cause of death is still higher than 15-24 and 25-34 year olds. Of particular concern for 15-24 year olds is intentional self-harm (suicide) and assault (homicide) which was the second and third leading causes of death, respectively, for this age-group.

As expected, deaths due to unnatural causes was highest for the youngest age-group, while deaths due to natural causes such as chronic disease and infections were highest for the older age-groups.

Table 10. Top 10 Rankable Causes of Death for Females Aged 15-44, by Age-group, Oklahoma, 2004-2006

Age-group	15-44		15-24		25-34		35-44	
Cause of death	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate
Accidents (unintentional injuries) (V01-X59,Y85-Y86)	1	31.9	1	28.8	1	27.1	2	39.9
Malignant neoplasms (C00-C97)	2	19.3	4	3.3	2	10	1	45.3
Diseases of heart (I00-I09,I11,I13,I20-I51)	3	11.8	6	2.4	4	5.9	3	27.6
Intentional self-harm (suicide) (X60-X84,Y87.0)	4	7.5	2	4.9	3	7.4	4	10.4
Assault (homicide) (X85-Y09,Y87.1)	5	4.2	3	3.5	5	4.9	8	4.3
Cerebrovascular diseases (I60-I69)	6	3.2	7	0.9	8	1.4	5	7.4
Diabetes mellitus (E10-E14)	7	3	8	0.8	6	2.5	7	5.7
Chronic liver disease and cirrhosis (K70,K73-K74)	8	2.4	-	-	-	-	6	6.6
Influenza and pneumonia (J10-J18)	9	1.8	-	-	9	1.4	10	3.8
Chronic lower respiratory diseases (J40-J47)	10	1.8	-	-	-	-	9	3.9

*Rates are number of deaths per 100,000 females aged 15-44

Source: Oklahoma State Department of Health, Health Care Information, Vital Records Division

2. Pregnant Women

Access to Care

- **Prenatal Care**

Figure 23 displays the percent of live births with late (third trimester) or no prenatal care, by county. Of the Oklahoma's 77 counties, 66 were at or below the 2006 national average of 7.9% for late or no prenatal care. Seven counties had between 8.0% and 15.0%, and two counties had between 15.1% and 25.0% of mothers who had a live birth enter into late prenatal care or had no prenatal care at all. Finally, two counties had more than one-fourth of their mothers who had a live birth enter into late or no prenatal care: Beckham at 38.4% and Roger Mills at 37.2%.

In 2006, 75.6% of mothers began prenatal care in the first trimester in Oklahoma, compared to 83.2% reported for the U.S. For this time period significant disparities existed between racial and ethnic groups, both in Oklahoma and in the U.S. Those least likely to have received first trimester prenatal care were Hispanic women in Oklahoma at 64.5%. With the introduction of "Soon-To-Be-Sooners", this disparity is anticipated to decrease for some Hispanic females in Oklahoma.

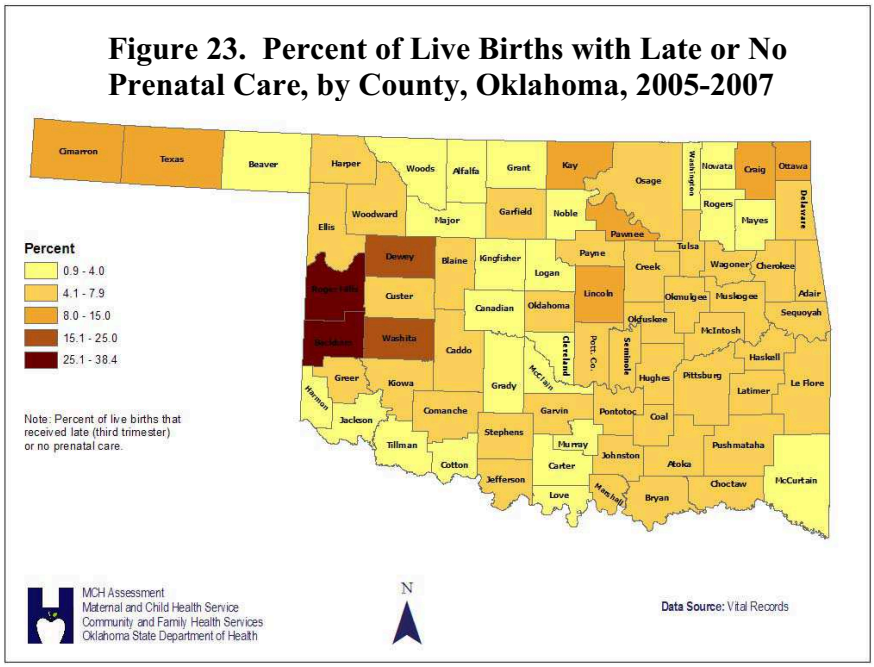
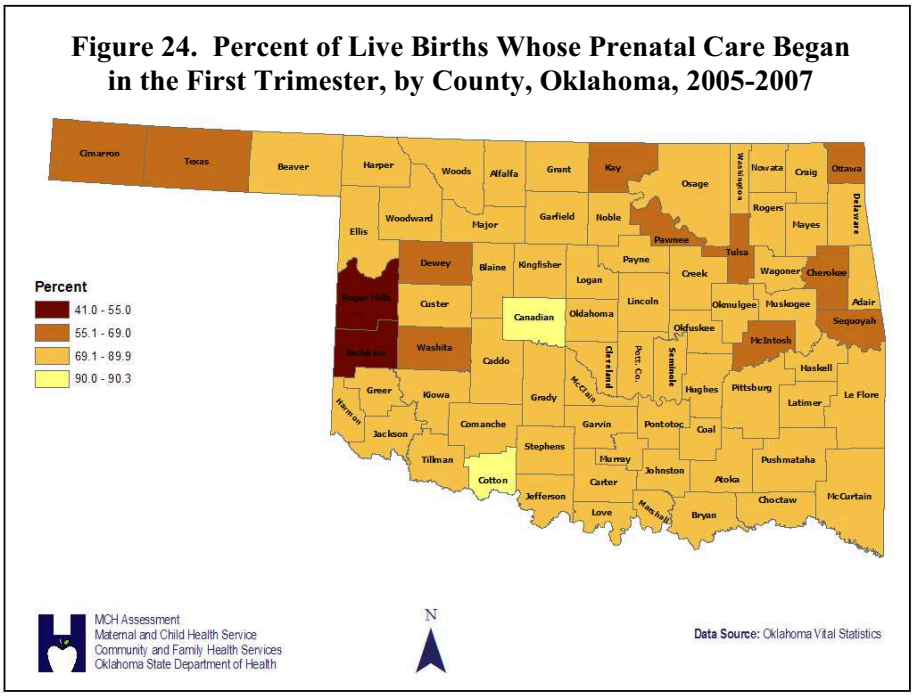
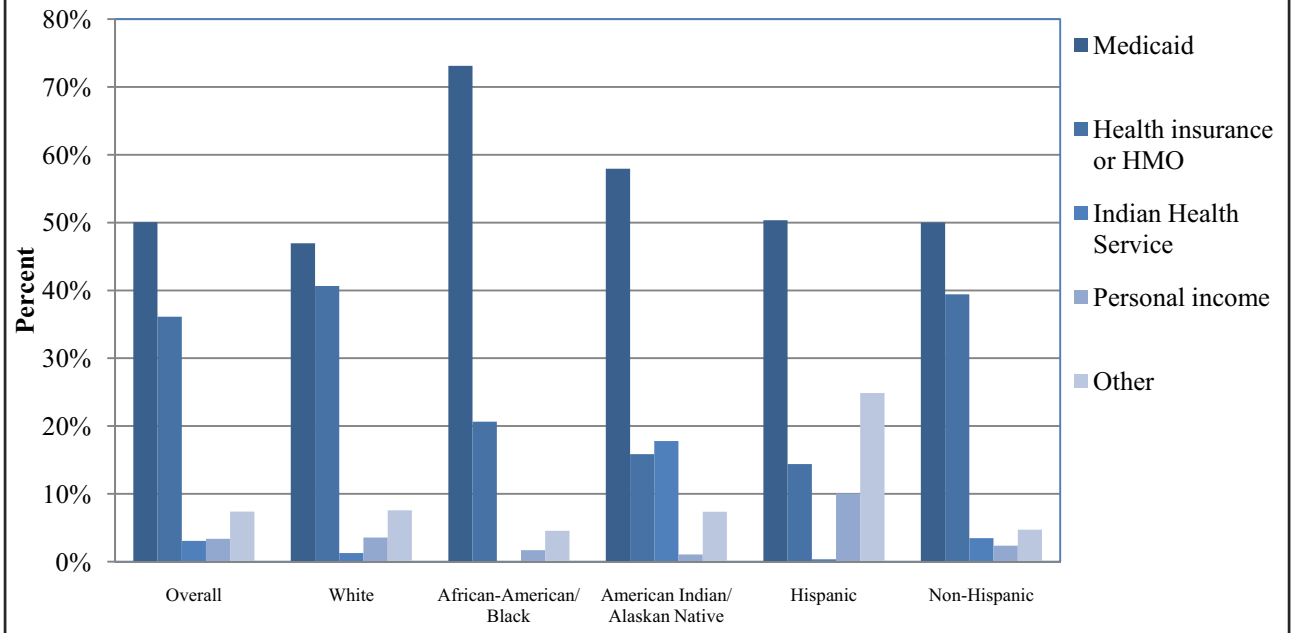


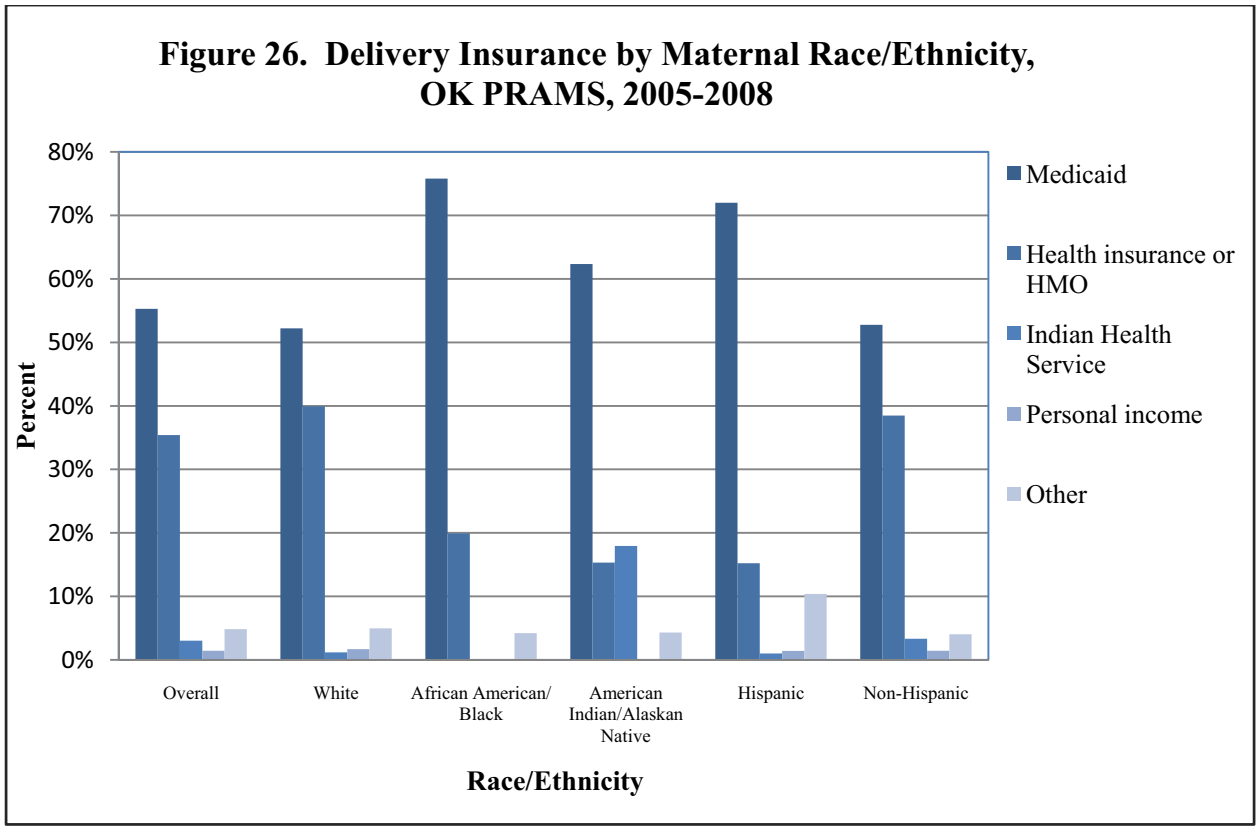
Figure 24 shows the percent of live births whose prenatal care began in the first trimester, by county. Seventy-five of Oklahoma's 77 counties fell short of the Healthy People 2010 goal of 90.0% of live births entering first trimester prenatal care, with two of those counties, Beckham and Roger Mills, reporting less than half of their live births entering first trimester prenatal care, at 42.3% and 48.1%, respectively. Only Canadian County and Cotton County had a higher percent of mothers entering prenatal care during the first trimester than the Healthy People 2010 goal of 90.0%, at 90.2% and 90.3%, respectively.



