SYSTEMATIC REVIEW

Mental Disorders of Pregnant and Postpartum Women After Earthquakes: A Systematic Review

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ABSTRACT

Objective: The aim of this review was to systematically search and critique relevant literature on the potential psychological impact of earthquakes on peripartum women to synthesize existing knowledge for further action.

Methods: A search through 5 databases was conducted for relevant publications in English, and the results were screened through a set of inclusion and exclusion processes.

Results: Eight articles were included. Depression and posttraumatic stress disorder were the most often reported mental disorders. Some factors (eg, family relationships and social support) were associated with mental disorders suffered by peripartum women after earthquakes. An assessment of the quality of the studies showed that most did not have high levels of evidence because of their cross-sectional design and limitations.

Conclusions: Among the factors that influenced the mental health of pregnant and postpartum women after earthquakes, family function appears to be one of the most important and deserves further exploration. Other mental health conditions such as minor psychiatric disorders should also be studied for their relationship with disasters and pregnancy. Well-designed studies are needed to enable a better understanding of the relationship between earthquakes and the mental disorders of peripartum women so that the most appropriate interventions can be proposed. (*Disaster Med Public Health Preparedness*. 2014;8:315-325)

Key Words: earthquake, mental disorders, pregnant, postpartum, systematic review

Earthquakes, especially major ones greater than 7.0 on the Richter scale, can cause great damage to life and property. Evidence has shown that the victims of earthquakes can suffer from mental disorders, which can also affect their physical health and quality of life in the future.[1] A mental disorder is characterized as a set of behavioral or psychological symptoms or patterns occurring in an individual that causes distress or disability and that reflects underlying psychobiological dysfunctions, as defined by the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-V*).[2]

A number of studies about earthquakes and mental disorders in the victims, eg, posttraumatic stress disorder (PTSD), major depression, social anxiety disorder, and dysthymic disorder has been reported.[1,3,4,5–11] An association between stress and mental disorders in pregnant women also has been made in both animal experiments and human studies.[12,13]

In general, among all victims of traumatic incidents such as earthquakes, women have been found to be more vulnerable than men to mental disorders.[1] Studies have observed that during pregnancy and in the postpartum period women experience hormonal fluctuations, including changes in their ovarian hormone and cortisol levels. These fluctuations have been reported to be related to a decrease in the volume of the hippocampus and in neurogenesis function, which play a role in the pathophysiology of major depressive disorders.[14] Stress has been found to influence the fluctuation of hormones, subsequently increasing the susceptibility of pregnant women and animals to depression.[12,13]

Among the most stressful of events, earthquakes may have a direct effect on the mental health of peripartum women. Normally, without the impact of an earthquake, the prevalence rates for major depressive disorders in pregnant and postpartum women range from 7% to 15%, which is higher than among

the general population.[15–17] The prenatal and postnatal periods, when women experience great physical and psychological changes, may be particularly important times to study the association between earthquakes and the mental health of these women. The psychological responses of pregnant women to earthquakes may have a negative impact on them and their babies, resulting in consequences such as suicide and preterm birth.[18,19] The effects on their mental health also may extend beyond the postpartum period.

Although some evidence of a relationship between stress and mental disorders in pregnant women is available, whether mental disorders are more prevalent after earthquakes is unclear. A comprehensive understanding of the impact of earthquakes on the mental health of pregnant and postpartum women and over the longer term is needed so that appropriate interventions can be designed to better help these women recover from such a major disaster. The aim of this systematic review is to provide an evidence-based overview of the psychological impact of earthquakes on pregnant and postpartum women, and other factors affecting their mental health.

METHODS

The Search Process

A systematic search through 5 health science databases (MEDLINE, Pubmed, CINAHL, Journal@OVID, and PsycInfo) was conducted for relevant studies published in English within the last 30 years, using the key words "mental disorders", "psychological disorders", "psychiatric disorders", "mental health", "pregnant women", "prenatal", "postpartum women", "postnatal", "earthquake", and "disaster".

