Regional Analysis of Maternal and Infant Health in Texas

PUBLIC HEALTH REGION 6/5S

Community Health Improvement Division

Maternal & Child Health Epidemiology

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Introduction

This report provides a comprehensive analysis of key maternal and infant health outcomes, as well as related risk and protective factors, in each of the eight Public Health Regions in Texas. The findings are critical for informing evidence-based practices, the Healthy Texas Mothers & Babies initiative, and strategies for building and implementing regional coalitions, whose mission is to design and implement public health interventions to meet the maternal and infant health needs identified.

Results from analysis of the latest population-level data are integrated with available Title V Maternal and Child Health community outreach survey results and focus group findings to address health concerns in each region. The report includes an overview of geographic/socioeconomic characteristics, birth demographics, infant mortality, access to health care and barriers, maternal health (obesity, hypertension, diabetes, smoking, drinking, physical abuse, postpartum depression, and postpartum checkup), infant health practices (breastfeeding, safe infant sleep, and well-baby checkup), and comprehensive risk analyses for Texas as well as for each Public Health Region. Statewide information regarding maternal mortality and morbidity is also included.

When possible, geographic mapping at the county level was performed to gain a better understanding of maternal and infant health indicators within a particular region and the state as a whole. Data terms, sources, and methods are addressed. For data monitoring purposes, a summary table showing trends for selected maternal and infant health indicators is presented at the end of the Texas overview and each region-specific section.

Data & Methods

Major public health data sources and data terms used in this report are detailed below, as well as a list of counties included in each of the eight Public Health Regions in Texas.

Data Sources

For most of the infant and maternal health indicators in this report, vital records data (information from Texas birth, death, fetal death, and linked birth/infant death files), hospital discharge data, and results from the Texas Pregnancy Risk Assessment Monitoring System (PRAMS) survey as well as the Texas Infant Feeding Practice Survey (IFPS) among Women, Infants, and Children (WIC) participants were used. Despite the few limitations described below, these data sources have been used by the Texas Department of State Health Services (DSHS) and other state agencies and stakeholders to inform, develop, and drive policies and programs to improve the health of mothers and babies, and to understand their emerging health needs. These invaluable sources of data provide a rich understanding of both infant and maternal health, and serve as an important resource for risk factor analysis and for identification of possible avenues for prevention.

The DSHS Vital Statistics Section collects demographic data on all (or the vast majority of) births and deaths in Texas, as well as information on fetal deaths weighing 350 grams or more or, if weight is unknown, occurring at 20 weeks of gestation or more. Vital records files are a rich and comprehensive source of data; however, the quality of birth and death certificate data is dependent on how accurately these records are completed by hospital staff, providers, or certifiers. It is also thought that the birth file likely underreports the prevalence of several maternal health indicators, such as diabetes and preeclampsia [1, 2]. All the years of vital records data used in this report (2006-2015) are final. Data were suppressed in county maps when there were fewer than 100 documented births in a county and in regional reporting when there were fewer than 15 cases in the numerator, to prevent identification of affected individuals that might be possible with smaller numbers, thereby protecting the confidentiality and privacy of these individuals and their families.

Texas Hospital Inpatient Discharge Public Use Data Files (PUDF) were used for severe maternal morbidity (SMM) and Neonatal Abstinence Syndrome (NAS) analyses in this report. The PUDF contains patient-level information for inpatient hospital stays from all Texas licensed hospitals except those that are statutorily exempt from the reporting requirement [3]. Data are available by quarter, beginning with data for 1999. Texas county-level data from first quarter 2006

through third quarter 2015 were analyzed to determine SMM rates and NAS rates. Cases of NAS were identified by the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis code for drug withdrawal syndrome in newborns, and hospital births were identified using ICD-9 codes for newborns born within the reporting hospital [4]. Cases of SMM were identified by ICD-9 diagnosis and procedure codes included in the 2017 Federally Available Resource Document provided by Health Resources and Services Administration (HRSA) [5]. However, this report does not use the recalculation methods indicated by HRSA to account for cases with unreasonably short hospital stays, and therefore the SMM rates in this report are likely overestimated. Delivery hospitalizations for SMM rates were identified by diagnosis codes for an outcome of delivery, diagnosis-related group delivery codes, and procedure codes for selected delivery-related procedures [6]. The estimates in these analyses do not include inpatient stays for state residents that may have been treated in another state besides Texas. Additionally, the estimates are not limited to only community hospitals, defined as short-term, non-Federal hospitals, but also include long-term care facilities such as rehabilitation, and alcoholism and chemical dependency hospitals. Data were suppressed when there were fewer than 5 cases in the numerator.

In Texas, the PRAMS survey provides the most comprehensive population-based data on maternal health before, during, and after pregnancy. Conducted in partnership with the Centers for Disease Control and Prevention (CDC), DSHS has been implementing PRAMS annually since 2002 [7]. The PRAMS survey asks questions (via mail or telephone) of mothers who have recently given birth on topics such as prenatal care, pregnancy intention, alcohol use, smoking, intimate partner violence, postpartum depression, breastfeeding, infant sleep position, and smoke exposure. Unlike vital records, which include information on almost all vital events (births and deaths) in Texas, PRAMS data are obtained from a sample of women who are residents of Texas and gave birth to a live infant. CDC provides Texas with a survey data file that includes survey weights, and CDC ensures that analyses are representative of women who have given birth to a live infant and are residents of Texas. For example, the 1,322 women who completed the survey in 2015 were representative of all 396,093 Texas residents who had a live birth. PRAMS data/results are generalizable to women who are Texas residents with at least one live birth within a specific year, whereas the birth file represents all live births in Texas. Because of this, along with potential sampling and reporting differences, PRAMS findings may differ from results obtained from vital statistics data. PRAMS results are reported along with 95 percent confidence intervals (CI), and the width of the confidence interval – in other words, the distance between its upper and lower limits – is an indicator of the variability, and thus the reliability, of the results. Texas PRAMS data are presented as estimated percentages or prevalence estimates to account for complex sampling and weighting. As with any

self-reported survey, possibility of recall bias exists; that is, women may not answer the question correctly or leave it blank because they may not remember the event. However, the schedule of survey mailings begins 61 to 183 days after the birth of the infant, so the recall risk is minimized. Based on CDC's suppression rules, PRAMS prevalence data were suppressed in this report when there were fewer than 30 respondents (unweighted sample size) in the denominator.

Additionally, the 2016 Texas WIC IFPS survey data were used [8]. As part of efforts to promote breastfeeding, DSHS periodically conducts a survey of breastfeeding beliefs, attitudes, and practices among women receiving WIC services in Texas. The purpose of this survey is to provide data to local WIC agencies to aid in planning and activity development. These data may also provide valuable information to coalitions, public health partners, policy makers, and those interested in supporting breastfeeding. The 2016 IFPS surveys were assigned to clinics in all 66 local WIC agencies operating at the time of the survey. WIC clinic supervisors were instructed to offer the survey using the informed consent script to each eligible participant presenting at the clinic for services during the survey administration period. Eligible participants were women who were biological mothers, who were age 18 or older, and who presented at the clinic for services and had a single baby who was aged 1 month through 30 months old at the time of the survey. A total of 10,325 surveys were completed from March 1 through April 22, 2016. After eliminating ineligible respondents, there were 8,561 eligible surveys for final analyses. The survey results were not weighted or adjusted, and therefore may not be representative of the general population presenting for WIC services in Texas. It's also noted that comparisons or conclusions cannot be reliably made when using analyses with small sample sizes. Caution should be used when interpreting these responses. Results for categories with fewer than 20 responses in IFPS were not reported.

Data Terms

Birth Weight

The weight of an infant at delivery, recorded in pounds and ounces or in grams. Birth weights are classified into 3 groups: Normal, Low, and Very Low. Very Low birth weight babies are also included in the Low birth weight group. A Normal birth weight is defined as at least 5 pounds, 9 ounces (or 2,500 grams); Low birth weight - less than 5 pounds, 9 ounces (or 2,500 grams); and Very Low birth weight - less than 3 pounds, 5 ounces (or 1,500 grams).

Border and Non-Border Counties: Counties are designated as Border or Non-Border according to Article 4 of the La Paz Agreement of 1983, which defines a county as a Border county if that county is within 100 Kilometers of the U.S./Mexico border. There are 32 counties in Texas designated as Border counties by this definition.

Body Mass Index: Body mass index (BMI) is a measure of weight-for-height that is often used to classify adults as being underweight, of normal weight, overweight, or obese [9]. In this report, maternal BMI is calculated using the mother's pre-pregnancy weight and height. BMI categories are defined using the standard cutoffs for adults, even if the mother is younger than 22 years of age.

Causes of Infant Death: Cause of death categories from the National Center for Health Statistics Instruction Manual are used to calculate information regarding the leading causes of infant death in this report [10]. Not all infant deaths in Texas are due to the leading causes shown in the report. Causes of infant death are reported as the number of deaths per 10,000 live births.

Communities: In this report, the term 'communities' refers to combined statistical areas (CSAs) and select large Metropolitan Statistical Areas (MSAs). CSAs and MSAs are defined by the U.S. Office of Management and Budget (OMB). CSAs are composed of adjacent metropolitan areas (containing an urban core of 50,000 or more population) and micropolitan areas (containing an urban core of at least 10,000 but less than 50,000 population), and consist of the county containing the urban core area, as well as adjacent counties with a high degree of social and economic integration with the urban core. To be consistent with recent past Healthy Texas Babies Data Books (from 2013-2017), this report uses the U.S. OMB CSA and MSA definitions released in 2013, with two exceptions. First, the traditional CSA of Dallas-Fort Worth was divided into three separate areas: Fort Worth-Arlington, Dallas-Plano, and the remaining outlying counties of the metropolitan area. Second, the county of Galveston was removed from the Houston-The Woodlands CSA so that this county could be analyzed separately.

Gestational Age: Gestational age is used to calculate whether or not a birth is preterm, as well as to calculate when in pregnancy the mother first received prenatal care. However, exact gestational age is often unknown and must be estimated. Beginning with final 2014 data, the National Center for Health Statistics has changed the variable used to estimate gestation [11]. The current standard, starting in 2014, uses the obstetric estimate of gestation on the birth certificate, and not a combination of last menstrual period and the obstetric estimate, as had been done in the past. This current standard for calculating gestational age is used throughout the report.

High Parity for Age: Parity is defined as the number of live births or other pregnancy outcomes that a woman has had including the birth being recorded. High parity for age was calculated based on the mother's age and total birth order.

Age	Total Birth Order*
<15 or 35+	1
<20 or 40+	2 or 3
<25 or 40+	4
<30 or 35+	5
All Ages	6 or more

*Sum of the live births or other pregnancy outcomes that a mother has had including the birth being recorded.

Infant Mortality: Infant mortality rate (IMR) is defined as the number of infants who died in a given year divided by the number of live births in that same year. This number is then multiplied by 1,000 to calculate the IMR. All of the births that comprise this rate are restricted to those women with Texas listed as their state of residence.

Perinatal Periods of Risk: A comprehensive approach designed to help communities use data to improve infant and maternal health outcomes. In addition to infant deaths, fetal deaths are also included in the perinatal periods of risk (PPOR) analysis to provide more information. The PPOR analysis divides fetal and infant deaths into four risk periods (maternal health/prematurity, maternal care, newborn care, and infant health), based on birth weight and age of death. An excess feto-infant mortality rate (F-IMR) is then calculated for each of these periods, both for the state as a whole (as well as for each Public Health Region) and for specific demographic study populations. The reference group for each of these calculations is a state-level reference population of mothers with near-optimal birth outcomes [12, 13]. In this report, 2010-2014 fetal death and linked birth/infant death files were used for the PPOR analysis.

Race/Ethnicity: For information obtained from birth records, fetal death records, or from PRAMS, race/ethnicity information shown throughout this report refers to the mother, not the infant. However, infant death data are classified according to infant's race/ethnicity. Women who identified themselves as only White or Black and who did not indicate that they were Hispanic were classified as White or Black, respectively. Women who identified themselves as Hispanic were classified as Hispanic, regardless of their race designation. Women of all other races, including multiracial women, were classified as 'Other', as long as the woman did not self-identify as Hispanic. The 'Other' category is not homogeneous, and there have been shifts in the demographics of women within this category. Since 2004, there has been an increase in the number of women identifying themselves as multiracial. Also, due to the limited number of women classified as 'Other' race/ethnicity in PRAMS, women classified as 'Other' race/ethnicity and women classified as White

were combined into one category called, White/Other women, for PRAMS racial/ethnic analyses.

Urban and Rural Counties: Counties are designated as Metropolitan or Non-Metropolitan by the U.S. Office of Budget and Management. Texas Health Professions Resource Center (HPRC) currently uses the designations that took effect in 2013. In Texas, 82 counties are designated as Metropolitan and 172 are designated as Non-Metropolitan. HPRC uses the terms 'Non-metropolitan and Metropolitan' interchangeably with 'Rural and Urban'.

List of Counties Included in each Public Health Region

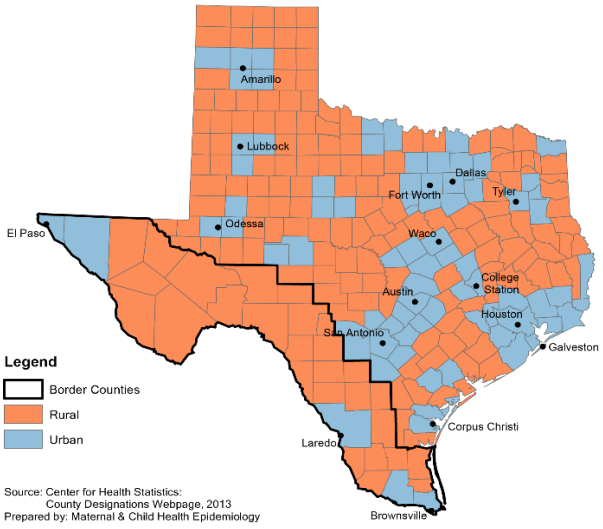
Table 1.1

Region	Counties
Public Health Region 1	Armstrong, Bailey, Briscoe, Carson, Castro, Childress, Cochran, Collingsworth, Crosby, Dallam, Deaf Smith, Dickens, Donley, Floyd, Garza, Gray, Hale, Hall, Hansford, Hartley, Hemphill, Hockley, Hutchinson, King, Lamb, Lipscomb, Lubbock, Lynn, Moore, Motley, Ochiltree, Oldham, Parmer, Potter, Randall, Roberts, Sherman, Swisher, Terry, Wheeler, Yoakum
Public Health Region 2/3	Archer, Baylor, Brown, Callahan, Clay, Coleman, Collin, Comanche, Cooke, Cottle, Dallas, Denton, Eastland, Ellis, Erath, Fannin, Fisher, Foard, Grayson, Hardeman, Haskell, Hood, Hunt, Jack, Johnson, Jones, Kaufman, Kent, Knox, Mitchell, Montague, Navarro, Nolan, Palo Pinto, Parker, Rockwall, Runnels, Scurry, Shackelford, Somervell, Stephens, Stonewall, Tarrant, Taylor, Throckmorton, Wichita, Wilbarger, Wise, Young
Public Health Region 4/5N	Anderson, Angelina, Bowie, Camp, Cass, Cherokee, Delta, Franklin, Gregg, Harrison, Henderson, Hopkins, Houston, Jasper, Lamar, Marion, Morris, Nacogdoches, Newton, Panola, Polk, Rains, Red River, Rusk, Sabine, San Augustine, San Jacinto, Shelby, Smith, Titus, Trinity, Tyler, Upshur, Van Zandt, Wood
Public Health Region 6/5S	Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Hardin, Harris, Jefferson, Liberty, Matagorda, Montgomery, Orange, Walker, Waller, Wharton
Public Health Region 7	Bastrop, Bell, Blanco, Bosque, Brazos, Burleson, Burnet, Caldwell, Coryell, Falls, Fayette, Freestone, Grimes, Hamilton, Hays, Hill, Lampasas, Lee, Leon, Limestone, Llano, McLennan, Madison, Milam, Mills, Robertson, San Saba, Travis, Washington, Williamson
Public Health Region 8	Atacosa, Bandera, Bexar, Calhoun, Comal, DeWitt, Dimmit, Edwards, Frio, Gillespie, Goliad, Gonzales, Guadalupe, Jackson, Karnes, Kendall, Kerr, Kinney, La Salle, Lavaca, Maverick, Medina, Real, Uvalde, Val Verde, Victoria, Wilson, Zavala
Public Health Region 9/10	Andrews, Borden, Brewster, Coke, Concho, Crane, Crockett, Culberson, Dawson, Ector, El Paso, Gaines, Glasscock, Howard, Hudspeth, Irion, Jeff Davis, Kimble, Loving, McCulloch, Martin, Mason, Menard, Midland, Pecos, Presidio, Reagan, Reeves, Schleicher, Sterling, Sutton, Terrell, Tom Green, Upton, Ward, Winkler
Public Health Region 11	Aransas, Bee, Brooks, Cameron, Duval, Hidalgo, Jim Hogg, Jim Wells, Kenedy, Kleberg, Live Oak, McMullen, Nueces, Refugio, San Patricio, Starr, Webb, Willacy, Zapata

Overview of Texas

Texas is a vast state, with regional differences in geography, population size, demographic and socioeconomic characteristics, as well as various maternal and infant health indicators. This section provides an overview of these variations and relates them to the challenges that exist for health care availability and access.

Figure 2.1
2013 Rural, Urban, and Border County Designations in Texas

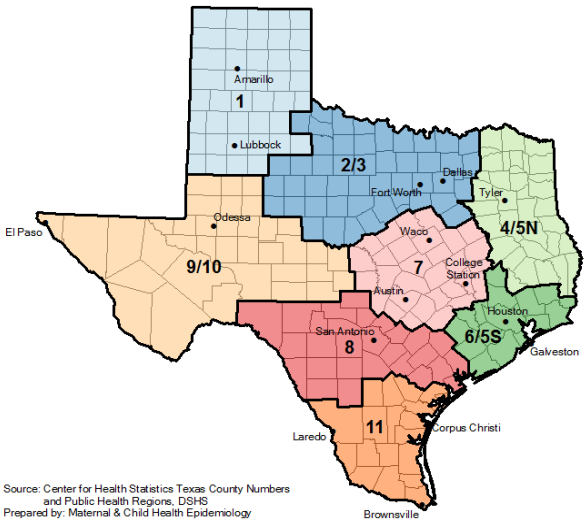


Geography

Texas is the second largest state in the United States (behind Alaska) in terms of land. The Lone Star State encompasses approximately 262,000 square miles, and accounts for 7.4 percent of the total U.S. land area [14]. Texas includes 254 counties that are classified as either rural or urban (Figure 2.1) [15]. About 88.8 percent of Texas population in 2015 resided in urban counties. The five largest metropolitan areas in Texas are located around the cities of Houston, San Antonio, Dallas, Austin, and Fort Worth, and these areas encompass multiple counties.

Given the immense size of Texas, the distance that some individuals, especially those living in rural counties, must travel to receive health care services can be a significant challenge to accessing and receiving those services.

Figure 2.2
Texas Public Health Regions



For administrative purposes, each of the 254 Texas counties is assigned to one of 8 public health regions (Figure 2.2). Public Health Region 1 (PHR 1) is administered from a regional office in Lubbock. Public Health Region 2/3 (PHR 2/3) is administered from a regional office in Arlington. Public Health Region 4/5 North (PHR 4/5N) is administered from a regional office in Tyler and Public Health Region 6/5 South (PHR 6/5S) is administered from a regional office in Houston. Public Health Region 7 (PHR 7) is administered from a regional office in Temple. Public Health Region 8 (PHR 8)

is administered from an office in San Antonio, Public Health Region 9/10 (PHR 9/10) is administered from an office in El Paso, and Public Health Region 11 (PHR 11) is administered from an office in Harlingen. A list of counties in each PHR is also presented in the Data & Methods section.

Population

Texas has the second largest population in the U.S. (behind California) [16], with an estimated population of 27.5 million in 2015. Texas is one of the fastest-growing states in the nation, with a population that has increased by 9.2 percent from 2010 to 2015. Public Health Regions 7 (11.6 percent), 6/5S (11.4 percent), and 8 (10.0 percent) experienced faster population growth rates than the state's from 2010 to 2015. The Texas Demographic Center predicts that by 2050, the population in Texas will exceed 31 million people using the zero migration scenario, will exceed 40 million people using the one-half 2000-2010 migration scenario, and will exceed 54 million people using the full 2000-2010 migration scenario [17, 18].

Race/Ethnicity

Hispanics (of all races) made up 40.0 percent of the state's population in 2015. Counties with the highest proportions of Hispanic populations were primarily located in the southern and western regions of Texas, along the Texas-Mexico border (Figure 2.3). Three major cities in Texas were located in counties where over 80 percent of the population were Hispanic: Brownsville, Laredo, and El Paso. The region with the largest percentage of Hispanics was PHR 11 at 83.7 percent and the lowest was PHR 4/5N at 15.6 percent. On the other hand, regional concentrations of the Non-Hispanic Black population in Texas (Figure 2.4) were quite different from that of the Hispanic population. Counties with the highest proportions of Black

Figure 2.3
Percent of Population that are Hispanic, 2015

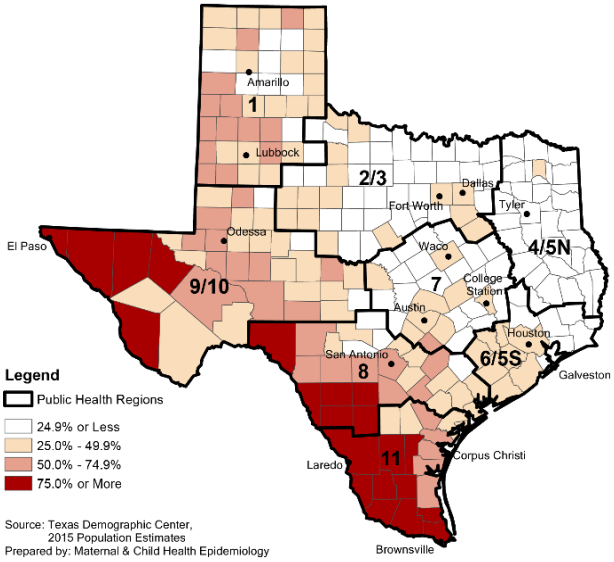
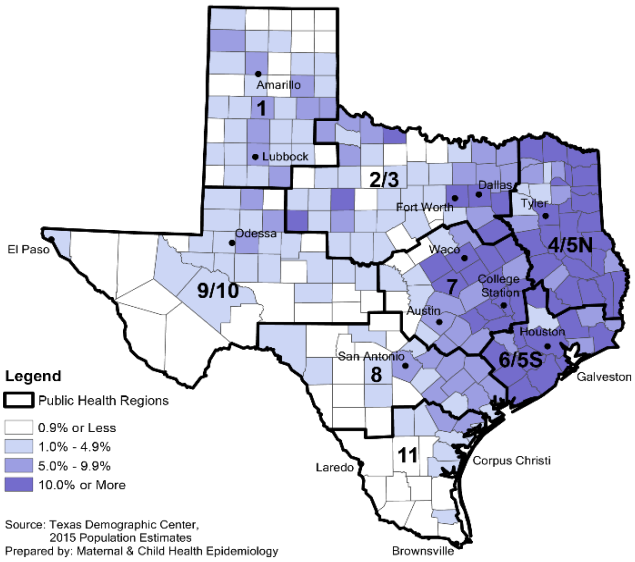


Figure 2.4
Percent of Population that are Black, 2015



populations in 2015 were largely concentrated in the northeastern, eastern, and north gulf-coast regions of the state. Blacks accounted for 11.5 percent of the total population in Texas. In terms of regional differences, PHR 6/5S (17.0 percent) had the highest Black proportion among its population and PHR 11 (1.1 percent) had the lowest Black proportion.

Age and Gender

Texas has a larger proportion of youth among its population than most other U.S. states [16]. In 2015, Texas was tied for the second largest proportion of the population being children younger than 18 years old (26.4 percent) in the nation. About 7.2 percent of the Texas population were younger than 5 years old, 14.6 percent were 5 to 14 years old, and 4.5 percent were 15 to 17 years old [19]. Border counties in South Texas had high percentages of individuals younger than 5 years old, as did several counties in west Texas and the Texas Panhandle.

