

# PRAMSGRAM

OKLAHOMA PREGNANCY RISK ASSESSMENT MONITORING SYSTEM VOL 13 NO 2 SPRING 2009

## Stressors, Social Support and Pregnancy Outcomes Among African American and White Mothers

### Introduction:

The impact of stress on pregnancy health is dependent upon the severity and duration of the stress, as well as maternal perception of the severity, and coping mechanisms available to mitigate the stressful event(s). Mild stress viewed positively, such as work-related stress due to deadlines and workload, may even have helpful, normal influences on fetal development.<sup>1</sup> However, severe, chronic, and negative stress for the mother can adversely affect pregnancy health.<sup>1-5</sup>

Multiple research studies have examined the relationship between birth outcomes and maternal stress. High levels of maternal stress have been associated with low birth weight, increases in smoking and alcohol use, and preterm delivery.<sup>2-5</sup> Researchers have indicated that the increase in tobacco use may explain the higher levels of low birth weight infants (LBW) for some women.<sup>2-5</sup> However, even when controlling for tobacco use, in some studies maternal stress was still an indicator for LBW and preterm labor.<sup>2-5</sup> These same studies found that even when controlling for stressors, African American women remained at an elevated risk for LBW and preterm compared to other women studied.<sup>6</sup>

One potential mitigating factor on the influence of stress is social support for the mother before and during her pregnancy. Social support might include the presence of a partner before, during and after pregnancy (for example, help and advice from family and friends, having a trusted provider). Research in this area has been varied as to the protective nature of support on stress relief or coping mechanisms. However, studies have shown that for African American women, social support can decrease the risk for depression. Programs that create social pregnancy-centered networks for pregnant women (like Centering Pregnancy) can reduce the risk of low birth weight among participants.<sup>7-8</sup>

### In Oklahoma:

- African American women were more likely to experience homelessness, job loss, arguments with their partners, and/or having their partner or themselves spend time in jail when compared to white women.
- African American women were more likely to have a low birth weight (LBW) infant if they lived in an urban area, had a previous LBW infant or had two or more pregnancy complications. Stressors did not impact their likelihood of LBW.
- Having a greater number of stressors did increase the likelihood of smoking and alcohol use during pregnancy for all women, both risk factors for LBW and certain birth defects.

This PRAMSGRAM is the third in a series to focus on the impact of health disparities between African American and white women in Oklahoma. This study will examine the impact of maternal stressors on low birth weight among Oklahoma's African American maternal population and assess if social supports mediate this risk.

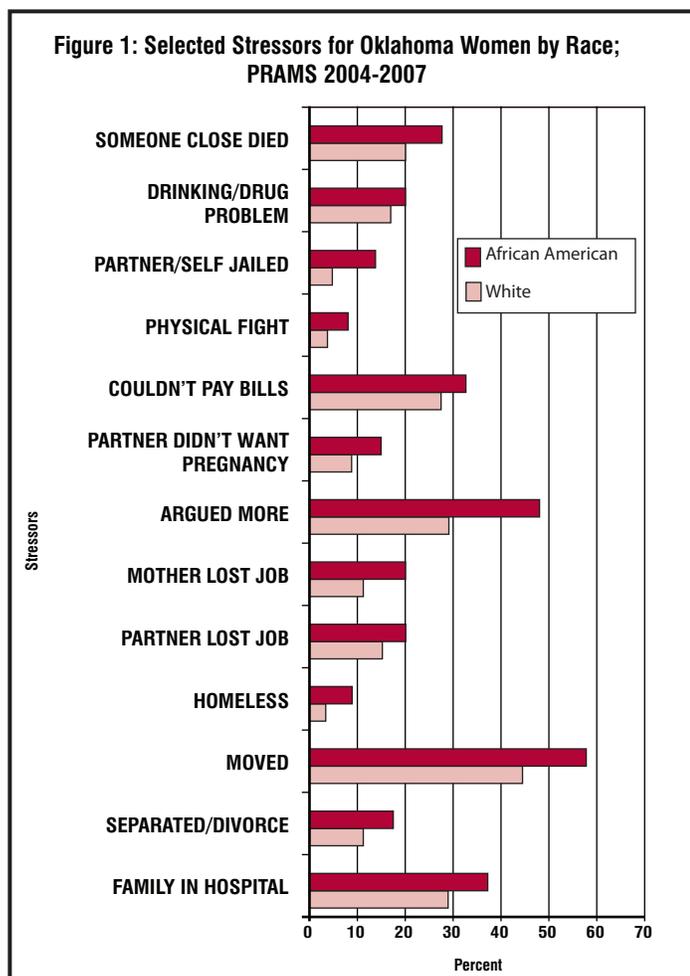
### Methods:

