

ORIGINAL ARTICLE

Postpartum Depression Among Rural Women From Developed and Developing Countries: A Systematic Review

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Abstract

Purpose: Postpartum depression (PPD) is a significant public health problem, with significant consequences for the mother, infant, and family. Available research has not adequately examined the potential impact of sociodemographic characteristics, such as place of residence, on risk for PPD. Therefore, this systematic review and meta-analysis examines the prevalence of and risk factors for PPD in rural communities within developed and developing countries, and where possible, compares rates to those among urban women.

Methods: Five databases were searched, from start dates through early May 2010, using key words relevant to PPD and rural residence. Peer-reviewed articles were eligible if a standardized assessment of depression was administered to rural mothers within the first year postpartum. Data on PPD were extracted from 19 articles, of which 17 provided data for meta-analyses.

Findings: The overall prevalence of PPD among rural women was 27.0% (95% CI, 18.8%-37.2%). Prevalence was somewhat higher among women in developing countries (31.3%; 95% CI, 21.3%-43.5%) than among women in developed countries (21.5%; 95% CI, 10.9%-38.0%), although there was significant heterogeneity among both groups of studies. Comparisons between rural and urban women yielded conflicting results. Although established PPD risk factors were associated with depression in rural women, additional risk factors were reported for rural women from developing countries, such as having 2 or more young children.

Conclusions: Longitudinal studies with clearly defined "rural" and "comparison" groups are needed to determine whether rural residence is associated with increased risk for PPD. The results can inform prevention and treatment programs tailored to serve rural women.

Key words postpartum depression, risk factors, rural.

Postpartum depression (PPD) is a significant public health problem affecting 10%-15% of women worldwide.¹ It occurs within 1 year after birth² and it is characterized by tearfulness, despondency, emotional lability, feelings of guilt, loss of appetite, suicidal ideation, sleep disturbances, poor concentration and memory, fatigue, and irritability, as well as feelings of inadequacy and inability to cope with the infant.^{3,4} PPD is one of the most common complications of childbearing, and it can have se-

vere consequences for the infant such as malnutrition,⁵⁻⁷ illness,⁶ developmental delay, poor growth,^{6,8-10} impaired mother-infant attachment,¹¹ and social interaction difficulties¹²; as well as consequences for the mother, including impaired functioning, poor quality of life, or death.^{4,13}

Various risk factors have been associated with PPD. The most consistently reported risk factors have been past history of depression or other psychiatric illness, depression during pregnancy, lack of social support, and recent life

stresses.^{1,3,4,9} Existing PPD research is largely limited to samples of predominantly Caucasian, married women of mid to high socioeconomic status (SES), living in large cities.^{1,14} As a result, the available research has not fully addressed the potential impact of other sociodemographic characteristics, such as rural or urban residence, that may contribute to the depressive symptomatology during the postpartum period.

There is some controversy as to whether rural residence is a protective or risk factor for mental health problems. Individuals living in rural areas have been shown to be geographically isolated from family and others within their own communities as a result of low population density.^{15,16} In addition, there is evidence that relative newcomers to tight-knit rural communities may find them difficult to penetrate and thus perceive limited social support.¹⁷ Rural residence might also be associated with low income,^{18,19} low levels of education,²⁰ lack of insurance,²⁰ and poor health-related quality of life,²¹ all of which may contribute to the onset of psychiatric illness and decreased help-seeking behavior. Lack of mental health services and decreased screening by primary health care providers in rural areas may prevent or delay access to treatment for rural women.^{22,23} This can have significant consequences for affected women, forcing them to endure symptoms on their own or enter care later in the course of their illness with more severe symptoms.²⁴

A number of studies have shown higher rates of depression among individuals living in small rural communities compared to those living in large metropolitan centers. For example, in the United States, rates of suicide are higher in rural than in urban areas,²⁵ especially among depressed individuals.²⁶ In addition, rural individuals are more likely to have major depression compared to urban individuals if a comorbid substance use disorder is present.¹⁹ In a Chinese study, rural residents were more likely to have depressive disorders compared to urban residents,²⁷ and in a sample of low-income women in rural Mexico, high rates of depressive symptoms were identified.²⁸ Similarly, married women living in rural areas in Ethiopia and Rwanda have been reported to have increased risk for developing depression.^{29,30} Possible risk factors associated with depression among rural women of reproductive age include low self-esteem and intimate partner violence exposure,³¹ in addition to established risk factors for depression in the general population of women.

