



Status of Diabetes 2018-2019 Bexar County, Texas

Report prepared May 2021

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KEY FINDINGS

- Bexar County's overall diabetes hospitalization rate is consistently higher than that of Texas overall.
- Bexar County children 10-17 years of age are hospitalized for diabetes approximately 4 times more than children under 10.
- In Bexar County, NH-Black individuals and Hispanic/Latinos consistently have higher diabetes hospitalization rates than NH-White individuals, however the disparity gap appears to be narrowing over time.
- Bexar County zip codes that have a higher percentage of youth reporting 1+ soda intake per day are also often the zip codes that have higher diabetes hospitalization rates.
- Bexar County zip codes that have higher percentages of youth reporting 1h or less of physical activity per week are often zip codes that also have higher diabetes hospitalization rates.
- Obesity is also strongly correlated with diabetes at the census tract level: The higher the percentage of self-reported adult obesity in a census tract, the higher the percentage of self-reported adult diabetes.
- Diabetes amputations rates among males in Bexar County are consistently more than double the rate among females. Hispanic/Latinos carry the highest burden of diabetic amputations.
- In Bexar County, census tracts with higher food insecurity (measured as higher participation rates in SNAP programs) and higher uninsured rates also have higher levels of diabetes.
- Bexar County's age-adjusted mortality rate for diabetes is higher than that of Texas overall, the US overall, and is also highest among the 5 largest counties in Texas.

Introduction

Diabetes is a chronic disease that occurs when your blood glucose, also known as blood sugar, is too high. Blood glucose is the main source of energy and comes from the foods you eat. When your blood sugar goes up, the pancreas releases a hormone called insulin. Insulin helps glucose from food get into your body cells to be used for energy. With diabetes, the body does not make enough insulin or cannot use it as well as it should, causing too much blood sugar to stay in the bloodstream. Consistently high blood sugar levels can cause serious damage to other organs and body systems.¹ There are three main types of diabetes:

- **Type 1 Diabetes (T1D):** The body attacks itself by mistakenly destroying the cells that produce insulin.¹
- **Type 2 Diabetes (T2D):** Your body does not use insulin well. Type 2 diabetes is the most common form of diabetes and is often caused by factors such as excessive consumption of sugar-sweetened beverages, excess weight, and physical inactivity.¹
- **Gestational Diabetes:** Develops in pregnant women who did not previously have diabetes. This type of diabetes goes away after the baby is born but increases risk for type 2 diabetes later in life for both mom and baby.¹

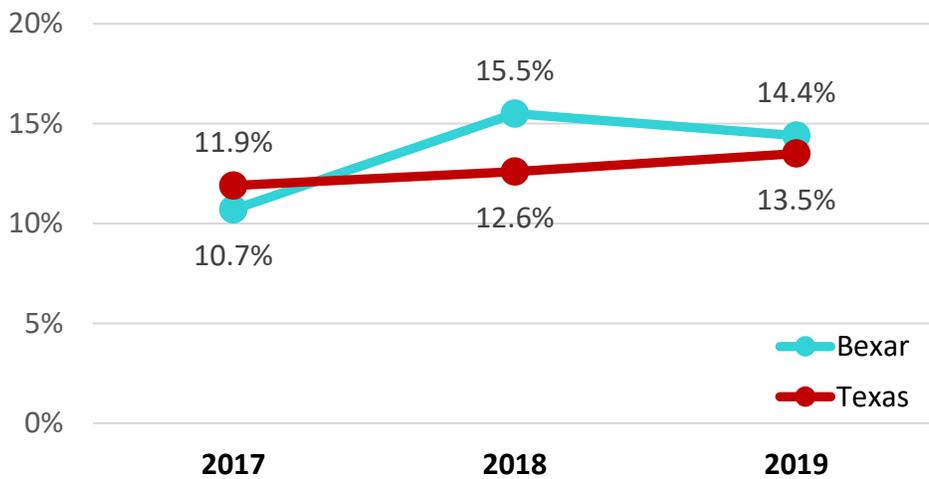
In 2018, almost 27 million Americans of all ages (8.2% of the population) had diabetes.² In youth, about 210,000 Americans under age 20 are estimated to have diabetes.² Uncontrolled diabetes often leads to devastating complications such as nerve damage, blindness, kidney failure, and lower-limb amputations.³ A person with diabetes has medical expenditures more than twice as high than individuals without this diagnosis.⁴ By addressing diabetes, many other related health problems can be prevented or delayed. **This report provides 2018/2019 data on diabetes prevalence and hospitalization in Bexar County, and highlights differences in diabetes according to age, sex, race/ethnicity, region, and socioeconomic factors.**



