Public Health Strategies for Addressing Heart Disease and Stroke in Texas, 2019-2023

TEXAS Health and Human Services

Texas Department of State Health Services

Prepared by the Health Promotion and Chronic Disease Prevention Section

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Executive Summary

Heart disease and stroke are the number one and number three causes of death in Texas.[1] Together, they account for nearly three of every ten deaths in the state. Additionally, the financial burden of heart disease and stroke is substantial; hospitalization charges related to heart disease and stroke reached $23 billion in 2016,[2] and trends suggest this problem will continue in the future.

The Public Health Strategies for Addressing Heart Disease and Stroke in Texas, 2019-2023, (TXPHS) provides a set of goals, objectives, and strategies for partners across the state to implement in an effort to reduce morbidity and mortality related to heart disease and stroke in Texas. The Heart Disease and Stroke Program at the Texas Department of State Health Services solicited input from a variety of stakeholders to inform development of the TXPHS, including the Texas Council on Cardiovascular Disease and Stroke and member organizations of the Texas Cardiovascular Disease and Stroke Partnership. These groups represent stakeholders from numerous sectors across the state, including local health departments, health systems, healthcare professionals, and nonprofit and academic partners with a shared interest in the health and well-being of Texans.

The TXPHS outline a comprehensive strategy to guide stakeholders across Texas in addressing heart disease and stroke through three overarching goals listed below. The goals are supported by eleven sets of objectives, aligned by common outcomes.

The goals of the TXPHS are to:

- **Support and Reinforce Healthy Behaviors**
- **Enhance Quality of Care and Community-Clinical Linkages**
- **Improve Systems of Care**

The TXPHS include objectives from existing data sources and achievable through coordinated efforts and effective use of available resources. A number of the objectives align with Healthy People 2020 objectives created by the Office of Disease Prevention and Health Promotion to improve the health of the nation and are supported by recommended interventions from The Guide to Community Preventive Services released by the Centers for Disease Control and Prevention.

To help achieve these objectives, targets were set by analyzing trends for the past five years and estimating a reasonable change that, with focused efforts and adequate resources, could be achieved.

Introduction

Heart disease and stroke are the number one and number three causes of death in Texas.[1] Together, they account for nearly three of every ten deaths in the state. Additionally, the financial burden of heart disease and stroke is substantial; hospitalization charges related to heart disease and stroke reached $23 billion in 2016,[2] and trends suggest this problem will continue in the future. Also of note:

- Age is a primary risk factor for heart disease and stroke. As the population ages, prevalence of heart disease and stroke are expected to increase.
- The incidence of morbid obesity in Texas is rising; 32.4 percent of adult Texans are obese; significantly increasing the risk of developing heart disease or having a stroke episode.[3]

Heart disease and stroke are largely preventable. By reducing risk factors through early detection and lifestyle modifications such as: reducing tobacco use; controlling high blood pressure, high blood cholesterol, and diabetes; decreasing overweight and obesity, physical inactivity; and modifying dietary patterns, heart disease and stroke prevalence would decline.

Key Facts

- About 2,300 Americans die from heart disease each day – an average of 1 death every 38 seconds.[4]
- In 2016, 1.6 million Texas adults reported that they had been diagnosed with heart disease or stroke.[3]
- Heart disease claimed more than 43,000 lives and accounted for 22.8 percent of deaths in Texas in 2015.[1]
- There were 336,462 hospitalizations of adult Texans related to heart disease in 2016, at an age-adjusted rate of 124.0 per 10,000 adults.[2]

Costs of Heart Disease and Stroke

- The estimated direct and indirect costs of heart disease and stroke in the U.S. are estimated to be $329.7 billion and the cost is projected to increase to $749 billion by 2035.[4]
- An estimated one in every seven U.S. dollars spent on health care goes toward heart disease and stroke.[5]
- Hospital charges for stroke in Texas totaled nearly $5 billion in 2016.[2] Of these charges, Medicare claims accounted for 56 percent ($2.77 billion) and Medicaid claims accounted for 19 percent ($258 million).[2]

Overarching Goals

TXPHS aims to increase the capacity for state and local entities to reduce premature death from heart disease and stroke by 2023. Achievement of these overarching goals is a collaborative effort and will be measured by:

- Reducing the age-adjusted mortality rate for ischemic heart disease from 99.0 (2015) to 89.1 per 100,000 individuals.
  Data Source: Texas Vital Statistics

- Reducing the age-adjusted mortality rate for stroke from 44.6 (2015) to 40.1 per 100,000 individuals.
  Data Source: Texas Vital Statistics

The Heart Disease and Stroke Program at the Texas Department of State Health Services solicited input from a variety of stakeholders to inform development of the TXPHS, including the Texas Council on Cardiovascular Disease and Stroke and member organizations of the Texas Cardiovascular Disease and Stroke Partnership. These groups represent stakeholders from numerous sectors across the state, including local health departments, health systems, healthcare professionals, and nonprofit and academic partners with a shared interest in the health and well-being of Texans.

Goal 1: Support and Reinforce Healthy Behaviors

It is a priority to establish and promote environments that support the reduction in prevalence of overweight and obesity through healthy eating, physical activity, breastfeeding, controlled diabetes, and increasing tobacco-free lifestyles for all Texans, with an emphasis on access to resources for priority populations.

There are several major risk factors that increase a person's chance of developing heart disease and stroke. Many of these risk factors are modifiable through lifestyle changes or early screening and early detection, such as overweight and obesity, high blood pressure, high cholesterol, tobacco use, and diabetes.

Objective 1.1	**Data Source**
1.1a: Increase the percent of children and adolescents in Texas who meet or exceed the 2008 Physical Activity Guidelines for Americans from 42.9% (2017) to 45.0% by 2023.	Youth Risk Behavior Surveillance System (YRBSS)
1.1b: Increase the percent of adults in Texas who meet or exceed the 2008 Physical Activity Guidelines for Americans from 44.3% (2015) to 46.5% by 2023.	Behavioral Risk Factor Surveillance System (BRFSS)

Strategies:

- Implement community-wide campaigns to increase physical activity using highly visible, broad-based, multicomponent strategies (e.g., social support, risk factor screening, and health education).
- Promote worksite physical activity programs to improve diet or physical activity and reduce weight among employees.
- Use built environment approaches combining transportation system interventions with land use and environmental design to integrate promotion of physical activity into community design.
- Create and enhance access to safe places for physical activity such as parks, trails, bike lanes, sidewalks, and joint-use facilities, combined with a focus on walking.
- Promote the use of family-based interventions such as goal setting, reinforcement of positive behavior, and organized physical activity to increase physical activity among children.
- Integrate Physical Activity Guidelines for Americans (Appendix A, Table 1) into schools, workplaces and other institutions through education, policy and environment-based initiatives.
- Promote integration of moderate- or vigorous-intensity physical activity during K-12 curricula physical education (PE) classes.
- Promote physical activity standards for early care and education settings including child care centers, prekindergarten classrooms and Head Start Programs.
- Promote use of point-of-decision prompts to encourage use of stairs.

