TEXAS
Department of
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Cardiovascular Disease in Texas 2012

Acknowledgements

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Table of Contents

Table of Contents

Table of Contents

List of Figures and Tables

Figures

List of Figures and Tables

List of Figures and Tables

List of Figures and Tables

List of Figures and Tables

Tables

Executive Summary

Prevalence

- In 2010, an estimated 8.3 percent of adult Texans 18 years or older reported they had been diagnosed with heart disease or stroke.
- Approximately 1.5 million adults in Texas were living with cardiovascular disease (CVD) in 2010.
- In 2010, male adults had a significantly higher prevalence of heart disease and heart attack compared to female adults in Texas.
- The prevalence of CVD, heart disease, and stroke among adults in Texas increased significantly as annual household income levels decreased.

Mortality

- From 2006 to 2010, the age-adjusted mortality rate (AAMR) for CVD, ischemic heart disease (IHD), and heart attack decreased significantly among males, females, white non-Hispanic (NH), African American NH, and Hispanic populations in Texas.
- In 2010, males had a significantly higher AAMR for CVD, IHD, and heart attack than females in Texas.
- In 2010, females had a significantly higher AAMR for stroke than males in Texas.
- The African American NH population had the highest age-adjusted mortality rate for CVD, IHD, and stroke among all racial/ethnic populations in Texas.

Hospitalizations

- From 2006 to 2010, the age-adjusted hospitalization rate for CVD and IHD in Texas declined significantly each year.
- The other NH population had the highest age-adjusted hospitalization rate for CVD, IHD, and stroke among all racial/ethnic populations in Texas in 2010.
- The African American NH population had the highest age-adjusted hospitalization rate for congestive heart failure (CHF) in Texas in 2010.
- In 2010, the total hospital charges for CVD was $19.9 billion, accounting for nearly one fourth (23.3%) of the total hospital charges in Texas.

Risk Factor Prevalence

- In 2009, about three in ten adults (29.1%) in Texas had high blood pressure.
- In 2009, about four in ten adults (40.9%) in Texas had high blood cholesterol.
- From 1999 to 2009, the prevalence of high blood pressure and high blood cholesterol among adults in Texas increased by 20.2 percent and 32.4 percent, respectively.
- In 2010, about two in three adults (66.6%) in Texas were overweight or obese in 2010.
- In 2010, an estimated 15.8 percent of adults in Texas were current cigarette smokers. From 1999 to 2009, the prevalence of current cigarette smoking among adults in Texas declined by 29.5 percent.
- In 2010, about one in ten adults (9.7%) in Texas had diabetes. The prevalence of diabetes increased by 56.5 percent between 2000 and 2010.
- In 2009, about three out of four adults (76.2%) in Texas consumed fewer than five servings of fruits and vegetables per day.
- In 2010, more than one in four adults (26.6%) in Texas reported no leisure time physical activity outside of work in the past

Executive Summary

month.
- The African American NH population had the highest prevalence of high blood pressure (2009) and diabetes (2010) among adults as compared to white NH and Hispanic populations in Texas.
- Male adults had significantly higher prevalence of current cigarette smoking, overweight or obesity, and consuming less than five servings of fruits and vegetables per day than female adults in Texas.
- Texas adults who reported having CVD had a significantly higher prevalence of high blood pressure, high cholesterol, diabetes, overweight or obesity, and no leisure time physical activity than those who did not have CVD.
- Texas adults who reported having a stroke had signficantly higher prevalence of high blood pressure, high cholesterol, diabetes, and no leisure time physical activity than those who did not have stroke.
- Public Health Region (PHR) 4 had the highest age-adjusted prevalence of current cigarette smoking among adults as compared to all PHRs in 2010. This was also significantly higher than the state age-adjusted prevalence.
- PHR 5 had the highest age-adjusted prevalence of diabetes among adults in Texas, followed by PHR 11. PHRs 5 and 11 had significantly higher age-adjusted prevalence of diabetes than PHRs 3, 6, 7, and 9, and the state average.
- All Texas PHRs had overweight and obesity prevalence estimates above 60 percent for adults.
- PHRs 4 and 5 had significantly higher age-adjusted prevalence of consuming less than five servings of fruits and vegetables per day among adults than the state average.
- Texas had significantly higher prevalence of high blood cholesterol (2009), overweight and obesity (2010), no leisure time physical activity (2010) among adults than the U.S.

Quality of Life

- Adults with CVD had significantly higher prevalence of reporting fair or poor general health, poor physical health for five or more days in the past month, poor mental health for five or more days in the past month compared to adults without CVD.

Emergency Medical Services (EMS)

- The average EMS response time for CVD in Health Service Region (HSR) 11 increased from 7.6 minutes in 2006 to 13.4 in 2008.
- The average EMS response time for stroke in HSR 11 jumped from 8.8 minutes in 2006 to 27.7 minutes in 2008.
- HSR 11 had the longest response time for CVD and stroke compared to other HSRs in 2007 and 2008.

References

1. Texas Behavioral Risk Factor Surveillance System, Texas Department of State Health Services.
2. 2010 Population Finder, U.S. Census.
3. Texas Vital Statistics, Center for Health Statistics, Texas Department of State Health Services.
4. Texas Health Care Information Collection, Texas Department of State Health Services.
5. Environmental Epidemiology and Injury Surveillance, Texas Department of State Health Services.

Chapter 1. Introduction

Cardiovascular disease is the leading cause of death, both in Texas and the nation.[1,2] In 2010, heart disease and stroke were, respectively, the first and third leading causes of death in Texas.[2] According to the American Heart Association (AHA), 2008 mortality data showed that nearly 2,200 Americans died of CVD each day, an average of one death every 39 seconds.[3] Although the age-adjusted mortality rate (AAMR) for CVD in Texas declined by 30.7 percent between 2000 (352.4 per 100,000) and 2010 (244.3 per 100,000), CVD accounted for 30.5 percent (50,711) of all deaths in Texas in 2010. While deaths due to CVD mainly affect the elderly, 23.2 percent of CVD related deaths in Texas occurred before age 65.[2]

According to the 2010 Texas Behavioral Risk Factor Surveillance System (BRFSS) survey, an estimated 1.5 million or 8.3% of adult Texans reported having been diagnosed with heart disease or stroke.[4,5] In addition to causing death, disability, and illness, the social and economic impact of CVD in the society is significant. The National Heart, Lung, and Blood Institute (NHLBI) estimated the direct and indirect costs of CVD in the United States (U.S.) in 2008 totaled $297.7 billion.[3] In 2010, the total hospital charges for CVD was $19.9 billion, accounting for nearly one fourth (23.3%) of the total hospital charges in Texas.[6]

CVD and multiple risk factors for CVD disproportionately affect the elderly, minority, and low-income populations. In Texas, 60.7 percent of deaths due to CVD occurred among persons age 75 and older. Despite significant decreases in CVD mortality rates, racial/ethnic disparities persist. The African American NH population had significantly higher AAMR for ischemic heart disease and stroke than white NH, Hispanics, and other NH (individuals who reported their race as Asian or Pacific Islander, American Indian or Alaskan Native or Other and their ethnicity as non-Hispanic) populations. There was an increasing gradient in prevalence of CVD, heart disease, stroke, diabetes, and no leisure time physical activity among adults in Texas as annual household income levels decreased.

The African American NH population reported significantly higher prevalence of stroke, diabetes, and high blood pressure compared to white NH and Hispanics in 2010. The other NH population had significantly higher age-adjusted hospitalization rates for CVD, IHD, and stroke than all racial/ethnic populations. Geographic disparities were also observed; significantly higher prevalence of diabetes and no leisure time physical activity were observed in East Texas (PHRs 4 and 5) and the south border (PHR 11) areas of Texas.

Between 1999 and 2010, while there was a significant decline in the prevalence of current cigarette smoking, there was a significant increase observed in the prevalence of high blood pressure, high blood cholesterol, diabetes, and overweight and obesity among adults in Texas. Furthermore, adults with CVD had significantly higher prevalence of risk factors including high blood pressure, high blood cholesterol, diabetes, overweight and obesity, and no leisure time physical activity than adults without CVD.

Chapter 1. Introduction

This report provides further details on mortality, prevalence, and hospitalization trends for CVD, heart disease, stroke, congestive heart failure, as well as prevalence trends of associated risk factors in Texas. Rates are compared across demographically and geographically diverse populations to identify disparities. The report also includes data relevant to the heart and stroke system of care, such as recognition of signs and symptoms of heart attack and stroke, calling 9-1-1, and emergency medical service response times related to CVD and stroke.

Through the guidance of the Texas Council on Cardiovascular Disease and Stroke, the Texas Cardiovascular Disease and Stroke Program at the Department of State Health Services (DSHS) has continuously collected and provided CVD health and hospital cost data and made resources available to statewide partners. This surveillance report describes the magnitude of the burden of CVD and monitors disease and risk factor trends over time in Texas. These data serve as benchmarks and indicators of progress toward stated goals and objectives outlined in the Texas Plan to Reduce Cardiovascular Disease and Stroke.

The Texas Cardiovascular Disease and Stroke Program of DSHS compiled the most relevant and useful data currently available into this report to better meet the needs of statewide partners working to reduce CVD. We hope this report will serve as a unique resource to assist current and future partners in planning and evaluating effective programs and activities to reduce the medical and social costs of CVD in worksites, healthcare sites, schools, and communities across the state.

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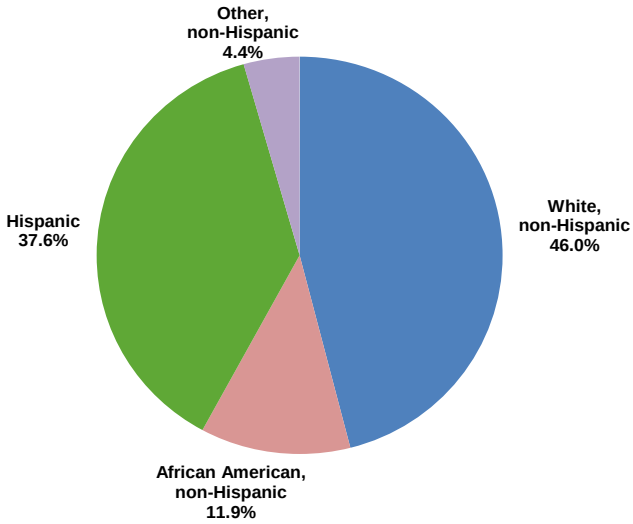
Chapter 2. Texas Demographics

I. Race/Ethnicity, Gender, and Age Distribution

In 2010, Texas was the second most populous state in the U.S. with an estimated population of 25,145,561.[7]

Figure 1. Race/Ethnic Distribution, Texas, 2010

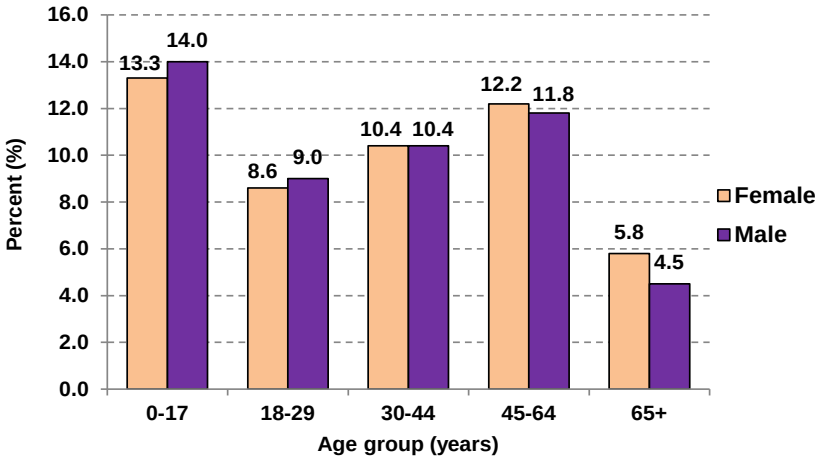
Texas has a racially/ethnically diverse population. In 2010, less than one-half (46.0%) of the population were white NH. Hispanics accounted for nearly two-fifths (37.6 %) of the Texas population compared to 16.3 percent of the U.S. population. Between 2000 and 2010, the Hispanic population in Texas increased by 41.8 percent. More than one in ten (11.9%) were African American NH. Other NH, which includes Asian, Pacific Islander, American Indian, Alaska Native, or other, comprised 4.4 percent of Texas' population (Figure 1).



Data Source: Center for Health Statistics, DSHS

In 2010, more than one in four Texans or 27.3 percent of the Texas population were under 18 years, less than one-fifth (17.6%) were aged 18-29, more than four in ten (44.8%) were aged 30-64, and one in 10 (10.3%) was aged 65 or older (Figure 2).

Figure 2. Age and Gender Distribution, Texas, 2010



Data Source: Center for Health Statistics, DSHS

Chapter 2. Texas Demographics

II. Race/Ethnicity Distribution by Geographic Location

Figure 3. White, non-Hispanic

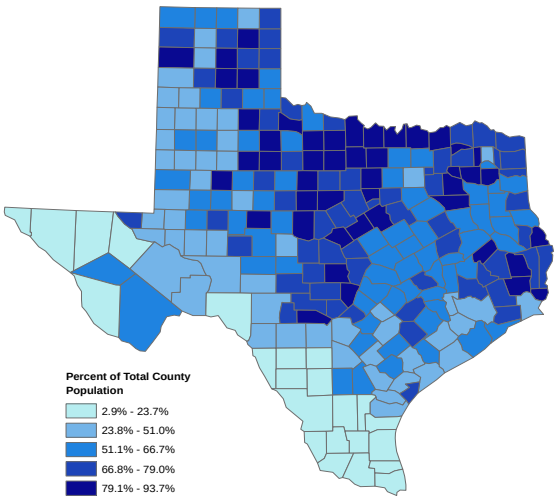


Figure 4. African American, non-Hispanic

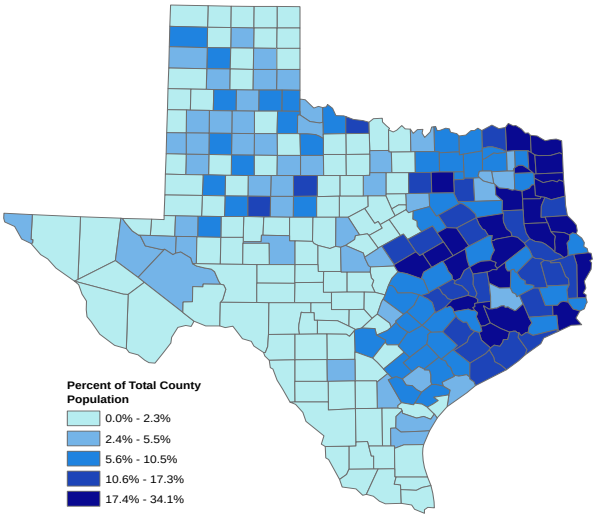


Figure 5. Hispanic

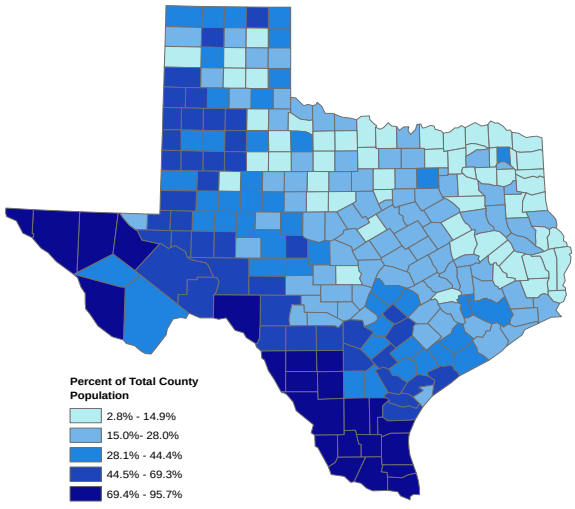
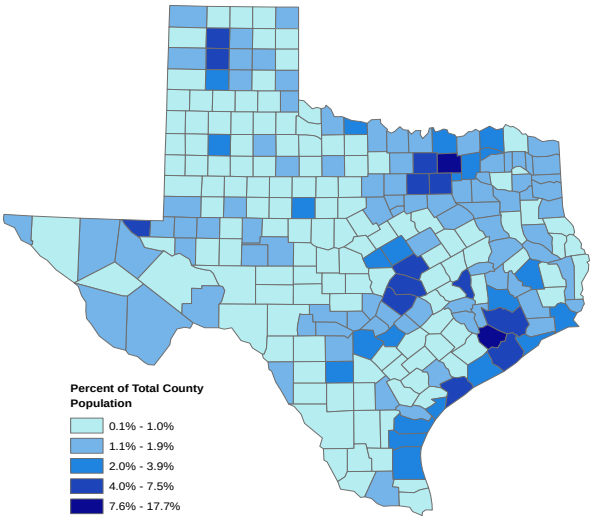


Figure 6. Other, non-Hispanic



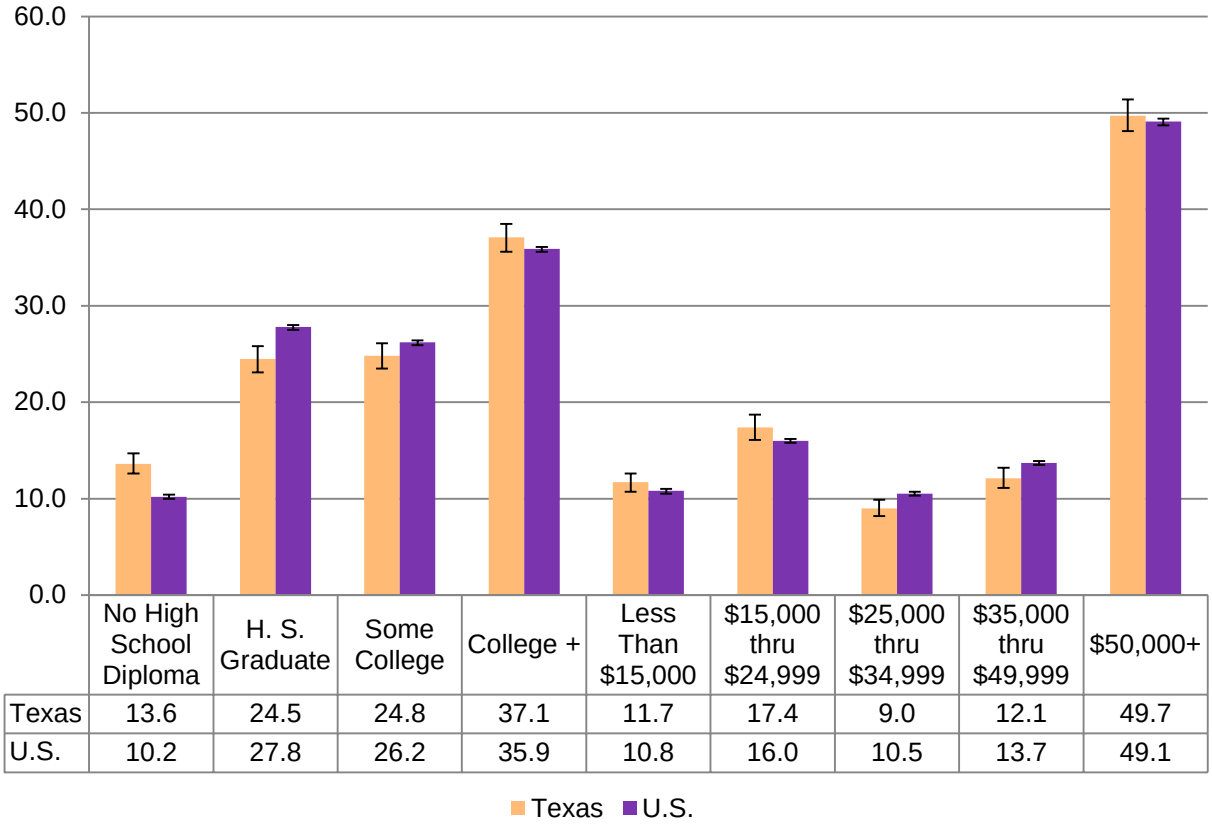
Data Source: Center for Health Statistics, DSHS

Texas consists of 254 counties. In 2010, white NH represented more than 75 percent of the county population in 70 counties. Hispanics were the majority population in 51 counties, which lie predominantly along the southern border of the state. The African American NH population was concentrated predominantly in east and north east Texas.

Chapter 2. Texas Demographics

III. Education and Household Income among Adults

Figure 7. Education and Household Income, Texas and U.S. Adults, 2010



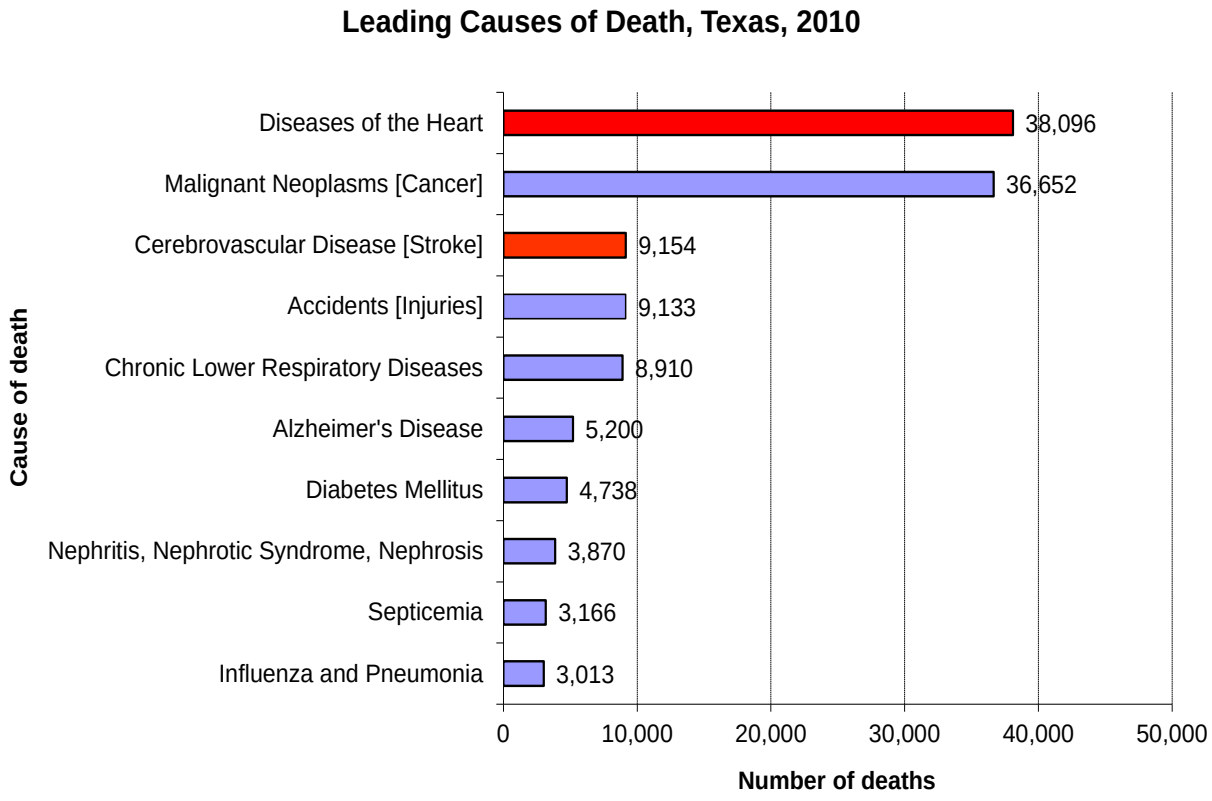
	No High School Diploma	H. S. Graduate	Some College	College +	Less Than $15,000	$15,000 thru $24,999	$25,000 thru $34,999	$35,000 thru $49,999	$50,000+
Texas	13.6	24.5	24.8	37.1	11.7	17.4	9.0	12.1	49.7
U.S.	10.2	27.8	26.2	35.9	10.8	16.0	10.5	13.7	49.1

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS.
National Behavioral Risk Factor Surveillance System.

In 2009, an estimated 13.6 percent (95% CI 12.6-14.7) of Texas adults did not graduate from high school. This was significantly higher compared to the U.S. (10.2%; 95% CI 10.0-10.4). About one in four adults (24.5%) in Texas reported graduation from high school or having a GED as their highest level of education completed. About one in four (24.8%) had some college education and less than four out of ten (37.1%) graduated from college. Approximately three out of ten adults (29.1%) in Texas reported household incomes less than $25,000 per year.

Chapter 3. Leading Causes of Death

Figure 8. Leading Causes of Death in Texas, 2010



Data Source: Texas Vital Statistics Unit, DSHS

Heart disease (defined as ICD-9 codes 390-398, 402, 404, 410-429 for deaths prior to 1999 and ICD-10 codes I00-I09, I11, I13, I20-I51 for 1999-2010 deaths) and stroke (defined as ICD-9 codes 430-434, 436-438 for deaths prior to 1999 and ICD-10 codes I60-69 for 1999-2010 deaths) were the first and third leading causes of death in Texas, respectively, in 2010. CVD (defined as ICD-9 codes 390-459 for deaths prior to 1999 and ICD-10 codes I00-I09 for 1999-2010 deaths), which includes heart disease and stroke, accounted for 30.5 percent of all deaths in Texas.

Other types of CVD include IHD (defined as ICD-9 codes 410-414, 429.2 for deaths prior to 1999 and ICD-10 codes I20-I25 for 1999-2010 deaths), heart attack (ICD-9 code 410 for deaths prior to 1999 and ICD-10 codes I21-I22 for 1999-2010 deaths), and CHF (ICD-9 code 428 for deaths prior to 1999 and ICD-10 code I50 for 1999-2010 deaths).

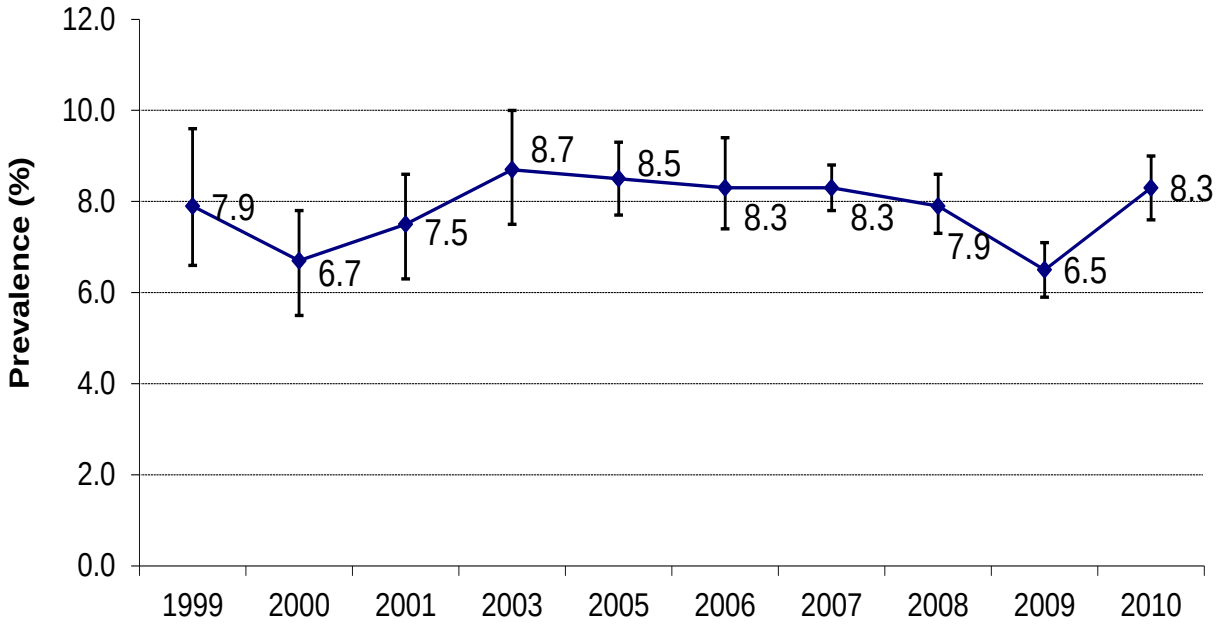
Chapter 4. Cardiovascular Disease

CVD refers to any of the disorders that affect the circulatory system, including IHD, CHF, hypertension, and stroke. This chapter describes the burden of CVD in Texas by different surveillance measures such as prevalence, hospitalizations, and mortality. Prevalence of diseases and risk behaviors among adults 18 years and older are monitored and tracked through the Texas BRFSS survey.

I. Prevalence

In 2010, an estimated 8.3 percent (95% Confidence Interval (CI) 7.6-9.0) of Texas adults reported that they had been diagnosed with CVD. That means there were approximately 1.5 million adults in Texas living with CVD in 2010.

Figure 9. Prevalence of Cardiovascular Disease among Adults, Texas, 1999-2010

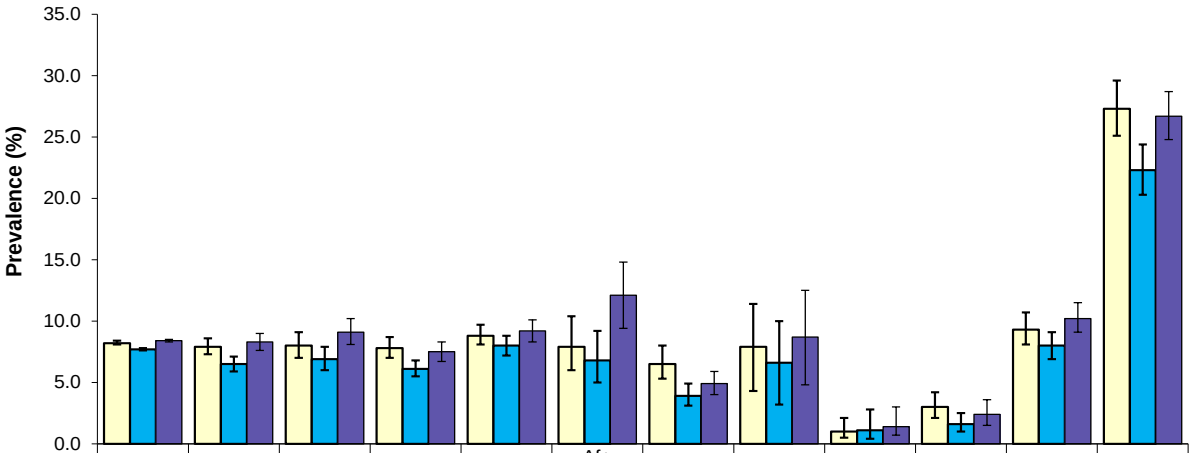


Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Overall the prevalence of CVD in the state did not change significantly between 1999 (7.9%; 95% CI 6.6-9.6) and 2008 (7.9%; 95% CI 7.3-8.6) although there were some fluctuations in early 2000s. While there was a significant decrease between 2008 and 2009 (6.5%; 95% CI 5.9-7.1), the prevalence of CVD significantly increased from 2009 to 2010. The prevalence of CVD in 2010 was comparable with previous years' (1999-2008) estimates.

Chapter 4. Cardiovascular Disease

Figure 10. Prevalence of CVD among Adults by Demographics, Texas, 2008-2010

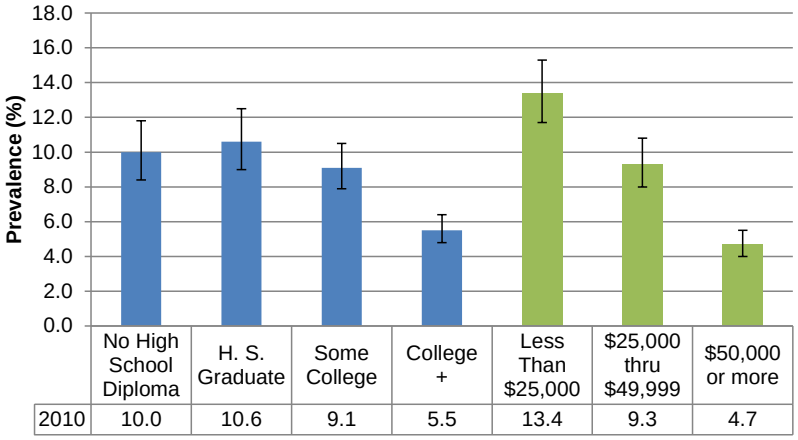


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	Other NH	18-29	30-44	45-64	65+
2008	8.2	7.9	8.0	7.8	8.8	7.9	6.5	7.9	1.0	3.0	9.3	27.3
2009	7.7	6.5	6.9	6.1	8.0	6.8	3.9	6.6	1.1	1.6	8.0	22.3
2010	8.4	8.3	9.1	7.5	9.2	12.1	4.9	8.7	1.4	2.4	10.2	26.7

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

The prevalence of CVD did not differ significantly among adult males and females in 2010. The white NH (9.2%; 95% CI 8.3-10.1) and African American NH (12.1%; 95% CI 9.4-14.8) populations had significantly higher prevalence of CVD compared to Hispanics (4.9%; 95% CI 4.0-5.9). More than one in four (26.7%; 95% CI 24.8-28.7) adult Texans aged 65 years and over reported having been diagnosed with CVD in 2010 (Figure 10).

Figure 11. Prevalence of CVD among Adults by Education and Household Income, Texas, 2010



	No High School Diploma	H. S. Graduate	Some College	College +	Less Than $25,000	$25,000 thru $49,999	$50,000 or more
2010	10.0	10.6	9.1	5.5	13.4	9.3	4.7

Adults with a college degree (5.5%; 95% CI 4.8-6.4) had the lowest prevalence of CVD among all education levels (Figure 11). The prevalence of CVD among adults increased significantly as annual household income level decreased (Figure 11).

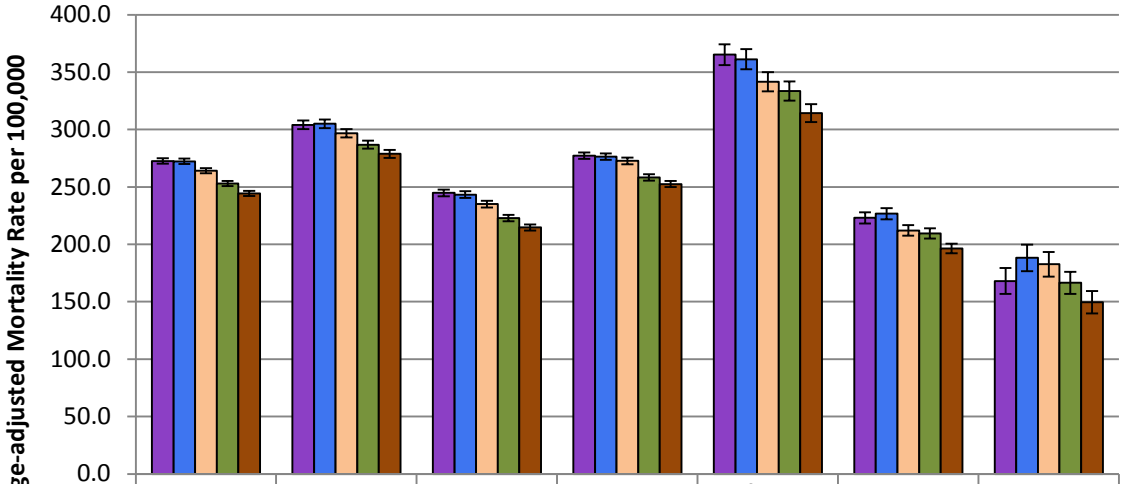
Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 4. Cardiovascular Disease

II. Mortality

Since 2006, the age-adjusted mortality rate for CVD in Texas declined significantly by 10.3 percent from 272.5 per 100,000 (95% CI 270.2-274.9) to 244.3 per 100,000 (95% CI 242.2-246.5) population in 2010. The AAMR for CVD decreased significantly among males, females, white NH, African American NH, and Hispanics from 2006 to 2010. In 2010, males (278.8 per 100,000; 95% CI 275.4-282.3) had significantly higher AAMR for CVD than females (214.8 per 100,000; 95% CI 212.1-217.4). While African American NH experienced the greatest decline in AAMR for CVD, this population continues to have the highest AAMR (314.3 per 100,000; 95% CI 306.5-322.0) among all racial/ethnic populations.

Figure 12. Age-adjusted Mortality Rates per 100,000 for CVD by Gender and Race/Ethnicity, Texas, 2006-2010



	Texas	Male	Female	White, NH	African American, NH	Hispanic	Other, NH
2006	272.5	304.1	244.8	277.2	365.2	223.1	168.1
2007	272.2	305.0	243.2	276.5	361.2	226.7	188.2
2008	264.1	296.7	235.1	272.7	341.7	212.1	182.6
2009	252.9	286.8	222.9	258.4	333.5	209.4	166.5
2010	244.3	278.8	214.8	252.4	314.3	196.4	149.6

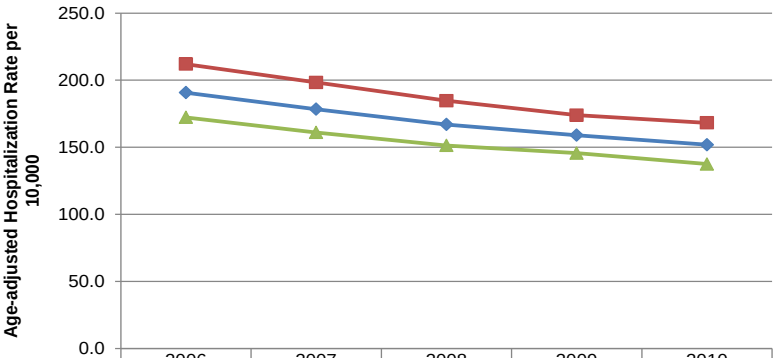
Data Source: Texas Vital Statistics Unit, DSHS

Chapter 4. Cardiovascular Disease

III. Hospitalization

Between 2006 and 2010, the age-adjusted hospitalization rate for CVD in Texas declined significantly each year (Figure 13). Decreasing trends were observed among males and females. Other NH population (253.7 per 10,000; 95% CI 249.9-257.4) had the highest hospitalization rates for CVD in 2010, but the population's hospitalization rate decreased overall by 14.5 percent from 2006 to 2010. African American NH (208.0 per 10,000; 95% CI 206.1-210.0) had the second highest hospitalization rate among all racial/ethnic populations (Figure 14).