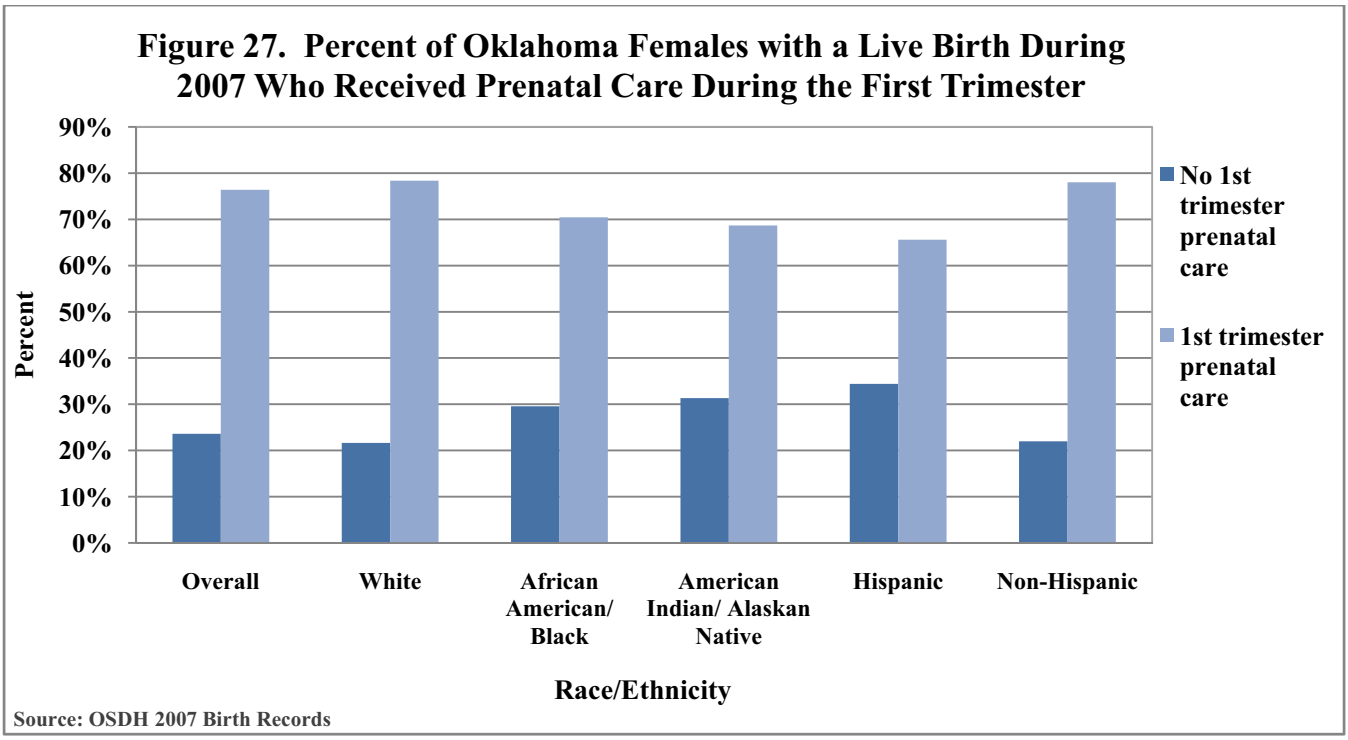
Figures 25 and 26 show prenatal and delivery insurance coverage by maternal race or Hispanic origin based on 2005-2008 OK PRAMS data. Among all resident live births during this period, 50% of the mothers received prenatal care coverage through Medicaid/SoonerCare and 36% from private insurance or a Health Maintenance Organization (HMO). Racial disparities are apparent in prenatal insurance: 73% of African American/Black females received prenatal insurance coverage through Medicaid/SoonerCare, compared to 45% for white females. Nearly 18% of American Indian/Alaska Native mothers received prenatal care via the Indian Health Service. Ten percent of Hispanic females paid for their prenatal coverage with personal income (cash, check, or credit card) compared with only 2% for non-Hispanic females. Fifty-five percent of deliveries in Oklahoma were covered by Medicaid/SoonerCare during 2005-2008, while 35% were covered by private insurance or HMOs. Racial and ethnic disparities exist for delivery insurance, with 76% of African American/Black deliveries covered by Medicaid/SoonerCare contrasted with 52% for white mothers, and 72% of Hispanic deliveries covered by Medicaid/SoonerCare compared with 53% of non-Hispanic deliveries.

Figure 25. Prenatal Care Coverage by Maternal Race/Ethnicity, OK PRAMS, 2005-2008





Overall rates for receipt of first trimester prenatal care mask underlying racial and ethnic disparities. White females in Oklahoma are more likely to access their prenatal care in the first trimester, when compared to African American/Black, American Indian/Alaska Native, and Hispanic females (Figure 27). No racial or ethnic group meets the Healthy People 2010 goal for 90% of females to enter into prenatal care during the first trimester.



- **Adequacy of Prenatal Care**

Adequacy of prenatal care (PNC) as defined by traditional indices of PNC, the Kotelchuck and Kessner models, is measured using the number of prenatal health care visits a female has had and the timing of those visits, although differences do exist between both methods (Krueger & Scholl, 2000). However, the quality of the care or the guidance provided during these visits is not factored into either index. Without knowledge about the quality and content of PNC, the true effectiveness of the provided care may not be captured for all females, and subsequent impact on birth outcomes may be difficult to measure. Research has shown a reduction in low birth weight, preterm births, and fetal deaths that can be linked to early and adequate prenatal care. However, adequate prenatal care, as traditionally measured, does not reduce the disparities in these areas between African American/Black and white females (Healy, Malone, Sullivan, & Porter, 2006; Conway & Kutinova, May 2006; Vintzileos, Ananth, Smulian, & Scorza, 2002).

The American College of Obstetrics and Gynecology (ACOG) recommends 33 topics be discussed by PNC providers. The following 16 topics were analyzed by OK PRAMS about new mothers' PNC experiences during their pregnancy (only those that can be measured by OK PRAMS are listed): Smoking During Pregnancy, Breastfeeding, Using Seat Belts, Alcohol Use During Pregnancy, Postpartum Family Planning, Nutrition and Weight Gain Counseling, Exercise, Use of Medications, Illegal/Illicit Drug Use, Risk Factors for Birth Defects and Diseases that Run in Families, Signs and Symptoms of Preterm Labor, HIV Testing, Intimate Partner Violence, and Postpartum Depression. There are 18 additional topics on the ACOG Antepartum Record Form E that are not measured by OK PRAMS (The American College of Obstetrics and Gynecology (ACOG), 2002). To determine if a difference existed between groups of females receiving information on all of the educational PNC topics inquired about in the

PRAMS survey, the 16 topics were grouped together. Overall, 15% of new mothers in Oklahoma received all 16 of the topics discussed in this study, irrespective of race.

When controlling for demographic variables such as marital status, age, race, education, SoonerCare status, and rural/urban status, African American/Black mothers were more likely to receive a discussion on physical abuse when compared with white mothers and less likely to receive a discussion on weight gain. Discussions about illegal drug use did not vary between different racial categories; however, those females who were under 20 years of age, less educated, living in rural areas, and/or had SoonerCare coverage were more likely to report this topic (data not shown).

The prenatal care received by African American/Black females and white females in Oklahoma varied on a few key topics, but overall the conversations between both maternal groups and their prenatal health care providers were similar. Only 15.3% of African American/Black mothers and 14.0% of white mothers reported receiving prenatal counseling on all 16 topics asked in the OK PRAMS survey (data not shown), a difference that was not statistically significant. Although the ACOG standards are not followed by every obstetric practice or by every prenatal health care provider in Oklahoma, the 16 measured topics are important and necessary for good pregnancy and postpartum health.

Four topics, seat belt use, intimate partner violence, pregnancy spacing, and postpartum depression, were each individually reported by fewer than 65% of the total maternal population (Figure 28). Due to their importance on the health of the current pregnancy, the health of the mother and her future pregnancies, or their impact on the bonding between a mother and her infant, these are significant and necessary topics for all females.

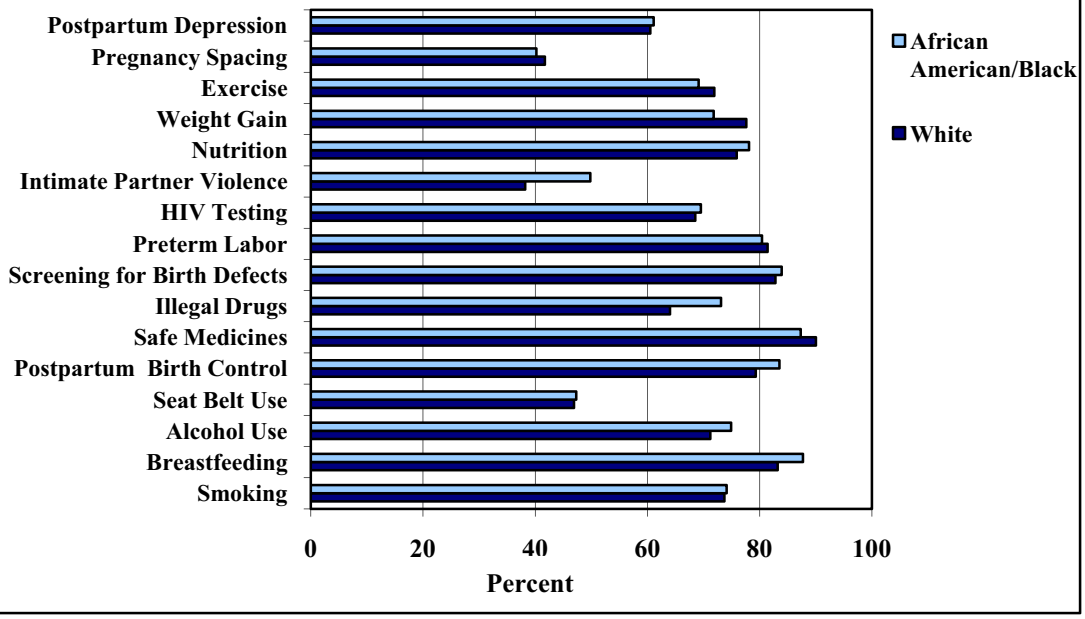
Maternal report of risk appropriate care shows that few females receive information on topics that were pertinent to their reported health behaviors or risks. While maternal smokers were very likely (over 80%) to receive discussions about the effects of smoking during pregnancy, less than 15% were then referred to the state cessation telephone quit line and fewer than 10% were prescribed an aid to help with quitting, for instance an inhaler, pill, spray or patch, both evidence-based methods to deter smoking in pregnant and parenting females.

Females who needed counseling about intimate partner violence (those who reported physical abuse before or during pregnancy) were marginally more likely to receive it if they were white. However, fewer than 45% of females in both groups recalled discussing this issue with their providers. Violence before and during a pregnancy can have harmful impacts on the pregnancy, including increasing the risk for delivering a low birth weight infant and increasing the likelihood of stillbirth or infant death (NP Yost, et al., 2005).

For those females classified as either overweight or underweight, slightly more than half, irrespective of race, received the necessary counseling on weight gain, nutrition, and exercise. However, for females who reported a previous low birth weight infant, African American/Black females were significantly more likely to receive the necessary counseling on weight gain and instructions if labor begins early. This is important because appropriate weight gain during pregnancy has the potential to increase the birth weight of the infant, and recognizing early labor

and knowing what to do may enable a pregnant female to arrive at the most appropriate facility for delivery, if labor cannot be delayed.

Figure 28. Prenatal Care Discussions Among African American/Black and White Females in Oklahoma, PRAMS, 2004-2006



- **Interconception care**

The issue of unintended pregnancy has a large research base, both in Oklahoma and nationwide. Less is known, however, about the frequency of multiple unintended pregnancies and the factors associated with avoiding subsequent unintended pregnancies.

An analysis of TOTS data and the intention of subsequent pregnancies revealed that pregnancy intention in a previous pregnancy resulting in a live birth was a strong predictor of pregnancy intention in the subsequent pregnancy. More than one in four females, 27.6% (95% CI: 25.7, 29.6), had a subsequent pregnancy by two years postpartum. A significant positive association was found between prior unintended pregnancies and subsequent unintended pregnancies (Table 11).

Table 11. Prevalence of Subsequent Unintended Pregnancies According to Intention of Prior Pregnancy, TOTS, 2004-2007				
	Percent (%) subsequent unintended pregnancy	95% Confidence Interval (CI)	Percent (%) subsequent intended pregnancy	95% Confidence Interval (CI)
Prior unintended pregnancy	81.9	75.2, 87.1	18.1	12.9, 24.8
Prior intended pregnancy	34.1	28.0, 40.8	65.9	59.2, 72.0

The role that postpartum health checkup and postpartum birth control played in mitigating the risk for a second unintended pregnancy highlighted the importance of interconception care for Oklahoma's new mothers, particularly in the first 2-6 months postpartum. Only 84.3% of Oklahoma's new mothers received a health checkup after pregnancy, regardless of intention status.

Among females with two consecutive unintended pregnancies, age, SoonerCare status, and marital status were highly significant factors (Table 12). In addition, not using birth control in the two through six months after the first unintended pregnancy and not having a health checkup increased the risk for a second unintended pregnancy by two years postpartum.

Table 12. Logistic Regression of Factors Influencing Two Consecutive Unintended Pregnancies, TOTS, 2004-2007		
Factors	**Adjusted Odds Ratio (AOR)**	**95% CI**
Age*		
< 20	3.2	1.6, 6.2
20 + (Reference)	1.0	1.0, 1.0
Medicaid*		
Yes	2.7	1.4, 5.2
No (Reference)	1.0	1.0, 1.0
Marital Status*		
Married (Reference)	1.0	1.0, 1.0
Unmarried	2.5	1.3, 4.8
Birth Control Use**		
Yes	1.0	1.0, 1.0
No	4.3	2.2, 8.2
Postpartum checkup		
Yes (Reference)	1.0	1.0, 1.0
No	2.0	1.0, 3.7

- **Oral Health**

Access to dental health care and programs for uninsured pregnant females in the state is difficult to ascertain. In 2006, SoonerCare began allowing pregnant females to receive dental care visits as part of the services offered through their pregnancy benefits. However, data on how many females receive dental care during pregnancy are not currently collected and are therefore not readily available from any state data sources.