Women comprised half of the total population in Texas in 2015. However, 5.7 million reproductive-aged women (ages 15-44) accounted for 20.9 percent of the total population. For the most part, urban counties with large metropolitan areas (including those containing the cities of Dallas-Fort Worth, Houston, San Antonio, Austin, and El Paso) had high proportions of women in their childbearing years. By region, PHR 7 had the highest proportion of women of reproductive age (22.1 percent) and PHR 4/5N had the lowest proportion of childbearing-aged women (17.7 percent).

Foreign Born

According to 2011-2015 U.S. Census Bureau American Community Survey (ACS) five-year estimates [20], Texas had a higher percentage of foreign-born residents (16.6 percent) compared to the nationwide average (13.2 percent). Over 70 percent of foreign-born Texas residents were born in Latin American countries – almost 19 percentage points more than the national average. About 29.5 percent of Texans spoke Spanish at home, compared with 13.0 percent of U.S. residents.

Counties along the Texas-Mexico border had high concentrations of foreign-born residents, as did several other counties in west and northwest Texas. Counties containing the non-border cities of Houston, Dallas, and Austin also had high concentrations of foreign-born residents. Within four metropolitan statistical areas in PHR 9/10 and PHR 11 (Laredo, McAllen-Edinburg-Mission, Brownsville-Harlingen, and El Paso), 72 to 92 percent of persons spoke a language other than English at home, with the vast majority speaking Spanish.

Income and Poverty

Income variations exist within different areas in Texas, and largely reflect gender and race/ethnic differences [20, 21]. The 2011-2015 Census ACS data showed that the median household income in 2015 inflation-adjusted dollars was $53,207 in Texas, which was slightly lower than the national median household income of $53,889. In Texas, non-Hispanic White households had a median income of $65,714, Hispanic households of $41,248, and Black households of $39,345.

Poverty, lack of health care coverage, and limited access to providers are root causes of many health disparities in Texas [22]. To determine who lives in poverty, the U.S. Census Bureau uses a set of income thresholds that vary by family size and composition. If a family's total income is less than their determined income threshold, then that family and every individual in it is considered to be in poverty. These poverty thresholds are used throughout the U.S. and do not vary geographically; however, they are updated each year to account for inflation. Based on 2011-2015 Census ACS data, Texas had a higher proportion (38.0 percent) of people living below 200 percent of the Federal Poverty Level (FPL) than the national average of 34.3 percent.

Among the adult population aged 18 and older in Texas, counties with large proportions of adults living below 200 percent FPL in 2011-2015 were concentrated in the Texas-Mexico border area. Several counties in east Texas, north central Texas, and the Texas Panhandle also had high rates of adults living below 200 percent FPL. It was also estimated that about 34.9 percent (3.6 million) of the adult female population lived below 200 percent FPL in Texas in 2011-2015. Counties along the Texas-Mexico border had high rates of poverty among women, as did several counties in rural East Texas, west of Fort Worth, and between Lubbock and Amarillo in the Panhandle (Figure 2.5). In terms of regional differences, PHR 11 had the highest proportion of women living below 200 percent FPL (49.1 percent), and PHR 2/3 had the lowest proportion (31.9 percent).

For children in poverty, Texas had a greater proportion of children under 5 years old living in poverty (below 100 percent FPL) than the nation as a whole in 2011-2015 (27.4 percent vs. 24.5 percent). About one-third of the counties in Texas had more than 33.0 percent of their children under 5 years old living below 100 percent FPL (Figure 2.6). By region, the poverty rate among children under 5 years old ranged from 22.9 percent in PHR 7 to 45.6 percent in PHR 11.

Figure 2.5
Estimated Percent of Adult Female Population Below 200% Federal Poverty Level, 2011-2015

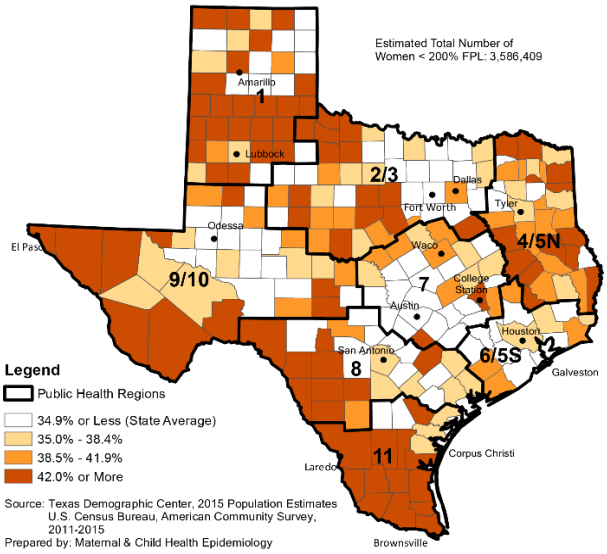
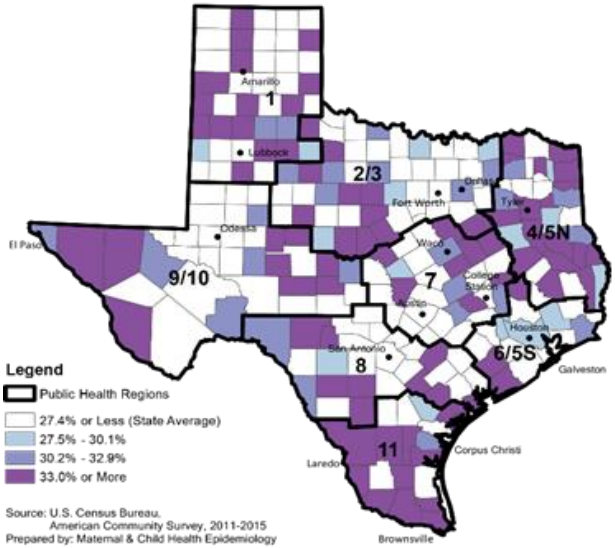


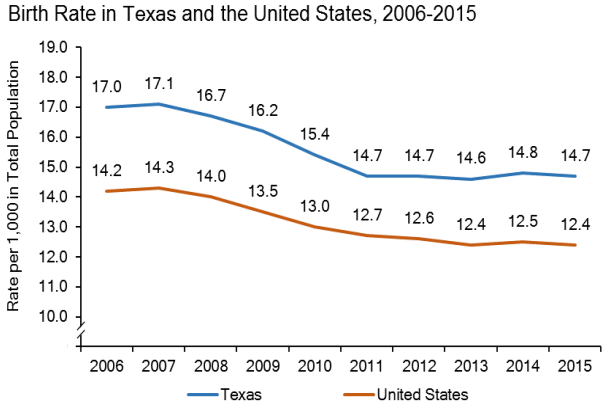
Figure 2.6
Percent of Children Younger than 5 Years Old Below 100% Federal Poverty Level, 2011-2015



Birth Demographics

There were 403,439 live births to Texas residents in 2015, which was a 1.0 percent increase from a decade ago. Male infants accounted for 51.1 percent of all births in 2015 and female infants accounted for 48.9 percent. While the number of births increased by 8.0 percent in PHR 6/5S from 2006 to 2015, the number of births decreased by 8.3 percent in PHR 11.

Figure 2.7



Source: National Center for Health Statistics
Prepared by: Maternal & Child Health Epidemiology

The birth rate was 14.7 births per 1,000 people in Texas in 2015. By region, the birth rate ranged from 17.4 births per 1,000 in PHR 11 to 12.6 births per 1,000 in PHR 4/5N. The birth rate in Texas as a whole has been fairly stable since 2011, and has been consistently higher than the national rate over the past decade (Figure 2.7). However, based on 2016 preliminary birth data, the birth rate in Texas dropped slightly to 14.2 births per 1,000 people [23].

Maternal Race/Ethnicity

Births to Hispanic mothers make up the largest percentage of all births in Texas, followed by births to White mothers, Black mothers, and mothers classified as 'Other' race/ethnicity. The proportion of all births to Hispanic mothers decreased

from 49.6 percent in 2006 to 47.4 percent in 2015. The proportion of all births to White mothers also decreased from 34.7 percent in 2006 to 33.9 percent in 2015. For Black mothers, the proportion of all births increased from 11.5 percent in 2006 to 11.8 percent in 2015.

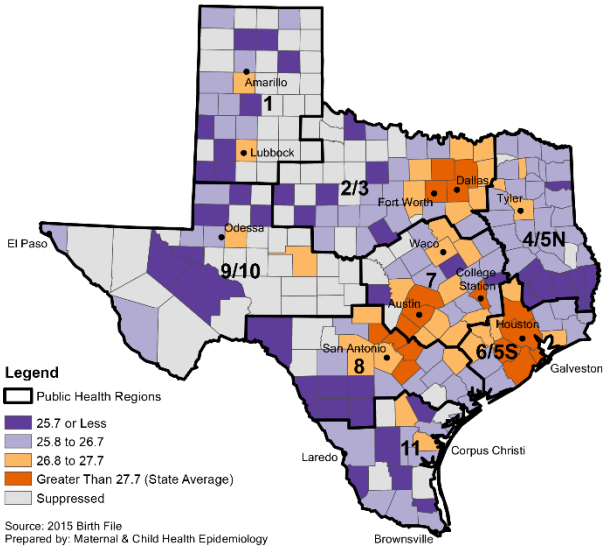
Although births to mothers who are classified as 'Other' race/ethnicity make up a small proportion of the total births in Texas, this race/ethnic group has had the largest increase in the percent of total live births over the past decade, from 4.2 percent in 2006 to 7.0 percent in 2015. Over 28,000 births in 2015 were to mothers who classified themselves as Asian, mixed race, or other race/ethnic designations. However, it is important to know that this group is quite heterogeneous (encompassing many different races/ethnicities), which often limits the interpretability of results for this particular racial/ethnic category.

Maternal Age

In 2015, more than half (52.9 percent) of Texas live births were to mothers 20 to 29 years of age, 24.8 percent were to mothers 30 to 34 years of age, and 11.4 percent were to mothers 35 to 39 years of age. About 8.2 percent of live births were to mothers younger than 20 years of age. While the percentage of births to mothers aged 30-34 and to mothers aged 35-39 increased from 2014, the percentage of births to mothers aged 20-29 and to mothers aged 19 or younger decreased from 2014.

As in the United States as a whole, Texas has seen a shift in the maternal age of women giving birth over time [24]. The average maternal age at birth in 2015 was 27.7 years of age, which was a substantial increase from an average age of 26.5 years in 2006. The average age for women with a live birth in 2015 also differed by region in Texas (Figure 2.8). The oldest average maternal age at birth occurred in PHR 7 (28.4 years of age), and the youngest occurred in PHR 4/5N (26.3 years of age). Counties with major urban centers, such as Dallas-Fort Worth, Austin, and Houston areas, tended to have an older average maternal age.

Figure 2.8
Average Age of a Women with a Live Birth, 2015



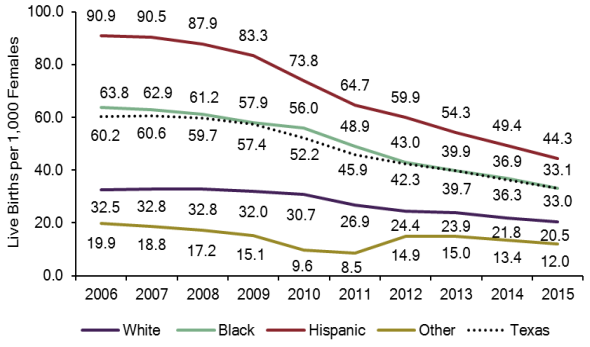
Teen Births

The increase in average maternal age observed over time is likely due in part to a pronounced decrease in the teen birth rate. In 2015, a total of 32,683 babies (about 8.1 percent of total births) were born to teenagers aged 15-19 in Texas, which translates to a teen birth rate of 33.0 births per 1,000 females for this age group. The teen birth rate in 2015 was a record low for Texas, but was still higher than the corresponding teen birth rate in the nation (22.3 births per 1,000) [25]. In Texas, the teen birth rate was much higher among adolescent females aged 18-19 (58.6 births per 1,000) than among adolescent females aged 15-17 (16.3 births per 1,000).

Texas, like the rest of the country, has reported dramatic decreases in teen birth rates, especially since 2007 (Figure 2.9). In particular, the teen birth rate among Hispanic youth aged 15-19 has declined by 51.3 percent from 2006 to 2015. The teen birth rate also has decreased by 48.1 percent among Black youth and by 36.9 percent among White youth during this timeframe. Although teen birth rates among Hispanics and Blacks have fallen faster than Whites, there is a wide gap by race/ethnicity. In 2015, Hispanic and Black teens had birth rates at least twice as high as the rate among White teens. Across all racial/ethnic groups, both 15-year olds and 16-year olds had a 56.0 percent decrease in their birth rates from 2006 to 2015. This decrease was the largest among each of the age groups in the 15 to 19 years old range.

Figure 2.9

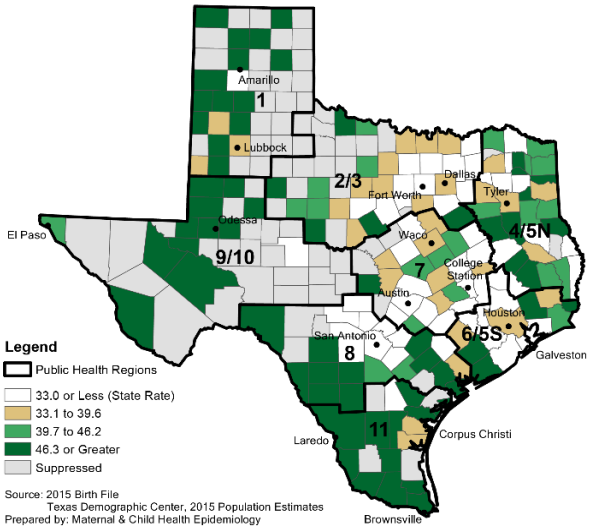
Teen (15 - 19 year old) Birth Rate per 1,000 Females by Race/Ethnicity, 2006-2015



Source: 2006-2015 Birth Files
Texas Demographic Center, 2006-2015 Population Estimates
Prepared by: Maternal & Child Health Epidemiology

Figure 2.10

Teen Birth Rate per 1,000 Females Age 15-19 Years Old, 2015



Source: 2015 Birth File
Texas Demographic Center, 2015 Population Estimates
Prepared by: Maternal & Child Health Epidemiology

Teen birth rates vary widely across the state. Teen birth rates are shown for counties with 100 or more documented births in 2015. Among these counties, many counties along the Texas-Mexico border, where there were large concentrations of Hispanic women, had high teen birth rates in 2015 (46.3 births per 1,000 or greater), as did several counties in the Texas Panhandle and East Texas (Figure 2.10). By region, PHR 11 had the highest teen birth rate

(50.9 births per 1,000), followed by PHR 9/10 (45.2 births per 1,000) and PHR 1 (43.5 births per 1,000). PHR 7 had the lowest teen birth rate in 2015 among all Texas regions (25.5 births per 1,000).

From 2006 to 2015, all PHRs in Texas had sizeable declines in teen birth rates. PHR 7 had the largest decrease (a 51.3 percent decrease) in teen birth rates during the past decade, and PHR 4/5N had the smallest decrease (a 36.8 percent decrease).

Infant Mortality & Morbidity

Infant mortality is the death of an infant before his or her first birthday. The Healthy Texas Babies initiative in DSHS Title V Maternal and Child Health since 2011 has aimed to reduce infant mortality using evidence-based interventions [26]. Multiple factors and characteristics that affect infant mortality are addressed.

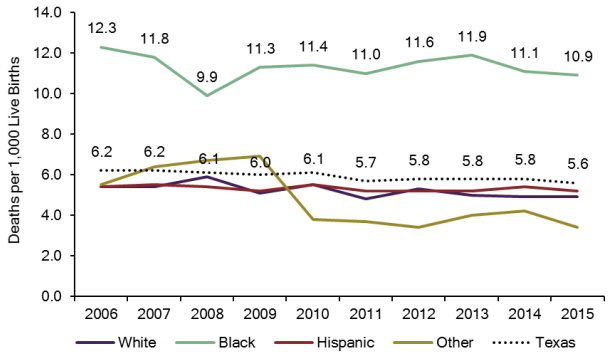
Infant Mortality

Infant mortality rate (IMR), the number of infant deaths per 1,000 live births, continues to be one of the most widely used indicators of the overall health of a community. The IMR for Texas as a whole has been at or below the national rate for the past ten years, and since 2011, the state has consistently been below the Healthy People 2020 (HP2020) target of 6.0 deaths per 1,000 live births [23]. The state IMR reached a new low of 5.6 deaths per 1,000 in 2015, down from 6.2 per 1,000 in 2006. Additionally, based on 2016 preliminary death and birth files, the state IMR remained at 5.6 deaths per 1,000 live births [23].

Racial/ethnic disparities in IMRs, however, have persisted in Texas. IMRs for Black infants have been twice as high as IMRs for White and Hispanic infants over time (Figure 2.11). Also, the overall decrease in IMR observed in Texas during the past decade was not equally distributed across all racial/ethnic groups. The IMR among Black infants decreased from 12.3 to 9.9 deaths per 1,000 live births from 2006 to 2008, then increased to 11.9 deaths per 1,000 in 2013 before dropping to 10.9 deaths per 1,000 in 2015 – an 11.4 percent decline in the past ten years. In comparison, the IMR among infants classified as 'Other' race/ethnicity declined by 38.2 percent, from 5.5 deaths per 1,000 in 2006 to 3.4 deaths per 1,000 in 2015.

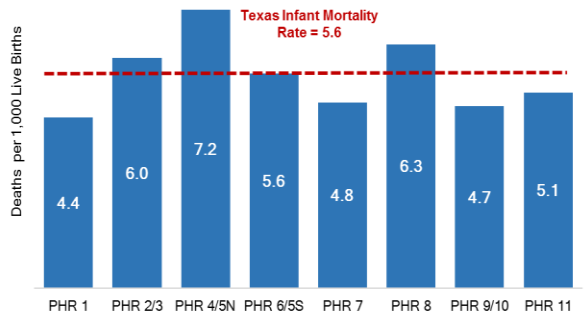
Figure 2.11

Infant Mortality Rate in Texas by Race/Ethnicity, 2006-2015



Source: 2006-2015 Texas Birth and Death Files
Prepared by: Maternal & Child Health Epidemiology

Figure 2.12
Infant Mortality Rate by Public Health Region (PHR), 2015



Source: 2015 Texas Birth and Death Files
Prepared by: Maternal & Child Health Epidemiology

Regional differences in IMRs are observed. Three regions (PHR 4/5N, PHR 8, and PHR 2/3) had IMRs higher than the state rate in 2015, with PHR 4/5N reporting the highest IMR of 7.2 deaths per 1,000 live births (Figure 2.12). In contrast, PHR 1 had the lowest IMR of 4.4 deaths per 1,000 among all Texas regions. From 2006 to 2015, most of the regions reported decreases in IMRs, except for PHR 4/5N and PHR 8. The IMR in PHR 4/5N continued to have an upward trend in recent years, from 5.6 deaths per 1,000 in 2011 to 7.2 deaths per 1,000 in 2015. And, the IMR in PHR 8 had a recent spike from 5.1 deaths per 1,000 in 2014 to 6.3 deaths per 1,000 in 2015.

Additionally, eleven of Texas' large communities met the HP2020 target of 6.0 or fewer infant deaths per 1,000 live births in 2015. The Austin-Round Rock and El Paso communities reported the lowest IMRs (3.8 deaths per 1,000 and 4.2 deaths per 1,000, respectively). In contrast, four large Texas communities (Tyler-Jacksonville, Victoria-Port Lavaca, Waco, and Longview-Marshall) had IMRs higher than 7.3 deaths per 1,000 live births. Both Beaumont-Port Arthur and Fort Worth communities had considerable declines in IMRs from 2014 to 2015.

Leading Causes of Infant Death

The top five leading causes of death among infants in Texas were congenital malformation, short gestation and low birth weight, sudden infant death syndrome (SIDS), maternal complications of pregnancy, and unintentional injuries. Leading causes of infant death, however, differed by race/ethnicity [23]. The most common cause of death among Black infants was short gestation and low birth weight, while congenital malformation was the most common cause of death among White infants, Hispanic infants, and infants classified as 'Other' race/ethnicity, respectively. In 2015, the death rate due to short gestation and low birth weight among Black infants (19.2 deaths per 10,000 live births) was three to five times the rate among infants of all other racial/ethnic groups (3.5 to 7.3 deaths per 10,000 live births).

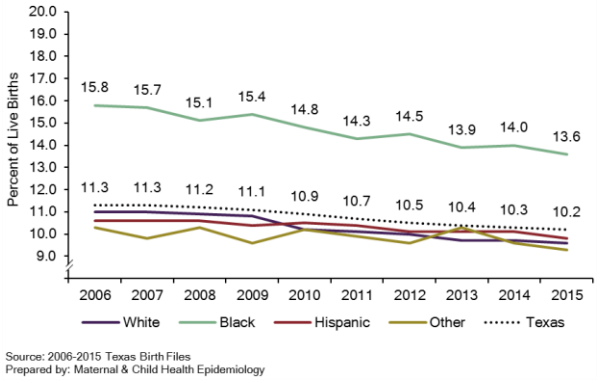
Based on 2011-2015 combined death files, congenital malformation topped the list as the leading cause of infant death across all PHRs in Texas. PHR 7 was the only region where SIDS did not make the top five leading causes of infant mortality. Other causes of infant death listed as top five leading causes in all PHRs included infections in the prenatal period, maternal complications of placenta, and neonatal

hemorrhage. PHR 11 was the only region where neonatal hemorrhage made the top five leading causes of infant death.

Preterm Birth

A preterm birth is one in which an infant is born before 37 weeks of gestation. Using the obstetric estimate of gestational age, 10.2 percent of all live births in Texas were delivered preterm in 2015, down from 11.3 percent in 2006. However, the preterm birth rate in Texas has consistently been higher than the national average over the past decade [23]. Based on 2016 preliminary birth data, the preterm birth rate increased slightly to 10.4 percent in Texas.

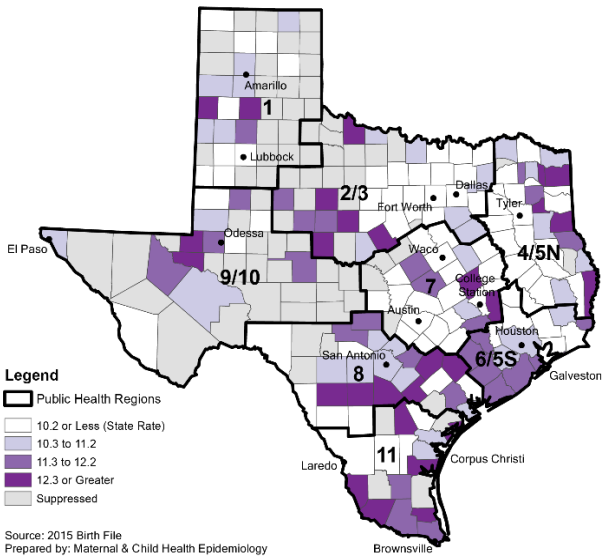
Figure 2.13
Percent of Live Births Born Preterm (Less Than 37 Weeks) in Texas by Race/Ethnicity Using Obstetric Estimate of Gestation, 2006-2015



Source: 2006-2015 Texas Birth Files
Prepared by: Maternal & Child Health Epidemiology

Racial/ethnic disparities exist in preterm birth rates. In 2015, Black infants (13.6 percent) had a higher preterm birth rate than did infants of any other racial/ethnic group (9.3 to 9.8 percent) (Figure 2.13). However, over the past decade, the preterm birth rate has decreased most rapidly among infants born to Black mothers, which has slightly narrowed the racial/ethnic gap in preterm birth rates.

Figure 2.14
Percent of Births That Were Preterm (Less Than 37 Weeks) Using Obstetric Estimate of Gestation, 2015



Source: 2015 Birth File
Prepared by: Maternal & Child Health Epidemiology

Geographic differences in preterm birth rates are observed. Among counties with 100 or more documented live births in 2015, many counties in the south and south coastal area of Texas had higher preterm birth rates than the state as a whole (Figure 2.14). By region, PHR 11 had the highest rate of preterm births (11.2 percent), while PHR 2/3 had the lowest rate of preterm births (9.1 percent) in 2015. On the other hand, from 2006 to 2015, PHR 1 had the largest decrease of 22.5 percent in preterm birth rates among all PHRs in Texas.