Data used in this report were collected from the Oklahoma Pregnancy Risk Assessment Monitoring System (PRAMS) for the years 2004 through 2007. PRAMS respondents who reported their race on the birth certificate as either African American or white were included in the study; women of all races were included in the multivariate logistic regression analysis. A more detailed methodology of PRAMS has been well-documented elsewhere.<sup>9</sup>

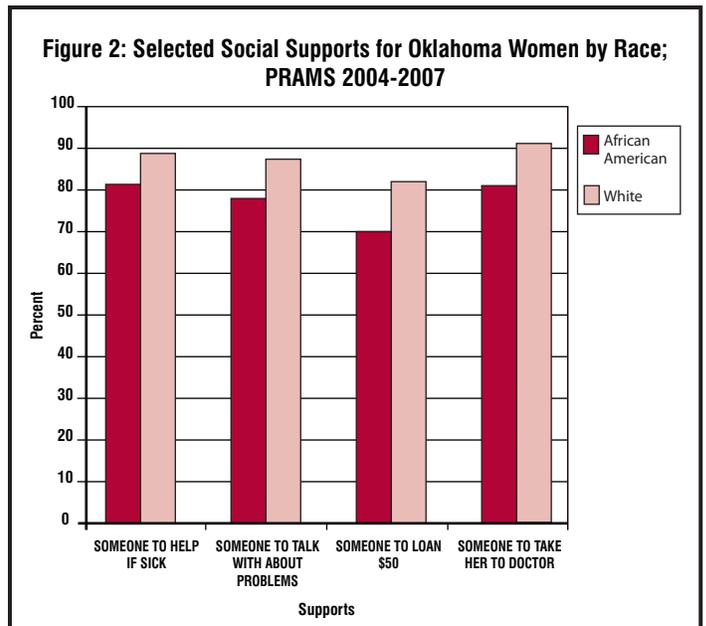
Multivariate logistic regression analyses were used to assess LBW (low <2,500gms vs. normal  $\geq$  2,500gms) among mothers having singleton births against covariates like age, race, education, marital status, adequacy of prenatal care (using the Kotelchuck Index), stress levels, key morbid conditions, social supports, domestic violence and smoking were assessed. Stressors included serious illness and hospitalization of loved one, separation or divorce, moving, homelessness, loss of job for mother or

husband/partner, arguing with husband/partner more than usual, husband/partner not wanting pregnancy, bills that could not be paid, physical fighting, time in jail for self or husband/partner, loved one with drug or alcohol problem and death of loved one. Morbidity included conditions like high blood pressure (including preeclampsia or toxemia) or retained water (edema), vaginal bleeding, and problems with placenta (such as abruption placentae, placenta previa). Multiple births were excluded from this analysis.

Due to the complex sample design of the PRAMS study, SAS-Callable SUDAAN 9.0.1 was used to run the statistical analysis. The logistic regression models fit the data adequately, as determined by Hosmer-Lemeshow goodness-of-fit tests. Statistical significance was established at  $p < 0.05$ .



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 225 and 275 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.