Inclusion and Exclusion Criteria

All reports relating to mental disorders in pregnant and postpartum women after an earthquake, and describing the design of experimental studies (if available) and observational studies with or without a baseline comparison group(s), were included. Excluded were reports with the following focuses: (1) other sources of stress (disasters) apart from earthquakes, (2) other study populations apart from pregnant and postpartum women, (3) outcome measures that targeted physical health only, (4) the analysis of secondary data (eg, systematic reviews), and (5) expert opinions (eg, qualitative studies, theoretical studies).

The abstracts of all of the searched articles were first examined with the inclusion and exclusion criteria in mind. Full texts of the relevant reports were subsequently retrieved for appraisal.

RESULTS

Based on the key word searches, 89 titles were retrieved. Title screening was subsequently performed to remove duplicate reports. The abstracts of the remaining 65 reports were screened based on the inclusion and exclusion criteria. After this process, 8 reports were included for further evaluation. A flowchart of the searching and screening process is shown in the Figure.

Table of Evidence

The contents of the 8 studies are summarized in the Table. The variables that were recorded for this summary included the participants, the time period and scale of the earthquake, the instruments used for assessing mental disorders, the mental disorders that were studied and their prevalence, and factors apart from the earthquake that would affect the mental condition of pregnant and postpartum women.

Assessing the Quality of the Studies

The quality of each article was evaluated according to the method for evaluating research guideline evidence (MERGE) checklist, developed by the New South Wales Department of Health.[20] Similar to other evidence-assessment systems, MERGE defines the levels of evidence used in assessing the quality of research studies. The classification ranges from level 1 (the highest) to level 5 (the lowest). Level 1 represents the best evidence from results generated from a systematic review of all relevant randomized controlled trials, while level 5 represents the lowest, consisting of the opinions of respected authorities and descriptive studies. In terms of the risk of bias, there are sublevels of 1a and 1b, 2a and 2b, and 3a and 3b; *a* refers to low risk, and *b* to moderate risk.

Depression and Its Risk Factors Among Pregnant Women

The Sichuan Earthquake of 2008

Depression and its risk factors among pregnant women were assessed 4 years after the Sichuan earthquake of 2008 in China.[21] The strength of this exploratory cross-sectional survey was the inclusion of a comparison group. However, demographic differences were noted among the comparison group, for example, in education levels and family income. Although descriptive analyses of the demographic data for both groups were carried out in this study, the differences in the demographics were not statistically tested. Taking into consideration the design of the study and the problem of the comparability of the earthquake and comparison groups, the quality of the evidence generated from this study was considered level 4.

Another study of the impact of the Sichuan earthquake on PTSD and depression in pregnant women[22] used a cross-sectional survey, randomized sampling, and the psychometrics of the instruments to assess the mental health and risk factors that were acceptable. However, no comparison group or a clear cause-and-effect relationship between the earthquake and the mental health of pregnant women could be established from the survey. Due to the observational design and