- **Mental Health**

A gap exists on the collection, reporting, analyzing, and evaluation of mental health issues associated with females of childbearing age. For pregnant females this gap widens as data are not readily available to address mental health issues at this time. Treatment of diagnoses such as substance abuse remains deficient among this population and the Oklahoma Department of Mental Health and Substance Abuse does not currently track this demographic and their service receipt.

Unintended Pregnancy

Females of all ages and races have unintended pregnancies, but particular groups such as teens, African American/Black females, and low-income females are at a higher risk. Unintended pregnancy is associated with certain adverse health outcomes such as higher rates of inadequate prenatal care, low birth weight, and infant mortality, as well as decreased life opportunities. (Centers for Disease Control and Prevention, 2009)

Intention of pregnancy is ascertained in Oklahoma by the core PRAMS question (Figure 29) that asks mothers to report their feelings about becoming pregnant in the time just before conception. Unintended pregnancies were defined as pregnancies for which the mother reported that she wanted to be pregnant later or did not want to be pregnant then or any time in the future.

Figure 29. PRAMS Question for Pregnancy Intendedness

Thinking back to *just before* you got pregnant with your new baby, how did you feel about becoming pregnant? Check one answer.

1) I wanted to be pregnant sooner
2) I wanted to be pregnant later
3) I wanted to be pregnant then
4) I didn't want to be pregnant then or at any time in the future

Overall, OK PRAMS data for 2007 show that 48% of pregnancies resulting in a live birth were unintended. Over one-third of mothers (36.5%) giving birth in 2007 stated that they wanted to be pregnant later, and the remaining 11.5% were mothers who reported they never wanted to be pregnant. In general, the data from 2007 suggests that approximately 19,000 pregnancies resulting in a live birth annually are the result of a mistimed pregnancy; and another 5,900 pregnancies were unwanted at the time the mother became pregnant. These numbers have not significantly changed over the past five years. Since 2000, the numbers have shifted between 48% to 52% without a clearly defined or predictable pattern.

Table 13. Percent of Births that were Unintended by Maternal Characteristics, OK PRAMS, 2007		
	Unintended Pregnancy	
Characteristic	**%**	**95% CI**
Age		
< 20	67.9	56.9-77.3
20-24	55.1	48.4-61.6
25-34	40.7	35.5-46.2
35 or older	26.2	17.0-38.1
Marital Status		
Married	32.7	28.6-37.2
Unmarried	69.0	62.9-74.5
Race		
White	44.3	40.1-48.6
AA/Black	66.8	53.1-78.2
AI/AN	59.2	48.3-69.3
Ethnicity		
Hispanic	50.1	38.3-61.9
Non-Hispanic	47.5	43.5-51.5
Education		
< 12 years	62.3	53.5-70.4
12 years	49.0	42.8-55.3
> 12 years	39.5	34.3-45.1
Previous Live Birth		
No	48.3	42.4-54.3
Yes	47.8	42.9-52.7
Medicaid/SoonerCare		
No	29.4	24.7-34.6
Yes	62.0	56.9-66.8

Table 13 shows that females with unintended pregnancies in Oklahoma were more likely to have been unmarried, less than 25 years old, have less than a high school education, African American/Black or American Indian/Alaska Native, and/or had pregnancy or postpartum care paid for by SoonerCare. Ethnicity and parity were not significant factors in pregnancy intention.

Reasons for unintended pregnancy are not readily collected by any state data sources. Structured focus groups were conducted in the Fall of 2009 and the Spring of 2010, in an attempt to achieve a better understanding of preconception and interconception health in the state. One area of the guided discussions asked females if their first pregnancy was or was not a planned event to probe some of those reasons for unintended and unplanned pregnancies in the state. The data from these groups represent females from Tulsa and Oklahoma City areas, and were mainly comprised of African American/Black, Hispanic and white females involved in social or health programs in those communities.

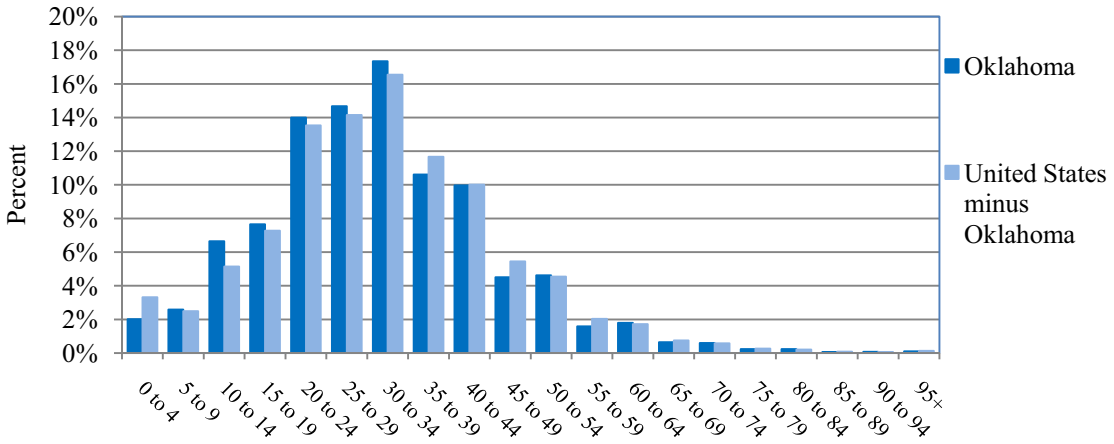
Among the females who responded that their first pregnancy was not planned, many said it was due to lifestyle changes (new job, hadn't gotten pregnant after trying for a long time), some reported they simply "didn't think about it. Never thought about it" or merely stated they were "young". For some females, a lack of birth control or a lack of understanding about how their method worked best were the main reasons they had an unplanned pregnancy. One female

reported thinking she could not get pregnant. These responses were consistent with other studies in the state that found adolescents were more likely to not use birth control because they thought they were not able to become pregnant (PRAMS Working Group, 2005).

Weight Gain

The average weight gained by pregnant females in Oklahoma during 2006 was 30.2 pounds, slightly lower than the national average (less Oklahoma) of 30.9 pounds, with 95% of Oklahoman mothers gaining between nine and 54 pounds (Figure 30). Average pregnancy weight gain varied little by race; however, non-Hispanic females gained three more pounds on average than Hispanic females (30.6 lbs vs. 27.3 lbs, respectively). Mothers with less than eight years education also gained less weight on average than mothers with eight or more years of education (27.0 lbs vs. 30.3 lbs, respectively). Maternal age was another important factor influencing pregnancy weight gain in Oklahoma. Mothers less than 15 years of age gained over eight pounds more pregnancy weight, on average, than mothers of ages 45 to 49 years (33.8 lbs vs. 25.6 lbs, respectively).

Figure 30. Weight Gain Distribution (in lbs.) During Pregnancy, NCHS, 2006



Source: National Center for Health Statistics, 2006 Birth Statistics

A majority of females in Oklahoma either do not gain sufficient weight or gain excess weight during their pregnancy. The American College of Medicine recommends underweight females gain 28-40 pounds during pregnancy, normal weight gain 25-35 pounds (37-54 pounds for twins), overweight females gain 15-25 pounds (31-50 pounds for twins), and obese females gain 11-20 pounds (25-42 pounds for twins).

According to data gathered from OK PRAMS during 2005-2007, 19.9% of females do not gain enough weight during their pregnancy, 44.8% gain too much weight, and only 35.8% gain the recommended amount. Table 14 displays the percentage of females in the OK PRAMS 2005-2007, categorized by pre-pregnancy body mass index, whose pregnancy weight gain fell within the recommended guidelines.

Table 14. Percentage of All Females by Pre-Pregnancy BMI Whose Pregnancy Weight Gain Fell Below, Met, or Exceeded ACOG Guidelines, OK PRAMS, 2005-2007			
Pre-pregnancy BMI	Weight gain with respect to ACOG guidelines	Percentage	95% CI
Underweight	Below	35.2	26.0, 44.5
	Within	47.8	37.9, 57.7
	Exceeded	17.0	9.7, 24.3
Normal	Below	24.9	22.2, 27.6
	Within	40.6	37.5, 43.6
	Exceeded	34.5	31.6, 37.5
Overweight	Below	8.5	6.1, 10.9
	Within	32.9	28.5, 37.1
	Exceeded	58.6	54.1, 63.1
Obese	Below	17.0	13.6, 20.5
	Within	23.1	19.2, 26.9
	Exceeded	59.9	55.4, 64.5
Total	Below	19.9	18.2, 21.6
	Within	35.4	33.3, 37.5
	Exceeded	44.7	42.6, 46.9

Tobacco Use

Tobacco use in Oklahoma is a serious public health concern. The high prevalence of tobacco users in our state contributes to a multitude of health problems, such as lung cancer and heart disease. Smoking among females of childbearing age brings additional complications and challenges, especially if they are using tobacco products before, during, and/or after pregnancy. Research has shown a very strong association between maternal smoking and low birth weight (U.S. Department of Health and Human Services, 2006).

Maternal smoking rates are high in Oklahoma. Thirty-one percent of females, who recently gave birth in Oklahoma, smoked during the three months prior to their pregnancy. While pregnant, 19.1% of females smoked and 26.7% smoked postpartum, (Table 15). The prevalence for smoking before and during pregnancy in Oklahoma is not significantly different from prevalence rates from five or even ten years ago (data not shown). Females most at risk for smoking before pregnancy are those less than 20, with less than a high school education, females receiving SoonerCare assistance, and females who are American Indian/Alaska Native and non-Hispanic.

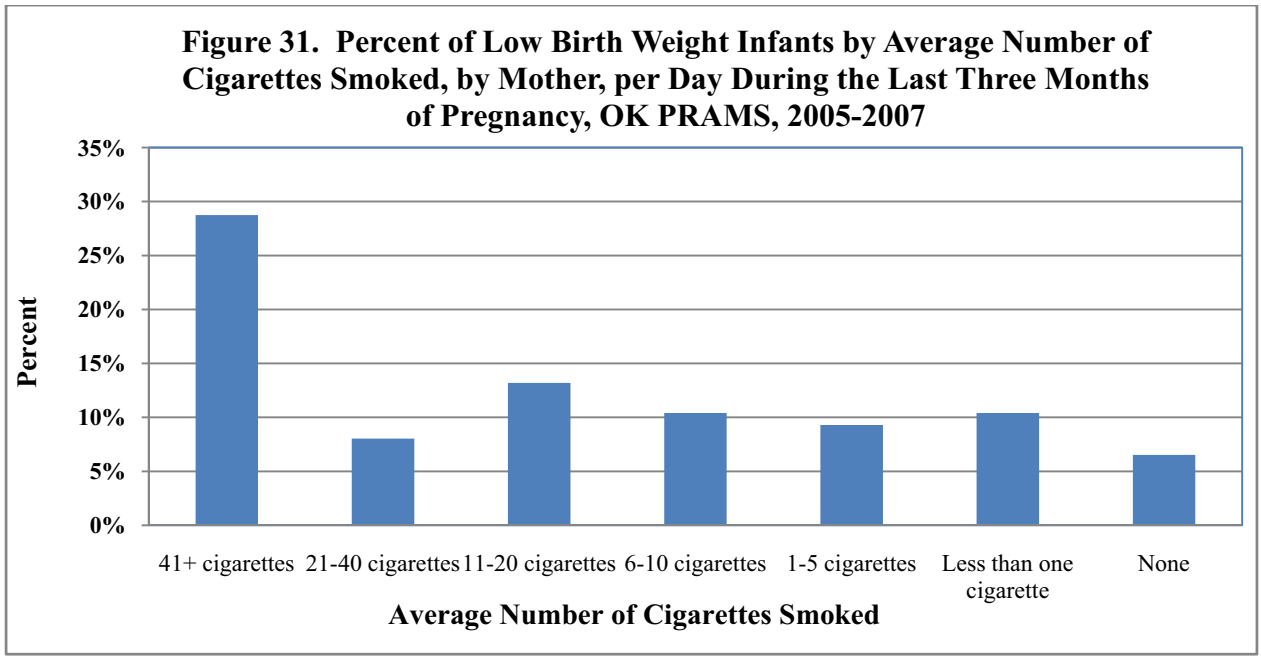
Although many females do abstain from smoking during their pregnancy, which research suggests can contribute favorably to birth outcomes; far too many continue to smoke during their third trimester (almost one in five pregnant Oklahomans). Those mothers at risk for smoking before their pregnancy are also those most likely to continue smoking during their third trimester and postpartum (Table 15).