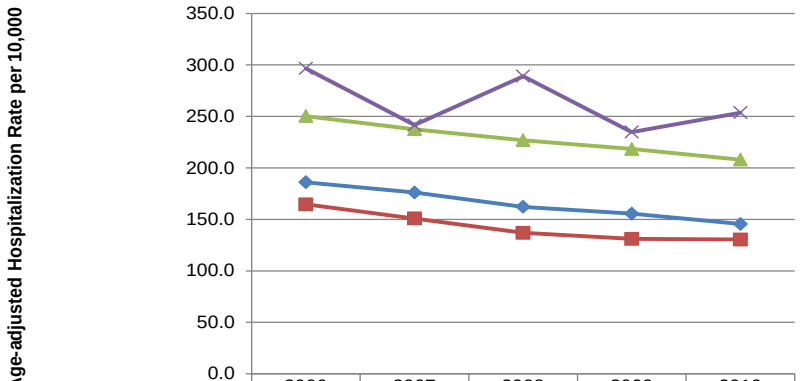
Figure 13. Age-adjusted Hospitalization Rates per 10,000 for CVD by Gender, Texas, 2006-2010



	2006	2007	2008	2009	2010
Texas	190.8	178.4	167.0	159.0	151.9
Male	212.0	198.3	184.7	173.9	168.2
Female	172.3	161.0	151.3	145.6	137.5

Data Source: Texas Health Care Information Collection, DSHS

Figure 14. Age-adjusted Hospitalization Rates per 10,000 for CVD by Race/Ethnicity, Texas, 2006-2010



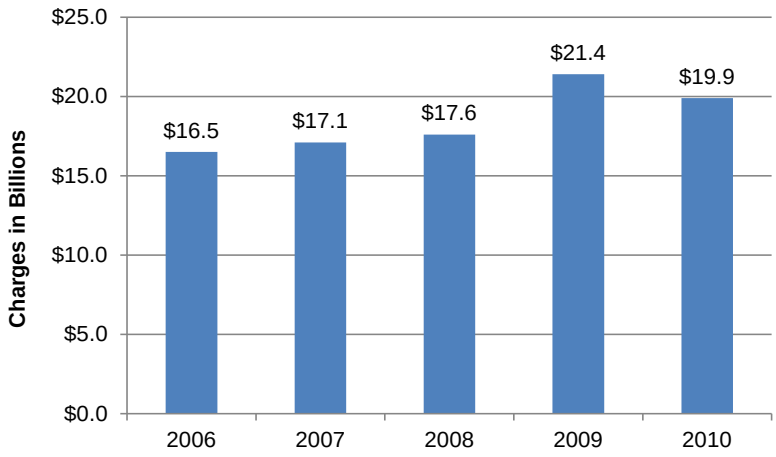
	2006	2007	2008	2009	2010
White, NH	186.0	176.1	162.1	155.5	145.5
African American, NH	250.3	237.5	226.8	218.4	208.0
Hispanic	164.5	150.8	136.9	131.0	130.5
Other, NH	296.6	241.6	289.0	234.8	253.7

Data Source: Texas Health Care Information Collection, DSHS

Chapter 4. Cardiovascular Disease

Total hospital charges for CVD in Texas increased by 20.5 percent from $16.5 billion in 2006 to $19.9 billion in 2010 (Figure 15).

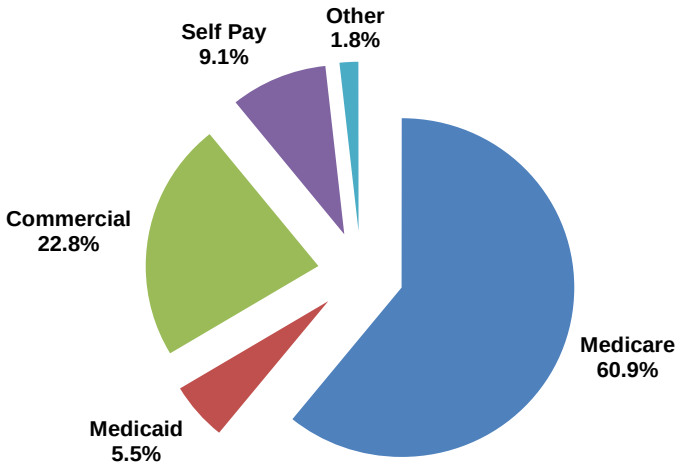
Figure 15. Total Hospital Charges for CVD, Texas, 2006-2010



Data Source: Texas Health Care Information Collection, DSHS

In 2010, there were 352,706 inpatient hospitalizations for CVD in Texas. Medicare (60.9%) was the primary source of payment for the majority of CVD hospitalizations in Texas. Other primary sources of payment included commercial (22.8%), Medicaid (5.5%), self pay (9.1%), and other sources (e.g. Title V, worker's compensation, other federal programs, other non-federal programs, Veteran Health Administration) (1.8%) (Figure 16).

Figure 16. Standard Source of Primary Payment for CVD Hospitalization, Texas, 2010



Data Source: Texas Health Care Information Collection, DSHS

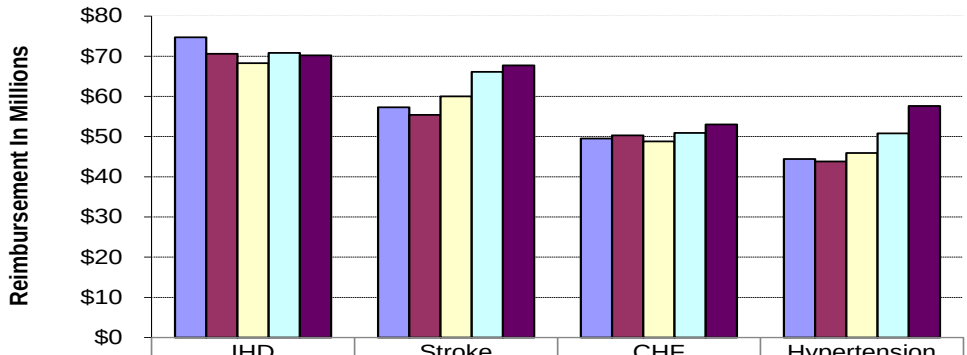
Chapter 4. Cardiovascular Disease

IV. Medicaid Reimbursement

Medicaid serves primarily low-income families, non-disabled children, related caretakers of dependent children, pregnant women, elderly, and people with disabilities. Texas Medicaid covers a limited number of optional groups, which are eligibility categories that states are allowed but not required to cover under their Medicaid programs.

Total Medicaid reimbursements for IHD decreased from $75 million in 2006 to $70 million in 2010 while increasing for stroke, CHF, and hypertension (Figure 17). Among IHD, stroke, CHF, and hypertension, the average Medicaid reimbursement amount was highest for those with a primary diagnosis of IHD, followed by stroke (Figure 18).

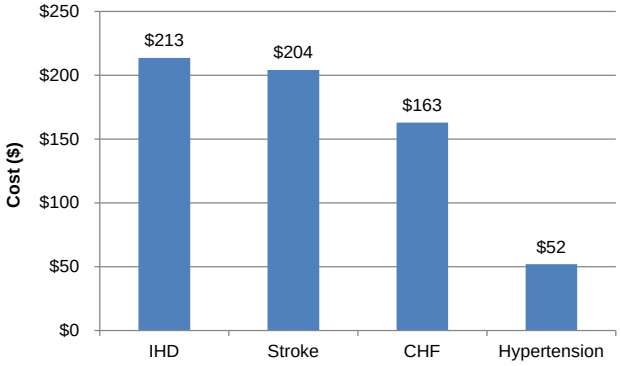
Figure 17. Cost of Medicaid Reimbursement for Selected CVD Diagnosis, Texas, 2006-2010



	IHD	Stroke	CHF	Hypertension
2006	$75	$57	$50	$44
2007	$71	$55	$50	$44
2008	$68	$60	$49	$46
2009	$71	$66	$51	$51
2010	$70	$68	$53	$58

Data Source: Texas Health and Human Services Commission

Figure 18. Average Medicaid Reimbursement per Claim by Selected CVD Diagnosis, Texas, 2010



Data Source: Texas Health and Human Services Commission

Chapter 5. Heart Disease

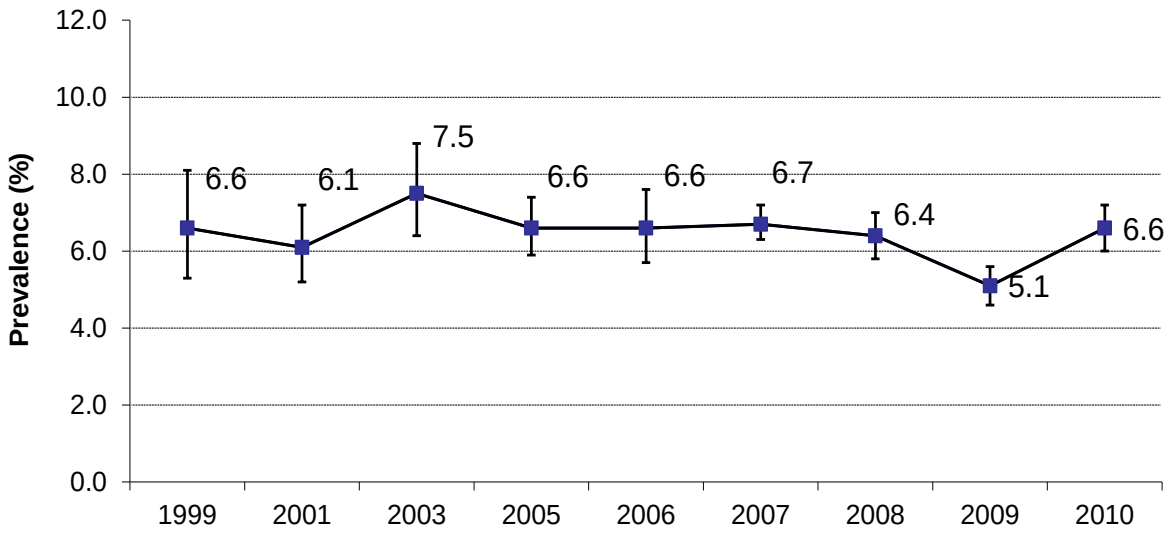
A. Heart Disease

Heart disease is a subset of CVD that includes all forms of diseases affecting the heart and blood vessels in the heart. Heart disease includes rheumatic heart disease, hypertensive heart disease, pulmonary heart disease, atherosclerotic heart disease, heart failure, and IHD.

I. Prevalence

The prevalence of heart disease in Texas did not change significantly between 1999 (6.6%; 95% CI 5.3-8.1) and 2008 (6.4 %; 95% CI 5.8-7.0). While there was a significant decrease between 2008 and 2009 (5.1 %; 95% CI 4.6-5.6), the prevalence of heart disease significantly increased from 2009 to 2010 (6.6%; 95% CI 6.0-7.2) and was similar to previous years' (1999-2008) estimates.

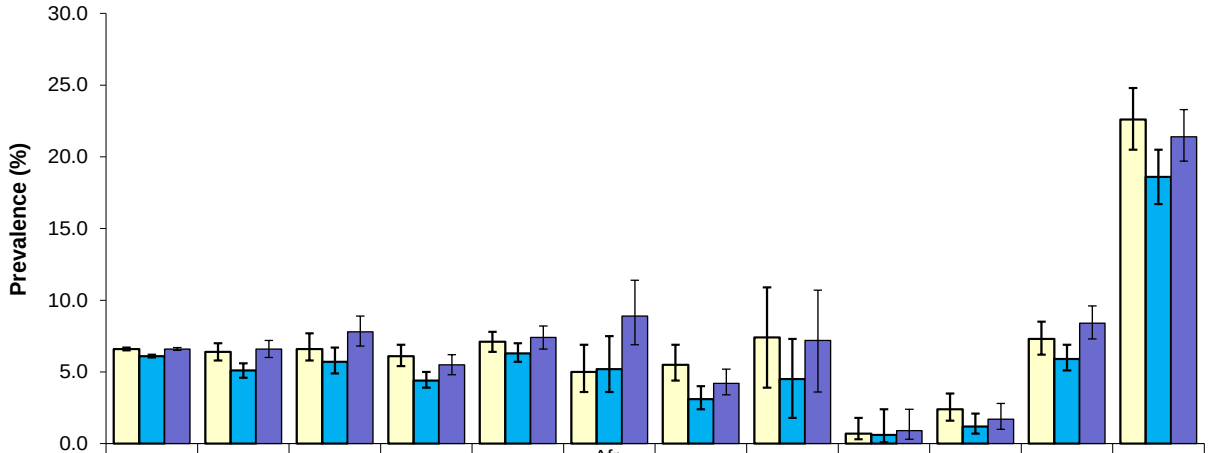
Figure 19. Prevalence of Heart Disease among Adults, Texas, 1999-2010



Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 5. Heart Disease

Figure 20. Prevalence of Heart Disease among Adults by Demographics, Texas, 2008-2010

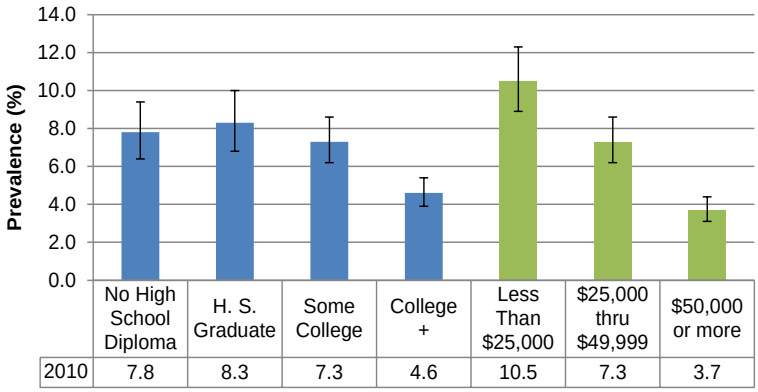


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	Other NH	18-29	30-44	45-64	65+
2008	6.6	6.4	6.6	6.1	7.1	5.0	5.5	7.4	0.7	2.4	7.3	22.6
2009	6.1	5.1	5.7	4.4	6.3	5.2	3.1	4.5	0.6	1.2	5.9	18.6
2010	6.6	6.6	7.8	5.5	7.4	8.9	4.2	7.2	0.9	1.7	8.4	21.4

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

In 2010, the prevalence of heart disease in Texas (6.6%; 95% CI 6.0-7.2) was similar to the national average (6.6%; 95% CI 6.5-6.7). Males (7.8%; 95% CI 6.8-8.9) had a significantly higher prevalence of heart disease compared to females (5.5%; 95% CI 4.8-6.2). Among racial/ethnic populations, African American NH (8.9%; 95% CI 6.6-11.1) and white NH (7.4%; 95% CI 6.5-8.2) populations had significantly higher prevalence of heart disease compared to Hispanics (4.2%; 95% CI 3.3-5.1). The prevalence of heart disease was highest among persons age 65 and older (Figure 20).

Figure 21. Prevalence of Heart Disease among Adults by Education and Household Income, Texas, 2010



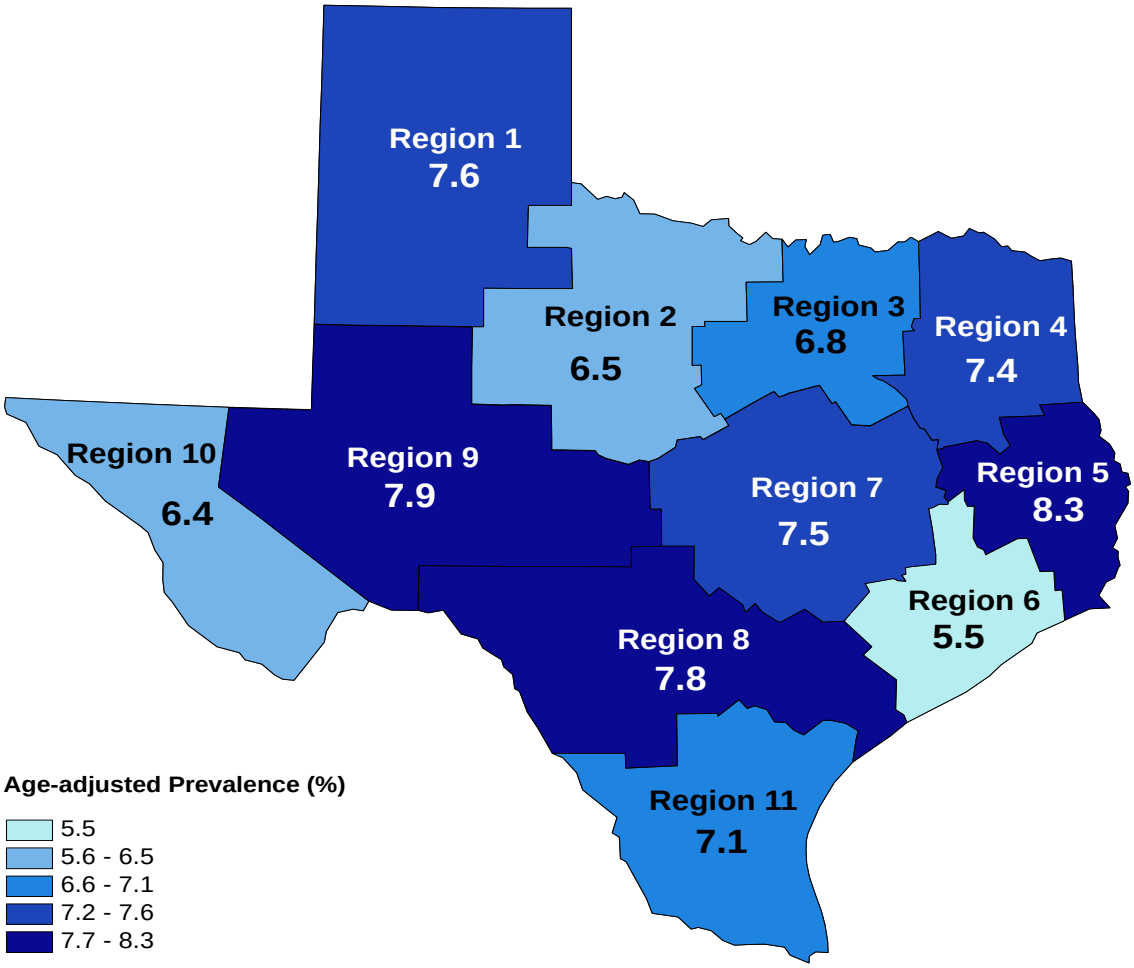
	No High School Diploma	H. S. Graduate	Some College	College +	Less Than $25,000	$25,000 thru $49,999	$50,000 or more
2010	7.8	8.3	7.3	4.6	10.5	7.3	3.7

Adults with a college degree (4.6%; 95% CI 3.9-5.4) had the lowest prevalence of heart disease among all education levels (Figure 21). The prevalence of heart disease among adults increased significantly as annual household income level decreased (Figure 21).

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 5. Heart Disease

Figure 22. Age-adjusted Prevalence of Heart Disease by Public Health Region (PHR), Texas, 2010



Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS
Created by: GIS, Center for Health Statistics, DSHS

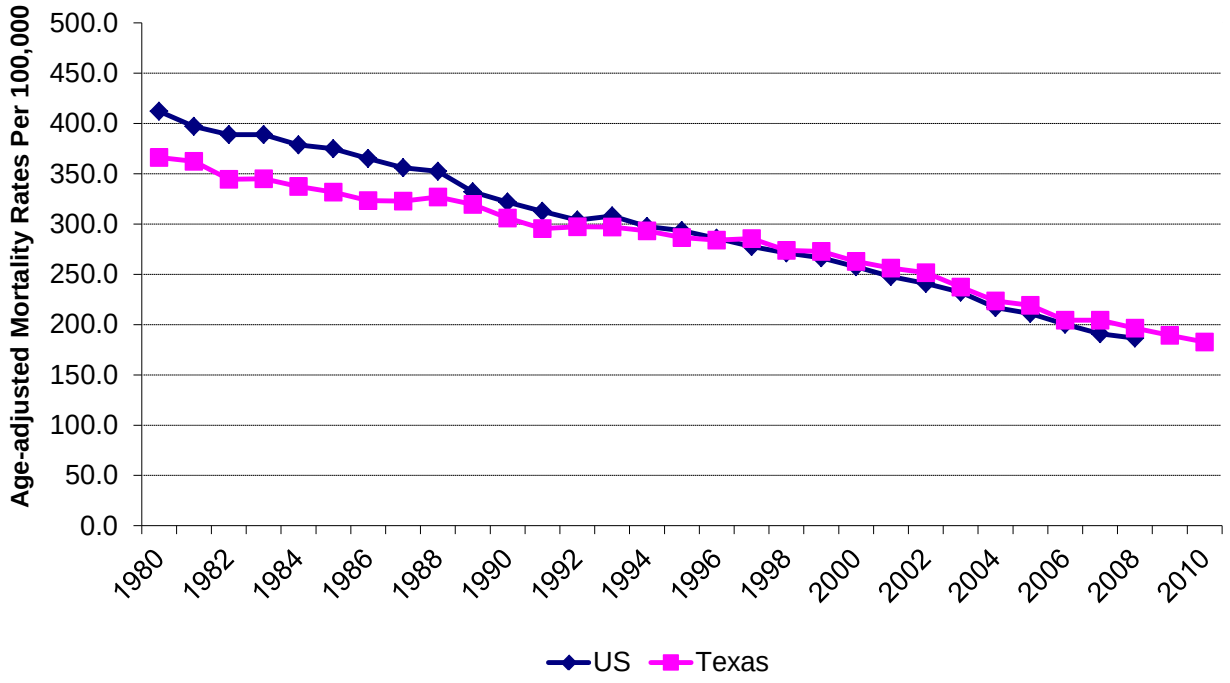
PHR 5 (8.3%; 95% CI 6.1-11.1) had the highest age-adjusted prevalence of heart disease while PHR 6 (5.5%; 95% CI 4.7-6.5) had the lowest age-adjusted prevalence. There were no statistically significant differences in the prevalence of heart disease among the PHRs in Texas.

Chapter 5. Heart Disease

II. Mortality

Since at least 1980, the heart disease age-adjusted mortality rates in Texas and the U.S. have decreased. In the U.S. the AAMR for heart disease declined by 54.7 percent between 1980 (412.1 per 100,000) and 2008 (186.5 per 100,000), whereas the rate declined by 50.1 percent between 1980 (366.3 per 100,000) and 2010 (182.7 per 100,000) in Texas.

Figure 23. Age-adjusted Mortality Rates per 100,000 for Heart Disease, Texas and U.S., 1980-2010*



* U.S. mortality data not available for 2009 and 2010.

Data Source: Texas Vital Statistics Unit, DSHS.
National Center for Health Statistics, National Vital Statistics System.

Chapter 5. Heart Disease

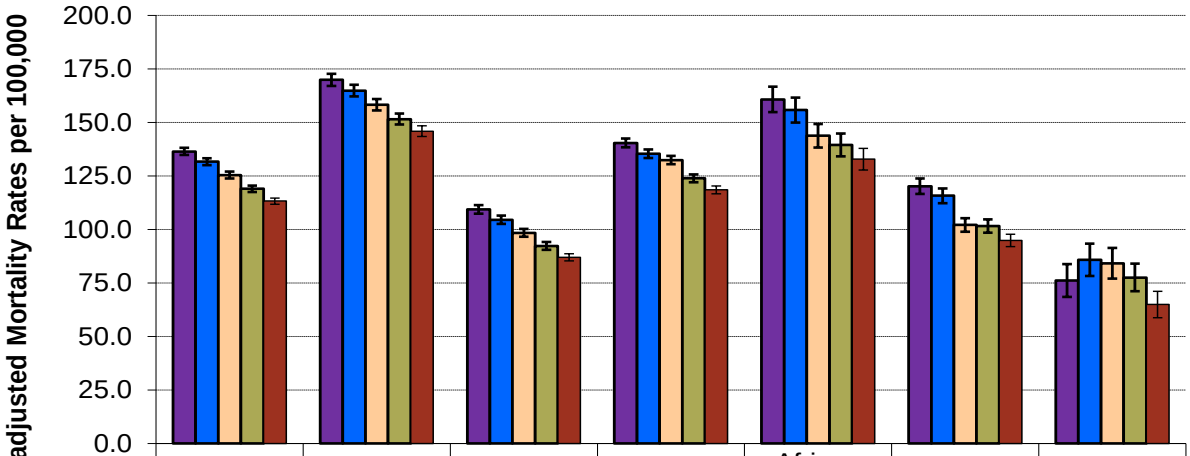
B. Ischemic Heart Disease

IHD, though largely preventable, is the most predominant type of heart disease, accounting for 62.4 percent (23,761) of all deaths from heart disease. IHD is a serious problem caused by inadequate circulation of blood to the heart muscle. Blood flow to the heart is blocked by cholesterol deposits called plaque inside the arteries serving the heart. IHD is also called coronary artery disease or coronary heart disease.[8]

I. Mortality

The AAMR for IHD in Texas declined significantly by 16.9 percent from 136.4 per 100,000 (95% CI 134.8-138.1) in 2006 to 113.3 per 100,000 (95% CI 111.8-114.7) in 2010. AAMRs for males, females, white NH, African American NH, and Hispanics all showed significant decline during the same period. In 2010, males (145.9 per 100,000; 95% CI 143.4-148.4) had a significantly higher AAMR for IHD compared to females (87.0 per 100,000; 95% CI 85.3-88.7) in Texas. The African American NH population continued to have the highest AAMR for IHD among all racial/ethnic populations.

Figure 24. Age-adjusted Mortality Rates per 100,000 for Ischemic Heart Disease by Gender and Race/Ethnicity, Texas, 2006-2010



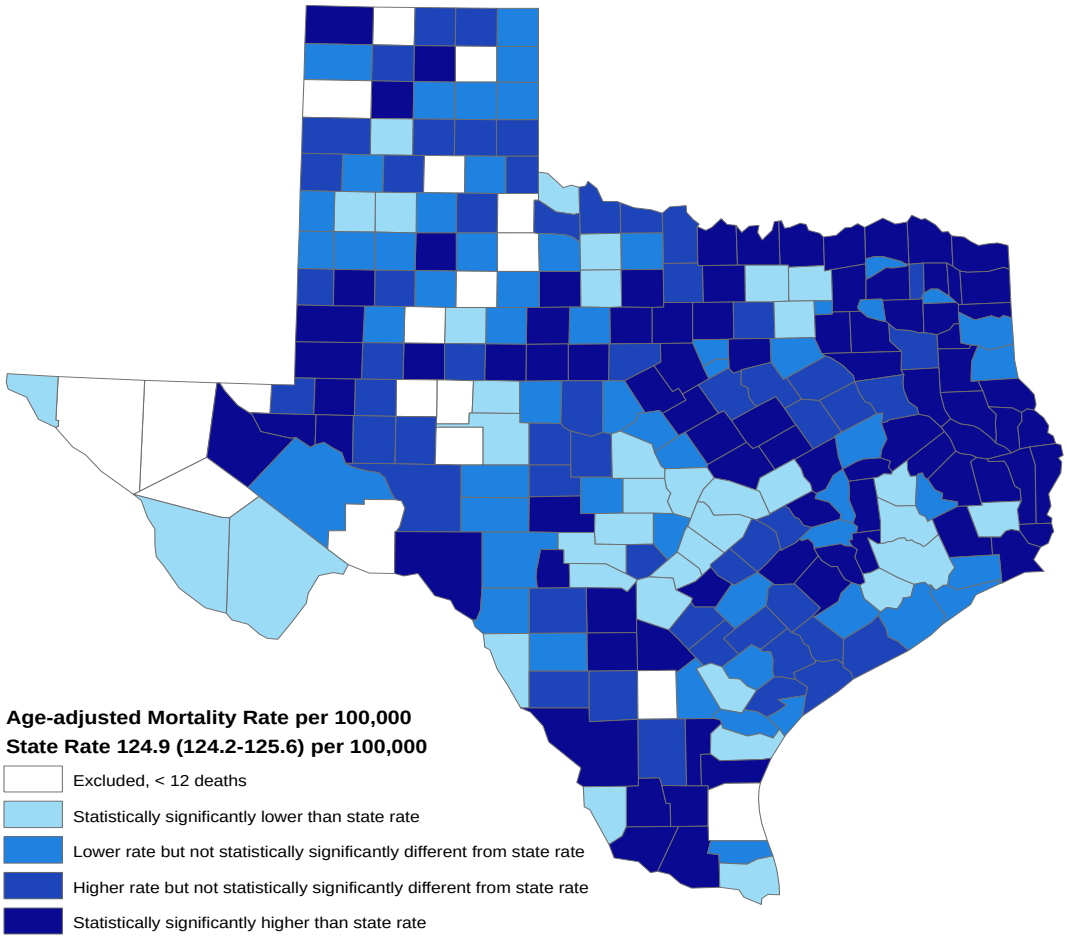
	Texas	Male	Female	White NH	African American NH	Hispanic	Other NH
2006	136.4	169.9	109.4	140.4	160.7	120.2	76.1
2007	131.7	164.8	104.5	135.4	155.8	115.8	85.8
2008	125.4	158.3	98.4	132.4	143.8	102.1	84.2
2009	119.0	151.5	92.3	123.9	139.5	101.6	77.5
2010	113.3	145.9	87.0	118.5	132.9	94.9	65.0

Data Source: Texas Vital Statistics Unit, DSHS

Chapter 5. Heart Disease

For the period of 2006-2010, the IHD age-adjusted mortality rate in Texas was 124.9 per 100,000 (95% CI 124.2-125.6). Of 254 counties, more than one-third (87 counties) had significantly higher mortality rates than the state's five-year average. Fifty-six counties had higher, but not significantly different, mortality rates than the state's five-year average. There were 93 counties that had lower mortality rates than the state's five-year average, but only 37 had significantly lower mortality rates than the state's five year average.

Figure 25. Age-adjusted Mortality Rates per 100,000 for Ischemic Heart Disease by County, Texas, 2006-2010

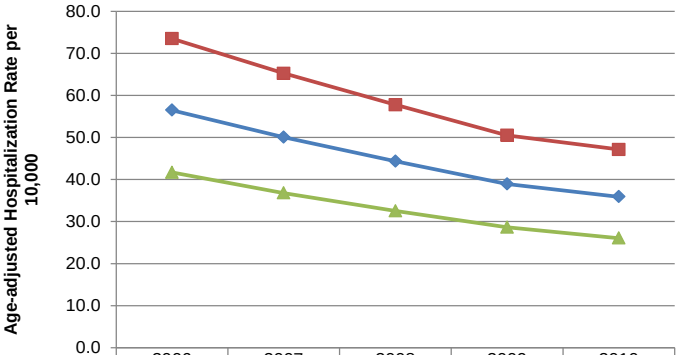


Data Source: Texas Vital Statistics Unit, DSHS
Created by: GIS, Center for Health Statistics, DSHS

Chapter 5. Heart Disease

II. Hospitalization

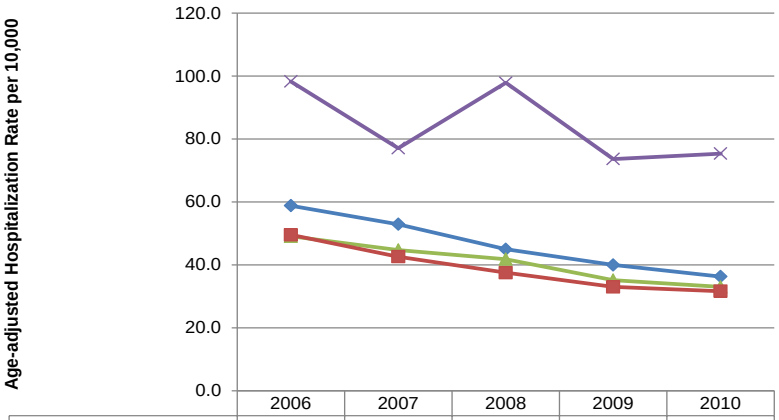
Figure 26. Age-adjusted Hospitalization Rates per 10,000 for Ischemic Heart Disease by Gender, Texas, 2006-2010



	2006	2007	2008	2009	2010
Texas	56.5	50.0	44.3	38.9	35.9
Male	73.5	65.3	57.8	50.5	47.1
Female	41.7	36.8	32.5	28.6	26.1

Data Source: Texas Health Care Information Collection, DSHS

Figure 27. Age-adjusted Hospitalization Rates per 10,000 for Ischemic Heart Disease by Race/Ethnicity, Texas, 2006-2010



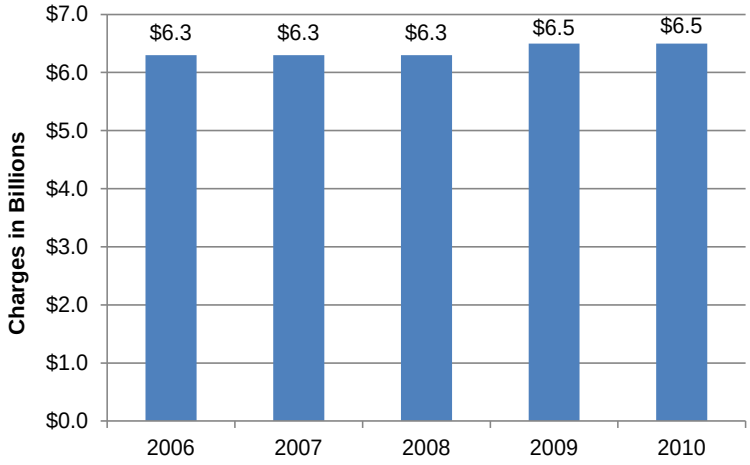
	2006	2007	2008	2009	2010
White, NH	58.8	52.9	44.9	40.0	36.3
African American, NH	49.0	44.7	41.8	35.1	33.0
Hispanic	49.5	42.6	37.5	33.0	31.6
Other, NH	98.3	77.1	97.8	73.6	75.3

Data Source: Texas Health Care Information Collection, DSHS

Between 2006 and 2010, the age-adjusted hospitalization rate for IHD in Texas declined significantly each year. Hospitalization rates for IHD declined significantly among males, females, and across all racial/ethnic populations during this period. Males (47.1 per 10,000; 95% CI 46.7-47.6) had 1.8 times higher IHD hospitalization rate than females (26.1 per 10,000; 95% CI 25.8-26.3) in 2010 (Figure 26). Other NH had more than two times higher IHD age-adjusted hospitalization rates compared to all racial/ethnic populations in 2010 (Figure 27).

Chapter 5. Heart Disease

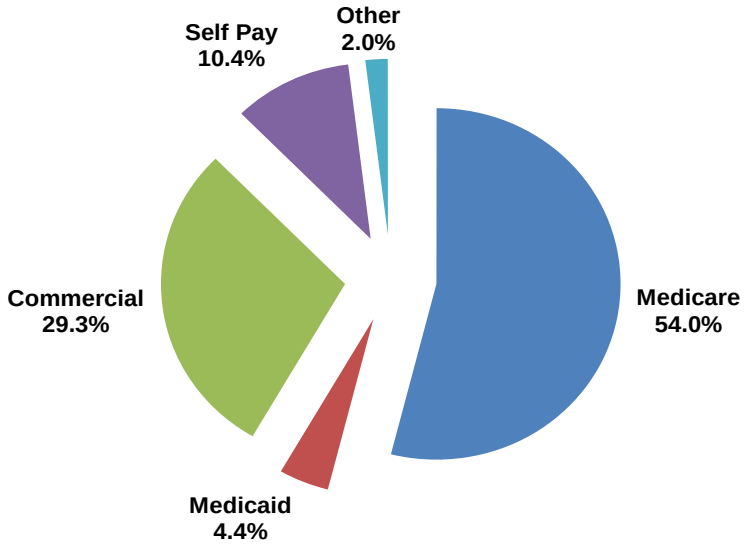
Figure 28. Total Hospital Charges for Ischemic Heart Disease, Texas, 2006-2010



Data Source: Texas Health and Human Services Commission

Total hospital charges for IHD were approximately $6.5 billion in 2009 and 2010 (Figure 28).

Figure 29. Standard Source of Primary Payment for Ischemic Heart Disease Hospitalization, Texas, 2010



In 2010 there were 83,619 inpatient hospitalizations for IHD in Texas. Medicare was the source of primary payment for 54 percent of IHD hospitalizations. Other payment sources included commercial (29.3%), self-pay (10.4%), Medicaid (4.4%), and other (2.0%) (Figure 29).

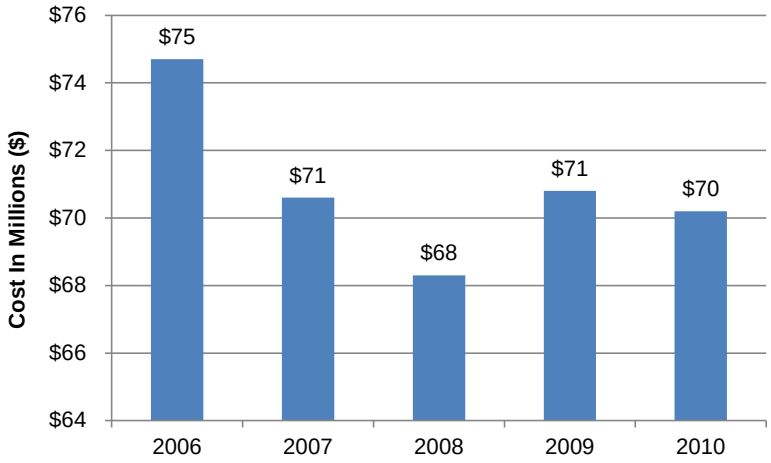
Data Source: Texas Health and Human Services Commission

Chapter 5. Heart Disease

III. Medicaid Reimbursement

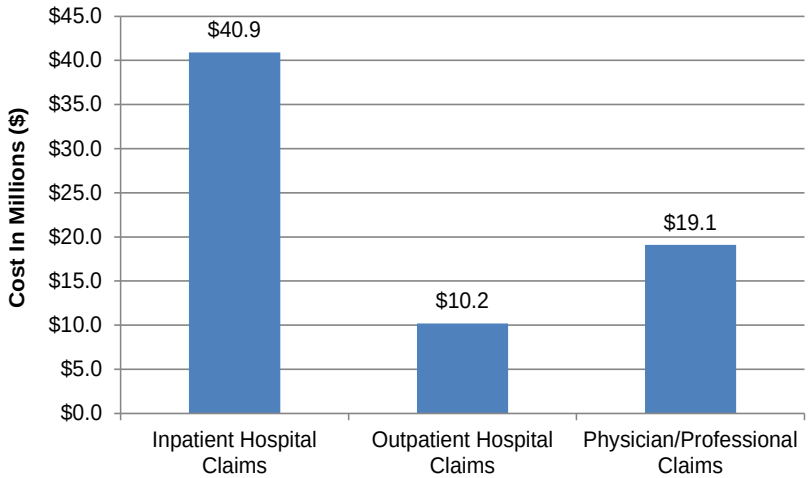
Reimbursement amounts from Medicaid for IHD decreased from $75 million in 2006 to $70 million in 2010 (Figure 30). In 2010, about 58.3 percent ($40.9 million) of the reimbursement claims were for inpatient hospital claims (Figure 31).

