

## Maternal Depression After Delivery in Oklahoma

### Introduction:

The reduction of depression after delivery, as a postpartum complication, is one of the Healthy People 2010 (HP 2010) targets for the reduction of maternal illness and complications due to pregnancy. Postpartum depression (PPD) can be disabling for a new mother. It has the potential to negatively impact her health and her ability to care and nurture her infant.<sup>1</sup>

Estimates of the prevalence and incidence of depression before, during and after pregnancy have varied widely. O'Hara and Swain (1996) conducted the first meta-analysis of the worldwide prevalence of postpartum depression.<sup>2</sup> They estimated the average prevalence of postpartum depression to be 13.0%, and the country in which the study was conducted did not significantly affect the prevalence estimates.<sup>2</sup> A study of new mothers in several U.S. states estimated a prevalence of 15.7%, when women were surveyed two to nine months postpartum.<sup>3</sup>

Significant factors found by several research studies to be correlated with elevated depressive symptoms include co-morbid anxiety symptoms, poor physical health, low levels of maternal education, stressful life events, parenting distress, financial problems, low family expressiveness, and having young children.<sup>3-6</sup>

The literature is conflicting, however, about whether women of color are more likely to suffer from postpartum depression when compared with white women.<sup>3-6</sup>

Relationships with significant others can be key; the quality of the relationship with a partner and the level of partner involvement were significant correlates of initial elevated depressive symptoms.<sup>4</sup> Symptoms of postpartum depression have also been associated with lower maternal self-efficacy scores, infants with difficult temperament (or "colic"), and lack of maternal social support.<sup>4,6</sup>

This PRAMSGRAM will examine women in Oklahoma who report two symptoms key to the diagnosis of depression during the postpartum period. It will discuss some correlates of maternal depression after delivery and

### In Oklahoma:

- One in four new mothers reported symptoms of maternal depression postpartum.
- Approximately forty percent of all Oklahoma mothers did not discuss postpartum depression with their health care provider.
- Women 20-24 were twice as likely to indicate symptoms of depression when compared to women 35 or older; adolescents (under 20) were 2.5 times as likely.
- Stressors found to increase the risk of depression symptoms were having an unintended pregnancy, arguing with a partner more than usual during pregnancy, and having bills one could not pay.

associated stressors and will provide recommendations to address this issue in Oklahoma.

### Methods:

This study used data from the Pregnancy Risk Assessment Monitoring System (PRAMS) for the survey years 2004, 2005, and 2006. For this period, 7,757 Oklahoma mothers were sent the PRAMS survey shortly after the birth of their child. Of these mothers, 5,762 completed the questionnaire, yielding an unweighted overall response rate of 74.3%. A detailed explanation of PRAMS methodology has been well-documented elsewhere.<sup>7</sup>

The presence of maternal depression symptoms after delivery was indicated for those mothers who responded "Yes" to the question "In the months after your delivery did you ever feel sad or hopeless almost every day for at least 2 weeks in a row that you stopped doing some usual activities?" A total of 5,586 mothers responded to this question. It should be noted that this is a surveillance definition of depression symptoms based on self-reported information from the mother, which should not be confused with a medical or clinical diagnosis of depression.

For the study a range of demographic, social, and behavioral variables supported by research as possible

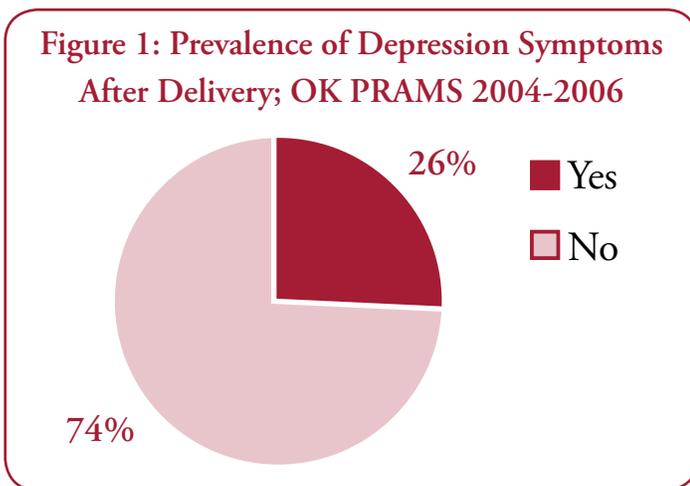
influences for maternal depression were analyzed. In addition to the standard demographic and socio-economic variables, variables that describe social support factors and social stressor factors during and after the pregnancy, maternal health and behavior, and pregnancy complications were included. Interaction variables that described whether the mother had access to needed health services, welfare, or counseling were also examined.

