

## Disparities in Chronic Health Conditions between Urban and Rural Oklahoma Mothers during the Preconception Period

### Introduction

According to the Centers for Disease Control and Prevention (CDC), "...all women and men can benefit from preconception health, whether or not they plan to have a baby one day. This is because part of preconception health is about people getting and staying healthy overall, throughout their lives."<sup>1</sup> Early and consistent quality health care prior to pregnancy can play a vital role in educating women about reproductive risks and helping identify ways to improve pregnancy and birth outcomes.

Care prior to pregnancy is important because even with excellent health care during pregnancy, it is difficult to overcome the effects of unhealthy behaviors existing prior to conception. This is especially true when behaviors are negatively influenced by adverse social determinants of health.<sup>2</sup>

Nationwide, the prevalence of diabetes in reproductive age women is increasing,<sup>3</sup> complications related to high blood pressure (hypertension) in pregnancy have become more common,<sup>4</sup> and between 14% and 23% of pregnant women experience depression.<sup>5</sup> Moreover, entry into prenatal care may be too late to impact certain health behaviors' influences on pregnancy outcomes.

Yet nationally, rural mothers experience more barriers accessing health care than women living in urban areas. The U.S. has a shortage of around 35,000 physicians, driven largely by an aging population with high levels of chronic illness (accounting for

over 75% of health expenditures). Oklahoma currently ranks 46th among states in its active physician to population ratio.<sup>6</sup>

Significant health disparities, including disability status, health status, and medical care access, exist between rural and urban women.<sup>7</sup> Furthermore, data from the Oklahoma Pregnancy Risk Assessment Monitoring System (PRAMS) indicate that disparities in chronic health conditions exist between urban and rural Oklahoma mothers. This report examines disparities of diabetes, hypertension, and depression among these women in the preconception period.

### Methods

During the 2012-2015 Oklahoma PRAMS surveillance period, a total of 11,730 mothers were sent a PRAMS survey. Of these, 7,551 mothers responded for a weighted response rate of 64.3%. PRAMS is designed to yield a representative sample and data weighting procedures and detailed methodology are described elsewhere.<sup>8</sup>

In this analysis, mothers who reported being diagnosed with diabetes, hypertension, or depression prior to pregnancy were considered to have a chronic condition. The maternal demographics considered when assessing disparities were age, race and Hispanic origin, education, marital status, pre-pregnancy body mass index (BMI), and annual household income. Urban and rural designations for the mother's place of residence were abstracted from the infant's birth certificate.

### OKLAHOMA FACTS:

Approximately 16% of new mothers reported being diagnosed with one chronic health condition (diabetes, hypertension, or depression)

Rural mothers reported a higher rate of diabetes (3.4%) than urban mothers (2.6%) prior to pregnancy

Rural mothers reported a higher rate of depression (13%) than urban mothers (11.4%) prior to pregnancy

There was no difference in the rate of hypertension (6.1%) between urban and rural mothers prior to pregnancy

76 of Oklahoma's 77 counties are designated as Health Professional Shortage Areas for Primary Care Physicians

Oklahoma ranks 46th among states in its active physician to population ratio

Rates of co-existing diabetes, hypertension and depression were higher among rural mothers than urban mothers

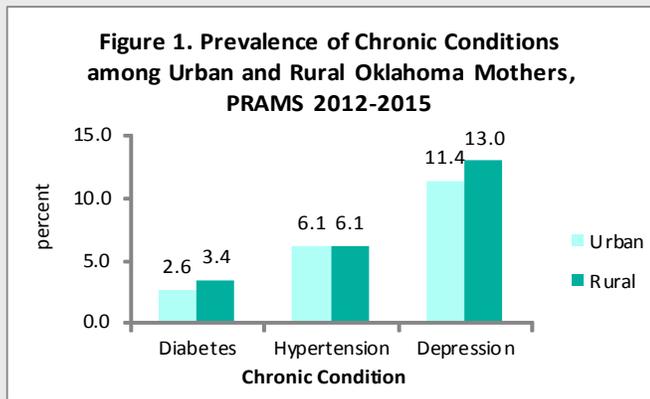
Statistics were calculated using SAS-callable SUDAAN (Version 9.4) software. Differences between percentages were assessed using the Cochran Mantel Chi Square test at the  $p < 0.05$  level.