**Results:**

African American mothers in Oklahoma were significantly more likely to report experiencing the following stressors in the 12 months prior to delivery when compared to white women: being homeless, losing a job, arguing more than usual with a partner or spouse and/or having their husband/partner or themselves spend time in jail (Figure 1). African American women in Oklahoma were three times more likely to be homeless during their pregnancy or preconception period and more than twice as likely to spend time in jail or have their partners spend time in jail compared to their white counterparts.

Measured social supports during pregnancy (Figure 2) show that African American mothers in the state were significantly less likely to report having someone during their pregnancy who they could talk to about their problems, someone to take them to the doctor, or someone to loan them \$50 compared to white mothers. Approximately 71% of African American mothers reported having someone during their pregnancy who could loan them \$50 if they needed it, compared to 82.2% of white mothers. No significant difference was found for having help if needed while sick during pregnancy; most mothers reported having needed help if sick (Figure 2).

To determine if these disparities in stressors and social supports contributed to a mother's risk for delivering a low birth weight infant, a multivariate logistic regression was run. In order to simplify the model, the stressor and support variables were grouped together as were pregnancy complications. When controlling for demographic, pregnancy and maternal behavior characteristics, only maternal race, smoking status during pregnancy, weight gain during pregnancy, birth defects, having a previous

premature or low birth weight infant, and the number of pregnancy complications were significantly associated with low birth weight among Oklahoma’s singleton births (Table 1).

Table 1: Multivariate Logistic Regression Odds Ratios for **Low Birth Weight** Among Singleton Births; PRAMS 2004-2007

Predictors	Adjusted Odds Ratios	95% Confidence Interval
<b>MATERNAL RACE</b>		
White (Reference)	1.00	1.00, 1.00
<b>African-American</b>	<b>1.57</b>	<b>1.01, 2.42</b>
Native American	0.71	0.46, 1.10
Other	1.38	0.63, 3.01
<b>SMOKING DURING LAST 3 MONTHS OF PREGNANCY</b>		
No (Reference)	1.00	1.00, 1.00
<b>Yes</b>	<b>1.52</b>	<b>1.15, 2.02</b>
<b>RECOMMENDED WEIGHT GAIN</b>		
<b>Under recommended</b>	<b>1.80</b>	<b>1.34, 2.41</b>
Within recommended (Ref.)	1.00	1.00, 1.00
Over recommended	0.78	0.59, 1.03
<b>BIRTH DEFECTS</b>		
No (Reference)	1.00	1.00, 1.00
<b>Yes</b>	<b>3.95</b>	<b>2.62, 5.97</b>
<b>PREVIOUS PREMATURE BIRTH</b>		
No (Reference)	1.00	1.00, 1.00
<b>Yes</b>	<b>1.82</b>	<b>1.32, 2.52</b>
<b>PREVIOUS LOW BIRTH WEIGHT</b>		
No (Reference)	1.00	1.00, 1.00
Yes	2.65	1.83, 3.83
<b>NUMBER OF PREGNANCY COMPLICATIONS</b>		
None (Reference)	1.00	1.00, 1.00
<b>One</b>	<b>1.98</b>	<b>1.49, 2.63</b>
<b>Two</b>	<b>4.15</b>	<b>3.09, 5.59</b>
<b>Three</b>	<b>6.20</b>	<b>4.33, 8.88</b>
<b>Four</b>	<b>7.59</b>	<b>4.96, 11.62</b>

Hosmer-Lemeshow Goodness of Fit  $p$ -value = 0.0140

However, when breaking the regression down even further to determine if these same risks apply to African American mothers and white mothers, the study found that the only significant contributors to delivering a low birth weight baby for African American women were geographic location (rural/urban), having had a previous low birth weight infant, and the number of pregnancy complications (Table 2). For white women the risks associated with delivering a low birth weight infant were smoking during pregnancy, weight gain, birth defects, previous premature or low birth weight infant, and number of pregnancy complications similar to that of the risks for the state overall (Table 3). Stressors and social supports for both groups of women were not found to be significantly associated with low birth weight.