Objective 1.2	Data Source
1.2a: Increase the percent of children and adolescents who report eating fruits and vegetables five or more times per day from 17.3% (2017) to 18.2% by 2023. (Appendix A, Figure 1)	YRBSS
1.2b: Increase the percent of adults who report eating fruits and vegetables five or more times per day from 23.3% (2017) to 24.5% by 2023.	BRFSS

Strategies:

- Enhance access to healthy foods and reduce access to unhealthy foods at worksites, community, and school-based settings.
- Promote participation in child care and school meal policies that ensure school breakfasts or lunches meet specific nutrition requirements (e.g., School Breakfast Program, National School Lunch Program).
- Implement recognition programs for child care, schools, workplaces and other institutions meeting recommended nutrition standards.
- Improve access to retail stores that sell high-quality fruits and vegetables or increase the availability of high-quality fruits and vegetables at retail stores in underserved communities.
- Use marketing strategies (e.g. placement and pricing strategies, prompts, demonstrations) along with other best practices to promote healthy food choices including fruits and vegetables.
- Establish policies to incorporate fruit and vegetable activities such as community gardens and farm to work or school programs into child care, schools and workplace settings as a way to increase consumption.

Objective 1.3	Data Source
1.3a: Reduce the proportion of children and adolescents who report a Body Mass Index (BMI) (height and weight self-report) in the overweight and/or obese from 18% (2017) to 17.1% by 2023.	YRBSS
1.3b: Reduce the proportion of adults who report a BMI (height and weight self-report) in the overweight and/or obese from 69.4% (2017) to 65.9% by 2023.	BRFSS
1.3c: Increase the percent of infants who are ever breastfed from 85.0% (2015) to 89.3% by 2023.	National Immunization Survey (NIS)
1.3d: Increase the percent of infants who are breastfed exclusively through 6 months from 24.1% to 25.3% by 2023.	NIS
1.3e: Increase the percent of infants who are breastfed through 12 months from 35.2% (2015) to 37.0% by 2023.	NIS

Strategies:

- Promote recommended physical activities guidelines for all age groups.
- Promote and increase access to affordable healthy foods and beverages at worksites, schools, hospitals and community settings.
- Promote worksite physical activity and wellness programs.
- Create and expand access to safe places to support physical activity for people of all ages, resources and abilities.

- Promote behavioral interventions to reduce recreational sedentary screen time among children 13 years of age and younger.
- Promote technology-supported multicomponent coaching and counseling interventions to reduce and to maintain weight loss.
- Increase access to breastfeeding friendly environments.
- Promote awareness and information about body mass index and healthy weight.
- Develop and strengthen partnerships among community-based organizations to reduce breastfeeding barriers and increase breastfeeding support.
- Promote early care and education standards for infant nutrition.
- Reduce employment-based barriers to breastfeeding initiation, continuation and exclusivity by increasing awareness about and ensuring compliance with lactation regulations.

Objective 1.4	**Data Source**
1.4a: Reduce the percent of cigarette smoking among pregnant women from 3.9% (2014) to 3.7% by 2023.	National Vital Statistics System (NVSS)
1.4b: Reduce the percent of mothers who report smoking is allowed in their home from 3.0% (2012) to 2.9% by 2023.	Pregnancy Risk Assessment Monitoring System (PRAMS)
1.4c: By 2023, reduce the percent of youth grades 9-12 who report: • using any type of tobacco from 16.8% (2017) to 16.0% • smoking cigarettes from 10.4% (2017) to 9.9% • using E-cigarettes from 10.3% (2017) to 9.8% • using smokeless tobacco from 5.4% (2017) to 5.1% • smoking cigars from 7.0% (2017) to 6.7%	YRBSS
1.4d: By 2023, reduce the percent of adults who report: • smoking cigarettes from 15.7% (2017) to 14.9% • using E-cigarettes from 4.7% (2017) to 4.5% • using smokeless tobacco from 4.2% (2017) to 4.0%	BRFSS

Strategies:

- Increase compliance with tobacco laws and policies in schools and communities and support increased enforcement of laws prohibiting tobacco sales to minors.
- Implement evidence-based, culturally appropriate programs to prevent tobacco use.
- Promote media campaigns to decrease the use of tobacco products, prevent young people from using tobacco products, and increase the availability of cessation services such as the Texas Tobacco Quitline and nicotine replacement therapy medications.
- Increase number of healthcare providers who assess, counsel, refer and treat young people and adults for cessation services (e.g. Texas Tobacco Quitline, nicotine replacement therapy medications).
- Engage stakeholders and partners to provide education, messaging, screening and counseling to populations with the greatest disparities in and risks from tobacco use and secondhand smoke.

Overweight & Obesity

The prevalence of overweight and obesity in the U.S. and Texas has been on the rise for the past few decades. In the U.S., more than one-third of adults and 17 percent of youth were obese in 2011-2014. Obesity is defined as a body mass index (BMI) of 30 or greater. The prevalence of obesity was higher among women than men and higher among non-Hispanic black and Hispanic adults compared with other racial and ethnic groups.[6] Research has shown that childhood obesity can be reduced by comprehensive obesity prevention and control efforts that involve community programing, school health programs, nutrition and physical activity programs for adults and advertising campaigns.[7] For more information please visit the DSHS Obesity Prevention Program website at www.dshs.texas.gov/obesity.

Physical Inactivity

Cardiovascular benefits of regular physical activity include lower risk for heart disease, high blood pressure, stroke, abnormal blood cholesterol and triglycerides, diabetes and obesity.[8] Regular physical activity is associated with reduced risk for chronic disease and a healthier, longer life. Despite the benefits, most Texans do not achieve their recommended amount of physical activity. Lack of physical activity has contributed to a sharp increase in childhood obesity over the past 20 years.[9] In 2017, too few Texas high school students reported being physically active for at least 60 minutes per day on five or more days during the past week (47.3 percent). Males were significantly more likely to be active (50.8 percent) than females (34.9 percent), while Hispanic students were less likely to be active (37.8 percent) compared to Whites (50.5 percent) and African-Americans (45.8 percent).[10] In 2015, only 25 percent of adults in Texas achieved the weekly moderate-intensity guidelines; 10 percent of adults met the muscle strengthening guidelines, and nearly 19 percent of Texas adults met both guidelines (Appendix A, Table 1).[11]

Unhealthy Diet

Nutrition plays an important role in an individual's overall health and quality of life. About half of all American adults—117 million individuals—have one or more preventable chronic diseases, many of which are related to poor quality eating patterns and physical inactivity, which include heart disease, high blood pressure, type 2 diabetes, some cancers and poor bone health.[12] To reduce risk of heart disease and stroke, the American Heart Association (AHA) encourages individuals to know the caloric intake necessary to maintain a healthy weight which is based on several factors, including age, gender, and level of physical activity.[13] Nutrition and calorie information on food labels are typically based on a 2,000-calorie diet.

TXPHS focuses on increasing the proportion of Texans who report eating fruits and vegetables five or more times per day. In 2015, Texas had a similar prevalence (76.2 percent) of low fruit and vegetable consumption compared to that of the nation (76.3 percent). Unfortunately, poor nutrition is starting at younger ages throughout the state.[14] Only 17.3 percent of Texas high-school students report eating five or more fruits and vegetables per day (Appendix A, Figure 1).[15]

Diabetes, also a major risk factor for heart disease and stroke, is a chronic disease that affects how the body turns food into energy. There are three main types of diabetes: type 1, type 2 and gestational diabetes (GD). Diabetes affects the risk of cardiac events in addition to cardiac outcomes. Adults with diabetes are 2-4 times more likely to die from heart disease than adults without diabetes, and the risk for stroke is 2-4 times greater with diabetes.[16] In fact, two out of three people with diabetes die from heart disease or stroke. Due to the relationship between diabetes and heart disease, diabetes management involves maintaining a healthy diet, controlling blood glucose, blood pressure and cholesterol levels. For more information about diabetes, please visit the DSHS Diabetes Prevention and Control Program website at www.dshs.texas.gov/diabetes.