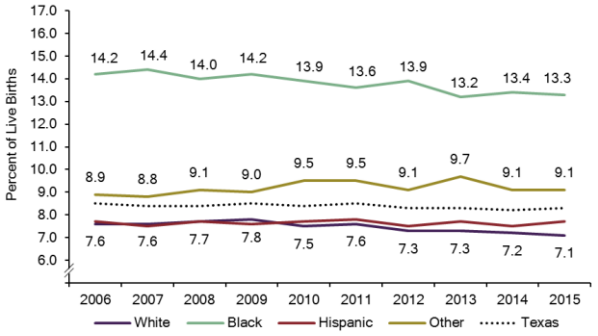
Low Birth Weight

Birth weight is another important factor associated with infants' mortality. Infants who have low birth weight (less than 2,500 grams) face infant mortality rates 25 times higher than that of their peers with birth weights of 2,500 grams or more [27]. In 2015, there were 33,288 low birth weight infants in Texas, which represented 8.3 percent of total live births. This rate was slightly higher than the national rate (8.1 percent), and did not meet the HP2020 target of 7.8 percent or fewer of all live births weighing less than 2,500 grams. The rate of low birth weight infants has not changed much since 2006, either in Texas or in the nation [23]. Based on 2016 preliminary birth data, the low birth weight rate was 8.4 percent in Texas.

As with IMRs and preterm births, Black mothers have a disproportionately high percentage of low birth weight infants. In 2015, the rate of low birth weight infants was 13.3 percent among Black mothers, compared with 9.1 percent among mothers of 'Other' race/ethnicity, 7.7 percent among Hispanic mothers, and 7.1 percent among White mothers (Figure 2.15). Over the past decade, low birth weight rates have decreased among Black infants and White infants, while rates have remained stable among Hispanic infants and infants of 'Other' race/ethnicity.

Figure 2.15

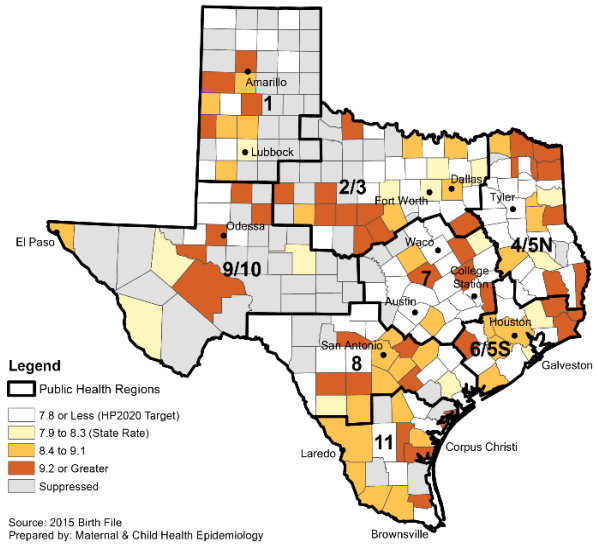
Percent of Live Births Born Low Birth Weight (Less Than 2500 g) in Texas by Race/Ethnicity, 2006-2015



Source: 2006-2015 Texas Birth Files
Prepared by: Maternal & Child Health Epidemiology

Figure 2.16

Percent of Infants Born Low Birth Weight (Less Than 2,500g), 2015



Source: 2015 Birth File
Prepared by: Maternal & Child Health Epidemiology

Rates of low birth weight infants vary across different areas of the state. In 2015, some counties met the HP2020 target of 7.8 percent or less for the percentage of low birth weight infants, but many counties did not (Figure 2.16). Counties with high percentages (9.2 percent or greater) of low birth weight infants were dispersed across the state. There were no clear geographic patterns for low birth weight rates across the state. In 2015, PHR 7 had the lowest rate of low birth weight infants among all Texas regions (7.6 percent), while PHR 8 had the highest rate (8.6 percent). Overall, the regional

differences in low birth weight rates were somewhat less pronounced than the regional differences in preterm birth rates. From 2006 to 2015, the low birth weight rate declined by 17.6 percent in PHR 1, whereas the low birth weight rate did not change much in other regions.

17P Prescription

Women who are at risk for a preterm birth are sometimes prescribed progesterone supplementation by her health care provider. The Texas PRAMS survey asks women, "During your most recent pregnancy, did a doctor, nurse, or other health care worker try to keep your new baby from being born too early by giving you a series of weekly shots of a medicine called Progesterone, Makena®, or 17P (17-alpha-hydroxyprogesterone)?" Based on statewide PRAMS data, trends in the prevalence of 17P use ranged from 4.8 percent (CI: 3.6-6.1) in 2009 to 5.6 percent (CI: 4.1-7.2) in 2015.

The prevalence rate of 17P use for White/Other women and Hispanic women has been similar to the statewide prevalence rate over time; however, the prevalence rate for Black women has traditionally been higher. In 2015, Black women had the highest prevalence rate of 17P use (6.2 percent, CI: 3.6-8.7), followed by Hispanic women (5.8 percent, CI: 3.1-8.5) and White/Other women (5.3 percent, CI: 3.3-7.3). The prevalence rate of 17P use among Black women has decreased from 10.3 percent (CI: 7.2-13.5) in 2014.

Among all PHRs in Texas, the pooled 2011-2015 PRAMS data revealed that PHR 1 had the highest rate of 17P use (8.1 percent, CI: 3.2-13.0) and PHR 7 had the lowest rate of 17P use (4.4 percent, CI: 2.7-6.0). Using pooled 2011-2015 data, the statewide prevalence rate of 17P use was 5.5 percent (CI: 4.8-6.2).

Health Care Coverage and Access

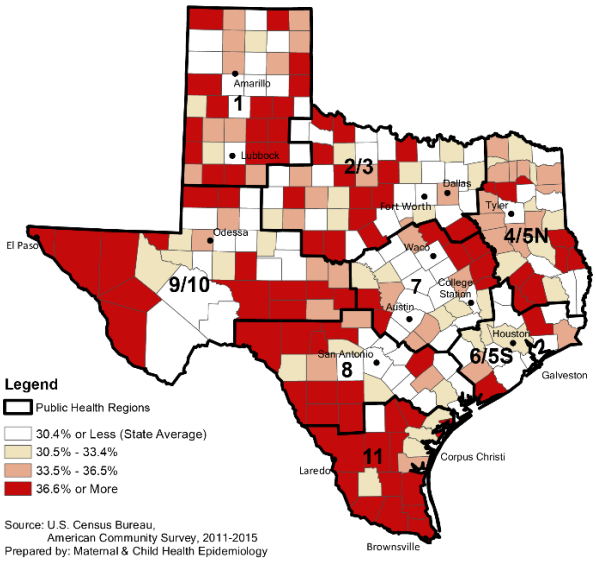
Health care coverage and access to health care are fundamental to the health of Texans. A major finding that emerged from the Title V stakeholder meetings was that limited access to health care was a widespread concern [22].

Health Insurance

Based on 2011-2015 Census ACS data, more than 5.36 million Texans did not have health insurance. Texas led the nation in the proportion of the total population without health insurance coverage in 2011-2015 (20.6 percent). The national uninsured rate was 13.0 percent. In terms of race/ethnicity, higher rates of uninsured were observed among Hispanics (31.9 percent), Blacks (18.3 percent), and Whites (11.8 percent) in Texas, compared with national rates (Hispanics, 25.8 percent; Blacks, 15.3 percent; Whites, 9.0 percent).

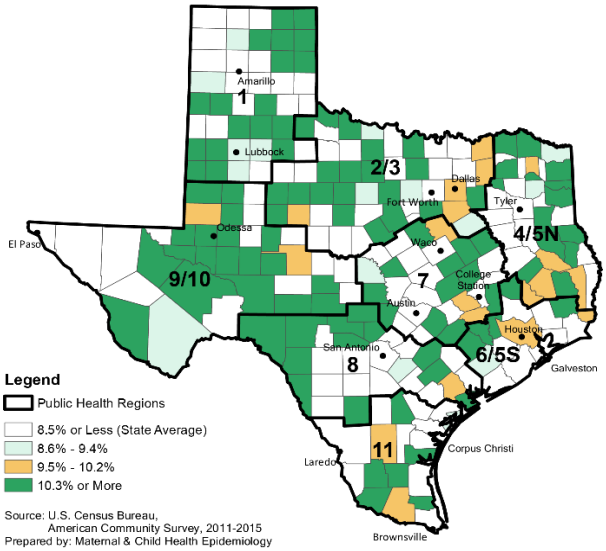
Texas also had higher proportions of uninsured women of reproductive age (ages 18-44) and uninsured children compared to the nation. About 30.4 percent of women aged 18-44 in Texas were uninsured in 2011-2015, compared to 18.7 percent nationwide. About 8.5 percent of children younger than 6 years old in Texas were uninsured, compared to 5.2 percent nationwide.

Figure 2.17
Percent of Females (18-44 Years) without Health Insurance, 2011-2015



Counties along the Texas-Mexico border as well as several counties outside Lubbock and Waco had high proportions (36.6 percent or more) of women aged 18-44 without health insurance (Figure 2.17). A few large counties (Houston, Dallas, Hidalgo, and El Paso counties) had higher rates of uninsured women of reproductive age than did the state as a whole. In terms of regional differences, the uninsured rate among women aged 18-44 ranged from 22.3 percent in PHR 7 to 47.4 percent in PHR 11.

Figure 2.18
Percent of Children Younger than 6 Years without Health Insurance, 2011-2015



On the other hand, counties with high proportions (10.3 percent or more) of uninsured children younger than 6 years old were concentrated in west Texas between Odessa and San Antonio, as well as in the Panhandle area (Figure 2.18). A few large counties (Harris, Dallas, and Hidalgo counties) had higher rates of uninsured children for this age group than did the state as a whole. In terms of regional differences, the uninsured rate among children younger than 6 years of age ranged from 6.8 percent in PHR 7 to 9.6 percent in PHR 9/10.

Health Professionals and Shortage Areas

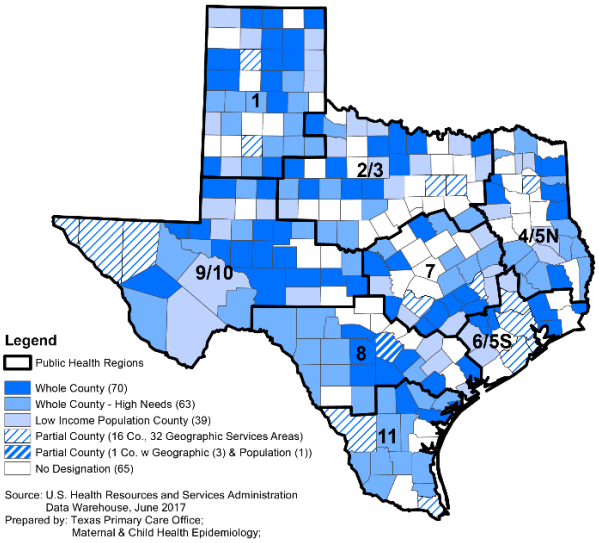
Given the size of the state and the vast distances between facilities for health services in rural areas, access to care in Texas can be a challenge. According to the most recent health professions data, there were 20,578 primary care physicians (PCPs) in Texas in 2016, with a density of 72.9 PCPs per 100,000 population [28]. Twenty-nine counties in Texas had no PCP in 2016. Overall, urban counties in the state (75.9 PCPs per 100,000 population) had better access to PCPs than the rural counties (49.4 PCPs per 100,000 population). By region, PHR 9/10 had the lowest density of 54.4 PCPs per 100,000 population and PHR 2/3 had the highest density of 78.0 PCPs per 100,000 population. Counties in the Panhandle, West Texas, and the Texas-Mexico border area typically had lower PCPs per 100,000 population.

There were 2,594 obstetrics and/or gynecology specialists (OB/GYNs) in Texas, with a density of 18.3 OB/GYNs per 100,000 females in the population. A little over 58 percent of the counties in Texas (148 counties) had no OB/GYN in 2016. Overall, the OB/GYN density in urban counties (19.4 OB/GYNs per 100,000 females) was two times as high as that in rural counties (9.1 OB/GYNs per 100,000 females). In terms of regional differences, PHR 11 had the lowest density of 13.5 OB/GYNs per 100,000 females, and PHR 6/5S had the highest density of 20.8 OB/GYNs per 100,000 females.

Health Professional Shortage Areas (HPSAs) are designated by employing a ratio of population to PCPs to determine whether or not an area has a shortage of physicians. The ratio threshold is 3,500:1 and is reduced to 3,000:1 in areas with high needs, such as at least 20 percent of population below poverty level or more than 20 infant deaths per 1,000 live births [29]. Areas that exceed these ratios may

qualify for designation as HPSAs. Other factors, such as time/distance to nearest source of care and population composition, are also included in the federal HPSA criteria. As of September 2017, over 34 percent of Texans had unmet primary care needs based on the primary care HPSA ratios [30].

Figure 2.19
Texas Primary Care Health Professional Shortage Areas, June 2017

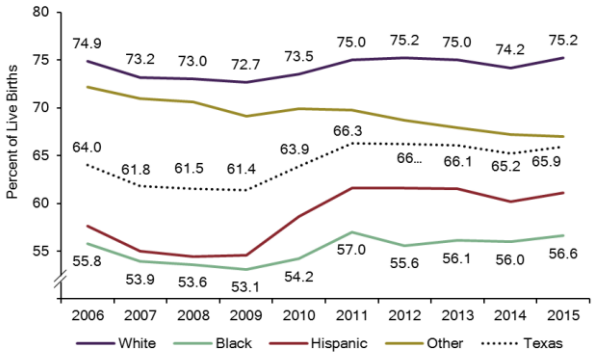


Recruiting and retaining health professionals is an ongoing challenge not only in rural areas, but in some urban areas as well. In rural areas, retention of health professionals is mostly due to population size, but in some urban areas, access is limited because many providers do not accept Medicaid or patients are not enrolled in Medicaid and unable to pay out-of-pocket. Most counties in Texas are designated as either a whole-county or a partial-county HPSA (Figure 2.19). A little over 25 percent of Texas counties (65 counties) were *not* designated as a geographic or population HPSA as of June 2017.

Prenatal Care in the First Trimester

The HP2020 target is to increase the proportion of pregnant women who receive prenatal care beginning in the first trimester of pregnancy to 77.9 percent. Texas, as a whole, is not meeting this target percentage. In 2015, about 65.9 percent of mothers in the state entered prenatal care within the first trimester (Figure 2.20). The 2016 preliminary birth data showed a small decrease in timely access to prenatal care to 65.1 percent in Texas [23].

Figure 2.20
Percent of Live Births Where Mother Received Prenatal Care in the First Trimester, 2006-2015

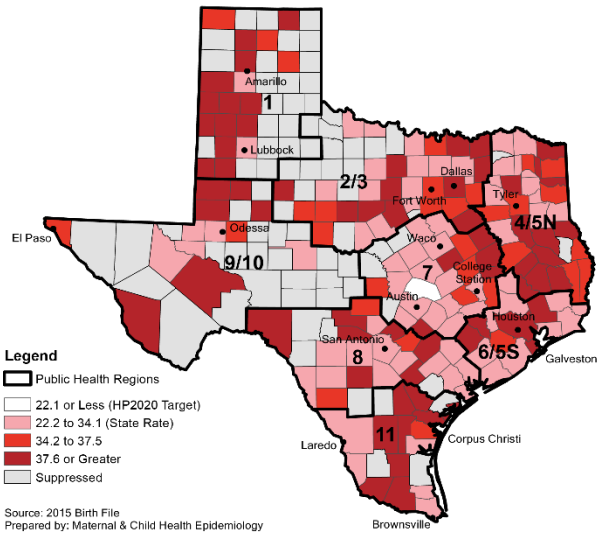


Source: 2006-2015 Birth Files
Prepared by: Maternal & Child Health Epidemiology

Disparities in timely prenatal care access exist among different racial/ethnic groups. A larger proportion of White women begin receiving prenatal care in the first trimester of pregnancy, compared with all other racial/ethnic groups. In 2015, 75.2 percent of White mothers reported receiving prenatal care in the first trimester of pregnancy, compared with 56.6 percent of Black mothers, 61.1 percent of Hispanic mothers, and 67.0

percent of mothers classified as 'Other' race/ethnicity. Timely access to prenatal care increased in Texas from 2009 to 2011 (mostly driven by a sharp increase in the percentage of Hispanic mothers receiving prenatal care in the first trimester during this timeframe), but has decreased slightly since 2011. Unlike other racial/ethnic groups, mothers of 'Other' race/ethnicity showed a continuous decrease in timely access to prenatal care from 2006 to 2015.

Figure 2.21
Percent of Live Births Where the Mother Did Not Receive Prenatal Care in the First Trimester, 2015



Late entry into prenatal care is a statewide problem. Among counties with 100 or more documented live births in 2015, only one urban county (Williamson County, in central Texas) met the HP2020 target percentage of women entering prenatal care in the first trimester (Figure 2.21). High proportions (37.6 percent or greater) of women not receiving prenatal care in the first trimester were concentrated mostly in East Texas, South Texas, and west of Lubbock and Amarillo in the Panhandle. In 2015, PHR 7 had the lowest proportion of mothers who did not receive prenatal care within the first trimester of pregnancy (25.9 percent), whereas PHR 11 had the highest proportion (37.1 percent). From 2006 to 2015, decreases in late entry into prenatal care were observed in most regions, except for PHR 6/5S and PHR 8.

Prenatal Care as Early as Wanted

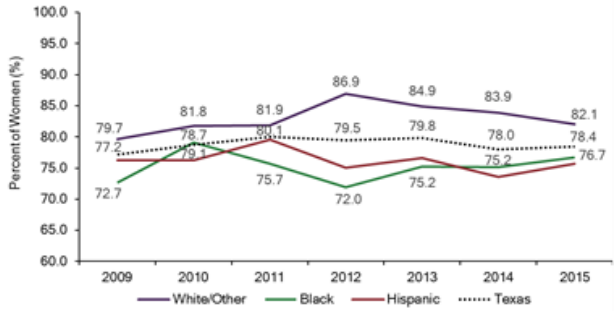
Early prenatal care allows for early and timely treatment that can help manage or prevent health problems. The PRAMS survey asks women, "Did you get prenatal care as early in your pregnancy as you wanted?" Based on statewide PRAMS data, trends in the prevalence of prenatal care as early as the mother wanted increased only slightly, from 77.2 percent (CI: 74.5-79.8) in 2009 to 78.4 percent (CI: 75.5-81.4) in 2015.

The prevalence rate among White/Other women in Texas has been consistently higher than the statewide prevalence rate over time, compared with the prevalence rates among Black and Hispanic women which have been lower (Figure 2.22). In 2015, White/Other women had the highest rate of obtaining prenatal care as early

as they wanted (82.1 percent, CI: 78.4-85.8), compared with Black women (76.7 percent, CI: 72.4-81.1) and Hispanic women (75.7 percent, CI: 70.6-80.9).

Figure 2.22

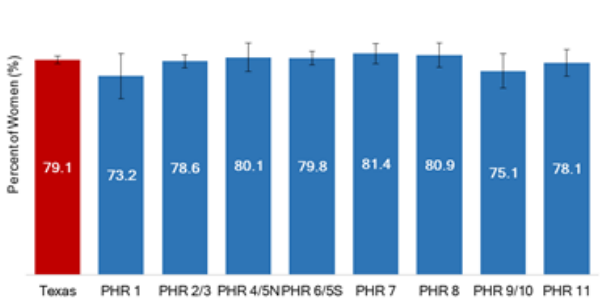
Percent of Women Reporting Prenatal Care as Early as Wanted by Race/Ethnicity, 2009-2015



Source: 2009-2015 Texas PRAMS
Prepared by: Maternal & Child Health Epidemiology

Figure 2.23

Percent of Women Reporting Prenatal Care as Early as Wanted by Public Health Region (PHR), 2011-2015



Source: Texas PRAMS, Combined 2011-2015
Prepared by: Maternal & Child Health Epidemiology

Based on pooled 2011-2015 PRAMS data, PHR 7 and PHR 8 had the highest rate of obtaining prenatal care as early as they wanted (81.4 percent, CI: 77.8-85.1 and 80.9 percent, CI: 76.5-85.4, respectively) (Figure 2.23). On the other hand, PHR 1 had the lowest rate (73.2 percent, CI: 64.9-81.4) among all PHRs in Texas. Using pooled 2011-2015 data, the statewide prevalence rate of receiving prenatal care as early as they wanted was 79.1 percent (CI: 77.8-80.5).

Barriers to Prenatal Care

Understanding the barriers women experience related to prenatal care is also important because women who experience late or no prenatal care are at higher risk for pregnancy complications and health problems. Women who indicated they did not get prenatal care as early as they wanted in the PRAMS survey were then asked a series of questions about barriers and obstacles, "Did any of these things keep you from getting prenatal care when you wanted it?"

The survey questions included the following: a) I couldn't get an appointment when I wanted one; b) I didn't have enough money or insurance to pay for my visits; c) I didn't have any transportation to get to the clinic or doctor's office; d) The doctor or my health plan would not start care as early as I wanted; e) I had too many other things going on; f) I couldn't take time off from work or school; g) I didn't have my Medicaid or Texas Health Steps card; h) I didn't have anyone to take care of my children; i) I didn't know that I was pregnant; and j) I didn't want anyone else to know I was pregnant.

Based on pooled 2011-2015 PRAMS data, 20.9 percent (CI: 19.5-22.2) of women in Texas did not receive prenatal care as early as they wanted, and the five most frequently noted barriers were:

1) I didn't have my Medicaid or Texas Health Steps card;

2) I didn't have enough money or insurance to pay for my visits;
3) I didn't know that I was pregnant;
4) I couldn't get an appointment when I wanted one; and
5) The doctor or my health plan would not start care as early as I wanted.

Barriers to Maternal & Child Health Services

Many Texans face significant barriers to accessing health care. Stakeholder feedback and identification of the needs and challenges, however, can lead to policy improvements and strategic planning initiatives for improving access across the state.

As part of the DSHS 2015 Title V Needs Assessment, a report that is submitted every five years under the Maternal and Child Health (MCH) Block Grant program, qualitative information on community needs was gathered through focus groups and stakeholder meetings [22]. In the summer of 2014, SUMA Social Marketing, Inc. (SUMA) conducted 16 focus groups statewide to gather qualitative data on the health needs of mothers, men, children, and youth in various communities. Twelve of the focus groups were held with women between the ages of 19 and 30 who had at least one child three years of age or younger. An additional four focus groups (in San Antonio and San Angelo) were held with men between the ages of 19 and 30 who worked in the oil and gas field or in an industrial environment. SUMA also facilitated eight meetings across the state with providers and other stakeholders to gather their perceptions of the needs of the clients and patients they served.

A central theme that emerged from the stakeholder meetings and focus groups was the need to improve access to a variety of health care services; this was a priority need in most regions in the state. Stakeholders enumerated many different types of factors that they believed limited access to health care. The main barriers were the inability to pay, undocumented status, a shortage of primary care providers and specialists, and a limited number of Medicaid providers. Other causes of limited access included lack of awareness of available services, lack of transportation, lack of culturally-sensitive providers, and difficulty of navigating affordable insurance/Medicaid system. For pregnant women, the delays in establishing eligibility for Medicaid prevented them from accessing prenatal care services earlier. In addition to limited access to health care, obesity and diabetes were also identified as top health care concerns statewide.

A number of the focus groups identified areas that, if better funded, could potentially improve access to health care services: health education for parents and children, case management and other forms of support in navigating the system, improved coordination and collaboration among providers, better continuity of care, and a shift to a focus on the whole person across the life course.

Maternal Health

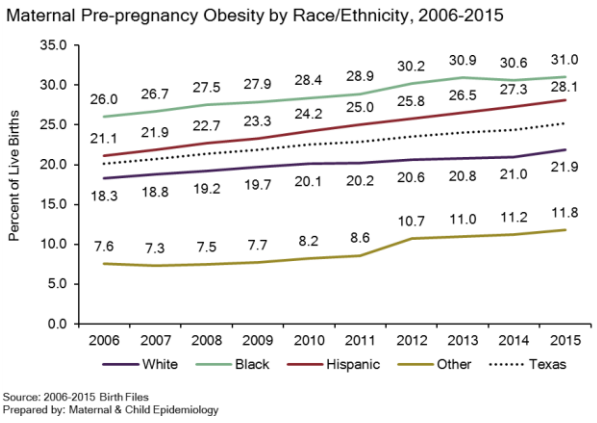
To reduce infant mortality and improve infant health outcomes, it's very important to understand and assess the maternal health before, during, and after pregnancy. Selected maternal indicators are discussed, including obesity, hypertension & diabetes, smoking, drinking, physical abuse, postpartum depression, and postpartum checkup. Statewide information regarding maternal mortality and morbidity are also included in the section.