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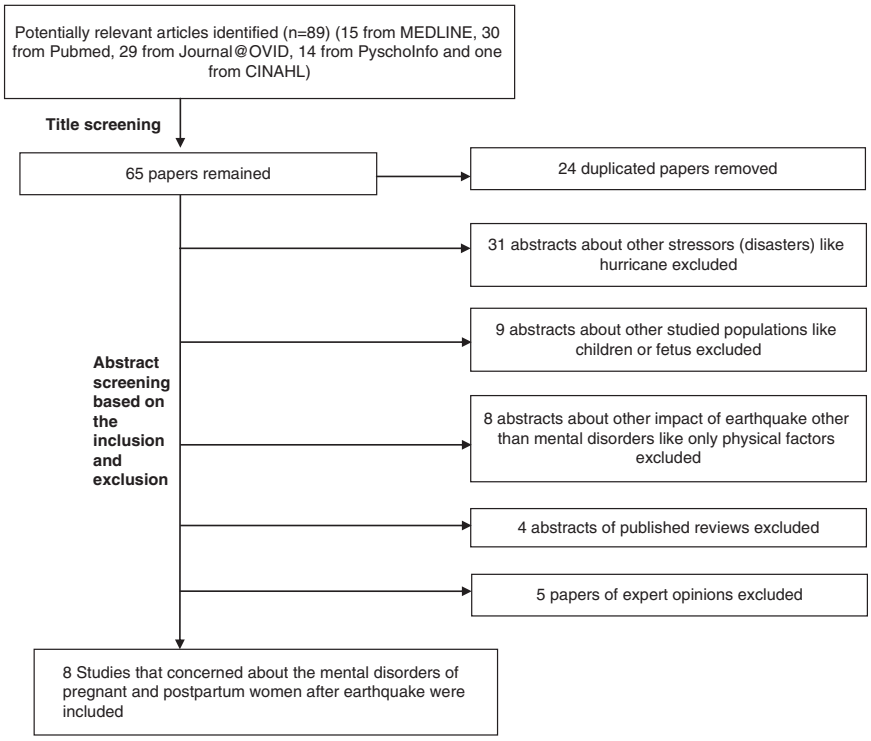
FIGURE

Flow chart of the Search Process



the limitations of this study, the evidence generated from this study was also considered level 4.

A third study evaluated PTSD and depression among new mothers 8 months after the Sichuan earthquake[23] in another cross-sectional survey, and participants were randomly selected using a set of explicit inclusion criteria. Good psychometrics were reported for the instruments used in this study, eg, the Impact of Event Scale-Revised for measuring PTSD and the Chinese edition of the Center for Epidemiologic Studies Depression Scale for measuring depression. However, the scale used to evaluate earthquake experiences was not clearly defined. The lack of evidence on the reliability and validity of this scale cast doubt on the results of this study. The lack of a comparison group and the design of the study contributed to the verdict that this study was level 4 in terms of evidence.

The Wenchuan Earthquake of 2008

Symptoms of antenatal depression in Chengdu, China, 3 months before and 3 months after the Wenchuan earthquake of 2008[24] were investigated in this study with the use of an exploratory and comparative cross-sectional design. The setting was a city (Chengdu) located 90 km from the epicenter of the earthquake. Because Chengdu suffered less damage from the disaster than Wenchuan, this factor may have affected representativeness of the subjects. Furthermore, all of the data were collected among women who were at 12 to 24 weeks' gestation, meaning that the sample did not comprehensively represent the antenatal population. A non-probabilistic convenience sampling strategy was used in this study, which increased the risk of sampling errors. At level 4, the quality of this study was also evaluated as low.

The 2007 Noto Peninsula Earthquake in Japan

The depressive moods of pregnant women living in the area affected by the 2007 Noto Peninsula earthquake in Japan[25] were studied. All of the participants in this longitudinal study were pregnant during or immediately after the earthquake, and all were followed up until 6 weeks after delivery to determine whether they suffered from depressive moods. The instruments used in this study carried good evidence of reliability and validity, but only a within-group comparison was made, without controlling for other possible factors. Thus, the cause-and-effect relationship between the earthquake and the depressive moods of pregnant women could not be clearly established.

The participants in this study received routine prenatal care at hospitals. The risk was that the prevalence of mental

