to increase fathers' involvement in child care and reduce marital conflicts may be helpful in reducing the adverse effects of unintended pregnancies on maternal mental health during pregnancy and postpartum (67).

Among the studies investigated in the present systematic review, Kheirabadi et al. (2009) studying the rural women in Isfahan found that the negative effects of some variables, including unintended pregnancy on PPD (29). Similarly, Mohamed et al. A cross-sectional study on 554 rural women in Sohag in Egypt, has reported that women in rural areas were more likely to have unintended pregnancies than women in urban areas (68). However, two other studies in sub-Saharan Africa (69) and rural areas of Bangladesh (70) have had different findings. This difference may be due to differences in social demographic characteristics, such as the age of the sample, so that younger women are more fertile and more likely to have sex than older women, and may be embarrassed to receive family planning advice from relatives or family care organizations, or a misunderstanding about contraceptive use may lead to failure in preventing pregnancy, and as a result, unintended pregnancies occurs in them.

In the present study, Gestational Diabetes (GD) was reported as a potential risk factor that was able to increase the chance of PPD in mothers by more than 2 times (36). Likewise, the results of a systematic review in 2019 on 18 studies showed that GDM significantly increased the risk of PPD. Therefore, gestational diabetes can be considered a risk factor for PPD and it is essential that pregnant mothers with GDM be screened for PPD (71). Zarghami et al. (2019) found that rural women were more likely to suffer from health problems, including gestational diabetes, than urban women, and these women were more

likely to develop PPD (42). These findings are consistent with the research findings in a rural area in Beirut, which indicated that medical illnesses and maternal health problems were observed only in rural women; by changes in function and disorders of the nervous system, these problems may result in stress and the vulnerability of these women to depression. Additionally, not discovering the relationship between medical factors, health problems, and depression in urban women can be attributed to their greater access to health facilities and higher socio-economic levels (72).

Among the mediating determinants in the category of obstetrics and pregnancy-related factors, the highest chance of PPD risk in women with an average of 25 years of age was related to cesarean delivery in the study of Pour Khaleghi et al. (2017)(48). This finding is consistent with the study by Doke et al. (73), who reported a significant association between the type of cesarean section and postpartum depression in younger women; considering the fact that cesarean delivery is associated with much more physical complications compared to normal delivery and the mother will also face many behavioral limitations (74). Besides, the physical complications of surgery can influence the real and mental image of the body in mothers with a cesarean delivery. The results of a systematic review and meta-analysis in 2019 showed that cesarean delivery, regardless of its type, is a risk factor for increased PPD (75), which is consistent with the findings of the present study. Sun et al. (2021) concluded that women who have a cesarean delivery, especially emergency type, are more likely to suffer from mild postpartum depression. Thus, it is essential that this group of women are evaluated and monitored for the development of postpartum mental disorders and mental health care access should be provided for them (76).

The findings of these studies are inconsistent with the findings by Shitu et al. (77), which did not find a significant relationship between some obstetric factors, such as type of delivery, and PPD. It can be due to the improvement of health care systems regarding maternal health and the difference in terms of follow-up time and cultural differences between different countries.

Salehi Pourmehr et al. found a significant relationship between maternal obesity before pregnancy and depression during pregnancy as well as in 6-8 weeks and one year after delivery. In this study, women with grades II and III of obesity were older and in a better socio-economic status. The risk of PPD during 6-8 weeks postpartum in this group of women was 7.5 times higher than women with normal weight before pregnancy (49). In a study investigating the relationship between pregnancy-related weight and postpartum mental health, in terms of maternal race and ethnicity, it was found that in general, pre-pregnancy obesity among non-Hispanic whites was significantly associated with higher levels of PPD than individuals with normal weight, while among the Spanish race, pre-pregnancy overweight was associated with lower PPD levels. Moreover, no significant relationship was observed between PPD and pre-pregnancy weight of non-Hispanic and Asian black women (78). Diversity in demographic groups suggests that social or cultural factors may moderate or mediate the association between obesity and mood disorders (79). It seems that although all women should be screened for PPD, identifying women at risk is an opportunity for early diagnosis and appropriate interventions to prevent negative effects on the health of the mother and her baby.