Breastfeeding

Breastfeeding has many benefits for both the mother and infant. Babies who are fed breast milk are at 15.0-20.0 percent lower risk, at school-age, of developing ear infections, asthma, type 2 diabetes, and obesity.[9] Breastfeeding is also associated with lower cholesterol levels, reduced hypertension, and lower risk of type 2 diabetes into adulthood. Mothers who breastfeed are less likely to develop breast and/or ovarian cancer, diabetes, and hypertension therefore reducing the prevalence of heart disease and stroke throughout the population.[9]

Tobacco Use

Tobacco use remains the single most preventable cause of death and disease in the U.S. In Texas, cigarette smoking is responsible for an estimated 28,030 premature deaths, $8.9 billion in healthcare cost, and $8.9 billion in death-related lost productivity per year.[17] Smoking prevalence has declined considerably, from 23.5 percent in 1999 to 19.4 percent in 2007 and to 14.5 percent in 2014. [17]

Smoking is a major cause of heart disease and stroke and is responsible for one out of every three deaths from heart disease.[18] Smoking can:

- Raise triglycerides and lower HDL
- Make blood more likely to clot, which can block blood flow to the heart and brain
- Damage cells that line the blood vessels
- Increase the buildup of plaque in blood vessels
- Cause thickening and narrowing of blood vessels

Exposure to secondhand smoke can also cause coronary heart disease, heart attack, and stroke:[18] Current rates of tobacco use in pregnancy and in the home post-delivery have been on the rise with many not aware of the elevated risks of disease and developmental delays that can occur in the mother and child.

Secondhand smoke causes nearly 34,000 early deaths from coronary heart disease each year in the U.S. among nonsmokers.[18] Each year, secondhand smoke exposure causes more than 8,000 deaths

from stroke.[18] Nonsmokers who breathe secondhand smoke at home or at work increase their risk of developing heart disease by 25-30 percent and stroke by 20-30 percent.[18]

Breathing the smoke interferes with the normal functioning of the heart, blood and vascular systems in ways that increase your risk of having a heart attack.[18] Even briefly breathing secondhand smoke can damage the lining of blood vessels and cause blood to become 'stickier' which can trigger a deadly heart attack.[18]

Goal 2: Enhance Quality of Care and Community-Clinical Linkages

Promoting partnerships between clinical and community groups in Texas is imperative to provide enhanced and coordinated patient care. Community partners (e.g. community health workers (CHWs), local health departments, pharmacists) and health systems (e.g. federally qualified health centers, hospitals, clinical practices) work together to implement effective and evidence-based strategies to reduce the burden of heart disease and stroke by controlling high blood pressure and high cholesterol.

Objective 2.1	**Data Source**
Increase the percent of adults with high blood pressure who have their blood pressure under control from 55.8% (2016) to 58.6% by 2023.	Healthcare Effectiveness Data and Information Set (HEDIS)

Strategies:

- Increase the use and training of team-based care members with a focus on CHWs to support patients with uncontrolled high blood pressure.
- Increase the use of self-measured blood pressure monitoring tied with clinical support.
- Increase the use of health information technology including electronic health records with clinical decision support tools, and registries among health systems to improve the identification and treatment of people with uncontrolled high blood pressure.
- Increase medication adherence for patients with high blood pressure through team-based care (e.g. community pharmacists, community health workers).
- Promote and implement community outreach and worksite programs that address healthy eating (ex: Dietary Approaches to Stop Hypertension (DASH) eating plan), physical activity, smoking cessation and healthy weight.
- Identify, disseminate and promote utilization for evidence-based guidelines for hypertension diagnosis, treatment and management.

Objective 2.2	Data Source
Reduce the percent of adults with high blood cholesterol levels from 33.0% (2017) to 31.4% by 2023.	BRFSS

Strategies:

- Increase the use and training of team-based care members with a focus on community health workers to support patients with high blood cholesterol.
- Increase medication adherence for patients with high blood cholesterol through team-based care (e.g. community pharmacists, community health workers).
- Promote implementation of screening guidelines by healthcare professionals for early detection and treatment of lipids disorders.
- Implement community outreach programs promoting healthy eating and physical activity.
- Increase the use of health information technology including electronic health records with clinical decision support tools, among health systems to improve the identification and treatment of people with high blood cholesterol.
- Increase awareness through media messaging about high blood cholesterol as a risk factor for heart disease and stroke.

High Blood Pressure

High blood pressure, also known as hypertension, occurs when the force of blood flowing through blood vessels is consistently too high.[19] High blood pressure affects one out of every three adults over age 20, or more than 85 million people in the United States. Nearly half of people with high blood pressure (45.6 percent) do not have it under control.[20] In Texas, 32.5 percent of adults reported that they had been diagnosed with high blood pressure in 2017.[3]

The relationship between blood pressure and risks for heart disease and stroke events are well established and independent of other risk factors. High blood pressure is a factor in 69 percent of first-time heart attacks, 77 percent of first-time strokes, and 74 percent of heart failures. The higher the blood pressure, the greater the risk for heart disease and stroke.[21]

The financial burden of hypertension has a huge impact on the nation and our state. It is estimated the direct and indirect cost of high blood pressure for 2011 to 2012 (annual average) is $48.4 billion.[20] In Texas in 2016, hospital charges for high blood pressure exceeded $2.2 billion.[2] Controlling high blood pressure in all patients with heart disease and stroke or stage 2 hypertension could reduce healthcare costs.[20]

High blood pressure can be caused by many different medical conditions, including chronic kidney disease, primary aldosteronism (a hormonal disorder), renovascular disease (narrowing or blockage of the renal arteries or veins), and thyroid or parathyroid disease. Many risk factors that contribute to high blood pressure are modifiable, including obesity, excessive alcohol consumption, smoking,

lack of physical activity and a diet high in sodium.[22] Reducing dietary sodium is an important part of managing high blood pressure. Excessive sodium intake is a risk factor for high blood pressure, which can lead to cardiovascular events. Based on the recommended guidelines, the vast majority of adults eat more sodium than they should – an average of more than 3,400 mg each day.[12]

In 2017, the American College of Cardiology and AHA collaborated to produce the first comprehensive clinical hypertension guidelines update in 14 years, the 2017 Guideline for the Prevention, Detection, Evaluation and Management of High Blood Pressure in Adults (Appendix A, Table 3). The new guidelines:

- Redefine high blood pressure as readings of 130 mmHg and higher for the systolic blood pressure measurement or readings of 80 mmHg and higher for the diastolic measurement.

- Recommend earlier intervention to prevent further increases in blood pressure and the complications of hypertension.