Table 15. Percentage of Mothers That Reported Smoking Before[1], During[2], and After[3] Pregnancy by Selected Demographics, OK PRAMS, 2006-2007

	Before		During		After	
Characteristic	%	95% CI	%	95% CI	%	95% CI
Overall	35.0	32.5- 37.6	20.5	18.4-22.8	27.6	25.3- 30.1
Maternal Age						
<20	48.4	40.6- 56.3	28.5	21.8- 36.2	41.5	33.9- 49.5
20-24	42.6	37.9- 47.3	24.9	20.9- 29.3	34.0	29.6- 38.7
25-34	27.2	23.9- 30.6	15.7	13.1- 18.7	20.2	17.3- 23.5
35 or older	22.4	16.0- 30.4	15.0	9.8- 22.4	17.8	12.1- 25.4
Maternal Education						
< HS	45.1	38.9- 51.4	32.0	26.3- 38.1	39.7	33.7- 46.0
HS	45.3	41.0- 49.7	26.2	22.5- 30.3	35.9	31.8- 40.2
> HS	19.6	16.7- 22.7	9.2	7.2- 11.6	13.3	10.9- 16.0
Marital Status						
Married	23.2	20.6- 26.1	11.8	9.8- 14.2	16.8	14.4- 19.4
Other	51.4	47.0- 55.8	32.9	28.9- 37.2	42.9	38.6- 47.3
Maternal Race						
White	34.1	31.3- 37.0	20.1	17.7- 22.7	26.9	24.3- 29.7
African American/Black	25.9	18.8- 34.6	16.1	10.6- 23.7	20.6	14.3- 28.8
American Indian/Alaska Native	50.0	42.1- 57.9	27.9	21.1- 35.8	40.1	32.5- 48.3
Other	10.8	2.4- 37.3	9.9	1.9- 38.1	1.3	0.5- 3.5
Maternal Ethnicity						
Hispanic	8.6	5.1- 14.2	2.1	0.8- 5.6	7.1	3.9- 12.4
Non-Hispanic	38.2	35.5- 41.0	22.7	20.4- 25.3	30.0	27.5- 32.7

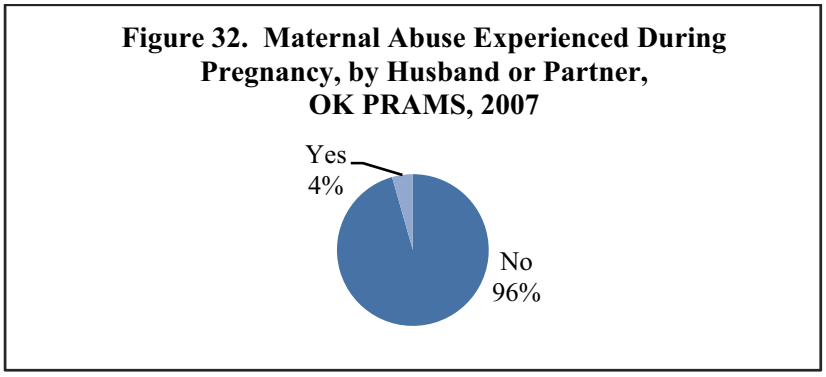
1 Smoking during the three months prior to conception.
2 Smoking during last three months of pregnancy.
3 Smoking at the time the PRAMS survey was administered.

OK PRAMS, 2005-2007, data showed that females who smoked were significantly more likely to give birth to a low birth weight infant than females who did not smoke (10.5% vs. 6.5%). Among females who reported smoking 41 or more cigarettes per day, on average, during the final three months of pregnancy, over 28% of live birth infants were low birth weight (Figure 31). Any amount of cigarette use during pregnancy increased the risk of low birth weight, even among females who reported less than one cigarette per day. Low birth weight infants are at higher risk for needing medical intervention at delivery and are more likely to have long-term health problems.



Intimate Partner Violence (IPV) During Pregnancy

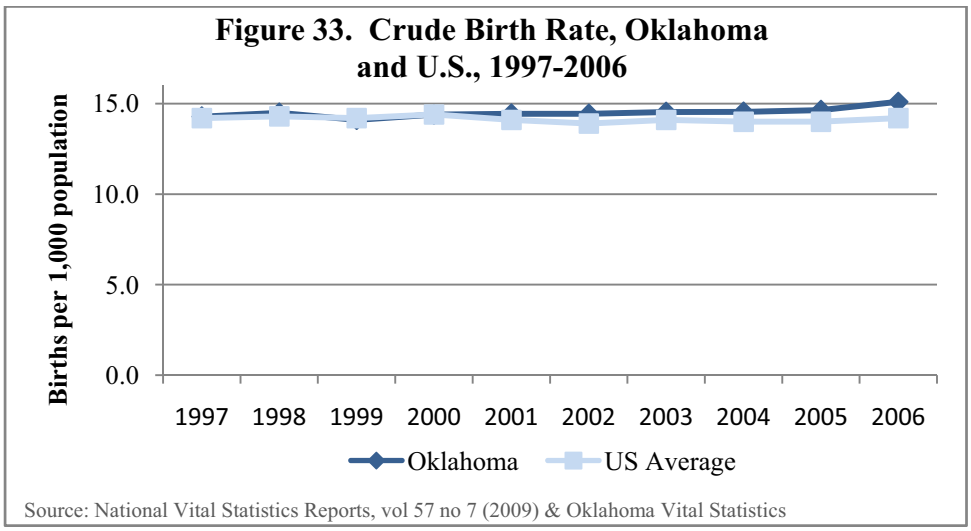
One in twenty females with a recent live birth, (4.4%) reported physical abuse during their most recent pregnancy (Figure 32). Due to the highly sensitive nature of this question, these results are generally considered to be conservative estimates, and the actual prevalence of violence before and during pregnancy is most likely higher. The National Coalition Against Domestic Violence estimates that one in every four women will experience domestic violence in their lifetime (National Coalition Against Domestic Violence, 2007).



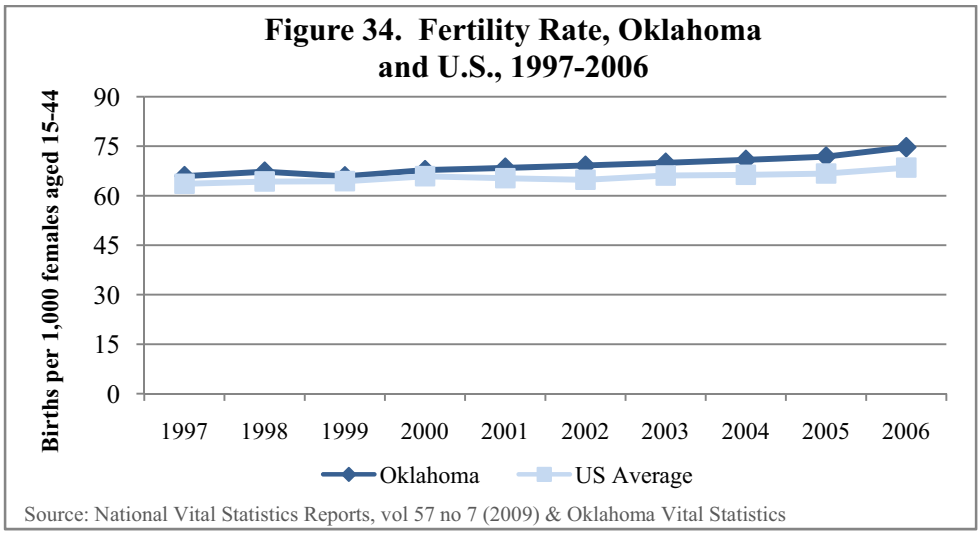
Births

The crude birth rate refers to the number of births per 1,000 population and uses the entire population, including men, women, and children, as the denominator. Trends in birth rates for Oklahoma have shown only a slight increase from 14.5 births per 1,000 population in 1998 to 15.2 births per 1,000 population in 2007, a 4.8% difference. The national birth rate has had only minor variation over the last ten years and remains virtually unchanged (Figure 33). In 2006, the latest year for which final natality data are available for the U.S., Oklahoma's crude birth rate of

15.1 births per 1,000 population was 6.3% higher than the national average of 14.2 (National Center for Health Statistics, 2009).



A fertility rate, specifically the general fertility rate, is defined as the ratio of all births to the female population aged 15-44. Oklahoma fertility rates have seen a 15% increase over a ten-year period, from 65.9 births per 1,000 females in 1998 to 75.8 births per 1,000 females in 2007. In 2006, the latest year for which final natality data are available for the U.S., Oklahoma's fertility rate of 74.7 births per 1,000 females age 15-44 was 9.1% higher than the national average of 68.5 (Figure 34). Twenty-four counties in Oklahoma had a lower fertility rate than the U.S. average of 68.5 (National Center for Health Statistics, 2009). Two counties, Harper and Roger Mills, had fertility rates of 100 or more.



Although the 45 and older age-group saw the largest percent increase at 64.3%, this figure is based on small numbers and even at that level of growth, births to this age-group comprised less than 1% of all births in Oklahoma.

In 2007, 96% of Hispanic mothers in Oklahoma reported their race as white. When shown by race only whites present substantial growth in the number of births over the past ten years. However, when shown by race and Hispanic origin, it is apparent that the majority of the increase in white births is to mothers of Hispanic origin (Table 16). The number of births to Hispanic mothers has increased 98.3% in the past ten years from 3,615 births in 1998 to 7,167 births in 2007 and 25.3% over the past five years from 5,720 births in 2003 to 7,167 births in 2007. Conversely, births to non-Hispanic white mothers have only increased 0.1% over the same ten-year period and 2.9% during the past five years. All racial groups, except those in the "Other" category, have seen an increase in births from 2003 to 2007.

Table 16. Total Number of Births by Maternal Age, and Race/Ethnicity, Oklahoma, 1998-2007

Maternal Characteristic	Oklahoma births by year										10-Year Percent Change	5-Year Percent Change
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007		
Total Births[1]	49354	48470	49712	50029	50310	48470	49712	51775	54010	54946	11.3	13.4
Age Group												
10-14	120	131	120	105	113	95	104	113	96	93	-22.5	-2.1
15-17	2704	2514	2492	2322	2216	2118	2165	2020	2280	2293	-15.2	8.3
18-19	5174	5169	5219	5145	5086	4855	4740	4662	4944	5230	1.1	7.7
20-24	15771	15540	16065	16652	17038	17191	17312	17292	17998	17943	13.8	4.4
25-29	13566	13195	13471	13251	13324	13711	14173	14646	15428	15932	17.4	16.2
30-34	7816	7766	8182	8563	8487	8865	8929	8817	8707	8856	13.3	-0.1
35-39	3415	3394	3464	3246	3301	3276	3528	3493	3785	3809	11.5	16.3
40-44	621	622	651	700	707	719	691	696	724	741	19.3	3.1
45+	28	28	26	25	31	33	34	34	42	46	64.3	39.4
Race/Ethnicity												
White	35264	34332	34456	34291	34277	34288	34519	33966	35010	35295	0.1	2.9
African American/Black	4757	4564	4759	4581	4667	4545	4638	4715	4900	4901	3.0	7.8
American Indian/ Alaska Native	4767	4700	5115	5183	5063	5199	5312	5640	5852	6272	31.6	20.6
Asian /Pacific Islander	834	832	942	966	1004	1064	1111	1050	1076	1228	47.2	15.4
Hispanic*	3615	3910	4352	4937	5251	5720	6046	6265	7065	7167	98.3	25.3
Other	5	4	34	36	21	17	8	79	14	12	140.0	-29.4

[1]Includes Births with Unknown or Missing Maternal Characteristics
*Persons of Hispanic origin can be of any race and are mutually exclusive from the other race categories.
Source: Oklahoma Vital Statistics

Table 17 displays the number of Oklahoma's 2007 live births by age within racial and ethnic groups. African American/Blacks, American Indian/Alaska Natives, and Hispanics have the highest percentage of births in each of the two youngest age groups: Aged "< 15" and aged "15-17". Nearly 20% of births for African American/Blacks and American Indian/Alaska Natives are to mothers 19 years-old and younger, compared to 11.8% of white mothers and 5.0% of Asian/Pacific Islander mothers. Asian/Pacific Islander mothers have the highest percentage of their births to mothers 30-34 and 35 and older at 28.8% and 17.3%, respectively, nearly twice that of any other ethnic group. As will be demonstrated throughout this needs assessment, maternal race, age, ethnicity, and behaviors are important factors in assessing adverse pregnancy outcomes.

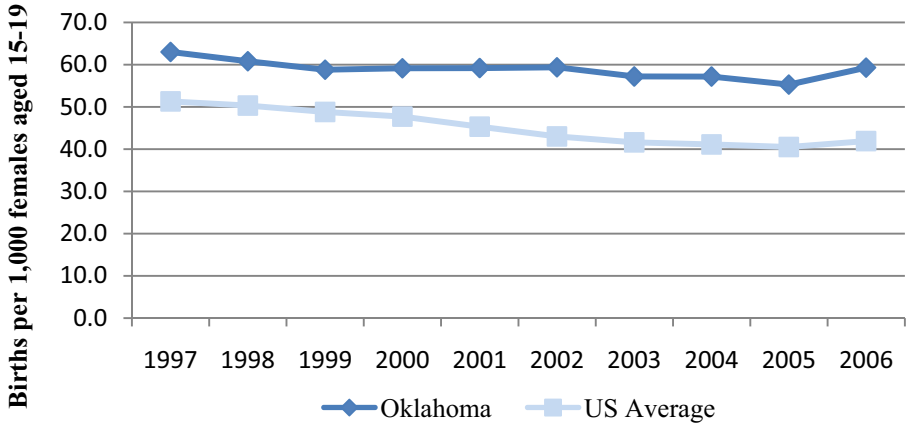
Table 17. Percent of Births by Maternal Age, within Racial Groups, Oklahoma, 2007								
		Age-group						
	Births	**< 15**	**15-17**	**18-19**	**20-24**	**25-29**	**30-34**	**35+**
White	35293	0.1	3.1	8.6	31.7	30.7	17.1	8.8
African American/Black	4901	0.6	7.0	12.2	36.3	25.6	11.7	6.7
American Indian/Alaska Native	6272	0.2	6.5	13.6	37.4	25.5	11.6	5.3
Asian/Pacific Islander	1228	0.0	1.2	3.8	17.9	31.0	28.8	17.3
Hispanic*	7167	0.3	6.0	9.8	33.3	25.8	16.2	8.7
Total	**54946**	**0.2**	**4.2**	**9.5**	**32.7**	**29.0**	**16.1**	**8.4**

*Persons of Hispanic origin can be of any race and are mutually exclusive from the other race categories.
Source: Oklahoma Vital Statistics

- **Adolescent Births**

Adolescent births are an important indicator for the state of Oklahoma. Adolescent births represent a myriad of social health issues as births to adolescents are more likely to: be unwanted; be unplanned; be preterm; be low birth weight; and die in their first year of life. The teen birth rate in the U.S. and Oklahoma has been steadily on the decline; however, in 2006 teen birth rates saw an increase for the first time since 1991 (National Center for Health Statistics, 2009). Whether in decline or not, Oklahoma's teen birth rate continues to be higher than the national average as Oklahoma's 2006 rate of 59.3 births per 1,000 females aged 15-19 was 41.5% higher than the national rate of 41.9 births per 1,000 females aged 15-19 (Figure 35). Worse yet, the rate increase continued as Oklahoma's 2007 teen birth rate was 61.8, a 4.2% increase from 2006. Approximately 14% of all births in Oklahoma are born to adolescent mothers aged 15-19.