Figure 30. Medicaid Reimbursement for Ischemic Heart Disease, Texas, 2006-2010



Data Source: Texas Health and Human Services Commission

Figure 31. Medicaid Reimbursement for Ischemic Heart Disease by Claim Type, Texas, 2010



Data Source: Texas Health and Human Services Commission

Chapter 5. Heart Disease

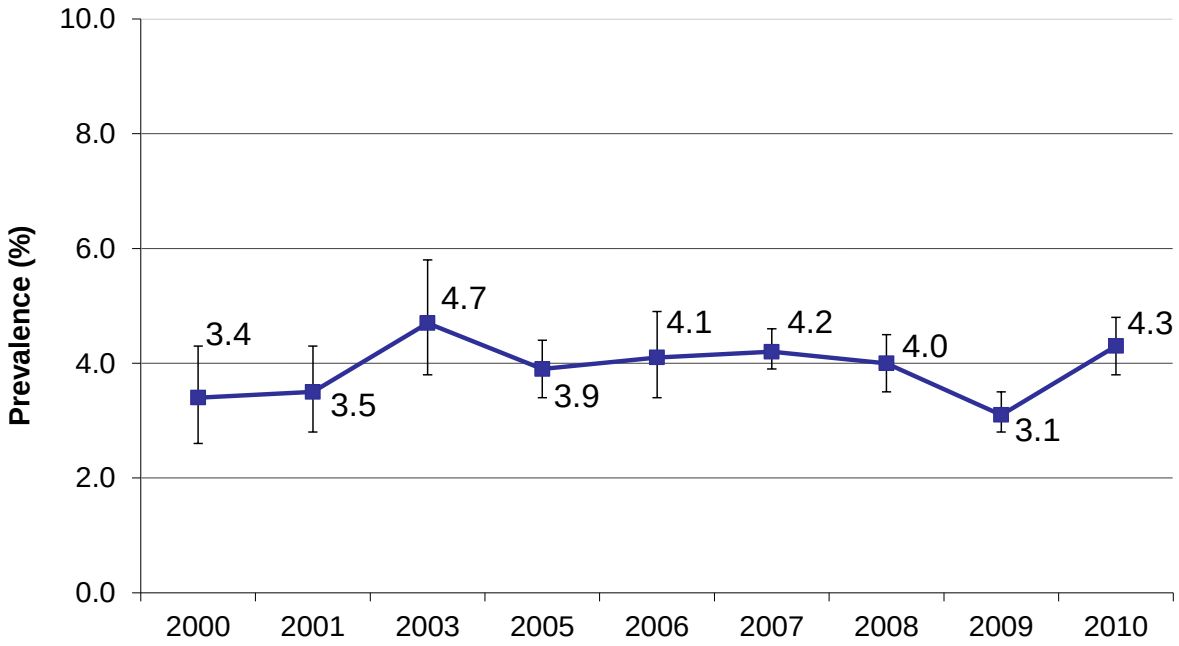
C. Heart Attack

A heart attack occurs when blood flow to a part of the heart muscle is blocked. If the blood flow is not restored quickly, the part of the heart muscle begins to die due to lack of oxygen and nutrients. Heart attacks usually occur as a result of ischemic heart disease.[9]

I. Prevalence

The prevalence of heart attack in Texas increased from 3.4 percent (95% CI 2.6-4.3) in 2000 to 4.3 percent (95% CI 3.8-4.8) in 2010, but the difference was not statistically signficant.

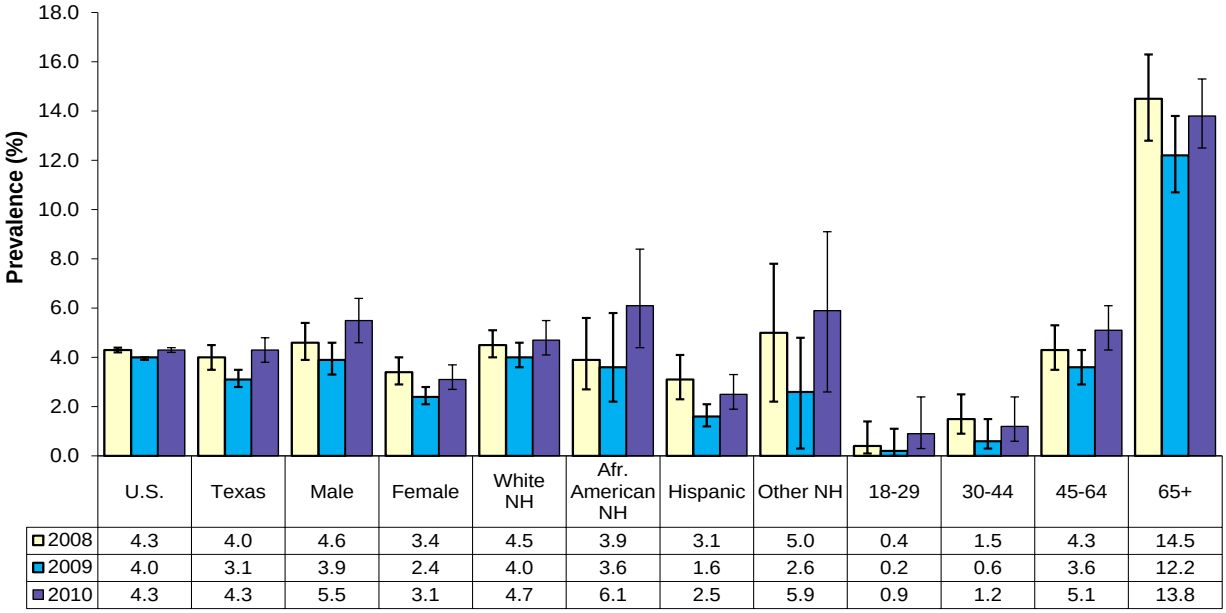
Figure 32. Prevalence of Heart Attack among Adults, Texas, 2000-2010



Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 5. Heart Disease

Figure 33. Prevalence of Heart Attack among Adults by Demographics, Texas, 2008-2010

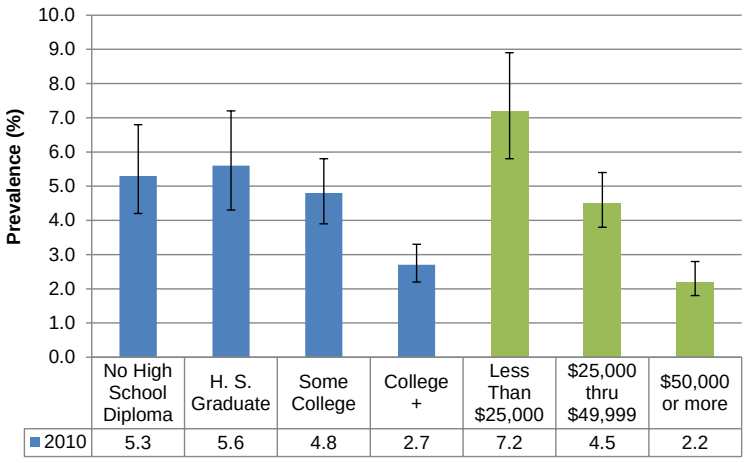


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	Other NH	18-29	30-44	45-64	65+
2008	4.3	4.0	4.6	3.4	4.5	3.9	3.1	5.0	0.4	1.5	4.3	14.5
2009	4.0	3.1	3.9	2.4	4.0	3.6	1.6	2.6	0.2	0.6	3.6	12.2
2010	4.3	4.3	5.5	3.1	4.7	6.1	2.5	5.9	0.9	1.2	5.1	13.8

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Males (5.5%; 95% CI 4.6-6.4) had a significantly higher prevalence of heart attack compared to females (3.1%; 95% CI 2.7-3.7) in 2010. Among racial/ethnic populations, African American NH (6.1%; 95% CI 4.2-8.1) and white NH (4.7%; 95% CI 4.0-5.4) populations had significantly higher prevalence of heart attack compared to Hispanics (2.5%; 95% CI 1.9-3.2). The prevalence of heart attack was highest among persons age 65 and over (Figure 33).

Figure 34. Prevalence of Heart Attack among Adults by Education and Household Income, Texas, 2010



	No High School Diploma	H. S. Graduate	Some College	College +	Less Than $25,000	$25,000 thru $49,999	$50,000 or more
2010	5.3	5.6	4.8	2.7	7.2	4.5	2.2

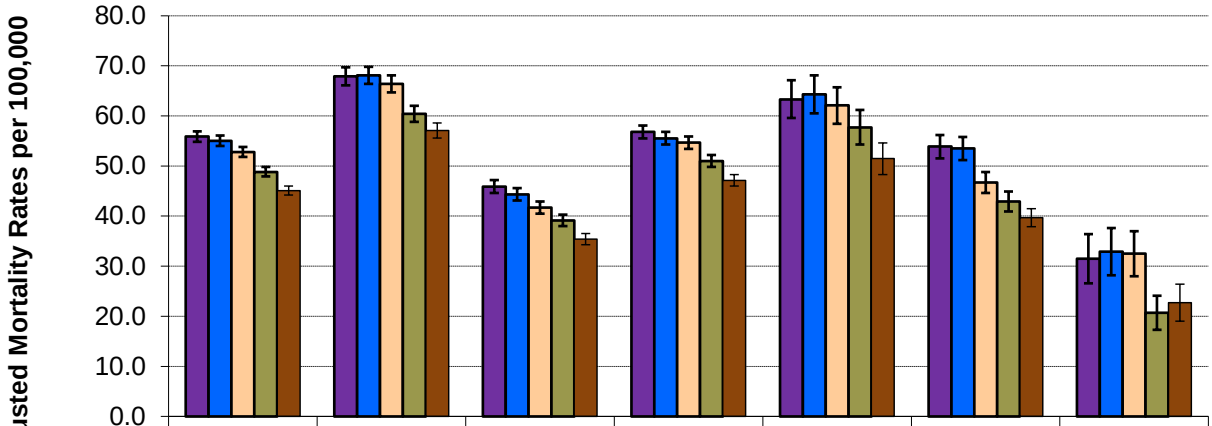
Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Adults with a college degree (2.7%; 95% CI 2.2-3.3) had the lowest prevalence of heart attack among all education levels (Figure 34). The prevalence of heart attack among adults increased significantly as annual household income level decreased (Figure 34).

Chapter 5. Heart Disease

II. Mortality

Figure 35. Age-adjusted Mortality Rates per 100,000 for Heart Attack by Gender and Race/ Ethnicity, Texas, 2006-2010



	Texas	Male	Female	White NH	African American NH	Hispanic	Other NH
2006	55.9	67.9	45.9	56.8	63.3	53.9	31.5
2007	55.0	68.1	44.3	55.5	64.3	53.5	32.9
2008	52.8	66.4	41.7	54.7	62.1	46.7	32.5
2009	48.8	60.4	39.1	51.0	57.7	42.9	20.7
2010	45.1	57.1	35.4	47.1	51.5	39.7	22.7

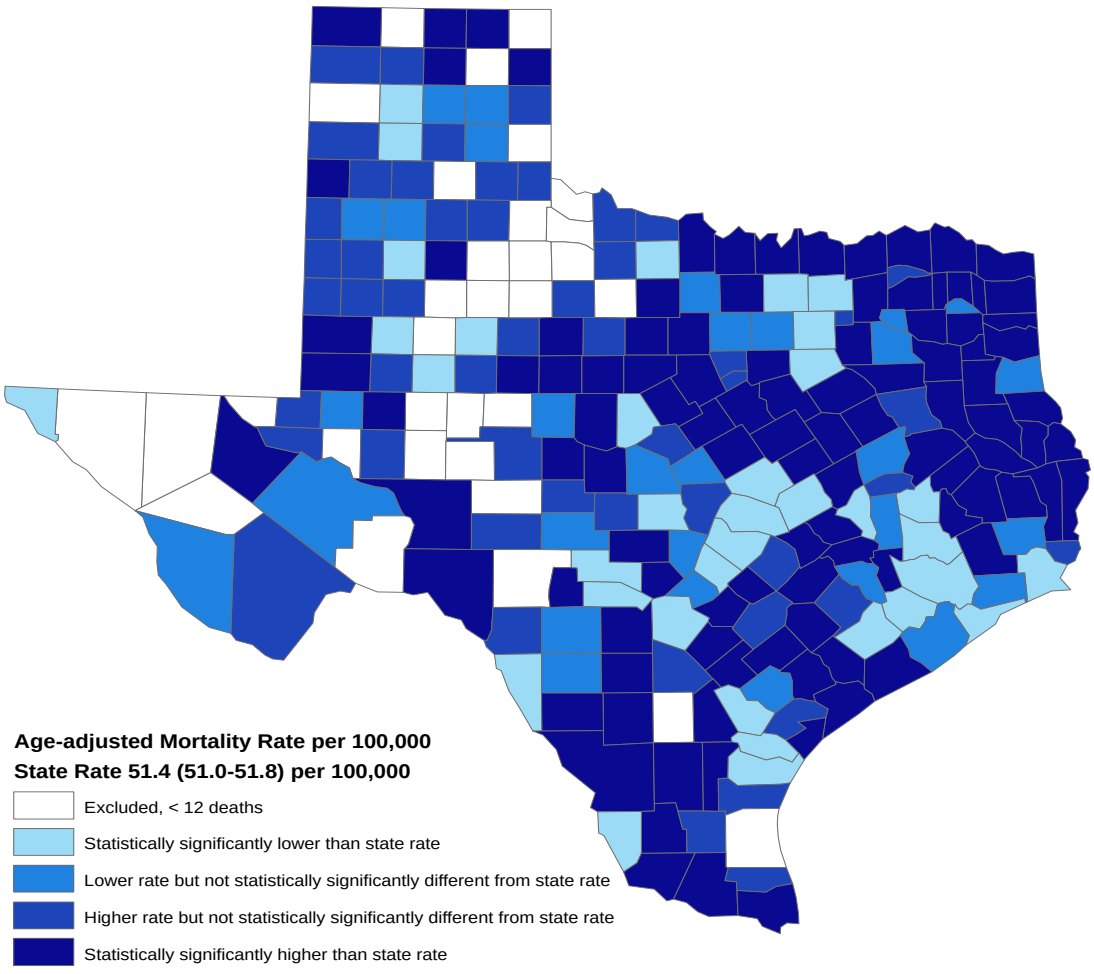
Data Source: Texas Vital Statistics Unit, DSHS

The age-adjusted mortality rate for heart attack in Texas remained stable from 2006 to 2008 followed by significant decline in 2009 and 2010. AAMRs for males, females, and all racial/ethnic groups all showed significant decline during the same period. Males (57.1 per 100,000; 95% CI 55.6-58.6) continued to have significantly higher AAMR for heart attack compared to females (35.4 per 100,000; 95% CI 34.3-36.5) in 2010. African American NH (51.5 per 100,000; 95% CI 48.3-54.6) had significantly higher AAMR for heart attack compared to Hispanics (39.7 per 100,000; 95% CI 37.9-41.5) and other NH (22.7 per 100,000; 95% CI 19.0-26.4).

Chapter 5. Heart Disease

For the period of 2006-2010, the heart attack age-adjusted mortality rate in Texas was 51.4 per 100,000 (95% CI 51.0-51.8). Of 254 counties in Texas, 106 counties (41.7 %) had significantly higher mortality rates than the state's five-year average. Fifty-one counties had higher but not significantly different rates than the state's five-year average. While 65 counties had lower mortality rates than the state's five-year average, only 35 had significantly lower mortality rates than the state's five-year average.

Figure 36. Age-adjusted Mortality Rates per 100,000 for Heart Attack by County, Texas, 2006-2010



Data Source: Texas Vital Statistics Unit, DSHS
Created by: GIS, Center for Health Statistics, DSHS

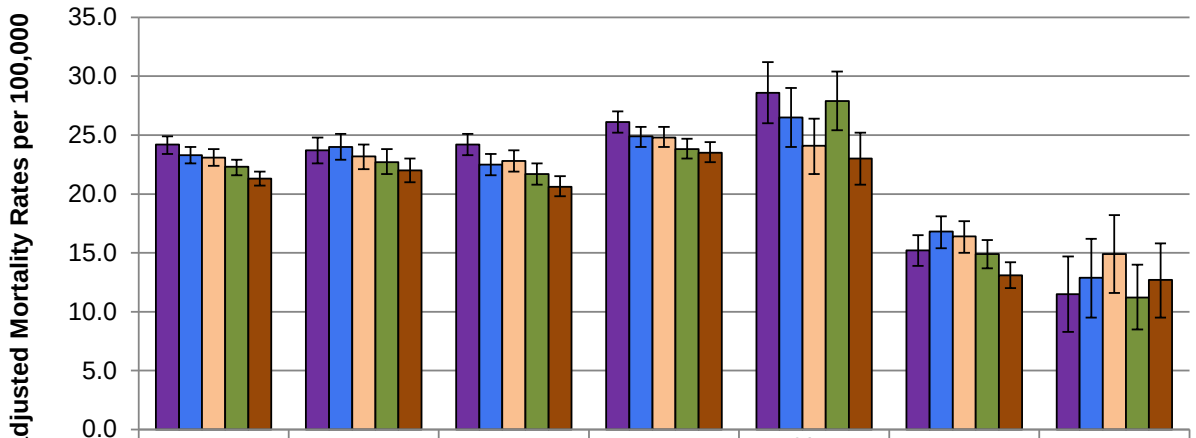
Chapter 5. Heart Disease

D. Heart Failure

Heart failure, also called congestive heart failure (CHF), is a life-threatening condition in which the heart cannot pump enough blood to the rest of the body. Heart failure can result from coronary heart disease, diabetes, high blood pressure, cardiomyopathy, congenital heart defects, heart valve disease, and arrhythmias.[10] The lifetime risk of heart failure for a person with blood pressure higher than 160/90 mmHg is double that of a person with blood pressure lower than 140/90 mm Hg.[11] The estimated cost of heart failure in the U.S. totaled $39.2 billion in 2010.[12]

I. Mortality

Figure 37. Age-adjusted Mortality Rates per 100,000 for Congestive Heart Failure by Gender and Race/Ethnicity, Texas, 2006-2010



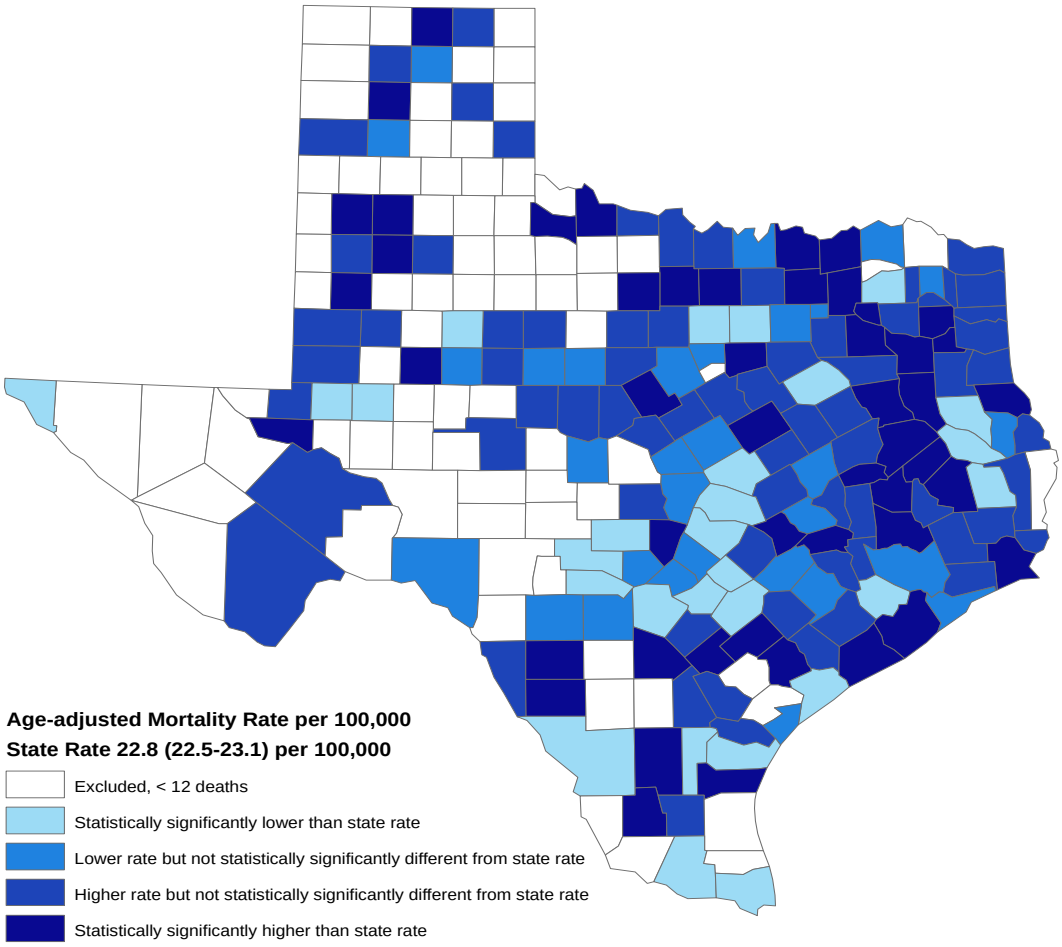
	Texas	Male	Female	White NH	African American NH	Hispanic	Other NH
2006	24.2	23.7	24.2	26.1	28.6	15.2	11.5
2007	23.3	24.0	22.5	24.9	26.5	16.8	12.9
2008	23.1	23.2	22.8	24.8	24.1	16.4	14.9
2009	22.3	22.7	21.7	23.8	27.9	14.9	11.2
2010	21.3	22.0	20.6	23.5	23.0	13.1	12.7

Data Source: Texas Vital Statistics Unit, DSHS

The mortality rates for CHF declined significantly from 2006 (24.2 per 100,000; 95% CI 23.4-24.9) to 2010 (21.3 per 100,000; 95% CI 20.7-21.9). There were no significant differences in the age-adjusted mortality rates for CHF between males and females in 2010. The white NH (23.5 per 100,000; 95% CI 22.7-24.4) and African American NH (23.0 per 100,000; 95% CI 20.8-25.2) populations had significantly higher AAMR for CHF compared to Hispanic and other NH populations.

Chapter 5. Heart Disease

Figure 38. Age-adjusted Mortality Rates per 100,000 for Congestive Heart Failure by County, Texas, 2006-2010



Data Source: Texas Vital Statistics Unit, DSHS
Created by: GIS, Center for Health Statistics, DSHS

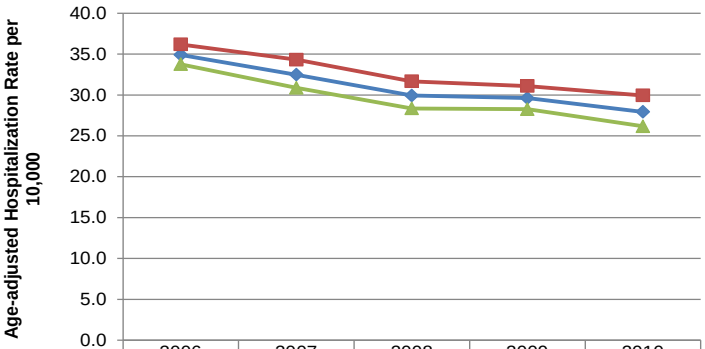
For the period of 2006-2010, the CHF age-adjusted mortality rate in Texas was 22.8 per 100,000 (95% CI 22.5-23.1). Of 254 counties in Texas, 49 counties (19.3%) had significantly higher mortality rates than the state's five-year average. Seventy-one counties had higher but not significantly different mortality rates than the state's five-year average. Fifty-eight counties had lower mortality rates than the state's five-year average, but only 28 counties had significantly lower mortality rates than the state's five-year average.

Chapter 5. Heart Disease

II. Hospitalization

Heart failure hospitalization rates in Texas declined significantly by 20 percent, from 34.9 per 10,000 in 2006 to 27.9 per 10,000 in 2010 (Figure 39). The African American NH (48.7 per 10,000; 95% CI 47.7-49.6) population had two times higher CHF hospitalization rate than the white NH (24.1 per 10,000; 95% CI 23.9-24.4) population and 1.8 times higher than the Hispanic population (26.6 per 10,000; 95% CI 26.1-27.1). The other NH (39.8 per 10,000; 95% CI 38.3-41.3) population had the second highest CHF hospitalization rate in 2010 (Figure 40).

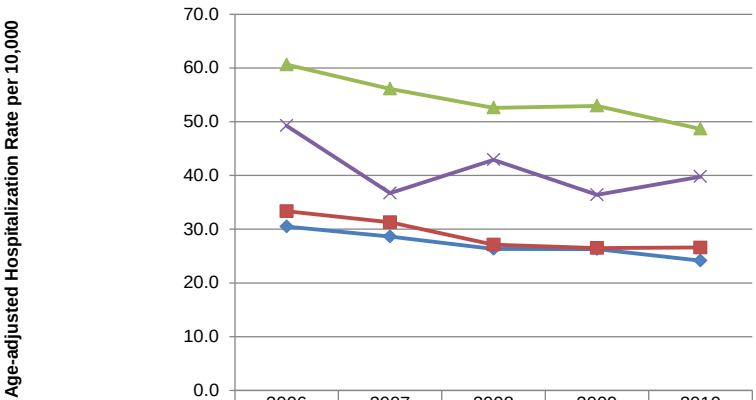
Figure 39. Age-adjusted Hospitalization Rates per 10,000 for Congestive Heart Failure by Gender, Texas, 2006-2010



	2006	2007	2008	2009	2010
Texas	34.9	32.5	29.9	29.6	27.9
Male	36.2	34.3	31.7	31.1	29.9
Female	33.8	30.9	28.4	28.3	26.2

Data Source: Texas Health Care Information Collection, DSHS

Figure 40. Age-adjusted Hospitalization Rates per 10,000 for Congestive Heart Failure by Race/Ethnicity, Texas, 2006-2010

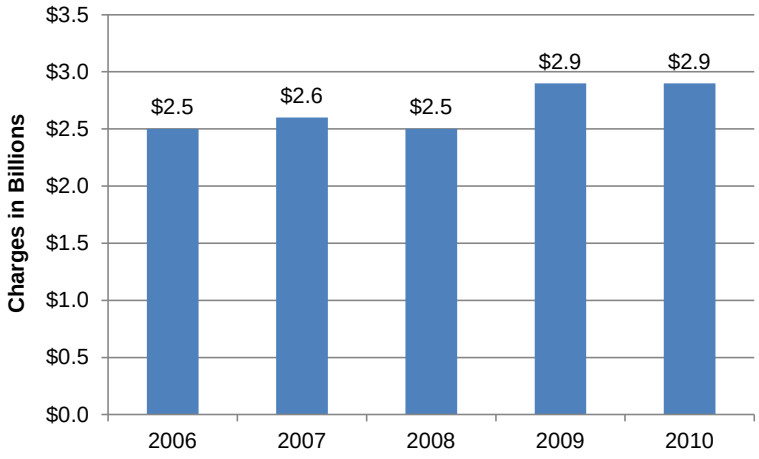


	2006	2007	2008	2009	2010
White, NH	30.5	28.6	26.3	26.3	24.1
African American, NH	60.6	56.1	52.6	52.9	48.7
Hispanic	33.4	31.3	27.1	26.5	26.6
Other, NH	49.3	36.7	42.9	36.4	39.8

Data Source: Texas Health Care Information Collection, DSHS

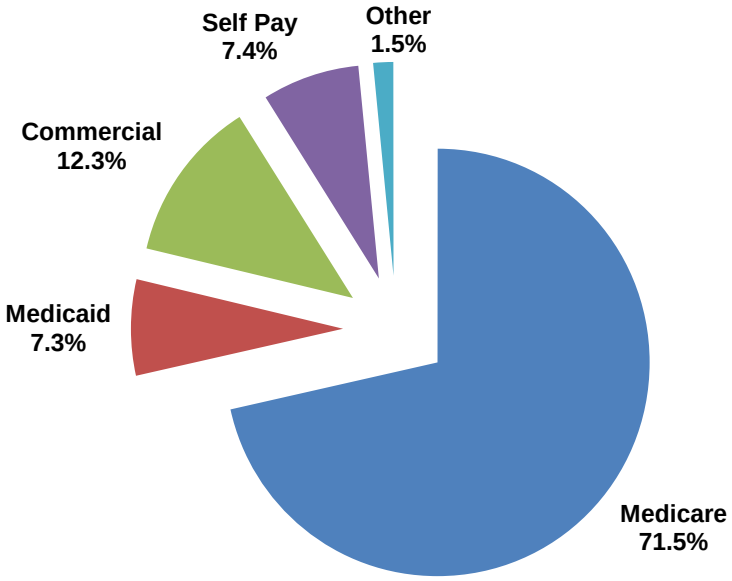
Chapter 5. Heart Disease

Figure 41. Total Hospital Charges for Congestive Heart Failure, Texas, 2006-2010



Data Source: Texas Health Care Information Collection, DSHS

Figure 42. Standard Source of Primary Payment for Congestive Heart Failure Hospitalization, Texas, 2010



Data Source: Texas Health Care Information Collection, DSHS

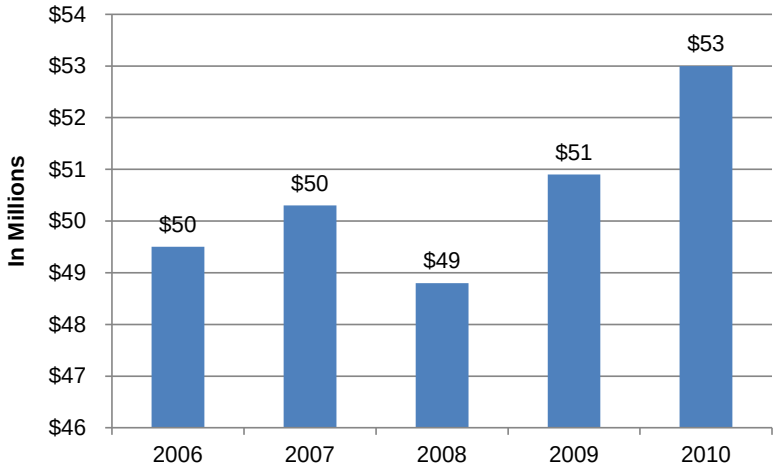
The total hospital charges for CHF increased from $2.5 billion in 2006 to $2.9 billion in 2010 (Figure 41). In 2010, the majority of CHF hospitalizations were paid for by Medicare (71.5%). Other sources of payment included commercial (12.3%), self-pay (7.4%), Medicaid (7.3%), and other (1.5%) (Figure 42).

Chapter 5. Heart Disease

III. Medicaid Reimbursement

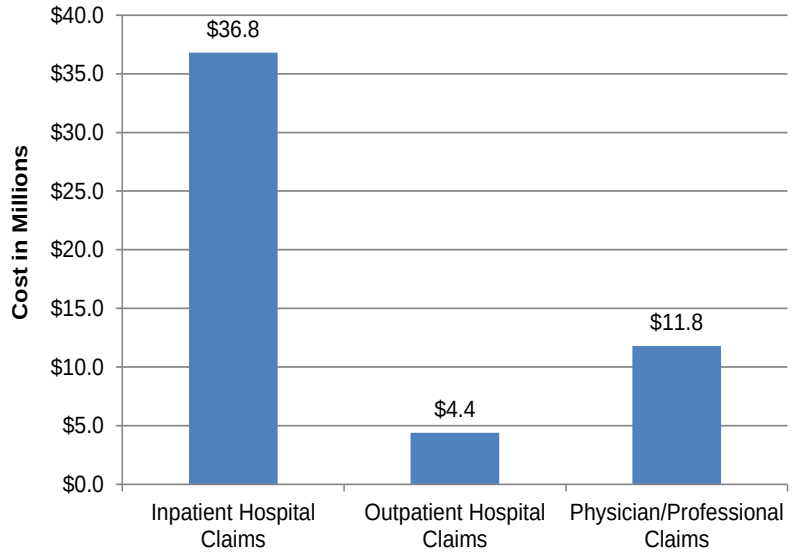
Total Medicaid reimbursement for CHF increased from $50 million in 2006 to $53 million in 2010 (Figure 43). In 2010, about 69.4 percent ($36.8 million) of the reimbursement claims for CHF were for inpatient hospital claims (Figure 44).

Figure 43. Medicaid Reimbursement for Congestive Heart Failure, Texas, 2006-2010



Data Source: Texas Health and Human Services Commission

Figure 44. Medicaid Reimbursement for Congestive Heart Failure by Claim Type, Texas, 2010



Data Source: Texas Health and Human Services Commission

Chapter 6. Stroke

Stroke or cerebrovascular disease occurs when a blood vessel that supplies oxygen and nutrients to the brain bursts or is obstructed by a blood clot or other mass.[13]

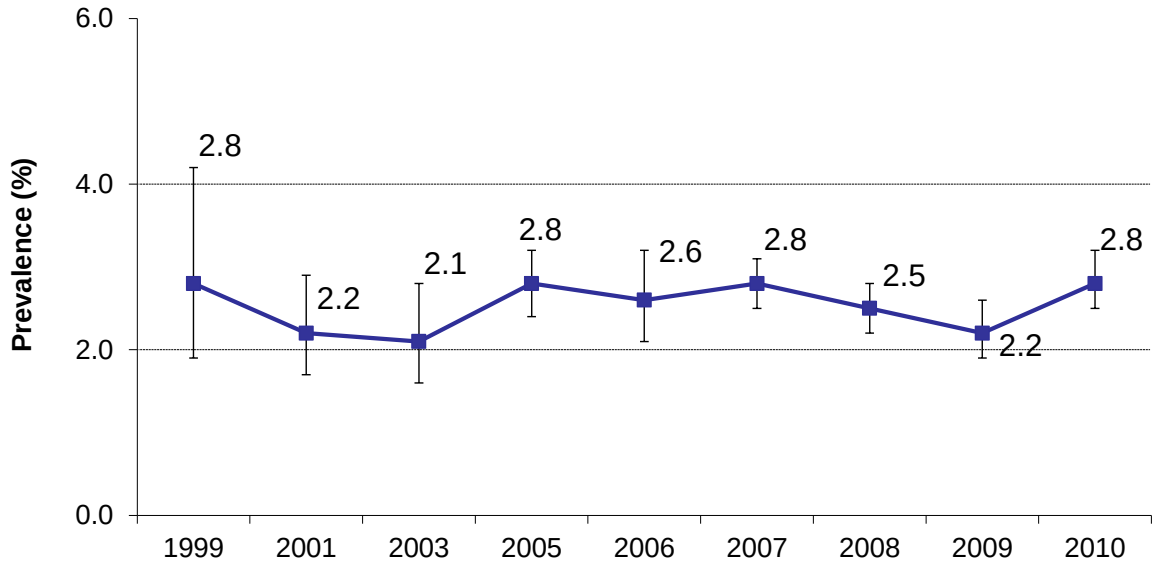
The two main types of stroke are ischemic and hemorrhagic. Ischemic stroke occurs as a result of an obstruction within a blood vessel supplying blood to the brain. Ischemic stroke accounts for 87 percent of all stroke cases. Hemorrhagic stroke results from a weakened vessel that ruptures and bleeds into the surrounding brain tissue. Hemorrhagic stroke has a much higher fatality rate than ischemic stroke and accounts for 13 percent of stroke cases.[3]

Stroke was the third leading cause of death in Texas in 2010 and the fourth leading cause of death in the U.S. in 2008. In addition, stroke is a leading cause of serious, long-term disability in the U.S. In 2008, the estimated direct and indirect cost of stroke in the U.S. totaled $34.3 billion.[3]

I. Prevalence

The prevalence of stroke in Texas has remained essentially unchanged from 1999 (2.8%; 95% CI 1.9-4.2) to 2010 (2.8%; 95% CI 2.5-3.2).

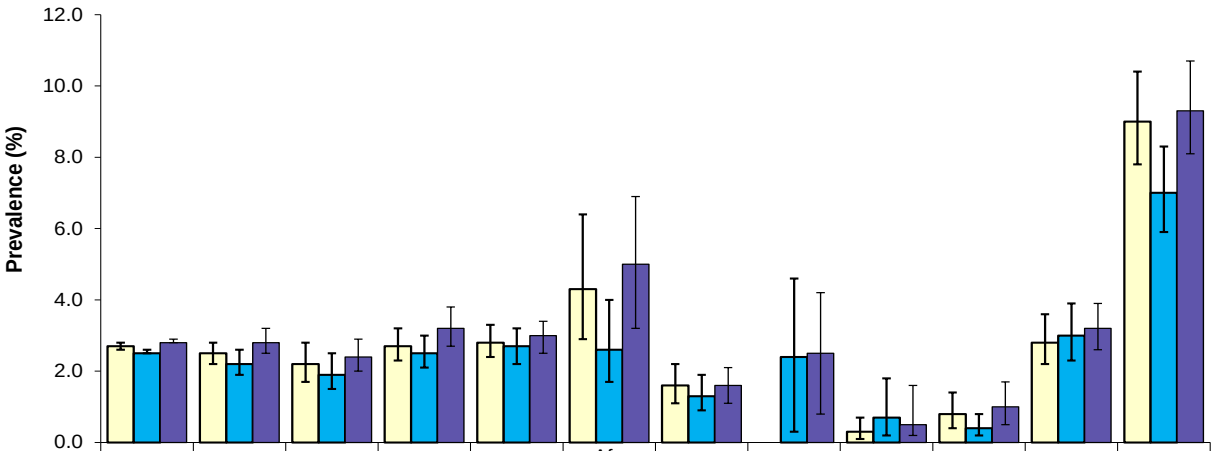
Figure 45. Prevalence of Stroke among Adults, Texas, 1999-2010



Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 6. Stroke

Figure 46. Prevalence of Stroke among Adults by Demographics, Texas, 2008-2010

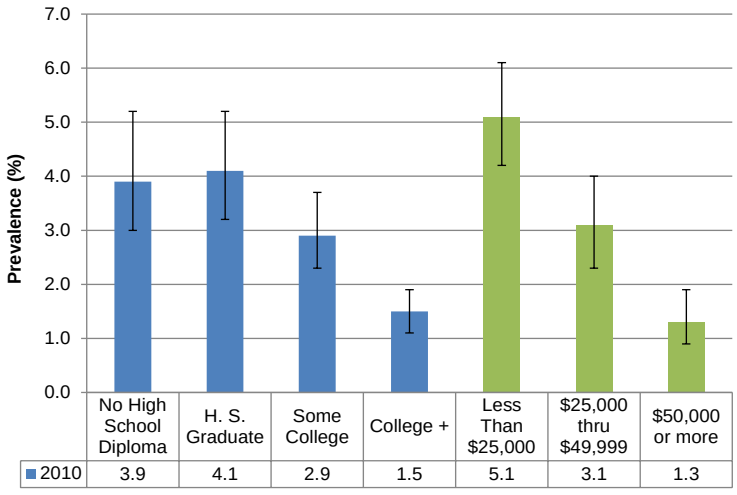


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	Other NH	18-29	30-44	45-64	65+
2008	2.7	2.5	2.2	2.7	2.8	4.3	1.6		0.3	0.8	2.8	9.0
2009	2.5	2.2	1.9	2.5	2.7	2.6	1.3	2.4	0.7	0.4	3.0	7.0
2010	2.8	2.8	2.4	3.2	3.0	5.0	1.6	2.5	0.5	1.0	3.2	9.3

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS
** Insufficient sample size to provide reliable estimates in 2008 for other NH*

According to 2010 Texas BRFSS, the African American NH (5.0%; 95% CI 3.2-6.9) and white NH (3.0%; 95% CI 2.5-3.4) populations had significantly higher prevalence of stroke compared to Hispanics (1.6%; 95% CI 1.1-2.1). The prevalence of stroke was highest among persons age 65 and older (Figure 46).