Diabetes Status in Bexar County

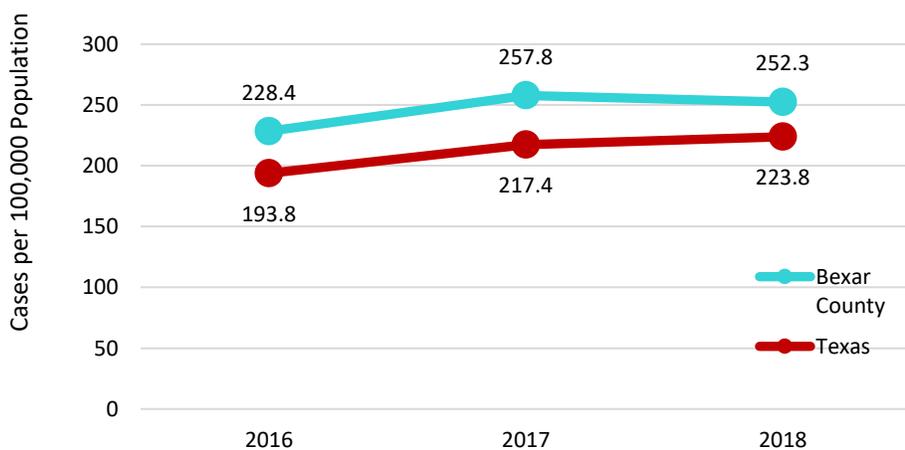
According to the Texas Department of State Health and Services, the prevalence of diabetes in Texas has increased 40 percent over the last decade.⁵

Figure 1. Percent (%) of Surveyed Adults Reporting They Ever had Diabetes, Bexar County



Over the past several years, the prevalence of self-reported adult diabetes in Bexar County has generally been similar to the prevalence across Texas. **(Figure 1).**

Figure 2. Inpatient Hospitalization Rate for Diabetes (All-ages) as Primary Diagnosis, Bexar County



Examining the most recent years of inpatient hospitalization data shows that the overall Diabetes hospitalization rate in Bexar County is consistently higher in comparison to the rate for Texas overall **(Figure 2).**



Figure 3. San Antonio Diabetes Prevalence by Census Tract, 2017

Figure 3 shows the prevalence of diabetes by census tract in 2017. The census tracts in dark brown had the highest proportion of residents reporting diabetes, up to 1 in 4 individuals.

Higher levels of diabetes were more common in central parts of Bexar County.