Contrasting evidence has shown that rural residence could be a protective factor for developing psychiatric illness. Some researchers have suggested that people in rural communities may be more likely than their urban counterparts to live in close proximity to immediate family, and to be more willing to use family and friends

for help and support than professionals.^{15,16} In addition, those living in rural communities have reported significantly higher levels of community belonging than those living in urban areas,³² which has also been shown to be protective against depression.³³ Evidence also exists reflecting lower levels of stress and depression among individuals living in rural areas,³⁴⁻³⁷ including women of reproductive age³¹; yet other studies have not found a significant relationship between depression and place of residence.^{38,39}

This mixed evidence raises the question of whether living in a rural area is a protective factor or a risk factor for developing PPD. In addition, the specific determinants of depression for rural postpartum women are largely unknown. To address these gaps in knowledge, this systematic review examines the available research evidence on depressive symptomatology during the postpartum period among rural women. Specifically, this study aims to (1) report the prevalence of PPD in rural communities within developed and developing countries and where possible, compare rates to those in urban centers; and (2) describe the risk factors that have been associated with PPD among rural women in developed and developing countries.

Methods

To gain a comprehensive overview of all existing studies examining PPD among rural women, a comprehensive literature search was performed. Computerized medical and psychological databases, including PsychInfo, Medline, CINAHL, EMBASE, and Cochrane Library, were searched from the beginning of the database until the first week of May 2010. Each database was searched independently using the following key words: postpartum, postnatal, pregnan*, perinatal, childbirth, obstetr*, labor, labour, puerperal, parturition, parity, or maternal; combined with mental health, mental illness, depress*, mood disorder, affective disorder, emotion, or baby blues; as well as rural, rural population, rural health, remote, small-town, or outback.

Published, peer-reviewed articles available in English or French were considered for this review. Only research studies that included a standardized measure of depression (either self-report or observer-rated) performed during the first postpartum year were included. Studies were required to report either the prevalence of PPD (as variously defined by the authors) in the population of interest or mean depression scores using scales with well-validated cut-off scores that indicate high risk of depression. Using these standardized measures of depression, results can be meaningfully interpreted in groups of

women living in rural areas—even if urban comparison groups are unavailable. Therefore, studies with and without urban comparison groups were included.

Approximately 760 abstracts were independently screened by 2 reviewers, and potentially relevant articles were selected based on the specific inclusion and exclusion criteria. The search was complemented by additional publications identified from reference lists of retrieved articles. A total of 19 empirical studies met inclusion criteria, and data from each article were extracted and tabulated.

Since the definition of “rural” may vary across countries, there may be important differences between the conditions in which rural women from developed countries live compared to rural women in developing countries. Therefore, in this review, articles were stratified into 2 categories: (1) data from rural mothers in developed countries, defined as those having high Human Development Index according to the United Nations⁴⁰ and (2) data from rural mothers from developing countries. Within each category, studies were examined to identify pertinent risk factors for the development of PPD in the respective populations.

Meta-analyses on the prevalence of PPD among all rural women, rural women in developed countries, and rural women in developing countries were conducted using the software Comprehensive Meta-Analysis (Version 2.2, Biostat, Englewood, NJ). Examination of the Q and I²

statistics revealed significant heterogeneity in all 3 analyses (all studies, developed countries, developing countries); as such the random effects models are reported. Since insufficient studies provided a comparison group of nonrural women, the planned meta-analysis to compare prevalence of PPD among rural and nonrural women could not be computed.

Results

Description of Studies

Of the 19 studies included in the review, 8 studies included samples from developed countries (summarized in Table 1) and 11 studies were conducted in developing countries (Table 2). Eight studies used cross-sectional designs⁴¹⁻⁵⁴ while 7 used longitudinal designs.^{18,52,55-59} Sample sizes ranged from 16 to 6,627 rural women, and in studies reporting maternal age, women ranged from 14 to 42 years of age.

For the 17 studies providing sufficient data with a dichotomous indicator of PPD (7 in developed and 10 in developing countries), the combined prevalence rate was 27.0% (95% CI, 18.8%-37.2%).