Figure 47. Prevalence of Stroke among Adults by Education and Household Income, Texas, 2010



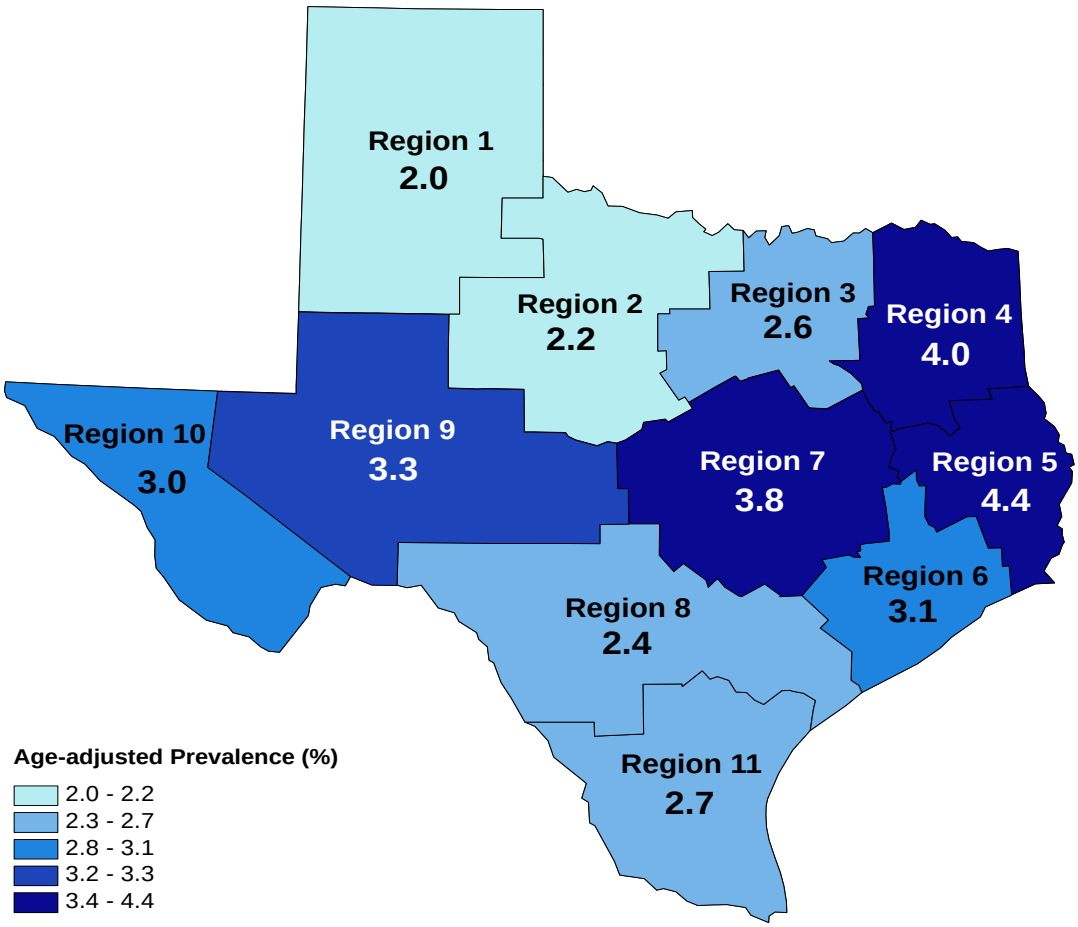
	No High School Diploma	H. S. Graduate	Some College	College +	Less Than $25,000	$25,000 thru $49,999	$50,000 or more
2010	3.9	4.1	2.9	1.5	5.1	3.1	1.3

Adults with a college degree (1.5%; 95% CI 1.1-1.9) had the lowest prevalence of stroke among all education levels (Figure 47). The prevalence of stroke increased significantly as annual household income level decreased. Adults with an annual household income of less than $25,000 (5.1%; 95% CI 4.2-6.1) had the highest prevalence of stroke by income.

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 6. Stroke

Figure 48. Age-adjusted Prevalence of Stroke by Public Health Region, Texas, 2010



Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS
Created by: GIS, Center for Health Statistics, DSHS

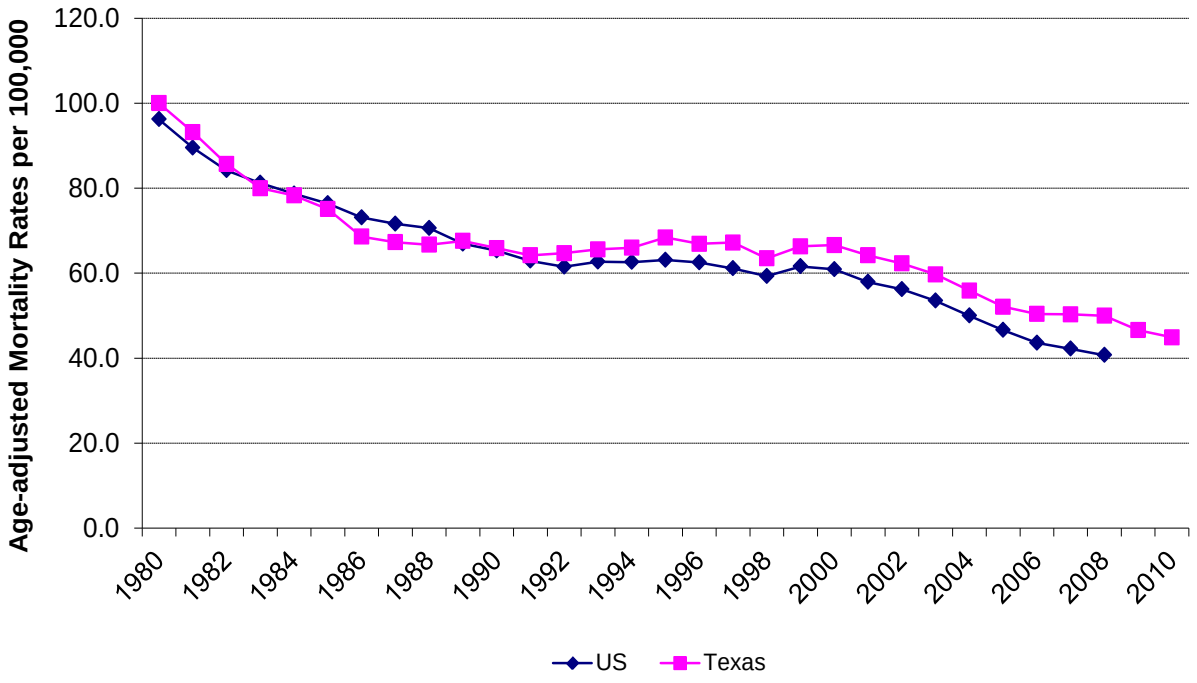
PHR 5 (4.4%; 95% CI 2.7-6.9) had the highest age-adjusted prevalence of stroke while PHR 1 (2.0%; 95% CI 1.5-2.8) had the lowest age-adjusted prevalence. There were no statistically significant differences in the prevalence of stroke among the PHRs in Texas.

Chapter 6. Stroke

II. Mortality

Since at least 1980, the age-adjusted mortality rates for stroke in Texas and the U.S. have decreased. The nation's AAMR for stroke declined by 57.7 percent between 1980 (96.2 per 100,000) and 2008 (40.7 per 100,000), whereas the state's rate declined by 55.1 percent between 1980 (100.0 per 100,000) and 2010 (44.9 per 100,000).

Figure 49. Age-adjusted Mortality Rates per 100,000 for Stroke, Texas and U.S., 1980-2010*



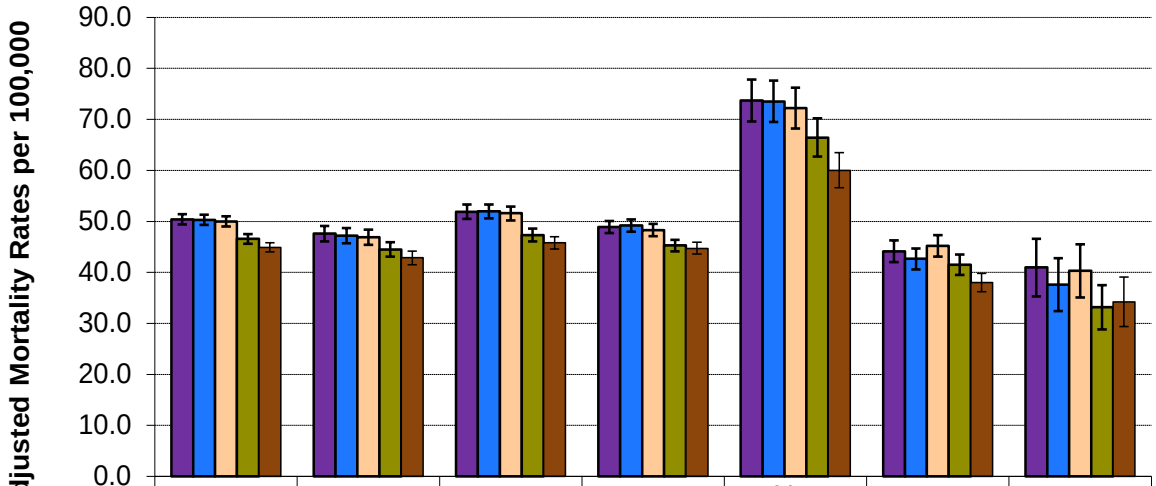
* U.S. mortality data not available for 2009 and 2010.

Data Source: Texas Vital Statistics Unit, DSHS.
National Center for Health Statistics, National Vital Statistics System.

Chapter 6. Stroke

From 2006 to 2008, the AAMR for stroke remained stable but was followed by a significant decrease in 2009. Texas had a stroke mortality rate of 44.9 per 100,000 (95% CI 44.0-45.8) in 2010. Females (45.8 per 100,000; 95% CI 44.6-47.0) had a significantly higher age-adjusted mortality rate for stroke as compared to males (42.9 per 100,000; 95% CI 41.5-44.2). The African American NH (60.0 per 100,000; 95% CI 56.6-63.5) population had 1.3 times higher AAMR for stroke than white NH (44.7 per 100,000; 95% CI 43.6-45.9), 1.6 times higher than Hispanic (38.0 per 100,000; 95% CI 36.2-39.8), and 1.8 times higher than other NH (34.2 per 100,000; 95% CI 29.4-39.1) populations.

Figure 50. Age-adjusted Mortality Rates per 100,000 for Stroke by Gender and Race/Ethnicity, Texas, 2006-2010

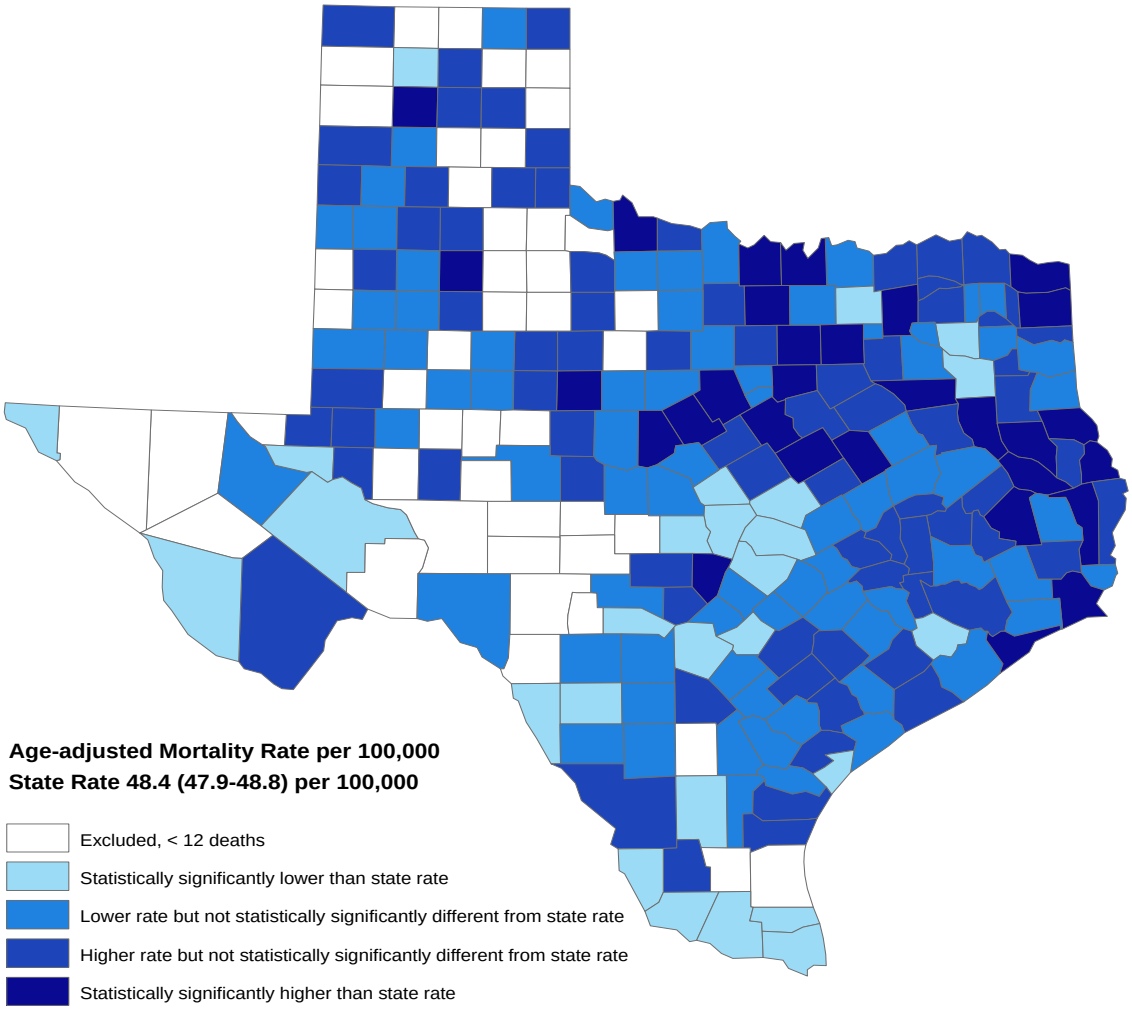


	Texas	Male	Female	White, NH	African American, NH	Hispanic	Other, NH
2006	50.4	47.6	51.9	48.9	73.7	44.1	41.0
2007	50.3	47.2	52.0	49.2	73.5	42.7	37.6
2008	50.0	46.9	51.6	48.3	72.2	45.2	40.3
2009	46.6	44.5	47.3	45.3	66.4	41.5	33.2
2010	44.9	42.9	45.8	44.7	60.0	38.0	34.2

Data Source: Texas Vital Statistics Unit, DSHS

Chapter 6. Stroke

Figure 51. Age-adjusted Mortality Rates per 100,000 for Stroke by County, Texas, 2006-2010



Data Source: Texas Vital Statistics Unit, DSHS
Created by: GIS, Center for Health Statistics, DSHS

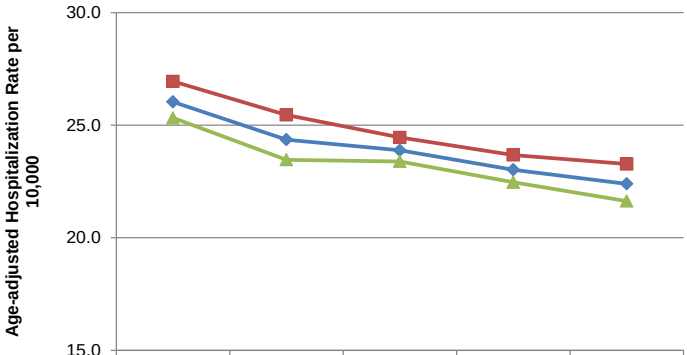
For the period of 2006-2010, the stroke AAMR in Texas was 48.4 per 100,000 (95% CI 47.9-48.8). Of 254 counties, about 11.8 percent (30 counties) had significantly higher mortality rates than the state's five-year average. Seventy-seven counties had higher rates but not significantly different than the state's five-year average. While 102 counties had lower mortality rates than the state's five-year average, only 27 counties had significantly lower mortality rates.

Chapter 6. Stroke

III. Hospitalization

Stroke hospitalization rates in Texas declined significantly by 14 percent, from 26.0 per 10,000 in 2006 to 22.4 per 10,000 in 2010. Significant decline was observed among males, females, and across all racial/ethnic groups from 2006 to 2010. The other NH (39.1 per 10,000; 95% CI 37.6-40.6) population had two times higher age-adjusted hospitalization rates for stroke than Hispanic (19.5 per 10,000; 95% CI 19.1-19.9) and 1.8 times higher rates than white NH (21.3 per 10,000; 95% CI 21.1-21.6) populations in 2010. The African American NH (29.5 per 10,000; 95% CI 28.8-30.2) population had the second highest hospitalization rates for stroke (Figure 53).

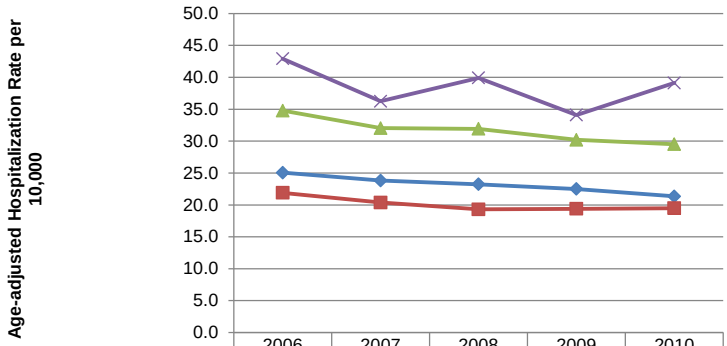
Figure 52. Age-adjusted Hospitalization Rates per 10,000 for Stroke by Gender, Texas, 2006-2010



	2006	2007	2008	2009	2010
Texas	26.0	24.4	23.9	23.0	22.4
Male	26.9	25.5	24.5	23.7	23.3
Female	25.3	23.5	23.4	22.5	21.6

Data Source: Texas Health Care Information Collection, DSHS

Figure 53. Age-adjusted Hospitalization Rates per 10,000 for Stroke by Race/Ethnicity, Texas, 2006-2010

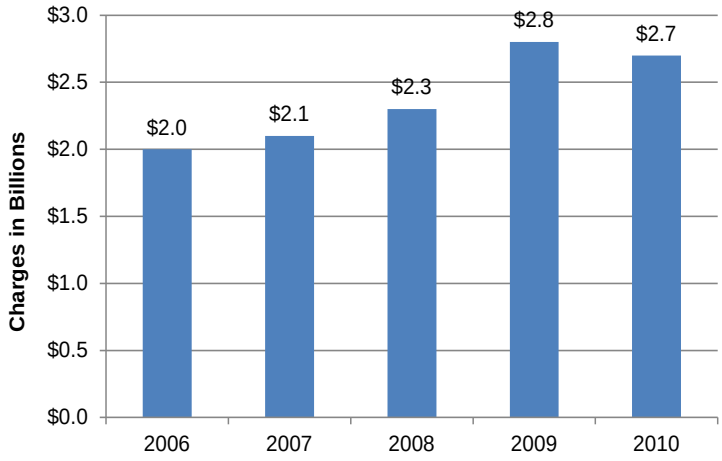


	2006	2007	2008	2009	2010
White, NH	25.1	23.8	23.2	22.5	21.3
African American, NH	34.8	32.0	31.9	30.2	29.5
Hispanic	21.9	20.4	19.3	19.4	19.5
Other, NH	42.9	36.2	39.9	34.1	39.1

Data Source: Texas Health Care Information Collection, DSHS

Chapter 6. Stroke

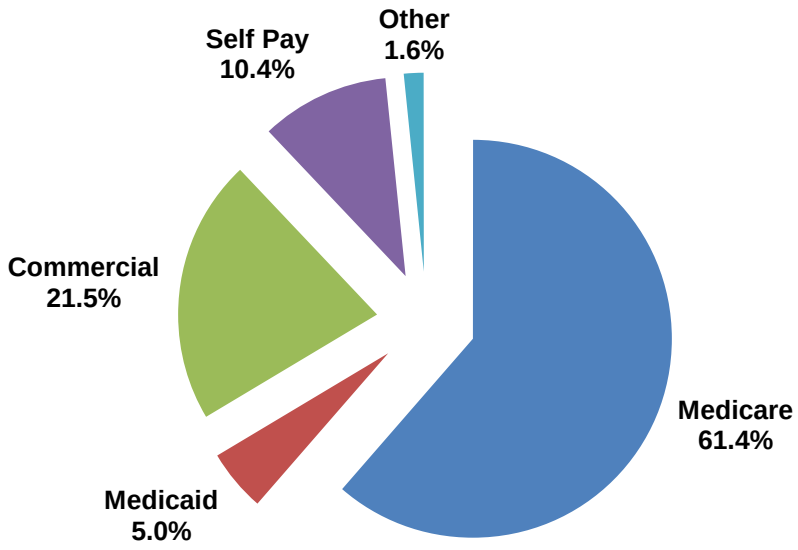
Figure 54. Total Hospital Charges for Stroke, Texas, 2006-2010



Data Source: Texas Health Care Information Collection, DSHS

The total hospital charges for stroke increased from $2 billion in 2006 to $2.7 billion in 2010.

Figure 55. Standard Source of Primary Payment for Stroke Hospitalization, Texas, 2010



Data Source: Texas Health Care Information Collection, DSHS

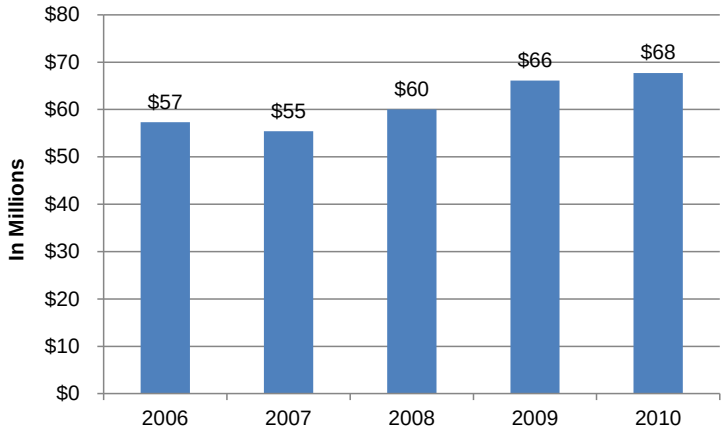
In 2010, the majority of stroke hospitalizations were paid by Medicare (61.4%). Other sources of payment included commercial (21.5%), self-pay (10.4%), Medicaid (5.0%), and other (1.6%).

Chapter 6. Stroke

IV. Medicaid Reimbursement

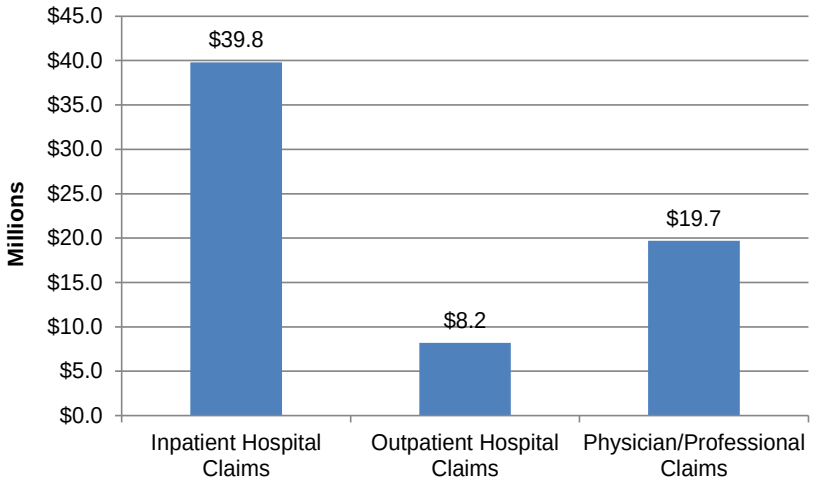
Total Medicaid reimbursement for stroke increased from $57 million in 2006 to $68 million in 2010 (Figure 56). In 2010, about 58.7 percent ($39.8 million) of the reimbursement claims for stroke were for inpatient hospital claims (Figure 57).

Figure 56. Medicaid Reimbursement for Stroke, Texas, 2006-2010



Data Source: Texas Health and Human Services Commission

Figure 57. Medicaid Reimbursement for Stroke by Claim Type, Texas, 2010



Data Source: Texas Health and Human Services Commission

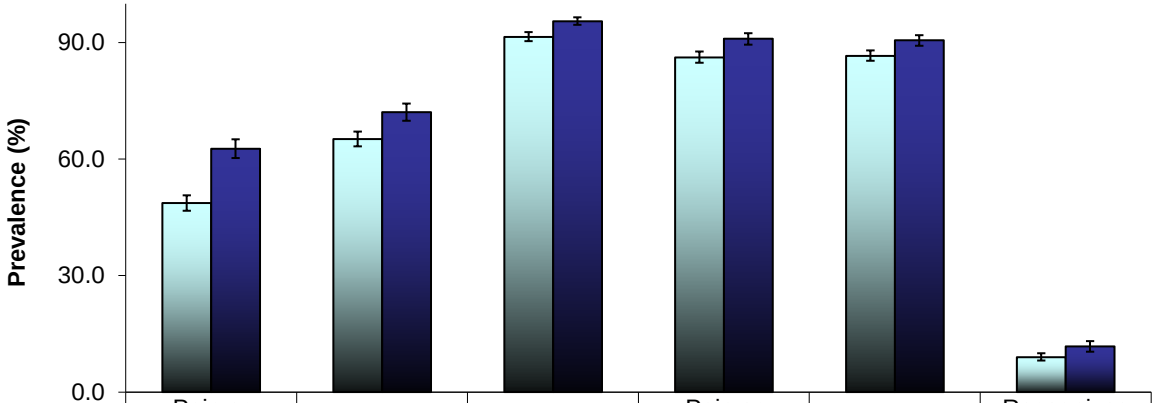
Chapter 7. Awareness of Signs and Symptoms of Heart Attack and Stroke and First Response

According to the NHLBI, an estimated 610,000 Americans will have an initial heart attack each year while another 325,000 will experience recurrent heart attacks. In addition, approximately 795,000 Americans experience stroke each year, more than three-quarters (710,000) of which are first attacks and 195,000 are recurrent attacks.[3] According to a report from the Centers for Disease Control and Prevention (CDC), almost half of cardiac deaths in 1999 occurred outside of a hospital. Early recognition and calling 9-1-1 increase the likelihood of immediate emergency response and timely medical care that can reduce disability and death.[14]

The Healthy People 2020 Heart Disease and Stroke topic area includes objectives for increasing the proportion of adults aged 20 years and older who are aware of the early warning signs and symptoms of a heart attack (HDS-16.2) and stroke (HDS-17.2), as well as the importance of accessing rapid emergency care by calling 9-1-1 or another emergency number (HDS-16.3, HDS-17.3).

The proportion of adults 18 years or older who could recognize all symptoms of a heart attack in Texas improved significantly from 9.0 percent (95% CI 8.1-10.0) in 2005 to 11.8 percent (95% CI 10.4-13.1) in 2009. There was also significant increase in the proportion of adults who recognized each of the five symptoms of a heart attack in 2009 compared to 2005.

Figure 58. Prevalence of Adults Recognizing Heart Attack Signs and Symptoms among Adults, Texas, 2005 & 2009



	Pain or discomfort in jaw, neck or back	Feeling weak, lightheaded, or faint	Chest pain or discomfort	Pain or discomfort in the arms or shoulders	Shortness of breath	Recognizes all heart attack symptoms
2005	48.7	65.2	91.5	86.2	86.6	9.0
2009	62.7	72.1	95.5	91.0	90.6	11.8

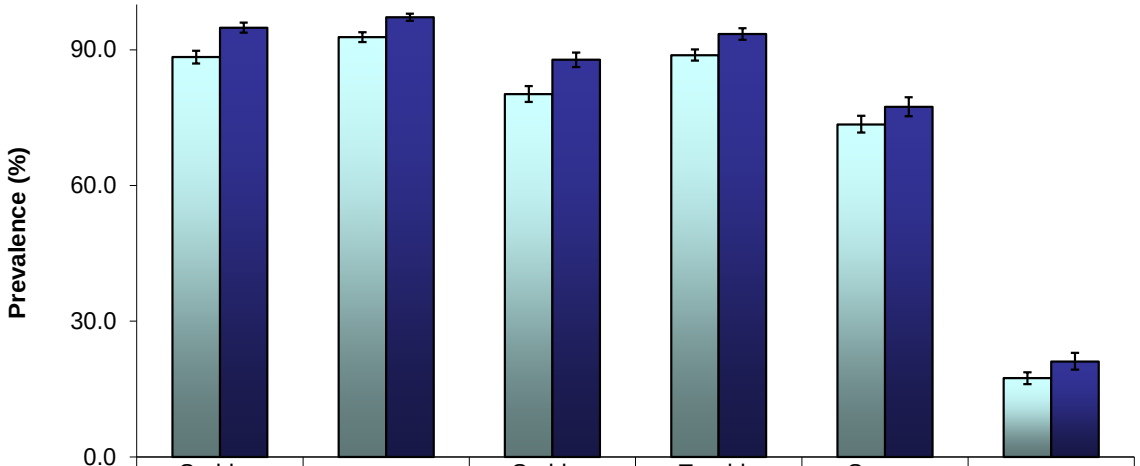
Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 7. Awareness of Signs and Symptoms of Heart Attack and Stroke and First Response

The proportion of adults 18 years or older who could recognize all symptoms of a stroke in Texas improved significantly from 17.4 percent (95% CI 16.1-18.7) in 2005 to 21.1 percent (95% CI 19.3-23.0) in 2009. There was also significant increase in the proportion of adults who recognized four of the five symptoms of a stroke in 2009 as compared to 2005. The proportion of adults who recognized severe headache with no known cause as a symptom of a stroke did not change significantly during the same period.

An estimated 85.9 percent (95% CI 84.2-87.5) of adults in Texas identified 9-1-1 as the first emergency response for heart attack and stroke in 2009. This was comparable to 85.1 percent (95% CI 83.8-86.5) in 2005.

Figure 59. Prevalence of Adults Recognizing Stroke Signs and Symptoms among Adults, Texas, 2005 & 2009



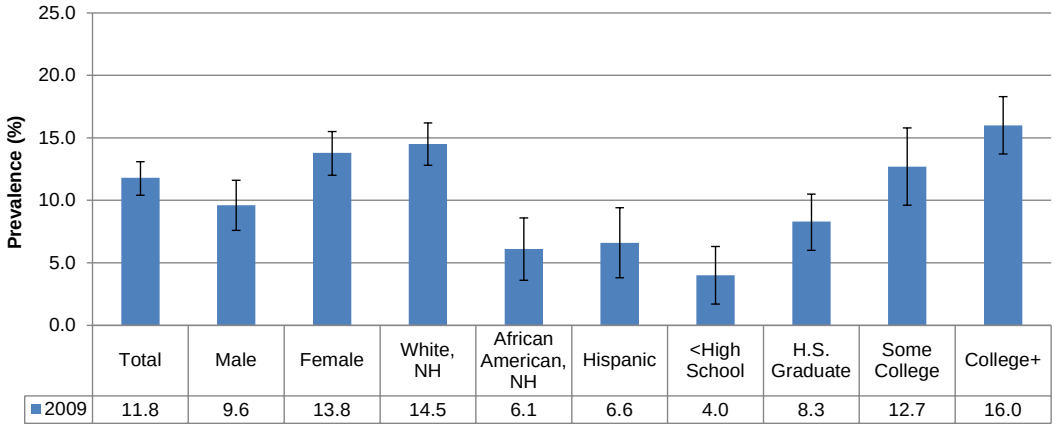
	Sudden confusion or trouble speaking	Numbness or weakness of arm/face/leg	Sudden trouble seeing in one or both eyes	Trouble walking, dizziness/loss of balance	Severe headache with no known cause	Recognizes all stroke symptoms
2005	88.4	92.8	80.2	88.8	73.5	17.4
2009	94.9	97.2	87.8	93.5	77.4	21.1

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 7. Awareness of Signs and Symptoms of Heart Attack and Stroke and First Response

In 2009, 13.8 percent of females (95% CI 12.0-15.5) were able to recognize all heart attack symptoms, while the percentage was significantly lower for males (9.6%; 95% CI 7.6-11.6). The white NH (14.5%; 95% CI 12.8-16.2) population reported more than two times higher recognition of all heart attack symptoms than African American NH (6.1%; 95% CI 3.6-8.6) and Hispanic (6.6%; 95% CI 3.8-9.4) populations. Adults with a college degree (16.0%; 95% CI 13.7-18.3) reported the highest recognition of all heart attack symptoms among all education levels (Figure 60).

Figure 60. Recognizes All Heart Attack Symptoms among Adults by Demographics, Texas, 2009

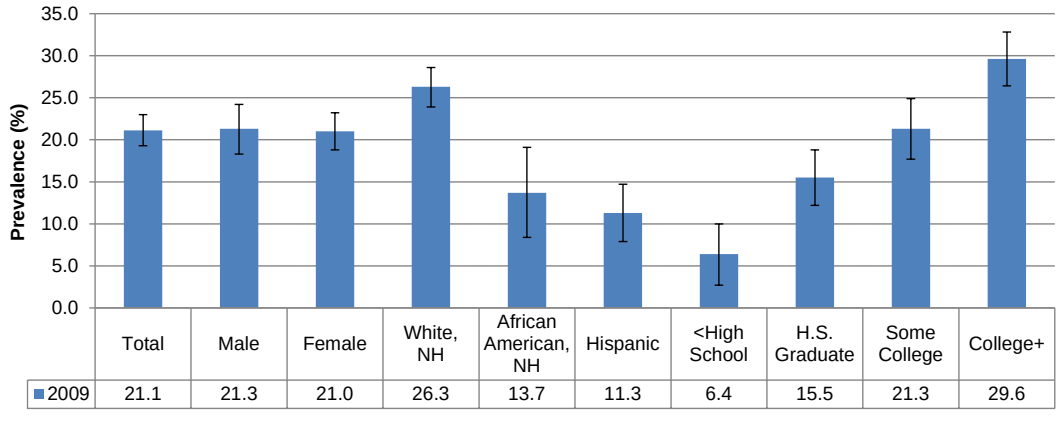


	Total	Male	Female	White, NH	African American, NH	Hispanic	<High School	H.S. Graduate	Some College	College+
2009	11.8	9.6	13.8	14.5	6.1	6.6	4.0	8.3	12.7	16.0

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

In 2009, recognition of all stroke symptoms did not differ significantly among males and females in Texas. The white NH (26.3%; 95% CI 23.9-28.6) population reported the highest recognition of all stroke symptoms among all racial/ethnic populations. Adults with a college degree (29.6%; 95% CI 26.4-32.8) had the highest recognition of all stroke symptoms among all education levels (Figure 61).

Figure 61. Recognizes All Stroke Symptoms among Adults by Demographics, Texas, 2009



	Total	Male	Female	White, NH	African American, NH	Hispanic	<High School	H.S. Graduate	Some College	College+
2009	21.1	21.3	21.0	26.3	13.7	11.3	6.4	15.5	21.3	29.6

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 8. Modifiable Risk Factors

Modifiable risk factors are conditions and lifestyle factors that increase the risk of developing disease. Many of the risk factors for CVD can be prevented or improved with lifestyle changes and/or medical treatment. Modifiable risk factors include tobacco use, high blood pressure, high blood cholesterol, diabetes, overweight and obesity, physical inactivity, and dietary patterns. Non-modifiable risk factors include age, gender, family history and other genetic predispositions. The more risk factors a person has, the higher the risk of developing heart disease.[15]

A. Tobacco Use

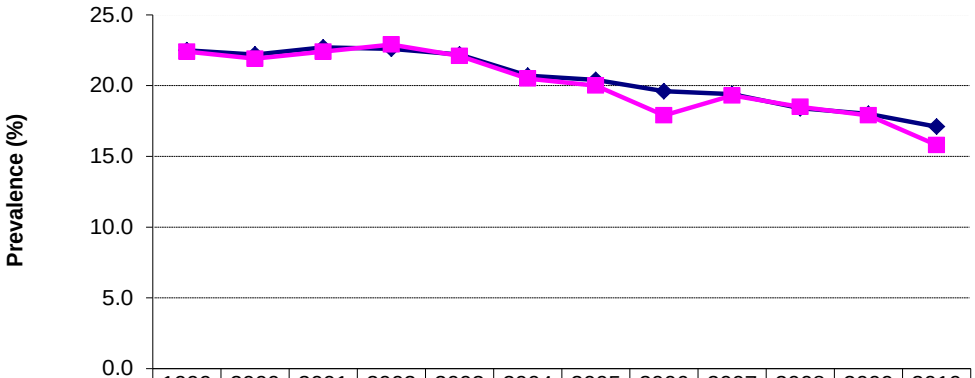
Tobacco use remains the single most prevantable cause of disease and death in the U.S. today. In the U.S., cigarette smoking is responsible for approximately 443,000 deaths annually, or about 20 percent of all deaths in the country.[16] Tobacco use is a major risk factor for heart disease and stroke. Current smokers have two to four times the risk of developing stroke compared to non-smokers or former smokers who stopped smoking ten years prior.[17]

Between 2000 and 2004, it was estimated that smoking cost $193 billion each year in the U.S., which included $96 billion in direct medical costs and $97 billion in lost productivity.[3]

Current smokers were defined as persons who reported smoking at least 100 cigarettes in their lifetime and now smoke every day or some days.

The prevalence of current cigarette smoking among adults in Texas declined significantly by 29.5% between 1999 (22.4%; 95% CI 20.8-24.0) and 2010 (15.8%; 95% CI 14.7-17.0).