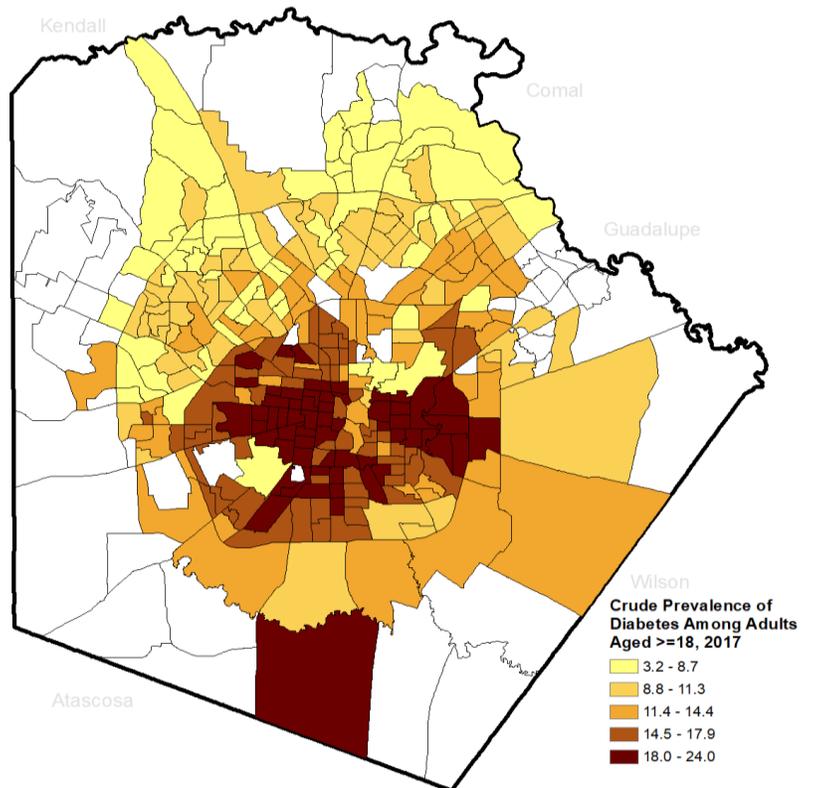


Figure 4. Bexar County Diabetes Hospitalization Rate (All ages) by Zip Code, averaged from 2016-2018