PRAMS asked mothers to select no or yes to the question, “Before you got pregnant with your new baby, did a doctor, nurse, or other health care worker tell you that you had any of the following health conditions?” Response options available were (a) Type 1 or Type 2 diabetes (NOT the same as gestational diabetes or diabetes that starts during pregnancy) (b) High blood pressure or hypertension, or (c) Depression.

### Results

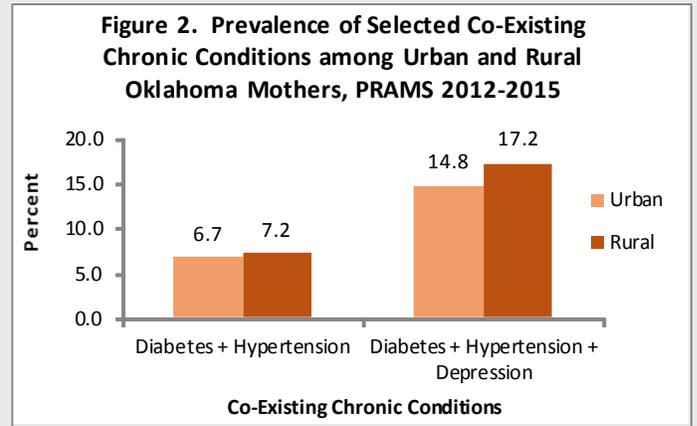
Overall, 43% of new mothers were urban residents and 57% were rural. Approximately 16% of surveyed mothers reported being diagnosed with one chronic health condition (diabetes, hypertension, or depression).

Rural mothers reported a higher rate of diabetes than urban mothers (3.4% vs. 2.6%). Rural mothers also reported higher rates of depression (13% vs. 11.4%). At 6.1% each, there was no difference in the rate of hypertension between the two groups (Figure 1). However, none of the differences were statistically significant.

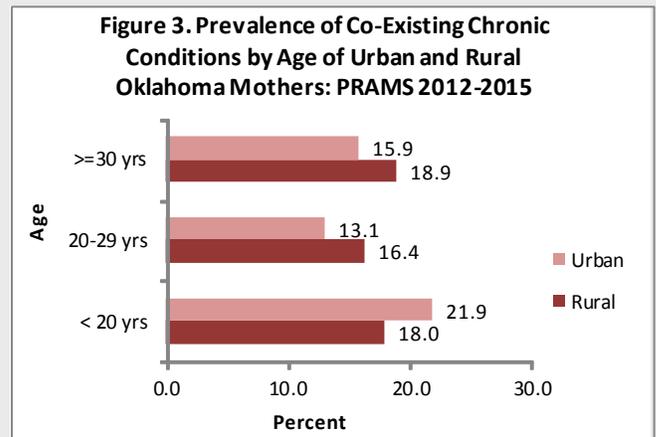


When looking at co-existing chronic conditions, rural mothers reported a higher rate of diabetes and hypertension than did urban mothers (7.2% vs. 6.7%). Rates of co-existing diabetes, hypertension and depression were also higher among rural mothers (Figure 2).

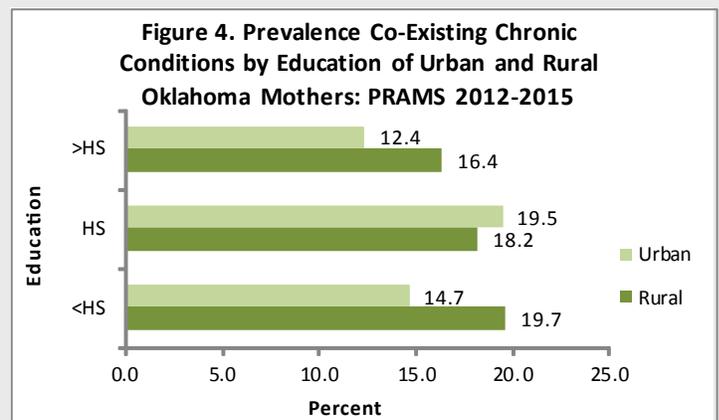
Prevalence of diabetes, hypertension, and depression among urban and rural Oklahoma mothers also varied across demographics. When looking at age, urban mothers younger than 20 years old were more likely than