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TABLE

Summary of the 8 Identified Papers

	Study	Objectives/Aims	Participants	Time Period and Scale of Earthquake	Instruments	Outcomes	Influencing Factors
1	Dong et al, *J Affect Disorders*. 2013	To analyze whether the earthquake continued to affect mental health of pregnant women 4 y after the disaster	520 pregnant women at 13 to 28 weeks' gestation 4 years after the earthquake 254 from earthquake area 276 from a control area	4 years after the 2008 earthquake; 8.0 on Richter scale	EPDS	Prevalence rate of depressive symptoms for pregnant women in earthquake area was 34.5%; rate in the control area, which was not struck by earthquake, was 39.5% (score ≥ 10) No statistical significance noted between results for the earthquake area and those for the non-earthquake area	Sleep quality, social support from husband and parents, the stress of pregnancy, life satisfaction, marital satisfaction, thoughts and feelings regarding the marriage and one's spouse, and agreement on relationship matters
2	Qu et al, *J Affect Disorders*. 2012a	To assess the impact of the earthquake on mental health of pregnant women in earthquake-stricken area	311 women who were pregnant after the earthquake	18 to 21 mo after the earthquake; 8.0 on Richter scale	IES-R EPDS	The rate of PTSD symptoms was 12.2%; the rate of major depressive symptoms was 40.8% (score ≥ 10)	Factors that influenced PTSD were age, severity of the earthquake experience, and stressors of pregnancy (witnessed people being trapped and experienced the death of a family member since the earthquake) Factors associated with depression were quality of the family relationship and stress of pregnancy (fear about significant people disliking the baby, fear about birth defects, fear about delivery complications)
3	Qu et al, *Arch Womens Ment Health*. 2012b	To assess the impact of the Sichuan earthquake on the PTSD and depression of new mothers	317 new mothers who delivered within 1 to 8 weeks after earthquake	8 mo after the earthquake; 8.0 on Richter scale	IES-R ESDS	Total rate of PTSD symptoms was 19.9%, among which 9.5% met criteria for full PTSD; 29% of participants had depressive symptoms, among those, 14.2% met criteria for severe depression	Earthquake experience in the past, family income, employment, sleep hours
4	Lau et al, *J Obstet Gynecol Neonatal Nurs*. 2011	To assess the prevalence and correlates of severe antenatal depressive symptoms among pregnant women before and after the earthquake	1545 pregnant women: 578 before the earthquake 578 after the earthquake	From 3 mo before the earthquake until 3 mo after the earthquake; 8.0 on Richter scale	EPDS	Prevalence of depression among pregnant women (score > 14) before and after the earthquake was 9.2% and 7.1%, respectively	Married for a shorter time, poor marital relationship, and poor social support were associated with depression before the earthquake Shorter staying time, multiparous, poor marital relationship, and poor social support were associated with depression after the earthquake

5	Hibino et al, *Psychiatry Clin Neurosci.* 2009a	To assess the health impact of stress on pregnant women during or immediately after a major earthquake	99 women who were pregnant during or immediately after the major earthquake	3-9 mo after the earthquake; 6.9 on Richter scale	EPDS	Mean EPDS scores of pregnant women before and after delivery were 3.9 ± 4.1 and 3.8 ± 4.1, respectively; percentage of high-risk individuals (total score < 9) was 13.1%	Sense of coherence, earthquake-related factor "Existing anxiety about an earthquake," socio-demographic factor "nulliparous," and depression during pregnancy were positively related to postpartum depression
6	Hibino et al, *Environ Health Prev Med.* 2009b	To explore the relationship between a medium-scale earthquake and maternal depression	155 women after delivery	3-9 mo after the earthquake; 6.9 on Richter scale	EPDS	Mean EPDS score was 4.2 ± 4.2; rate of higher risk (score ≥ 9) was 11.6%	EPDS scores were significantly correlated with increased "trouble with infant care," increased artificial "lactation," decreased "satisfaction with delivery," increased "anxiety about the earthquake," and "birth history"
7	Chang et al, *Psychiatry Clin Neurosci.* 2002	To investigate the prevalence of minor psychiatric morbidity and presentation of PTSD symptoms in pregnant women that were related to the earthquake	171 pregnant women who lived in the earthquake area during and after the 921 earthquake for at least 6 mo	6 mo after the earthquake; 7.3 on Richter scale	PTSD reaction checklist 12-item version CHQ	29.2% of the pregnant women suffered from minor psychiatric illnesses	More casualties among relatives, and more starvation experience Higher negative attitude scores relating to the influence of the earthquake on their pregnancies
8	Glynn et al, *Am J Obstet Gynecol.* 2001	To check whether the timing of the earthquake was related to an affective response to the earthquake and to the length of gestation	29 pregnant women; not mentioned was actual sample who experienced earthquake in the first, second, and third trimester 11 postpartum women	No time period mentioned Earthquake measured 6.8 on Richter scale	Life-events inventory	Stress was rated as most stressful if the earthquake occurred during the first trimester (mean = 3.40), and least stressful during the third trimester (mean = 2.38)	Timing of the earthquake during pregnancy was related to the affective response