High Cholesterol

In 2017, one in three adult Texans had been diagnosed with high cholesterol, a major risk factor for heart disease.[23] Elevated low-density lipoprotein (LDL) cholesterol, low high-density lipoprotein (HDL) cholesterol, and triglycerides are each independent risk factors for heart disease and stroke.[24] Classification of LDL, HDL, total cholesterol and triglycerides are outlined in Appendix A, Table 2. Lowering high blood cholesterol involves reducing risk factors such as obesity, physical inactivity, a diet high in saturated fats, excess alcohol consumption and tobacco use. A diet high in carbohydrates (more than 60 percent of energy intake), certain diseases, certain drugs and genetic causes are also associated with abnormal lipoproteins.[24]

Current guidelines from the National Cholesterol Education Program (NCEP) recommend a fasting lipoprotein profile (total cholesterol, LDL, HDL, and triglyceride) be measured every five years for adults 20 years and older. Adherence to screening guidelines by healthcare providers and making patients aware of their cholesterol levels are critical components to reduce high cholesterol.[23] In addition to therapeutic lifestyle changes, treatment with medication therapy may be indicated. LDL-lowering drug therapy has been shown to be very effective in reducing risk for heart disease and stroke.[24] The use of cholesterol-lowering treatments including the use of statins has increased substantially among adults since 1999.[4]

Goal 3: Improve Systems of Care

It is necessary to promote capacity and infrastructure changes within the health delivery system to effectively prevent, treat and manage heart disease and stroke for all Texans. The benefits of rapid identification and treatment of heart attack and stroke are clear: early treatment of a heart attack reduces heart muscle damage and early treatment of stroke can minimize functional disability.

Monitoring, tracking and making improvements within the systems of care in Texas are priorities in the TXPHS. It is necessary to increase the number of adults who can identify the signs and symptoms of heart attacks and strokes, develop and implement screening and treatment guidelines and protocols, and increase quality and equity of long-term care to improve systems of care. Texas policymakers, agency and organizational leaders and community-level practitioners should work towards improving these factors to reduce mortality and morbidity from heart attack and stroke.

Objective 3.1	**Data Source**
Increase the percent of adults who are aware of the early warning signs and symptoms of a stroke from 15.5% (2013) to 16.3% by 2023.	BRFSS
Strategies: • Promote the use of public education programs tailored to appropriate audiences to increase the awareness of the signs and symptoms of heart attack and stroke. • Promote media messaging to increase knowledge of early warning signs of heart attack and stroke. • Identify and create resources for stakeholders and partners to disseminate in their community.	
Objective 3.2	**Data Source**
Increase the percent of adults who are aware of the importance of calling 9-1-1 if a heart attack or stroke is suspected from 86.9% (2013) to 91.2% by 2023.	BRFSS
Strategies: • Promote the use of public education programs tailored to appropriate audiences to increase the awareness of calling 9-1-1 if a heart attack or stroke is suspected. • Promote media messaging to increase knowledge of to call 9-1-1 if a heart attack or stroke is suspected. • Identify and create resources for stakeholders and partners to disseminate in their community.	

Objective 3.3	Data Source
Increase the percent of out-of-hospital cardiac arrests in which appropriate bystander and emergency medical services (EMS) administered cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) from 78.7 (2014) to 82.6% by 2023.	EMS Registry
Strategies: • Identify and promote community-based group training in CPR and the use of AED. • Support the maintenance of evidence-based, CPR/AED programs in schools. • Promote CPR training/AED placement and training policies for businesses, restaurants and other community settings.	
Objective 3.4	**Data Source**
Increase the percent of adult heart attacks survivors who are referred to cardiac rehabilitation following discharge from 61.6% (2016) to 64.7% by 2023.	ACTION Registry
Strategies: • Increase awareness and training of benefits of cardiac rehabilitation to healthcare professionals. • Identify and address barriers to cardiac rehabilitation referral. • Partner with healthcare systems to include cardiac rehabilitation referral consideration as part of discharge procedures.	
Objective 3.5	**Data Source**
Increase utilization of EMS trauma pre-notification among EMS providers from 54.3% (2016) to 57.0% by 2023.	ACTION Registry
Strategies: • Enhance ongoing EMS/Trauma training for EMS personnel to recognize heart attack and stroke symptoms and transporting the patient to the correct level facility. • Support EMS agencies efforts to equip ambulances with ECG and modems to capture data and send to hospitals. • Collaborate with Texas Regional Advisory Councils (RACs) to improve the pre-notification process between EMS and hospitals.	

The systems of care targeting cardiac and stroke events can be classified as the stroke system of care; the emergency healthcare system; and the heart attack system of care. While each of these systems has a unique role, coordination among the systems of care is of the utmost importance to ensure efficient and effective, high-quality care.

Texas Department of State Health Services' Heart Attack and Stroke Data Collection Initiative focuses on pre-hospitalization and hospitalization portions of the overall heart attack and stroke systems of care, specifically through heart attack and stroke data elements, with a particular focus on ST-elevated myocardial infarction (STEMI). The collection of comprehensive data will enable DSHS

to conduct gap analyses and identify areas for improvement, which will lead to improved systems of care and outcomes for patients. Pre-hospital data is accessed through EMS & Trauma Registries - statewide passive surveillance systems that collect reportable event data from EMS providers, hospitals, justices of the peace, medical examiners and rehabilitation facilities. Hospital data is not collected through any statewide surveillance system but through national registries.

Stroke System of Care

Stroke is the third leading cause of death in Texas. There are three major types of stroke: ischemic stroke, hemorrhagic stroke, and a transient ischemic attack (TIA). Ischemic stroke (the most common type) occurs when blood flow to the brain is blocked. Hemorrhagic stroke occurs when a blood vessel in the brain bursts and bleeds in the brain. A TIA, or "mini stroke," is caused by a temporary clot or when the blood flow stops for a short time and then returns to normal. A TIA is a warning sign that a major stroke may occur in the future.

The stroke death rate in Texas declined by 14.4 percent from 2005 to 2015 (from 52.1 deaths per 100,000 people in 2005 to 44.6 deaths per 100,000 people in 2015).[25,26] Stroke can cause a range of disabilities from loss of speech, to paralysis of limbs and other neurological impairments, making stroke a leading cause of long-term disability and a major economic burden in terms of healthcare costs and lost productivity.[4]

Many areas of Texas are currently underserved with regard to stroke facilities that are able to effectively diagnose, treat and manage stroke patients. DSHS designates Texas stroke facilities as either *comprehensive, primary or support* facilities, based on services provided. Services may include acute stroke care, supportive care and transport and comprehensive stroke care, including the full range of stroke treatments, rehabilitation and long-term care. According to the 2017 Texas Stroke Hospital Performance Measures report, the stroke prevalence rate in 2015 in Texas was 3.0 percent. Of the reporting hospitals, about one out of four patients (25.5 percent) received Tissue plasminogen activator (tPA) within 45 minutes of hospital arrival and over half (56.8 percent) received tPA within the recommended 60 minutes.[27] The door-to-tPA times and percent treated varied by method of arrival. 58.9 percent of patients that arrived by EMS vs. 50.9 percent of patients arriving by private transport had a door-to-tPA time ≤ 60 minutes.[28] Time to IV tPA therapy, often referred to as door-to-needle time, is a significant measure of hospitals quality encompassing multiple elements of the stroke system of care; time of symptom onset, first medical contact, hospital arrival, initial CAT scan, and interpretation of CAT scan. IV tPA therapy should be administered within 60 minutes of hospital arrival for eligible acute ischemic stroke patients. Appropriate identification and utilization of treatment for stroke events and improving and expanding the stroke system of care are key objectives of the TXPHS.