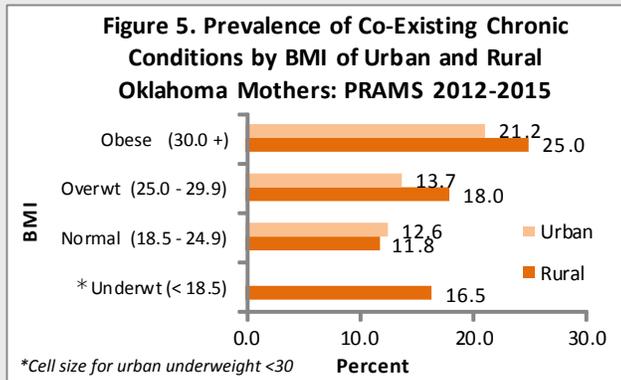
rural mothers of this age to report having co-existing chronic conditions. Yet rural mothers aged 20-29 and those older than 30 were more likely than their urban counterparts to report having co-existing chronic conditions (Figure 3).



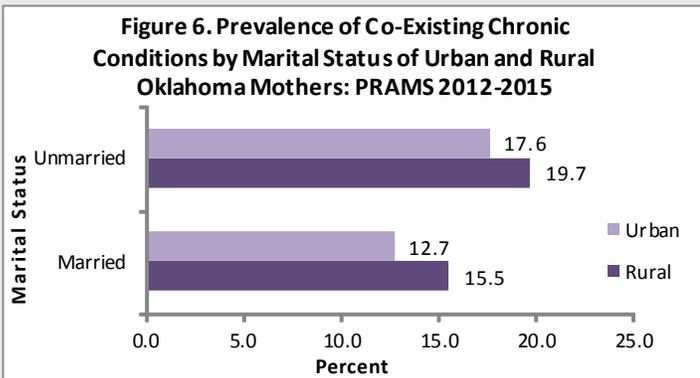
Rural mothers with less than a high school education as well as those with more than a high school education were more likely than their urban counterparts to report having co-existing chronic conditions prior to conception. This was also true of urban mothers with a high school diploma compared to their rural counterparts (Figure 4).



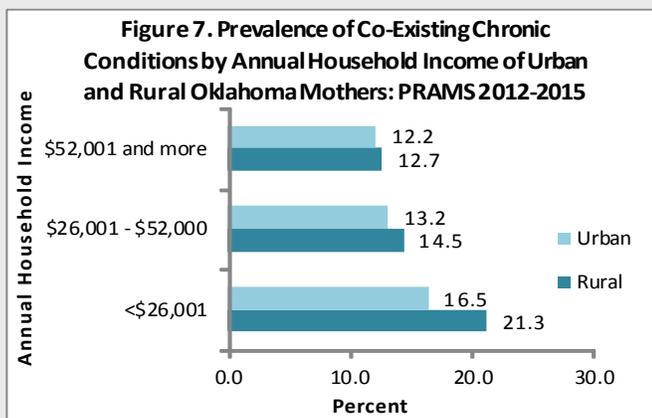
Across mothers' pre-pregnancy body mass indices (BMIs), urban mothers of normal weight were the only ones to report higher rates of co-existing chronic conditions than rural mothers of this weight. Overweight and obese rural mothers were more likely than urban mothers of the same weight to have co-existing chronic conditions (Figure 5).



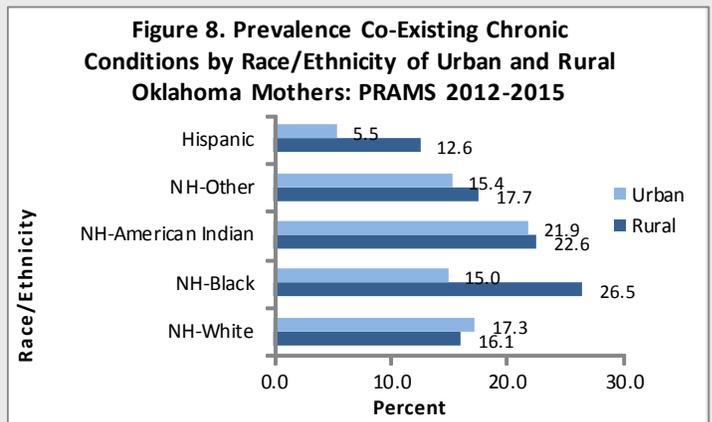
When examining marital status, both married and unmarried rural mothers were more likely to have co-existing chronic conditions than married and unmarried urban mothers (Figure 6).