Pre-Pregnancy Obesity

Obesity among women of reproductive age is of great concern, becase of its association with multiple adverse maternal and infant health outcomes. A recent study has found that pre-pregnancy obesity is strongly related to infant mortality, and deaths from congenital anomalies and SIDS are much higher among babies born to obese mothers than to mothers with normal pre-pregnancy weights [31]. Obesity is also a well-established risk factor for a variety of pregnancy and birth complications, including gestational diabetes, preeclampsia, miscarriage, and cesarean delivery [32, 33].

A rise in pre-pregnancy obesity has been observed over time, both in Texas and in other states [34]. The statewide proportion of mothers with a pre-pregnancy body mass index (BMI) in the obese range increased from 20.1 precent in 2006 to 25.2 percent in 2015. Based on 2016 preliminary birth data, the pre-pregnancy obsesity rates continued to increase to 25.9 percent in Texas [23].

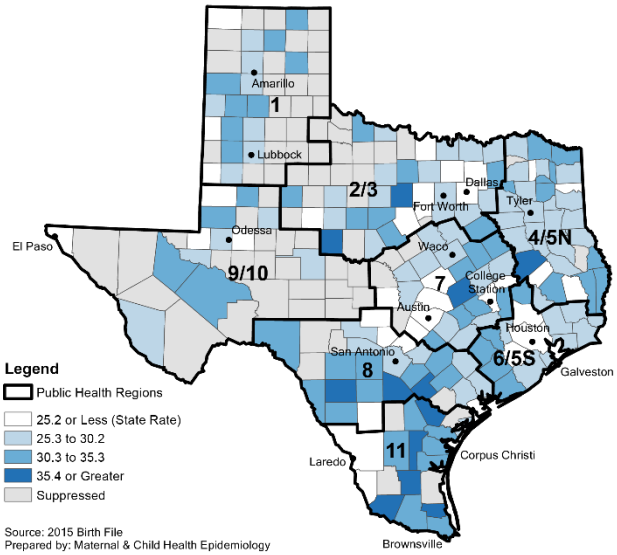
Figure 2.24



Source: 2006-2015 Birth Files
Prepared by: Maternal & Child Epidemiology

Black and Hispanic mothers had higher percentages of obesity before pregnancy than did White mothers and mothers of 'Other' race/ethnicity (Figure 2.24). In 2015, pre-pregnancy obesity was almost three times more prevalent among Black mothers (31.0 percent) than among mothers of 'Other' race/ethnicity (11.8 percent). However, since 2006, the pre-pregnancy obesity rate in Texas has increased most sharply among mothers of 'Other' race/ethncity (a 55.3 percent increase). Hispanic mothers have also seen a relatively large increase in pre-pregnancy obesity between 2006 and 2015 (a 33.2 percent increase among Hispanic mothers, compared with increases of 19.7 percent and 19.2 percent among White and Black mothers, respectively).

Figure 2.25
Percent of Live Births Where the Mother was Obese, 2015



Many rural and suburban counties in Texas have higher pre-pregnancy obesity rates than the state as a whole. In 2015, a few counties in the southern area had high rates of pre-pregnancy obesity (35.4 percent or greater), when compared to the rest of the state (Figure 2.25). Overall, mothers in rural counties in the state (30.3 percent) experienced a higher rate of pre-pregnancy obesity than their urban counterparts (24.6 percent). In 2015, PHR 2/3 had the lowest rate of pre-pregancy obesity (22.1 percent), while PHR 11 had the highest rate of pre-pregnancy obesity (30.4 percent). From 2006 to 2015, increases in pre-pregnancy obesity rates were observed among all regions in Texas. Of particular note, the pre-pregancy obesity rate has increased substantially in PHR 2/3 by almost one-third over the past decade.

Maternal Hypertension & Diabetes

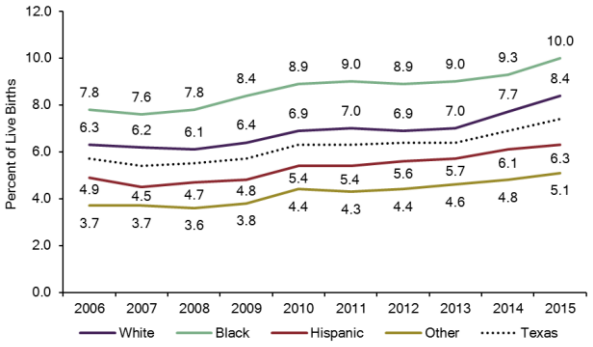
Hypertension (high blood pressure) and diabetes are two common medical problems encountered during pregnancy. Babies born to women with diabetes are at an increased risk for a variety of complications, including preterm birth, low blood sugar, respiratory distress syndrome, and birth injury [35]. Hypertensive related pregnancy complications can lead to fetal growth retardation, fetal death, and maternal mortality and morbidity [36]. Hypertension/eclampsia is a diagnosis closely related to severe maternal morbidity, and a leading cause of maternal death for Black women in Texas [37].

According to 2015 birth certificate data, 7.4 percent of all live births in Texas were to mothers with some form of hypertension, and 5.5 percent of all live births were to mothers who had diabetes (these mothers either had hypertension or diabetes pre-pregnancy, or developed the condition over the course of the pregnancy). Rates of both maternal hypertension and maternal diabetes have increased since 2006 (Figure 2.26 & Figure 2.27). Based on 2016 preliminary birth data, the maternal hypertension rate was 7.5 percent and the maternal diabetes rate was 5.7 percent in Texas [23].

Both maternal hypertension and diabetes rates vary by race/ethnicity. Of all racial/ethnic groups, Black mothers followed by White mothers have the highest

Figure 2.26

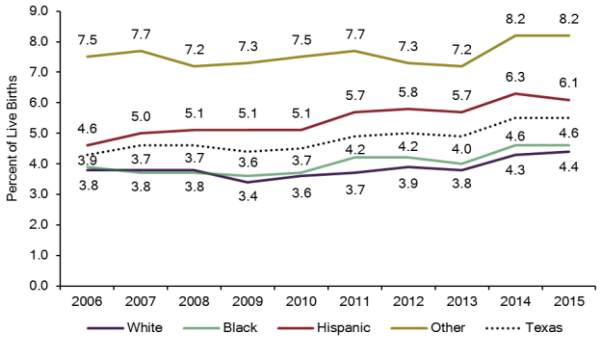
Rates of Maternal Hypertension by Race/Ethnicity, 2006-2015



Source: 2006-2015 Birth Files
Prepared by: Maternal & Child Epidemiology

Figure 2.27

Rates of Maternal Diabetes by Race/Ethnicity, 2006-2015



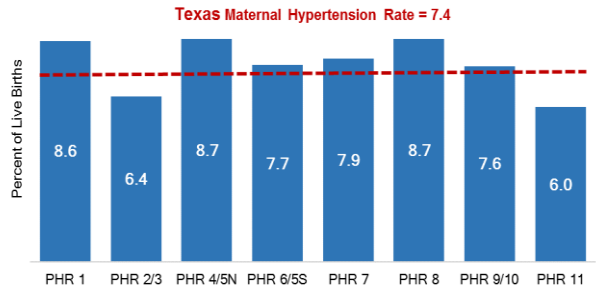
Source: 2006-2015 Birth Files
Prepared by: Maternal & Child Epidemiology

percentages of maternal hypertension over time, while mothers of 'Other' race/ethnicity followed by Hispanic mothers have the highest percentages of maternal diabetes. From 2006 to 2015, the maternal hypertension rate among Black mothers was 1.9 to 2.2 times that of mothers of 'Other' race/ethnicity, who were least likely to have diagnosed hypertension before and/or during pregnancy (Figure 2.26). In 2015, the maternal diabetes rate was 8.2 percent among mothers of 'Other' race/ethnicity, 6.1 percent among Hispanic mothers, 4.6 percent among Black mothers, and 4.4 percent among White mothers (Figure 2.27).

Among all PHRs in Texas, both PHR 4/5N and PHR 8 had the highest rates of maternal hypertension in 2015 (8.7 percent), while PHR 11 had the lowest rate of maternal hypertension (6.0 percent) (Figure 2.28). On the other hand, PHR 1 had the highest percentage of live births to mothers with diabetes (7.4 percent), while PHR 9/10 had the lowest percentage (3.8 percent) (Figure 2.29). Overall, mothers in rural counties (8.1 percent) experienced a higher prevalence of maternal hypertension than their urban counterparts (7.3 percent). Statewide, small urban/rural differences were observed in the prevalence of maternal diabetes.

Figure 2.28

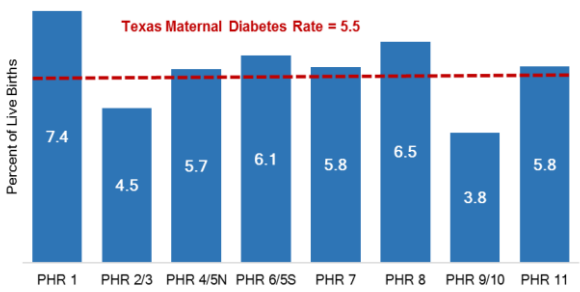
Percent of Live Births Where the Mother had Hypertension by Public Health Region (PHR), 2015



Source: 2015 Texas Birth File
Prepared by: Maternal & Child Health Epidemiology

Figure 2.29

Percent of Live Births Where the Mother had Diabetes by Public Health Region (PHR), 2015



Source: 2015 Texas Birth File
Prepared by: Maternal & Child Health Epidemiology

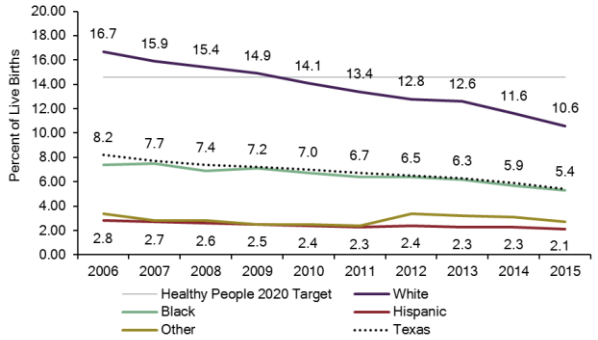
As mentioned earlier, pre-pregnancy obesity is associated with both hypertension and diabetes during pregnancy [32, 33]. In 2015, 20.7 percent of all mothers in Texas with pre-pregnancy obesity also had hypertension, diabetes, or both conditions. In contrast, 7.2 percent of mothers with normal pre-pregnancy BMI were hypertensive, diabetic, or had both conditions.

Maternal Smoking

Women and their offspring face additional health risks if women smoke cigarettes during pregnancy, as smoking increases the risk of low birthweight, prematurity, placenta previa, placental abruption, and SIDS [38]. Texas is one of the better performing states when it comes to maternal smoking before and during pregnancy [39].

Figure 2.30

Percent of Live Births Where the Mother Smoked Cigarettes 3 Months Before Pregnancy, 2006-2015

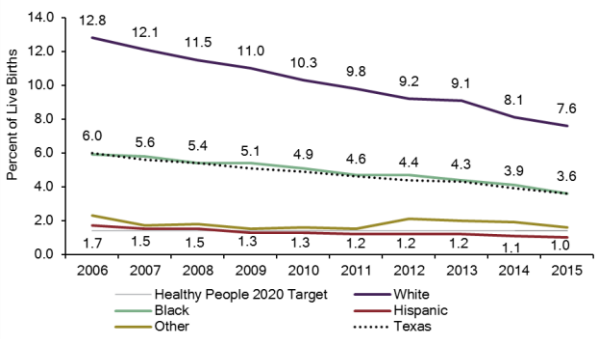


Source: 2006-2015 Birth Files
Prepared by: Maternal & Child Health Epidemiology

In Texas, the reported rate of smoking three months before pregnancy has decreased from 8.2 percent in 2006 to 5.4 percent in 2015 (Figure 2.30). This rate is better than the HP2020 target of 14.6 percent. All racial/ethnic groups in the state have met the HP2020 target rate since 2010. Part of the reason for the low maternal smoking rate in the state is because of a large number of births to Hispanic women – about 47.4 percent of all births in Texas were to Hispanic women in 2015. Overall, Hispanic women have a lower prevalence of smoking before pregnancy than women of all other races/ethnicities in Texas. In 2015, only 2.1 percent of Hispanic women and 2.7 percent of women of 'Other' race/ethnicity smoked three months prior to becoming pregnant, compared with 5.3 percent of Black women and 10.6 percent of White women.

Figure 2.31

Percent of Live Births Where the Mother Smoked Cigarettes During Pregnancy, 2006-2015



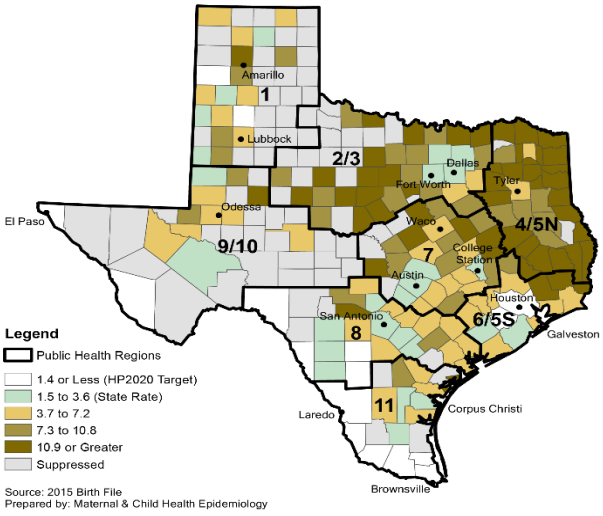
Source: 2006-2015 Birth Files
Prepared by: Maternal & Child Health Epidemiology

Hispanic women and women of 'Other' race/ethnicity also have the lowest prevalence of smoking during pregnancy over time (Figure 2.31). In 2015, only Hispanic women (1.0 percent) were meeting the HP2020 target of at least 98.6 percent abstinence from smoking during pregnancy in Texas. Based on 2016 preliminary birth data, both Hispanic women (1.0 percent) and women of 'Other' race/ethnicity (1.3

percent) were meeting the HP2020 target rate [23]. While the overall proportion of women who smoke during pregnancy has decreased by two-fifths in Texas from 2006 (6.0 percent) to 2015 (3.6 percent), there is still room for improvement, especially among White women.

In 2007, 29.2 percent of women who smoked three months prior to pregnancy abstained from smoking (did not smoke at all) once becoming pregnant. In 2015, this rate of total abstinence from smoking during pregnancy among previous smokers increased to 35.2 percent [23].

Figure 2.32
Percent of Live Births Where the Mother Smoked During Pregnancy, 2015



Geographic differences in rates of smoking during pregnancy exist across the state. In 2015, counties near the Texas-Mexico border generally had lower rates of smoking during pregnancy, while higher rates of smoking during pregnancy were seen in many counties in East and North Texas (Figure 2.32). By region, PHR 4/5N had the highest rate of smoking during pregnancy in 2015 (12.1 percent), followed by PHR 1 (7.5 percent) and PHR 7 (4.3 percent). PHR 11 had the lowest rate (1.1 percent) and was the only region meeting the HP2020 target of at least 98.6 percent abstinence from smoking during pregnancy. From 2006 to 2015, all regions in Texas had dramatic declines in the prevalence of smoking during pregnancy.

Drinking During Pregnancy

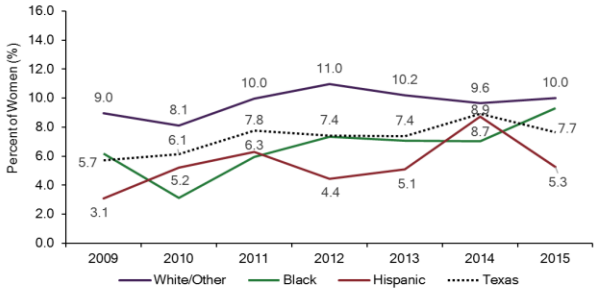
Alcohol use during pregnancy has been associated with several adverse outcomes for the baby, including Fetal Alcohol Syndrome (FAS) and other Fetal Alcohol Spectrum Disorders (FASD), birth defects, and low birth weight [40]. The PRAMS survey asks women, "During the last 3 months of your pregnancy, how many alcoholic drinks did you have in an average week?" According to CDC, the definition of "drinking" is someone who has any amount of alcohol during an average week. Based on statewide PRAMS data, trends in the prevalence of drinking in the last three months of pregnancy ranged from 5.7 percent (CI: 4.4-7.0) in 2009 to 7.7 percent (CI: 6.0-9.4) in 2015.

The prevalence rate of drinking in the last three months of pregnancy among Hispanic women and Black women in Texas has been generally below the statewide

prevalence rate over time, with White/Other women demonstrating the highest prevalence rate (Figure 2.33). In 2015, White/Other women had the highest rate of drinking in the last three months of pregnancy (10.0 percent, CI: 7.2-12.8), followed by Black women (9.3 percent, CI: 6.3-12.3) and Hispanic women (5.3 percent, CI: 2.7-7.8). For Black women, the 2015 prevalence rate of drinking in the last three months of pregnancy surpassed the statewide prevalence rate for the first time since 2010.

Figure 2.33

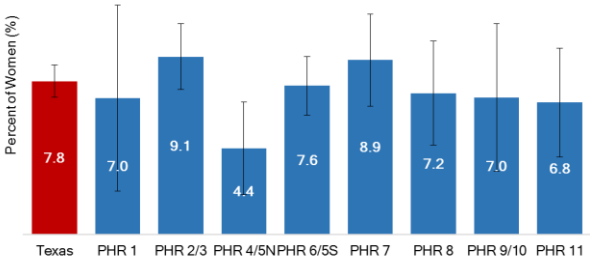
Percent of Women Reporting Drinking in the Last Three Months of Pregnancy by Race/Ethnicity, 2009-2015



Source: 2009-2015 Texas PRAMS
Prepared by: Maternal & Child Health Epidemiology

Figure 2.34

Percent of Women Reporting Drinking in the Last Three Months of Pregnancy by Public Health Region (PHR), 2011-2015



Source: Texas PRAMS, Combined 2011-2015
Prepared by: Maternal & Child Health

There are regional differences in the prevalence of drinking during pregnancy. Based on pooled 2011-2015 PRAMS data, both PHR 2/3 (9.1 percent, CI: 7.4-10.8) and PHR 7 (8.9 percent, CI: 6.6-11.3) had the highest rate of drinking in the last three months of pregnancy, while PHR 4/5N (4.4 percent, CI: 2.1-6.8) had the lowest rate of drinking in the last three months of pregnancy (Figure 2.34). Using pooled 2011-2015 data, the statewide prevalence rate was 7.8 percent (CI: 7.0-8.7).

Physical Abuse Before/During Pregnancy

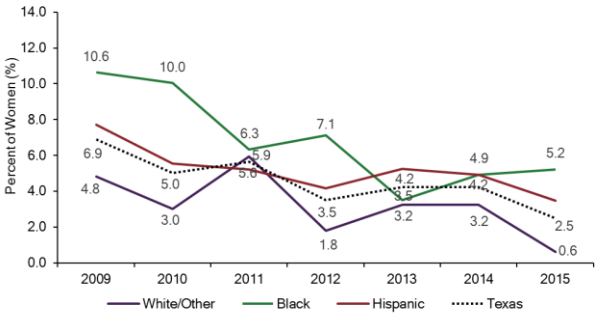
Physical abuse before and/or during pregnancy has been associated with adverse outcomes for the mother and the infant. The PRAMS survey asks women: "During the 12 months before you got pregnant with your new baby, did your husband or partner push, hit, slap, kick, choke, or physically hurt you in any other way?" and "During your most recent pregnancy, did your husband or partner push, hit, slap, kick, choke, or physically hurt you in any other way?"

Women who answered "yes" to one or both of the questions above were considered as having experienced physical abuse by a husband or partner before and/or during pregnancy. Women under the age of 18 were not asked questions on abuse. Based on statewide PRAMS data, trends in the prevalence of physical abuse before and/or during pregnancy ranged from 6.9 percent (CI: 5.2-8.5) in 2009 to 2.5 percent (CI: 1.4-3.6) in 2015.

The prevalence rate of physical abuse before and/or during pregnancy among Black women and Hispanic women in Texas has been generally higher than the statewide prevalence rate over time, with White/Other women demonstrating the lowest prevalence rate (Figure 2.35). In 2015, Black women reported the highest rate of physical abuse before and/or during pregnancy (5.2 percent, CI: 2.9-7.5), followed by Hispanic women (3.5 percent, CI: 1.4-5.5) and White/Other women (0.6 percent, CI: 0.0-1.4).

Figure 2.35

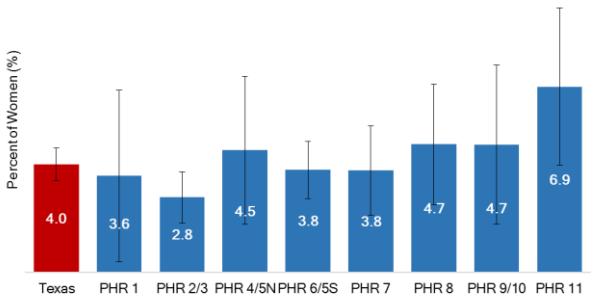
Percent of Women Reporting Physical Abuse Before or/and During Pregnancy by Race/Ethnicity, 2009-2015



Source: 2009-2015 Texas PRAMS
Prepared by: Maternal & Child Health Epidemiology

Figure 2.36

Percent of Women Reporting Physical Abuse Before or/and During Pregnancy by Public Health Region (PHR), 2011-2015



Source: Texas PRAMS, Combined 2011-2015
Prepared by: Maternal & Child Health Epidemiology

Based on pooled 2011-2015 PRAMS data, PHR 11 had the highest rate of physical abuse before and/or during pregnancy (6.9 percent, CI: 4.0-9.8), while PHR 2/3 had the lowest rate of abuse before and/or during pregnancy (2.8 percent, CI: 1.8-3.7) (Figure 2.36). Using pooled 2011-2015 data, the statewide prevalence rate was 4.0 percent (CI: 3.4-4.6).

Postpartum Depression

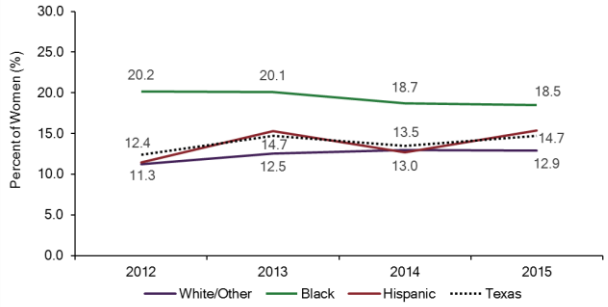
Postpartum depression (PPD) is a type of clinical depression that is thought to affect 10-15 percent of women after childbirth [41]. CDC provides the participating PRAMS states an indicator of PPD symptoms based on these two questions: "Since your new baby was born, how often have you felt down, depressed, or hopeless?" and "Since your new baby was born, how often have you had little interest or little pleasure in doing things?" These two questions asking about PPD symptoms were included on the 2012-2015 Texas PRAMS survey. Based on statewide PRAMS data, trends in the prevalence of PPD symptoms ranged from 12.4 percent (CI: 9.8-15.0) in 2012 to 14.7 percent (CI: 12.3-17.2) in 2015.

The prevalence rate for PPD symptoms among White/Other women and Hispanic women in Texas has been generally below the statewide prevalence rate over time, with Black women demonstrating the highest prevalence rate (Figure 2.37). In 2015, Black women had the highest rate of PPD symptoms (18.5 percent, CI: 14.4-

22.5), followed by Hispanic women (15.4 percent, CI: 11.2-19.6) and White/Other women (12.9 percent, CI: 9.6-16.1).