Figure 35. Teen Birth Rates (Females Aged 15-19), by Year, Oklahoma and U.S., 1997-2006



Source: National Vital Statistics Report , vol 57 no 7 (2009) & Oklahoma Vital Statistics

Significant variation exists among racial and ethnic groups for teen birth rates as Hispanic teens aged 15-19 had the highest birth rate in 2007 at 111.2 births per 1,000 females aged 15-19. This was significantly higher than the next two closest groups with a rate of 86.5 for American

Indian/Alaska Natives and 71.4 for African American/Blacks, and was more than twice as high as the white population at 50.1, and Asian/Pacific Islanders at 30.7 (Figure 36).

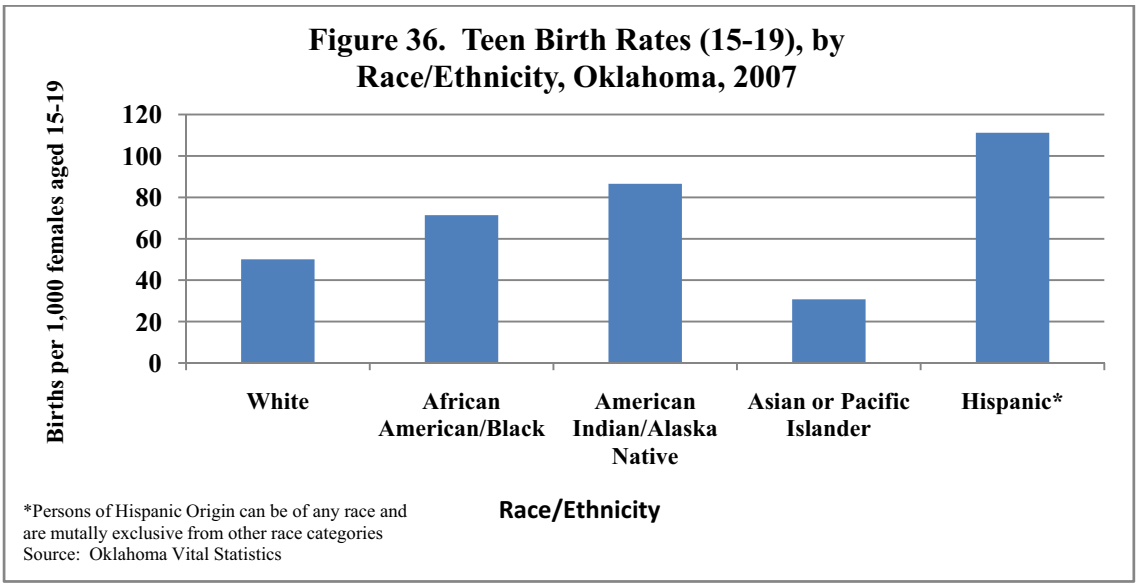
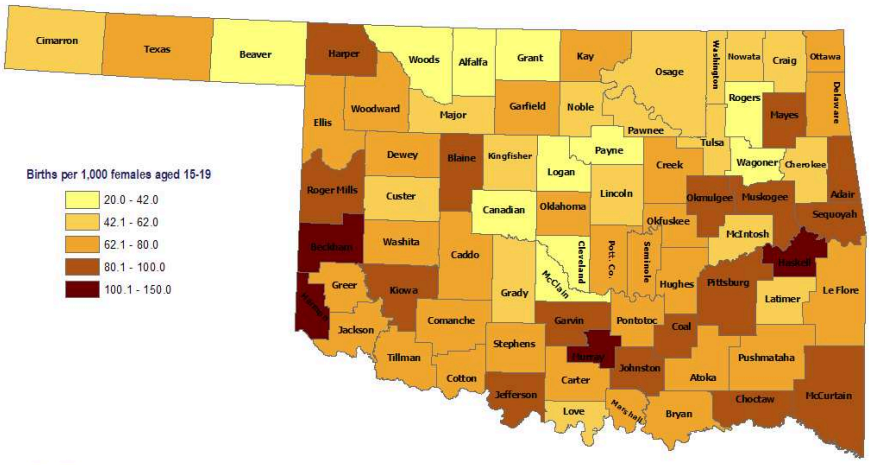


Figure 37 displays a map of teen birth rates by county. The ranges selected were based on the U.S. average of 41.9 (42.0) births per 1,000 females aged 15-19 and Oklahoma's 2007 rate of 61.3 (61.0). For Oklahoma and Tulsa counties, the two most densely populated counties in the state, the birth rate was 69.9 and 61.9 births per 1,000 females aged 15-19, respectively.

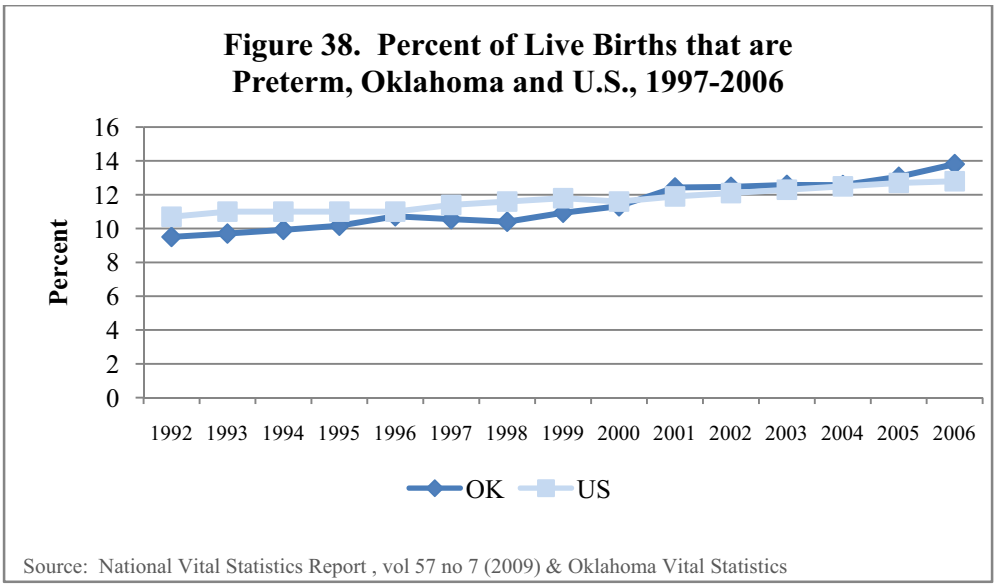
All but 11 counties in Oklahoma were above the national average of 41.9 births per 1,000 females age 15-19. Four counties, Harmon, Murray, Haskell, and Beckham, had rates of 100 or more at 148.9, 113.5, 110.3, and 102.1 births per 1,000 females aged 15-19, respectively. The southeast region of the state continues to have some of the highest teen birth rates affirming the need for continued outreach and prevention efforts in this region.

Figure 37. Teen Birth Rates (Females Aged 15-19), by County, Oklahoma, 2005-2007

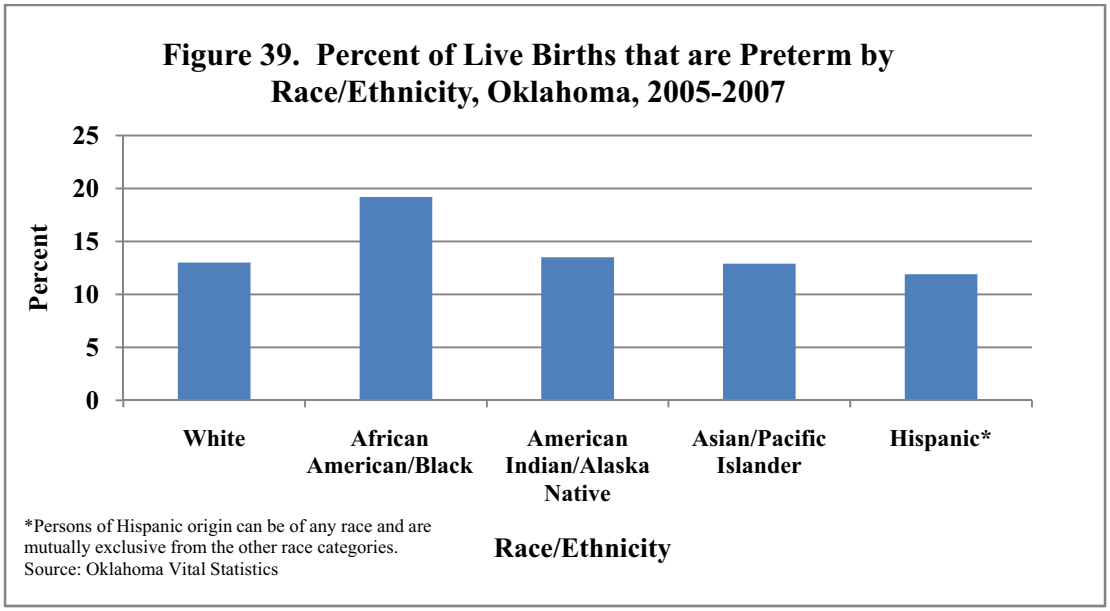


- **Preterm Births**

A preterm birth is defined as any live birth with a gestational age of less than 37 completed weeks. An important perinatal health problem, preterm births are a determinant of neonatal and infant morbidity, including respiratory problems, neurodevelopment deficiency, and infections. Data from the Oklahoma Hospital Association show the hospital stay for a normal, full-term infant in 2007 cost an average of $1,844 and had an average length of stay of 2 days. This compares to $13,006 for an average stay of 5.6 days for a preterm birth without any major problems. The average cost for a preterm birth with major problems was $57,571 with an average stay of 15.6 days. Infants born with extreme immaturity or respiratory distress syndrome had an average cost of $113,517 and average length of stay of 30.5 days (Oklahoma Hospital Association, 2009). Over the past 15 years, Oklahoma has seen an increase in the percent of births that are delivered preterm from 9.5% in 1992 to 13.8% in 2006 (Figure 38). Oklahoma's preterm birth rate of 13.8% in 2006 was 7.8% higher than the national average of 12.8%. Oklahoma's 2007 preterm birth rate was 13.4%, an increase of 6.4% from five years earlier.

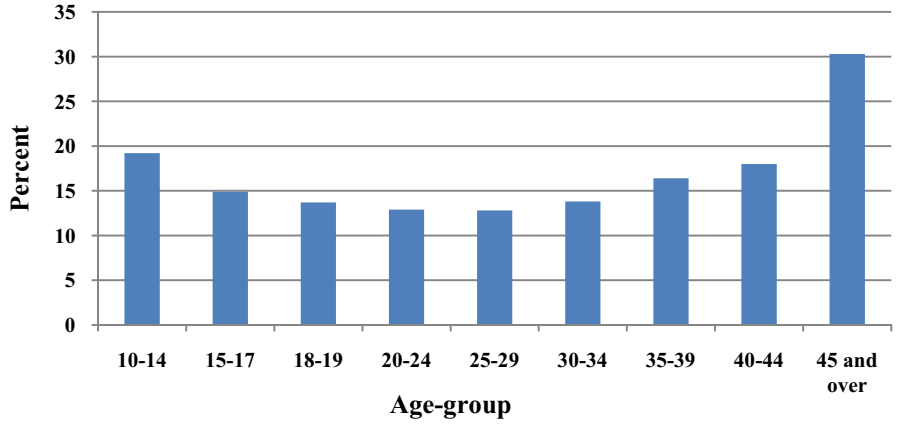


Racial disparities exist in the percent of infants that are born premature (less than 37 completed weeks gestation) as African American/Black mothers had the highest preterm birth rate at 19.2%, followed by American Indian/Alaska Natives at 13.5%, whites at 13.0%, Asian/Pacific Islanders at 12.9%, and Hispanics at 11.9% (Figure 39). While prematurity is an important concern for all racial groups, with disorders due to short gestation and low birth weight being the number one cause of infant death for African American/Blacks, addressing the high rate of prematurity is paramount for this racial group.