Abbreviations: CHQ, Chinese Health Questionnaire; EPDS, Edinburgh Postnatal Depression Scale; ESDS, Epidemiologic Studies Depression Scale (Chinese edition); IES-R, Impact of Event Scale-Revised; PTSD, posttraumatic stress disorder.

disorders in this sample might have been underestimated because pregnant women with severe mental symptoms were less likely to attend routine prenatal care, and might have been omitted from this study. The longitudinal design was a strong point, but considering the possibility of bias, the level of evidence for this study was rated 4.

In another study, the relationship between the Noto Peninsula earthquake and maternal postnatal depression[26] was assessed in a cross-sectional survey with 155 women who had experienced the event and returned the questionnaires after childbirth. The researchers mainly focused on the relationship between the earthquake and maternal postnatal depression from 3 to 9 months after the earthquake. The participants were not randomly selected, and they were not compared with the general population. In addition, other pregnant women with mental problems who did not attend the routine prenatal care in the hospital were not included in this study. A higher risk of selection bias could not be ruled out. Due to its design, a cause-and-effect relationship could also not be established. Consequently, the evidence generated from this study was deemed to be level 4.

Taiwan 921 Earthquake of 1999

The study of psychiatric morbidity and pregnancy outcome in a disaster area of Taiwan 921 earthquake of 1999 in China[27] included a cross-sectional survey that investigated the prevalence of PTSD and minor psychiatric disorders in pregnant women 6 to 12 months after the earthquake. The reliability and validity of the Posttraumatic Stress Reaction Checklist and the Chinese Health Questionnaire (CHQ-12) used for this study were not mentioned in the article. There was no control group for comparison that could better demonstrate a cause-and-effect relationship between the earthquake and PTSD and minor psychiatric disorders. The level of evidence for this study was 4.

The effects of the timing of the earthquake during pregnancy on emotional responses and birth outcomes[28] was assessed in this quasi-experimental study. The effects of the earthquake were randomly distributed across women at different stages of their pregnancies. As earthquakes are not predictable, the participants could not be randomly allocated in advance into different time groups for comparison. In addition, the psychometrics of the life-events inventory used to assess psychological responses to the earthquake were not mentioned; therefore, the criteria for evaluating outcomes were not adequately met in this study. Women who experienced the earthquake during their first and second trimesters and reported their psychological responses at 32 weeks' gestation might have contributed to the recall bias. According to the MERGE checklist, the level of evidence for the quality of this study was 3b.

In summary, an assessment of the quality of the 8 studies in this review showed that, methodologically, most of them were cross-sectional surveys in which it was not possible to control for the impact of factors other than the earthquake on the mental health of pregnant women, given the lack of a comparable group. According to MERGE,[20] these studies were of an insufficiently high quality to provide strong evidence of the potential mental health impact on pregnant and postpartum women after an earthquake.

DISCUSSION

Meta-analysis

The 8 studies in this systematic review varied greatly in their outcomes, which can partly be explained by the differences in the periods of time after the earthquake, and in the study designs and instruments selected for the mental health assessments in each. Given the heterogeneity of these factors, it would not be viable to conduct a meta-analysis of the studies that would combine the effects of earthquakes on the mental health of pregnant and postpartum women.

The Types of Mental Disorders

The researchers who conducted the 8 studies tended to focus on depression and PTSD. Because symptoms of depression are common in women during pregnancy and in the postpartum period, this may have contributed to the hypothesis that earthquakes, as a major stressor, could lead to a higher risk of depression in this specific group.[29] An earthquake, which can result in the loss of loved ones and in great damage to property, may have a direct effect on the mental health of pregnant women.