Timely treatment to reduce the impact of a stroke requires early recognition of signs and symptoms and rapid response. The 2013 Texas Behavioral Risk Factor Surveillance System (BRFSS) survey indicated that only 29.1 percent of adults in Texas could correctly identify all stroke signs and symptoms (Appendix A, Table 4).[2]

Emergency System of Care

For both a stroke and a cardiac event, rapid diagnosis and treatment can mean the difference between recovery, disability, or death. Healthy People 2020 sets out developmental objectives for increasing the proportion of persons who have access to rapidly responding pre-hospital emergency services and the proportion covered by basic life support or advanced life support.[29]

In Texas, the average EMS response time varies by year and between urban and rural areas of the state (Appendix A, Table 5). Variation also occurs in total pre-hospital time. The time from when the 9-1-1 call was received to the time EMS arrived as the point of care, generally a hospital.[27]

The Texas Governor's EMS and Trauma Advisory Council is tasked with developing and updating a "Texas Emergency Healthcare Strategic Plan." The TXPHS states that to improve cardiac and stroke response times within the emergency healthcare system, EMS, cardiac and stroke entities and Regional Advisory Councils should develop, implement, and continually evaluate and improve regional plans of care. The AHA's Mission: Lifeline initiative focuses on increasing the number of patients with timely access to quality care from the onset of the emergency all the way through hospital discharge and the start of secondary prevention.[28] This initiative works with hospitals to improve heart attack system of care across the state.

Heart Attack System of Care

The heart attack system of care ranges from acute care to rehabilitation services. While early treatment and continued management is crucial, many areas of Texas do not have capacity for emergency cardiac care. Patients who receive artery opening therapy within the first or second hour after the onset of heart attack symptoms experience significant reductions in disability and death.[32]

According to the 2017 Texas STEMI/Heart Attack Hospital Performance Measures report, about four percent of the adult population in Texas had a heart attack each year from 2011 to 2015. Of the reporting hospitals, 94.7 percent of directly admitted patients received Percutaneous Coronary Intervention (PCI) within the recommended 90 minutes, but only 66.4 percent of transfer patients received PCI within the recommended 120 minutes. Persons having a heart attack that arrived via ambulance received PCI within 90 minutes 97.7 percent of the time compared those who arrived via private vehicle at 91.2 percent.[31]

Appropriate identification and utilization of treatment for cardiovascular events and improving and expanding the heart system of care are key objectives of the TXPHS. Treatment to restore a normal heartbeat occurs through electric shock to the heart (defibrillation) within three to five minutes of the event. With every minute that passes without cardiopulmonary resuscitation (CPR) and defibrillation, the chance of survival is reduced by 7 percent to 10 percent.[32] Recognizing signs and symptoms of cardiac arrest, calling 9-1-1 and beginning treatment are critical to improve patient outcomes. In 2013, while 86.9 percent of Texans recognized 9-1-1 as the first emergency response

for heart attack and stroke, only 18.9 percent of Texas adults could correctly identify all signs and symptoms of a heart attack.[23]

A systems approach that focuses on building capacity for state and local efforts to implement data-driven, evidence-based, culturally appropriate interventions in communities remains a cornerstone priority for the Heart Disease and Stroke Program (HDSP). The HDSP and the Partnership are pursuing population-based, capacity-building strategies by monitoring the heart disease and stroke burden; supporting collaboration among multi-sectoral partners; coordinating available services and resources; expanding reach and improving quality of care; connecting partners to evidence-based interventions; and working to reduce healthcare disparities.

Disparities in Heart Disease and Stroke

Many health disparities exist among Texans with heart disease and stroke, including those based on age, race/ethnicity, pregnancy, and geographic region. To address these disparities, interventions need to be tailored to improve health equity and health outcomes for those most affected. This would include using culturally appropriate messages and community health workers (CHWs) in the community and clinical settings to help facilitate change.

Age Disparities

Differences exist in terms of age. Individuals aged 65 and older experience the highest rates of heart disease and stroke compared to all other age groups. Normal aging leads to a thickening and possible hardening of the heart walls, arteries, and valves. [33] Older individuals who experience hardening of the arteries, called arteriosclerosis, paired with high blood pressure, obesity and poor diet are more likely to develop cardiovascular disease, creating a higher risk of cardiac episodes and stroke.[33]

Race/Ethnic Disparities

Racial/ethnic disparities also persist, with rates of heart disease and stroke highest among the Black race/ethnic group. The prevalence of nearly all risk factors for heart disease and stroke is also higher among the Black race/ethnic group compared to all other race/ethnic groups. Almost 50 percent of Black adults (aged over 18) have hypertension and experience the onset of heart disease and stroke at relatively earlier ages.[34] Although Black individuals only make up 11.8 percent of the population of Texas, they comprise 39.8 percent of the obese population.[34] While the rate of cardiovascular disease has decreased in most groups, the Black race/ethnic group has not seen a change, experiencing an overall decline in life expectancy compared to that of the White race/ethnic group.[34] (Appendix A, Table 6)

Pregnancy-Related Disparities

Women of childbearing age who also have heart disease or associated risk factors are at an increased likelihood for maternal mortality, which continues to be an issue of concern here in Texas and nationwide. Cardiovascular and coronary conditions, obstetric hemorrhage, infection/sepsis and cardiomyopathy were the leading causes of pregnancy-related (76 percent) deaths in Texas. Black women had the highest pregnancy-related death rate of 13.9 per 100,000 live births, followed by Hispanic (9.3 per 100,000 live births) and White (6.0 per 100,000 live births) women. [35] Cardiac and cerebrovascular events, along with hypertension/eclampsia accounted for almost 40 percent (38.2 percent) of maternal deaths in Texas from 2012-2015.[35] Many associated risk factors contribute to maternal death, including chronic conditions such as pre-pregnancy obesity, hypertension and diabetes.

Geographic Disparities

In addition to the disparities noted above, there are geographic differences in mortality rates associated with ischemic heart disease and stroke within Texas urban, rural, and border regions. The highest age-adjusted mortality rates associated with heart disease are concentrated in East Texas and along the Texas-Mexico border. The highest age-adjusted mortality rates associated with stroke are concentrated in Northeast Texas (Appendix A, Figures 2-3).

Conclusion

It is critical for state, regional, and community stakeholders to be knowledgeable about heart disease and stroke. It is equally important that they understand the risk factors and disparities surrounding health disease and stroke, and their impact on health and well-being. We urge you to use The Public Health Strategies for Addressing Heart Disease and Stroke in Texas, 2019-2023, (TXPHS) to determine the role and direction that your organization decides to pursue as part of a unified, coordinated effort to reduce premature death from heart disease and stroke, as well as to improve the quality of life for Texans.

Appendix A. Tables & Figures

Table 1: 2008 Recommended Physical Activity Guidelines for All Americans

Age Groups	Moderate Exercise	Vigorous Exercise	Muscle Strengthening
Adults	150 minutes/week	Or 75 minutes/week	2+ days/week
Children and Adolescents	60 minutes/day	3 days/week	3 days/week

Source: U.S. Department of Health and Human Services. (2008). 2008 Physical Activity Guidelines for Americans.