According to our results, another risk factor for PPD was gender disappointment (28). The findings of the studies by Goyal et al. (81) and Ye et al.(82) confirm the

findings of this study; although, in some studies, no significant relationship has been reported between child gender and PPD (80). This may be due to the importance of infant gender in some cultures. For example, in some Asian cultures, families expect married couples to have at least one son in order to retain their family name. Gender discrimination, especially by the spouse's parents (devaluing the girl's gender), reduces the social and moral support of the mother in the postpartum period, which may contribute to the significant symptoms of PPD (83).

Extensive global research has been conducted on the fear of childbirth as a public health problem in the last two decades (30, 84). In some cohort or experimental studies, the mean score of fear of childbirth in the intervention group was significantly reduced compared to the control group (85, 86). The reason for this is the type of studies performed, the characteristics of the participants, the level of knowledge, awareness, and experience of the mother about pregnancy and childbirth. According to the findings of our study, the majority of women were primiparous with low self-confidence, low social support, and low quality of marital relationships, which can cause stress in the mother and fetus, increased mothers' fear of childbirth, and subsequently, increased demand for cesarean section, leading to postpartum depression symptoms.

The results of the studies investigated in the present review are consistent with many studies conducted in other countries (87, 88), in terms of measuring the relationship between the communication of couples, their marital status, and postpartum mental health; the existence of intimate relationships with the spouse and marital satisfaction could significantly reduce the chances of PPD (25, 26, 31, 34, 44, 51, 53, 54) and MB (24). It can then be concluded that marital satisfaction is one

of the important predictors of postpartum psychological changes (89); one possible explanation for this is the fact that a woman in a high-quality marital relationship may feel more capable of confronting the postpartum period's challenges. Consequently, mental and physical stress and needs related to baby care may have less negative impacts on mothers who can rely on a good relationship with their partner. Conversely, dissatisfied relationships are unlikely to protect women from the stressors that can lead to depression (90). Maternal-perceived emotional and psychological disorders are considered as strong predictors of postpartum depression disorder (91).

The study showed that maternal mental disorders during pregnancy, such as a history of depression in recent pregnancies, any maternal anxiety (55), and in some studies, depression in the early months after childbirth have been identified as the most important predictors of parental self-efficacy (92). Mothers' belief in having the ability to organize and perform parenting tasks is not only an important predictor of parenting quality, but is also associated with maternal and child mental health outcomes (93). Gao et al. (94) and Shorey et al. (95) found a negative association between PPD and maternal self-efficacy. The results of these studies are consistent with several other studies in this field showing the important role of low self-efficacy of parents in the development of postpartum depression (96, 97). It seems that women's unpreparedness to become a mother during pregnancy, as a result of reduced maternal performance after childbirth and inevitable negative attitudes towards the child, lead to impaired maternal mental health after childbirth. Therefore, more emphasis should be placed on preparing pregnant women to accept the role of a mother and improve mother-child relationships, followed by reducing PPD.

PPD may result from the lack of certain psychosocial factors, such as lack of social support, decreased maternal self-esteem, and perceived stress in relationships with others (98). According to the findings of the present study, low or moderate social support increased the chances of PPD in mothers up to 2 times (25), while other studies (99) showed an almost 5-fold increase in both groups of adolescent and adult mothers receiving little or no social support. In a study in this area, mothers who lacked any support from their husbands or others were, respectively, 7 and 3 times more likely to suffer from PPD symptoms than women who had only support from their husbands or family members alone. Therefore, a focus on mothers without social support is needed for identifying cases of PPD and for preventing it (18). As demonstrated by previous research, social support plays a critical role in the well-being promotion in the postpartum period (100). Hence, assessing mothers' perceptions of their level of support may be valuable in identifying specific indicators for learning how to better support women who are transitioning to motherhood (101).

Social isolation (or loneliness) has proven to be an important factor in predicting PPD among urban women (42). Moreover, it has been shown that social isolation is strongly associated with PPD in women in developed countries, such as Canada and the United Kingdom (102, 103). The possible explanations for the phenomenon of social isolation in urban areas and its negative effects on mental health in modern societies can include population density, change in the structure of traditional families, specialization and cultural heterogeneity of modern cities, reduced family and social ties, and finally creating social isolation (104).