On the other hand, a higher rate of birth complications (eg, preterm birth, low birth weight, restricted intrauterine growth, and birth defects such as ear malformations) after an earthquake may serve as a secondary stressor specifically for peripartum women and contribute to the pathophysiology of peripartum mental disorders.[19,30–32] Major earthquakes could also potentially be traumatic for survivors, and PTSD could be an outcome of studies on the impact of earthquakes. The focus on depression and PTSD in the reviewed studies was in line with most studies on the psychological impact of earthquakes on the general population.[1,6,7,9–11]

Apart from depression and PTSD, minor psychiatric morbidities (MPDs) were also reported in a study about the psychiatric impact of earthquakes on pregnant women in Taiwan.[27] MPDs are clinical symptoms of individuals which, in addition to depression, include anxiety, fatigue, sleep disturbances, and somatic symptoms. MPDs do not satisfy all of the criteria in defining a mental disorder according to the international classification of disease.[33] Symptoms of MPDs, such as anxiety and sleep disturbances, have been studied frequently in other populations after earthquakes,[8,34] and in the perinatal population that did not experience an earthquake.[35,36]

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Researchers have rarely taken MPDs into consideration in studies about pregnant and postpartum women after earthquakes. Because MPDs have been related not only to disaster but also to pregnancy, and because little is known about the impact of a combination of these factors, a more comprehensive exploration of this aspect of mental health is necessary. This additional evaluation would be particularly welcome, as the current review of related studies has demonstrated that such studies contain relatively low levels of evidence (3b and 4, based on MERGE).[20]

The Prevalence of Depression and PTSD

The prevalence of antenatal depression in women who experienced an earthquake during pregnancy ranged from 7.1%[24] to 40.8%.[22] Compared with those who had not experienced an earthquake recently, the rate of antenatal depression ranged from 7% to 13%.[15] Given the similar rate of 7% to 7.1% at one end, the range in the prevalence of depression among pregnant women after an earthquake (40.8%[22]) was wider than among those who had not experienced an earthquake (13%[15]). This finding clearly demonstrates that antenatal depression is more prevalent among women who experienced an earthquake during pregnancy than among those who had not.

However, the prevalence of postpartum depression among women who experienced the earthquake during pregnancy differed in range from 11.6% to 29%[23,26] versus 3.5% to 63.3%[37,38] when compared with those who had not experienced an earthquake. We have been unable to determine whether earthquakes are associated with a higher rate of postpartum depression.

The prevalence of PTSD after the 2008 Wenchuan earthquake was 12.2% in pregnant women[22] and 19.9% in postpartum women.[23] These rates were higher than in the general population after the earthquake in Taiwan (10%)[39] but lower than in the general population of mainland China (56.8%).[40] Nevertheless, both studies by Qu et al[22,23] yielded a relatively low level of evidence because, methodologically, they are cross-sectional observation studies with no concurrent comparable groups

It is unclear whether the rate of PTSD was significantly and statistically higher in pregnant and postpartum women after an earthquake than in the general population who experienced an earthquake. Further evidence is needed to demonstrate whether the incidence of depression in postpartum women and of PTSD in pregnant and postpartum women is higher in those who have experienced an earthquake, as compared to those who have not.

Timing of Studies on the Psychological Impact of Earthquakes

In this review, 7 of the 8 studies were found to have focused on relatively short-term reactions to an earthquake.[22–28] The studies were conducted at 3 months[24] and up to 21 months after the incident.[22] It was not unusual for researchers to pay more attention to the acute psychological reactions to the earthquake, because the earthquake was an acute stressor that happened in a very short period of time. It was also believed that individuals, including perinatal women, can recover from the mental health consequences of a disaster through adaptation after some time,[41] and that the impact from an earthquake also would lessen with time. Although some studies have reported that disasters also can have a long-time impact on the mental health of survivors,[42,43] the participants of those studies were not pregnant or postpartum women.