Annual household income followed this same pattern, with rural mothers of all income levels reporting higher rates of co-existing chronic health conditions than urban mothers of all income levels (Figure 7).



Rates of co-existing chronic conditions were higher among rural Non Hispanic (NH)-Black, rural NH-American Indian, rural NH-Other, and rural Hispanic mothers than their urban counterparts (no statistically significant differences between races). The percent of rural NH-Black mothers who reported having co-existing chronic health conditions was 26.5% compared to their urban NH-Black counterparts with 15.0%. However, although NH-Black mothers in rural areas had the highest rate of co-existing chronic health conditions, NH-American Indian mothers in both urban and rural areas also had high rates (Figure 8).



Generally, Oklahoma mothers across several different demographics living in rural areas had a higher burden of diabetes, depression, and hypertension than did urban mothers, with few exceptions.

### Limitations

Potential limitations to this study include:

- Small sample sizes and wide confidence intervals when stratifying by demographics—thus true differences could not be detected;
- Social desirability bias and recall bias in answering questions;
- Due to the mobility of the population, mothers may have moved between urban and rural areas;
- Other chronic conditions may exist and show evidence of disparity between urban and rural populations;
- Presence of chronic conditions is self-reported and unverified by medical reports
- Imprecision of urban and rural classifications may mask understanding of relationships among variables.

## Discussion

This is the first report to document urban and rural disparities between Oklahoma mothers with co-existing chronic health conditions (diabetes, hypertension, and depression).

Diabetes during pregnancy has been associated with increased risk of congenital anomalies and cesarean delivery.<sup>3</sup> Chronic hypertension has been related to prematurity and low birth weight.<sup>4,9</sup> For the mother, complications can include preeclampsia, eclampsia, stroke, induction of labor and placental abruption.<sup>4</sup> Depression during pregnancy may lead to unhealthy eating and sleeping habits, premature birth, and low birth weight infants. Women with postpartum depression may withdraw from loved ones, have feelings of guilt or anger, and doubt their ability to care for their infants.<sup>5</sup>

Previous research indicates the importance of maternal conditions prior to pregnancy, particularly the effects of chronic illness on birth outcomes and the health condition of mothers during and post pregnancy.<sup>10</sup> As part of the continuum of care for all women of childbearing age, identifying and treating medical conditions before pregnancy is essential to preventing maternal morbidity and mortality.<sup>11</sup>

This means that part of prevention is related to the distribution of health resources (including health care providers). Figure 9 shows the areas in Oklahoma that meet the federal criteria of Health Professional Shortage Areas (or HPSAs) for primary care physicians.<sup>12</sup>

The HPSA designation can be used to indicate health care provider shortages in primary care, dental health, or mental health. Each state identifies areas that meet federal criteria for designation as a health professional shortage area (HPSA) while certain types of facilities (Community Health Centers, Tribal Facilities, and Correctional Facilities) are automatically designated as facility HPSAs. The main eligibility criteria is based on a threshold ratio for population to providers.<sup>13</sup> Seventy six of Oklahoma's 77 counties are designated as HPSAs for primary care.<sup>13</sup>

This study indicates that being unmarried, overweight/obese, Hispanic, or a minority race were risk factors among rural mothers in having co-existing chronic conditions. Emerging research has shown that chronic stress among women of color related to individual and institutional prejudices and racism impacts pregnancy and health outcomes.<sup>14</sup> Moreover, lower socioeconomic status has repeatedly been linked to poorer health outcomes.<sup>15,16</sup> Access, utilization, and quality of care also must be taken into consideration when examining geographical disparities.