In reviewing the majority of the studies in the present systematic review, adverse events and life crises such as loss of job

and housing, financial crisis, etc. were significantly associated with PPD. In these studies, the high number of recent events ( $\geq 4$ ) showed a significant relationship with the likelihood of PPD (25, 36). Research findings on American women indicated that three or more stressful life events (communicative and traumatic) and postpartum depression symptoms were more likely to occur among women with disabilities than women without disabilities. The findings of this study are confirmed by evidence-based clinical studies, which conclude that stressful biological effects include adverse effects on memory, concentration, and mood, with a strong association with depressive symptoms (105).

According to research findings, the partner (spouse) plays a crucial role in the mother's perinatal period (106). In fact, for many women, their partner has a significantly important role in identifying perinatal psychological problems and providing professional support and assistance (107). It seems that the mother's attitude towards the idleness of the spouse and his supportive role can reduce the emotional and psychological distress in the mother, helping her adapt to sensitive and committed behaviors. In the present study, the idleness of a spouse from the mothers' point of view was associated with a significant reduction of two important postpartum mental disorders (24, 34). Consistent with the findings of the present study, many studies have shown the association between the family depression (108) or maternal depression during life (89) and the development of postpartum depression symptoms. In explaining this finding, it can be stated that the postpartum period is the most vulnerable time for women who have already experienced these disorders in their lives and with the onset of pregnancy and childbirth, the onset of re-depression may be expected. Therefore, knowing the risk factors is



useful for the prevention and treatment of these mental disorders.

Moreover, there is a link between PPD and child developmental delay, possibly due to the way of the attachment of depressed mothers to and care for their baby. As reported by a meta-analysis of 46 observational studies, maternal depressive symptoms increased the risk of poor parenting behaviors, including impatience, reduced sensitivity, hostility, fewer and simultaneously more negative interactions, less responsiveness, and less effective communication, compared to healthy mothers (109). The results of this systematic review indicated that mothers with PPD had difficulty in their relationships with their child in all components of mother-infant bonding (58).

Improving interpersonal relationships with family members and receiving social support, especially, from the mother-in-law and the new mothers in the family plays an important role in reducing PPD (110). In the present study, poor family relationships and decreased communication with others was revealed to increase the likelihood of PPD (33, 54). These findings are in agreement with the findings of previous studies that have suggested interpersonal psychotherapy and resolving family problems and conflicts and improving communication as effective ways for reduction of PPD (111).

According to the findings of the reviewed studies in the category of factors related to postpartum status, receiving support for infant care significantly increases maternal performance after delivery (50). Men's participation in neonatal care leads to increased marital satisfaction in couples and thus reduces the risk of depression during pregnancy and postpartum (88). In fact, in addition to its negative effects on the mother and her baby, PPD can also challenge the mental health of fathers, especially new fathers. Hence, to promote

the mental health of couples after childbirth, it is necessary to develop programs to include fathers in postpartum care (112).

In examining the relationship between neonatal characteristics of mothers with high-risk pregnancies in the present study, a significant difference was observed between case and control groups in terms of 5-minute Apgar score, neonatal weight, infant hospitalization in ICU, and meconium aspiration. In other words, the characteristics of the postpartum infant played an important role in the likelihood of postpartum grief in the mother (24). Although all mental health diagnoses are effectively managed through a comprehensive, interdisciplinary model, postpartum mood disorders are naturally susceptible to this management approach. A combination of various hormonal, biological, and psychological factors is responsible for many of the complications of pregnancy and postpartum, including neonatal problems, such as low birth weight and mood disorders. Thus, an interprofessional process that allows health care providers to work together to reduce these interrelated risk factors will be more effective in reducing the rate of these outcomes (113).