Figure 2.37

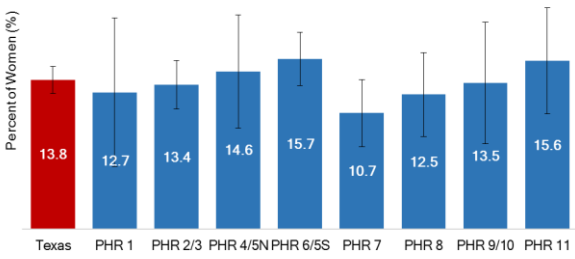
Percent of Women Reporting Postpartum Depression Symptoms by Race/Ethnicity, 2012-2015



Source: 2012-2015 Texas PRAMS
Prepared by: Maternal & Child Health Epidemiology

Figure 2.38

Percent of Women Reporting Postpartum Depression Symptoms by Public Health Region (PHR), 2012-2015



Source: Texas PRAMS, Combined 2012-2015
Prepared by: Maternal & Child Health Epidemiology

Regional differences in the prevalence of PPD symptoms are observed in Texas. Based on pooled 2012-2015 PRAMS data, both PHR 6/5S and PHR 11 had the highest rate of PPD symptoms (15.7 percent, CI: 13.3-18.2 and 15.6 percent, CI: 10.7-20.5, respectively), while PHR 7 had the lowest rate of PPD symptoms (10.7 percent, CI: 7.6-13.8) (Figure 2.38). Using pooled 2012-2015 data, the statewide prevalence rate was 13.8 percent (CI: 12.6-15.1).

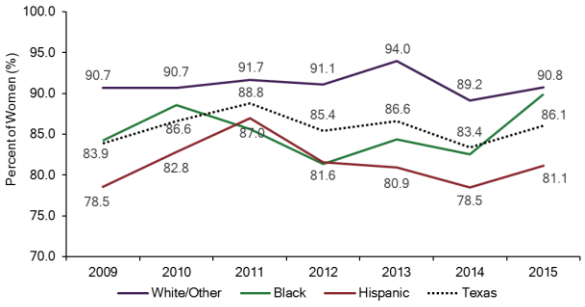
Postpartum Checkup

Postpartum visits are important for screening and assessing the health of the mother. The PRAMS survey asks women, "Since your new baby was born, have you had a postpartum checkup for yourself? A postpartum checkup is the regular checkup a woman has about 4-6 weeks after she gives birth." Based on Texas PRAMS data, trends in the statewide prevalence of a postpartum checkup ranged from 83.9 percent (CI: 81.5-86.3) in 2009 to 86.1 percent (CI: 83.6-88.5) in 2015.

The prevalence rate of postpartum checkup among Hispanic women and Black women in Texas has been generally below the statewide prevalence rate over time, with White/Other women demonstrating the highest prevalence rate (Figure 2.39).

Figure 2.39

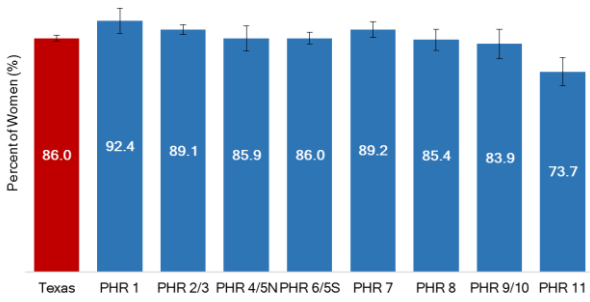
Percent of Women Reporting Postpartum Checkup by Race/Ethnicity, 2009-2015



Source: 2009-2015 Texas PRAMS
Prepared by: Maternal & Child Health Epidemiology

Figure 2.40

Percent of Women Reporting Postpartum Checkup by Public Health Region (PHR), 2011-2015



Source: Texas PRAMS, Combined 2011-2015
Prepared by: Maternal & Child Health Epidemiology

In 2015, White/Other women had the highest postpartum visit rate (90.8 percent, CI: 88.0-93.5), followed by Black women (89.9 percent, CI: 86.7-93.1) and Hispanic women (81.1 percent, CI: 76.6-85.7).

Regional differences also exist in the prevalence rate of postpartum visits. Based on pooled 2011-2015 PRAMS data, PHR 1 had the highest postpartum visit rate (92.4 percent, CI: 87.7-97.1), whereas PHR 11 had the lowest postpartum visit rate (73.7 percent, CI: 68.4-78.9) (Figure 2.40). Using pooled 2011-2015 data, the statewide prevalence rate of postpartum visits was 86.0 percent (CI: 84.9-87.2).

Maternal Mortality & Morbidity

Maternal mortality and morbidity are important indicators of the quality of health and healthcare in a population. Recent trends in maternal mortality and severe maternal morbidity are discussed in this section.

Maternal Mortality

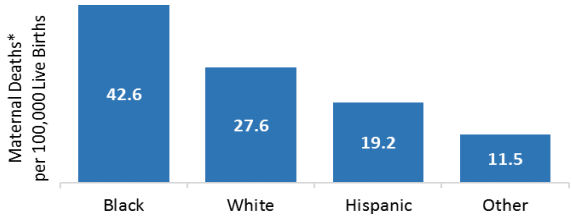
The death of a mother is an immeasurable loss for her children and family. In this report, maternal death is defined as the death of a woman while pregnant or within 365 days of the end of a pregnancy from causes associated with or aggravated by the pregnancy [42].

The maternal mortality rate (MMR) is the number of maternal deaths while pregnant or within 42 days of the end of pregnancy for every 100,000 live births. Compared to the other 49 states and District of Columbia, Texas ranked 44th in the nation for overall MMR for the combined years 2005-2014 [43]. Maternal mortality rates have been increasing in Texas and in the United States over the past decade. This increase could be partly attributed to rising rates of chronic health conditions, such as hypertension, diabetes, and chronic heart disease [44]. However, some research suggests that recent observed increases in MMR may be due to changes in medical coding, changes in surveillance, and data error on death certificates [45, 46].

Because the majority of maternal deaths occur after 42 days postpartum, the rest of the maternal death statistics shown focus on numbers and corresponding rates of maternal death while pregnant or within 365 days of the end of pregnancy. Also, because of potential data issues associated with identifying maternal deaths using death certificate data alone [46], only confirmed maternal deaths were used to calculate these maternal death rates. Maternal deaths were confirmed by matching each woman's death record with a birth or fetal death event within 365 days. In Texas, there were 382 confirmed maternal deaths in the four-year period between 2012 and 2015.

Figure 2.41

Rate of Maternal Death in Texas by Race/Ethnicity, 2012-2015



*Confirmed maternal deaths occurring while pregnant or within 365 days of end of pregnancy.
Source: 2012-2015 Death Files, 2011-2015 Live Birth and Fetal Death Files
Prepared by: Maternal & Child Health Epidemiology

For the combined years 2012-2015, the rate of maternal death among Black mothers (42.6 per 100,000 live births) was 1.5 times higher than the rate among White mothers (27.6 per 100,000 live births) and 2.2 times higher than the rate among Hispanic mothers (19.2 per 100,000 live births) (Figure 2.41).

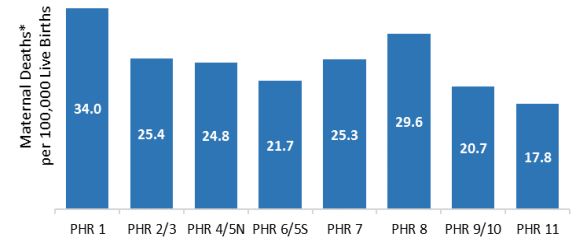
Mothers aged 40 years and older had the highest maternal death rate of all age groups, at 55.0 maternal deaths per 100,000 live births. Higher rates of maternal death were also observed among women with diabetes (39.9 per 100,000 live births), hypertension (56.3 per 100,000 live births), and pre-pregnancy obesity (29.2 per 100,000 live births), as well as among women who smoked during pregnancy (86.0 per 100,000 live births).

Between 2012 and 2015, the most common specific causes of death for mothers during pregnancy or within 365 days postpartum were drug overdose (16.8 percent), cardiac event (14.4 percent), homicide (11.0 percent), suicide (8.6 percent), and infection/sepsis (8.4 percent). The top causes of maternal death during pregnancy or within 7 days postpartum were hemorrhage (19.0 percent), cardiac event (17.7 percent), and amniotic embolism (12.7 percent).

The relatively large proportion of maternal deaths in Texas due to drug overdose is particularly concerning in light of the current opioid epidemic and recent increases in maternal opioid use during pregnancy [47]. The risk of maternal death due to drug overdose was higher for White mothers and for mothers aged 40 years or older. Opioids were involved in 58 percent of maternal deaths from drug overdose, and almost 80 percent of drug overdose deaths occurred after 60 days postpartum.

Figure 2.42

Rate of Maternal Death in Texas by Public Health Region (PHR), 2012-2015



*Confirmed maternal deaths occurring while pregnant or within 365 days of end of pregnancy.
Source: 2012-2015 Death Files, 2011-2015 Birth and Fetal Death Files
Prepared by: Maternal & Child Health Epidemiology

Among all PHRs in Texas, PHR 1 had the highest maternal death rate (34.0 per 100,000 live births) and PHR 11 had the lowest maternal death rate (17.8 per 100,000 live births) for the combined years 2012-2015 (Figure 2.42). PHR 2/3 had the highest drug overdose maternal death rate, at 6.4 maternal deaths from drug overdose per 100,000 live births, followed by PHR 1 (6.0 per

100,000 live births) and PHR 9/10 (5.2 per 100,000 live births). PHR 4/5N had the lowest drug overdose maternal death rate (1.3 per 100,000 live births).

Severe Maternal Morbidity

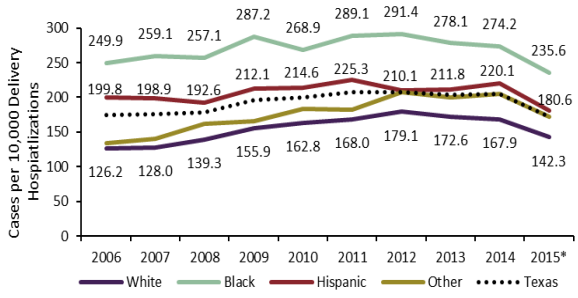
Severe maternal morbidity (SMM) is a term used to describe any unintended outcomes of labor and delivery that result in significant consequences for a mother's health [48]. A hospital delivery was considered a SMM case if the mother had one or more of the conditions or procedures indicated on a list of SMM-related medical codes, including conditions such as acute renal failure, cardiac arrest, eclampsia, and sepsis, and including procedures such as blood transfusion and hysterectomy.

SMM is closely related to maternal mortality because it involves conditions that, if left untreated, could result in maternal death. Like maternal mortality, SMM rates in the United States have been rising in the past decade. According to data from Texas Hospital Inpatient Discharge Public Use Data Files, the SMM rate in Texas increased by 19.3 percent between 2006 and 2011, from 174.1 cases per 10,000 delivery hospitalizations to 207.7 cases per 10,000 delivery hospitalizations. However, Texas has seen a slight decrease in SMM between 2011 and 2014. There was also a substantial decrease in SMM observed between 2014 and 2015, from 205.6 cases per 10,000 delivery hospitalizations to 172.4 cases per 10,000 delivery hospitalizations, but SMM rates for 2015 are based only on 3 quarters of data (due to a coding change) and therefore may not be as reliable as previous years' rates.

Blood transfusions during delivery hospitalizations were used to estimate obstetric hemorrhage, the top contributor of SMM. Trends in obstetric hemorrhage rates were similar to those seen in overall SMM. Other common causes of SMM included cardiac event, disseminated intravascular coagulation (DIC), hysterectomy, and eclampsia.

Figure 2.43

Rate of Severe Maternal Morbidity (SMM) by Race/Ethnicity in Texas, 2006-2015

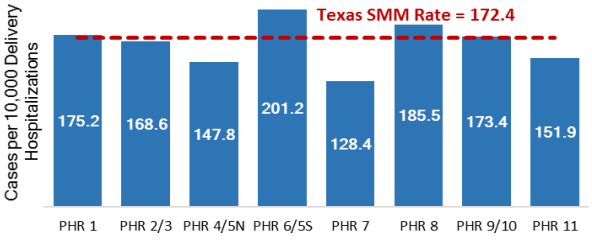


*Year 2015 only includes data from first 3 quarters.
Source: Hospital Inpatient Discharge Public Use Data File, 2006-2015
Prepared by: Maternal & Child Health Epidemiology

Mirroring the trends observed for maternal deaths, there are substantial racial/ethnic disparities in the rates of mothers with serious pregnancy complications. Black mothers in Texas had an SMM rate at least 1.2 times higher than SMM rates observed among mothers of other racial/ethnic groups, with 235.6 SMM cases per 10,000 delivery hospitalizations in 2015 compared with 180.6 cases per 10,000 delivery hospitalizations for Hispanic

mothers and 142.3 cases per 10,000 delivery hospitalizations for White mothers (Figure 2.43). Although White mothers had higher maternal death rates than did Hispanic mothers, the opposite was true for SMM – higher SMM rates were observed among Hispanic mothers than among White mothers. Similarly, rates of obstetric hemorrhage were highest among Black mothers, followed by Hispanic mothers and then White mothers.

Figure 2.44
Rate of Severe Maternal Morbidity (SMM) in Texas by Public Health Region (PHR), 2015*



*Year 2015 only includes data from first 3 quarters.
Source: Hospital Inpatient Discharge Public Use Data File, 2006-2015
Prepared by: Maternal & Child Health Epidemiology

Four public health regions had SMM rates above the Texas rate in 2015: PHR 6/5S (201.2 cases per 10,000 delivery hospitalizations), PHR 8 (185.5 cases per 10,000 delivery hospitalizations), PHR 1 (175.2 cases per 10,000 delivery hospitalizations) and PHR 9/10 (173.4 cases per 10,000 delivery hospitalizations) (Figure 2.44). The lowest regional SMM rates were seen in PHR 7 (128.4 cases per 10,000 delivery hospitalizations) and PHR 4/5N (147.8 cases per 10,000 delivery hospitalizations).

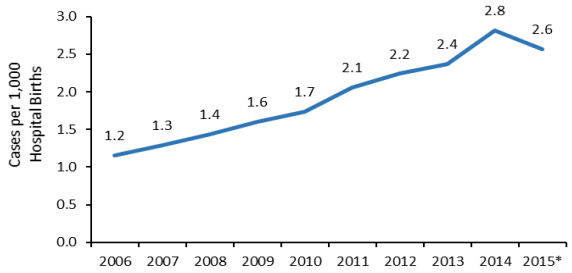
Maternal Drug Use and Neonatal Abstinence Syndrome

The use of opioids or certain other drugs during pregnancy can result in a drug withdrawal syndrome in newborns called neonatal abstinence syndrome (NAS). Newborns with NAS are more likely than other infants to have low birthweight, respiratory and feeding problems, and other complications [47]. Similarly, mothers who use drugs such as opioids during pregnancy are more likely to have complications, such as prolonged hospital stay and death before hospital discharge [49]. Since drug overdose is a frequent cause of maternal death in Texas, it is important to monitor the rate of maternal drug use during pregnancy. NAS data can be used as an indicator of trends of drug use in pregnant mothers, but because not all newborns whose mothers use drugs will develop NAS, the true incidence of drug use during pregnancy can be expected to be higher than the observed rate of NAS [47].

Data from the Texas Hospital Inpatient Discharge Public Use Data File indicate that the rate of infants born each year experiencing NAS has more than doubled since 2006, from 1.2 cases per 1,000 hospital births in 2006 to 2.6 cases per 1,000 hospital births in 2015 (Figure 2.45). This was less than the increase observed in the rest of the United States, in which NAS rates increased 5-fold from 2000 to 2012, and Texas had lower rates of NAS than the national average in 2012 (2.2 cases compared to 5.8 cases per 1,000 hospital births) [46].

Figure 2.45

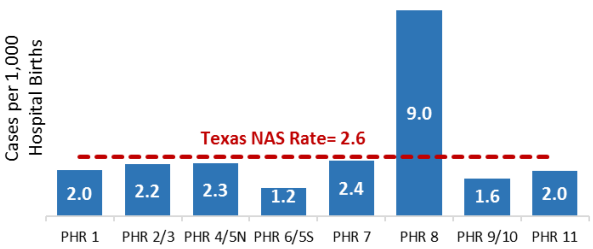
Rate of Neonatal Abstinence Syndrome (NAS) in Texas, 2006-2015



*Year 2015 only includes data from first 3 quarters.
Source: Hospital Inpatient Discharge Public Use Data File, 2006-2015
Prepared by: Maternal & Child Health Epidemiology

Figure 2.46

Rate of Neonatal Abstinence Syndrome (NAS) in Texas by Public Health Region (PHR), 2015*



*Year 2015 only includes data from first 3 quarters.
Source: Hospital Inpatient Discharge Public Use Data File, 2006-2015
Prepared by: Maternal & Child Health Epidemiology

Among all PHRs in Texas, PHR 8 had the highest NAS rate in 2015 (9.0 cases per 1,000 hospital births), and PHR 6/5S had the lowest NAS rate (1.2 cases per 1,000 hospital births) (Figure 2.46). For each year from 2006 to 2015, PHR 8 consistently had a rate of NAS that was over three times the statewide NAS rate, yet it had one of the lowest average percent changes from 2006 to 2015. Using data available for all reported years, the lowest average yearly percent increases were seen in PHR 6/5S (5.2 percent), PHR 11 (7.6 percent), and PHR 8 (10.5 percent). The highest average yearly increases were observed in PHR 1 (25.5 percent), PHR 4/5N (21.5 percent), and PHR 7 (17.8 percent). NAS rates in Texas overall increased at an average of 9.6 percent per year from 2006 to 2015.

Based on the most recent four-quarter data records in 2014, the counties with the highest percentages of reported NAS cases in the state were Bexar County (29.0 percent of the state total), Dallas County (9.7 percent), Harris County (8.6 percent), Tarrant County (6.5 percent), and Travis County (4.8 percent). In particular, Bexar County in PHR 8 has reported the highest annual number of NAS cases since 2006, accounting for almost one-third of Texas' total NAS cases every year.

Infant Health Practices

Protecting and improving the well-being of infants is an important task. Known protective infant health practices are addressed in this section, such as breastfeeding, safe infant sleep, and well-baby checkup [50].

Breastfeeding

Studies have shown that breastfeeding or giving expressed breast milk to infants is protective against SIDS, and this effect is stronger when breastfeeding is exclusive [51]. Mothers are encouraged to feed the infant breast milk as much as possible and for as long as possible. According to the National Immunization Survey, 83.1 percent (CI: 79.9-86.3) of infants born in Texas in 2014 were breastfed at least

once, exceeding the HP2020 target of 81.9 percent for proportion of infants having ever breastfed [52]. The same survey also found that 24.6 percent (CI: 21.5-27.7) of Texas-born infants were exclusively breastfed for the first six months after birth, which was slightly lower than the HP2020 target of 25.5 percent [52].

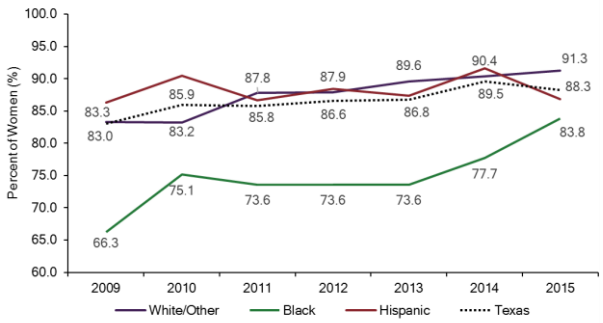
Ever Breastfeeding

A question about ever breastfeeding is included in the Texas PRAMS survey that asks women, "Did you ever breastfeed or pump breast milk to feed your new baby, even for a short period of time?" Based on statewide PRAMS data, trends in the prevalence of ever breastfeeding ranged from 83.0 percent (CI: 80.7-85.3) in 2009 to 88.3 percent (CI: 85.8-90.7) in 2015.

The prevalence rate of ever breastfeeding among Black women in Texas has been below the statewide prevalence rate over time, with White/Other women and Hispanic women generally above the statewide prevalence rate (Figure 2.47). In 2015, White/Other women (91.3 percent, CI: 88.5-94) reported the highest rate of ever breastfeeding, followed by Hispanic women (86.8 percent, CI: 82.4-91.2) and Black women (83.8 percent, CI: 79.8-87.8).

Figure 2.47

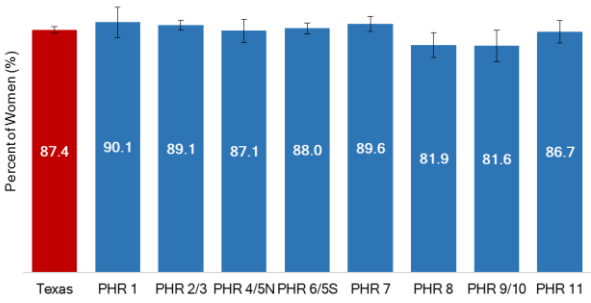
Percent of Women Who Ever Breastfeed their Infant by Race/Ethnicity, 2009-2015



Source: 2009-2015 Texas PRAMS
Prepared by: Maternal & Child Health Epidemiology

Figure 2.48

Percent of Women Reporting Ever Breastfeeding Infant by Public Health Region (PHR), 2011-2015



Source: Texas PRAMS, Combined 2011-2015
Prepared by: Maternal & Child Health Epidemiology

Based on pooled 2011-2015 PRAMS data, PHR 1 had the highest rate of ever breastfeeding (90.1 percent, CI: 84.7-95.5), while PHR 8 (81.9 percent, CI: 77.5-86.4) and PHR 9/10 (81.6 percent, CI: 75.9-87.4) had the lowest rates of ever breastfeeding (Figure 2.48). Using pooled 2011-2015 data, the statewide prevalence rate of ever breastfeeding was 87.4 percent (CI: 86.3-88.5).

For women who reported they breastfed their infant, they were also asked a series of questions about experiences in the hospital: "This question asks about things that may have happened at the hospital where your new baby was born. For each item, check **No** if it did not happen or **Yes** if it did happen." The survey questions include the following: a) Hospital staff gave me information about breastfeeding; b)

My baby stayed in the same room with me at the hospital; c) Hospital staff helped me learn how to breastfeed; d) I breastfed in the first hour after my baby was born; e) I breastfed my baby in the hospital; f) My baby was fed only breast milk at the hospital; g) Hospital staff told me to breastfeed whenever my baby wanted; h) The hospital gave me a breast pump to use; i) The hospital gave me a gift pack with formula; j) The hospital gave me a telephone number to call for help with breastfeeding; and k) Hospital staff gave my baby a pacifier.

Based on pooled 2011-2015 PRAMS data for Texas, the five most frequently noted hospital experiences that women had about breastfeeding were:
1) Hospital staff gave me information about breastfeeding;
2) I breastfed my baby in the hospital;
3) My baby stayed in the same room with me at the hospital;
4) The hospital gave me a telephone number to call for help with breastfeeding; and
5) Hospital staff helped me learn how to breastfeed.

Exclusive Breastfeeding

While a relatively large proportion of Texas mothers report having ever breastfed, rates of exclusive breastfeeding are much lower. The Texas PRAMS survey does not collect data on exclusive breastfeeding. However, the 2016 Texas WIC IFPS survey asked mothers using WIC clinic services when their child first ate or drank anything other than breastmilk, indicating the amount of time after birth during which the child was exclusively breastfed. In 2016, about 18.4 percent (CI: 17.2-19.6) of Texas WIC participants reported exclusively breastfeeding their child for the first three months after delivery, and 6.0 percent (CI: 5.1-6.8) reported exclusively breastfeeding their child for the first six months after delivery. This was substantially lower than the 2014 National Immunization Survey rate (24.6 percent) among all mothers in Texas who breastfed exclusively for the first six months.

The highest rates of exclusive breastfeeding for the first three months among WIC participants were reported by PHR 1 (30.7 percent, CI: 23.6-37.8) and PHR 9/10 (23.2 percent, CI: 18.3-28.2), while the lowest rates were reported by PHR 6/5S (15.4 percent, CI: 13.0-17.9) and PHR 11 (16.3 percent, CI: 13.5-19.0). Due to low responses in PHR 1, PHR 4/5N, and PHR 8 for the WIC IFPS survey, the rates of exclusive breastfeeding for the first six months were not reported in those regions. The rates of WIC participants who breastfed exclusively for the first six months among the remaining five regions ranged from 4.4 percent (CI: 2.7-6.1) in PHR 11 to 10.4 percent (CI: 6.5-14.3) in PHR 9/10.