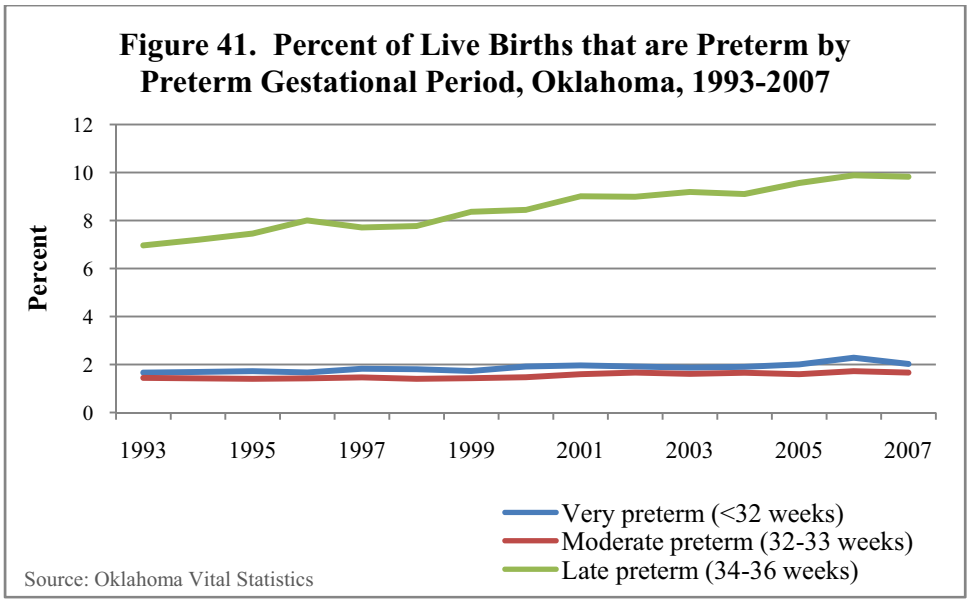
Variation also exists among maternal age for preterm births. While many other indicators follow a bell curve which indicates a normal distribution, preterm births by maternal age follow a well curve, represented by higher frequencies at each end of the spectrum and lower frequencies toward the center. Mothers aged 25-29 have the lowest preterm birth rate at 12.8%, followed closely by mothers aged 20-24 at 12.9%. The oldest mothers, aged 45 and over, have the highest preterm birth rate at 30.3%, followed by the youngest mothers, aged 10-14, at 19.2% (Figure 40).

Figure 40. Percent of Live Births that are Preterm by Maternal Age-group, Oklahoma, 2005-2007



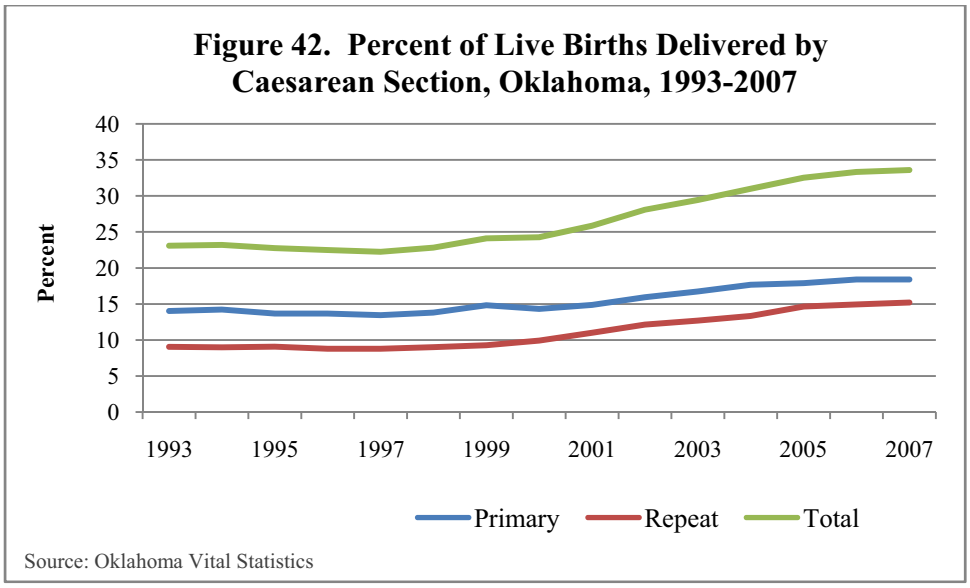
Source: Oklahoma Vital Statistics

Of those births delivered preterm, the majority of increase has been in the later preterm category, which is considered 34-36 completed weeks of gestation. Over the past 15 years late preterm births increased 41.1% from 6.96% of all births in 1993 to 9.82% in 2007 (Figure 41). This compares to an increase in very preterm births by 29.5% and to moderate preterm births by 17.8% over the same time frame. Over the past five years the preterm birth rate increased 6.7% from 9.19% in 2003 to 9.82% in 2007.

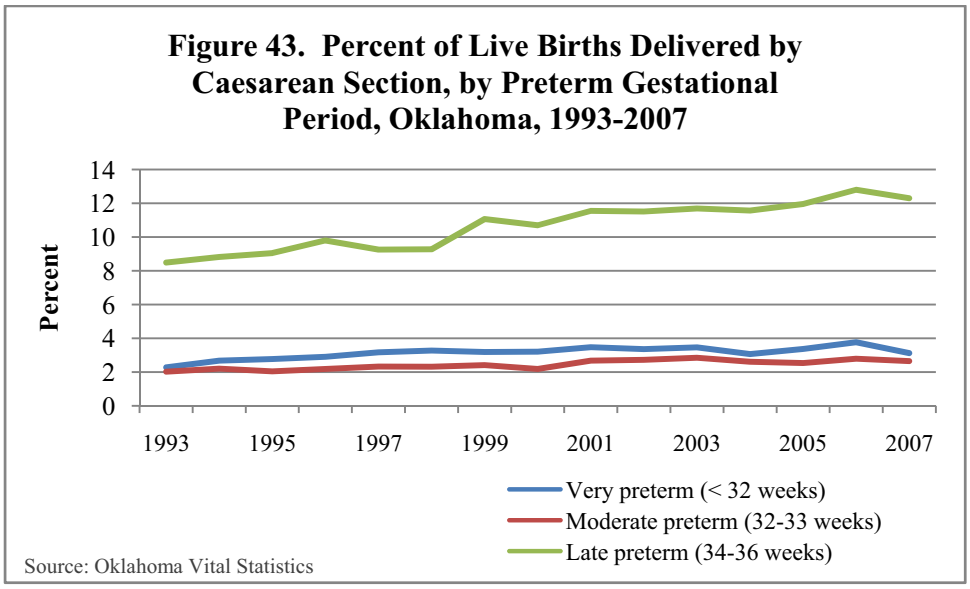


- **Caesarean Deliveries**

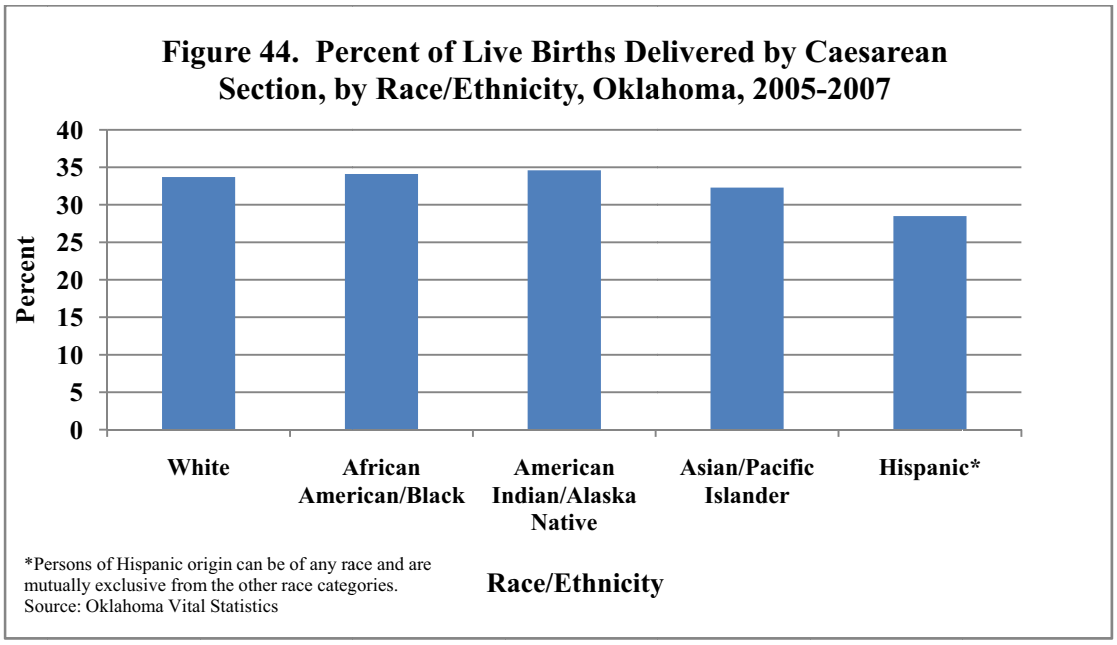
A caesarean delivery, or c-section, is a surgical procedure generally reserved as an alternative delivery method when health risks to the mother or fetus are present. However, concern is rising over elective caesarean deliveries, which are c-sections or inductions of labor that are done more out of convenience for the patient or doctor than from medical necessity. Of concern are the risks to the mother such as increased chances of infection, excessive bleeding, blood clots, and a longer hospital stay. Another concern is the financial burden that medically unnecessary procedures place on the health care system. Data from the Oklahoma Hospital Association show that the average charge for an uncomplicated c-section delivery in 2007 was $11,002 with an average length of stay of 3 days. This compares to $6,867 and 2 days for a vaginal delivery without complications. For c-sections with complications the costs were an average of $13,854 and length of stay of 3.7 days. A vaginal delivery with complications was $9,325 with a stay of 2.6 days, substantially lower than an uncomplicated c-section (Oklahoma Hospital Association, 2009). Oklahoma has seen a significant increase in the number of caesarean deliveries over the last 15 years, increasing 45.5% from 23.1% in 1993 to 33.6% in 2007 (Figure 42). While the majority of these deliveries are primary c-sections, the number and percent of deliveries that are repeat c-sections have seen the most growth with a 67.7% increase in the last 15 years and a 19.7% increase from 2003-2007. The growth in repeat c-section deliveries is likely due to the major insurer of physicians in Oklahoma, Physician Liability Insurance Company (PLICO), not providing coverage for vaginal birth after c-section (VBAC).



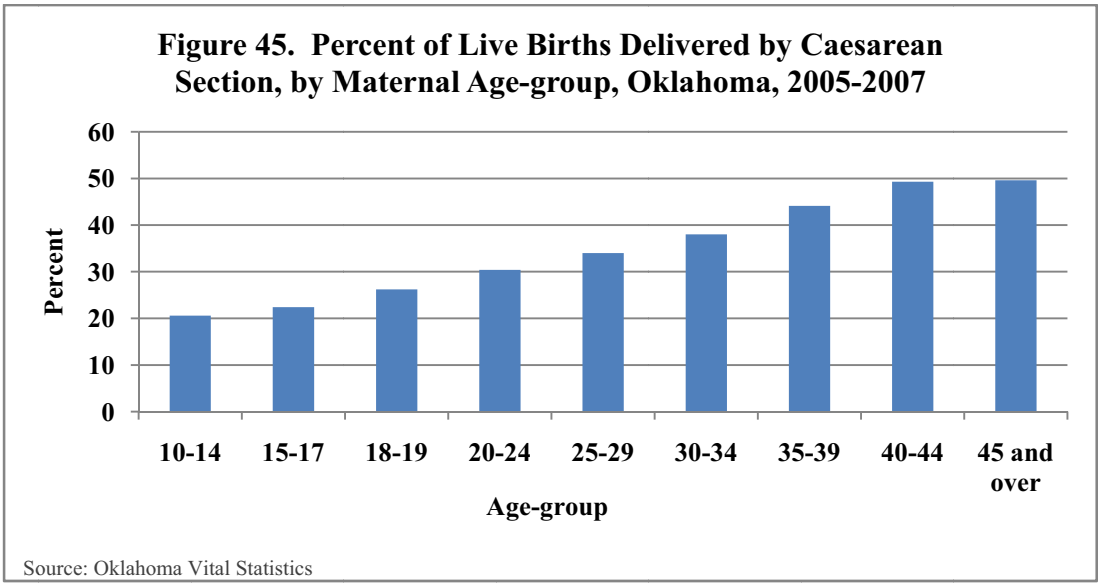
The last 15 years have seen a significant increase in the percent of c-sections that are performed prior to 37 weeks completed gestation. The percent of c-sections performed from 1993-2007, that were during the very preterm (less than 32 weeks) and moderate preterm (32-33 weeks) gestation periods have increased modestly. During this same time-frame the percent of c-sections that were performed during the late preterm gestation period (34-36 weeks) has increased 44.9% from 8.5% in 1993 to 12.3% in 2007 (Figure 43).



There was racial variation in the percentage of live births delivered by c-section in Oklahoma. At least a third of births to American Indian/Alaska Natives, African American/Blacks, and whites are delivered by c-section at 34.6%, 34.1%, and 33.7%, respectively (Figure 44). Only slightly lower are Asian/Pacific Islanders at 32.3% and Hispanics at 28.5%. All racial and ethnic groups have seen increases in c-section deliveries since 1993.



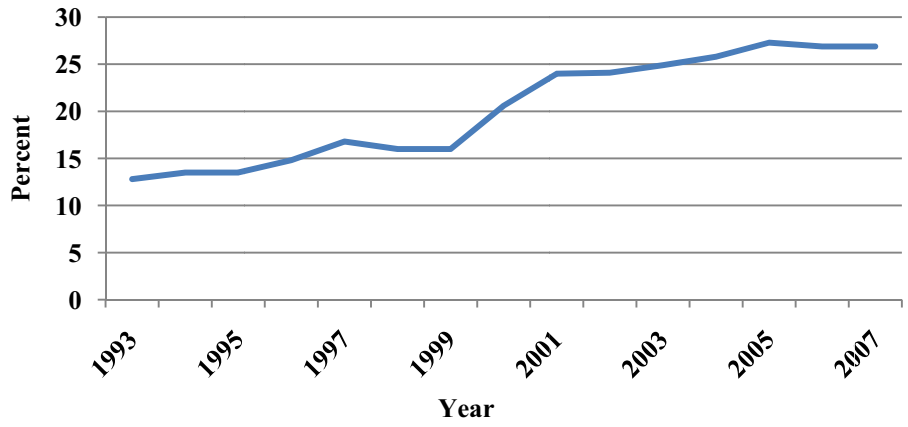
Significant variation is seen by maternal age for births delivered by c-section. There appears to be a strong correlation that as age increases so does the likelihood of having a c-section as evidenced by the rate of 49.6% for mothers aged 45 and over, indicating a 2.4 times higher rate than mothers aged 10-14 at 20.6% (Figure 45).