Figure 62. Prevalence of Current Cigarette Smoking among Adults, Texas and U.S., 1999-2010



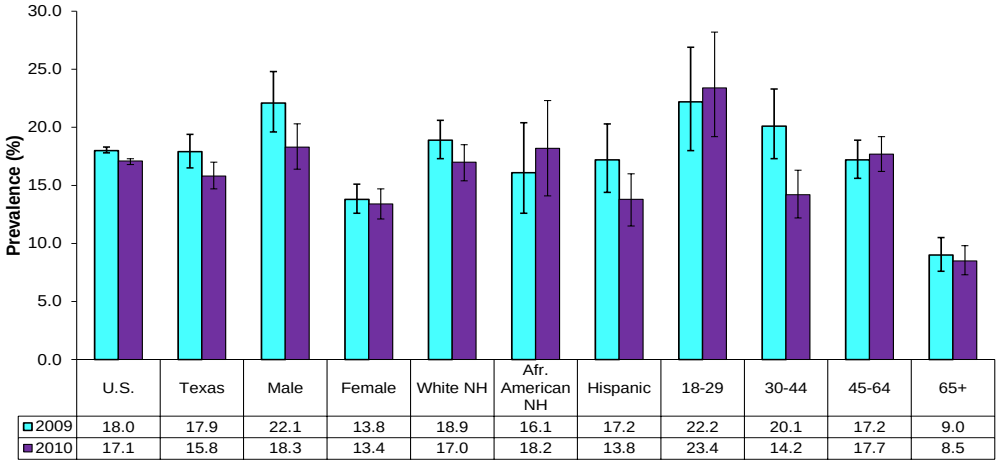
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
US	22.5	22.2	22.7	22.6	22.2	20.7	20.4	19.6	19.4	18.4	18.0	17.1
Texas	22.4	21.9	22.4	22.9	22.1	20.5	20.0	17.9	19.3	18.5	17.9	15.8

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 8. Modifiable Risk Factors

According to 2010 Texas BRFSS, males (18.3%; 95% CI 16.4-20.3) had significantly higher prevalence of current smoking compared to females (13.4%; 95% CI 12.1-14.7). There were no significant differences in the prevalence of current smoking among racial/ethnic populations in the state. Adults aged 18-29 years had the highest prevalence of current smoking in 2010. The prevalence of current smoking declined significantly from 20.1 percent (95% CI 17.3-23.3) in 2009 to 14.2 percent (95% CI 12.2-16.3) in 2010 among adults aged 30-44 years (Figure 63).

Figure 63. Prevalence of Current Cigarette Smoking among Adults by Demographics, Texas, 2009-2010

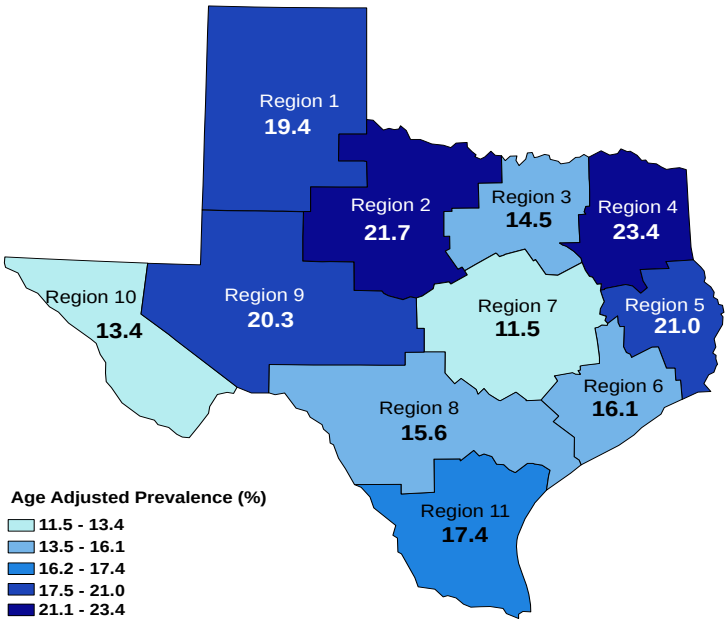


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	18-29	30-44	45-64	65+
2009	18.0	17.9	22.1	13.8	18.9	16.1	17.2	22.2	20.1	17.2	9.0
2010	17.1	15.8	18.3	13.4	17.0	18.2	13.8	23.4	14.2	17.7	8.5

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Figure 64. Age-adjusted Prevalence of Current Cigarette Smoking by Public Health Region, Texas, 2010

PHR 4 had the highest age-adjusted prevalence (23.4%; 95% CI 19.2-28.3) of current cigarette smoking among all PHRs in 2010. This was also significantly higher than the state age-adjusted prevalence (16.1%; 95% CI 14.8-17.4) (Figure 64).



Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS
Created by: GIS, Center for Health Statistics, DSHS

Chapter 8. Modifiable Risk Factors

B. High Blood Pressure (HBP)

HBP, or hypertension, is often referred to as the "silent killer" due to its lack of symptoms and warning signs. Blood pressure is the force of blood pushing against the artery walls. Blood pressure is measured by two numbers: a numerator called systolic pressure is the highest pressure of the blood in the arteries during contraction of the heart and a denominator, called diastolic pressure, which is the lowest pressure of the blood in the arteries between contractions. When blood pressure is too high, the heart works harder to pump blood, and can lead to serious CVD complications.[18] See Table 1 for blood pressure classifications.

Table 1. Blood Pressure Classification

Blood Pressure Classification	Systolic Blood Pressure (mmHg)	Diastolic Blood Pressure (mmHg)
Normal	<120	and < 80
Prehypertension	120-139	or 80-89
Stage 1 Hypertension	140-159	or 90-99
Stage 2 Hypertension	≥160	or ≥100

Adapted from the 7th Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Bloode Pressure, DHHS, 2003

Studies have shown that HBP is a significant risk factor for developing CVD. The higher one's blood pressure, the greater the risk of heart attack, heart failure, stroke, and kidney disease.[19] An estimated 28 percent of new IHD cases among men and 29 percent of such cases among women were attributable to blood pressure levels that exceeded higher than normal (≥130/85) levels.[20] Hypertension precedes more than 90 percent of new CHF cases. The risk of heart failure is increased two to three times among those with hypertension.[21] Those with blood pressure levels <120/80 mmHg have approximately half the lifetime risk of developing stroke than those with hypertension.[3]

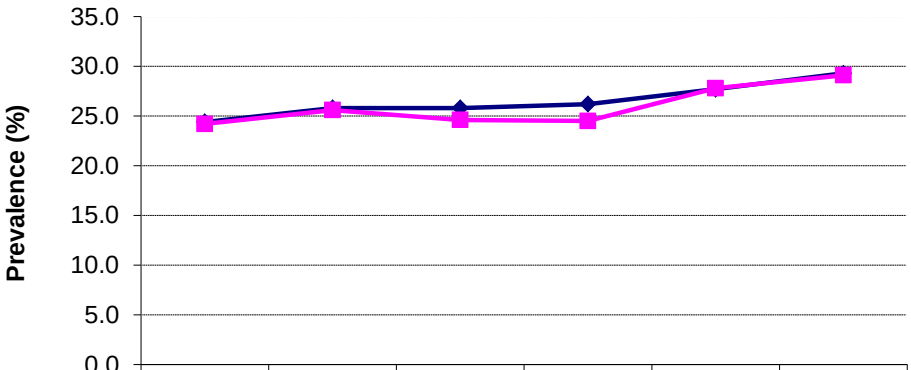
In 2008, HBP was listed as a primary or contributing cause of death for 347,689 people in the U.S. In 2008, the estimated cost of HBP in the U.S. was $50.6 billion.[3]

I. Prevalence

In 2009, about 3 in 10 adults (29.1%; 95% CI 27.8-30.5) in Texas had high blood pressure (excluding during pregnancy). The prevalence of HBP remained unchanged between 1999 (24.2%; 95% CI 22.7-25.7) and 2005 (24.5%; 95% CI 23.3-25.8). This was followed by a significant increase in the prevalence of HBP between 2005 and 2007 (27.8%; 95% CI 26.9-28.8) (Figure 65).

Chapter 8. Modifiable Risk Factors

Figure 65. Prevalence of High Blood Pressure among Adults, Texas and U.S., 1999-2009

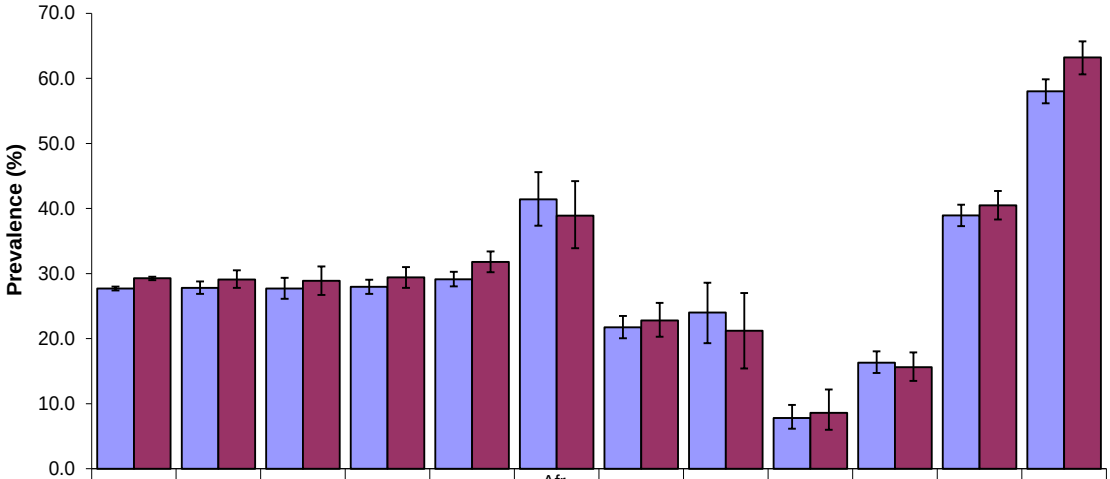


	1999	2001	2003	2005	2007	2009
US	24.4	25.8	25.8	26.2	27.7	29.3
Texas	24.2	25.6	24.6	24.5	27.8	29.1

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Almost 4 out of 10 African American NH adults (38.9%; 95% CI 33.9-44.2) in Texas reported having been told they had high blood pressure by a health professional in 2009. The African American NH population continued to have the highest prevalence of high blood pressure among all racial/ethnic populations, followed by white NH (31.8%; 95% CI 30.2-33.4). High blood pressure prevalence increased significantly with age (Figure 66).

Figure 66. Prevalence of High Blood Pressure among Adults by Demographics, Texas, 2007 & 2009



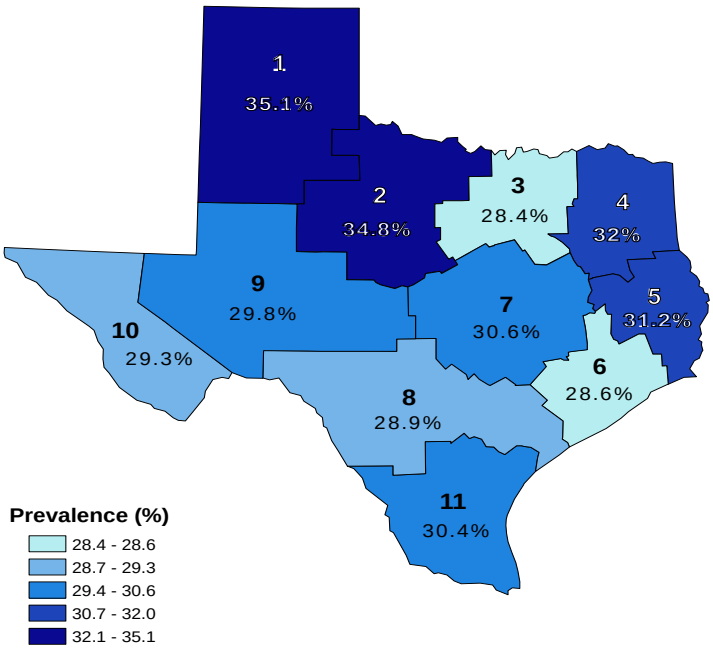
	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	Other NH	18-29	30-44	45-64	65+
2007	27.7	27.8	27.7	28.0	29.1	41.4	21.7	24.0	7.8	16.3	38.9	58.0
2009	29.3	29.1	28.9	29.4	31.8	38.9	22.8	21.2	8.6	15.6	40.5	63.2

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 8. Modifiable Risk Factors

In 2009, there were no significant differences in the age-adjusted prevalence of HBP among the PHRs in Texas (Figure 67).

Figure 67. Age-adjusted Prevalence of High Blood Pressure by Public Health Region, Texas, 2009

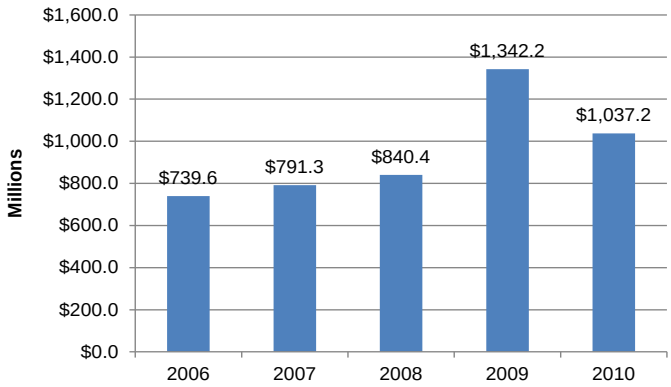


Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS
Created by: GIS, Center for Health Statistics, DSHS

II. Financial Burden

The total hospital charges for high blood pressure increased from $739.6 million in 2006 to $1.3 billion in 2009. In 2010, the total hospital charges for HBP was over $1 billion (Figure 68).

Figure 68. Total Hospital Charges for High Blood Pressure, Texas, 2006-2010

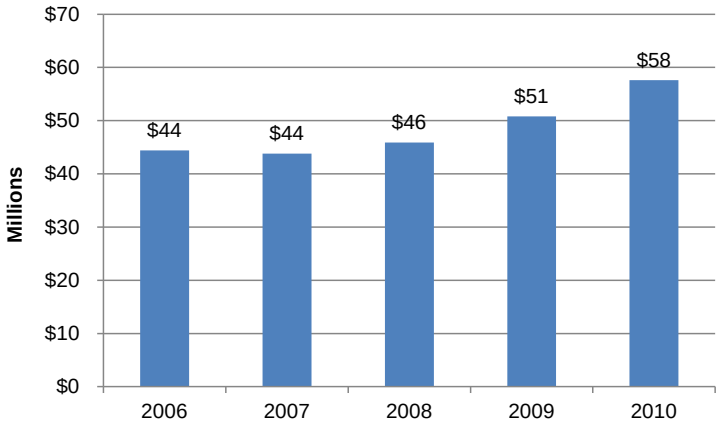


Data Source: Texas Health and Human Services Commission

Chapter 8. Modifiable Risk Factors

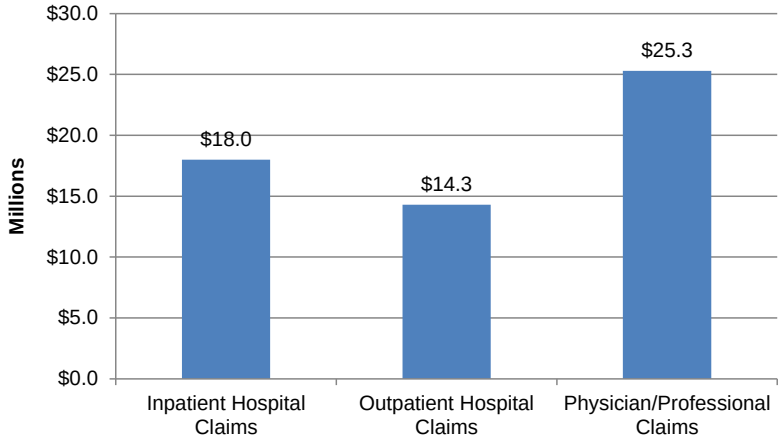
The estimated Medicaid reimbursement for HBP remained stable between 2006 and 2008 but has increased from $51 million in 2009 to $58 million in 2010 (Figure 69). In 2010, about 44 percent ($25.3 million) of the reimbursement claims for HBP were for physician/professional claims, 31.2 percent ($18.0 million) for inpatient hospital claims, and 24.8 percent ($14.3 million) for outpatient hospital claims (Figure 70).

Figure 69. Medicaid Reimbursement for High Blood Pressure, Texas, 2006-2010



Data Source: Texas Health and Human Services Commission

Figure 70. Medicaid Reimbursement for High Blood Pressure by Claim Type, Texas, 2010



Data Source: Texas Health and Human Services Commission

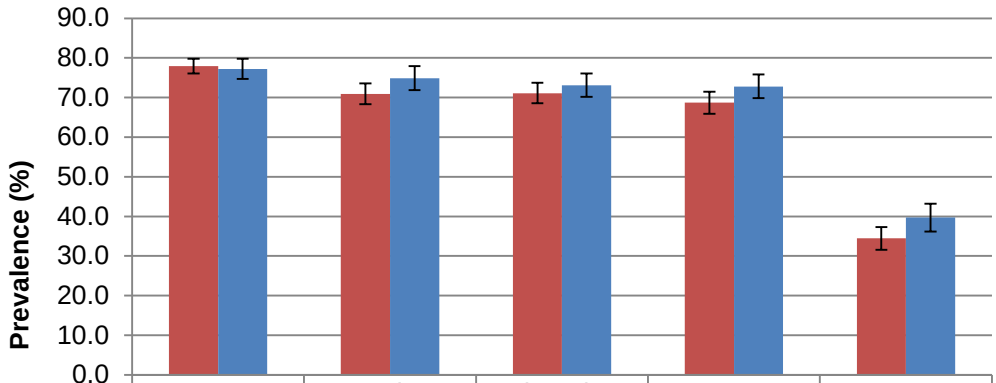
Chapter 8. Modifiable Risk Factors

III. Actions to Control High Blood Pressure

A number of actions can be taken to control HBP including diet change, exercise, reducing salt and alcohol intake, and taking medications. A combination of these actions will have the greatest impact. Studies have shown that antihypertensive therapies have been associated with a 35 to 40 percent reduction in stroke incidence, 20 to 25 percent reduction in heart attack and more than 50 percent reduction in heart failure.[19] In 2009, about 22.8 percent (95% CI 20.2-25.3) of Texas adults with diagnosed HBP reported not taking any medication to control their HBP.

In 2009, more than three-quarters (77.2%; 95% CI 74.7-79.8) of Texas adults with diagnosed HBP reported taking any medication to control their HBP. More than seventy percent of Texas adults with diagnosed HBP reported cutting down on salt (74.9%; 95% CI 71.9-77.9), changing eating habits (73.1%; 95% CI 70.2-76.1), and exercising (72.8%; 95% CI 69.9-75.8) in 2009. There were slight increases but no significant differences in percentage of adults taking each of the five specific actions to control HBP from 2007 to 2009 (Figure 71).

Figure 71. Percentage of Respondents Taking Specific Actions to Control High Blood Pressure among Adults with High Blood Pressure, Texas, 2007 & 2009



	Taking medications	Cutting down on salt	Changing eating habits	Exercising	Reducing alcohol use
2007	77.9	70.9	71.1	68.7	34.5
2009	77.2	74.9	73.1	72.8	39.7

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 8. Modifiable Risk Factors

C. High Blood Cholesterol

Cholesterol is a waxy, fat-like substance that the body uses to make hormones, vitamin D, and substances that help you digest food. It is carried in the bloodstream in small packages called lipoproteins. Two kinds of lipoproteins carry cholesterol throughout the body. Low density lipoprotein (LDL) cholesterol is sometimes called "bad" cholesterol. Elevated levels of LDL cholesterol lead to a buildup of cholesterol in the arteries. The higher the level of LDL in a person's blood, the greater chance they have of developing heart disease.[22]

High density lipoprotein (HDL) cholesterol carries cholesterol from parts of the body back to the liver so that it can be removed from the body. HDL is sometimes called "good" cholesterol because the higher the level, the lower the chance of getting heart disease.[22]

Persons with high total cholesterol levels have been estimated to have one and one-half to two times the lifetime risk of developing coronary heart disease compared to persons with desirable cholesterol levels.[23] In 2009, about 4 in 10 adults (40.9%; 95% CI 39.2-42.6) in Texas had been screened and diagnosed with high blood cholesterol.

Table 2. Classification of LDL, HDL, and Total Cholesterol

Cholesterol Type	Level (mg/dL)	Classification
LDL Cholesterol	<100	Optimal
	100-129	Near optimal/Above optimal
	130-159	Borderline High
	160-189	High
	≥190	Very High
HDL Cholesterol	<40	Low
	≥60	High
Total Cholesterol	<200	Desirable
	200-239	Borderline High
	≥240	High

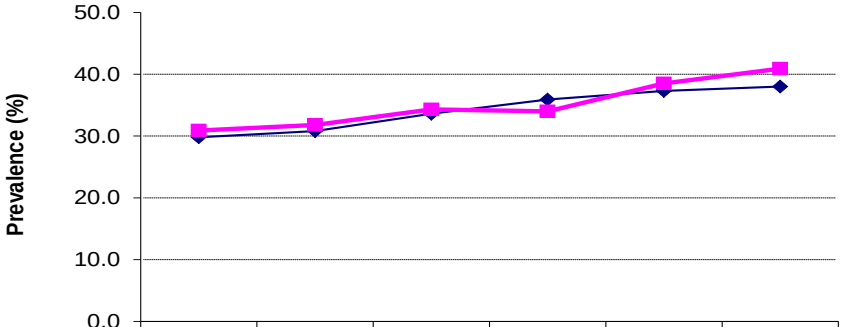
Source: Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults, 2002

Chapter 8. Modifiable Risk Factors

I. Prevalence

The prevalence of high blood cholesterol among adults in Texas significantly increased by 32.4 percent between 1999 (30.9%; 95% CI 29.0-32.8) and 2009. The prevalence of high blood cholesterol in Texas was significantly higher than in the U.S. (38.0%; 95% CI 37.7-38.4) in 2009.

Figure 72. Prevalence of High Blood Cholesterol among Adults, Texas and U.S., 1999-2009

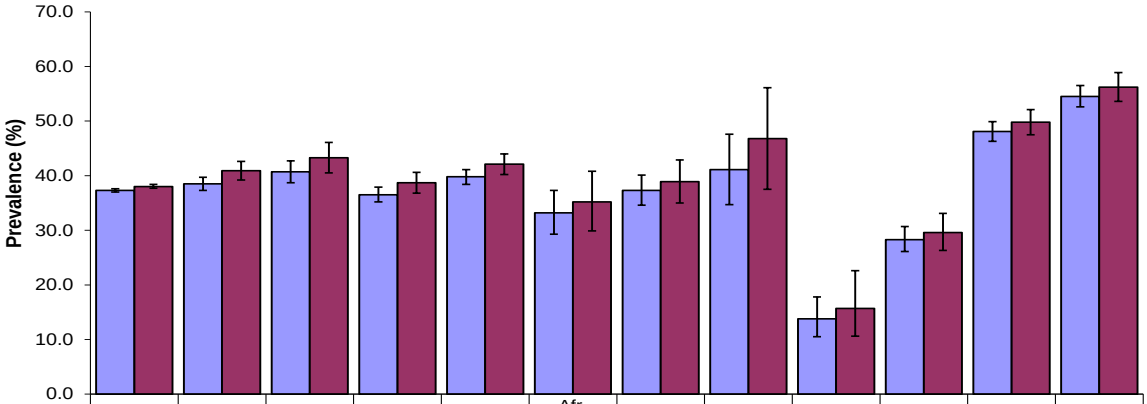


	1999	2001	2003	2005	2007	2009
US	29.8	30.8	33.6	35.9	37.3	38.0
Texas	30.9	31.8	34.3	34.0	38.5	40.9

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

There were no significant differences in the prevalence of high blood cholesterol among males and females or among racial/ethnic populations in Texas in 2009. High blood cholesterol prevalence increased significantly with an increase in age (Figure 73).

Figure 73. Prevalence of High Blood Cholesterol among Adults by Demographics, Texas, 2007 & 2009

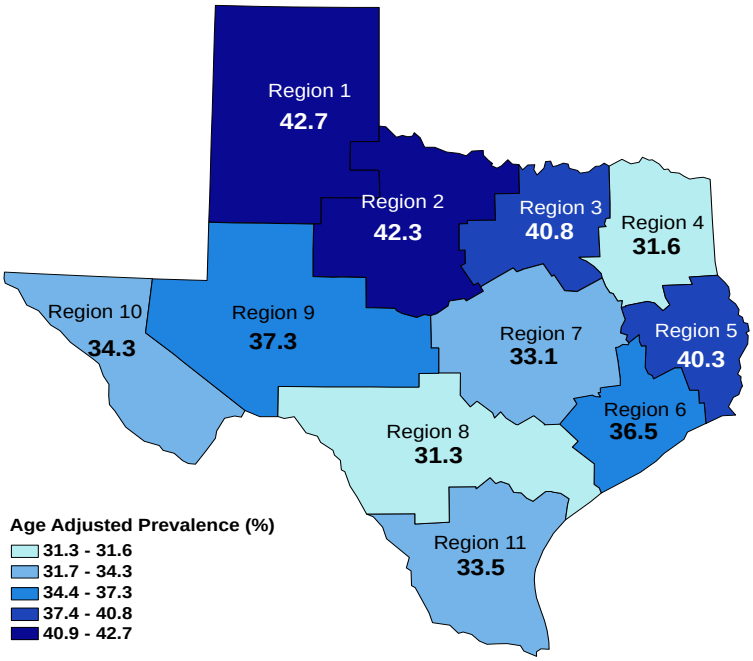


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	Other NH	18-29	30-44	45-64	65+
2007	37.3	38.5	40.7	36.5	39.8	33.2	37.3	41.1	13.8	28.3	48.1	54.5
2009	38.0	40.9	43.3	38.7	42.1	35.2	38.9	46.8	15.7	29.6	49.8	56.2

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

PHR 1 (42.7%; 95% CI 37.0-48.6) had the highest age-adjusted prevalence of high blood cholesterol while PHR 8 (31.3%; 95% CI 37.2-35.7) had the lowest age-adjusted prevalence among the PHRs in Texas. There were no significant differences in the age-adjusted prevalence of high blood cholesterol among the PHRs in Texas (Figure 74).

Figure 74. Age-adjusted Prevalence of High Blood Cholesterol by Public Health Region, Texas, 2009



Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS
Created by: GIS, Center for Health Statistics, DSHS

II. Blood Cholesterol Screening

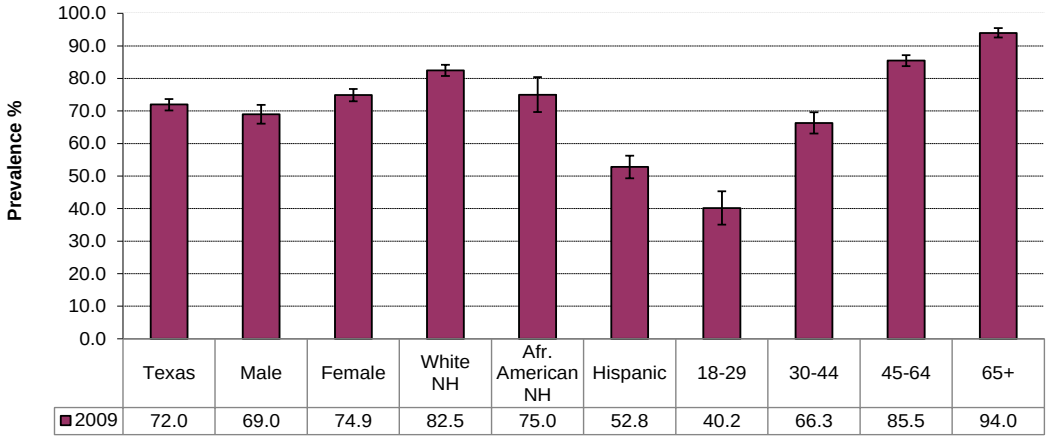
The prevalence of Texas adults who reported they had their cholesterol checked within the past five years remained relatively unchanged between 2001 (70.0%; 95% CI 68.6-71.4) and 2009 (72.0%; 95% CI 70.2-73.7).

Figure 75. Prevalence of Adults Who Reported Having Blood Cholesterol Checked Within the Past Five Years, Texas, 2001-2009

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Females (74.9%; 95% CI 73.0-76.8) had a significantly higher prevalence of having their cholesterol checked within the past five years than males (69.0%; 95% CI 66.1-71.9) in 2009. The Hispanic (52.8%; 95% CI 49.3-56.3) population had the lowest prevalence of having their cholesterol checked within the past five years as compared to white NH (82.5%; 95% CI 80.8-84.2) and African American NH (75.0%; 95% CI 69.7-80.4) populations. The prevalence of having cholesterol checked within the past five years increased significantly with age (Figure 76).

Figure 76. Prevalence of Adults Who Reported Having Blood Cholesterol Checked Within the Past Five Years by Demographics, Texas, 2009

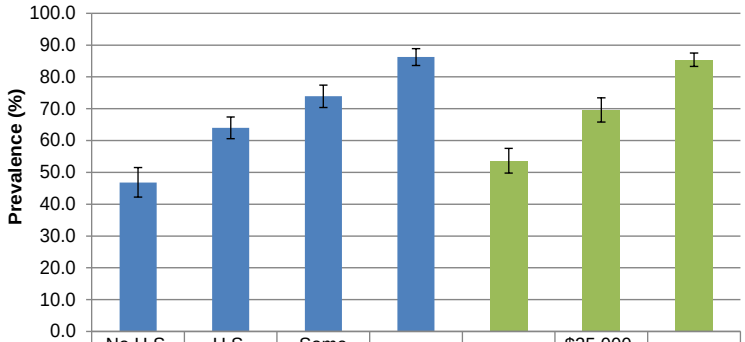


	Texas	Male	Female	White NH	Afr. American NH	Hispanic	18-29	30-44	45-64	65+
2009	72.0	69.0	74.9	82.5	75.0	52.8	40.2	66.3	85.5	94.0

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

The prevalence of adults who reported having cholesterol checked within the past five years increased significantly with higher education and annual household income levels (Figure 77).

Figure 77. Prevalence of Adults Who Reported Having Blood Cholesterol Checked Within the Past Five Years by Education and Household Income, Texas, 2009



	No H.S. Diploma	H.S. Graduate	Some College	College+	<$25.000	$25,000-$49,999	$50,000+
2009	46.8	64.0	73.9	86.3	53.7	69.6	85.4

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 8. Modifiable Risk Factors

D. Diabetes

Diabetes is a disease in which the body does not produce or properly use insulin. Insulin is necessary for the body to be able to utilize glucose for energy. There are two main types of diabetes. Type I diabetes develops when the body no longer produces insulin because the body's immune system attacks and destroys the pancreatic cells that produce insulin.[24] Type II diabetes usually begins with insulin resistance, with which the body's cells do not use insulin properly.[24] Type II diabetes accounts for 90 to 95 percent of diabetes among adults.[25]

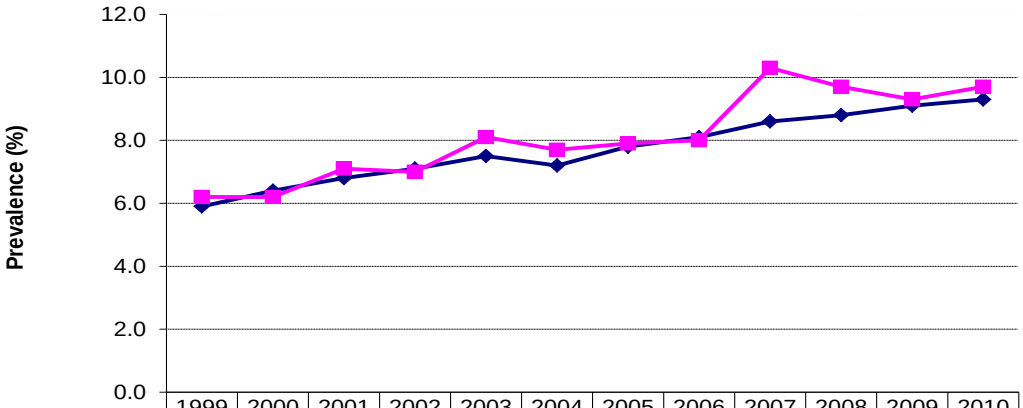
Diabetes is a significant co-morbid condition and an independent risk factor for CVD. CVD is the leading cause of death among people with diabetes, accounting for about 65 percent of diabetes-related deaths.[26] Adults with diabetes have two to four times the risk of having heart disease or suffering from a stroke than people without diabetes.[26]

In 2008, an estimated 18.3 million people in the U.S. had been diagnosed with diabetes and another 7.1 million had undiagnosed diabetes.[3] The total estimated cost of diagnosed diabetes in the U.S. was $174 billion[27], and the estimated cost of undiagnosed diabetes was $18 billion in 2007.[28]

I. Prevalence

In 2010, about 9.7 percent (95% CI 9.0-10.4) of adults in Texas reported having been told by a physician that they have diabetes. Diabetes prevalence in Texas significantly increased by 56.5 percent between 1999 (6.2%; 95% CI 5.3-7.1) and 2010. Similary, diabetes prevalence in the U.S. rose by 57.6 percent in the same time period.

Figure 78. Prevalence of Diabetes among Adults, Texas and U.S., 1999-2010



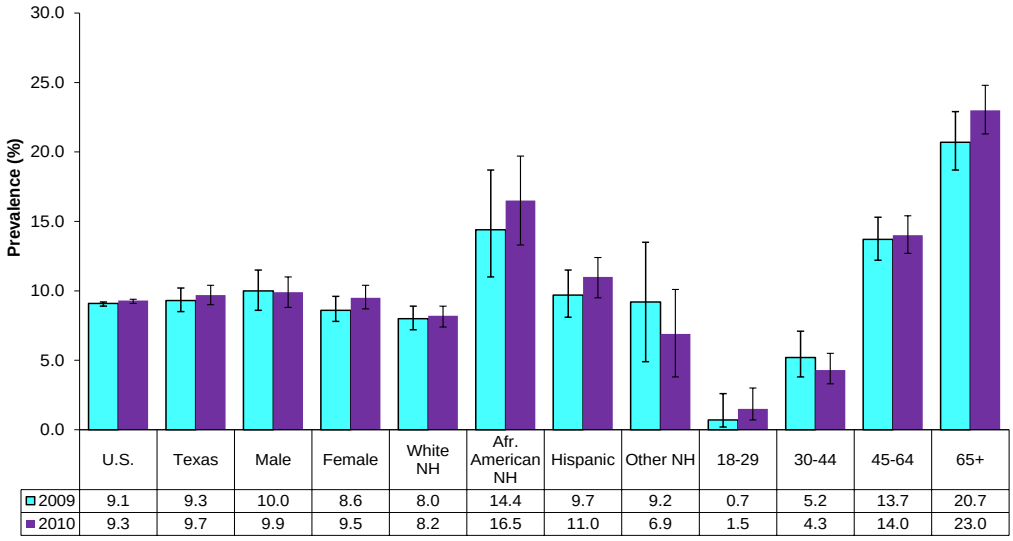
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
US	5.9	6.4	6.8	7.1	7.5	7.2	7.8	8.1	8.6	8.8	9.1	9.3
Texas	6.2	6.2	7.1	7.0	8.1	7.7	7.9	8.0	10.3	9.7	9.3	9.7

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 8. Modifiable Risk Factors

In 2010, African American NH (16.5%; 95% CI 13.5-20.0) had the highest prevalence of diabetes among all racial/ethnic populations, followed by Hispanics (11.0%; 95% CI 9.6-12.5). Diabetes prevalence increased significantly with age. There were no significant differences in the prevalence of diabetes among males and females (Figure 79).

Figure 79. Prevalence of Diabetes among Adults by Demographics, Texas, 2009-2010

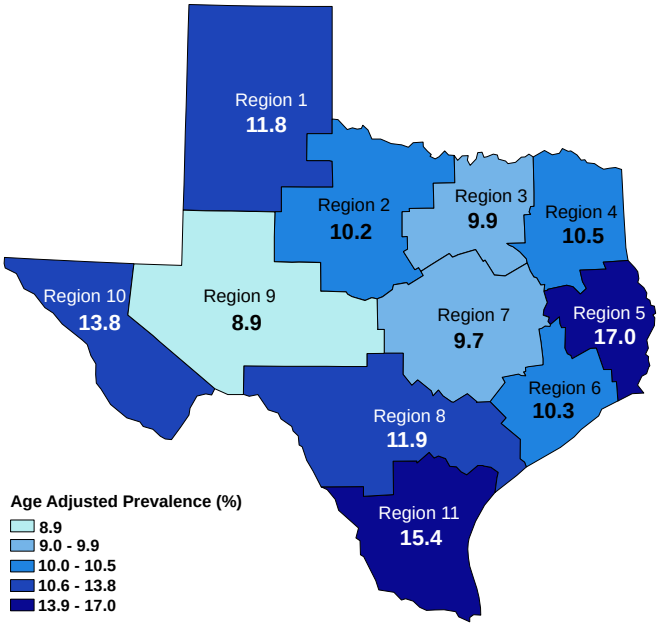


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	Other NH	18-29	30-44	45-64	65+
2009	9.1	9.3	10.0	8.6	8.0	14.4	9.7	9.2	0.7	5.2	13.7	20.7
2010	9.3	9.7	9.9	9.5	8.2	16.5	11.0	6.9	1.5	4.3	14.0	23.0

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Figure 80. Age-adjusted Prevalence of Diabetes by Public Health Region, Texas, 2010

PHR 5 (17.0%; 95% CI 13.3-21.4) had the highest age-adjusted prevalence of diabetes in Texas, followed by PHR 11 (15.4%; 95% CI 13.3-17.7). PHRs 5 and 11 had significantly higher age-adjusted prevalence of diabetes than PHR 9 (8.9%; 95% CI 6.9-11.3), PHR 7 (9.7%; 95% CI 7.8-11.9), PHR 3 (9.9%; 95% CI 8.4-11.6), PHR 6 (10.3%; 95% CI 9.0-11.8), and the state average (11.0%; 95% CI 10.3-11.7).