Table 2: Classification of LDL, Total, HDL Cholesterol and Triglycerides (mg/dL)

Classification of LDL, Total, HDL Cholesterol and Triglycerides (mg/dL)	
LDL Cholesterol	
< 100	Optimal
100-129	Near optimal/above optimal
130-159	Borderline high
160-189	High
> 190	Very high
Total Cholesterol	
< 200	Desirable
200-239	Borderline high
≥ 240	High
HDL Cholesterol	
< 40	Low
≥ 60	High (Desirable)
Triglycerides	
< 150	Normal
150-199	Borderline high
200-499	High
≥ 500	Very high

Source: Third Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults, 2001 and the 2004 Update.

Table 3: Blood Pressure Stages

Blood pressure is classified as normal, elevated, hypertension stage 1, hypertension stage 2 and hypertensive crisis.

Blood Pressure Category	**Systolic mmHg** (upper number)		**Diastolic mmHg** (lower number)
Normal	Less than 120	AND	Less than 80
Elevated	120-129	AND	Less than 80
High Blood Pressure (Hypertension) Stage 1	130-139	OR	80-89
High Blood Pressure (Hypertension) Stage 2	140 or higher	OR	90 or higher
Hypertensive Crisis	Higher than 180	AND/OR	Higher than 120

Adapted from the American Heart Association Journal, Hypertension and the Journal of the American College of Cardiology, 2017

Table 4: Recognition of Signs and Symptoms of Stroke in Texas, 2013

Symptoms of Stroke	**% of Respondents Who Recognized Symptoms of Stroke**
Sudden confusion, trouble speaking or understanding	92.0%
Sudden trouble seeing in one or both eyes	83.1%
Sudden numbness or weakness of the face, arm or leg	95.7%
Sudden trouble walking, dizziness or loss of balance and coordination	91.9%
Sudden severe headache with no known cause	73.6%
Recognized all 5 signs and symptoms	**29.1%**

Data source: Texas BRFSS, Center for Health Statistics, DSHS, 2013

Table 5: EMS Response Times

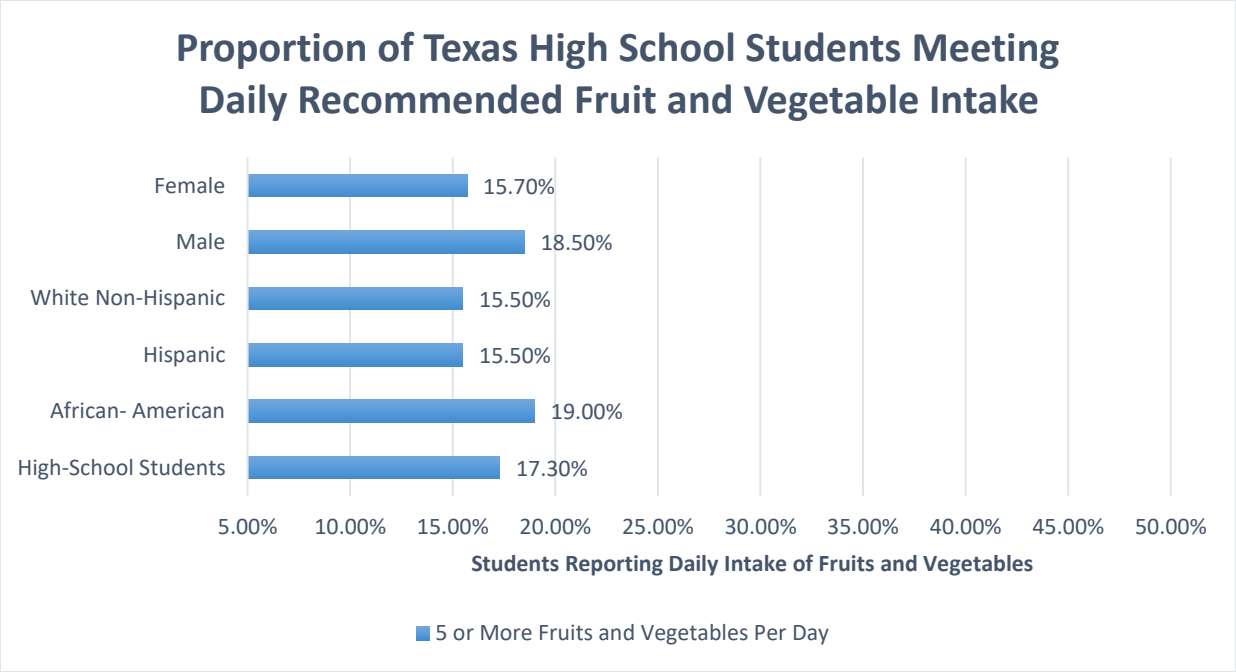
	Suspected Cardiac Event		Suspected Stroke	
	Arrive to Scene Average Time	Total Pre-Hospital Average Time	Arrive to Scene Average Time	Total Pre-Hospital Average Time
2008	8.5 minutes	39.7 minutes	11 minutes	42.3 minutes
2014	8.5 minutes	43.4 minutes	8.8 minutes	41.5 minutes
2014: Urban	8 minutes	41.4 minutes	8.2 minutes	40.2 minutes
2014: Rural	10.3 minutes	49.7 minutes	11.2 minutes	46.8 minutes

Texas Department of State Health Services. (2014). Texas EMS & Trauma Registries. Texas Department of State Health Services.

Table 6: Heart Disease and Stroke Risk Factors for African-Americans in Texas

Heart Disease & Stroke Risk Factors	African-Americans	Texas
Diabetes	14.8%	11.2%
High Blood Cholesterol	38.0%	36.1%
Hypertension	49.9%	35.1%
Obesity	41.7%	33.6%
Tobacco Use	14.5%	17.2%

Data source: Texas BRFSS, Center for Health Statistics, DSHS, 2016; Texas BRFSS, Center for Health Statistics, DSHS, 2015 (high blood cholesterol only)



Source: Texas Youth Risk Behavior Surveillance System Survey Data, 2017, Center for Health Statistics, Texas Department of State Health Services.

Figure 1: Proportion of Texas students meeting daily recommended fruit and vegetable intake by sex, race, and ethnicity.