On the other hand, if studies on the impact of a disaster on pregnant or postpartum women take place long after the disaster, a potential recall bias and influencing factors would weaken the rigor of those studies. Therefore, assessments on the psychological impact of an earthquake on pregnant or postpartum women should not be conducted too long after the occurrence of earthquake.

Factors Relating to the Psychological Impact of Earthquakes

To investigate appropriate interventions for the psychological disorders suffered by pregnant and postpartum women after an earthquake, it is essential to have a full understanding of the factors influencing these disorders. Various factors have been identified from the reviewed studies. They have included experiences relating to the earthquake,[22,25–27] family relationships,[21–22,24] economic factors such as family income and employment,[23] support from society and family,[21,24,25] the timing of the earthquake during pregnancy,[28] and birth history and baby-rearing.[26] Earthquakes are stressful events in which differences in severity and timing may also contribute to various mental health outcomes. As such, the diversity of the individual experiences of pregnant women to earthquakes and their social support in terms of various familial factors deserve more research.

Social support, which is widely regarded as a key factor in buffering against peripartum depression in the general population,[44–48] was identified as playing an important role after an earthquake.[21,24–25] Researchers clearly pointed out that social support has a positive effect on the level of psychological stress that a person suffers. It would influence the way people cope with and adjust to stressful events, thereby buffering them against adverse effects on their mental and physical health.[49,50] In this regard, it could alleviate the stress caused by an earthquake.

However, some studies have found that an earthquake could also destroy support systems, consequently leading to a higher rate of mental disorders in survivors.[24,51] It appears that social support may act as a mediator between earthquakes and stress,

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and is further related to the mental health of peripartum women. However, the roles and dynamics of social support in mitigating the negative psychological effects of disasters are not very clearly or comprehensively explained in the reviewed studies (only a quantitative correlation between social support and mental disorders after an earthquake was identified). To use social support to help peripartum women after an earthquake, further evidence is needed to understand the roles and mechanism of this factor.

Among the factors related to peripartum mental health after an earthquake, family income, employment, family relationships, support from society and family, and baby-rearing were all related to the family. It was observed that for family members dealing with the demands of stress, family income and employment[14] were necessary material resources, and family relationships[21,22,24] were the emotional resources. According to Lau et al,[24] Qu et al,[22,23] and Dong et al,[21] a positive association exists between functional family relationships, especially a functional marital relationship, and the mental health of pregnant women after an earthquake. The marital relationship might serve as a resource to help family members (including pregnant and postpartum women after an earthquake) to recover from or adapt to the stress of change. Other studies also discovered that particular patterns in family relationships influenced the physiological and psychological processes of individual family members.[52,53]

All of the described factors are aspects of family system resources that can play a role in mediating between stress and adaptation.[54] According to the Double ABCX model, family system resources are developed to satisfy the demands on the family or to help the family to adapt stressful events.[55] The role played by the family in dealing with the mental disorders suffered by pregnant and postpartum women after an earthquake is important and should not be underestimated. For instance, as a type of informal social support, family support[56] could play a large part in maintaining the psychological health of the family members.[57]

Family support refers to a range of supportive behaviors (emotional support and instrumental support), which are provided by a family member or intimate partner through interpersonal relationships and received by another family member.[58] Various studies have indicated that greater family support is associated with better psychological adjustment among adolescents,[59] fewer symptoms of depression,[58] and lower rates of PTSD after a psychiatric breakdown.[60]

Natural disasters such as an earthquake could thrust a family into a state of instability and reduce the support that family members are able to give, or lead to family dysfunction. These events could, in turn, give rise to a series of psychological problems among family members, including pregnant women.[61] Such problems might improve or deteriorate, depending on the level of family support that is extended. This factor suggests that it is important to conduct further studies about family support for pregnant women.

The studies that were reviewed reveal a very imperfect understanding of the influence of family on the mental disorders of pregnant and postpartum women,[21–24,26] as the various researchers did not conduct an in-depth investigation of the influence of family factors. As a result, information is very limited about the interactions between family and perinatal mental health. The lack of specific and robust studies about the family relationship and the mental disorders of pregnant and postpartum women after a major earthquake suggest a specific direction that can be investigated within this larger topic.