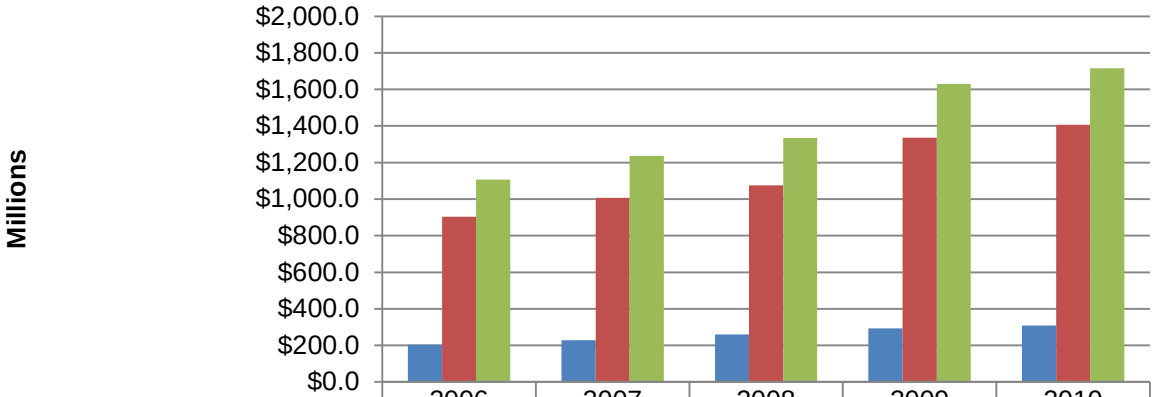
Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS
Created by: GIS, Center for Health Statistics, DSHS

Chapter 8. Modifiable Risk Factors

II. Financial Burden

The total hospital charges for diabetes increased from $1.1 billion in 2006 to $1.7 billion in 2010. An estimated 82 percent ($1.4 billion) of the total hospital charges in 2010 for diabetes was for type II diabetes.

Figure 81. Total Hospital Charges for Diabetes, Texas, 2006-2010



	2006	2007	2008	2009	2010
Diabetes, Type I	$203.6	$228.8	$259.6	$292.4	$309.2
Diabetes, Type II	$903.6	$1,007.2	$1,075.3	$1,336.9	$1,406.6
Diabetes, Type I and Type II	$1,107.2	$1,236.1	$1,334.8	$1,629.3	$1,715.8

Data Source: Texas Health Care Information Collection, DSHS

Chapter 8. Modifiable Risk Factors

E. Overweight and Obesity

According to the CDC, obesity rates in the U.S. doubled for adults and tripled for children between 1980-2008. In addition, the increase in obesity rates during the past several decades was observed in all population groups regardless of age, sex, race, ethnicity, socioeconomic status, education level, or geographic region.[29] Obesity is an independent risk factor for CVD and it is associated with numerous comorbidities such as CVD, type II diabetes, and hypertension.[30] More than three-quarters of the prevalence of hypertension can be directly attributed to excess body fat.[31,32] Overweight and obesity classifications (Table 3) are determined by the Body Mass Index (BMI) which is calculated using the weight and height. BMI is used because it significantly correlates with total body fat content.[33]

Table 3. Classification of Overweight and Obesity by BMI for Adults

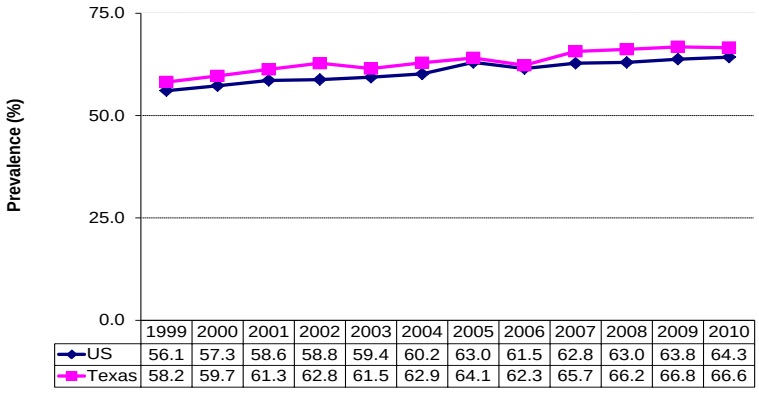
Category	BMI range (kg/m²)
Underweight	<18.5
Normal	18.5-24.9
Overweight	25.0-29.9
Obesity	30.0-39.9
Extreme Obesity	≥40

Source: Adapted from NHLBI Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults, 1998.

Prevalence

The prevalence of overweight and obesity among adults (BMI ≥ 25) significantly increased by 14.4 percent between 1999 (58.2%; 95% CI 56.4-60.0) and 2010 (66.6%; 95% CI 65.4-68.0). For the years 2007-2010, the prevalence of overweight and obesity in Texas was significantly higher compared to the U.S.

Figure 82. Prevalence of Overweight and Obesity among Adults, Texas and U.S., 1999-2010



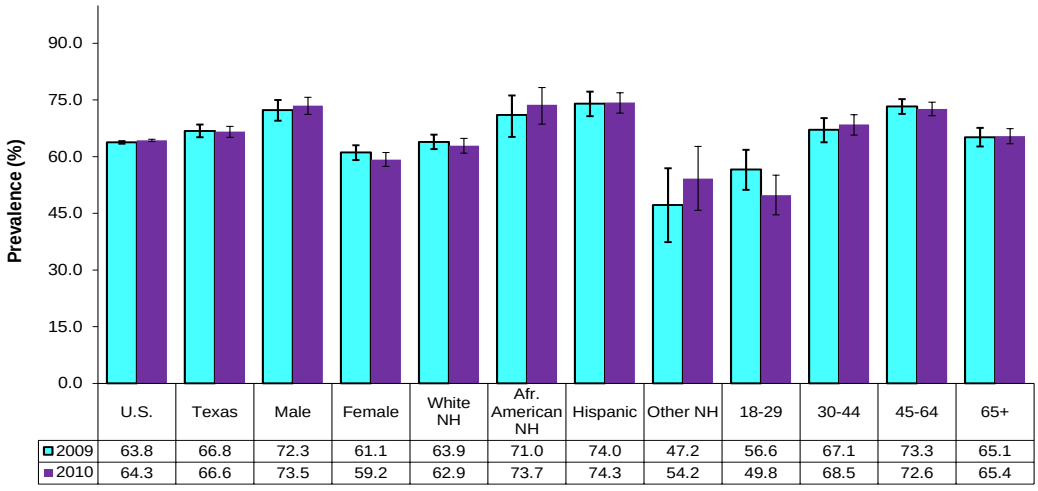
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
US	56.1	57.3	58.6	58.8	59.4	60.2	63.0	61.5	62.8	63.0	63.8	64.3
Texas	58.2	59.7	61.3	62.8	61.5	62.9	64.1	62.3	65.7	66.2	66.8	66.6

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 8. Modifiable Risk Factors

In 2010, about two-thirds of Texas adults were overweight or obese. Males (73.5%; 95% CI 71.2-75.7) had significantly higher prevalence of overweight and obesity than females (59.2%; 95% CI 57.4-61.1). Hispanics (74.3%; 95% CI 71.5-76.9) and African American NH (73.7%; 95% CI 68.6-78.3) had significantly higher prevalence of overweight and obesity compared to white NH (62.9%; 95% 60.9-64.8) and other NH (54.2%; 95% CI 45.8-62.7) (Figure 83).

Figure 83. Prevalence of Overweight and Obesity among Adults by Demographics, Texas, 2009-2010

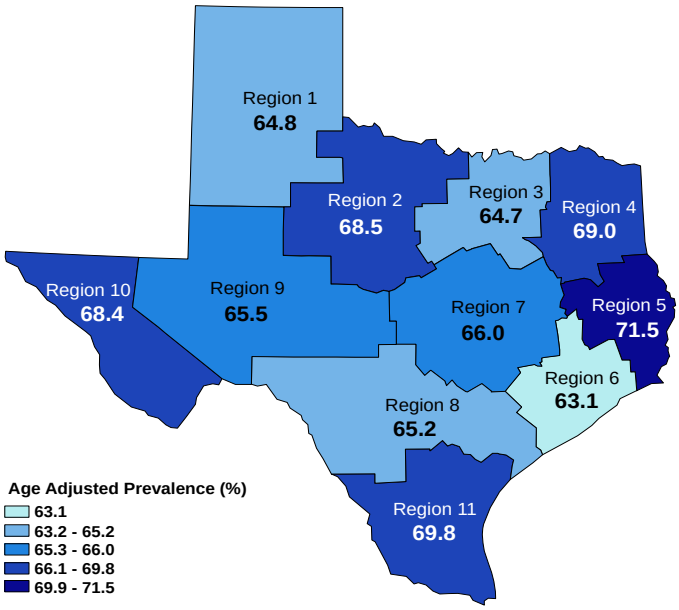


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	Other NH	18-29	30-44	45-64	65+
2009	63.8	66.8	72.3	61.1	63.9	71.0	74.0	47.2	56.6	67.1	73.3	65.1
2010	64.3	66.6	73.5	59.2	62.9	73.7	74.3	54.2	49.8	68.5	72.6	65.4

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Figure 84. Age-adjusted Prevalence of Overweight and Obesity by Public Health Region, Texas, 2010

PHR 5 (71.5%; 95% 62.7-79.0) had the highest age-adjusted prevalence of overweight and obesity in Texas, followed by PHR 11 (69.8%; 95% CI 66.2-73.1). All Texas PHRs had overweight and obesity prevalence estimates above 60 percent.



Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS
Created by: GIS, Center for Health Statistics, DSHS

Chapter 8. Modifiable Risk Factors

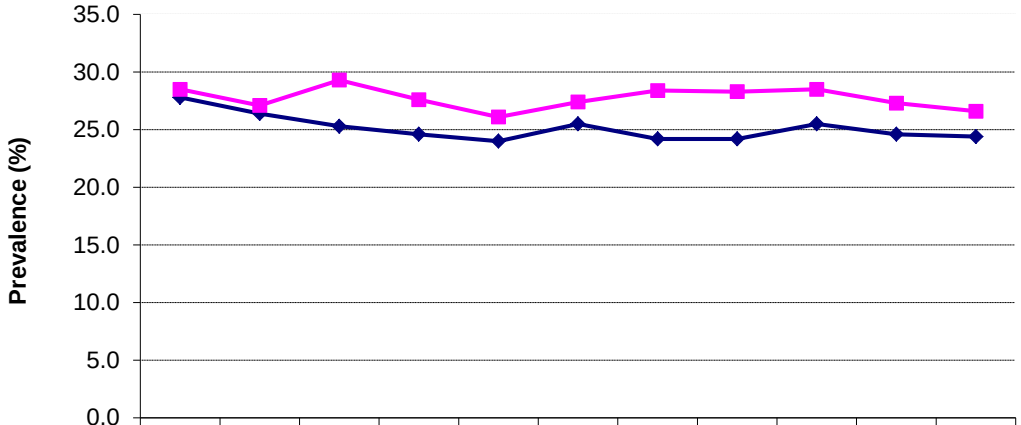
F. Physical Inactivity

Sedentary lifestyle is a well-documented risk factor for coronary heart disease (CHD).[34] It is estimated that sedentary persons have nearly twice the risk of developing CHD compared to those who are physically active.[34,35] Regular physical activity can reduce the risk of CVD and control HBP, high blood cholesterol and weight. Physical activity can also decrease the risk of diabetes and colon cancer, improve mental health, and help maintain healthy bones, muscles, and joints.[36]

Prevalence

In 2010, more than one in four adults (26.6%; 95% CI 25.3-28.0) in Texas reported having no leisure time physical activity outside of work in the past month. The prevalence of no leisure time physical activity in Texas has remained relatively constant from 2000-2010. Texas has had significantly higher prevalence of no leisure time physical activity than the U.S. since at least 2002 (Figure 85).

Figure 85. Prevalence of No Leisure Time Physical Activity among Adults, Texas and U.S., 2000-2010



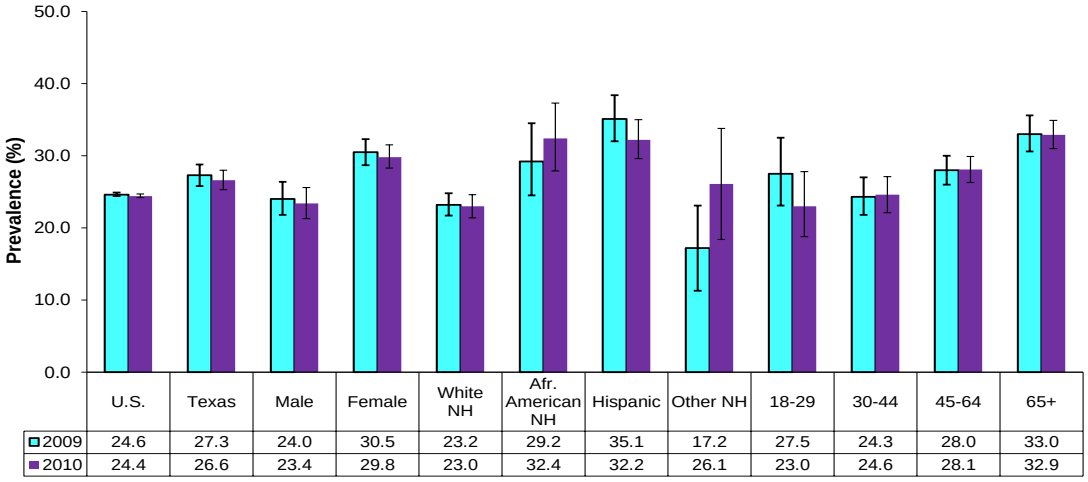
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
US	27.8	26.4	25.3	24.6	24.0	25.5	24.2	24.2	25.5	24.6	24.4
Texas	28.5	27.1	29.3	27.6	26.1	27.4	28.4	28.3	28.5	27.3	26.6

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 8. Modifiable Risk Factors

In 2010, females (29.8%; 95% CI 28.3-31.5) had a significantly higher prevalence of no leisure time physical activity than males (23.4%; 95% CI 21.3-25.6). The African American NH (32.4%; 95% CI 27.9-37.3) and Hispanic (32.2%; 95% CI 29.6-35.0) populations had significantly higher prevalence of no leisure time physical activity as compared to white NH (23.0%; 95% CI 21.4-24.6) (Figure 86).

Figure 86. Prevalence of No Leisure Time Physical Activity among Adults by Demographics, Texas, 2009-2010

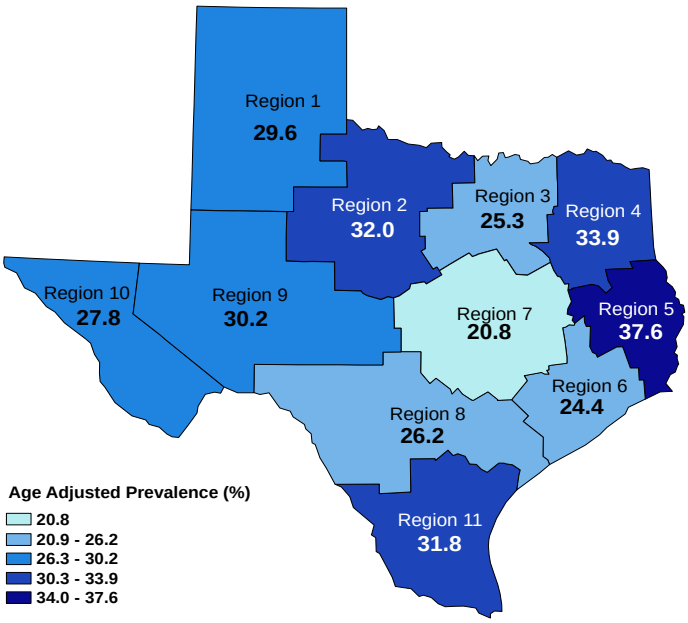


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	Other NH	18-29	30-44	45-64	65+
2009	24.6	27.3	24.0	30.5	23.2	29.2	35.1	17.2	27.5	24.3	28.0	33.0
2010	24.4	26.6	23.4	29.8	23.0	32.4	32.2	26.1	23.0	24.6	28.1	32.9

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Figure 87. Age-adjusted Prevalence of No Leisure Time Physical Activity by Public Health Region, Texas, 2010

PHR 5 (37.6%; 95% CI 29.9-46.0) had the highest age-adjusted prevalence of no leisure time physical activity in Texas. PHR 5, PHR 4 (33.9%; 95% CI 28.6-39.6) and PHR 11 (31.8%; 95% CI 28.6-35.2) had significantly higher age-adjusted prevalence than the state average (26.5%; 95% CI 25.2-28.0). PHR 7 (20.8%; 95% CI 17.7-24.3) had the lowest age-adjusted prevalence of no leisure time physical activity (Figure 87).



Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS
Created by: GIS, Center for Health Statistics, DSHS

Chapter 8. Modifiable Risk Factors

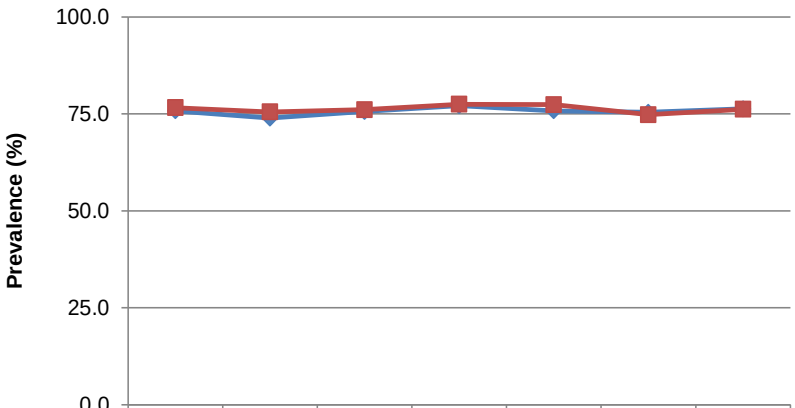
G. Fruit and Vegetable Consumption

Poor diet, such as a diet high in saturated fat or sodium, contributes to heart disease and related conditions.[15] Up to 30 percent of deaths from IHD are due to unhealthy diets.[37] A diet high in fruits and vegetables is associated with reduced risk of CVD.[38]

Prevalence

In 2009, more than three-quarters (76.2%; 95% CI 74.7-77.6) of adults in Texas consumed less than five servings of fruits and vegetables per day as recommended for maintaining good health and reducing risk for chronic diseases. Between 2000 and 2009, the prevalence of consuming less than five servings of fruits and vegetables per day in Texas has remained constant.

Figure 88. Prevalence of Consuming Less than Five Servings of Fruits and Vegetables per day among Adults, Texas and U.S., 2000-2003, 2005, 2007, 2009



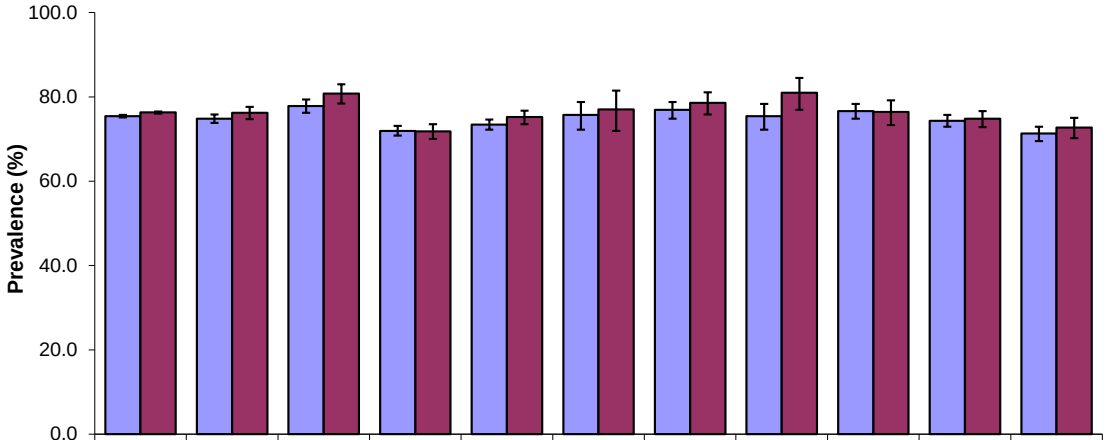
	2000	2001	2002	2003	2005	2007	2009
US	75.8	73.9	75.6	77.1	75.8	75.4	76.3
Texas	76.6	75.5	76.1	77.5	77.4	74.8	76.2

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

In 2009, the prevalence of consuming less than five servings of fruits and vegetables per day in Texas was high among all demographics. About eight out of ten (80.8%; 95% CI 78.4-83.0) males reported eating less than five servings of fruits and vegetable per day, which was significantly higher than females (71.8%; 95% CI 70.0-73.5). There were no significant differences among racial/ethnic populations. Persons aged 45-64 and 65 and older had significantly lower prevalence of eating less than five servings of fruits and vegetables per day than persons aged 18-29 (Figure 89).

Chapter 8. Modifiable Risk Factors

Figure 89. Prevalence of Consuming Less than Five Servings of Fruits and Vegetables per day among Adults by Demographics, Texas, 2007 & 2009

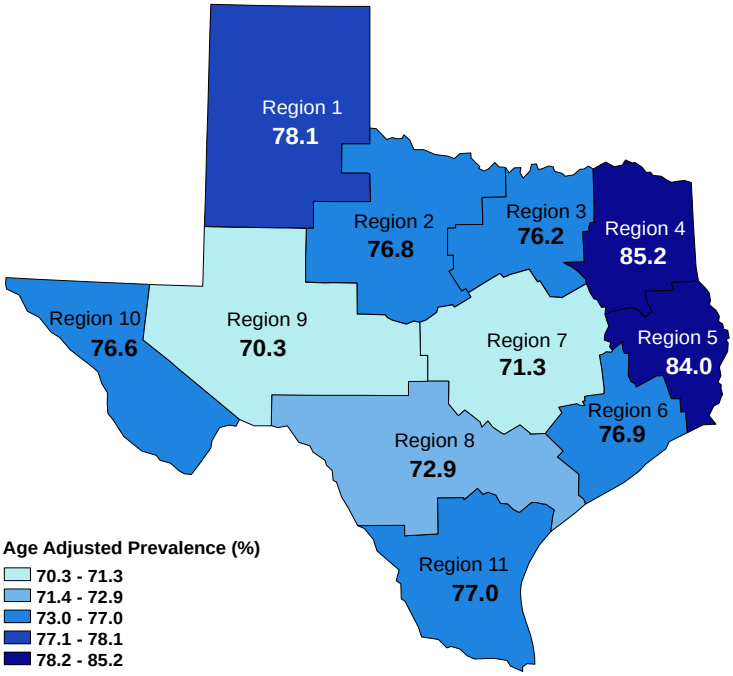


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	18-29	30-44	45-64	65+
2007	75.4	74.8	77.8	71.9	73.4	75.7	76.9	75.4	76.6	74.3	71.3
2009	76.3	76.2	80.8	71.8	75.2	77.0	78.6	81.0	76.4	74.8	72.7

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Figure 90. Age-adjusted Prevalence of Consuming Less than Five Servings of Fruits and Vegetables per day by Public Health Region, Texas, 2009

PHR 4 (85.2%; 95% CI 81.3-88.4) and PHR 5 (84.0%; 95% CI 78.2-88.4) had the highest age-adjusted prevalence of consuming less than five servings of fruits and vegetables per day in Texas. PHRs 4 and 5 had significantly higher age-adjusted prevalence than the state average (76.3%; 95% CI 74.9-77.7). PHR 9 (70.3%; 95% CI 63.0-76.7) and PHR 7 (71.3%; 95% CI 68.0-74.5) had the lowest age-adjusted prevalence among the PHRs. PHR 7 had significantly lower prevalence than the state average (Figure 90).



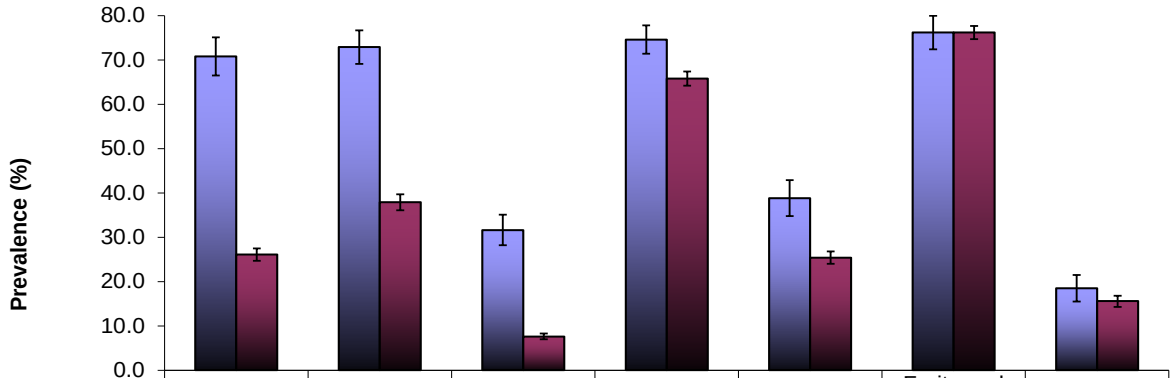
Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS
Created by: GIS, Center for Health Statistics, DSHS

Chapter 8. Modifiable Risk Factors

H. Comparison of Modifiable Risk Factors among People with and without CVD

Texas adults who reported having CVD had a significantly higher prevalence of high blood pressure, high cholesterol, diabetes, overweight or obesity, and no leisure time physical activity than those who did not have CVD. Among those who had been diagnosed with CVD, approximately seven out of ten had high blood pressure (70.8%; 95% CI 66.5-75.1) or high blood cholesterol (72.9%; 95% CI 69.1-76.7). Prevalence of diabetes was more than four times higher among those who had CVD (31.6%; 95% CI 28.2-35.1) than those who did not have CVD (7.6%; 95% CI 7.0-8.3). Prevalence of no leisure time physical activity was about one and a half times higher among those who had CVD (38.8%; 95% CI 34.8-42.9) than those who did not have CVD (25.4%; 95% 24.0-26.8).

Figure 91. Prevalence of Modifiable Risk Factors among Adults with and without CVD, Texas, 2009, 2010



	High Blood Pressure*	High Cholesterol *	Diabetes	Overweight or Obesity	No Leisure Time Physical Activity	Fruits and Vegetables Less than 5 servings a day*	Current Smoking
With CVD	70.8	72.9	31.6	74.6	38.8	76.2	18.5
Without CVD	26.1	37.9	7.6	65.8	25.4	76.2	15.6

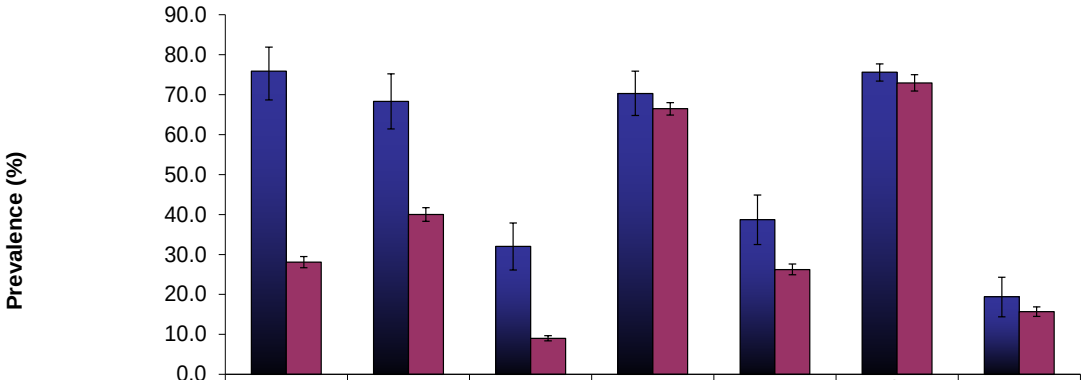
*Note: * indicates most recent data from 2009 BRFSS.*

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 8. Modifiable Risk Factors

Texas adults who reported having a stroke had signficantly higher prevalence of high blood pressure, high cholesterol, diabetes, and no leisure time physical activity than those who did not have stroke. Among those who had been diagnosed with stroke, approximately three-quarters (75.9%; 95% CI 68.7-81.9) had high blood pressure compared to 28.1 percent (95% CI 26.7-29.5) among those who had not been diagnosed with stroke. Almost seven out of ten (68.3%; 95% CI 61.4-75.2) adults who had a stroke also had high cholesterol. Prevalence of diabetes among those who had a stroke (32.0%; 95% CI 26.1-37.9) was 3.6 times higher than those who did not have a stroke (9.0%; 95% CI 8.4-9.7). Prevalence of no leisure time physical activity was about one and a half times higher among those who had a stroke (38.7%; 95% CI 32.5-44.9) than those who had not had a stroke (26.2%; 95% CI 24.9-27.6).

Figure 92. Prevalence of Modifiable Risk Factors among Adults with and without Stroke, Texas, 2009, 2010



	High Blood Presure*	High Cholesterol *	Diabetes	Overweight or Obesity	No Leisure Time Physical Activity	Fruits & Vegetables Less than 5 servings a day*	Current Smoking
Ever had a Stroke	75.9	68.3	32.0	70.3	38.7	75.6	19.4
Never had a Stroke	28.1	40.0	9.0	66.5	26.2	72.9	15.7

*Note: * indicates most recent data from 2009 BRFSS.*

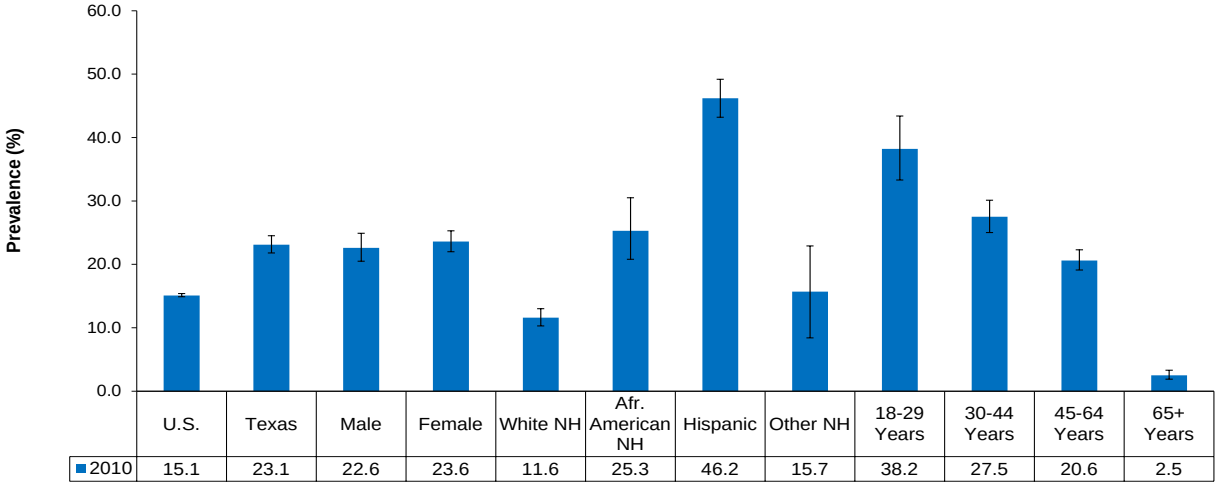
Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 9. Access to Healthcare and Healthcare Quality

I. Access to Healthcare

According to 2010 BRFSS, Texas (23.1%; 95% CI 21.8-24.5) had a significantly higher prevalence of adults who had no health care coverage compared to the U.S. (15.1%; 95% CI 14.9-15.4). Hispanics (46.2%; 95% CI 43.2-49.2) had four times higher prevalence of no health care coverage than white NH (11.6%; 95% CI 10.3-13.0). About one out of four (25.3%; 95% CI 20.8-30.5) African American NH had no health care coverage. A decreasing gradient was seen in prevalence of no health care coverage with an increase in age group (Figure 93).

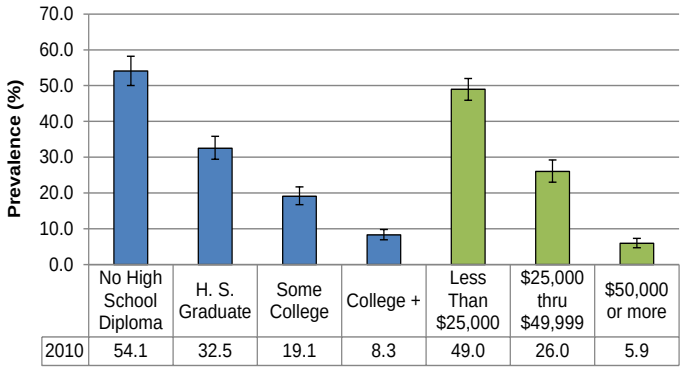
Figure 93. Prevalence of No Health Care Coverage among Adults by Demographics, Texas, 2010



Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Figure 94. Prevalence of No Health Care Coverage among Adults by Education and Household Income, Texas, 2010

More than half (54.1%; 95% CI 50.0-58.2) of adults who had earned less than a high school education had no health care coverage. Almost half (49.0%; 95% CI 45.9-52.0) of adults with a household income less than $25,000 had no health care coverage. The prevalence of no health care coverage increased significantly as education and annual household income levels decreased (Figure 94).

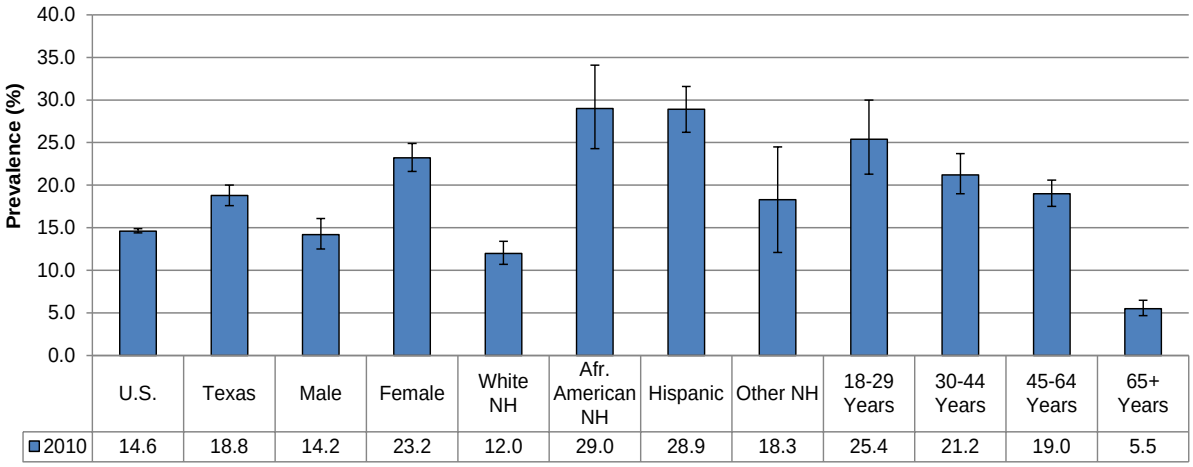


Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 9. Access to Healthcare and Healthcare Quality

In 2010, Texas (18.8%; 95% CI 17.6-20.0) had a significantly higher prevalence of adults who could not see a doctor in the past 12 months due to cost compared to the national average (14.6%; 95% CI 14.4-14.9). Females (23.2%; 95% CI 21.6-24.9) had a significantly higher prevalence of inability to see a doctor due to cost compared to males (14.2%; 95% 12.5-16.1). The African American NH (29.0%; 95% CI 24.3-34.1) and Hispanic (28.9%; 95% CI 26.2-31.6) populations had over twice the prevalence of inability to see a doctor due to cost than white NH (12.0%; 95% CI 10.7-13.4). About one out of four (25.4%; 95% CI 21.3-30.0) adults aged 18-29 years in Texas could not see a doctor due to cost (Figure 95).

Figure 95. Prevalence of Adults Who Could Not See a Doctor Because of Cost by Demographics, Texas, 2010

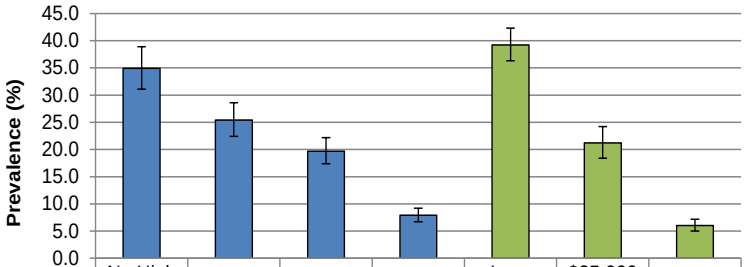


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	Other NH	18-29 Years	30-44 Years	45-64 Years	65+ Years
2010	14.6	18.8	14.2	23.2	12.0	29.0	28.9	18.3	25.4	21.2	19.0	5.5

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Figure 96. Prevalence of Adults Who Could Not See a Doctor Because of Cost by Education and Household Income, Texas, 2010

The prevalence of adults who could not see a doctor due to cost increased significantly with lower education level and lower annual household income (Figure 96).



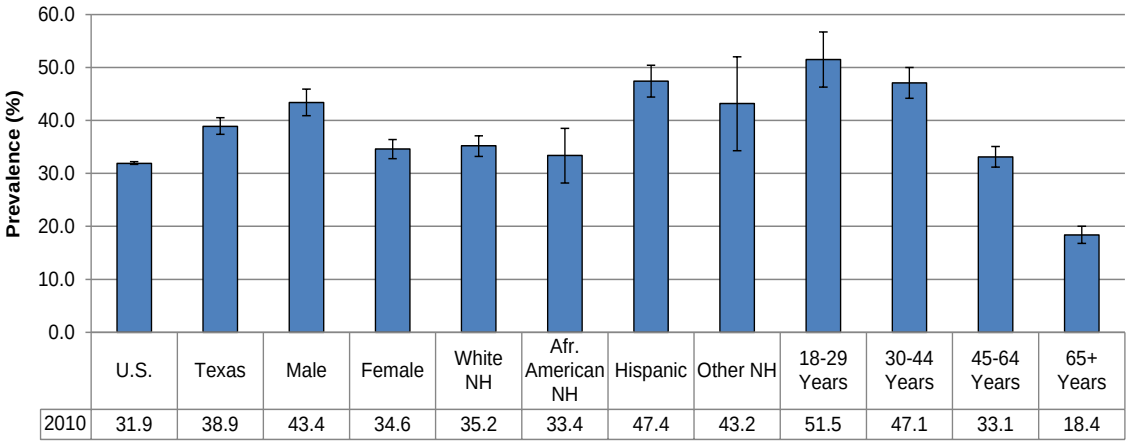
	No High School Diploma	H. S. Graduate	Some College	College +	Less Than $25,000	$25,000 thru $49,999	$50,000 or more
2010	34.9	25.4	19.7	7.9	39.2	21.2	6.0

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 9. Access to Healthcare and Healthcare Quality

In 2010, Texas (38.9%; 95% CI 37.4-40.5) had a significantly higher prevalence of adults who had not had a routine health check-up within the past year compared to the national average (31.9%; 95% CI 31.7-32.2). Males (43.4%; 95% CI 40.9-45.9) had a significantly higher prevalence of no routine checkup within the past year than females (34.6%; 95% CI 32.8-36.4). Hispanics (47.4%; 95% CI 44.4-50.4) had a significantly higher prevalence of no routine checkup within the past year than white NH (35.2%; 95% CI 33.2-37.1) and African American NH (33.4%; 95% CI 28.2-38.5) populations. Adults aged 18-29 years (51.5%; 95% CI 46.3-56.7) and 30-44 years (47.1%; 95% CI 44.2-50.0) had significantly higher prevalence than the older age groups (Figure 97).