The prevalence of maternal depression symptoms was reported for these variables and chi-square tests of association were performed. In this descriptive analysis, variables were examined using percentages and 95% confidence limits. Chi-square tests were considered significant at  $p < .05$ .

A multivariate logistic regression was performed on selected factors for the second stage of the analysis, with maternal depression selected as the response variable. Predictor variables were selected from the full model using the GLMSELECT procedure in SAS, employing a backward selection technique that maximized the goodness of fit of the model using the Akaike Information Criterion (AIC). A logistic regression containing the best-fitting selection of predictor variables was then run in SUDAAN to obtain odds ratios with 95% confidence intervals.

## Results:

Approximately one in four mothers (25.8%, 95% CI 24.0%, 27.7%) who responded to PRAMS reported symptoms of maternal depression postpartum (See Figure 1).



The results of the descriptive univariate analysis show the mother's demographic breakdown, the presence of social support during and after her pregnancy,

social stressors during and after her pregnancy, access to needed health care or counseling services, and maternal health and behavioral factors all play a role in increasing or reducing the risk of postpartum maternal depression (See Table 1).

Because many of these factors are strongly intercorrelated, it is important to determine which variables bear the strongest relationship with postpartum depression (PPD) while discarding factors that may have little influence on PPD yet are correlated with variables that are strongly associated. Therefore, a multivariate logistic regression model is useful to provide meaningful results for this analysis.

<b>Table 1: Selected Demographic Characteristics of Oklahoma Women by Postpartum Depression Symptom Status; PRAMS 2004-2006</b>					
<b>CHARACTERISTIC</b>	<b>POSTPARTUM DEPRESSION SYMPTOMS</b>				
	<b>NO</b>		<b>YES</b>		<b>P-VALUE</b>
	<b>%</b>	<b>CI</b>	<b>%</b>	<b>CI</b>	
<b>OVERALL</b>	74.2	72.3, 76.0	25.8	24.0, 27.7	
<b>AGE</b>					
<20	63.3	57.0, 69.2	36.7	30.8, 43.0	<.0001
20-24	68.6	64.8, 72.1	31.4	27.9, 35.2	
25-29	76.2	72.8, 79.3	23.8	20.7, 27.2	
30-34	84.0	80.1, 87.2	16.1	12.8, 19.9	
35+	83.9	78.2, 88.3	16.1	11.7, 21.8	
<b>RACE</b>					
WHITE	76.0	73.9, 78.0	24.0	22.0, 26.1	.0114
AFRICAN AM.	64.2	56.7, 71.1	35.8	29.0, 43.3	
NATIVE AM.	70.7	64.1, 76.5	29.3	23.5, 35.9	
<b>ETHNICITY</b>					
NON-HISPANIC	74.9	72.9, 76.8	25.1	23.2, 27.1	.0681
HISPANIC	69.3	63.4, 74.7	30.7	25.4, 36.6	
<b>EDUCATION*</b>					
<12*	64.0	58.9, 68.8	36.0	31.2, 41.1	<.0001
12+	76.7	74.6, 78.6	23.4	21.4, 25.4	
<b>MARITAL STATUS</b>					
MARRIED	80.5	78.4, 82.5	19.5	17.5, 21.6	<.0001
UNMARRIED	64.4	60.9, 67.8	35.6	32.2, 39.1	
<b>MEDICAID</b>					
YES	68.3	65.4, 71.0	31.7	29.0, 34.6	<.0001
NO	81.9	79.4, 84.1	18.1	15.9, 20.6	

\* Excludes mothers < age 18

The results of the regression analysis, displayed in Table 2, show that after controlling for other demographic, social

support, social stressor, and health factors, maternal age is one of the strongest predictors of depression postpartum for mothers (< 20 years of age, AOR=2.47, 95% CI 1.33, 4.57), while other demographic factors such as race, ethnicity, education, and marital status were less important in comparison and were excluded from the final model.