Limitations

A limitation of this review is that the searches were restricted to published papers in English. Useful information in other languages from certain countries, such as China and Japan, might have been missed. Nevertheless, this review included studies on those countries that were published in English. Because earthquakes often occur in Japan, researchers there have more experience with the psychological impact of earthquakes on pregnant and postpartum women. In future reviews, well-designed studies in the Chinese and Japanese languages could be included to generate more comprehensive results about the impact of earthquakes on pregnant and postpartum women.

Future Research

The most commonly identified mental disorders of pregnant and postpartum women were depression and PTSD. The prevalence of these mental disorders was higher after an earthquake, but some studies found it to be similar to that of the general population. The potential association between earthquakes and a higher incidence of those mental disorders in pregnant and postpartum women needs to be further explored.

In the future, more critical consideration should be given to the timing of the study of pregnant and postpartum women after an earthquake. Mental symptoms such as those for PTSD and depression in association with stressors may decrease over time.[62] The mental health of pregnant and postpartum women in the period after an earthquake should be studied to better understand if earlier interventions, which may further reduce or prevent mental health problems in the long term, are warranted. The evidence from this review suggests that such a study should be conducted within 2 years after the occurrence of an earthquake.

Other influencing factors such as family support or family system resources are also important variables for future studies about the psychological impact of earthquakes on pregnant

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and postpartum women. Although these factors have been investigated in some of the reviewed studies and associations with mental disorders after an earthquake were found, a more comprehensive discussion of these factors was not available. These factors may act as mediators or moderators in addressing the mental disorders of pregnant and postpartum women after earthquakes. Additional studies about these factors may contribute to identifying appropriate and effective interventions for these women to recover from the associated mental health problems.

Because high-quality original studies about the mental disorders of pregnant and postpartum women after earthquakes are lacking, it is important to conduct well-designed studies such as cohort, case-controlled, or quasi-experimental studies to explore the cause-and-effect relationship between major earthquakes and the mental disorders of pregnant and postpartum women (randomized controlled studies cannot be used to explore this causal relationship because earthquakes are unpredictable). If stronger evidence existed for this relationship, the best intervention(s) to relieve the mental disorders and symptoms of pregnant and postpartum women after an earthquake would be an essential area and direction of future research. This sysematic review did not offer strong evidence as to which particular types of interventions should be considered for the mental disorders or symptoms of pregnant and postpartum women after earthquakes.

Quantitative studies are not the only choice for exploring the dynamics between family and mental disorders after an earthquake. Although 5 articles containing expert opinions were retrieved by keyword searches before abstracts were screened, terms such as qualitative descriptive study, phenomenology, ethnography, grounded theory, and focus group, which are signs of qualitative studies, did not appear in those reports. In future studies, the multifaceted human complexity and phenomenon of family support, interactions, and dynamics involving pregnant and postpartum women suffering from mental disorders after a major earthquake can be better explored with qualitative designs. For instance, a substantive theory generated from a grounded study can contribute insights for further research or for current practice.

CONCLUSIONS

As identified from this review, the current literature lacks clear indications for a better understanding of the relationship between family factors and the potential impact of earthquakes on the mental health of pregnant and postpartum women. Therefore, it is currently difficult to ascertain the evidence for a specific theoretical model that explains the essential family factors that may have an impact on the psychological and mental health of those women after an earthquake. Better evidence of the dynamics and interactions of family in relation to mental health in such a situation are necessary, before appropriate interventions to relieve any related mental health problems can be considered.

Such information could inform practice and further research. Case-controlled, quasi-experimental, and other types of assessments may be used to strengthen the research in this area of study. In particular, to better investigate and understand family support and dynamics, qualitative studies or a mixed-method approach (eg, a quantitative survey that includes more family factors and measures, supplemented by a qualitative inquiry) could be used to investigate the role of family in the mental health of pregnant and postpartum women after earthquakes.

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