Table 2: Multivariate Logistic Regression Odds Ratios for **Low Birth Weight** Among Singleton **African-American** Births; PRAMS 2004-2007

Predictors	Adjusted Odds Ratios	95% Confidence Interval
<b>GEOGRAPHICAL AREA OF RESIDENCE</b>		
Rural (Reference)	1.00	1.00, 1.00
<b>Urban</b>	<b>2.71</b>	<b>1.12, 6.55</b>
<b>PREVIOUS LOW BIRTH WEIGHT</b>		
No (Reference)	1.00	1.00, 1.00
<b>Yes</b>	<b>3.55</b>	<b>1.79, 7.02</b>
<b>NUMBER OF PREGNANCY COMPLICATIONS</b>		
None (Reference)	1.00	1.00, 1.00
One	1.28	0.54, 3.06
<b>Two</b>	<b>5.01</b>	<b>1.97, 12.78</b>
<b>Three</b>	<b>3.24</b>	<b>1.24, 8.45</b>
<b>Four</b>	<b>5.72</b>	<b>2.01, 16.32</b>

Hosmer-Lemeshow Goodness of Fit  $p$ -value = 0.0004

Table 3: Multivariate Logistic Regression Odds Ratios for **Low Birth Weight** Among Singleton **White** Births; PRAMS 2004-2007

Predictors	Adjusted Odds Ratios	95% Confidence Interval
<b>SMOKING DURING LAST 3 MONTHS OF PREGNANCY</b>		
No (Reference)	1.00	1.00, 1.00
<b>Yes</b>	<b>1.78</b>	<b>1.31, 2.41</b>
<b>RECOMMENDED WEIGHT GAIN</b>		
<b>Under recommended</b>	<b>1.97</b>	<b>1.38, 2.81</b>
Within recommended (Reference)	1.00	1.00, 1.00
Over recommended	0.83	0.59, 1.16
<b>BIRTH DEFECTS</b>		
No (Reference)	1.00	1.00, 1.00
<b>Yes</b>	<b>3.85</b>	<b>2.26, 6.56</b>
<b>PREVIOUS PREMATURE BIRTH</b>		
No (Reference)	1.00	1.00, 1.00
<b>Yes</b>	<b>2.06</b>	<b>1.43, 2.97</b>
<b>PREVIOUS LOW BIRTH WEIGHT</b>		
No (Reference)	1.00	1.00, 1.00
<b>Yes</b>	<b>2.99</b>	<b>1.94, 4.60</b>
<b>NUMBER OF PREGNANCY COMPLICATIONS</b>		
None (Reference)	1.00	1.00, 1.00
<b>One</b>	<b>2.09</b>	<b>1.51, 2.91</b>
<b>Two</b>	<b>3.82</b>	<b>2.70, 5.39</b>
<b>Three</b>	<b>7.66</b>	<b>5.15, 11.40</b>
<b>Four</b>	<b>8.86</b>	<b>5.38, 14.59</b>

Hosmer-Lemeshow Goodness of Fit  $p$ -value = 0.0747

Stressors were found to play a role in a mother’s likelihood of smoking or drinking during her pregnancy. Both are risk factors for low birth weight, some pregnancy complications (placenta problems, hypertension) and some birth defects, including Fetal Alcohol Syndrome (Tables 4,5). Although no direct association was found between stress and low birth weight, an indirect association appears to be present in terms of increased substance use during pregnancy and stressors. Social supports were not found to be protective.