Figure 97. Prevalence of No Routine Health Checkup within Past Year among Adults by Demographics, Texas, 2010

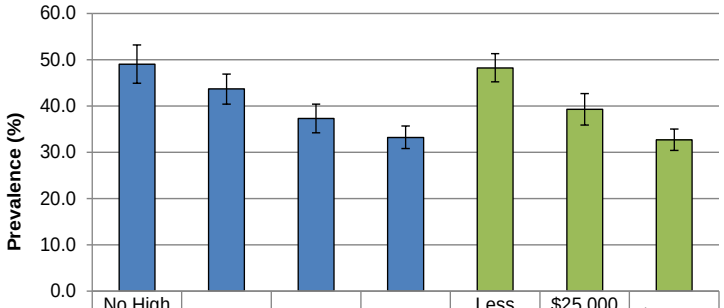


	U.S.	Texas	Male	Female	White NH	Afr. American NH	Hispanic	Other NH	18-29 Years	30-44 Years	45-64 Years	65+ Years
2010	31.9	38.9	43.4	34.6	35.2	33.4	47.4	43.2	51.5	47.1	33.1	18.4

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Figure 98. Prevalence of No Routine Health Checkup within Past Year among Adults by Education and Household Income, Texas, 2010

Adults with a college degree (33.2%; 95% CI 30.8-35.7) had the lowest prevalence of no routine health checkup within the past year among all education levels. Prevalence of no routine health checkup within the past year significantly increased as annual household income levels decreased (Figure 98).



	No High School Diploma	H. S. Graduate	Some College	College +	Less Than $25,000	$25,000 thru $49,999	$50,000 or more
2010	49.0	43.7	37.3	33.2	48.2	39.3	32.7

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 9. Access to Healthcare and Healthcare Quality

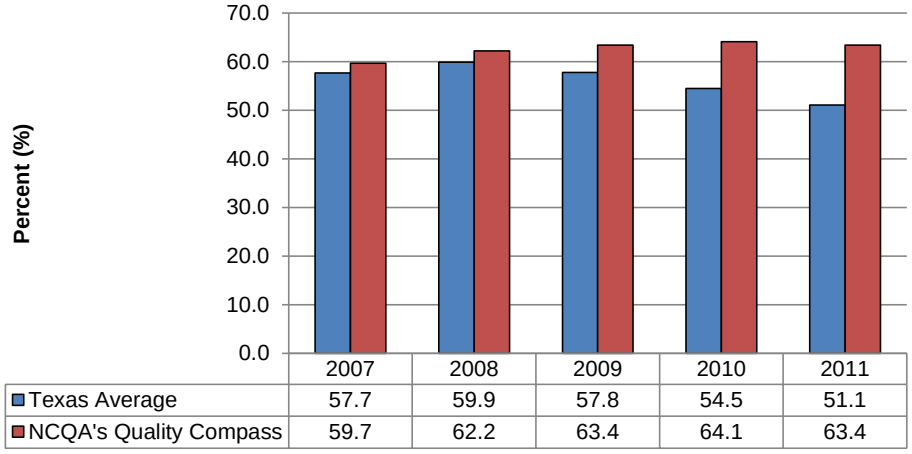
II. Secondary Prevention of Heart Attack and Stroke

According to a 2003 National Committee for Quality Assurance (NCQA) report, an estimated 57,000 Americans die each year because they do not receive appropriate healthcare. Most die as a result of not adequately monitoring or controlling known conditions such as HBP or high blood cholesterol.[39]

The Healthcare Effectiveness Data and Information Set (HEDIS®) consists of standardized performance measures designed for comparing the quality of care among managed care organizations. Health maintenance organizations (HMOs) with 5,000 or more members are required to report HEDIS measures annually to the Texas Health Care Information Council (THCIC) of the Center for Health Statistics of DSHS.[39] HEDIS is developed and maintained by NCQA.

According to the 2011 Guide to Texas HMO Quality report, about one-half (51.1%) of Texas adult HMO members with hypertension had their blood pressure under control. This was lower than the national average of 63.4 percent. Average blood pressure control estimates in Texas decreased from 2008 and 2011 (Figure 99).[39]

Figure 99. Percentage of Blood Pressure Control* among Adult HMO Members with Hypertension, Texas and U.S., 2007-2011



	2007	2008	2009	2010	2011
Texas Average	57.7	59.9	57.8	54.5	51.1
NCQA's Quality Compass	59.7	62.2	63.4	64.1	63.4

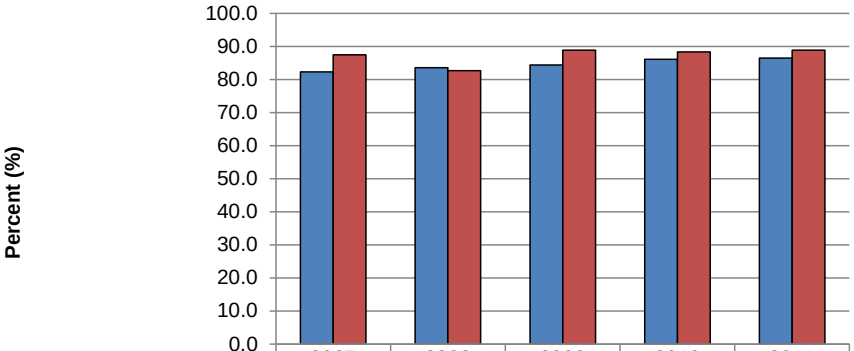
* Blood pressure control was defined as the percentage of members age 18-85 years diagnosed with HBP whose blood pressure was reading below 140 mmHg systolic and 90 mmHg diastolic during the measurement year.

Data Source: Guide to Texas HMO Quality 2011

Chapter 9. Access to Healthcare and Healthcare Quality

LDL cholesterol (LDL-C) screening in patients after discharge from the hospital for an acute cardiac event increased from 82.3 percent in 2007 to 86.5 percent in 2011 in Texas but were lower than the national average in 2007 and from 2009 to 2011 (Figure 100).

Figure 100. Percentage of Cholesterol Management* for Patients with Cardiovascular Condition: LDL-C Screening, Texas and U.S., Adult HMO Members, 2007-2011



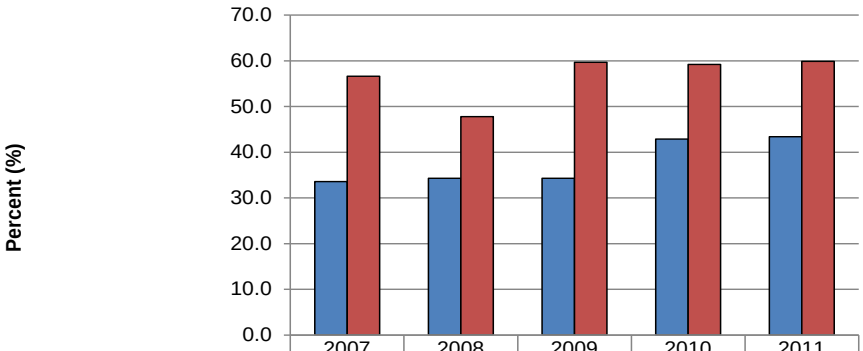
	2007	2008	2009	2010	2011
Texas Average	82.3	83.6	84.4	86.1	86.5
NCQA's Quality Compass	87.5	82.7	88.9	88.4	88.9

* Cholesterol management for patients with cardidovascular condition was defined as the percentage of members age 18-75 years old that had an LDL-C screening during the measurement year and the year prior after discharge from the hospital for an acute cardiovascular event.

Data Source: Guide to Texas HMO Quality 2011

Controlled LDL-C levels among Texas patients after discharge from the hospital for an acute cardiac event increased from 33.6 percent in 2007 to 43.4 percent in 2011 but were lower than the national average during the same period (Figure 101).

Figure 101. Percentage of Cholesterol Control* for Patients with Cardiovascular Condition: LDL-C Control, Texas and U.S., Adult HMO Members, 2007-2011



	2007	2008	2009	2010	2011
Texas Average	33.6	34.3	34.3	42.9	43.4
NCQA's Quality Compass	56.6	47.8	59.7	59.2	59.9

* Cholesterol control was defined as the percentage of members age 18-75 years old that had an LDL-C level < 100 mg/dL during the measurement year and the year prior after discharge from the hospital for an acute cardiovascular event.

Data Source: Guide to Texas HMO Quality 2011

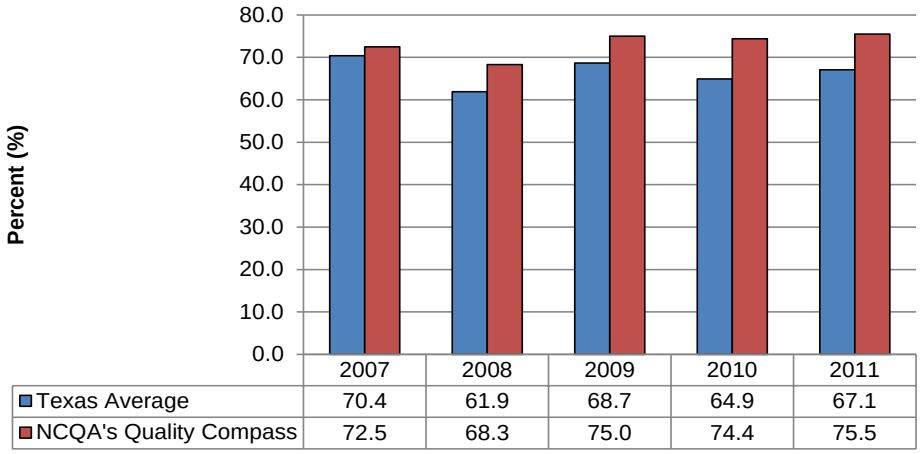
Chapter 9. Access to Healthcare and Healthcare Quality

III. Management of CVD

Beta-adrenergic blocking drugs or beta-blockers reduce nerve impulses to the heart and blood vessels decreasing the force of heart contractions.[9] Studies show that treatment with beta-blockers lowers the risk of a subsequent heart attack by reducing the heart's workload and lowering blood pressure.[40,41]

According to the 2011 Guide to Texas HMO Quality report, slightly more than two-thirds (67.1%) of Texas adults used persistent beta-blocker treatment after a heart attack. This was lower than the national average of 75.5 percent. Average persistent beta-blocker estimates in Texas varied between 2007 and 2011 (Figure 102). Note: the lower age limit decreased from 35 years of age to 18 years of age beginning with HEDIS 2008.[40]

Figure 102. Percentage of Persistent Beta-Blocker Treatment after a Heart Attack*, Texas and U.S., Adult HMO Members, 2007-2011



	2007	2008	2009	2010	2011
Texas Average	70.4	61.9	68.7	64.9	67.1
NCQA's Quality Compass	72.5	68.3	75.0	74.4	75.5

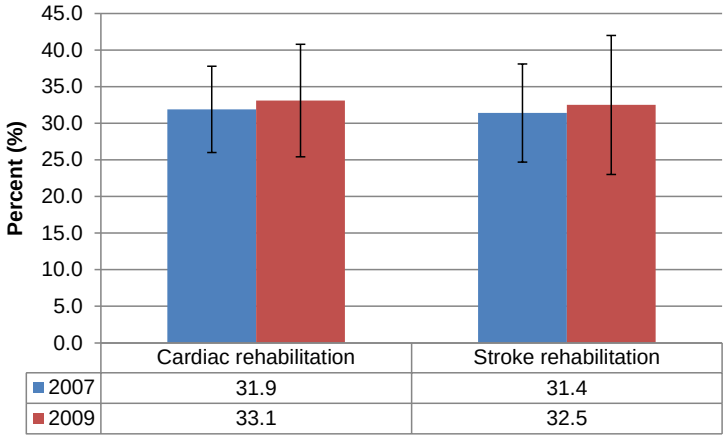
* The percentage of members age 35 and older in 2007 and the percentage of members age18 years and older for years 2008-2011 who were hospitalized during the measurement year with a diagnosis of acute myocardial infarction and who received six months of beta-blocker treatment after discharge. Members who have a valid medical reason not to take the drug are excluded.

Data Source: Guide to Texas HMO Quality 2011

Chapter 9. Access to Healthcare and Healthcare Quality

The American Heart Association and American Association of Cardiovascular and Pulmonary Rehabilitation emphasize the importance of cardiac rehabilitation as an essential way to improve a cardiac patient's functionality and recovery and reduce subsequent morbidity and mortality.[42] In 2009, slightly less than one-third of adults in Texas reported going to rehabilitation following a heart attack (33.1%; 95% CI 25.4-40.8) or stroke (32.5%; 95% CI 23.0-42.0) (Figure 103).

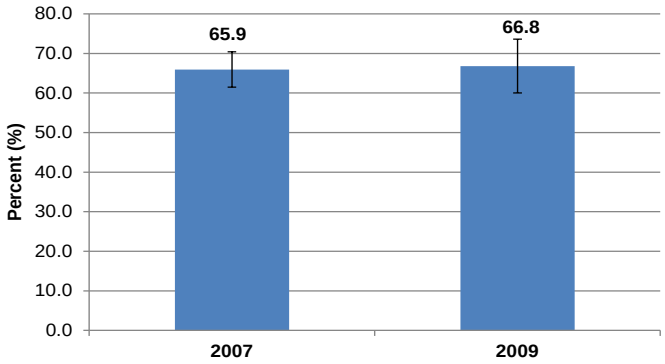
Figure 103. Percentage of Adults Who Went to Rehabilitation Following a Heart Attack or Stroke, Texas, 2007 & 2009



Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Studies have shown that aspirin use for patients who have had a heart attack, stroke, unstable angina, or transient ischemic attack, if not contraindicated, prevents recurrent events.[43] The AHA and American College of Cardiology (ACC) recommend adults with coronary or other vascular disease take 75 mg to 162 mg of aspirin daily, unless contraindicated, for secondary prevention.[44] In 2009, about two-thirds (66.8%; 95% CI 60.0-73.6) of Texas adults age 35 years and older with CVD reported that they take aspirin daily or every other day (Figure 104).

Figure 104. Percentage of Adults with CVD Who Took Aspirin Daily or Every Other Day, Texas, 2007 & 2009



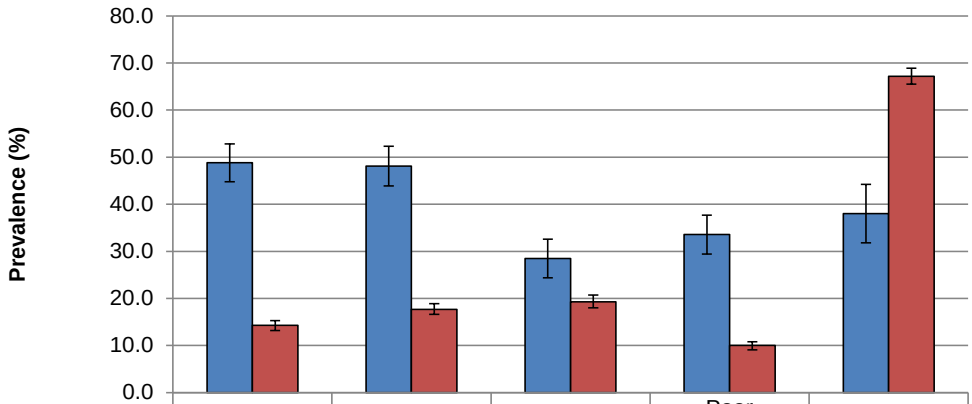
Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

Chapter 10. Quality of Life

Nearly one-half of adults who were diagnosed with CVD (48.8%; 95% CI 44.8-52.8) reported having fair or poor general health as compared to 14.3 percent of adults without CVD (95% CI 13.2-15.3). Adults with CVD (48.1%; 95% CI 43.9-52.3) had 2.7 times higher prevalence of reporting that their physical health was poor for five or more days in the past month compared to adults without CVD (17.7%; 95% CI 16.6-18.9). Adults with CVD (28.5%; 95% CI 24.4-32.6) had significantly higher prevalence of having at least five or more days in the past month in which their mental health was not good than adults without CVD (19.3%; 95% CI 18.0-20.7).

Adults who were diagnosed with CVD (33.6%; 95% CI 29.4-37.7) had 3.4 times higher prevalence of reporting that poor physical or mental health kept them from participating in their usual activities for five or more days in the past month as compared to adults without CVD (10.0%; 95% CI 9.1-10.8). Adults 18-64 years of age with CVD (38.0%; 95% CI 31.8-44.2) had significantly lower prevalence of employment compared to adults 18-64 years of age without CVD (67.2%; 95% CI 65.5-68.9).

Figure 105. Health Related Quality of Life Indicators by CVD Status, Texas, 2010



	General Health Fair or Poor	Physical Health Not Good (5+ days)	Mental Health Not Good (5+ days)	Poor Physical or Mental Health Kept from Doing Usual Activities (5+ days)	Employed
With CVD	48.8	48.1	28.5	33.6	38.0
Without CVD	14.3	17.7	19.3	10.0	67.2

Data Source: Texas Behavioral Risk Factor Surveillance System, DSHS

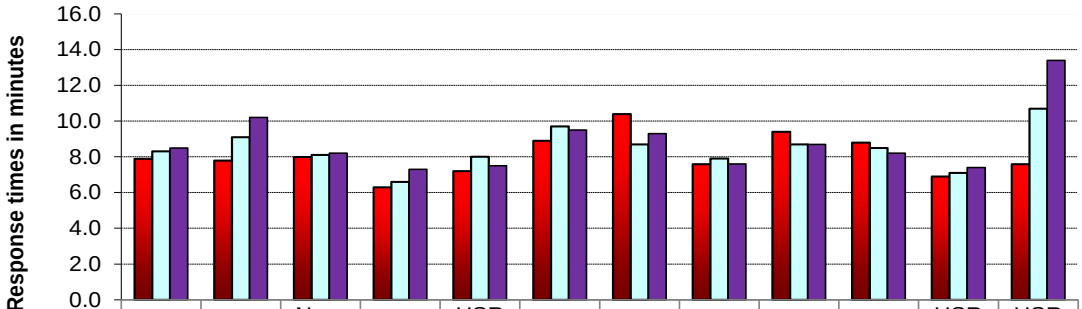
Chapter 11. Emergency Medical Services Care

I. Use of EMS Due to CVD among Texas Residents

Response Time for CVD

In 2008, there were 50,600 EMS transports for people with suspected CVD in Texas. The average EMS response time, which was from the time the call was received to the time EMS arrived on the scene, was 8.5 minutes. The average EMS response time in HSR 11 increased from 7.6 minutes in 2006 to 13.4 in 2008. HSR 11 had the longest response time compared to other HSRs in 2007 and 2008. HSR 1 had the shortest response time compared to other HSRs in 2006, 2007, and 2008 (Figure 106).

Figure 106. EMS Response Time* in Minutes for CVD among Texas Residents by Border/ Non-Border and Health Service Region, Texas, 2006-2008



	Texas	Border	Non-Border	HSR 1	HSR 2/3	HSR 4	HSR 5	HSR 6	HSR 7	HSR 8	HSR 9/10	HSR 11
2006	7.9	7.8	8.0	6.3	7.2	8.9	10.4	7.6	9.4	8.8	6.9	7.6
2007	8.3	9.1	8.1	6.6	8.0	9.7	8.7	7.9	8.7	8.5	7.1	10.7
2008	8.5	10.2	8.2	7.3	7.5	9.5	9.3	7.6	8.7	8.2	7.4	13.4

* Response time is defined as call received time to time EMS arrived on scene.

Counties designated as “Border” in the La Paz Agreement, utilized here, include Brewster, Brooks, Cameron, Crockett, Culberson, Dimmit, Duval, Edwards, El Paso, Frio, Hidalgo, Hudspeth, Jeff Davis, Jim Hogg, Kenedy, Kinney, La Salle, Maverick, McMullen, Pecos, Presidio, Real, Reeves, Starr, Sutton, Terrell, Uvalde, Val Verde, Webb, Willacy, Zapata, and Zavala.

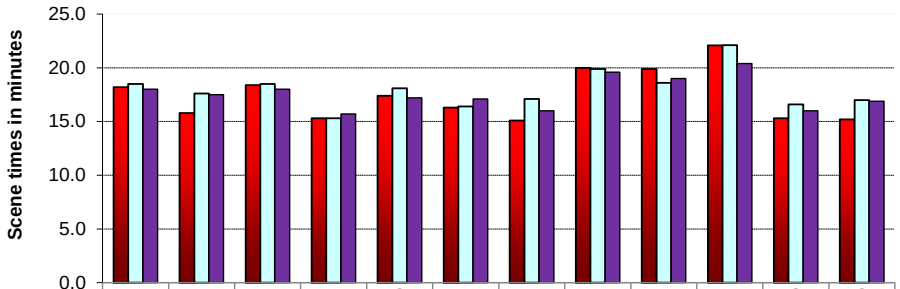
Data Source: Texas EMS/Trauma Registry, DSHS

Scene Time for CVD

The average time at the scene, which was from the time EMS arrived on scene to the time EMS departed the scene, for a suspected cardiac event in Texas was 18 minutes in 2008. HSR 8 had the longest average time at the scene from 2006-2008, while HSR 1 had the shortest scene time in 2007 and 2008 (Figure 107).

Chapter 11. Emergency Medical Services Care

Figure 107. EMS Scene Time* in Minutes for CVD among Texas Residents by Border/Non-Border and Health Service Region, Texas, 2006-2008



	Texas	Border	Non-Border	HSR 1	HSR 2/3	HSR 4	HSR 5	HSR 6	HSR 7	HSR 8	HSR 9/10	HSR 11
2006	18.2	15.8	18.4	15.3	17.4	16.3	15.1	20.0	19.9	22.1	15.3	15.2
2007	18.5	17.6	18.5	15.3	18.1	16.4	17.1	19.9	18.6	22.1	16.6	17.0
2008	18.0	17.5	18.0	15.7	17.2	17.1	16.0	19.6	19.0	20.4	16.0	16.9

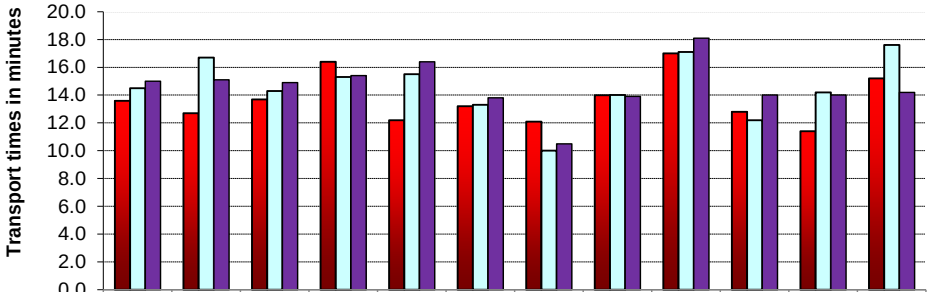
* Scene time is defined as time EMS arrived on scene to time EMS departed scene.

Data Source: Texas EMS/Trauma Registry, DSHS

Transport Time for CVD

In 2008, the average EMS transport time for CVD, which was from the time EMS departed the scene to the time EMS arrived at the destination, was 15.0 minutes in Texas. The average transport time in HSR 2/3 increased from 12.2 minutes (2006) to 16.4 minutes (2008). HSR 7 had the longest transport time compared to other HSRs in 2008. HSR 5 had the shortest transport time from 2006-2008 (Figure 108).

Figure 108. EMS Transport Time in Minutes for CVD among Texas Residents by Border/Non-Border and Health Service Region, Texas, 2006-2008**



	Texas	Border	Non-Border	HSR 1	HSR 2/3	HSR 4	HSR 5	HSR 6	HSR 7	HSR 8	HSR 9/10	HSR 11
2006	13.6	12.7	13.7	16.4	12.2	13.2	12.1	14.0	17.0	12.8	11.4	15.2
2007	14.5	16.7	14.3	15.3	15.5	13.3	10.0	14.0	17.1	12.2	14.2	17.6
2008	15.0	15.1	14.9	15.4	16.4	13.8	10.5	13.9	18.1	14.0	14.0	14.2

** Transport time is defined as time EMS departed scene to time EMS arrived at destination.

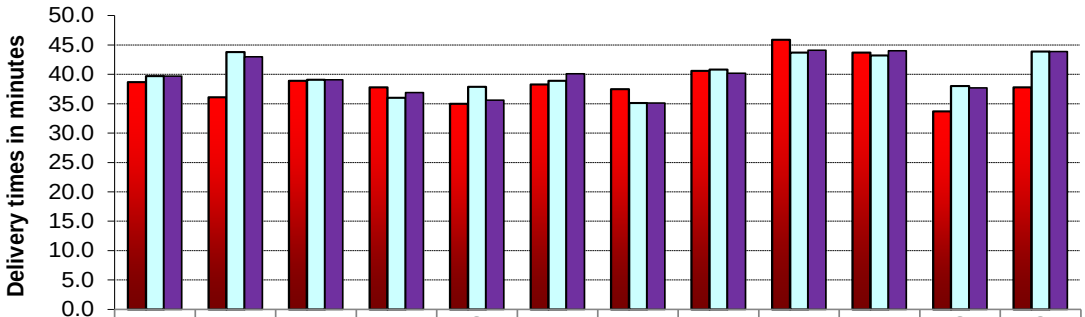
Data Source: Texas EMS/Trauma Registry, DSHS

Chapter 11. Emergency Medical Services Care

Delivery Time for CVD

The average EMS delivery time, which is from the time the call was received to the time EMS arrived at the destination, for a suspected cardiac event in Texas was 39.7 minutes in 2008. The EMS delivery time in the border region increased by 6.9 minutes between 2006 (36.1 minutes) and 2008 (43.0 minutes). The EMS delivery time for CVD was higher in the border region than the non-border region in 2007 and 2008. HSR 7 had the longest EMS delivery time for CVD while HSR 5 had the shortest EMS delivery time compared to other HSRs in 2008 (Figure 109).

Figure 109. EMS Delivery Time* in Minutes for CVD among Texas Residents by Border/ Non-Border and Health Service Region, Texas, 2006-2008



	Texas	Border	Non-Border	HSR 1	HSR 2/3	HSR 4	HSR 5	HSR 6	HSR 7	HSR 8	HSR 9/10	HSR 11
2006	38.7	36.1	38.9	37.8	35.0	38.3	37.5	40.6	45.9	43.7	33.7	37.8
2007	39.7	43.8	39.1	36.0	37.9	38.9	35.1	40.8	43.7	43.2	38.0	43.9
2008	39.7	43.0	39.1	36.9	35.6	40.1	35.1	40.2	44.1	44.0	37.7	43.9

* Delivery time is defined as call received time to time EMS arrived at destination.

Data Source: Texas EMS/Trauma Registry, DSHS

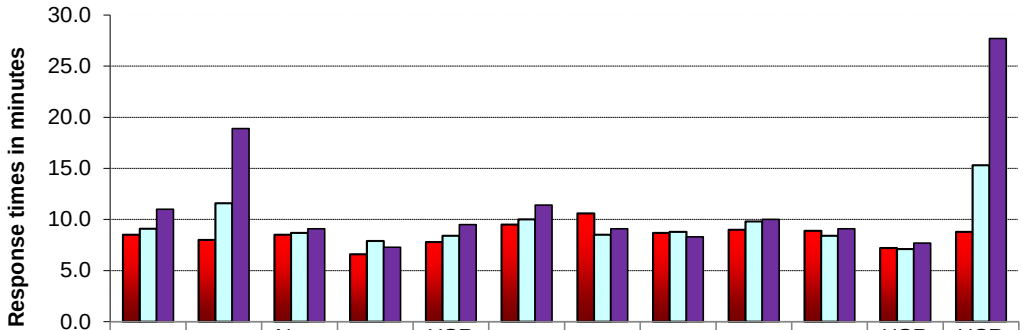
II. Use of EMS Due to Stroke among Texas Residents

Response Time for Stroke

In 2008, there were 9,528 transports for people in Texas with suspected stroke. The average EMS response time for stroke in Texas was 11.0 minutes. The average EMS response time for stroke in the border region increased from 11.6 minutes in 2007 to 18.9 minutes in 2008. The average EMS response time for stroke in HSR 11 increased from 8.8 minutes in 2006 to 27.7 minutes in 2008. HSR 11 had the longest response time for stroke in 2007 and 2008 compared to other HSRs. HSR 1 had the shortest response time for stroke in 2008 (Figure 110).

Chapter 11. Emergency Medical Services Care

Figure 110. EMS Response Time* in Minutes for Stroke among Texas Residents by Border/ Non-Border and Health Service Region, Texas, 2006-2008



	Texas	Border	Non-Border	HSR 1	HSR 2/3	HSR 4	HSR 5	HSR 6	HSR 7	HSR 8	HSR 9/10	HSR 11
2006	8.5	8.0	8.5	6.6	7.8	9.5	10.6	8.7	9.0	8.9	7.2	8.8
2007	9.1	11.6	8.7	7.9	8.4	10.0	8.5	8.8	9.8	8.4	7.1	15.3
2008	11.0	18.9	9.1	7.3	9.5	11.4	9.1	8.3	10.0	9.1	7.7	27.7

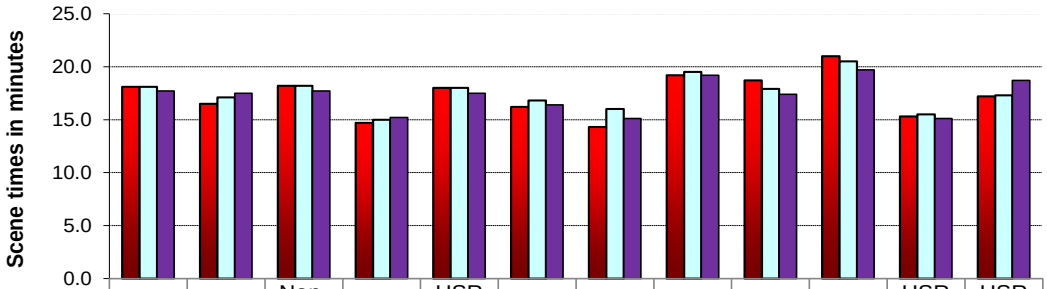
* Response time is defined as call received time to time EMS arrived on scene.

Data Source: Texas EMS/Trauma Registry, DSHS

Scene Time for Stroke

The average time at the scene for a suspected stroke event in Texas was 17.7 minutes in 2008. HSRs 5 and 9/10 had the shortest scene times among all the HSRs at 15.1 minutes in 2008. HSR 8 had the longest scene time for stroke from 2006-2008 (Figure 111).

Figure 111. EMS Scene Time in Minutes for Stroke among Texas Residents by Border/ Non-Border and Health Service Region, Texas, 2006-2008**



	Texas	Border	Non-Border	HSR 1	HSR 2/3	HSR 4	HSR 5	HSR 6	HSR 7	HSR 8	HSR 9/10	HSR 11
2006	18.1	16.5	18.2	14.7	18.0	16.2	14.3	19.2	18.7	21.0	15.3	17.2
2007	18.1	17.1	18.2	15.0	18.0	16.8	16.0	19.5	17.9	20.5	15.5	17.3
2008	17.7	17.5	17.7	15.2	17.5	16.4	15.1	19.2	17.4	19.7	15.1	18.7

** Scene time is defined as time EMS arrived on scene to time EMS departed scene.

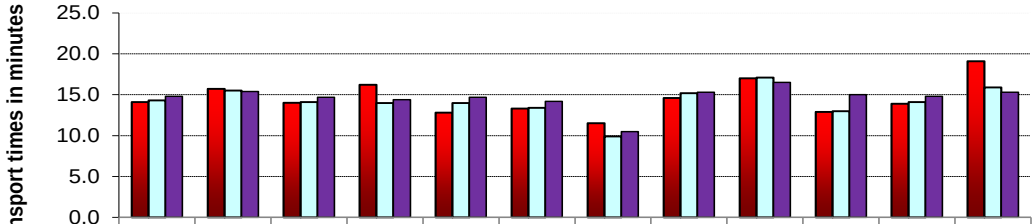
Data Source: Texas EMS/Trauma Registry, DSHS

Chapter 11. Emergency Medical Services Care

Transport Time for Stroke

The average EMS transport time for stroke in Texas was 14.8 minutes in 2008. HSR 5 had the shortest transport time for stroke from 2006-2008. HSR 7 had the longest transport time in 2007 and 2008. Transport time for stroke in HSR 11 improved by almost 4 minutes between 2006 (19.1 minutes) and 2008 (15.3 minutes) (Figure 112).

Figure 112. EMS Transport Time* in Minutes for Stroke among Texas Residents by Border/Non-Border and Health Service Region, Texas, 2006-2008



	Texas	Border	Non-Border	HSR 1	HSR 2/3	HSR 4	HSR 5	HSR 6	HSR 7	HSR 8	HSR 9/10	HSR 11
2006	14.1	15.7	14.0	16.2	12.8	13.3	11.5	14.6	17.0	12.9	13.9	19.1
2007	14.3	15.5	14.1	14.0	14.0	13.4	9.9	15.2	17.1	13.0	14.1	15.9
2008	14.8	15.4	14.7	14.4	14.7	14.2	10.5	15.3	16.5	15.0	14.8	15.3

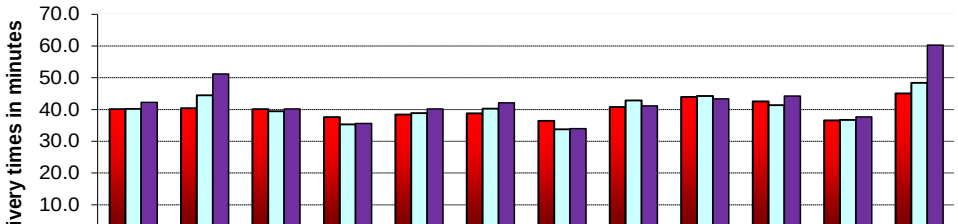
** Transport time is defined as time EMS departed scene to time EMS arrived at destination.

Data Source: Texas EMS/Trauma Registry, DSHS

Delivery Time for Stroke

The average EMS delivery time for stroke in Texas was 42.3 minutes in 2008. The border region (51.2 minutes) had a much longer delivery time for stroke than the non-border region (40.2 minutes) in 2008. HSR 11 had the longest delivery time at 60.3 minutes, while HSR 5 had the shortest at 34.0 minutes (Figure 113).

Figure 113. EMS Delivery Time* in Minutes for Stroke among Texas Residents by Border/Non-Border and Health Service Region, Texas, 2006-2008



	Texas	Border	Non-Border	HSR 1	HSR 2/3	HSR 4	HSR 5	HSR 6	HSR 7	HSR 8	HSR 9/10	HSR 11
2006	40.1	40.4	40.1	37.6	38.4	38.8	36.4	40.8	44.0	42.6	36.6	45.1
2007	40.2	44.5	39.5	35.3	38.9	40.3	33.8	42.9	44.3	41.4	36.7	48.4
2008	42.3	51.2	40.2	35.6	40.2	42.1	34.0	41.2	43.4	44.3	37.7	60.3

* Delivery time is defined as call received time to time EMS arrived at destination.

Data Source: Texas EMS/Trauma Registry, DSHS

Chapter 12. Health Disparities in CVD

Prevalence

- Males had significantly higher prevalence of heart disease, heart attack, smoking, overweight or obesity, and consuming fruits and vegetables less than five times per day than females.
- Females had significantly higher prevalence of stroke and no leisure time physical activity than males.
- African American NH had significantly higher prevalence of stroke, overweight or obesity, no leisure time physical activity, diabetes, and high blood pressure than white NH.
- African American NH had significantly higher prevalence of stroke, diabetes, and high blood pressure than Hispanics.
- Hispanics had significantly higher prevalence of overweight or obesity, no leisure time physical activity, and diabetes than white NH.
- PHR 4 had significantly higher age-adjusted prevalence of diabetes, no leisure time physical activity, and consuming fruits and vegetables less than five times per day than the Texas average.
- PHR 5 had significantly higher age-adjusted prevalence of diabetes, no leisure time physical activity, and consuming fruits and vegetables less than five times per day than the Texas average.
- PHR 11 had significantly higher age-adjusted prevalence of diabetes and no leisure time physical activity than Texas.
- Prevalence of CVD, heart disease, stroke, diabetes, and no leisure time physical activity were inversely proportional to annual household income.
- Adults with a college degree had significantly lower prevalence of CVD, heart disease, heart attack, stroke, no leisure time physical activity, and consuming fruits and vegetables less than five times per day compared to adults with no HS diploma, HS graduates, and adults with some college education.

Mortality

- Males had significantly higher AAMR for CVD, IHD, and heart attack compared to females.
- Females had significantly higher AAMR for stroke compared to males.
- African American NH had significantly higher AAMR for CVD, IHD, and stroke than all racial/ethnic populations. White NH had significantly higher AAMR for CVD, IHD, and stroke than Hispanics and other NH.
- African American NH and white NH had significantly higher AAMR for heart attack and congestive heart failure than Hispanics and other NH.

Chapter 12. Health Disparities in CVD

Hospitalization

- Males had significantly higher age-adjusted hospitalization rates for CVD, IHD, CHF, and stroke compared to females.
- Other NH had significantly higher age-adjusted hospitalization rates for CVD, IHD, and stroke than all racial/ethnic populations.
- African American NH had significantly higher age-adjusted hospitalization rates for CVD and stroke than white NH and Hispanics.
- White NH had a significantly higher age-adjusted hospitalization rate for IHD than African American NH and Hispanics.
- African American NH had a significantly higher age-adjusted hospitalization rate for CHF than all racial/ethnic populations. Other NH had a significantly higher age-adjusted hospitalization rate for CHF compared to white NH and Hispanics.

Technical Notes

I. Data Sources

This report draws on a variety of data sources to examine multiple aspects of CVD and related risk factors. These data sources include information on the Texas population, disease prevalence, mortality, hospitalization, Medicaid reimbursement, and emergency medical services. A variety of national statistics are also presented in this report.

A. Prevalence and Risk Factors

Prevalence is the proportion of people in a population who have a specific disease or condition at a point in time or during a given time period. Prevalence estimates are often used to describe the burden of a disease for a given population. Texas CVD prevalence estimates are based on self-reported data from the Texas Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS collects health status, risk, and behavioral data by means of a telephone survey of randomly selected Texas residents. The data are weighted to reflect statewide age and sex distributions as well as the individual's probability of being selected and to provide estimates that represent the Texas population as a whole. Respondents who answered "don't know/not sure" or "refused" to answer were excluded from the analysis.