PPD in Developed Countries

Eight studies examined PPD in mothers living in rural areas within developed countries, as summarized in

Table 1 Summary of Studies Examining Postpartum Depression (PPD) Among Women in Rural Populations in Developed Countries

Study	Sample	Assessment Measures	Depression Prevalence
Astbury et al ⁴¹ (1994)	Australia—Victoria N = 535 urban N = 213 rural	EPDS	- PPD (8-9 mo): 15.4% of total sample - Among depressed women: 20.7% were rural and 79.3% urban (OR = 0.54; 95% CI, 0.33-0.90)
Baker et al ⁴² (2005)	USA—North Carolina—Robeson County N = 151 rural	PDSS	- PPD (6 wk): 23.2%
Baker and Oswalt ⁴³ (2008)	USA—North Carolina—Robeson County N = 154 rural	PDSS	- PPD (6 wk): 22.5%
Bilszta et al ¹⁸ (2008)	Australia—Melbourne and Albury/Wodonga N = 908 urban N = 1,058 rural	EPDS	- Antenatal depression was more common in the urban group: 8.5% versus 3.4% (P = .006) - PPD (6-8 wk) was more common in the rural group: 8.5% versus 6.6% (P = .064)
Griepma et al ⁴⁴ (1994)	Australia—Gippsland Region N = 185 rural	EPDS	- PPD (3 mo): 57.8%
Johnstone et al ⁴⁵ (2001)	Australia—New South Wales N = 268 urban N = 236 rural	EPDS	- PPD (8 wk): 13.1% of total sample - Mean EPDS—6.2 (SD = 4.7) - Rural versus urban: OR = 1.6 (nonsignificant).
Price and Proctor ⁵⁰ (2009)	USA—rural Midwest N = 37 rural	PRIME-MD	- PPD: 24.3%
Reighard and Evans ⁴⁶ (1995)	USA—southern rural N = 181 rural	EPDS	- PPD: 19.9%

EPDS, Edinburgh Postnatal Depression Scale; PDSS, Postpartum Depression Screening Scale; PRIME-MD, Primary Care Evaluation of Mental Disorders.

Table 2 Summary of Studies Examining Postpartum Depression (PPD) Among Women in Rural Populations in Developing Countries

Study	Sample	Assessment Measures	PPD Prevalence (Time of Assessment)
Black et al ⁴⁸ (2007)	- Bangladesh—Matlab - N = 221 rural	CES-D (Bengali)	52% (12 mo)
Chaaya et al ⁵⁵ (2002)	Lebanon—Beirut and Beka'a Valley N = 206 urban N = 188 rural	EPDS (Arabic)	Rural: 26% (3-5 mo) Urban: 16% (3-5 mo) Rural versus urban, <i>P</i> = .016
Chandran et al ⁵⁶ (2002)	South India—Vellore in Tamil Nadu N = 359 rural	CIS-R (ICD-10) (Tamil)	19.8% (first year, mean of 9.8 wk, SD-2.2)
Ege et al ⁴⁹ (2008)	Eastern Turkey—Malatya (semirural) N = 364 semirural	EPDS (Turkish)	33.2% (first year) 29.9% (6-24 wk) 39.2% (25-48 wk) - Mean EPDS score was 11.1 ± 4.1
Gausia et al ⁵⁹ (2009)	- Bangladesh—Matlab N = 346 rural	EPDS (Bangla)	22% (6-8 wk)
Kheirabadi and Maracy ⁵² (2010)	Iran—rural areas of Isfahan N = 1,291 rural	BDI-II EPDS	26.3% (6-8 wk)
Kheirabadi et al ⁵¹ (2009)	Iran—rural areas of Isfahan N = 6,627 rural	BDI-II	57.1% (20% mild, 18.3% moderate, and 18.9% severe) (2-12 mo)
Rahman and Creed ⁵⁷ (2007)	- Pakistan—Tehsil, Kahuta N = 129 depressed rural women	SCAN (ICD-10) (Urdu) SRQ-20	94% (3 mo) 76% (6 mo) 62% (12 mo) 57% depressed at all points.
Rahman et al ⁵⁸ (2003)	- Pakistan—Tehsil, Kahuta N = 541 rural	SCAN (ICD-10) (Urdu)	PPD (10-12 wk): 28%
Savarimuthu et al ⁵³ (2010)	- India—Vellore N = 137 rural	ICD-10 EPDS	PPD (2-10 wk): 26.3%
Stewart et al ⁵⁴ (2010)	- Malawi—Thyolo N = 190 rural	SCID SRQ	Minor/major PPD (9.9 mo, range 9.4-10.9) : 30.4%