Table 4: Multivariate Logistic Regression Odds Ratios for **Smoking** During Last 3 Months of Pregnancy; PRAMS 2004-2007

Predictors	Adjusted Odds Ratios	95% Confidence Interval
MATERNAL RACE		
<b>White</b>	<b>3.28</b>	<b>2.16, 5.00</b>
African-American (Reference)	1.00	1.00, 1.00
<b>Native American</b>	<b>2.15</b>	<b>1.30, 3.58</b>
Other	2.19	0.74, 6.47
MATERNAL ETHNICITY		
Hispanic (Reference)	1.00	1.00, 1.00
<b>Non-Hispanic</b>	<b>17.24</b>	<b>8.69, 34.20</b>
MATERNAL AGE		
<20 (Reference)	1.00	1.00, 1.00
<b>20-29</b>	<b>1.67</b>	<b>1.16, 2.41</b>
<b>30+</b>	<b>1.58</b>	<b>1.02, 2.46</b>
INSURANCE		
<b>Medicaid</b>	<b>2.61</b>	<b>1.89, 3.60</b>
Private Insurance (Reference)	1.00	1.00, 1.00
MULTIVITAMIN USE DURING PREGNANCY		
<b>No</b>	<b>1.99</b>	<b>1.49, 2.65</b>
Yes (Reference)	1.00	1.00, 1.00
MARITAL STATUS		
Married (Reference)	1.00	1.00, 1.00
<b>Unmarried</b>	<b>2.18</b>	<b>1.69, 2.82</b>
NUMBER OF PREGNANCY STRESSORS		
None (Reference)	1.00	1.00, 1.00
<b>One</b>	<b>1.76</b>	<b>1.19, 2.60</b>
<b>Two</b>	<b>1.63</b>	<b>1.07, 2.48</b>
<b>Three</b>	<b>2.34</b>	<b>1.60, 3.43</b>
<b>Four</b>	<b>3.94</b>	<b>2.65, 5.87</b>

Hosmer-Lemeshow Goodness of Fit  $p$ -value < .0001

## Discussion:

Stressors and social supports varied between African American women and white women in Oklahoma. African American women were significantly more likely to face certain stressors, like loss of a job or homelessness, and were less likely to have three of the four measured sources of social support. However, these differences did not contribute directly to the risk for low birth weight for their infants in this study.

The results of this study differ from those of some other studies, which have found a link between stress and low birth weight or preterm delivery.<sup>4, 10</sup> Because many of the stressors reported in PRAMS were rare events occurring among less than 10% of surveyed pregnant women, PRAMS may not have sufficient sample size to detect an association between stress and low birth weight or preterm delivery if it exists. What this study did find, however, was that stress may not impact birth weight or preterm directly but, due to its influence on smoking and drinking during

Table 5: Multivariate Logistic Regression Odds Ratios for **Drinking** During Last 3 Months of Pregnancy; PRAMS 2004-2007

Predictors	Adjusted Odds Ratios	95% Confidence Interval
MATERNAL RACE		
White	2.12	0.91, 4.93
<b>African-American</b>	<b>3.10</b>	<b>1.15, 8.35</b>
Native American (Reference)	1.00	1.00, 1.00
Other	3.62	0.79, 16.71
MATERNAL ETHNICITY		
Hispanic (Reference)	1.00	1.00, 1.00
<b>Non-Hispanic</b>	<b>2.31</b>	<b>1.07, 4.97</b>
MATERNAL AGE		
<20 (Reference)	1.00	1.00, 1.00
20-29	1.47	0.70, 3.09
30+	2.29	1.06, 4.96
INSURANCE		
Medicaid (Reference)	1.00	1.00, 1.00
<b>Private Insurance</b>	<b>1.58</b>	<b>1.07, 2.34</b>
NUMBER OF PREGNANCY STRESSORS		
None (Reference)	1.00	1.00, 1.00
One	1.75	0.94, 3.23
Two	1.93	1.00, 3.74
Three	1.93	1.00, 3.75
<b>Four</b>	<b>4.13</b>	<b>2.12, 8.03</b>

Hosmer-Lemeshow Goodness of Fit  $p$ -value = 0.0004

pregnancy, stress does appear to have an in-direct effect on risk in Oklahoma. The link between stress and increased tobacco and/or alcohol consumption has been replicated in previous studies.<sup>3, 4</sup>

More studies are needed to determine what the underlying risk factors are for delivering low birth weight infants among African American women in this state, whether it is unmeasured stressors, or other factors that cannot be identified in survey research such as blood cortisol levels, predisposition to high blood pressure, and other genetic factors, etc.