## Recommendations

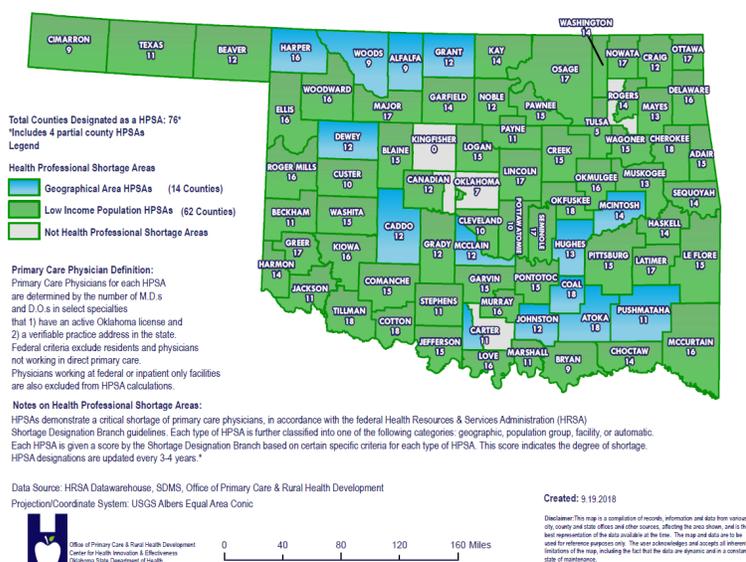
Chronic conditions in women do not exist nor develop in a vacuum and interventions should address this.

Preconception care for women with diabetes should be optimized to include counseling programs along with strict glycemic control. Hyperglycemia during fetal development leads to an increased risk of congenital malformations, which remains the leading cause of infant mortality in Oklahoma.<sup>17</sup> Poor outcomes associated with hypertension may be detected or avoided by increasing awareness, improving patient education and counseling, and providing appropriate treatment for high blood pressure.<sup>4</sup> The American College of Obstetricians and Gynecologists recommends all pregnant women be screened for depression at least once during the perinatal period.<sup>5</sup>

Other recommendations for Oklahoma include:

- Increase access to health care providers, including granting full practice authority for nurse practitioners in rural areas;
- Increase support for the state's Academic Medical Centers (AMCs) that train health professionals and form the basis of the state's safety net system;
- Fund state health workforce enhancement efforts

Figure 9. Oklahoma's Primary Care Health Professional Shortage Areas (HPSAs)



- with data driven prioritizations;
- View every interaction with a health care provider as an opportunity for preconception health education;
- Educate women on the benefits of being as healthy as possible prior to conception;
- Expand Medicaid coverage;
- Increase transportation availability to improve access to health care;
- Mandate health education in schools;
- Further examine life course and social determinants contributions to health and apply them to public health practice

The Oklahoma State Department of Health (OSDH) is part of a national CoIIN (Collaborative Improvement & Innovation Network) team focusing on preconception health. In partnership with other organizations across the state, a preconception health assessment tool is being developed to use in various health care settings including county health departments, Healthy Start projects, private physician offices, and a Federally Qualified Health Center (FQHC).

The Office of Primary Care & Rural Health Development [also known as the state Primary Care Office (PCO)] at OSDH is funded by the Health Resources Services Administration (HRSA). The PCO works closely with HRSA in communicating opportunities and challenges taking place in Oklahoma and continuously re-evaluates health professional shortage areas.

## Conclusion

The focus of this study was to assess disparities in co-existing chronic conditions between urban and rural mothers in the preconception period. Given the rising rates of chronic disease in the United States, understanding the association between maternal risk factors and chronic disease may help public health practitioners better understand how to address needs at the community and individual levels. This will lead to a better understanding about the importance of differentiating urban and rural program needs for women prior to conception. Public health researchers and practitioners must consider a combination of environmental, structural, economic, and individual behavior changes to adequately reduce adverse birth outcomes.

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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.

Monthly, PRAMS sampled between 200 to 250 recent mothers taken from the Oklahoma live birth registry. Mothers were mailed up to three questionnaires in either English or Spanish seeking their participation. Follow-up phone interviews for non-respondents were conducted.

A systematic stratified sampling design was 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.

## TERMS

**Auto HPSA**—a facility that is automatically designated as a HPSA by statute or through regulation without having to apply for a designation. Includes Federally Qualified Health Centers (FQHCs), FQHC Look-A-Likes, Indian Health Facilities, Indian Health Service and Tribal Hospitals, Dual-funded Community Health Centers/Tribal Clinics, and certain CMS-Certified Rural Health Clinics.<sup>13</sup>

**Disparity**—the quantity that separates a group from a reference point on a particular measure of health that is expressed in terms of a rate, proportion, mean, or some other quantitative measure.<sup>18</sup>

**Preconception health**—a broad term encompassing numerous factors that can affect the health of reproductive age men and women and any children they may have.<sup>1</sup>

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