CES-D, Center for Epidemiologic Studies-Depression Scale; EPDS, Edinburgh Postnatal Depression Scale; CIS-R, Revised Clinical Interview Schedule; BDI-II, Beck Depression Inventory II; SRQ, self-rating questionnaire; SCAN, schedule of clinical assessment in neuropsychiatry; ICD-10, international classification of disease; SCID, structured clinical interview for DSM disorders.

Table 1. Postpartum depression was assessed with the Edinburgh Postnatal Depression Scale (EPDS),^{18,41,44-46} the Postpartum Depression Screening Scale (PDSS),^{42,43} or the Primary Care Evaluation of Mental Disorders (PRIME-MD).⁵⁰

Overall, the combined prevalence rate for the 7 studies of developed countries including data appropriate for meta-analysis was 21.5% (95% CI, 10.9%-38.0%). These studies are described in detail below.

Two studies by Baker et al^{42,43} reported on the prevalence of PPD in a rural population of North Carolina, USA. In the first article (2005), a prevalence rate of 23.2% at 6 weeks postpartum was reported in a sample of 151 rural women, although the majority of women were single (72.2%) and had a high-school education or less (82.7%).⁴² Nonetheless, in 2008 the same group reported results for a more ethnically diverse sample, finding similar prevalence rates (22.5%), also at 6 weeks postpartum.⁴³ In another study using a US sample of a southern rural community, 19.9% (36/181) of women had an

EPDS score of equal or greater than 12 at their postpartum visit.⁴⁶ Similarly, another study found that 24.3% (9/37) of postpartum women had major depression according to the PRIME-MD.⁵⁰ Much higher rates were reported in Australia where 57.8% (N = 107) of rural women had EPDS ≥ 12 at 3 months postpartum.⁴⁴

Three studies compared rates of PPD among women living in rural and urban areas.^{18,41,45} Johnstone et al⁴⁵ found that rural women were 1.6 times more likely to have developed depression (EPDS ≥ 13) by 8 weeks postpartum compared to urban women, but the difference was not statistically significant.⁴⁵ Similarly, in a longitudinal study measuring depression before and after birth among rural and urban women, antenatal depression (EPDS ≥ 15) was more prevalent among the urban group, but PPD (EPDS ≥ 13) was higher in the rural group (8.5%) than the urban (6.6%) group at 6-8 weeks postpartum, although again the difference was not significant.¹⁸ Nevertheless, when evaluating risk factors for PPD using multivariate analyses, rural residence was a

significant predictor of PPD after controlling for antenatal depression and past psychiatric history. In contrast, in a large Australian case-control study, women from non-metropolitan areas had significantly lower odds (OR = 0.54, CI 0.33-0.90) of depression at 8-9 months postpartum than did women living in metropolitan areas.⁴¹

According to studies included in this review, risk factors associated with rural residence in developed countries included past depression^{42,43} or psychiatric history, antenatal depression, having no partner, low SES, recent life events, and past sexual abuse.¹⁸ However, in 1 study, controlling for past psychiatric history and antenatal depression reduced the strength of the association between rural residence and postpartum depression.¹⁸ Only 1 study reported protective factors, which included good partner relationship and adequate social support.¹⁸

PPD in Developing Countries

Eleven studies used samples of rural postpartum women in developing countries, and data are summarized in Table 2. There was greater variability in the assessment measures used in these studies, which included the EPDS,^{49,52,53,55,59} the Center for Epidemiologic Studies-Depression Scale (CES-D),⁴⁸ the schedule of clinical assessment in neuropsychiatry (SCAN), or other structured interviews based on ICD-10,^{53,57,58} the Beck Depression Inventory II (BDI-II),^{51,52} the Revised Clinical Interview Schedule (CIS-R),⁵⁶ and the structured clinical interview for DSM-IV disorders (SCID).⁵⁴

Overall, the combined prevalence rate for the 10 studies of developing countries that included data appropriate for meta-analysis was 31.3% (95% CI, 21.3%-43.5%). These studies are described in detail below.