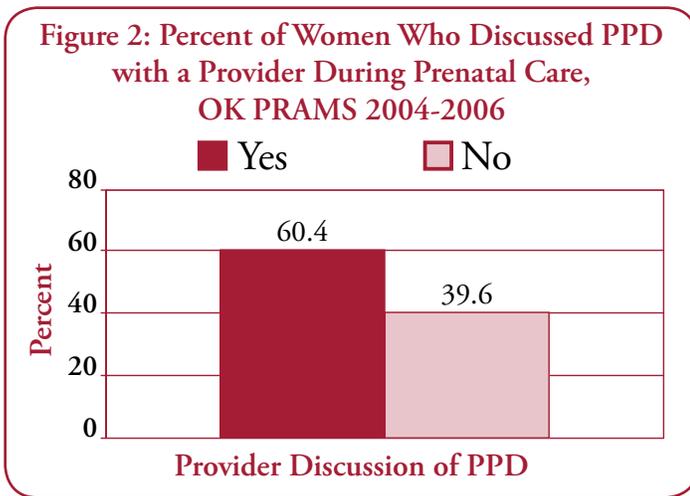
In addition, unintended pregnancy placed mothers at higher risk of depression (AOR=1.37, 95% CI 1.02, 1.84). Lack of social support was also a risk factor (“Someone to loan me \$50” AOR=1.55, 95% CI 1.17, 2.06). Two social stressors included in the model, “I argued with my husband or partner more than usual” (AOR=1.33, 95% CI 1.02, 1.73) and “I had a lot of bills I couldn’t pay” (AOR=1.47, 95% CI 1.12, 1.92) significantly increased the risk of depression. A lack of access to needed dental care (AOR=1.36, 95% CI 1.03, 1.80), breastfeeding counseling (AOR=1.72, 95% CI 1.05, 2.83) and, most importantly, personal or family counseling (AOR=2.57, 95% CI 1.77, 3.74) were associated with depression symptoms after delivery (See Table 2).

In line with these findings, mothers who did not report seeing a health care provider for a postpartum checkup showed increased odds of having signs of postpartum depression (AOR=1.39, 95% CI 1.01, 1.93). Mothers suffering from certain pregnancy or birth complications were at heightened risk of depressive symptoms: gestational diabetes (AOR=1.50, 95% CI 1.04, 2.16), severe nausea, vomiting, or dehydration (AOR=1.40, 95% CI 1.10, 1.78), preterm or early labor (AOR=1.20, 95% CI 0.92, 1.57), and an infant stay in the neonatal intensive care unit (NICU) (AOR=1.36, 95% CI 0.99, 1.88).

The Pregnancy Risk Assessment Monitoring System (PRAMS) is an ongoing, population-based study designed to collect information about maternal behaviors and experiences before, during and after pregnancy. On a monthly basis, PRAMS samples between 200 and 250 recent mothers from the Oklahoma live birth registry. Mothers are sent as many as three mail questionnaires seeking their participation, with follow-up phone interviews for non-respondents. A systematic stratified sampling design is used to yield sample sizes sufficient to generate population estimates for groups considered at risk for adverse pregnancy outcomes. Information included in the birth registry is used to develop analysis weights that adjust for probability of selection and non-response.