The findings of the present study also revealed that congenital anomalies significantly contribute to the occurrence of PPD (43, 45). However, in a study by Laudi et al. (114), no significant relationship was observed between neonatal encephalopathy at birth and PPD. The discrepancy between their results and our reviewed studies can be due to the focus on a particular defect. For example, in some studies, the baby's health problems in the first 12 hours after birth and also the need for surgical treatment in the baby is one of the main determinants of PPD (115), which is consistent with the findings of our study. To explain the reasons behind these results, it can be stated that skin-to-

skin contact in the first hours of life after birth increases maternal oxytocin resulting in more mother-child attachment, which reduces levels of stress and depression in the mother (116). On the other hand, studies show that parents whose infants are admitted to intensive care units for any reason are more likely to suffer from negative emotions and are at higher risks of developing symptoms of anxiety, post-traumatic stress and severe postpartum depression (117).

Violence against women is a social, economic, developmental, legal, educational, human, and health issue. The relationship between violence against women and mental illness has not been sufficiently investigated (118). Findings of our study concerning mediating factors in the category of behavioral factors have shown the association between domestic violence or any abuse against women during pregnancy and postpartum with an increase in the chance of PPD by 3 times in 2 to 4 weeks (61) and more than 4 times in 2 months in postpartum (59). Necho et al. reported that the types of psychological, sexual, and physical violence significantly increased the chances of maternal depression by 3 to 6 times during the 4 weeks after delivery. The findings of this study also showed a statistically significant relationship between drug abuse or smoking and alcoholism in spouses with PPD (119), which is consistent with the findings of the present study. According to the findings of these studies, the disclosure of domestic violence in pregnancy as a risk factor should be considered like some diseases and adequate monitoring should be done in this regard.

One of the important mediating factors related to health care in this study was the delay in maternal access to antenatal visits, which was reported by Abdollahi and Rouhani (2014). The findings of this study showed that delay in prenatal visits is an effective factor in increasing the risk of

PPD (25). Lack of adequate prenatal care is considered as a risk factor for poor pregnancy outcomes and lack of proper postpartum care for mothers and infants (120). Secondary analysis of data from the Pregnancy Risk Assessment Monitoring System (PRAMS) on 618 women in 47 states in the USA and New York showed that most women who experienced symptoms of PPD had not sought prenatal care during pregnancy. In fact, seeking help was a much better predictor of diagnosing PPD than asking questions about symptoms. In that study, the most important factors associated with reducing help requests were having a previous history of mental health and seeing a doctor for a chronic illness. Also, the Asian / Pacific island women were at higher risk of not seeking help during pregnancy (121). Accordingly, it can be argued that more investment in public health interventions and the expansion of psychiatric services in prenatal care with the aim of reducing social stigma in mothers and increasing their level of knowledge and awareness of PPD should be directed at educating mothers during pregnancy, especially for women who may not have previously referred due to mental or chronic illness.

There is an inverse correlation between vitamin D levels and clinical depression, but the evidence is not strong enough to recommend universal supplements for depression (122). Findings of some studies also indicate the association of low levels of D 25 (OH) in people with depressive disorder (123). In one of our reviewed studies, more than half of the mothers with PPD had vitamin D levels less than 20n g/ml and were 3 times more likely to have PPD than women with normal levels (27). Moreover, a review of three studies evaluating the association between vitamin D and PPD risk had revealed an association between low prenatal vitamin D levels and an increased risk of

postpartum depressive symptoms. Vitamin D at a dose of 2000 IU/d may be a good choice to safely correct serum levels and reduce depressive symptoms. Therefore, health care professionals should facilitate adequate intake of vitamin D during pregnancy to reduce the consequences of depression resulting from postpartum deficiency (124). Additionally, in our study, the use of some supplements, such as vitamin B6 (pyridoxine), iron, along with controlling fat and cholesterol showed a protective effect; and high intake of vitamin A and beta-cryptoxanthin was associated with an increased risk of PPD (63). This finding is consistent with the findings of Bremner et al., who found the association between the high concentrations of vitamin A and an increased risk of PPD (125). Evidence suggests that the need for this vital micronutrient (vitamin A) increases during pregnancy; despite, over use of this vitamin in pregnancy, especially in some developed countries, can be worrying because it may have teratogenic effects in the first 60 days after fertilization. Therefore, routine intake of vitamin A before birth is not recommended (126).