At 6-8 weeks postpartum, rates of PPD were found to be 22% in rural Bangladesh⁵⁹ and 26.3% in rural Iran.⁵² In a South Indian rural sample, Chandran et al reported a prevalence of PPD of 19.8% at an average of 9.8 weeks after childbirth.⁵⁶ Similarly, 26.3% of women from rural India reported PPD at 2-10 weeks postpartum,⁵³ and 28% of married women from rural Pakistan reported PPD at 10-12 weeks after birth.⁵⁸ In addition, in a semirural area of eastern Turkey, 29.9% of women 6-24 weeks postpartum and 39.2% of women assessed at 25-48 weeks postpartum had high levels of depressive symptoms (EPDS \geq 13).⁴⁹ Even higher rates were reported in a sample of 221 families from rural India where 52% of women in this sample had CES-D scores above the cut-off point of 16, indicating clinically significant depressive symptomatology.⁴⁸ Similarly, in rural Iran, 57.1% had PPD according to the BDI-II, where 20% scored in the mild range, 18.3% in the moderate range, and 18.9% in the severe range during the first year postpartum.⁵¹

In addition, Rahman and Creed⁵⁷ assessed the course of PPD by following 160 rural Pakistani depressed women from their third trimester of pregnancy to 12 months postpartum. They found that rates of depression decreased over time, with 94% of the sample meeting criteria for depression at 3 months, 76% at 6 months, and 62% at 12 months postpartum. Fifty-seven percent of the sample met criteria for depression at all time points. Persistence of depression was related to poverty, having more than 5 children, an uneducated husband, and lack of a friend.

Only 1 study conducted in a developing country included a comparison group.⁵⁵ Women from Beirut were compared to women from a Beka'a Valley rural area 24 hours after delivery and at 4-5 months postpartum. The prevalence of PPD in rural women (26%) was significantly higher than among urban women (16%) ($P = .016$).

Several risk factors were reported to be related to PPD in rural women from developing countries. These included sociodemographic characteristics such as being young^{48,51-53} or single,⁴⁸ having low education^{48,51,53,55} or husband's low education,⁴⁹ low income,^{48,56,57} and small household size⁴⁸; reproductive history including unplanned pregnancy,^{49,51} previous history of abortion,^{49,53} delivering through cesarean section,⁵⁵ not breastfeeding,⁵⁵ unwanted sex of baby,^{49,51,53,56} perinatal death,⁵⁹ poor knowledge of infant care,⁴⁹ and having more than 5 children⁵⁷ or having 2 or more children under age 7^{57,58}; and sociopsychological problems including prenatal depression,^{52,55,56,59} history of depression or mental health problems,^{51,59} stressful life or past-year events,^{55,56} low social support,^{49,55-57} problems with in-laws,^{56,59} numbers of years married,⁴⁹ unhappy marriage,⁵³ physical abuse during pregnancy and after childbirth,⁵³ and husband's use of alcohol.⁵³ Again, only 1 study reported on protective factors, which included support by family members and presence of the infant's grandmother.⁵⁸

Discussion

Despite the small number of studies identified for this review, the results are suggestive of some important potential differences between rural and urban women in their risk for PPD. Specifically, results of this review suggest that: (1) the prevalence of PPD among rural women may be higher than among either urban women or postpartum women in the general population; (2) PPD may be more prevalent among rural women from developing countries compared to rural women from developed countries; and (3) established risk factors for PPD are likely applicable to rural women from both developed

and developing countries, although there may be additional risk factors relevant to rural women from developing countries.