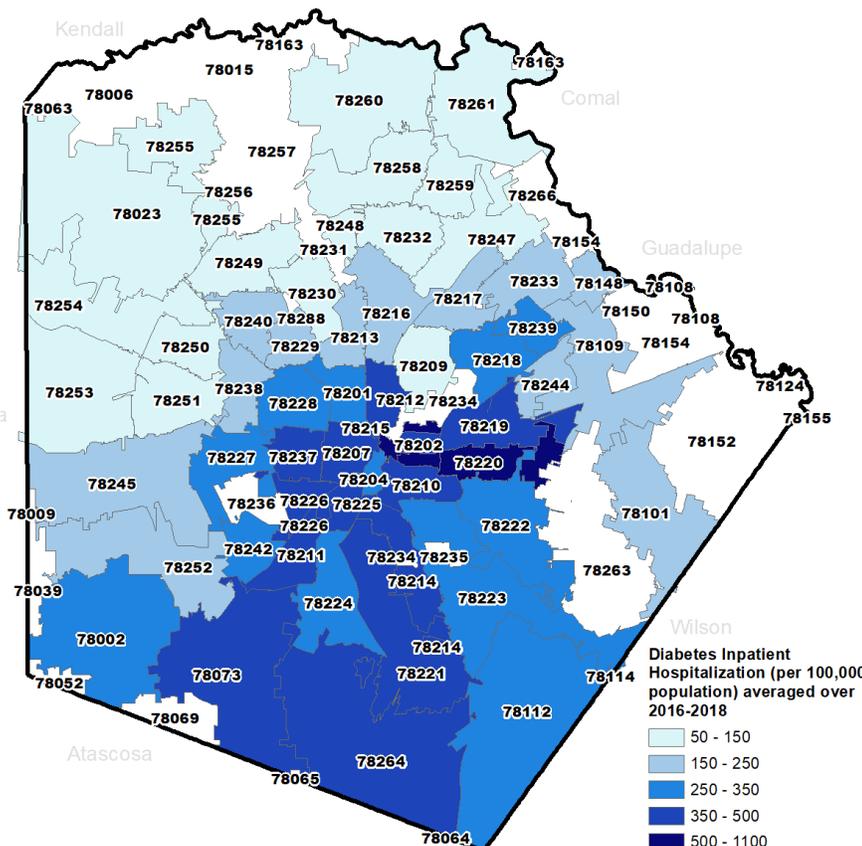


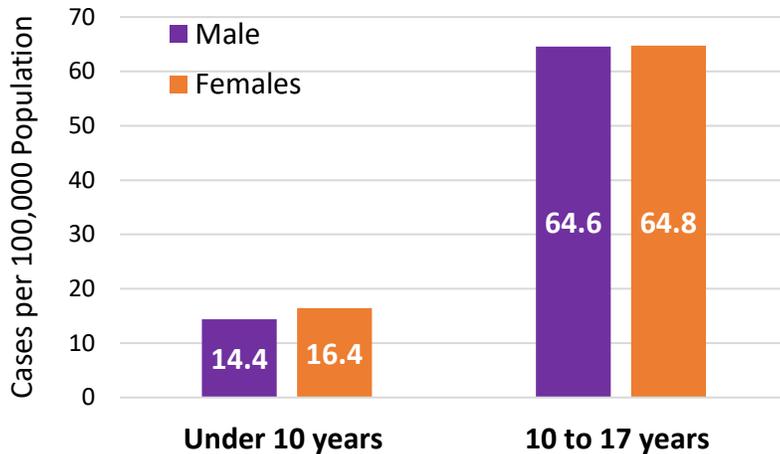
Figure 4 shows diabetes hospitalization rates averaged over 2016, 2017, and 2018. Zip codes in darkest blue are those with the highest diabetes hospitalization rates in San Antonio, seen consistently over the three years. Zip codes with higher hospitalization rates are more common in central and southern parts of Bexar County. This pattern matches patterns of diabetes prevalence seen in Figure 3.

Zip codes were excluded (and thus appear white) if there were low diabetes counts or unavailable data for any of the three years.



Diabetes Differences by Age and Sex

Figure 5. Pediatric Inpatient Hospitalization Rates for Diabetes as Primary Diagnosis, by Sex, 2018

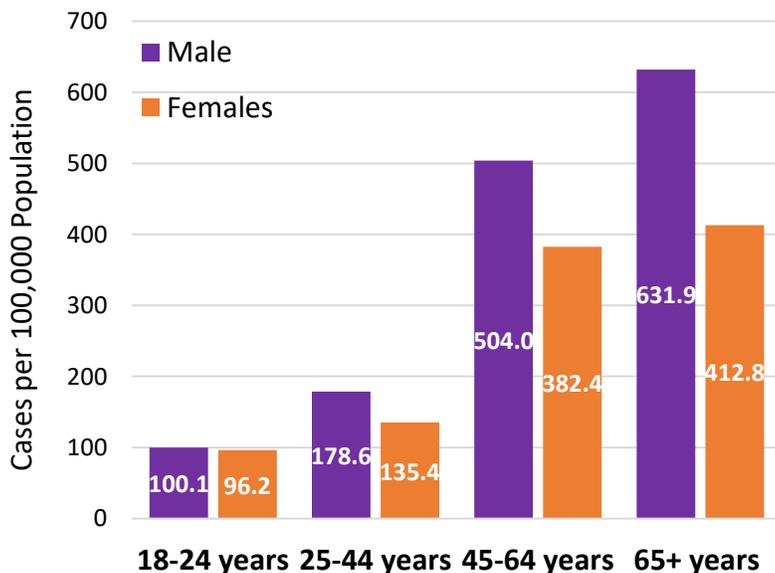


Diabetes is one of the most common chronic diseases among youth. Results from SEARCH, a national multicenter study, show a rise in new cases of diabetes in children and youth in the US.⁶

The onset of T1D in children commonly occurs before age 14. For T2D, the average age at which children receive a diagnosis is 14.⁷ During 2002-2015, higher incidence rates were observed among youth 10 years or older in the SEARCH study.⁶

Comparing that to the hospitalization data for Bexar County shows similar trends. Bexar County Children 10-17 are hospitalized for diabetes at a rate approximately 4 times higher compared to children under 10 (Figure 5).

Figure 6. Adult Inpatient Hospitalization Rates for Diabetes as Primary Diagnosis, by Sex, 2018