This study did not measure stressors that may be more influential on determinants of health for some groups of women, like neighborhood safety, racism, sexism, illegal drug use, extreme poverty, health literacy levels, and feelings of isolation. Social supports like faith-based supports, family support outside of having a partner/spouse, and the importance of faith itself were not measured. These may impact or improve pregnancy health for some women differently than those support items measured. Some women may process stress differently and what may constitute a high level of stress for one woman may not for another. Coping skills also differ from one woman to another. Positive methods to cope with stress are not measured, although smoking and drinking, which can be maladaptive coping mechanisms for some

women, were measured. In addition, mental health plays an important role in stress relief as well as the ability to find and maintain social supports; all issues outside the scope of the survey tool used for this study.

This is the third in a series of PRAMSGRAMS to highlight the disparities between African American and white women in Oklahoma. The first PRAMSGRAM, discussing general perinatal health disparities, found that, although women in both groups received approximately the same number of prenatal care (PNC) visits, African American women faced multiple challenges to obtaining timely PNC, such as transportation, inability to get appointments when needed, and feeling a need to hide their pregnancy, much more often than white women.<sup>11</sup>

The second PRAMSGRAM focused on the experience of PNC for African American women and white women. Women all across the state were not given the same information during pregnancy and most women do not discuss important and potentially stressful circumstances with their health care providers, such as domestic violence and postpartum depression. African American women were more likely to receive discussions about issues like domestic violence and illegal drug use, but not always when risk-appropriate, raising the question of stereotypical care versus risk-appropriate care. The need for greater standardization of prenatal care was the most pressing finding from that report.<sup>11</sup>

And finally, this study, the third, sought to examine disparities in outcomes by comparing experiences with stressors and social support to find how these may modify birthweight disparities. The work in these three PRAMSGRAMS did not find one large contributor to infant health disparities between African American and white women. What they do provide, however, is more in-depth information about the problem, information on what knowledge is lacking, details on some services that need to be refined and strengthened, and the need for individualized standardized care that may help all women in this state achieve the healthiest outcomes possible for their pregnancies.

## Recommendations:

1. Fully fund home visitations programs like Children First, Oklahoma Child Abuse Prevention Program (OCAP), and Healthy Start to ensure mothers in Oklahoma get the information they need for healthy pregnancies (and in-between pregnancies) and learn to develop relationships with health care providers.
2. Refer all pregnant smokers to the free Oklahoma Tobacco Helpline 1-800-QUIT NOW. All pregnant smokers should be offered effective smoking cessation interventions that *exceed* the minimal advice to quit by their health care provider.
3. Identify and utilize standardized screening tools for assessing alcohol and drug use before, during and after pregnancy.
4. Provide more treatment opportunities for women who abuse substances before, during and after pregnancy.
5. Add discussions about the impact of stress on health and pregnancy to prenatal care and preconception care tools.
6. Encourage women with moderate to high levels of stress to develop and practice positive coping skills such as walking, prenatal yoga, massage, and relaxation techniques when needed.
7. Incorporate into the curriculum for health professionals, intimate partner violence training on recognizing signs of abuse, the impact of abuse on pregnancy health, and how to appropriately refer and work with victims of abuse or sexual assault.
8. Support postpartum efforts for transition to SoonerPlan, Insure Oklahoma, and other benefit programs that reduce the impact of stressors like loss of job, homelessness, and depression during the postpartum period.
9. Investigate effective models for and create mother-to-mother support groups (peer counseling groups) to create social networks in communities where mothers live.
10. Fund research to examine the influence of those other factors that could not be determined by this study, such as the effects of environment, genetics, blood cortisol levels, and faith, on pregnancy health and outcomes.
11. Improve research tools that collect surveillance data on stressors to better identify stressors that may be more influential on pregnancy health and outcomes.

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