- **Inductions**

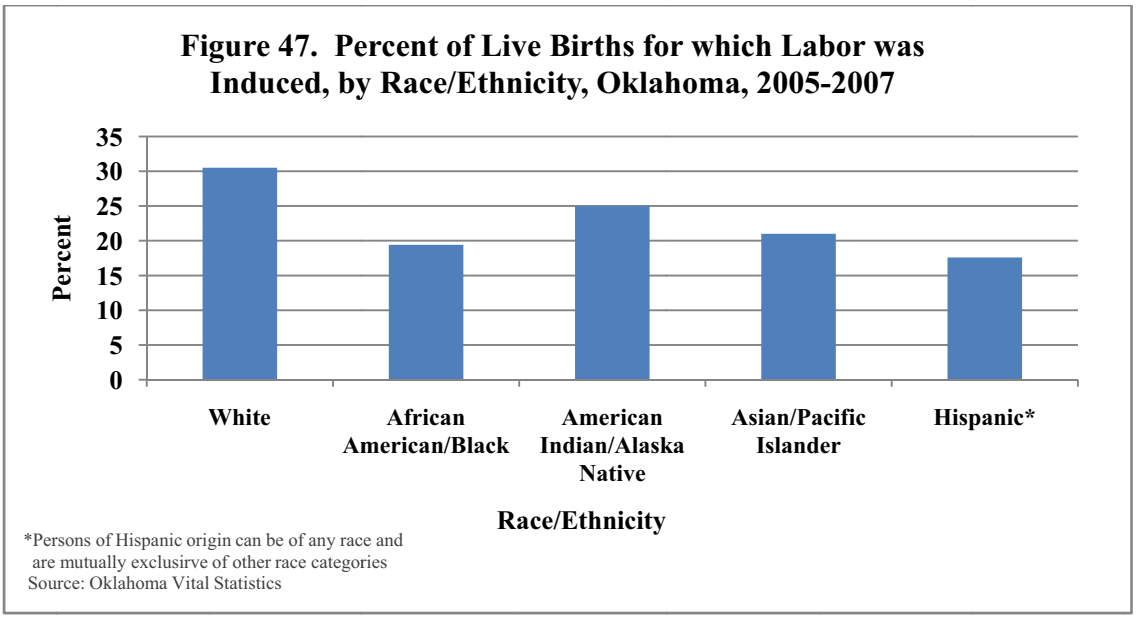
Induction of labor is the method of bringing on or inducing labor using medications or other methods versus allowing the labor to occur naturally. When maternal complications are present, such as diabetes or high blood pressure, induction of labor may be performed to avoid further complications with the delivery or to reduce potential harm to the mother or fetus. While there are risks involved with labor induction, when medically indicated the benefits of induction often outweigh the risks. Over the last 15 years Oklahoma has seen a significant increase in the percent of births where labor was induced, increasing from 12.8% of all births in 1993 to 26.9% of all births in 2007, representing a 110% increase. Oklahoma's induction rate of 270.5 per 1,000 live births from 2005-2007, was 20% higher than the national average of 225.3 per 1,000 live births (Figure 46).

Figure 46. Percent of Live Births for which Labor was Induced, by Year, Oklahoma, 1993-2007

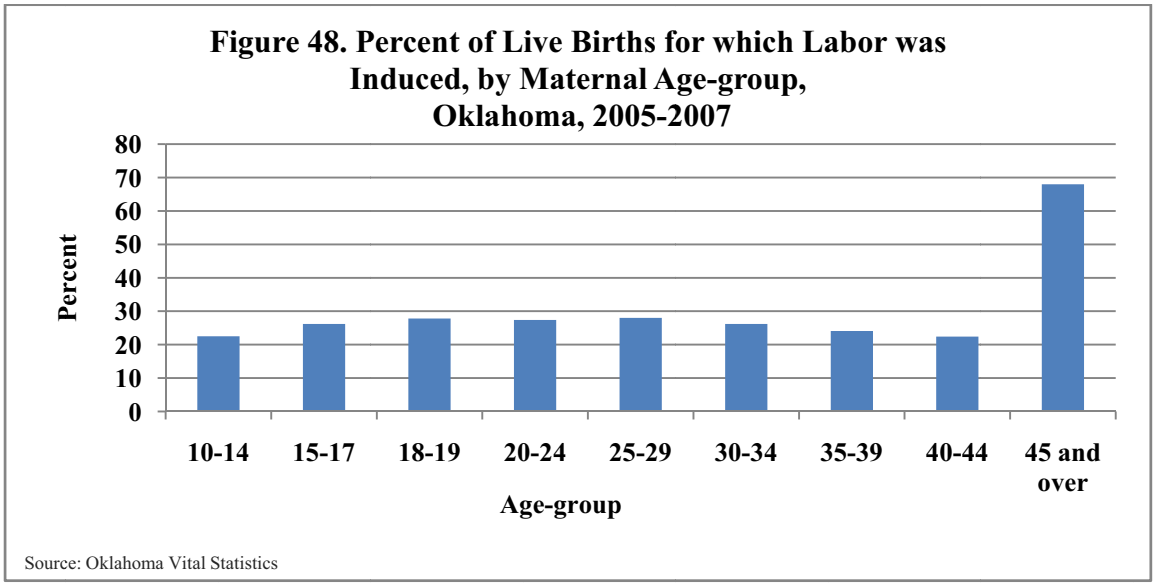


Source: Oklahoma Vital Statistics

Significant differences were noted among race and ethnic groups for the percent of births that were induced (Figure 47). White mothers had the highest rate of inductions at 30.5%, followed by American Indian/Alaska Natives at 25%, and Asian/Pacific Islanders at 21%. African American/Black and Hispanic mothers had the lowest induction rates at 19.4% and 17.6%, respectively.



Differences were also observed for inductions when examined by maternal age-groups. While less than six percentage points separated mothers aged 10-44, mothers aged 45 and over were more than twice as likely as younger mothers to have labor induced at 68% of all births compared to the high of 28% for mothers aged 25-29 (Figure 48).

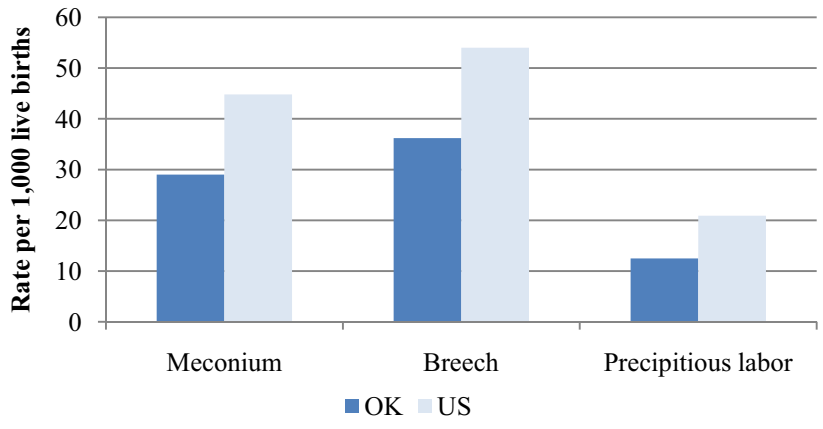


- **Delivery Complications**

Most labor and deliveries occur without any complications. However, sometimes conditions arise that can be anticipated and treated by providers, while other times conditions appear suddenly and unexpectedly. There are three complications of labor and delivery that are reported on both 1989 and 2003 revisions of the U.S. Standard Certificate of Live Birth and are therefore comparable from year to year and between populations. They are meconium moderate/heavy,

breech/malpresentation, and precipitous labor (Figure 49). Oklahoma was significantly lower than the national average for all three complications at 29.0 vs. 44.8 per 1,000 live births for meconium, 36.2 vs. 54.0 per 1,000 live births for breech/malpresentation, and 12.5 vs. 20.9 for precipitous labor. Other complications with substantially higher rates in Oklahoma were "other complications" at 140.6 per 1,000 live births, followed by fetal distress at 34.9, cephalopelvic disproportion at 16.2, dysfunctional labor at 11.7, and PROM at 16.8.

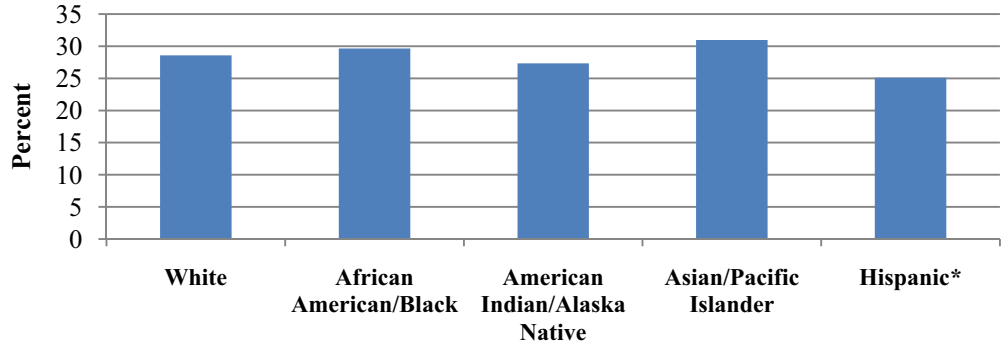
Figure 49. Rates of Selected Complications of Delivery, Oklahoma, 2005-2007 and U.S., 2006



Source: National Vital Statistics Report, vol 57 no 7 (2009) & Oklahoma Vital Statistics

Racial and ethnic variations exist for the presence of delivery complications (Figure 50). Asian/Pacific Islanders had the highest percent of births with at least one delivery complication present at 31.0%, followed by African American/Blacks at 29.7%, whites at 28.6%, American Indian/Alaska Natives at 27.3%, and Hispanics at 25.1%.

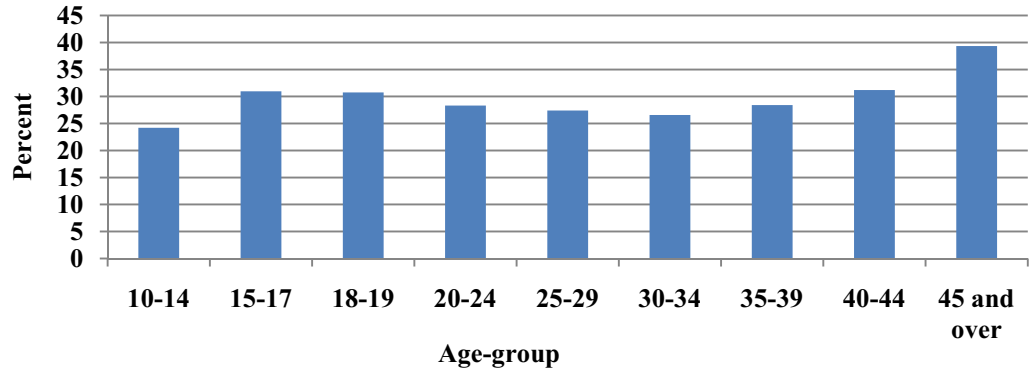
Figure 50. Percent of Live Births with One or More Delivery or Labor Complications, by Maternal Race/Ethnicity, Oklahoma, 2005-2007



*Persons of Hispanic origin can be of any race and are mutually exclusive of other race categories.
Source: Oklahoma Vital Statistics

Variations exist for delivery complications among maternal age-groups as well (Figure 51). Mothers aged 10-14, notwithstanding, the risk for delivery complications is greater at either end of the age spectrum with mothers aged 45 and over having the highest percent of complications at 39.4%, followed by mothers aged 15-17 at 31.0%, mothers aged 18-19 at 30.7%, and mothers aged 40-44 at 31.2%.