Most studies reported elevated rates of PPD among rural women relative to what would be expected based upon data reported for the general population of postpartum women. According to a seminal meta-analysis, PPD occurs in 10%-15% of women.¹ However, in this review, rates of PPD ranged from 23% to 57.8% among rural women, suggesting elevated rates in rural communities. Studies including a comparison group of urban women yielded mixed results, but they also suggest elevated rates associated with rural residence: 1 study found significantly higher rates among their rural sample⁵⁵ and 2 studies found higher but nonsignificant rates,^{18,45} whereas 1 study found lower rates⁴¹ compared to women from urban areas. It is notable that the one study reporting lower rates compared women living in metropolitan and nonmetropolitan areas, and therefore it did not report on rates of PPD among rural women specifically. Individuals residing in small, nonmetropolitan communities may differ from both urban and rural residents; however, even those studies included in this review that focused on "rural" women applied variable definitions of this term.⁴⁹ As a result, inconsistencies between studies might be partially attributable to heterogeneity in this definition.

The use of different assessments of depression might also contribute to contradictory findings. Only 6 studies^{50,53,54,56-58} utilized a diagnostic assessment for depression; the remainder reported the proportion of women who scored above an established cut-off score on an inventory of depressive symptoms. However, it has been reported that CES-D might classify more postpartum women as being depressed than does the EPDS,⁶⁰ and variable cut-off scores for the EPDS have been established depending on the language, culture, and timing of the assessment.⁶¹ Finally, some, but not all, studies reported risk for PPD associated with rural residence after controlling for variables known to increase the risk for PPD in the general population, including age, income, level of social support, and past psychiatric history.^{18,45} It is difficult to draw comparisons between studies that did and did not adjust for these important variables. In conclusion, although the findings of this review are suggestive of increased risk for PPD among rural women, additional research is needed to compare women from various rural and urban areas at different time points within the first year postpartum, controlling for possible confounding variables.

Additionally, it is difficult to compare findings across studies, in particular as a result of differences in time of assessment. Only 1 longitudinal study could be identified

for this review. In this examination of perinatal depression among Pakistani rural women, decreasing rates of depressive symptoms were reported as the postpartum period progressed.⁵⁷ This trend has also been observed in previous longitudinal studies of postpartum women in the general population,⁶²⁻⁶⁵ suggesting that for some women depression remits. However, other studies have found no significant differences in the prevalence of depressive symptoms as the postpartum period progresses,⁶⁶ or they may report higher prevalence of PPD later in the postpartum.⁴⁹ The inconsistency of findings for the persistence of PPD calls for further assessment in both rural communities and general population samples, using prospective study designs.

PPD appears to be somewhat more prevalent among rural women from developing countries compared to developed countries: although the 95% confidence intervals overlapped, prevalence of PPD among rural women from developing countries was estimated at 31%, while among rural women from developed countries, prevalence was estimated at 21.5%. When 1 study with a very high rate (52.8%) was removed from the meta-analysis, the prevalence estimate for studies in developed countries dropped to 17.0% (95% CI, 11.0%-25.3%). This finding is consistent with other research indicating that rates of depression in samples from urban areas within developing countries are higher than those from urban areas in developed countries.⁶⁷⁻⁷³ Rates of PPD have been reported to be as high as 60% among women in developing countries, demonstrating a higher burden of morbidity.⁷⁴ This increased risk for PPD among rural women in developing countries is likely associated with some unique risk factors. Although rural women from both developed and developing countries share common risk factors, such as being single, low SES, past psychiatric history, depression during pregnancy, recent stressful events, history of abuse, and low social support, studies of rural women from developing countries identified additional risk factors. These include: poor relationship with partner or in-laws, having an unemployed or uneducated husband, husband's psychopathology, years of marriage, having more than 5 children, having 2 or more children under the age of 7, infant's gender, and lack of knowledge of infant care, problems with in-laws, and having an unemployed or uneducated husband.^{49,51,53,56-59} Other studies assessing PPD in urban areas of developing countries have found similar risk factors,^{28,47,72,75} Differences in risk factors for PPD between developing and developed countries may be a result of the relative levels of poverty and deprivation that many women living in developing countries must endure. There is a need for consistency across studies when evaluating risk factors. Future studies could explore the social factors including

relationship with partner, family and partner's family; as well as knowledge of infant care to determine to what extent these other risk factors impact women's lives.

Research on depression among rural women has also identified some rural-specific risk factors that may also apply to postpartum women. For example, environmental factors could be involved in depression risk associated with rural residence, as in an Australian study where environmental degradation in rural areas (eg, dryland salinity) was associated with depression.⁷⁶ In addition, there is some evidence of specific gene-environment interactions that may confer susceptibility to depression among rural women.⁷⁷ These recent studies suggest that there may be other factors in addition to sociodemographic or interpersonal variables contributing to PPD risk among rural women.