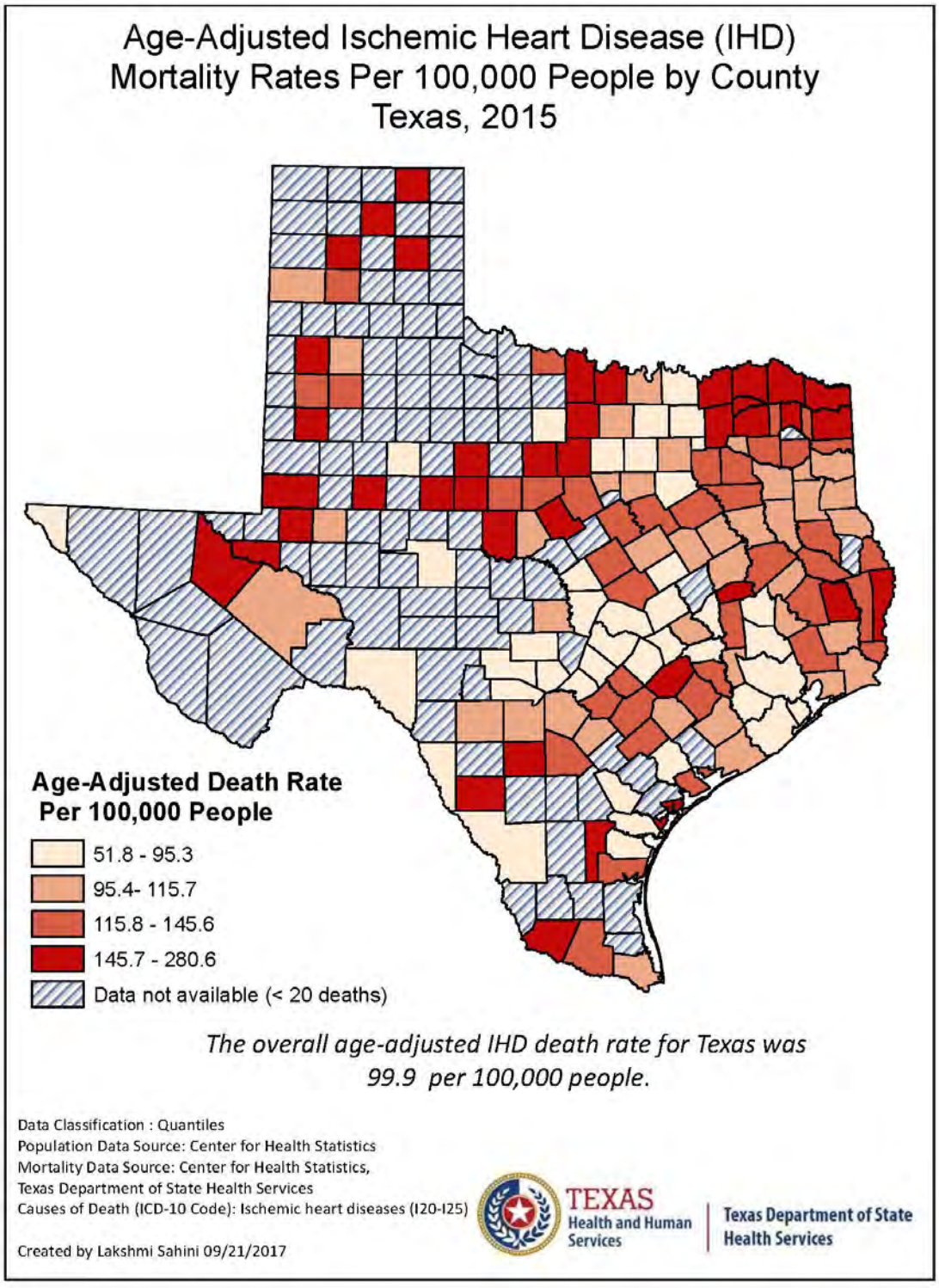


Figure 2. Ischemic heart disease age-adjusted mortality rate by county, 2015.

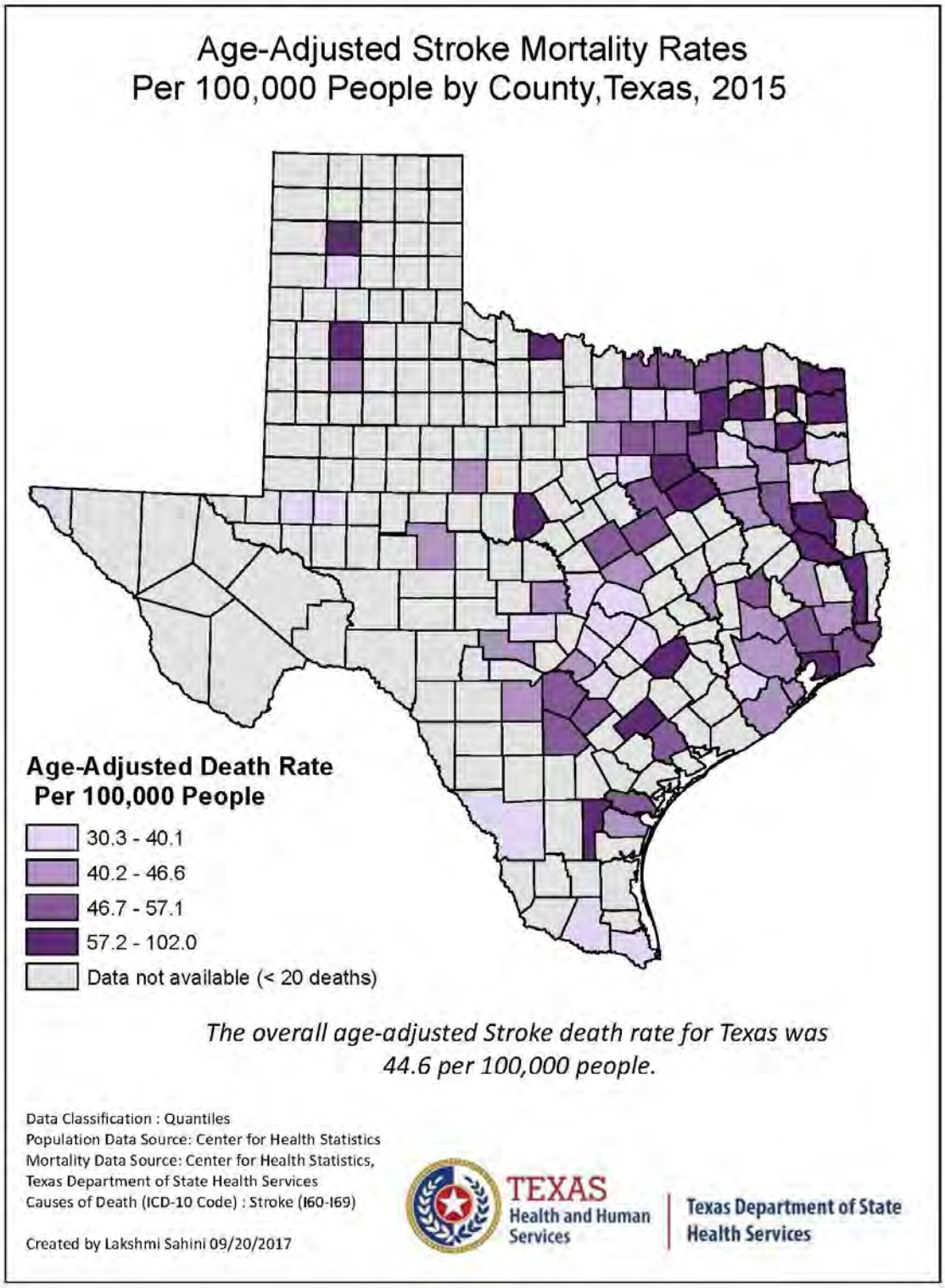


Figure 3. Stroke age-adjusted mortality rate by county, 2015.

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Appendix C. Data Sources

ACTION Registry- The ACTION Registry®-GWTG™ (ARG) is risk-adjusted, outcomes-based, quality improvement program that focuses exclusively on high-risk STEMI/NSTEMI patients. It helps hospitals apply American College of Cardiology/AHA Clinical Guideline recommendations in their facilities, and provides invaluable tools to assist them in achieving their goal of quality improvement. The registry's real-time quarterly reports will support efforts to reduce procedural complications, identify areas of excellence and opportunities for improvement and document the results of Quality Improvement efforts.