Figure 51. Percent of Live Births with One or More Delivery or Labor Complications, by Maternal Age-group, Oklahoma, 2005-2007

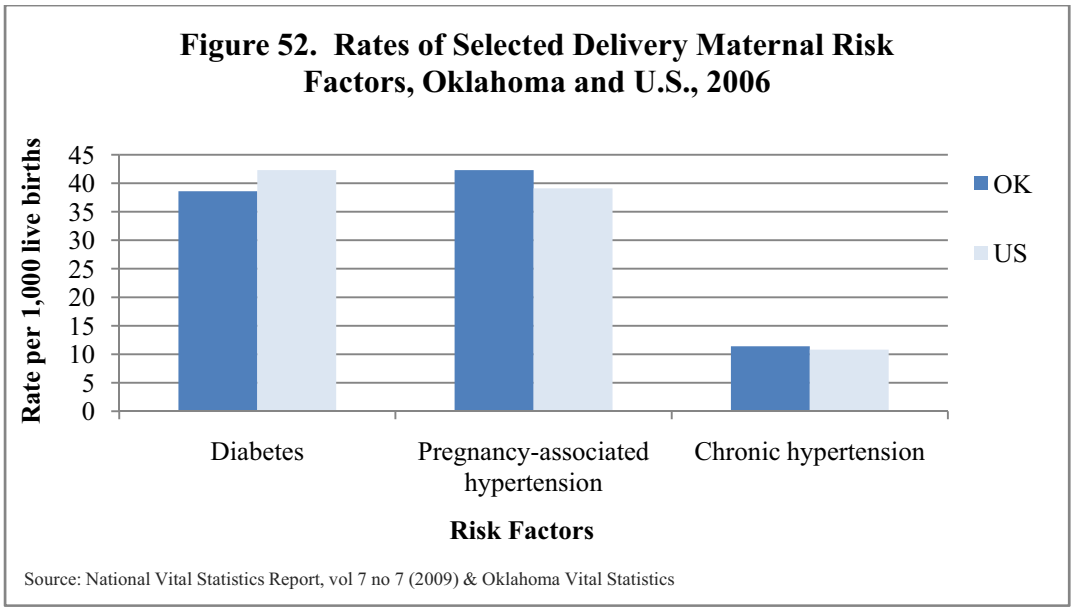


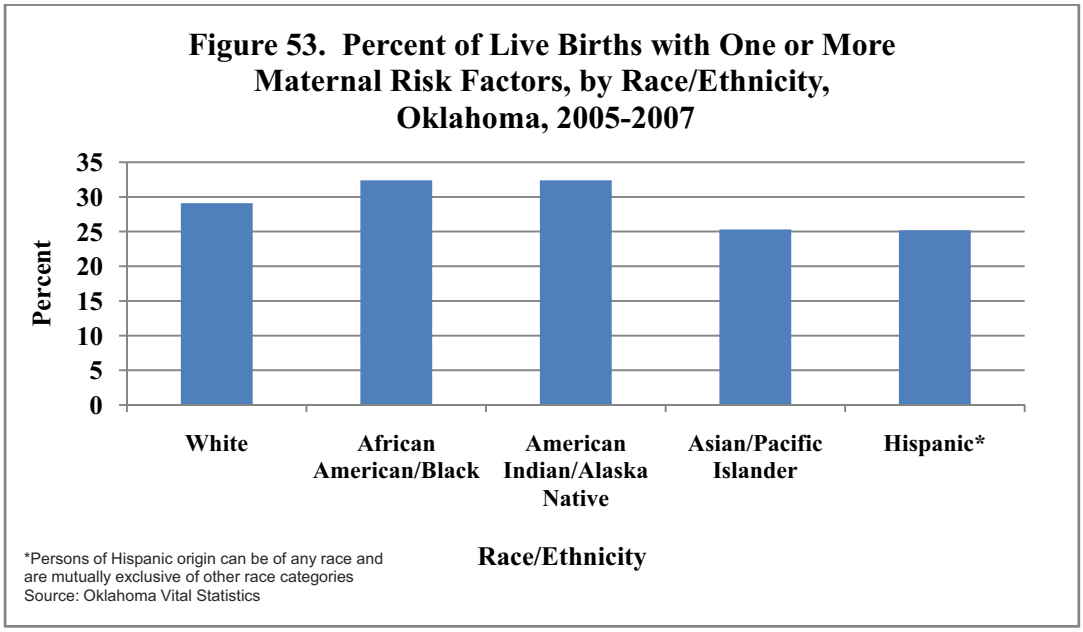
Source: Oklahoma Vital Statistics

Morbidity

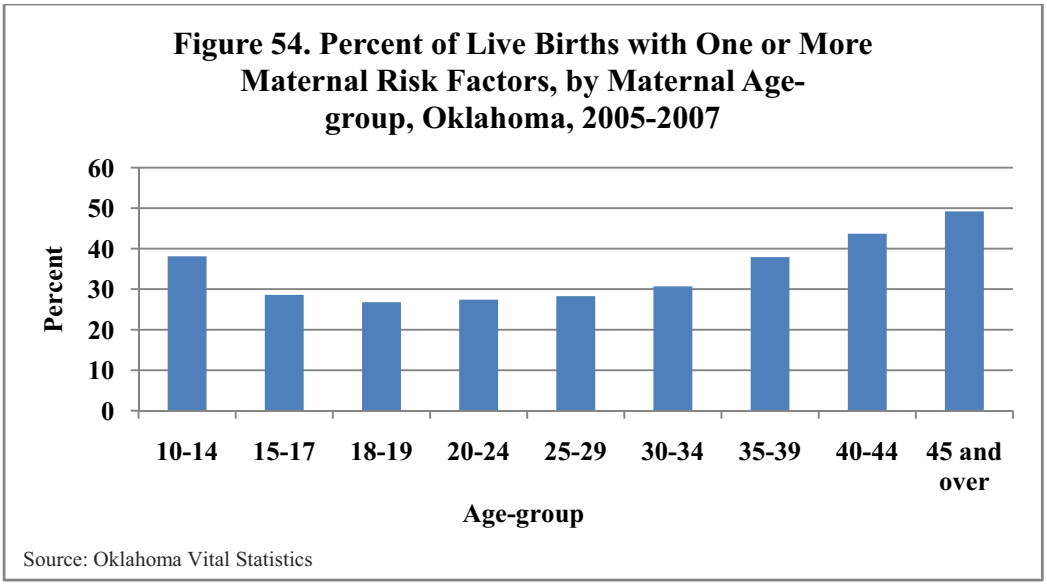
Maternal risk factors are an important public health concern due to their association with pregnancy complications and poor birth outcomes. Diabetes, chronic hypertension, and pregnancy associated hypertension were selected based on the comparable reporting for the nation (Figure 52). The Oklahoma 2006 rate of diabetes per 1,000 live births during pregnancy was lower than the U.S. rate for 2006, at 38.6 and 42.3 per 1,000 live births, respectively. However, Oklahoma rates for pregnancy associated hypertension at 42.3 and chronic hypertension at 11.4 were both higher than the U.S. rate of 39.1 and 10.8, respectively. Other risk factors with relatively high rates were "other risk factors" at 185.3 per 1,000 live births, anemia at 16.2, and previous preterm birth at 13.7.

Variation exists among racial and ethnic groups for the presence of maternal risk factors (Figure 53). African American/Black mothers and American Indian/Alaska Native mothers had the highest percentage of live births with one or more maternal risk factors present during pregnancy at 32.4% each, followed by whites at 29.1%. Hispanics and Asian/Pacific Islanders had the lowest percentage of live births with one or more maternal risk factors at 25.2% and 25.3%, respectively.





Disparities exist among maternal age groups for the presence of maternal risk factors (Figure 54). Maternal risk factors are more prevalent among the oldest mothers with approximately half (49.2%) of mothers aged 45 and over and 43.7% of mothers aged 40-44 having one or more maternal risk factors during their pregnancy. Mothers aged 10-14 and 35-39 had relatively high percentages of live births with one or more maternal risk factors at 38.1% and 37.9%, respectively.



A STD during pregnancy can cause serious complications for both the mother and the newborn. In 2007, estimates showed that the numbers of pregnant females in the U.S. infected with a STD were as follows: bacterial vaginosis 1,080,000; herpes simplex virus 2,880,000; chlamydia 100,000; trichomoniasis 124,000; gonorrhea 13,200; hepatitis B 16,000; HIV 6,400; and, syphilis <1,000 (Centers for Disease Control and Prevention 2007).

Left untreated an infection could be the cause of early onset of labor, PROM, and uterine infection after delivery. The damaging effects STDs may have upon infants include stillbirth, low birth weight, conjunctivitis (eye infection), pneumonia, neonatal sepsis, neurologic damage, blindness, deafness, acute hepatitis, meningitis, chronic liver disease, and cirrhosis. Most of these health issues are considered to be preventable and easily treatable if the STD is diagnosed early during routine prenatal care (Centers for Disease Control and Prevention 2007).

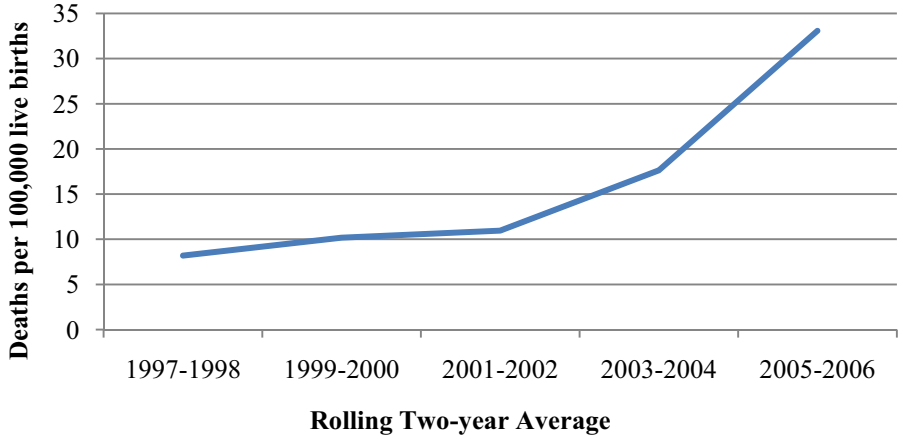
Prevalence rates for maternal infections among pregnant females are not readily available for all STDs; however, OK PRAMS and birth certificate records do collect data on kidney and bladder (or urinary tract infections) and genital herpes infections for females who recently delivered a live birth. According to 2005-2008 OK PRAMS data, 26.4% (95% CI: 24.8%, 28.1%) of females had a urinary tract infection or kidney infection during their most recent pregnancy. And 0.75% (95% CI: 0.49%, 1.15%) or 7.5 per 1,000 live births (95% CI: 4.9, 11.5) had a genital herpes infection reported on their infant's birth certificate (data not shown).

Mortality

Maternal mortality can occur when a female experiences sudden and unexpected complications during pregnancy, childbirth, and just after delivery. Maternal mortality rates are expressed as the number of maternal deaths per 100,000 live births. The World Health Organization (WHO) defines a maternal death as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes" (Say, Souza, & Pattinson, 2009).

In 2004, Oklahoma Vital Records began collecting pregnancy information on the death certificate to help assist in identifying obstetric or pregnancy-related deaths. As a result, the number and rate of maternal deaths increased significantly in 2005 and 2006, although increases were already being seen from 2002-2004. To help account for these differences in Oklahoma (Table 18) represents seven years of data from 1999 forward using only International Classification of Diseases (ICD-10) classifications. As of 2005, only 31 states were utilizing the revised death certificate with the pregnancy check box option, while most other states use a similar pregnancy status question. Also, maternal mortality data for the U.S. do not include in its rate calculation the following causes of death: ICD O96-O97 maternal causes more than 42 days after delivery or termination of pregnancy, while Oklahoma's rate does. Therefore, a rate comparison between Oklahoma and the U.S. will not be given. In addition, to ameliorate the variability as a result of these changes, two-year averages were used to display maternal mortality rates over time (Figure 55). Over the last ten years the maternal mortality rate (MMR) in Oklahoma has experienced significant increases, from 6.2 in 1997 to 25.9 in 2006 (Figure 55). The 2006 MMR of 25.9 deaths per 100,000 live births in Oklahoma was nearly twice the 2006 U.S. average of 13.3 deaths per 100,000 live births.

Figure 55. Maternal Mortality Rate, Oklahoma, 1997-2006



Source: Oklahoma Vital Statistics

The 1999-2006 MMR in Oklahoma was 19.4 deaths per 100,000 births (Table 18). The leading cause of death was "Other direct obstetric causes" and includes specific causes such as eclampsia and pre-eclampsia, hemorrhage, and obstetrical tetanus and embolism. Due to the small number of deaths in this category when stratified by race, only rates for whites and African American/Blacks are presented. The MMR of 37.2 deaths per 100,000 live births for African American/Blacks in Oklahoma was more than twice the rate of 17.8 for whites.

Table 18. Number of Maternal Deaths and Maternal Mortality Rates for Selected Causes, by Race, Oklahoma, 1999-2006

	Number			Rate		
Cause of death (based on ICD-10)	All Races	White	Black	All Races	White	Black
Maternal causes (A34,O00-O95,O98-O99)	79	56	14	19.4	17.8	37.2
Pregnancy with abortive outcome (O00-O07)	3	2	-	0.7	*	*
Ectopic pregnancy (O00)	1	1	-	*	*	*
Spontaneous abortion (O03)	-	-	-	*	*	*
Medical abortion (O04)	-	-	-	*	*	*
Other abortion (O05)	-	-	-	*	*	*
Other and unspecified pregnancy with abortive outcome (O01-O02,O06-O07)	2	1	-	*	*	*
Other direct obstetric causes (A34,O10-O92)	43	30	9	10.6	9.5	23.9
Eclampsia and pre-eclampsia (O11,O13-O16)	4	4	-	1.0	1.3	*
Hemorrhage of pregnancy and childbirth and placenta previa (O20,O44-O46,O67,O72)	4	3	-	1.0	1.0	*
Complications predominately related to the puerperium (A34,O85-O92)	12	7	3	3.0	2.2	8.0
Obstetrical tetanus (A34)	-	-	-	*	*	*
Obstetric embolism (O88)	8	5	2	2.0	1.6	*
Other complications predominately related to the puerperium (O85-O87,O89-O92)	4	2	1	1.0	*	*
All other direct obstetric causes (O10,O12,O21-O43,O47-O66,O68-O71,O73-O75)	21	15	6	5.2	4.8	16.0
Obstetric death of unspecified cause (O95)	5	4	-	1.2	1.3	*
Indirect obstetric causes (O98-O99)	25	17	5	6.2	5.4	13.3
Maternal causes more than 42 days after delivery or termination of pregnancy (O96-O97)	3	3	-	0.7	1.0	*
Death from any obstetric cause occurring more than 42 days but less than one year after delivery (O96)	3	3	-	0.7	1.0	*
Death from sequelae of direct obstetric causes (O97)	-	-	-	*	*	*

Rates are maternal deaths per 100,000 live births

* Rates are suppressed when numerator is less than 3.

- Quantity zero.

After several years of inactivity, in 2009, MCH re-established the state level Maternal Mortality Review (MMR) Committee. The MMR Committee is comprised of individuals from varied organizations and occupations. The MMR Committee has met twice and has reviewed eight cases. Although pertinent and important data are being compiled with each review, it will likely take several years of data collection to get a more realistic picture of pregnancy related death issues in Oklahoma.

3. Infants

Access to Care

The statewide implementation in July 2010 of an electronic application for SoonerCare (eNB1) will add a newborn to its mother's existing SoonerCare case. This change will facilitate the newborn having full Medicaid eligibility before being discharged from the hospital. In SFY