Elevated risk for PPD among rural women has important implications for clinical service delivery. Residence in isolated rural areas may decrease access to mental health screening and treatment, resulting in fewer diagnoses of depression or anxiety,^{31,78} or delays in receiving appropriate treatment.⁷⁹ One study has reported decreased probability of seeking treatment for PPD among rural women with PPD compared to urban women.⁸⁰ In a study of prenatal depression among rural women, Jesse et al identified 4 main barriers for seeking help, including lack of trust, judgment or stigma, dissatisfaction with the health care system and not wanting help.²² In addition, lack of knowledge about depression could also limit treatment access, as noted in a study of major depression where 47.5% of low-income rural women with depressive symptoms self-reported no depression.⁸¹

Screening for depression is reported to occur infrequently in rural communities, despite clinician-reported confidence in diagnosing and treating depression.⁷⁸ For example, in a US study assessing quality of screening practices in rural care, only 35% of women were screened formally or informally for depression, according to the national guidelines (Healthy People 2010).⁸² Improved screening tools and referral systems may assist primary health care providers in rural areas to identify risk factors and detect mental health problems early. In an attempt to improve practices, Farrell et al developed a computer-based electronic screening tool for rural users of primary care and demonstrated its effective use.⁸³ In Australia, several rural projects have already been implemented to improve access to mental health care for rural residents with depression and anxiety, by enabling general practitioners to screen their patients and refer them to allied health professionals.⁸⁴

Although not the focus of this review, we could identify only 2 intervention studies for rural women with PPD.^{79,85} In both, group therapy was associated with de-

creases in depressive symptoms among rural postpartum women.^{79,85} Other research has identified depression interventions that are effective among rural men and women, and these interventions may have applicability to the treatment of PPD. For example, telehealth has been used for treatment in rural areas.^{86,87} Such long-distance or electronic treatments might be viable in high-income countries with high technological development. However, these options might be less effective in rural communities within developing countries, which may have impeded access to technological advances and health care insurance options, making such care costly to patients. This may be magnified for rural residents who lack proximity to urban centers. Nonetheless, psychological interventions delivered by community-based primary health workers have demonstrated effectiveness in resource-poor communities.⁸⁸ Additionally, group interpersonal psychotherapy was shown to be effective for treatment of depression in rural Uganda.³⁰ Projects aimed at improving insurance accessibility in rural areas of developing countries have also demonstrated positive outcomes for depression.⁸⁹ Additional projects aimed to address income disparities associated with rural residence for women in developing countries will likely be associated with improvements in mental health status, including risk for PPD.

Conclusions

To our knowledge, this is the first systematic review assessing the available literature on PPD among rural women. Prevalence rates of PPD among rural women from developed and developing countries are higher than both rates reported in the general population of postpartum women, and women in metropolitan centers. Risk factors associated with rural residence are similar to those reported in other populations including past history of depression or psychiatric history, prenatal depression, and low social support. However, additional, rural-specific factors that may be contributing to the development of PPD require further research.

Early detection of and treatment for postpartum depression could benefit not only the mother's mental health and social functioning, but also the infant's physical and psychological health, and the family environment. Public health programs directed at rural postpartum women should include prevention, detection, and treatment initiatives. Education about depressive symptoms can reduce stigma and increase treatment seeking. Training primary health care providers to screen perinatal women for depressive symptoms may reduce prevalence and severity by detecting symptoms early and

offering adequate treatment options and referrals. In addition, a broad range of options should be available to rural perinatal women including self-help materials, support groups, psychiatric interventions, and counseling services addressing social isolation, perceived stress and financial hardship.

As there are significant limitations to the available evidence, a study using a prospective design with multiple assessments from pregnancy into the postpartum period would be helpful to confirm these conclusions. This research should aim to ascertain prevalence rates of PPD among rural women compared to women living in urban areas at various time points, and as secondary goals, confirm the specific risk factors associated with PPD among rural women. Further research will also be required to determine which PPD interventions could be feasible and effective for perinatal rural women.

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