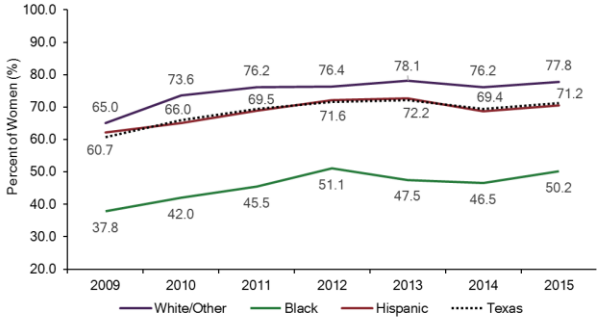
Safe Infant Sleep

For decades, public health research has shown that infants placed on their backs to sleep are less likely to die from SIDS [53]. The PRAMS survey asks women, "In which one position do you most often lay your baby down to sleep now?" Based on Texas PRAMS data, trends in the statewide prevalence of placing infants to sleep on their backs ranged from 60.7 percent (CI: 57.6-63.8) in 2009 to 71.2 percent (CI: 68.1-74.4) in 2015. The HP2020 objective is to increase the proportion of infants placed on their backs to sleep to 75.8 percent [52].

The prevalence rate of infant back sleeping among Hispanic women in Texas has been similar to the statewide prevalence rate over time, with White/Other women demonstrating the highest prevalence rate. The prevalence rate among Black women has consistently fallen below the statewide prevalence rate, however, there has been a measurable increase statewide and for each race/ethnic group since 2009 (Figure 2.49). In 2015, White/Other women had the highest rate of placing their infants to sleep on their backs (77.8 percent, CI: 73.9-81.8), followed by Hispanic women (70.6 percent, CI: 65.1-76.0) and Black women (50.2 percent, CI: 44.9-55.5). Only White/Other women in Texas are currently meeting the HP2020 target of 75.8 percent of infant back sleeping.

Figure 2.49

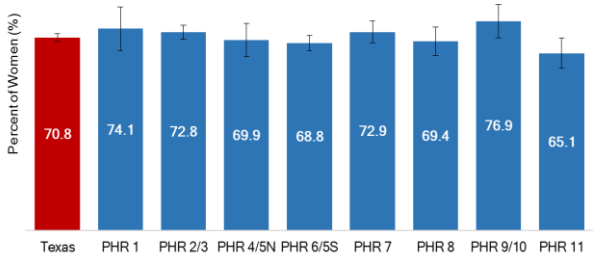
Percent of Women Reporting Putting Their Infants to Sleep on Backs by Race/Ethnicity, 2009-2015



Source: 2009-2015 Texas PRAMS
Prepared by: Maternal & Child Health Epidemiology

Figure 2.50

Percent of Women Reporting Putting Their Infants to Sleep on Backs by Public Health Region (PHR), 2011-2015



Source: Texas PRAMS, Combined 2011-2015
Prepared by: Maternal & Child Health Epidemiology

Based on pooled 2011-2015 PRAMS data, women in PHR 9/10 reported the highest rate of placing their infants to sleep on their backs (76.9 percent, CI: 70.8-82.9), and women in PHR 11 reported the lowest rate of placing their infants to sleep on their backs (65.1 percent, CI: CI: 59.6-70.6) (Figure 2.50). Using pooled 2011-2015 data, the statewide prevalence rate was 70.8 percent (CI: 69.3-72.2).

Well-baby Checkup

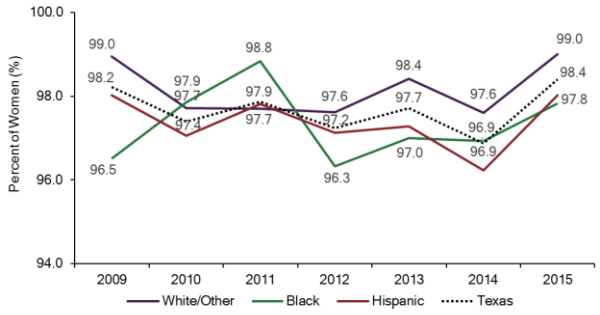
Well-baby visits are important for screening and assessing the health of an infant. The PRAMS survey asks women, "Has your new baby had a well-baby checkup? A well-baby checkup is a regular health visit for your baby usually at 1, 2, 4, and 6

months of age." Based on Texas PRAMS data, trends in the statewide prevalence of a well-baby checkup remained stable from 98.2 percent (CI: 97.4-99.1) in 2009 to 98.4 percent (CI: 97.5-99.3) in 2015.

The prevalence rate of a well-baby checkup among Hispanic and Black women in Texas has been generally below the statewide prevalence rate over time, with White/Other women demonstrating a higher prevalence rate (Figure 2.51). In 2015, White/Other women reported a higher well-baby checkup rate (99.0 percent, CI: 98.0-100.0) than Hispanic women (98.0 percent, CI: 96.5-99.6) and Black women (97.8 percent, CI: 96.3-99.3).

Figure 2.51

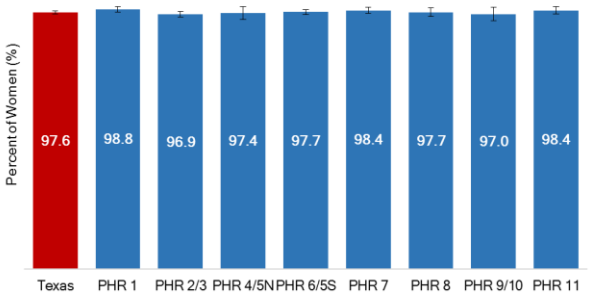
Percent of Women Reporting a Well-Baby Checkup by Race/Ethnicity, 2009-2015



Source: 2009-2015 Texas PRAMS
Prepared by: Maternal & Child Health Epidemiology

Figure 2.52

Percent of Women Reporting a Well-Baby Checkup by Public Health Region (PHR), 2011-2015



Source: Texas PRAMS, Combined 2011-2015
Prepared by: Maternal & Child Health Epidemiology

Well-baby checkups are consistently high across the state. Based on pooled 2011-2015 PRAMS data, the percentage of women reporting a well-baby checkup ranged from 96.9 percent (CI: 95.8-97.9) in PHR 2/3 to 98.8 percent (CI: 97.8-99.8) in PHR 1 (Figure 2.52). Using pooled 2011-2015 data, the statewide prevalence rate of a well-baby checkup was 97.6 percent (CI: 97.1-98.1).

Perinatal Periods of Risk

In order to provide communities and stakeholders more in-depth information to help reduce infant mortality, a comprehensive Perinatal Periods of Risk (PPOR) approach for the state as a whole and for each region was undertaken. PPOR gives analytic steps to investigate and address the specific causes of high fetal and infant mortality rates and disparities among study populations (such as Whites, Blacks, Hispanics, and Teens). Both Phase I and Phase II analyses were conducted. PPOR analysis results are provided in the report, along with practicable recommendations.

PPOR examines the risk of feto-infant mortality during different perinatal periods. Based on birth weight and age at death, fetal and infant deaths are partitioned into four corresponding risk periods: maternal health/prematurity, maternal care, newborn care, and infant health (Figure 2.53).

Figure 2.53

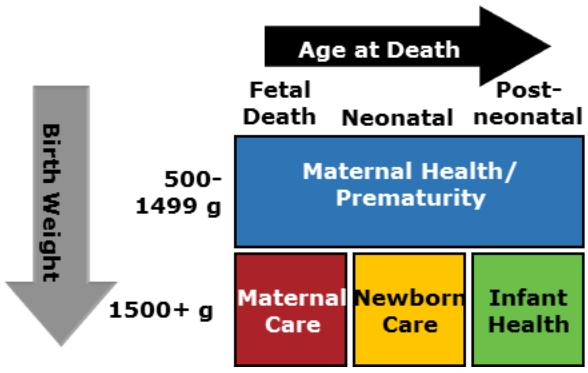
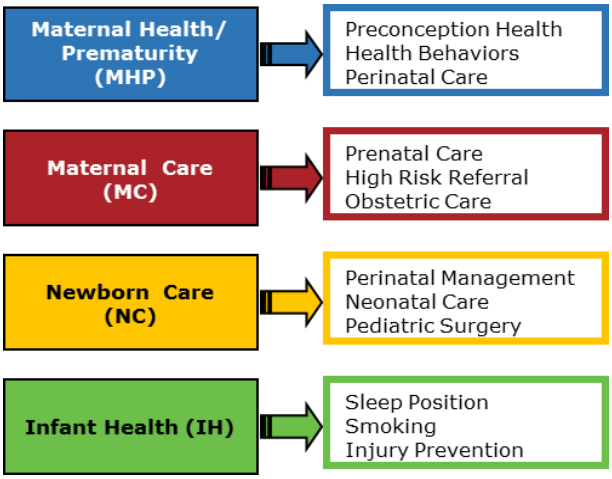


Figure 2.54



Each of these periods has different risk factors and causes of death, and subsequently, different opportunities for prevention. Therefore, the four risk periods represent distinct points of intervention in the health care continuum (Figure 2.54).

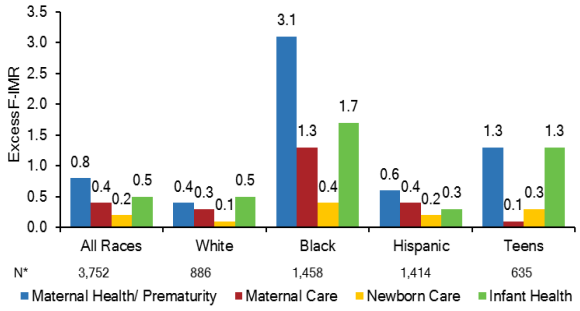
In this report, 2010-2014 fetal death and linked birth/infant death files were used for the PPOR analysis. The five most recent years of vital records data were combined to reach sufficient numbers of deaths for all regions.

Phase I Analysis

Texas and specific study populations (i.e., Black, White, Hispanic, or teens) were compared to a state-level reference group generally known to have better feto-infant mortality outcomes (i.e., non-Hispanic White women who are at least 20 years of age and have 13+ years of education). In the following analysis, these study populations are not mutually exclusive. The feto-infant mortality rate (F-IMR) is calculated as the number of fetal and infant deaths per 1,000 live births and fetal deaths. The excess F-IMR is the difference in F-IMR between the study population and the reference group.

Figure 2.55

Excess Feto-Infant Mortality Rates (F-IMR), Texas (2010-2014)



*N is the number of excess fetal and infant deaths for each of the groups shown.
Source: 2010-2014 Linked Birth Infant Death Files
Prepared by: Maternal & Child Health Epidemiology

The 2010-2014 F-IMRs in Texas were 6.5 per 1,000 for White mothers, 11.8 per 1,000 for Black mothers, 6.7 per 1,000 for Hispanic mothers, and 8.3 per 1,000 for teen mothers. In 2010-2014, Black mothers experienced a total of 6.6 excess fetal and infant deaths per 1,000 live births and fetal deaths (Figure 2.55). Total excess F-IMRs for White

mothers, Hispanic mothers, and teen mothers were 1.3 per 1,000, 1.5 per 1,000, and 3.1 per 1,000, respectively.

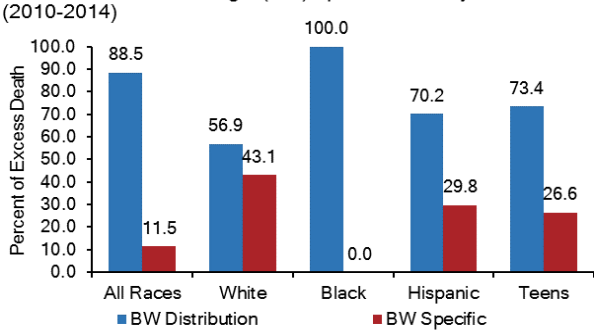
Black women had the highest excess F-IMR for all four risk periods, with 56 percent of all Black fetal and infant deaths being potentially preventable deaths (i.e. excess fetal and infant deaths). Moreover, 47 percent of the overall excess Black fetal and infant deaths occurred in the Maternal Health/Prematurity risk period. For teen mothers, 85 percent of excess feto-infant deaths occurred in the Maternal Health/Prematurity and Infant Health risk periods.

Phase II Analysis

For fetal and infant deaths occurring in the Maternal Health/Prematurity risk period, a Kitagawa analysis was conducted for each study population, to examine whether excess feto-infant mortality was primarily due to a greater number of very low birth weight (VLBW) births in the study population compared to the reference population (a difference in birth weight distribution), or to a higher mortality rate among VLBW infants than seen in the reference population (a difference in birth weight specific mortality). The percentage of excess deaths attributable to a difference in birth weight distribution compared with the percentage attributable to a difference in birth weight specific mortality rates in Texas are shown in Figure 2.56 for each study population.

Figure 2.56

Percent of Excess Death Attributable to Birth Weight (BW) Distribution vs. Birth Weight (BW) Specific Mortality, Texas (2010-2014)



Source: 2010-2014 Linked Birth Infant Death Files
Prepared by: Maternal & Child Health Epidemiology

For all subpopulations examined, the majority of excess Maternal Health/Prematurity risk period deaths were attributable to a greater number of VLBW births in these groups when compared to the reference population. Notably, Black infants (0 percent) had lower mortality rates among VLBW births than the reference population; for this subgroup, all excess deaths (100 percent) were potentially attributable to a greater number of VLBW births (Figure 2.56). For all of these study populations, and especially for infants born to Black mothers, interventions aimed at reducing the number of VLBW births are likely to be most effective at closing the gap in feto-infant mortality. For White mothers, Hispanic mothers, and teen mothers, some proportion of excess feto-infant death was also attributable to a higher mortality rate among VLBW births than the reference population.

To examine differences in *birth weight distribution* during the Maternal Health/Prematurity risk period, a multivariable logistic regression analysis was conducted to identify factors associated with risk of delivering a VLBW baby. Factors examined included maternal demographic factors (race/ethnicity, age, and education), multiple gestations, smoking during pregnancy, high parity for age, previous preterm birth, maternal weight gain during pregnancy, adequacy of prenatal care, trimester prenatal care began, and payment source for the delivery.

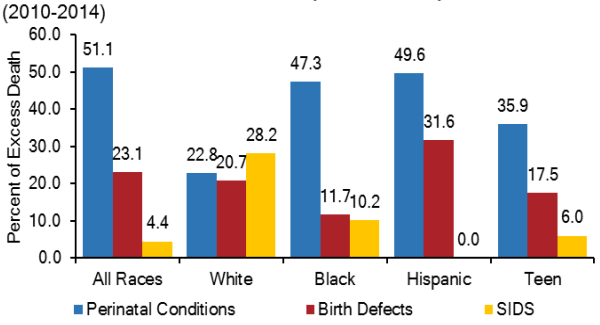
Factors that contributed the most to risk of a VLBW birth in Texas included weight gain less than 15 pounds and inadequate prenatal care. Approximately 19 percent of all VLBW births were attributable to weight gain less than 15 pounds. Five percent of all VLBW births could be attributed to inadequate prenatal care. Black mothers and teen mothers in the state were more likely to gain less than 15 pounds or receive inadequate prenatal care compared to the reference population.

To identify factors related to *birth weight specific mortality* in the Maternal Health/Prematurity risk period, an analysis was also performed to assess risk of infant death among VLBW births. Factors examined in this analysis included maternal demographics, congenital anomalies, inadequate prenatal care, maternal diabetes, maternal hypertension, infant transfer, maternal transfer, respiratory care, ruptured membranes, and prenatal steroids.

Inadequate prenatal care and congenital anomalies contributed the most to infant mortality among VLBW births in Texas. Specifically, 3 percent of infant deaths to this group were attributable to inadequate prenatal care, and an additional 3 percent were attributable to congenital anomalies. Among VLBW births, infants whose mothers received prenatal steroids had a 22 percent *reduced* risk of infant death. Compared to the reference population, White mothers and teen mothers were more likely to deliver an infant with congenital anomalies or receive inadequate prenatal care. Hispanic mothers and Teen mothers were also less likely to receive prenatal steroids compared to the reference population.

Figure 2.57

Excess Infant Health-Related Death by Race/Ethnicity and Cause, Texas (2010-2014)



Source: 2010-2014 Linked Birth Infant Death Files
Prepared by: Maternal & Child Health Epidemiology

Among all infant deaths in the Infant Health risk period, perinatal conditions were the primary cause of death, accounting for 51 percent of excess infant deaths in Texas (Figure 2.57). Of the subgroups examined, Black infants and infants born to teen mothers had the greatest excess infant mortality in this risk period, with perinatal conditions accounting for a large proportion of

excess infant deaths. Birth defects contributed to 18 percent of excess infant deaths to teen mothers and to 21 percent of excess deaths among White infants. SIDS accounted for 28 percent of excess deaths among White infants and for 10 percent of excess deaths among Black infants.

To further examine excess mortality in the Infant Health risk period, an analysis was conducted to determine risk factors associated with infant death among infants 28 days and older. Maternal demographic factors, smoking during pregnancy, adequacy of prenatal care, breastfeeding status at hospital discharge, and trimester prenatal care began were all examined. No first trimester prenatal care, breastfeeding at hospital discharge, and smoking had the greatest impact on overall risk of infant death during this time period in Texas. Among all infants 28 days and older, infants who were breastfed at hospital discharge had a 9 percent *reduced* risk of infant death. About 2 percent of infant deaths were attributable to not receiving prenatal care in the first trimester, and 1 percent of infant deaths were attributable to maternal smoking during pregnancy.

Recommendations

Phase I analyses identified the populations and periods of risk with the largest excess feto-infant mortality compared to the reference population. In Texas, the period of risk and study population with the highest excess feto-infant mortality rate, and thus the greatest opportunity for potential impact, was the Maternal Health/Prematurity risk period among the Black population. Interventions should also be targeted to Black populations for Maternal Care and Infant Health-related deaths. Among teen mothers, interventions should focus on Maternal Health/Prematurity and Infant Health-related deaths. Maternal Health/Prematurity-related deaths should also be targeted among the Hispanic population, while Infant Health-related deaths should be the focus among the White population.

Phase II analyses identified modifiable risk factors that contributed the most to excess feto-infant mortality. To reduce excess feto-infant mortality in the Maternal Health/Prematurity period of risk, interventions in Texas should focus on improving access to and use of prenatal care among Black, Hispanic, and teen mothers; reducing the number of women gaining less than 15 pounds during pregnancy; reducing rates of teen pregnancy; and reducing rates of premature rupture of the membranes. Interventions likely to be most effective in reducing Infant Health-related excess feto-infant mortality include reducing prematurity among all race groups; reducing birth defects among White infants and infants born to teen mothers; increasing rates of breastfeeding; reducing SIDS among White infants and Black infants; improving access to and use of prenatal care; and reducing parental smoking.

For your convenience, a companion PPOR fact sheet for Texas, 2010-2014 can be found at this website: https://www.dshs.texas.gov/healthytexasbabies/data.aspx

Summary Table: Selected Health Indicators in Texas

Lastly, a summary table for selected health indicators from 2006 to 2015 is presented below, to help easily monitor/depict statewide trends.

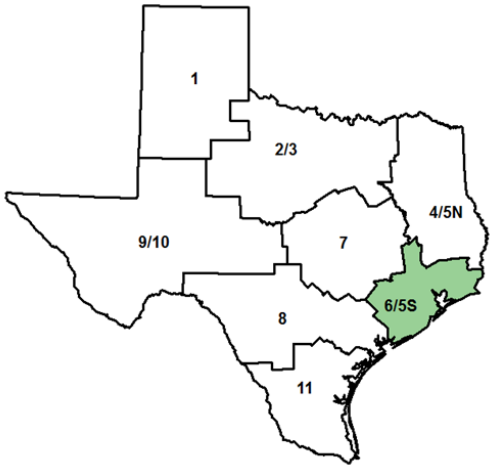
	Texas										
Indicators	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**10-Year Trend**
Birth Rate [a]	17.0	17.0	16.7	16.2	15.3	14.7	14.7	14.6	14.8	14.7	
Maternal Age (in Years)	26.5	26.5	26.6	26.7	26.9	27.1	27.2	27.4	27.6	27.7	
Teen Birth Rate [b]	60.2	60.6	59.7	57.4	52.2	45.9	42.3	39.7	36.3	33.0	
Infant Mortality Rate [c]	6.2	6.2	6.1	6.0	6.1	5.7	5.8	5.8	5.8	5.6	
Preterm Birth [d]	11.3	11.3	11.2	11.1	10.9	10.7	10.5	10.4	10.3	10.2	
Low Birth Weight [d]	8.5	8.4	8.4	8.5	8.4	8.5	8.3	8.3	8.2	8.3	
Prenatal Care in the 1st Trimester of Pregnancy [d]	64.0	61.8	61.5	61.4	63.9	66.3	66.2	66.1	65.2	65.9	
Pre-Pregnancy Obesity [d]	20.1	20.7	21.4	21.9	22.5	22.9	23.5	24.0	24.4	25.2	
Maternal Hypertension [d]	5.7	5.4	5.5	5.7	6.3	6.3	6.4	6.4	6.9	7.4	
Maternal Diabetes [d]	4.3	4.6	4.6	4.4	4.5	4.9	5.0	4.9	5.5	5.5	
Smoking During Pregnancy [d]	6.0	5.6	5.4	5.1	4.9	4.6	4.4	4.3	3.9	3.6	
Severe Maternal Morbidity (SMM) [e, g]	174.1	175.8	178.2	196.3	200.0	207.7	207.0	203.3	205.6	172.4	
Neonatal Abstinence Syndrome (NAS) [f, g]	1.2	1.3	1.4	1.6	1.7	2.1	2.2	2.4	2.8	2.6	

[a] Live births per 1,000 population
[b] Live births per 1,000 teen females (aged 15-19)
[c] Deaths per 1,000 live births
[d] Percent of live births
[e] Cases per 10,000 delivery hospitalizations
[f] Cases per 1,000 hospital births
[g] Year 2015 data only includes the first three quarters.

Sources: 2006-2015 Texas Birth and Death files, Center for Health Statistics, DSHS; 2006-2015 Texas Population Estimates, Texas Demographic Center; 2006-2015 Texas Hospital Inpatient Discharge Public Use Data File, Texas Department of State Health Services.

PUBLIC HEALTH

REGION 6/5S



Key Findings:

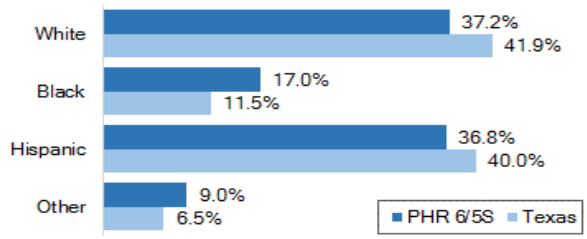
- Overall, the region's infant mortality rate (5.6 deaths per 1,000 live births in 2015) was similar to the state. Houston-The Woodlands and Galveston communities met the HP2020 target of 6.0 or fewer infant deaths per 1,000.
- The Beaumont-Port Arthur community had the highest percentage of low birth weight infants among all large communities in Texas.
- A low rate of smoking during pregnancy was observed (2.5 percent in 2015), compared to the state's 3.6 percent.
- Late entry into prenatal care was a serious concern in several counties, including Harris County and Galveston County.
- Three-tenths of childbearing-aged women had no health insurance. Many families struggled with the high cost of health care and had difficulty navigating the system to get the best care.
- PHR 6/5S had a higher rate of severe maternal morbidity than all other Texas regions.
- Interventions to reduce fetal/infant mortality should focus on healthy weight gain during pregnancy; reducing prematurity and birth defects; reducing SIDS among Black and White infants; and increasing breastfeeding rates and access to prenatal care.

Public Health Region 6/5S

Public Health Region 6/5S (PHR 6/5S) consists of 16 counties of Southeast Texas. This region includes the metropolitan area of Houston–The Woodlands–Sugar Land, the second largest metropolitan area in Texas (after Dallas–Fort Worth-Arlington) and the fifth largest one in the United States. PHR 6/5S had a total population of 7,213,320 in 2015, making it the second most populous region in Texas. The region's population growth rate was 11.4 percent from 2010 to 2015, which was faster than the state's growth rate (9.2 percent) and was the second highest growth rate (after PHR 7) among all PHRs in Texas. The population of the Houston-The Woodlands-Sugar Land metro area is centered in the city of Houston, the largest economic and cultural center of the American South, with a population of about 2.3 million.