Definitions used in this report:

1. CVD is defined as respondents 18 years and older who answered "yes" to one or more of the following:

- *Has a doctor, nurse or other health professional ever told you that you had a heart attack, also called a myocardial infarction?*
- *Has a doctor, nurse or other health professional ever told you that you had angina or coronary heart disease?*
- *Has a doctor, nurse or other health professional ever told you that you had a stroke?*

2. Heart disease is defined as respondents 18 years and older who answered "yes" to one or more of the following:

- *Has a doctor, nurse or other health professional ever told you that you had a heart attack, also called a myocardial infarction?*
- *Has a doctor, nurse or other health professional ever told you that you had angina or coronary heart disease?*

3. Heart attack is defined as respondents 18 years and older who answered "yes" to the following question:

- *Has a doctor, nurse or other health professional ever told you that you had a heart attack, also called a myocardial infarction?*

4. Stroke is defined as respondents 18 years and older who answered "yes" to the following question:

- *Has a doctor, nurse or other health professional ever told you that you had a stroke?*

5. HBP defined as respondents 18 years and older who answered "yes" to the following question:

- *Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?*

(Excludes females who responded "yes" to having been told they had high blood pressure only when pregnant and respondents that were told they had borderline high or were pre-hypertensive)

6. High blood cholesterol is defined as respondents 18 years and older who answered "yes" to the following questions:

- *Blood cholesterol is a fatty substance found in the blood. Have you ever had your blood cholesterol checked?*

AND

- *Have you ever been told by a doctor, nurse, or other health professional that your blood cholesterol is high?*

7. Diabetes is defined as respondents 18 years and older who answered "yes" to the following question:

- *Have you ever been told by a doctor that you have diabetes?*

(Excludes females who responded "yes" to having been told they had diabetes only when pregnant and respondents that were told they had pre-diabetes or were borderline diabetic)

8. Current smoker is defined as respondents 18 years and older who answered "yes" to the following question:

- *Have you smoked at least 100 cigarettes in your entire life?*

AND those who answered "every day" or "some days" to the following question:

- *Do you now smoke cigarettes every day, some days, or not at all?*

9. Overweight or obesity is defined as respondents 18 years and older with BMI of 25.0 or more

calculated from self-reported height and weight. **Body Mass Index (BMI)** is a mathematical formula to assess body weight relative to height. The measure correlates highly with body fat. BMI was calculated as weight in kilograms divided by the square of height in meters (Kg/m^2)

10. No Leisure time physical activity is defined as respondents 18 years and older who answered "no" to the following question:

- *During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?*

11. Fruit and vegetable consumption less than five times per day was calculated based on self-reports from respondents 18 years and older who answered the following questions:

- *How often do you drink fruit juices such as orange, grapefruit, or tomato?*
- *Not counting juice, how often do you eat fruit?*
- *How often do you eat green salad?*
- *How often do you eat potatoes, not including French fries, fried potatoes, or potato chips?*
- *How often do you eat carrots?*

AND

- *Not counting carrots, potatoes, or salad, how many servings of vegetables do you usually eat?"*

12. No healthcare coverage is defined as respondents 18 years and older who answered "no" to the following question:

- *Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?*

13. Prevalence of adults who could not see a doctor because of cost was estimated based on respondents 18 years and older who answered "yes" to the following question:

- *Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?*

14. Prevalence of no routine health checkup within the past year is defined as respondents 18 years and older who answered "within past 2 years", "within past 5 years", "5 or more years ago", or "never" to the following question:

- *About how long has it been since you last visited a doctor for a routine checkup?*

15. Prevalence of adults who went to rehabilitation following a heart attack is defined as respondents 18 years and older who answered "yes" to the following questions:

- *After you left the hospital following your heart attack did you go to any type of outpatient rehabilitation?*

  Note: Only asked if respondent reported they had a heart attack or myocardial infarction.

16. Prevalence of adults who went to rehabilitation following a stroke is defined as respondents 18 years and older who answered "yes" to the following questions:

- *After you left the hospital following your stroke did you go to any type of outpatient rehabilitation?*

  Note: Only asked if respondent reported they had a stroke.

17. Prevalence of adults with CVD who took aspirin daily or every other day is defined as respondents 35 years and older who answered "yes" to the following questions:

- *Do you take aspirin daily or every other day?*

  Note: Denominator were respondents with CVD (based on reported answers to CVD questions) who answered "no".

Actions to Control High Blood Pressure

Respondents who reported hypertension were asked a series of questions on taking a number of actions to control their high blood pressure. Respondents who answered "don't know/not sure" or "refused" to answer were excluded from the analysis.

BRFSS questions for taking specific actions to control HBP include:

Are you now doing any of the following to help lower or control your high blood pressure?
- *Are you changing your eating habits to help lower or control your high blood pressure?*
- *Are you cutting down on salt to help lower or control your high blood pressure?*
- *Are you reducing alcohol use to help lower or control your high blood pressure?*
- *Are you exercising to help lower or control your high blood pressure?*

Technical Notes

Knowledge of Heart Attack and Stroke Signs and Symptoms

Recognition of heart attack and stroke signs and symptoms by the individual and/or their family/friends is the first and most crucial factor in timely emergency response for heart attack and stroke. Therefore, it is also important that more people learn to recognize symptoms of heart attack and stroke and that they know to seek professional medical assistance immediately after recognizing these symptoms (e.g., call 9-1-1). Currently, about 47 percent of heart attack and stroke victims die before medical personnel arrive.[14]

The 2005 and 2009 Texas BRFSS contained questions that measured the public's knowledge of heart attack and stroke symptoms. The series of questions asked the respondents if they thought each of the symptoms was a sign of a heart attack. Another series of questions asked the respondents if they thought each of the symptoms was a sign of stroke. Respondents could answer "yes", "no", "don't know", or "not sure". Respondents who answered "don't know/not sure" or "refused" to answer were excluded from the analysis. The results of these questions are summarized in the report.

BRFSS questions for heart attack warning signs include (An incorrect symptom or decoy which is in *italic* was included to assess a respondent's ability to discriminate between true and false symptoms):

- Do you think pain or discomfort in the jaw, neck, or back are symptoms of a heart attack?
- Do you think feeling weak, light-headed, or faint are symptoms of a heart attack?
- Do you think chest pain or discomfort are symptoms of a heart attack?
- *Do you think sudden trouble seeing in one or both eyes is a symptom of a heart attack?*
- Do you think pain or discomfort in the arms or shoulder is a symptom of a heart attack?
- Do you think shortness of breath is a symptom of a heart attack?

BRFSS questions for stroke warning signs include (An incorrect symptom or decoy which is in *italic* was included to assess a respondent's ability to discriminate between true and false symptoms):

- Do you think sudden confusion or trouble speaking are symptoms of a stroke?
- Do you think sudden numbness or weakness of face, arm, or leg, especially on one side, are symptoms of a stroke?
- Do you think sudden trouble seeing in one or both eyes is a symptom of a stroke?
- *Do you think sudden chest pain or discomfort is a symptom of a stroke?*
- Do you think sudden trouble walking, dizziness, or loss of balance are symptoms of a stroke?
- Do you think severe headache with no known cause is a symptom of a stroke?

Technical Notes

The proportion of adults who were aware of calling 9-1-1 as the first emergency response for heart attack and stroke was measured by those who answered "call 9-1-1" to the following question:

- *If you thought someone was having a heart attack or a stroke, what is the first thing you would do?*

  1. Take them to the hospital
  2. Tell them to call their doctor
  3. Call 9-1-1
  4. Call their spouse or a family member
  5. Do something else
  7. Don't know/not sure
  9. Refused

Data Limitations

BRFSS does not include persons under the age of 18, those who live in institutions, have no telephone, or only have a mobile phone. This may introduce some bias in survey population due to under-representation of certain segments of the population. There is also potential for recall bias, due to self-reporting of disease and risk factors.For additional information, please visit the Texas BRFSS website at: http://www.dshs.state.tx.us/chs/brfss/query/brfss_form.shtm.

B. Mortality

CVD mortality data used for this report are from 1980 through 2010 and were obtained from the Texas Center for Health Statistics (CHS), Vital Statistics Unit (VSU).
For this report, CVD mortality rates are calculated and presented per 100,000 population. Rates were age adjusted to the 2000 U.S. Census population so that valid comparisons can be made between populations of different age distributions.

Methods

Texas death certificate data were compiled and tabulated by the Statistical Services Division of DSHS VSU. For deaths from 1999-2010, the underlying causes of death were classified according to the Tenth Revision of the International Classification of Diseases (ICD-10). For years prior to 1999, ICD codes from the ninth revision were used (ICD-9). For this report, cause of death refers to "Underlying Cause of Death." The code groups used include:

CVD (ICD-9: 390-459 and ICD-10: I00-I99)

Technical Notes

HD (ICD-9: 390-398, 402, 404, 410-429 and ICD-10: I00-I09, I11, I13, I20-I51)

IHD (ICD-9: 410-414, 429.2 and ICD-10: I20-I25)

Stroke (ICD-9: 430-434, 436-438 and ICD-10: I60-I69)

CHF (ICD-9: 428 and ICD-10: I50)

Heart Attack (ICD-9: 410 and ICD-10 I21-I22)

The 2000 U.S. Census population was used for age standardization (age adjustment) of death rates replacing the previous 1940 population standard. Death trends by sex, race, and age-specific mortality data were computed for 2006 through 2010.

This publication also includes maps of selected chronic disease death rates for the state as a whole and at the county level. The maps allow the reader to identify areas in the state with significantly high or low rates of disease deaths. Although county rates provide a high degree of specificity, rates in counties with small populations and few deaths for a specific condition can be unreliable.

The U.S. heart disease and stroke age-adjusted mortality rates were obtained from the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS).

Data Limitations

Death data are based on a subset of variables collected on the Texas Certificate of Death. While the underlying cause of death has generally been used for charting temporal and geographic patterns of death, analyses based on underlying cause alone can fail to include significant conditions present at death. The mortality data from 1999 and later cannot be directly compared with the data from previous years due to the ICD-9 to ICD-10 coding change.

For additional information, please visit the VSU website at: http://www.dshs.state.tx.us/chs/vstat/.

C. Hospitalization

Hospital discharge data include information about the patterns of care, the public health burden, and the charges associated with chronic disease morbidity. The Texas Health Care Information Collection (THCIC) at DSHS is responsible for collecting hospital discharge data from all state licensed hospitals except those that are statutorily exempt from the reporting requirement. All reporting hospitals are required to submit discharged inpatient claims data on a quarterly basis, using the ANSI 837 Institutional file format. Hospital discharge data for CVD are obtained from the THCIC Hospital Inpatient Discharge Public Use Data Files (PUDF). Hospital discharge data have been available in Texas since 1999. The data represented in this report are for the period

from 2006 to 2010. ICD codes used for hospital discharge data analysis are:

CVD (ICD-9: 390-459)
IHD (ICD-9: 410-414)
Stroke (ICD-9: 430-434, 436-438)
CHF (ICD-9: 428)
Hypertension (ICD-9: 401-405)
Diabetes (ICD-9: 250)
Diabetes Type I (ICD-9: 250.x1/x3, x = 0-9)
Diabetes Type II (ICD-9: 250.x0/x2, x = 0-9)

Data Limitations

Hospitals must submit data no later than 60 days after the close of a calendar quarter. Depending on the hospitals' collection and billing cycles, the final source of payment may not have been determined when the data are submitted. This can affect the accuracy of source of payment data, particularly self pay and charity, that later qualify for Medicaid or other payment sources. THCIC data represent the number of hospitalizations and not the number of individuals who hadcomplications due to CVD. For CVD conditions, an individual can be hospitalized more than once for the same condition during the data collection period, and multiple hospitalizations cannot be distinguished from the data source since the data have been de-identified.

For additional information, please visit the THCIC website at: http://www.dshs.state.tx.us/thcic/hospitals/HospitalData.shtm

D. Healthcare Effectiveness Data and Information Set (HEDIS®)

HEDIS is a tool used by more than 90 percent of America's health plans to measure performance on important dimensions of care and service.

It is a set of standardized performance measures designed to provide purchasers and consumers with the information they need to reliably compare the performance of healthcare plans. The performance measures in HEDIS® are related to many significant public health issues such as cancer, heart disease, smoking, asthma, and diabetes. HEDIS® is sponsored, supported, and maintained by the National Committee on Quality Assurance (NCQA), a non-profit organization committed to assessing, reporting on, and improving the quality of care provided by organized delivery systems.

Technical Notes

For more information on HEDIS®, Quality Compass, or NCQA please visit http://www.ncqa.org and http://www.opic.state.tx.us/health/guide-to-texas-hmo-quality

E. Population Data and Age-Adjustment

The age distribution of a population changes over time and from place to place. Because some diseases like heart disease and stroke are more common in older people, comparing rates of populations, counties, or over a certain period of time can be misleading if the age distributions of the populations being compared are different. In order to make appropriate comparisons, rates are age-adjusted.

A rate is age-adjusted by applying an age-specific rate of the population of interest to a standard population, thus estimating the number of deaths that would occur in a standard population if it had the same age-specific rate. For the period from 2006-2010, Texas population estimates were used to calculate age-specific and race-specific rates. For the trend data, age-specific rates were calculated using population estimates for each year. Finally, all rates are standardized against the 2000 U.S. standard population.

Maps of age-adjusted rates by county use rates calculated for a five-year period because counties with small populations had too few deaths to calculate rates for a shorter interval. As noted, there are still some counties that had fewer than 12 deaths for the five-year period. Therefore, rates are not provided for these counties.

For additional information, please visit the Population Data for Texas website at: http://www.dshs.state.tx.us/chs/popdat/

F. Medicaid Reimbursement

Medicaid is a jointly funded state-federal healthcare program, established in Texas in 1967 and administered by the Health and Human Services Commission (HHSC). Medicaid pays for acute healthcare (physician, inpatient, outpatient, and pharmacy, lab, and X-ray services). It also covers long-term services and support for aged and disabled clients. In Texas, the federal government funds approximately 61 percent of the cost of the Medicaid program. (Refer to http://aspe.hhs.gov/health/fmap.htm for additional information.)

Medicaid serves primarily low-income families, non-disabled children, related caretakers of dependent children, pregnant women, elderly, and people with disabilities. Texas Medicaid covers a limited number of optional groups, which are eligibility categories that states are allowed but not required to cover under their Medicaid programs.

Technical Notes

Medicaid reimbursement data in this report contains services paid by Medicaid (acute claims only) under fee-for-service (FFS) and patient care case management (PCCM) programs with primary diagnosis codes. Pharmacy claims are excluded. ICD codes used for Medicaid data analysis:

IHD (ICD-9 410-414)

Stroke (ICD-9 430-438)

CHF (ICD-9 428)

Hypertension (ICD-9 401-405)

For additional information on the Texas Medicaid Claim Data please contact:
Xiaoling Huang; Strategic Decision Support; Financial Services Division; Health and Human Services Commission State of Texas at email: XiaoLing.Huang@hhsc.state.tx.us; Phone: 512-424-6656

G. Emergency Medical Services

The data in this report are from the 2006, 2007, and 2008 Texas EMS/Trauma Registry, DSHS.

Data selection criteria for use in this report are as follows:

- Number of calls received
- Suspected illness types include cardiac arrest, cardiac rhythm disturbance, and chest pain/discomfort
- Suspected illness types defined as stroke/CVD.
- Medical-related calls only (i.e. calls exclusively related to trauma were excluded)
- 9-1-1 calls only (no inter-facility transfers)
- Texas residents only

Data Limitations

- The Registry does not receive medical-related calls from all participating EMS providers. Any numbers presented in this report are likely underestimations and caution should be exercised when interpreting these data.
- Due to the quality of data submitted to the Registry, identification of all reported CVD-related runs was not possible. Several fields were used in the creation of this dataset (see above), so data quality in each of these fields determined if a case was appropriately selected.
- These numbers are in terms of CVD-related runs, not necessarily in terms of people.
- City of residence is not reported with enough consistency to be utilized in analysis.

- In the tables, total count refers to the total number of records in each geographic area being examined, and valid values refers to the number of records within each geographic area that had the variables necessary to calculate the given indicator.

Counties designated as "Border" in the La Paz Agreement, utilized here, include Brewster, Brooks, Cameron, Crockett, Culberson, Dimmit, Duval, Edwards, El Paso, Frio, Hidalgo, Hudspeth, Jeff Davis, Jim Hogg, Kenedy, Kinney, La Salle, Maverick, McMullen, Pecos, Presidio, Real, Reeves, Starr, Sutton, Terrell, Uvalde, Val Verde, Webb, Willacy, Zapata, and Zavala.

For additional information, please visit the Texas EMS/Trauma Registry website at: http://www.dshs.state.tx.us/injury/registry/datadict.shtm

II. Terminology

Age-Adjusted Rates: An age-adjusted rate provides a single summary measure that allows one to examine the comparative likelihood of experiencing a condition in two populations, despite differences in age structures.

Body Mass Index (BMI): A mathematical formula to assess body weight relative to height. The measure correlates highly with body fat. BMI was calculated as weight in kilograms divided by the square of height in meters (Kg/m^2).

Confidence Interval: A range of estimated values which has a specified probability (often 95%) of including the true value of a measure.[45] Prevalence estimates, mortality rates, or hospitalization rates were considered statistically significantly different if their 95% confidence intervals did not overlap.

Data Suppression: Rate estimates calculated with a small number of events or population sizes are statistically unstable. They exhibit wide confidence intervals indicative of great variability. In this report, data suppression rules are enforced so that the data presented are reliable. For demographic or geographic subgroups where there is less than or equal to 12 deaths, mortality rates are suppressed. In addition, this is done to protect the identity of persons who have been hospitalized or died.

Discharge: A patient must have been admitted to a hospital. A discharge is a completed inpatient hospitalization. A hospitalization may be completed by death or by releasing the patient to the customary place of residence, a nursing home, another hospital, or other location.

Prevalence: The proportion of individuals in a population who have the disease at a point in time or during a given time period. Prevalence is computed by dividing the number of existing cases at a particular point or period in time by the total population from which the cases came. It is

often multiplied by 100 and expressed as a percent.

Risk Factor: A variable associated with an increased risk of disease or infection. Risk factors are not necessarily causal. All risk factor data are from the Texas BRFSS. Information on risk factors includes only for persons 18 years and older.

Appendix Heart Disease and Stroke Mortality by County, 2006-2010

Age-adjusted Mortality Rates per 100,000 for Heart Disease and Stroke by County, Texas, 2006-2010

County	Heart Disease				Stroke			
	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Anderson	242.3	224.1	260.5	681	50.5	42.2	58.9	141
Andrews	225.7	190.9	260.5	162	52.1	35.3	68.9	37
Angelina	221.5	207.5	235.5	962	149.9	138.3	161.6	639
Aransas	185.7	166.7	204.7	367	38.0	29.2	46.8	72
Archer	163.3	128.6	198	85	44.2	25.7	62.6	22
Armstrong	198.4	131.7	265.1	34	*	*	*	*
Atascosa	212.3	191.7	232.8	408	49.0	39.1	59.0	93
Austin	258.1	233.1	283.0	412	43.2	32.9	53.5	68
Bailey	160.9	120.5	201.3	61	47.2	25.4	69.0	18
Bandera	149.4	128.4	170.4	195	36.7	26.1	47.3	46
Bastrop	200.6	184.6	216.5	604	41.8	34.3	49.2	121
Baylor	154.4	113.6	195.2	55	41.0	20.9	61.0	16
Bee	187.6	165.2	210.1	268	40.5	30.0	50.9	58
Bell	224.7	215.4	234.0	2247	42.8	38.7	46.9	428
Bexar	179.9	176.7	183.0	12471	45.6	44.0	47.2	3137
Blanco	198.0	162.4	233.6	119	78.5	55.8	101.2	46
Borden	*	*	*	*	*	*	*	*
Bosque	207.2	183.3	231.2	288	62.6	49.5	75.8	87
Bowie	247.2	233.9	260.6	1315	57.6	51.1	64.1	304
Brazoria	201.6	193.2	209.9	2255	45.4	41.4	49.4	491
Brazos	195.4	183.1	207.7	975	51.4	45.1	57.7	253
Brewster	148.4	116.5	180.3	83	49.8	31.0	68.6	27
Briscoe	155.5	87.3	223.6	20	*	*	*	*
Brooks	311.3	259.4	363.3	138	*	*	*	*
Brown	220.9	202.5	239.4	550	88.7	77.1	100.3	224
Burleson	216.4	189.5	243.3	249	50.6	37.5	63.7	57
Burnet	164.8	149.7	179.9	457	34.6	27.7	41.6	95
Caldwell	189.9	169.6	210.2	335	38.8	29.5	48.0	68
Calhoun	185.2	160.6	209.9	217	46.5	34.2	58.8	55

Appendix Heart Disease and Stroke Mortality by County, 2006-2010

County	Heart Disease				Stroke			
	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Callahan	208.8	179.5	238.0	196	36.4	23.8	49.1	32
Cameron	163.3	157.3	169.2	2860	31.8	29.1	34.4	554
Camp	214.5	181.7	247.2	165	54.8	38.6	71.0	44
Carson	194.7	152.3	237.2	81	54.8	32.4	77.2	23
Cass	255.7	234.5	276.9	560	69.6	58.5	80.8	150
Castro	178.4	137.2	219.6	72	33.5	16.0	51.1	14
Chambers	192.4	168.6	216.1	252	47.2	34.9	59.4	57
Cherokee	244.4	226.1	262.8	681	63.3	53.9	72.7	175
Childress	199.4	158.4	240.3	91	62.0	39.5	84.6	29
Clay	209.8	175.8	243.8	146	36.6	22.5	50.6	26
Cochran	157.5	104.6	210.5	34	*	*	*	*
Coke	134.3	95.9	172.7	47	*	*	*	*
Coleman	208.7	175.2	242.2	149	44.2	29.3	59.0	34
Collin	166.7	160.9	172.5	3154	41.2	38.3	44.2	756
Collingsworth	239.3	177.7	300.9	58	48.8	22.3	75.4	13
Colorado	225.2	201.8	248.6	356	47.5	36.6	58.4	73
Comal	156.9	146.8	167.1	919	46.0	40.5	51.6	262
Comanche	246.9	216.8	277	258	68.8	52.7	84.9	70
Concho	180.2	125.0	235.4	41	69.4	34.3	104.4	15
Cooke	223.0	203.9	242.1	524	59.7	49.8	69.6	140
Coryell	220.8	199.9	241.6	431	50.1	40.1	60.1	96
Cottle	138.0	80.4	195.7	22	*	*	*	*
Crane	222.4	158.8	285.9	47	61.4	28.0	94.7	13
Crockett	210.8	152.9	268.6	51	*	*	*	*
Crosby	279.5	227.5	331.5	111	84.5	55.7	113.4	33
Culberson	104.0	51.4	156.7	15	*	*	*	*
Dallam	243.9	186.3	301.4	69	51.6	24.5	78.6	14
Dallas	199.9	196.8	203.0	16252	52.5	50.9	54.1	4108
Dawson	196.6	165.5	227.6	154	45.1	30.2	60.0	35
Deaf Smith	205.6	175.7	235.5	182	49.7	35.0	64.4	44

Appendix Heart Disease and Stroke Mortality by County, 2006-2010

County	Heart Disease				Stroke			
	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Delta	187.5	141.9	233.0	65	73.2	45.1	101.3	26
Denton	175.8	169.1	182.5	2624	44.3	40.8	47.9	604
DeWitt	250.4	224.8	275.9	369	52.2	40.6	63.8	78
Dickens	164.1	110.5	217.8	36	*	*	*	*
Dimmit	211.0	172.1	249.9	113	41.8	24.3	59.3	22
Donley	215.4	163.8	267.0	67	*	*	*	*
Duval	229.2	194.0	264.3	163	28.3	15.9	40.7	20
Eastland	202.0	178.9	225.1	294	42.1	31.5	52.6	61
Ector	248.5	235.8	261.3	1456	53.8	47.9	59.8	316
Edwards	128.8	70.9	186.7	19	*	*	*	*
Ellis	193.2	181.6	204.8	1064	51.8	45.6	57.9	273
El Paso	158.3	153.8	162.8	4794	43.8	41.5	46.2	1324
Erath	240.2	217.1	263.3	416	69.0	56.6	81.4	119
Falls	347.5	312.7	382.3	383	56.4	42.2	70.5	61
Fannin	325.0	300.7	349.3	687	56.0	46.0	66.1	119
Fayette	247.5	225.4	269.7	479	47.6	38.0	57.3	94
Fisher	199.4	152.7	246.1	70	51.2	28.2	74.2	19
Floyd	176.9	137.6	216.1	78	58.9	36.7	81.2	27
Foard	327.8	232.0	423.5	45	*	*	*	*
Fort Bend	164.2	157.7	170.8	2386	41.0	37.6	44.3	565
Franklin	201.4	169.3	233.6	151	41.7	27.0	56.4	31
Freestone	211.7	185.9	237.5	259	44.9	33.1	56.7	56
Frio	218.1	184.2	252.0	159	42.7	27.7	57.7	31
Gaines	237.9	200.7	275.1	157	39.8	24.5	55.1	26
Galveston	188.5	181.2	195.9	2521	53.2	49.2	57.2	679
Garza	170.4	123.2	217.6	50	69.2	38.9	99.5	20
Gillespie	178.0	160.5	195.5	397	49.4	40.4	58.5	114
Glasscock	*	*	*	*	*	*	*	*
Goliad	169.1	133.4	204.9	86	40.8	23.4	58.3	21
Gonzales	166.5	143.3	189.8	197	57.2	43.6	70.8	68
Gray	209.6	186.8	232.4	326	55.9	44.1	67.7	86

Appendix Heart Disease and Stroke Mortality by County, 2006-2010

County	Heart Disease				Stroke			
	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Grayson	249.7	238.0	261.3	1773	45.8	40.8	50.8	324
Gregg	231.4	219.6	243.2	1469	51.8	46.2	57.4	329
Grimes	227.3	201.9	252.8	307	53.9	41.2	66.7	69
Guadalupe	191.0	179.2	202.8	1004	41.3	35.7	46.9	209
Hale	189.2	168.7	209.6	330	54.6	43.6	65.6	95
Hall	207.6	153.7	261.5	57	68.8	37.9	99.8	19
Hamilton	247.1	211.2	283.0	182	54.5	37.8	71.2	41
Hansford	214.8	163.0	266.6	66	*	*	*	*
Hardeman	99.9	65.8	134.0	33	41.7	19.9	63.6	14
Hardin	208.9	191.7	226.1	567	52.1	43.5	60.7	140
Harris	191.7	189.3	194.1	24388	49.8	48.6	51.1	6097
Harrison	210.1	194.6	225.6	705	45.8	38.5	53.1	152
Hartley	197.7	146.4	249.1	57	*	*	*	*
Haskell	230.0	189.0	271.0	121	62.9	42.1	83.8	35
Hays	166.6	154.7	178.4	758	45.3	39.0	51.6	201
Hemphill	162.4	110.1	214.7	37	*	*	*	*
Henderson	238.1	224.9	251.3	1247	58.2	51.7	64.7	308
Hidalgo	176.7	171.6	181.7	4723	31.5	29.3	33.6	843
Hill	204.6	185.9	223.2	462	58.5	48.6	68.4	134
Hockley	206.8	180.5	233.2	237	58.9	44.8	73.0	67
Hood	181.9	168.2	195.7	670	44.0	37.3	50.8	164
Hopkins	229.1	208.4	249.8	472	50.4	40.6	60.1	103
Houston	227.4	204.3	250.5	372	46.6	36.1	57.0	76
Howard	246.5	224.3	268.7	474	44.4	35.0	53.8	85
Hudspeth	122.3	70.0	174.6	21	*	*	*	*
Hunt	261.7	246.1	277.3	1080	57.1	49.6	64.6	224
Hutchinson	227.8	202.7	252.8	318	56.7	44.2	69.2	79
Irion	95.7	43.7	147.7	13	*	*	*	*
Jack	242.3	200.0	284.6	126	63.0	41.5	84.4	33
Jackson	215.0	185.0	245.1	197	38.3	25.6	51.0	35
Jasper	238.1	217.4	258.8	508	60.6	50.3	71.0	132

Appendix Heart Disease and Stroke Mortality by County, 2006-2010

County	Heart Disease				Stroke			
	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Jeff Davis	130.1	81.0	179.2	27	*	*	*	*
Jefferson	234.2	225.8	242.5	3002	61.4	57.2	65.7	791
Jim Hogg	301.2	238.3	364.1	88	52.6	26.0	79.3	15
Jim Wells	236.6	215.7	257.4	494	43.5	34.5	52.5	90
Johnson	223.6	212.0	235.1	1445	56.1	50.2	61.9	355
Jones	236.3	207.9	264.8	265	49.1	36.1	62.1	55
Karnes	281.7	245.3	318.0	231	37.1	23.8	50.4	30
Kaufman	246.4	231.4	261.5	1027	52.4	45.3	59.5	210
Kendall	206.3	185.2	227.4	367	58.8	47.4	70.1	103
Kenedy	*	*	*	*	*	*	*	*
Kent	192.2	98.0	286.4	16	*	*	*	*
Kerr	159.5	147.9	171.1	725	43.0	37.0	48.9	203
Kimble	260.6	208.7	312.5	97	*	*	*	*
King	*	*	*	*	*	*	*	*
Kinney	124.8	86.1	163.5	40	*	*	*	*
Kleberg	268.7	240.8	296.6	356	54.1	41.7	66.5	73
Knox	176.4	131.0	221.8	58	63.8	36.5	91.1	21
Lamar	245.2	227.7	262.7	756	49.6	41.8	57.4	156
Lamb	197.4	168.6	226.2	181	47.2	33.2	61.1	44
Lampasas	185.3	160.6	209.9	217	35.5	24.9	46.1	43
La Salle	228.2	174.7	281.6	70	41.7	19.0	64.4	13
Lavaca	214.1	191.9	236.4	356	54.5	43.4	65.6	92
Lee	230.1	199.2	260.9	214	39.3	26.7	52.0	37
Leon	195.3	170.5	220.1	238	47.1	35.2	59.1	60
Liberty	271.9	254.2	289.5	913	45.6	38.3	53.0	148
Limestone	227.8	202.5	253.1	311	72.7	58.5	86.9	101
Lipscomb	168.5	116.3	220.7	40	51.2	23.4	79.0	13
Live Oak	187.1	157.0	217.2	148	35.9	22.8	49.0	29
Llano	146.8	130.6	162.9	317	29.0	21.9	36.2	63
Loving	*	*	*	*	*	*	*	*
Lubbock	206.5	198.4	214.7	2448	47.7	43.8	51.7	565
Lynn	205.3	157.5	253.1	71	44.3	22.6	66.1	16

Appendix Heart Disease and Stroke Mortality by County, 2006-2010

County	Heart Disease				Stroke			
	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
McCulloch	225.0	188.2	261.7	144	48.3	31.6	65.0	32
McLennan	204.1	195.8	212.4	2316	55.6	51.3	59.9	635
McMullen	*	*	*	*	*	*	*	*
Madison	251.8	215.7	287.9	187	51.6	35.4	67.8	39
Marion	241.1	207.6	274.6	199	55.9	39.6	72.2	45
Martin	181.7	129.7	233.6	47	*	*	*	*
Mason	130.0	92.8	167.2	47	*	*	*	*
Matagorda	222.6	201.4	243.7	426	52.9	42.5	63.3	99
Maverick	186.7	168.2	205.1	394	34.7	26.8	42.6	74
Medina	225.6	205.7	245.5	495	41.0	32.4	49.6	88
Menard	228.5	167.0	290.0	53	*	*	*	*
Midland	181.1	170.7	191.6	1147	43.4	38.3	48.6	273
Milam	179.8	159.4	200.1	300	41.9	32.2	51.7	71
Mills	176.4	138.0	214.8	81	39.8	21.9	57.7	19
Mitchell	192.4	156.9	227.9	113	36.0	20.6	51.4	21
Montague	230.8	206.6	255.0	349	69.3	56.0	82.7	103
Montgomery	199.3	192.3	206.3	3152	47.6	44.1	51.1	727
Moore	201.4	171.1	231.7	170	31.7	19.7	43.6	27
Morris	272.6	239.2	305.9	257	49.1	34.9	63.3	46
Motley	185.4	116.7	254.0	28	*	*	*	*
Nacogdoches	199.1	183.4	214.9	616	78.7	68.8	88.6	243
Navarro	194.9	177.9	211.9	504	53.4	44.5	62.3	138
Newton	284.4	247.9	320.8	234	53.0	37.2	68.9	43
Nolan	253.6	221.8	285.4	244	54.8	39.7	69.8	51
Nueces	175.0	168.2	181.8	2563	49.7	46.1	53.4	712
Ochiltree	234.6	189.3	279.9	103	48.0	27.4	68.5	21
Oldham	*	*	*	*	*	*	*	*
Orange	233.6	219.7	247.5	1084	46.7	40.4	52.9	214

Appendix Heart Disease and Stroke Mortality by County, 2006-2010

County	Heart Disease				Stroke			
	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Palo Pinto	270.5	246.0	294.9	470	48.2	38.0	58.5	85
Panola	189.8	167.4	212.1	277	38.9	28.8	49.0	57
Parker	206.2	193.7	218.7	1046	54.9	48.3	61.4	268
Parmer	209.3	168.7	250.0	102	48.7	29.2	68.2	24
Pecos	167.8	138.0	197.6	122	27.3	15.0	39.5	19
Polk	239.5	222.3	256.7	744	58.0	49.6	66.5	181
Potter	240.1	227.1	253.1	1308	61.9	55.3	68.5	336
Presidio	117.7	86.3	149.1	54	31.2	14.9	47.5	14
Rains	184.2	153.1	215.2	135	48.2	32.2	64.1	35
Randall	164.6	154.1	175.2	935	44.4	38.8	49.9	247
Reagan	175.7	111.8	239.7	29	85.8	40.8	130.7	14
Real	292.0	228.0	356.0	80	*	*	*	*
Red River	286.4	253.6	319.2	293	63.7	48.2	79.2	65
Reeves	247.0	207.8	286.3	152	40.9	24.5	57.2	24
Refugio	198.5	159.0	238.0	97	54.1	33.7	74.6	27
Roberts	*	*	*	*	*	*	*	*
Robertson	274.6	243.0	306.2	290	41.6	28.8	54.3	41
Rockwall	173.6	158.2	189.1	484	45.4	37.3	53.4	122
Runnels	201.4	170.6	232.1	165	55.3	39.5	71.1	47
Rusk	244.6	226.8	262.3	728	48.8	40.9	56.8	145
Sabine	236.5	205.9	267.2	229	75.9	58.6	93.2	74
San Augustine	262.8	225.6	300.0	192	64.5	46.2	82.7	48
San Jacinto	197.1	175.5	218.8	319	52.4	41.2	63.7	83
San Patricio	186.7	171.1	202.4	546	48.2	40.3	56.1	142
San Saba	150.0	115.1	184.9	71	34.3	17.5	51.1	16
Schleicher	170.1	113.7	226.4	35	*	*	*	*
Scurry	157.8	132.9	182.8	154	47.6	34.0	61.2	47

Appendix Heart Disease and Stroke Mortality by County, 2006-2010

County	Heart Disease				Stroke			
	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Shackelford	204.4	146.6	262.2	48	*	*	*	*
Shelby	248.1	223.4	272.7	389	68.8	56.0	81.7	110
Sherman	98.4	52.9	143.9	18	*	*	*	*
Smith	215.3	206.7	223.9	2406	39.2	35.5	42.9	438
Somervell	176.3	135.9	216.8	73	45.4	25.0	65.9	19
Starr	213.1	193.8	232.3	471	33.7	26.1	41.3	76
Stephens	231.3	194.7	267.8	154	66.0	46.7	85.3	45
Sterling	148.4	67.7	229.0	13	*	*	*	*
Stonewall	213.3	140.5	286.1	33	*	*	*	*
Sutton	137.2	91.1	183.4	34	*	*	*	*
Swisher	189.3	151.2	227.3	95	62.6	40.6	84.6	31
Tarrant	201.9	198.3	205.4	12346	55.0	53.1	56.9	3257
Taylor	247.6	235.4	259.8	1582	67.7	61.3	74.1	431
Terrell	*	*	*	*	*	*	*	*
Terry	308.8	268.0	349.6	220	35.4	21.5	49.3	25
Throckmorton	147.2	88.3	206.1	24	*	*	*	*
Titus	223.8	199.5	248.0	327	45.0	34.2	55.9	66
Tom Green	180.9	169.8	191.9	1034	44.4	38.9	49.8	252
Travis	154.2	149.6	158.7	4428	44.2	41.7	46.7	1207
Trinity	260.7	231.0	290.4	296	54.2	41.0	67.4	65
Tyler	212.7	188.6	236.7	300	38.8	28.8	48.9	57
Upshur	265.8	244.1	287.4	579	43.8	35.0	52.5	96
Upton	183.0	125.6	240.4	39	*	*	*	*
Uvalde	186.3	163.8	208.8	264	46.9	35.6	58.2	66
Val Verde	201.9	183.3	220.6	451	44.4	35.7	53.2	99
Van Zandt	254.6	237.7	271.6	869	45.5	38.3	52.7	154
Victoria	222.0	207.8	236.1	947	49.5	42.8	56.2	209
Walker	207.1	189.4	224.8	525	53.2	44.0	62.5	128
Waller	251.3	225.4	277.3	361	48.5	37.0	60.1	68

Appendix Heart Disease and Stroke Mortality by County, 2006-2010

County	Heart Disease				Stroke			
	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths	Age-adjusted Mortality Rate	95% Confidence Interval (CI)		Number of Deaths
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Ward	240.6	202.6	278.6	154	32.6	18.3	46.9	20
Washington	198.4	179.4	217.3	422	52.3	42.6	61.9	113
Webb	195.9	185.5	206.2	1373	48.5	43.3	53.6	339
Wharton	194.3	176.3	212.3	448	48.7	39.7	57.8	112
Wheeler	209.1	162.1	256.1	76	*	*	*	*
Wichita	216.7	205.6	227.9	1453	53.6	48.0	59.1	361
Wilbarger	259.3	225.5	293.0	227	70.0	52.1	87.9	59
Willacy	157.1	132.2	182.0	153	29.7	18.9	40.5	29
Williamson	128.2	122.2	134.2	1772	33.3	30.2	36.4	443
Wilson	195.4	175.0	215.9	351	45.5	35.5	55.4	80
Winkler	207.7	162.5	252.9	81	57.9	34.3	81.6	23
Wise	229.8	211.0	248.7	569	64.4	54.2	74.7	152
Wood	221.5	205.7	237.4	753	36.5	30.1	42.9	125
Yoakum	212.3	164.2	260.3	75	*	*	*	*
Young	267.1	239.8	294.3	368	44.2	33.2	55.2	62
Zapata	102.7	79.0	126.4	72	21.2	10.5	31.9	15
Zavala	173.8	138.9	208.8	95	31.6	16.6	46.6	17
Texas	195.2	194.4	196.1	192334	48.4	47.9	48.8	46623

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