<b>Table 2: Multivariate Logistic Regression Odds Ratios for Maternal Postpartum Depression among Oklahoma Women; PRAMS 2004-2006</b>		
<b>POSTPARTUM DEPRESSION PREDICTOR</b>	<b>ADJUSTED ODDS RATIO (AOR)</b>	<b>95% CONFIDENCE INTERVAL (CI)</b>
<b>MATERNAL AGE</b>		
<20	2.47	(1.33, 4.57)
20-24	1.94	(1.12, 3.35)
25-29	1.64	(0.95, 2.83)
30-34	1.10	(0.61, 1.97)
35+	1.00	(1.00, 1.00)
<b>PREGNANCY INTENTION</b>		
PROB. DIDN'T WANT	1.37	(1.02, 1.84)
DIDN'T MIND	0.87	(0.63, 1.19)
PROB. WANTED	1.00	(1.00, 1.00)
<b>GESTATIONAL DIABETES</b>		
NO	1.00	(1.00, 1.00)
YES	1.50	(1.04, 2.16)
<b>SEVERE NAUSEA, DEHYDRATION</b>		
NO	1.00	(1.00, 1.00)
YES	1.40	(1.10, 1.78)
<b>PRETERM LABOR</b>		
NO	1.00	(1.00, 1.00)
YES	1.20	(0.92, 1.57)
<b>INFANT IN NICU</b>		
NO	1.00	(1.00, 1.00)
YES	1.36	(0.99, 1.88)
<b>DENTAL CARE</b>		
NEEDED/DIDN'T RECEIVE	1.36	(1.03, 1.80)
NEEDED/DID RECEIVE	1.06	(0.75, 1.49)
DIDN'T NEED/DIDN'T RECEIVE	1.00	(1.00, 1.00)
DIDN'T NEED/DID RECEIVE	0.65	(0.39, 1.07)
<b>BREASTFEEDING HELP</b>		
NEEDED/DIDN'T RECEIVE	1.72	(1.05, 2.83)
NEEDED/DID RECEIVE	1.02	(0.74, 1.40)
DIDN'T NEED/DIDN'T RECEIVE	1.00	(1.00, 1.00)
DIDN'T NEED/DID RECEIVE	0.90	(0.67, 1.21)
<b>PERSONAL/FAMILY COUNSELING</b>		
NEEDED/DIDN'T RECEIVE	2.57	(1.77, 3.74)
NEEDED/DID RECEIVE	1.83	(1.05, 3.21)
DIDN'T NEED/DIDN'T RECEIVE	1.00	(1.00, 1.00)
DIDN'T NEED/DID RECEIVE	1.67	(0.41, 6.83)
<b>POSTPARTUM CHECKUP</b>		
NO	1.39	(1.01, 1.93)
YES	1.00	(1.00, 1.00)
<b>ARGUED WITH HUSBAND/PARTNER</b>		
NO	1.00	(1.00, 1.00)
YES	1.33	(1.02, 1.73)
<b>COULDN'T PAY BILLS</b>		
NO	1.00	(1.00, 1.00)
YES	1.47	(1.12, 1.92)
<b>SOMEONE TO LOAN ME \$50</b>		
NO	1.55	(1.17, 2.06)
YES	1.00	(1.00, 1.00)

For all women in Oklahoma when asked if their health care provider discussed PPD only 60.4% of women answered affirmatively (See Figure 2). Discussions about PPD did not impact the prevalence of symptoms of depression among Oklahoma mothers (data not shown).



## Discussion:

One in four Oklahoma mothers suffer from key symptoms of postpartum depression between two and six months postpartum. This finding is reinforced by other reports that have found high rates of mental illness in Oklahoma. According to the Oklahoma Governor's and Attorney General's Blue Ribbon Task Force, Oklahoma has the highest rate of severe mental illness in the nation at 10.4%.<sup>8</sup>

A special population of mothers with depression symptoms postpartum in Oklahoma is the adolescent population. Several studies have reported similar findings that the burden of depression for adolescent women is higher than for older women.<sup>9-11</sup> Adolescents in those studies reported their depression resulted from suddenly realizing motherhood; feeling abandoned and rejected by their families and social networks; and feeling torn between motherhood and schoolwork.<sup>11</sup>

Women with perceived needs that were unmet, such as assistance with breastfeeding, family counseling or dental care, were at a higher risk for depression symptoms when compared to women who had no unmet needs, although family counseling is an exception. Women who needed counseling and received it were also more likely to indicate symptoms of depression when compared to women who indicated they neither needed nor received counseling. Identifying needs during pregnancy and referral options available to providers may be key to mediating this risk for new mothers.