As demonstrated by previous research, there is an association between household food insecurity and adverse medical and psychosocial consequences throughout life (127). In the present systematic review, it was manifested that household food insecurity (moderate or severe) is an important risk factor for PPD symptoms among mothers (28, 38). This is consistent with the findings by Garman et al. (128). Considering the increase in nutritional needs during pregnancy (129) and the potential negative effects of stressful and endangered nutritional status on maternal and infant health and the possibility of postpartum depression and maternal anxiety, the assessment of mothers during pregnancy in terms of the access to food, the economic situation of the household, and especially familiarizing and informing

them about proper nutrition in this period, seem necessary.

#### **4-1. a) Strengths of the study:**

The main strengths of the current study are as follows: (1) Based on the current knowledge of the authors of the present study, until the time of the extraction of findings, this is the first comprehensive systematic review examining the mediating dimensions affecting postpartum mental health using the combined method or synthesizing the findings of primary studies in terms of an effect index (OR or RR). It should be mentioned that the printed version of the systematic review of structural dimensions affecting postpartum mental health with the DOI ID: 10.22038 / IJP.2021.54669.4317 has already been made available to those interested (2). The up-to-dateness and inclusion of a large number of observational studies (42 articles) are among the strengths of this study; their results can be considered complementary to RCT findings, and with providing long-term data, they may reflect real-world effects more accurately regarding the effectiveness and side effects of interventions (19), (3) The researchers of the present study attempted to accurately analyze all the identified mediating risk factors as much as possible in the review of studies and provide clear predictors of postpartum mental health disorders. The most important strength of this systematic review is the attention to the main categories of mediating factors, as well as its constituent variables in each category based on the standard classification of the WHO model, which can help health care providers create a guideline based on strong evidence related to social determinants affecting postpartum mental health.

Limitations of the study: (1) Review of texts focusing on domestic studies, (2) Failure to include some studies due to lack of reliable statistical index to report

"relationship strength" and better interpretation or conclusion or poor quality of some articles despite their relevance to the purpose of the present study; they included a few number of studies performed in relation to some mediating determinants affecting postpartum mental health, especially maternal grief (2 studies) as well as postpartum psychosis (1 study). (3) The lack of generalizability of the findings for reasons such as, diverse sampling framework in primary studies, small sample size, differences in the type of instrument being measured, the impact of the type and timing of the follow-up, as well as cultural and ethnic differences in Iran. (4) The frequency of mediating variables in the category of obstetrics, pregnancy, and childbirth and psychosocial factors compared to other factors, caused the authors to spend more time and attention to extract their related information and display them in the form of the finding tables.

Given the strengths listed above and the limitations of this systematic review, we believe in our success in providing the most accurate outstanding risk factors for postpartum mental health and association with common postpartum mental health disorders based on the WHO model. These findings could be a step forward for the consolidation of the evidence that shows postpartum mental disorders are a significant public health threat to mothers and their infants.

## **5- CONCLUSION**

### **5-1. Emphasis on the importance of findings in clinical practice**

Based on available information, it seems that in the context of the reviewed studies, the most attention in the postpartum period is on the baby and the mother is deprived of the necessary attention. Health care professionals should be aware of the increased risk of common mental disorders by examining the

underlying factors (structural and mediating) of these outcomes, so that proper and effective preventive strategies can be implemented by identifying potential causes of these disorders during routine pregnancy and postpartum care.

### **5-2. Authors' research findings**

Identifying women potentially at risk for postpartum psychiatric disorders is critical to preventing the onset and subsequent consequences. This comprehensive study was conducted to identify the mediating factors affecting mental health and its association with the three most common postpartum disorders. The findings show that the results of studies on the relationship between these factors are inconsistent with the mental health consequences of postpartum mothers and the majority of studies in this area focus on postpartum depression, and the two mental disorders of maternal grief and postpartum psychosis are less investigated, especially in the Iranian context. Hence, information in this area is very limited. Overall, this study shows the need to identify potential risk factors for postpartum mental health, especially in the field of mediating health determinants during routine prenatal and postnatal care in mothers due to the inclusiveness of this category according to the model of the World Health Organization. Therefore, it is recommended that risk factors for postpartum mental disorders be monitored regularly in health centers and further investigations be conducted, given the importance of this issue, in the field of prevention of mental health disorders in different subgroups, especially in pregnant women.

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## 7- CONFLICT OF INTEREST

None.

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