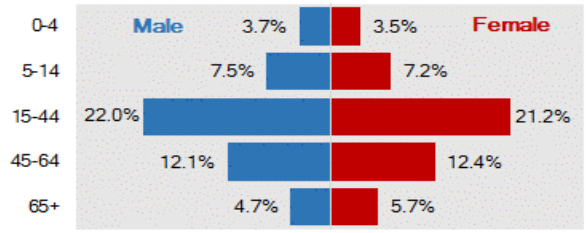
Blacks accounted for 17.0 percent of the population in PHR 6/5S in 2015, and persons of 'Other' race/ethnicity accounted for 9.0 percent (Figure 3.1). Both proportions were higher than the state's average, and were higher than among all other regions in Texas. PHR 6/5S had the same proportion of young people under 15 years of age as the state (21.9 percent) (Figure 3.2). The proportion of women of reproductive age (ages 15-44; 21.2 percent) in PHR 6/5S was similar to the state's proportion (20.9 percent).

Figure 3.1
Population Distribution by Race/Ethnicity



Source: Texas Demographic Center, 2015 Population Estimates
Prepared by: Maternal & Child Health Epidemiology

Figure 3.2
Population Distribution by Age Group, PHR 6/5S



Source: Texas Demographic Center, 2015 Population Estimates
Prepared by: Maternal & Child Health Epidemiology

Based on 2011-2015 Census ACS data, PHR 6/5S had a higher percentage of foreign-born residents (21.5 percent) compared to the state (16.6 percent). Especially, within the counties containing and nearby the city of Houston, more than a quarter of the residents were foreign-born. Spanish is the most spoken non-English language in Texas homes. About 27.8 percent of Texans in PHR 6/5S spoke Spanish at home, compared with 29.5 percent of Texans in the state as a whole.

Socioeconomic characteristics such as income level and poverty are added challenges for meeting the health needs of mothers, children, and families within a community. According to 2011-2015 Census ACS data, seven counties in PHR 6/5S had a median household income that was higher than the state's median household

income of $53,207. The county-level median household income in this region ranged from $37,666 to $89,152. PHR 6/5S had a lower proportion of adult females living below 200 percent FPL (32.3 percent) compared to the state (34.9 percent). Similarly, PHR 6/5S had a lower rate of children younger than 5 years old living below 100 percent FPL (25.5 percent) compared to the state (27.4 percent). Seven counties in this region had child poverty rates higher than the state's rate.

Birth Demographics

A total of 110,148 births were registered in PHR 6/5S in 2015, which was an 8.0 percent increase from 2006. This percent increase in the total number of births was the largest among all PHRs in Texas. In comparison, the total number of births in Texas has increased by 1.0 percent since 2006. The birth rate for PHR 6/5S was 15.3 births per 1,000 people in 2015, which has declined from 17.0 births per 1,000 in 2006. The region's birth rate over the past decade has declined slower than the birth rate for the state as a whole (The Texas birth rate decreased from 17.0 births per 1,000 in 2006 to 14.7 births per 1,000 in 2015).

Male infants accounted for 50.9 percent of all births in 2015 in PHR 6/5S, and female infants accounted for 49.1 percent of births. Births to Hispanic mothers made up the largest percentage of all births in this region (42.5 percent), followed by births to White mothers (30.6 percent), Black mothers (17.6 percent) and mothers classified as 'Other' race/ethnicity (9.4 percent). Among all PHRs in Texas, PHR 6/5S had the largest proportion of births to Black mothers and mothers of 'Other' race/ethnicity, respectively. While the proportions of births to White, Black, and Hispanic mothers have decreased over the past decade in PHR 6/5S, the proportion of births to mothers of 'Other' race/ethnicity has increased.

The average age for women with a live birth in 2015 in PHR 6/5S was 28.3 years of age, older than the state's average maternal age at birth (27.7 years of age). Among all PHRs in Texas, PHR 6/5S had the second oldest average maternal age. As in the state as a whole, this region has seen an increase from an average maternal age of 26.9 years a decade ago. Counties with major urban centers, such as Houston and Galveston areas, had an older average maternal age than other counties in the region.

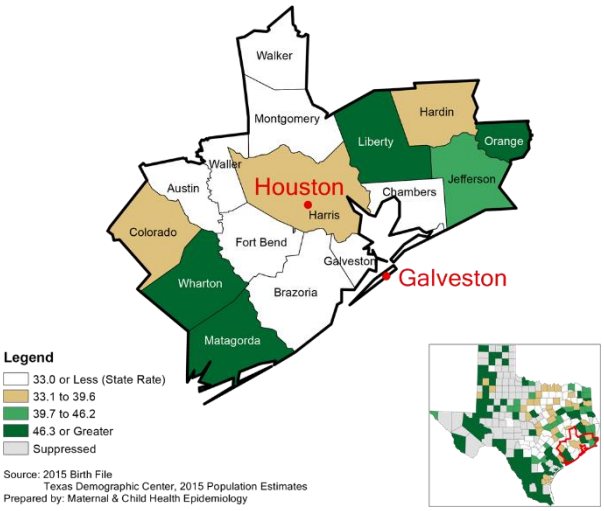
Teen Births

The increase in average maternal age observed over time is likely due in part to a prominent decrease in the teen birth rate. In 2015, a total of 7,639 babies (about 6.9 percent of total births) were born to teenagers aged 15-19 in PHR 6/5S, for a teen birth rate of 30.0 births per 1,000 teen females. The region's teen birth rate in 2015 was lower than the corresponding teen birth rate in Texas as a whole (33.0

births per 1,000). PHR 6/5S, like the rest of the state, has experienced a substantial decrease in teen birth rates since 2006 (53.6 births per 1,000). The teen birth rate in PHR 6/5S has declined by 44.0 percent over the past decade, compared to an overall decrease of 45.2 percent in the state's teen birth rate.

Teen birth rates vary widely across the region. Four counties had high teen birth rates in 2015 (46.3 births per 1,000 or greater), when compared to the rest of the region (Figure 3.3). Teen birth rates are shown for all PHR 6/5S counties with 100 or more documented births in 2015. Among these counties, teen birth rates ranged from 9.6 births per 1,000 teen females to 49.7 births per 1,000 teen females.

Figure 3.3
Teen Birth Rate per 1,000 Females Age 15-19 Years Old in PHR 6/5S, 2015



Infant Mortality & Morbidity

In 2015, a total of 615 infants in PHR 6/5S died before reaching their first birthday; this comprised about 27.1 percent of the total infant deaths in Texas. PHR 6/5S had an IMR of 5.6 deaths per 1,000 live births in 2015, which was the same as the state IMR. The region's IMR has decreased by 8.0 percent since 2006, compared to a 9.3 percent decrease for Texas as a whole during this timeframe.

Two large communities (Houston-The Woodlands and Galveston) in the region met the HP2020 target of 6.0 or fewer infant deaths per 1,000 live births in 2015. Although the Beaumont-Port Arthur community did not meet the HP2020 target, the community had a prominent decrease in IMR, from 9.9 deaths per 1,000 in 2014 to 6.9 deaths per 1,000 in 2015.

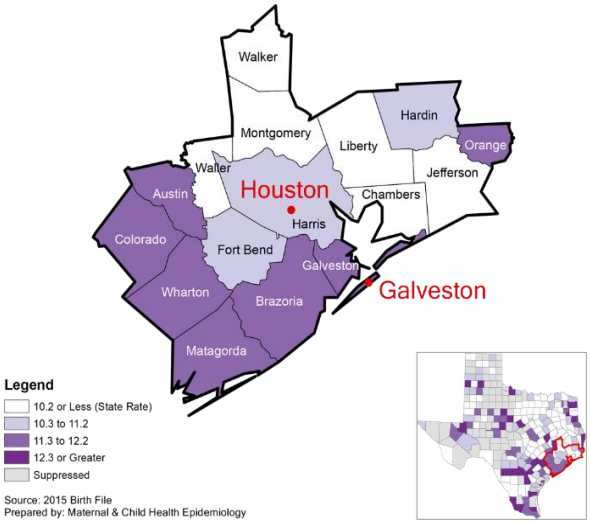
Based on 2011-2015 combined death files, congenital malformation was the most common cause of death among infants in PHR 6/5S; this was similar to all other PHRs. Other causes of infant death listed as top five leading causes in this region included short gestation and low birth weight, maternal complications of pregnancy, SIDS, and infections in the perinatal period. Compared to previous 2006-2010 data, the region saw a decrease in infant deaths caused by SIDS and infections in the perinatal period, and an increase in infant deaths caused by congenital malformation and maternal complications of pregnancy.

Preterm Birth

Preterm births are those that occur prior to 37 weeks of gestation. Using the obstetric estimate of gestational age, about 10.7 percent of live births in PHR 6/5S were delivered preterm in 2015, compared to the state's preterm birth rate of 10.2 percent. The region's preterm birth rate has decreased from 11.3 percent in 2006.

Preterm birth rates vary by race/ethnicity in PHR 6/5S. Black infants (14.0 percent) had a higher rate of preterm birth in 2015 than did infants of any other racial/ethnic group (9.8 to 10.1 percent). Over the past decade, preterm birth rates have declined among Black and White infants, while rates have remained stable among Hispanic infants and infants of 'Other' race/ethnicity in the region.

Figure 3.4
Percent of Births That Were Preterm (Less Than 37 Weeks) Using Obstetric Estimate of Gestation in PHR 6/5S, 2015



Geographic differences in preterm birth rates exist in PHR 6/5S. A few counties in the southern area of the region had high rates of preterm birth (12.3 percent or greater), when compared to the rest of the region (Figure 3.4). Preterm birth rates are shown for all PHR 6/5S counties with 100 or more documented births in 2015. Among these counties, preterm birth rates ranged from 7.9 percent to 11.8 percent.

Low Birth Weight

Low birth weight (less than 2,500 grams) is another important factor related to infant mortality. In 2015, about 8.5 percent of all newborns in PHR 6/5S had low birth weight, similar to the state's rate of 8.3 percent. The region's low birth weight rate has remained stable since 2006.

In 2015, Black infants (12.9 percent) had the highest rate of low birth weight, followed by infants classified as 'Other' race/ethnicity (9.8 percent) and White and Hispanic infants (7.2 percent). From 2006 to 2015, decreases in low birth weight rates were observed among Black and White infants, while increases in low birth weight rates were seen among infants of 'Other' race/ethnicity in the region.

Figure 3.5
Percent of Infants Born Low Birth Weight (Less Than 2,500g) in PHR 6/5S, 2015

Low birth weight rates vary by county in PHR 6/5S. Six counties in the region met the HP2020 target of 7.8 percent or fewer of all live births weighing less than 2,500 grams, while four counties (mainly in the Beaumont-Port Arthur community) had high percentages (9.2 percent or greater) of low birth weight infants (Figure 3.5). Low birth weight rates are shown for all PHR 6/5S counties with 100 or more documented births in 2015. Among these counties, low birth weight rates ranged from 5.5 percent to 11.7 percent.

17P Prescription

Women who are at risk of preterm birth may benefit from taking 17P (17-alpha-hydroxyprogesterone). Based on pooled 2011-2015 PRAMS data, about 5.7 percent (CI: 4.4-7.1) of women in PHR 6/5S said 17P was prescribed by their doctors or health care workers during their most recent pregnancy to help keep their new babies from being born too early. The prevalence rate for this region was about the same as the statewide prevalence rate (5.5 percent, CI: 4.8-6.2).

Based on pooled 2011-2015 PRAMS data for PHR 6/5S, Black women had a higher rate of 17P use than White/Other and Hispanic women. Black women in PHR 6/5S had about the same prevalence rate of 17P use (8.4 percent, CI: 6.3-10.5) as Black women in the state as a whole (8.7 percent, CI: 7.4-10.1). However, the prevalence rate of 17P use among White/Other women in the region (5.7 percent, CI: 3.7-7.8) was higher than the rate of White/Other women in Texas (4.6 percent, CI: 3.7-5.5). Hispanic women in the region also had about the same prevalence rate of 17P use (4.7 percent, CI: 2.3-7.0) as Hispanic women in Texas (5.5 percent, CI: 4.4-6.7).

Health Care Coverage and Access

Health insurance and access to health care are crucial to the health of Texans. Based on 2011-2015 Census ACS data, more than 1.4 million individuals in PHR 6/5S had no health insurance coverage. The region's uninsured rate among the total population was 21.2 percent, compared to the state's rate of 20.6 percent.

About 30.7 percent of women of reproductive age (ages 18-44) in PHR 6/5S did not have health insurance; this was similar to the state's uninsured rate for this age

group (30.4 percent). Only two counties in the region had high proportions (36.6 percent or greater) of women aged 18-44 years without insurance. Also, the proportion of uninsured children younger than 6 years was 8.9 percent in PHR 6/5S, compared to 8.5 percent of the state as a whole. Five counties in the northern area of the region had high proportions (10.3 percent or greater) of uninsured children under 6 years of age.

Health Professionals

According to the most recent health professions data, there were 5,675 primary care physicians (PCPs) in PHR 6/5S in 2016, with a density of 77.2 PCPs per 100,000 residents [28]. The PCP density in the region was higher than that in the state as a whole (72.9 PCPs per 100,000). Urban-rural disparities in access to PCPs exist in the region. Urban counties in PHR 6/5S had a PCP density of 77.7 PCPs per 100,000 residents, compared with 57.5 PCPs per 100,000 residents in rural counties.

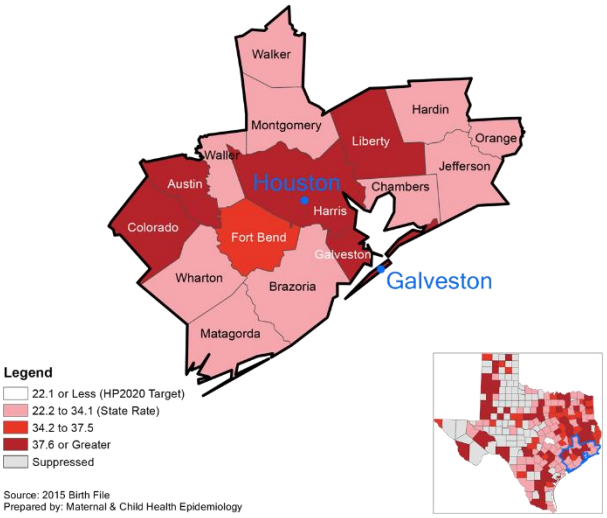
There were 765 obstetrics and/or gynecology specialists (OB/GYNs) in PHR 6/5S, with a density of 20.8 OB/GYNs per 100,000 female residents. The OB/GYN density in the region was higher than that in the state as whole (18.3 OB/GYNs per 100,000 females), and in fact, was the highest among all Texas regions. Four counties in PHR 6/5S had no OB/GYN in 2016. Overall, urban counties in the region (20.9 OB/GYNs per 100,000 females) had better access to these specialists than rural counties (17.3 OB/GYNs per 100,000 females).

Prenatal Care in the First Trimester

Receiving prenatal care in the first trimester is recommended for all pregnant women to enhance a healthy pregnancy. In 2015, only 63.4 percent of women delivering a live birth in PHR 6/5S entered prenatal care within the first trimester. This rate was lower than the state's rate of 65.9 percent, and did not meet the HP2020 target of 77.9 percent of pregnant women receiving prenatal care beginning in the first trimester of pregnancy. The proportion of mothers who began receiving prenatal care in the first trimester in the region has not changed much since 2006.

In 2015, about 73.1 percent of White mothers in PHR 6/5S received prenatal care beginning in the first trimester of pregnancy, compared with 55.1 percent of Black mothers, 59.3 percent of Hispanic mothers, and 65.2 percent of mothers classified as 'Other' race/ethnicity. Over the past decade, the proportion of women receiving prenatal care in the first trimester has increased among Hispanic mothers, but not among the other racial/ethnic groups.

Figure 3.6
Percent of Live Births Where the Mother Did Not Receive Prenatal Care in the First Trimester in PHR 6/5S, 2015



Late entry into prenatal care is a problem in PHR 6/5S. Five counties, including Harris County and Galveston County, had high proportions (37.6 percent or greater) of mothers not receiving prenatal care in the first trimester, when compared to the rest of the region (Figure 3.6). Among all PHR 6/5S counties with 100 or more documented live births in 2015, the percentage of live births where the mother had late entry into prenatal care ranged from 27.3 percent to 42.3 percent.

Prenatal Care as Early as Wanted and Barriers

Early and adequate prenatal care is extremely important for the health of both the mother and baby. Based on pooled 2011-2015 PRAMS data, about 79.8 percent (CI: 77.3-82.3) of women in PHR 6/5S indicated they received prenatal care as early as they wanted. The prevalence rate for this region was about the same as the statewide prevalence rate (79.1 percent, CI: 77.8-80.5).

Based on pooled 2011-2015 PRAMS data for PHR 6/5S, White/Other women reported a higher rate of receiving prenatal care as early as they wanted than Hispanic and Black women. White/Other women in PHR 6/5S reported about the same prevalence of receiving prenatal care as early as they wanted (84.4 percent, CI: 81.1-87.6) as White/Other women in Texas (83.9 percent, CI: 82.3-85.6). However, Hispanic women in the region reported a higher prevalence of receiving prenatal care as early as they wanted (77.5 percent, CI: 72.8-82.2) compared to Hispanic women in the state as a whole (76.1 percent, CI: 73.7-78.4). Black women in the region also reported about the same prevalence of receiving prenatal care as early as they wanted (75.2 percent, CI: 71.8-78.6) as Black women in Texas (75.0 percent, CI: 72.9-77.1).

Understanding barriers to prenatal care for women who did not get prenatal care as early as they wanted is also important. Based on pooled 2011-2015 PRAMS data, about 20.2 percent (CI: 17.7-22.7) of women in PHR 6/5S did not receive prenatal care as early as they wanted, and the five most frequently noted barriers were:
1) I didn't have enough money or insurance to pay for my visits;
2) I didn't have my Medicaid or Texas Health Steps card;
3) I didn't know that I was pregnant;

4) I couldn't get an appointment when I wanted one; and
5) I had too many other things going on.

Barriers to Maternal & Child Health Services

Many Texans face substantial barriers to accessing health care. Stakeholder feedback and identification of the needs and challenges, however, can lead to policy improvements and strategic planning initiatives for improving access.

A common theme that emerged from the 2014 Title V stakeholder meetings and focus groups with mothers in Houston was the high cost of health care and the difficulty to navigate the system to get the best care [22]. Many women seeking prenatal care during their first trimester often faced delays because of the long Medicaid approval process or the time it took to get other insurance coverage in place. Stakeholders also identified a lack of access to mental health services for women and children as a priority problem. Many behavioral health providers in PHR 6/5S did not participate in Medicaid or Children's Health Insurance Program due to reimbursement issues; and, the racial and cultural diversity in the area further complicated the access to services. Another barrier was the limited access to dental care for many children and women at multiple stages in their life and for uninsured individuals without the means to pay.

Most participants in the meetings agreed that coordination and continuity of care were regional priorities, as providers rarely coordinated among themselves and referrals often were made in an untimely manner or not at all. Many providers and families were unaware of available services and programs. It was a priority need to educate parents about child safety, parenting, and how to help their teenagers develop life skills as well as to inform pregnant women the importance of access to prenatal care. In addition, Houston women identified obesity as a top health concern. Some mothers addressed time constraints and the obligation to care for small children made physical activity challenging, some described losing weight they gained during their pregnancies was challenging, and others said the high cost of eating healthily made it challenging for them to follow a healthy diet.

Maternal Health

Maternal well-being is important to the health of children and families. Selected health indicators for women before and during pregnancy are discussed, including obesity, hypertension & diabetes, smoking, drinking, physical abuse, postpartum depression, and postpartum checkup.

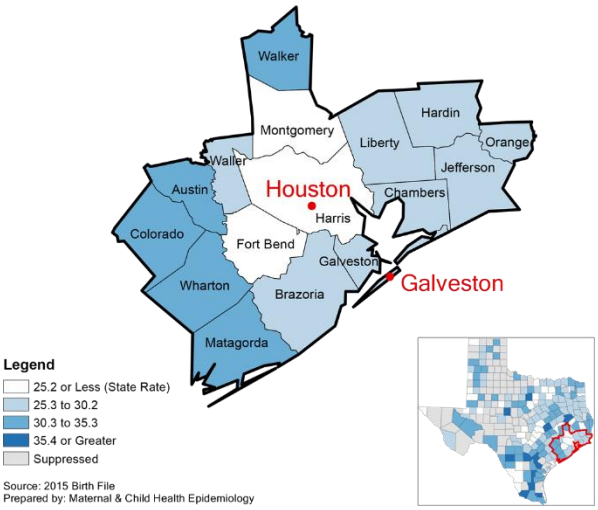
Pre-pregnancy Obesity

Obesity among women of reproductive age is of major concern, because of its association with multiple adverse maternal and infant health outcomes. In 2015, about 24.7 percent of women in PHR 6/5S were obese before becoming pregnant, slightly lower than the state's rate of 25.2 percent. The region's pre-pregnancy obesity rate has increased from 19.4 percent in 2006.

Black mothers in PHR 6/5S had the highest rate of pre-pregnancy obesity in 2015 (31.7 percent), followed by Hispanic mothers (27.4 percent), White mothers (21.3 percent), and mothers of 'Other' race/ethnicity (10.4 percent). The region's pre-pregnancy obesity rate was lower than the corresponding state rate among all racial/ethnic groups, except for Black mothers. However, since 2006, the pre-pregnancy obesity rate in PHR 6/5S has risen most sharply among mothers of 'Other' race/ethnicity (an 82.5 percent increase). In comparison, the pre-pregnancy obesity rate has increased by two-fifths among Hispanic mothers and by one-fifth among Black and White mothers over the past decade.

Pre-pregnancy obesity rates vary by county in PHR 6/5S. Three counties in the region had pre-pregnancy obesity rates lower than the state's rate (Figure 3.7). Among all PHR 6/5S counties with 100 or more documented births in 2015, pre-pregnancy obesity rates ranged from 20.0 percent to 34.7 percent. Overall, mothers in rural counties in the region (32.6 percent) experienced a much higher rate of pre-pregnancy obesity than their urban counterparts (24.6 percent).

Figure 3.7
Percent of Live Births Where the Mother was Obese in PHR 6/5S, 2015



Maternal Hypertension & Diabetes

Hypertension (high blood pressure) and diabetes are two common maternal health problems a woman may experience during pregnancy. The 2015 birth certificate data showed that in PHR 6/5S, about 7.7 percent of all live births were to mothers with some form of hypertension, and 6.1 percent of all live births were to mothers who had diabetes (these mothers either had hypertension or diabetes pre-pregnancy, or developed the condition over the course of the pregnancy). Both rates in the region were slightly higher than the state's rate of maternal hypertension (7.4 percent) and maternal diabetes (5.5 percent), respectively. Over the past decade, the maternal hypertension rate has increased by more than one-third in the region, while the maternal diabetes rate has remained stable.

Rates of maternal hypertension and diabetes vary by race/ethnicity. In 2015, Black mothers in PHR 6/5S had the highest rate of maternal hypertension (10.9 percent), followed by White mothers (8.2 percent), Hispanics mothers (6.6 percent), and mothers of 'Other' race/ethnicity (4.7 percent). From 2006 to 2015, increases in maternal hypertension rates were observed among all racial/ethnic groups. In contrast, mothers of 'Other' race/ethnicity in PHR 6/5S had the highest rate of maternal diabetes (8.3 percent), followed by Hispanic mothers (7.2 percent) and Black and White mothers (4.5-5.0 percent). Over the past decade, the maternal diabetes rate has increased among Hispanic mothers, but not among the other racial/ethnic groups in the region.