BRFSS- Texas Behavioral Risk Factor Surveillance System, initiated in 1987, is a federally and state funded telephone survey conducted on a monthly basis of 500 randomly selected Texas households to collect data on lifestyle risk factors contributing to the leading causes of death and chronic diseases. As a primary source for comprehensive statewide data on preventive health practices and health risk behaviors, BRFSS is an important tool for decision-making throughout DSHS and the public health community. Public and private health authorities at the federal, state and local levels rely on BRFSS to identify public health problems, design policy and interventions, set goals and measure progress toward those goals.

YRBSS- Youth Risk Behavior Surveillance Survey monitors priority health-risk behaviors and the prevalence of obesity and asthma among youth and young adults. The YRBSS includes a national school-based survey conducted by the Centers for Disease Control and Prevention and state, territorial, tribal and local surveys conducted by state, territorial and local education and health agencies and tribal governments.

TXVS- Texas Vital Statistics provides records for births or deaths that have occurred in Texas from 1903 to the present. Vital statistics refers to demographic data on births, deaths, fetal deaths, abortions, marriages and divorces. At the Department of State Health Services, vital statistics functions are distributed within two organizational units: The Center for Health Statistics (CHS) and the Vital Statistics Unit (VSU). The Data Management team within CHS is responsible for developing, analyzing and distributing public health data derived from records of vital events. The team also responds to statistical data requests and develops the Texas Vital Statistics Annual Report.

HEDIS- Healthcare Effectiveness Data and Information Set consists of standardized performance measures designed for comparing the quality of care of managed care organizations. As reported by the State of Managed Care Quality (2004), this tool is used by more than 90 percent of America's health plans to measure performance on important dimensions of care and service. HEDIS® is developed and maintained by the National Committee for Quality Assurance (NCQA), a private non-profit organization committed to assessing, reporting and improving the quality of care provided by organized healthcare delivery systems.

Texas EMS/Trauma Registry- Texas EMS/Trauma Registry is a legislatively mandated program responsible for collecting, analyzing and disseminating information on emergency medical services runs and the occurrence of trauma in Texas including spinal cord injuries, traumatic brain injuries and submersion injuries. EMS providers and acute care hospitals, designated to provide trauma care, must report trauma cases to the EMS/Trauma Registry. The EMS/Trauma Registry uses information on injuries to investigate the causes of injuries, their distribution, health outcomes and associated costs. Local communities and providers rely on the data from the EMS/Trauma Registry to evaluate the trauma system in Texas and to plan injury prevention programs.

PRAMS- Pregnancy Risk Assessment Monitoring System is a surveillance project of the Centers for Disease Control and Prevention (CDC) and state health departments. Developed in 1987, PRAMS collects state-specific, population-based data on maternal attitudes and experiences before, during and shortly after pregnancy. PRAMS surveillance currently covers about 83 percent of all U.S. births.

NVSS- National Vital Statistics System is the oldest and most successful example of inter-governmental data sharing in Public Health and the shared relationships, standards and procedures form the mechanism by which the National Center for Health Statistics (NCHS) collects and disseminates the Nation's official vital statistics. These data are provided through contracts between NCHS and vital registration systems operated in the various jurisdictions legally responsible for the registration of vital events – births, deaths, marriages, divorces and fetal deaths.

NIS- National Immunization Survey is a national survey conducted annually by the Centers for Disease Control and Prevention to assess immunization levels among pre-school children 19 through 35 months old. The NIS is the only population-based survey to provide national, state, local area and territorial estimates of vaccination coverage among children aged 19-35 months in the United States. The NIS provides national and state estimates of vaccination coverage, including new vaccines as they are licensed and recommended for use. The survey also tracks progress towards Healthy People 2020 goals.

Appendix D. Resources for Action

The following organizations provide public and professional education, programs and resources for cardiovascular disease and stroke. This is not intended to be an exhaustive list but provides a sampling of what is already available from credible sources. Before selecting and using any program, seek information regarding the efficacy or adaptability of the program for your intended population.

National Resources

Agency for Healthcare Research and Quality
http://www.ahrq.gov

American Heart Association/American Stroke Association
http://www.americanheart.org

- Get with the Guidelines – hospital guidelines for heart disease and stroke
- Acute Stroke Treatment Program – hospital-based guide for primary stroke centers
- Power to End Stroke – public awareness campaign that embraces and celebrates African-Americans
- Mission: Lifeline – guidelines for timely STEMI treatment for healthcare providers
- Heartsaver AED – workplace training program
- Go Red For Women – public awareness campaign
- Go Red Por Tu Corazón – public awareness campaign for Hispanic women
- CPR Anytime – general public training program
- Heart 360 – patient portal to track and manage heart health

Bridges to Excellence - quality-improvement program for the healthcare industry
http://www.bridgestoexcellence.org

Centers for Disease Control and Prevention
https://www.cdc.gov/

- Guide to Community Preventive Services – guide to evidence-based practices

- Promoting Physical Activity: A Guide for Community Action

- Million Hearts – campaign to prevent 1 million heart attacks and strokes in five years by coordinating national efforts

Cholesterol Guidelines http://www.nhlbi.nih.gov/guidelines/cholesterol/index.htm

Healthy People 2020
https://www.healthypeople.gov/

Hypertension Guidelines
https://professional.heart.org/professional/ScienceNews/UCM_496965_2017-Hypertension-Clinical-Guidelines.jsp

National Heart, Lung and Blood Institute
http://www.nhlbi.nih.gov

American Stroke Association
http://www.stroke.org

Self-Management Resource Center
https://www.selfmanagementresource.com/

U.S. Department of Health and Human Services
https://www.hhs.gov/

U.S. Preventive Services Task Force
http://www.uspreventiveservicestaskforce.org

- Counseling and Interventions to Prevent Tobacco Use and Tobacco-Caused Disease.

- Screening for Coronary Heart Disease

- Screening for High Blood Pressure

- Screening for Lipid Disorders

Texas Resources

Texas Department of State Health Services
https://www.dshs.texas.gov

- Heart Disease and Stroke Program
  https://www.dshs.texas.gov/heart

- Texas Healthy Communities Program https://www.dshs.texas.gov/txhc/Texas-Healthy-Communities.aspx

- Texas Council on Cardiovascular Disease and Stroke
  https://www.dshs.texas.gov/heart/TXHEART DISEASE AND STROKES-Council.aspx

- Regional Advisory Councils https://www.dshs.texas.gov/emstraumasystems/etrarac.shtm

- Texas Diabetes Council, *Plan to Prevent and Treat Diabetes in Texas*
  https://www.dshs.texas.gov/txdiabetes/data.shtm

TEXERCISE
https://hhs.texas.gov/services/health/food-fitness/texercise
A statewide health and wellness initiative of the Texas Health and Human Services Commission (HHSC) that encourages individuals and communities to adopt healthy lifestyle habits such as regular physical activity and good nutrition –

Brain Attack Coalition
http://www.brainattackcoalition.org

Appendix E. Acknowledgements

Health Promotion and Chronic Disease Prevention Section

Staff from the **Health Promotion and Chronic Disease Prevention Section** at the Texas Department of State Health Services played a key role in coordinating meetings, writing and editing drafts of the *Texas Public Health Strategies for Addressing Heart Disease and Stroke*, 2019-2023.

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