In Oklahoma, women with infants placed in the NICU were at a higher risk for depression. Research studies suggest that mothers are at special risk for postpartum depression when caring for infants born prematurely or infants with special health care needs. For these women, marital status, her child's need for rehospitalization, any changes in parental roles, and her concerns about her child's health significantly predict the development of maternal depression.<sup>12</sup> Partner support, support services and employment were found to decrease a woman's risk of depression.<sup>12</sup>

Even though many postpartum women in Oklahoma suffer from symptoms of depression, 39.6% of women stated their health care provider did not include a discussion about PPD in their prenatal care. This means that more than one-third of new mothers were not informed prenatally about PPD, and the chance that they were assessed for risks is even lower.

Barriers to postpartum screening and treatment for depression exist. Women who are both economically disadvantaged and at increased risk for PPD may not follow through with the postpartum visit due to situational, psychological or cultural barriers. For the same reasons, they may not seek treatment or drop out after an initial treatment visit. Assessment for depression alone is not sufficient without enhanced post-referral care to ensure that treatment is received and follow-up visits are made.<sup>13</sup>

Perceived stigma is an important barrier for women needing care for mental illness. Among a group of women who were low-income, diagnosed with depression, and receiving maternity and gynecological care at a public clinic, 51 percent of these women were concerned with how their family or friends would perceive their depression, 40 percent were embarrassed to talk about their depression with another person, and 26 percent thought they could not be helped by mental health care.<sup>14</sup>

One additional barrier in Oklahoma is an overall lack of screening for PPD. The Oklahoma State Department of Health (OSDH) is in the process of implementing a Postpartum Depression Screening initiative in the county health department clinics across the state. Any woman utilizing a county health department clinic up to one year after a pregnancy will be screened with the Edinburgh Postnatal Depression Scale by the first program she visits (i.e. WIC, a family planning clinic, Children First Program, etc.) and referred for appropriate follow-up care as needed. The Edinburgh Postnatal Depression Scale has been extensively tested and has cross-cultural validity.

Limitations for this study include the absence of two factors that research indicates contribute to maternal depression for some women, family history of (or pre-existing) maternal depression and infant colic, since Oklahoma PRAMS does not collect information on these subjects. One of the social support variables (“Someone to help me if I were tired and feeling frustrated with my new baby”) may capture some of the issues associated with colicky infants, but it may not be the best proxy. In addition, the use of only one question to identify women with symptoms of depression may create some bias, as may the self-report of depression symptoms. Mothers who may have developed depression later in the postpartum period (after completing the PRAMS survey) were not represented in this study.

## Recommendations:

1. Screen every woman in Oklahoma for maternal depression, before and up to one year postpartum (at a late-term prenatal visit, a postpartum checkup, WIC visits, well woman checkups, pediatrician visits).
2. Ensure all women understand the importance of returning for their postpartum checkup around six weeks after delivery; to discover and reduce barriers to postpartum care where possible.
3. Provide opportunities for parents with infants in the NICU to learn about opportunities and support groups that exist near their homes and in the hospital, to include information on PPD and how families can support a mother with signs and symptoms of PPD.
4. Educate Medicaid providers on the new coverage of social work services available to patients with SoonerCare/Medicaid. Providers can call 1-800-522-0114 to obtain information from SoonerCare/Medicaid on which social work providers to refer to in their area.
5. Provide education for providers in delivery hospitals, obstetrics clinics, pediatric clinics and family medicine practices on PPD awareness and referral information for appropriate treatment, including appropriate follow-up care.
6. Encourage new mothers with signs and symptoms of depression to call the Oklahoma Warmline for Postpartum Depression at 1-405-474-6720 or the PSI national hotline 1-800-944-4PPD. Information is also available at [www.postpartum.net](http://www.postpartum.net)
7. Screen all pregnant and postpartum adolescents for depression. Physicians may choose to treat, co-treat with a counselor or refer the adolescent for mental health services. Schools and school counselors should provide support for pregnant and postpartum adolescents to cope with the stress of motherhood, schoolwork and feelings of isolation.
8. Find a way to incorporate mental health awareness into school health curricula to reduce the stigma surrounding mental health problems.

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