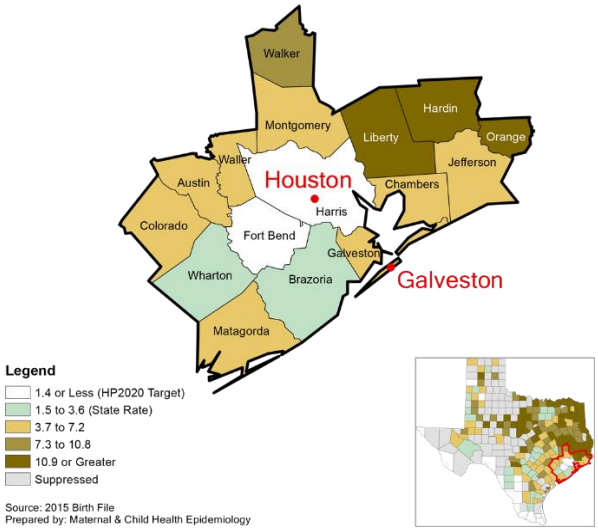
Both large communities in PHR 6/5S, Beaumont-Port Arthur (8.7 percent) and Galveston (8.3 percent), had high percentages of babies where the mother had some form of hypertension in 2015. Overall, mothers in rural counties in PHR 6/5S (9.4 percent) experienced a higher prevalence of maternal hypertension than their urban counterparts (7.6 percent). While the Houston-The Woodlands community (6.2 percent) reported a higher rate of maternal diabetes than the state as a whole, the Galveston community (4.8 percent) had a lower maternal diabetes rate than the state. Small urban/rural differences in the prevalence of maternal diabetes were observed in the region.

Smoking During Pregnancy

Smoking while pregnant has also been linked with many health problems, including premature birth, low birth weight, birth defects, and infant death. In PHR 6/5S, only 2.5 percent of women who gave birth in 2015 smoked during pregnancy. This region's rate was lower than the statewide rate of 3.6 percent. The percentage of live births where mothers smoked during pregnancy in the region has decreased from 5.0 percent in 2006.

Of all racial/ethnic groups in PHR 6/5S, White women have the highest percentage of maternal smoking. In 2015, White women (5.8 percent) had a rate of smoking during pregnancy that was three times that of Black women (2.2 percent). Both Hispanic women (0.6 percent) and women of 'Other' race/ethnicity (0.7 percent) in the region are currently meeting the HP2020 target of at least 98.6 percent abstinence from smoking during pregnancy. From 2006 to 2015, sizable decreases in rates of smoking during pregnancy were observed among all racial/ethnic groups in the region.

Figure 3.8
Percent of Live Births Where the Mother Smoked During Pregnancy in PHR 6/5S, 2015



Geographic variation exists in rates of smoking during pregnancy. In 2015, two counties in PHR 6/5S had low rates of smoking during pregnancy (1.4 percent or less) that met the HP2020 target, while three counties in the northern part of the region had high rates of smoking during pregnancy (10.9 percent or greater) (Figure 3.8). Among all PHR 6/5S counties with 100 or more documented births in 2015, smoking rates during pregnancy ranged from 0.8 percent to 14.9 percent. Overall, women in rural counties in the region (5.6 percent) had a higher prevalence of smoking during pregnancy than their counterparts in urban counties (2.4 percent).

Drinking During Pregnancy

Alcohol use during pregnancy has been associated with several adverse birth outcomes. Based on pooled 2011-2015 PRAMS data, 7.6 percent (CI: 6.1-9.1) of women in PHR 6/5S reported drinking in the last three months of pregnancy. The prevalence rate for this region was about the same as the statewide prevalence rate (7.8 percent, CI: 7.0-8.7).

Based on pooled 2011-2015 PRAMS data for PHR 6/5S, White/Other women reported a higher rate of drinking in the last three months of pregnancy than Black and Hispanic women. White/Other women in PHR 6/5S reported about the same rate of drinking in the last three months of pregnancy (10.0 percent, CI: 7.4-12.6) as White/Other women in Texas (10.2 percent, CI: 8.8-11.5). However, Black women in the region reported a higher rate of drinking in the last three months of pregnancy (8.4 percent, CI: 6.2-10.6) compared to Black women in Texas (7.4 percent, CI: 6.1-8.6). Hispanic women in the region reported about the same rate of drinking in the last three months of pregnancy (5.1 percent, CI: 2.8-7.4) as Hispanic women in the state as a whole (6.0 percent, CI: 4.7-7.2).

Physical Abuse Before/During Pregnancy

Physical abuse before and/or during pregnancy has been associated with adverse outcomes for the mother and the infant. Based on pooled 2011-2015 PRAMS data, 3.8 percent (CI: 2.7-4.9) of women in PHR 6/5S reported experiencing physical

abuse before and/or during pregnancy. The prevalence rate for this region was about the same as the statewide prevalence rate (4.0 percent, CI: 3.4-4.6).

Based on pooled 2011-2015 PRAMS data for PHR 6/5S, Black women reported a higher rate of physical abuse before and/or during pregnancy than White/Other and Hispanic women. Black women in PHR 6/5S reported about the same rate of physical abuse before and/or during pregnancy (5.1 percent, CI: 3.3-6.8) as Black women in Texas (5.4 percent, CI: 4.3-6.5). However, White/Other women in the region reported a higher rate of physical abuse before and/or during pregnancy (4.1 percent, CI: 2.4-5.8) compared to White/Other women in Texas (2.9 percent, CI: 2.2-3.7). On the other hand, Hispanic women in the region reported a lower rate of physical abuse before and/or during pregnancy (3.0 percent, CI: 1.3-4.8) compared to Hispanic women in Texas (4.6 percent, CI: 3.5-5.7).

Postpartum Depression

Postpartum depression (PPD) has been associated with adverse health outcomes for mothers and infants. Based on pooled 2012-2015 PRAMS data, 15.7 percent (CI: 13.3-18.2) of women in PHR 6/5S reported PPD symptoms. The prevalence rate for this region was higher than the statewide prevalence rate (13.8 percent, CI: 12.6-15.1). PHR 6/5S, along with PHR 11, had the highest prevalence of PPD symptoms among all PHRs in Texas.

Based on pooled 2012-2015 PRAMS data for PHR 6/5S, Black women reported a higher rate of PPD symptoms than White/Other and Hispanic women. Black women in PHR 6/5S reported a higher rate of PPD symptoms (21.9 percent, CI: 18.2-25.6) compared to Black women in Texas (19.4 percent, CI: 17.2-21.5). White/Other women in the region also reported a higher rate of PPD symptoms (15.0 percent, CI: 11.5-18.6) compared to White/Other women in Texas (12.4 percent, CI: 10.7-14.1). However, Hispanic women in the region reported about the same rate of PPD symptoms (14.0 percent, CI: 9.5-18.4) as Hispanic women in Texas (13.7 percent, CI: 11.6-15.8).

Postpartum Checkup

Postpartum visits are important for screening and assessing the health of the mother. Based on pooled 2011-2015 PRAMS data, 86.0 percent (CI: 83.8-88.2) of women in PHR 6/5S reported a postpartum checkup. The prevalence rate for this region was the same as the statewide prevalence rate (86.0 percent, CI: 84.9-87.2).

Based on pooled 2011-2015 PRAMS data for PHR 6/5S, White/Other women reported a higher postpartum visit rate than Black and Hispanic women.

White/Other women in PHR 6/5S reported about the same postpartum visit rate (91.4 percent, CI: 89.0-93.9) as White/Other women in Texas (91.3 percent, CI: 90.0-92.6). However, Black women in the region reported a lower postpartum visit rate (83.8 percent, CI: 80.9-86.8) compared to Black women in Texas (84.8 percent, CI: 83.0-86.6). Hispanic women in the region also reported about the same postpartum visit rate (81.9 percent, CI: 77.6-86.2) as Hispanic women in the state as a whole (81.8 percent, CI: 79.7-83.9).

Infant Health Practices

Protecting and improving the well-being of infants is an important task. Known protective infant health practices are addressed in this section, such as breastfeeding, safe infant sleep, and well-baby checkup.

Breastfeeding

Breastfeeding protects babies from infections and illnesses, reduces the risk of sudden infant death syndrome, and also has many health benefits for mothers. Based on pooled 2011-2015 PRAMS data, 88.0 percent (CI: 86.1-89.9) of women in PHR 6/5S reported ever breastfeeding. The prevalence rate for this region was about the same as the statewide prevalence rate (87.4 percent, CI: 86.3-88.5).

Based on pooled 2011-2015 PRAMS data for PHR 6/5S, Hispanic women and White/Other women reported higher rates of ever breastfeeding than Black women. Hispanic women in PHR 6/5S (91.3 percent, CI: 88.2-94.5) reported a higher rate of ever breastfeeding compared to Hispanic women in Texas (88.2 percent, CI: 86.4-90.0). White/Other women in the region (89.4 percent, CI: 86.5-92.3), however, reported the same rate of ever breastfeeding compared to White/Other women in Texas (89.4 percent, CI: 88.0-90.9). On the other hand, Black women in the region (75.5 percent, CI: 72.0-79.0) reported a lower rate of ever breastfeeding compared to Black women in the state as a whole (76.6 percent, CI: 74.5-78.8).

In addition, based on pooled 2011-2015 PRAMS data for PHR 6/5S, the five most frequently noted hospital experiences that women had about breastfeeding were:
1) Hospital staff gave me information about breastfeeding;
2) I breastfed my baby in the hospital;
3) My baby stayed in the same room with me at the hospital;
4) Hospital staff helped me learn how to breastfeed; and
5) The hospital gave me a telephone number to call for help with breastfeeding.

PRAMS does not collect data on exclusive breastfeeding, but according to the 2016 WIC IFPS survey for Texas, 15.4 percent (CI: 13.0-17.9) of WIC participants in PHR

6/5S exclusively breastfed their child for the first three months. This rate was lower than the state's rate of exclusive breastfeeding for the first three months among WIC participants (18.4 percent, CI: 17.2-19.6), and was the lowest rate among all PHRs in Texas. Also, about 4.5 percent (CI: 2.9-6.1) of WIC participants in PHR 6/5S exclusively breastfed their child for the first six months; this was lower than the state's rate of 6.0 percent (CI: 5.1-6.8).

Safe Infant Sleep

To reduce the risk of SIDS and other sleep-related deaths, infants should be placed on their backs to sleep. Based on pooled 2011-2015 PRAMS data, 68.8 percent (CI: 66.1-71.6) of women in PHR 6/5S reported placing their infants to sleep on their backs. The prevalence rate for this region was lower than the statewide prevalence rate (70.8 percent, CI: 69.3-72.2).

Racial/ethnic disparities exist in infant safe sleep practices. Based on pooled 2011-2015 PRAMS data for PHR 6/5S, White/Other women reported a higher rate of placing their infants to sleep on their backs than Hispanic and Black women. White/Other women in PHR 6/5S reported the same rate of placing infants to sleep on their backs (77.0 percent, CI: 73.3-80.7) as White/Other women in Texas (77.0 percent, CI: 75.1-78.9). Hispanic women in the region also reported about the same rate of placing infants to sleep on their backs (70.8 percent, CI: 65.7-75.9) as Hispanic women in Texas (70.6 percent, CI: 68.1-73.1). However, Black women in the region reported a lower rate of placing infants to sleep on their backs (43.4 percent, CI: 39.3-47.4) compared to Black women in the state as a whole (48.2 percent, CI: 45.7-50.7).

Well-baby Checkup

Well-baby visits are important for screening and assessing the health of an infant. Based on pooled 2011-2015 PRAMS data, 97.7 percent (CI: 96.7-98.8) of women in PHR 6/5S reported a well-baby checkup. The prevalence rate for this region was about the same as the statewide prevalence rate (97.6 percent, CI: 97.1-98.1).

Based on pooled 2011-2015 PRAMS data for PHR 6/5S, White/Other women and Black women reported higher well-baby checkup rates than Hispanic women. White/Other women in PHR 6/5S reported about the same well-baby checkup rate (98.7 percent, CI: 97.8-99.7) as White/Other women in Texas (98.1 percent, CI: 97.4-98.7). However, Black women in the region reported a higher well-baby checkup rate (98.5 percent, CI: 97.5-99.5) compared to Black women in Texas (97.4 percent, CI: 96.6-98.2). Hispanic women in the region also reported about the same well-baby checkup rate (96.6 percent, CI: 94.5-98.7) as Hispanic women in Texas (97.3 percent, CI: 96.4-98.2).

Perinatal Periods of Risk

In order to provide communities and stakeholders more in-depth information to help reduce infant mortality, a comprehensive Perinatal Periods of Risk (PPOR) approach for PHR 6/5S was undertaken. PPOR gives analytic steps to investigate and address the specific causes of high fetal and infant mortality rates and disparities among study populations (such as Whites, Blacks, Hispanics, and Teens). Both Phase I and Phase II analyses were conducted. PPOR analysis results are provided in this report, along with practicable recommendations.

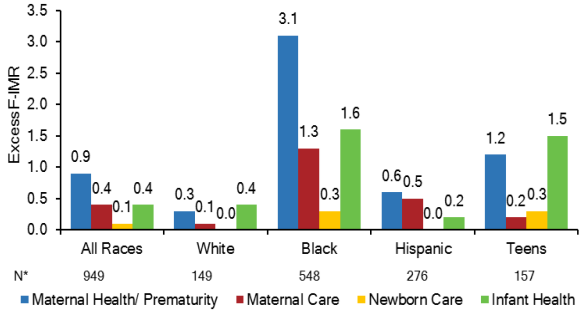
PPOR examines the risk of feto-infant mortality during different perinatal periods. Based on birth weight and age at death, fetal and infant deaths are partitioned into four corresponding risk periods: maternal health/prematurity, maternal care, newborn care, and infant health. Each of these periods has different risk factors and causes of death, and subsequently, different opportunities for prevention. Therefore, the four risk periods represent distinct points of intervention in the health care continuum (see PPOR Section in Overview of Texas).

Phase I Analysis

PHR 6/5S and specific study populations (i.e., Black, White, Hispanic, or teens) were compared to a state-level reference group generally known to have better feto-infant mortality outcomes (i.e., non-Hispanic White women who are at least 20 years of age and have 13+ years of education). These study populations are not mutually exclusive. The feto-infant mortality rate (F-IMR) is calculated as the number of fetal and infant deaths per 1,000 live births and fetal deaths. The excess F-IMR is the difference in F-IMR between the study population and the reference group.

Figure 3.9

Excess Feto-Infant Mortality Rates (F-IMR), Region 6/5S (2010-2014)



*N is the number of excess fetal and infant deaths for each of the groups shown.
Source: 2010-2014 Linked Birth Infant Death Files
Prepared by: Maternal & Child Health Epidemiology

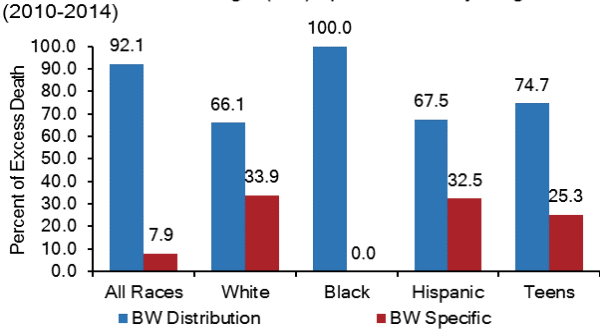
In PHR 6/5S, 2010-2014 F-IMRs were 6.1 per 1,000 for White mothers, 11.5 per 1,000 for Black mothers, 6.5 per 1,000 for Hispanic mothers, and 8.5 per 1,000 for teen mothers. Black mothers experienced a total of 6.3 excess fetal and infant deaths per 1,000 live births and fetal deaths in 2010-2014 (Figure 3.9). Total excess F-IMRs for White mothers, Hispanic mothers, and teen mothers were 0.9 per 1,000, 1.3 per 1,000, and 3.3 per 1,000, respectively.

Black women had the highest excess F-IMRs for three of the four perinatal risk periods, with 55 percent of all Black fetal and infant deaths being potentially preventable (i.e. excess fetal and infant deaths). Moreover, 50 percent of the overall excess Black fetal and infant deaths occurred in the Maternal Health/Prematurity risk period. For teen mothers, 83 percent of excess feto-infant deaths occurred in the Maternal Health/Prematurity and Infant Health risk periods.

Phase II Analysis

For fetal and infant deaths occurring in the Maternal Health/Prematurity risk period, a Kitagawa analysis was conducted for each study population, to examine whether excess feto-infant mortality was primarily due to a greater number of very low birth weight (VLBW) births in the study population compared to the reference population (a difference in birth weight distribution), or to a higher mortality rate among VLBW infants than seen in the reference population (a difference in birth weight specific mortality). The percentage of excess deaths attributable to a difference in birth weight distribution compared with the percentage attributable to a difference in birth weight specific mortality rates in PHR 6/5S are shown in Figure 3.10 for each study population.

Figure 3.10
Percent of Excess Death Attributable to Birth Weight (BW) Distribution vs. Birth Weight (BW) Specific Mortality, Region 6/5S (2010-2014)



Source: 2010-2014 Linked Birth Infant Death Files
Prepared by: Maternal & Child Health Epidemiology

Overall, as well as for all study populations, the majority of excess Maternal Health/Prematurity risk period deaths in PHR 6/5S were attributable to a greater number of VLBW births in these groups when compared to the reference population. Notably, Black infants (0 percent) had lower mortality rates among VLBW births than the reference population; for this subgroup, all excess deaths (100 percent) were potentially attributable to a greater number of VLBW births (Figure 3.10). Especially for infants born to Black mothers, interventions aimed at reducing the number of VLBW births are likely to be most effective at closing the gap in feto-infant mortality. For infants born to White mothers, Hispanic mothers, and teen mothers, some proportion of excess feto-infant death was also attributable to a higher mortality rate among VLBW births than the reference population.

To examine differences in *birth weight distribution* during the Maternal Health/Prematurity risk period, a multivariable logistic regression analysis was conducted to identify factors associated with risk of delivering a VLBW baby. Factors examined included maternal demographic factors (race/ethnicity, age, and

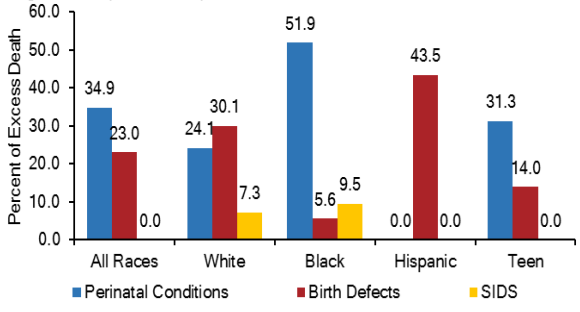
education), multiple gestations, smoking during pregnancy, high parity for age, previous preterm birth, maternal weight gain during pregnancy, adequacy of prenatal care, trimester prenatal care began, and payment source for the delivery.

Factors that contributed the most to risk of a VLBW birth in PHR 6/5S included weight gain less than 15 pounds and inadequate prenatal care. Approximately 19 percent of all VLBW births were attributable to weight gain less than 15 pounds. Four percent of all VLBW births could be attributed to inadequate prenatal care. All study populations were more likely to gain less than 15 pounds or receive inadequate prenatal care compared to the reference population.

To identify factors related to *birth weight specific mortality* in the Maternal Health/Prematurity risk period, an analysis was also performed to assess risk of infant death among VLBW births. Factors examined in this analysis included maternal demographics, congenital anomalies, inadequate prenatal care, maternal diabetes, maternal hypertension, infant transfer, maternal transfer, respiratory care, ruptured membranes, and prenatal steroids. Inadequate prenatal care and congenital anomalies contributed the most to infant mortality among VLBW births in PHR 6/5S. Specifically, 4 percent of infant deaths to this group were attributable to inadequate prenatal care, and 2 percent of deaths were attributable to congenital anomalies. Compared to the reference population, all study populations were less likely to receive adequate prenatal care compared to the reference population.

Among all infant deaths in the Infant Health risk period, perinatal conditions were the primary cause of death, accounting for 35 percent of excess infant deaths in PHR 6/5S (Figure 3.11). Of the subgroups examined, Black infants and infants born to teen mothers had the greatest excess infant mortality in this risk period, with perinatal conditions accounting for a large proportion of excess infant deaths in the region. SIDS contributed to 10 percent of excess deaths among Black infants and to 7 percent of excess deaths among White infants. Birth defects accounted for 30 percent of excess deaths among White infants and for 14 percent of excess infant deaths to teen mothers.

Figure 3.11
Excess Infant Health-Related Death by Race/Ethnicity and Cause, Region 6/5S (2010-2014)



Source: 2010-2014 Linked Birth Infant Death Files
Prepared by: Maternal & Child Health Epidemiology

To further examine excess mortality in the Infant Health risk period, an analysis was conducted to determine risk factors associated with infant death among infants 28 days and older. Maternal demographic factors, smoking during pregnancy, adequacy of prenatal care, breastfeeding status at hospital discharge, and trimester

prenatal care began were all examined. Not receiving prenatal care in the first trimester and breastfeeding had the greatest impact on overall risk of infant death during this time period. Among PHR 6/5S infants 28 days and older, infants who were breastfed at hospital discharge had an 11 percent *reduced* risk of infant death, and about 4 percent of infant deaths were attributable to not receiving prenatal care during the first trimester.

Recommendations

Phase I analyses identified the populations and periods of risk with the largest excess feto-infant mortality compared to the reference population. In PHR 6/5S, the period of risk and study population with the highest excess feto-infant mortality rate, and thus the greatest opportunity for potential impact, was the Maternal Health/Prematurity risk period among the Black population. Interventions should also be targeted to Black populations for Maternal Care and Infant Health-related deaths. Among teen mothers, interventions should focus on Maternal Health/Prematurity and Infant Health-related deaths. Maternal Health/Prematurity-related deaths should be targeted among the Hispanic population, while Infant Health-related deaths should be the focus among the White population.

Phase II analyses identified modifiable risk factors that contributed the most to excess feto-infant mortality. To reduce excess feto-infant mortality in the Maternal Health/Prematurity period of risk, interventions in PHR 6/5S should focus on improving access to and use of prenatal care; reducing the number of women gaining less than 15 pounds during pregnancy; and reducing rates of congenital anomalies. Interventions likely to be most effective in reducing Infant Health-related excess feto-infant mortality include reducing prematurity among all race groups; reducing birth defects among White infants and infants born to teen mothers; increasing rates of breastfeeding; reducing SIDS among Black infants and White infants; and increasing access to prenatal care.

For your convenience, a companion PPOR fact sheet for PHR 6/5S, 2010-2014 can be found at this website:
https://www.dshs.texas.gov/healthytexasbabies/data.aspx

Summary Table: Selected Health Indicators in PHR 6/5S

Lastly, a summary table for selected health indicators from 2006 to 2015 is presented below, to help easily monitor/depict regional trends.

	Public Health Region 6/5S											Texas
Indicators	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**10-Year Trend**	**2015**
Birth Rate [a]	17.0	17.0	16.9	16.7	15.6	14.8	14.9	14.8	15.1	15.3		14.7
Maternal Age (in Years)	26.9	27.0	27.1	27.2	27.4	27.6	27.8	27.9	28.1	28.3		27.7
Teen Birth Rate [b]	53.6	54.2	54.2	51.7	47.8	42.0	38.2	35.8	32.4	30.0		33.0
Infant Mortality Rate [c]	6.1	5.9	6.0	6.1	6.0	5.5	5.7	6.2	5.8	5.6		5.6
Preterm Birth [d]	11.3	11.5	11.6	11.6	11.4	11.1	11.0	10.9	10.8	10.7		10.2
Low Birth Weight [d]	8.7	8.7	8.7	8.9	8.7	8.8	8.6	8.6	8.5	8.5		8.3
Prenatal Care in the 1st Trimester of Pregnancy [d]	63.8	61.0	60.0	59.2	61.0	63.5	63.3	63.7	62.4	63.4		65.9
Pre-Pregnancy Obesity [d]	19.4	20.6	21.5	22.0	23.0	23.1	23.3	24.2	24.1	24.7		25.2
Maternal Hypertension [d]	5.7	5.3	5.7	5.9	6.5	6.7	6.5	6.7	6.9	7.7		7.4
Maternal Diabetes [d]	5.7	5.5	5.4	5.0	5.1	5.6	5.4	5.5	6.1	6.1		5.5
Smoking During Pregnancy [d]	5.0	4.6	4.4	4.1	3.8	3.3	3.3	3.0	2.6	2.5		3.6

[a] Live births per 1,000 population
[b] Live births per 1,000 teen females (aged 15-19)
[c] Deaths per 1,000 live births
[d] Percent of live births
Sources: 2006-2015 Texas Birth and Death files, Center for Health Statistics, DSHS; 2006-2015 Texas Population Estimates, Texas Demographic Center.

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