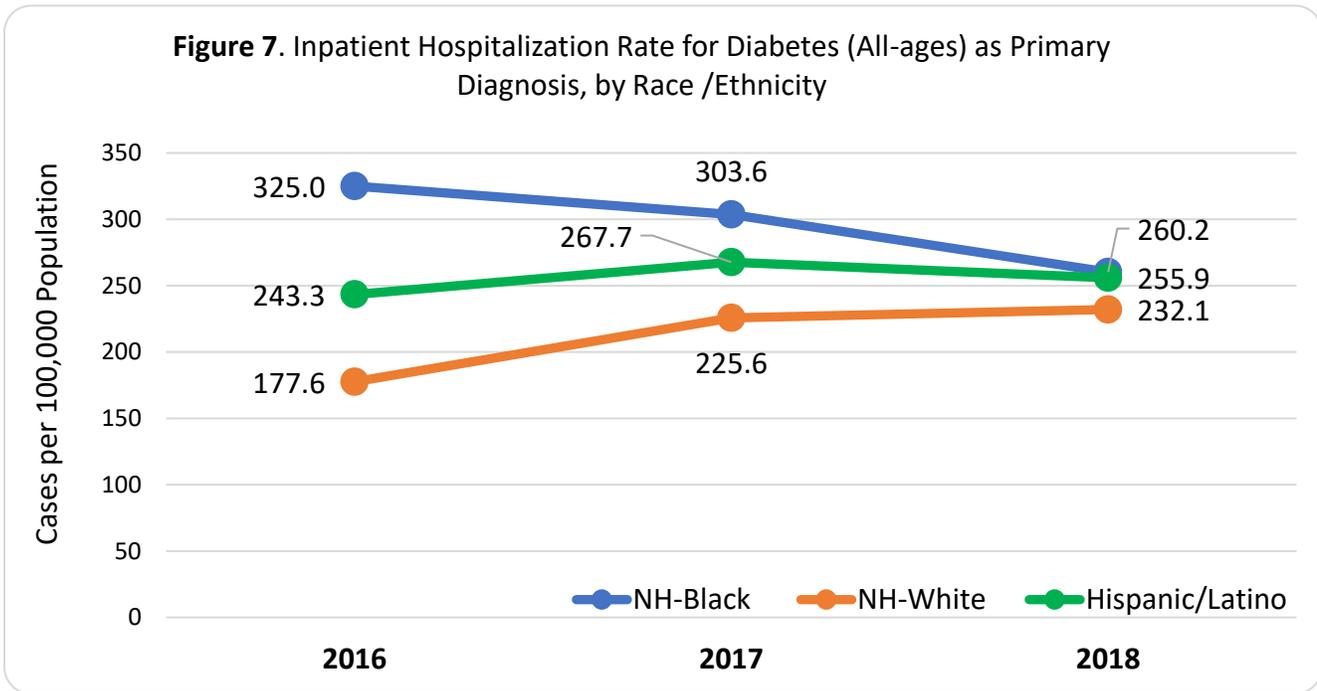


Diabetes hospitalization rates increase with age, but no matter the age-group, Bexar County adult males had higher hospitalization rates than females in 2018. The male vs. female difference widens at older age – males 65 years and above had a rate of 631.9 per 100,000 population, while females 65 and above had a rate of 412.8 per 100,000 population (Figure 6).



Diabetes Differences by Race/Ethnicity

Diabetes disproportionately affects racial/ethnic minority populations. Among US adults aged 18 years or older, age-adjusted data for 2017-2018 showed that diabetes prevalence was notably higher among Hispanic/Latinos (12.5%) and non-Hispanic black individuals (11.7%) when compared with non-Hispanic white individuals (7.5%).²



In Bexar County, NH-Black individuals and Hispanic/Latinos consistently had higher hospitalization rates than NH-White individuals from 2016-2018, however the disparity gaps appear to be narrowing. Between 2017-2018, hospitalization rates for NH-Black individuals and Hispanic/Latinos decreased, becoming more similar to the rate in NH-White individuals (**Figure 7**).

Behavioral/Lifestyle Factors and Diabetes

Two examples of behavioral or lifestyle factors that increase the risk of diabetes include consumption of sugar-sweetened beverages (SSBs) and physical inactivity, and these risk factors develop early in life and have long-term consequences into adulthood. Children learn eating habits and social behavior from their surroundings, parents/grandparents, caregivers, siblings, and peers. Consequently, the home environment, community, and school are crucial sources of education that help shape what and how children eat from the time they are born and into childhood and adolescence.⁸ It is important to note, however, that eating patterns and food choices can often be influenced by poverty and lack of access to nutritious foods which are often more expensive (see section below on food insecurity). Studies show that the overall quality and mean energy intake of the parent's diet has a significant impact on that of their children.⁹ Additionally, the availability of more energy-dense, low-nutritional value foods in the home has been associated with greater consumption of sweet and savory snacks and higher intakes of high-calorie beverages by youth.¹⁰ Identifying and preventing risk behaviors at an early age can reduce the burden of chronic disease.

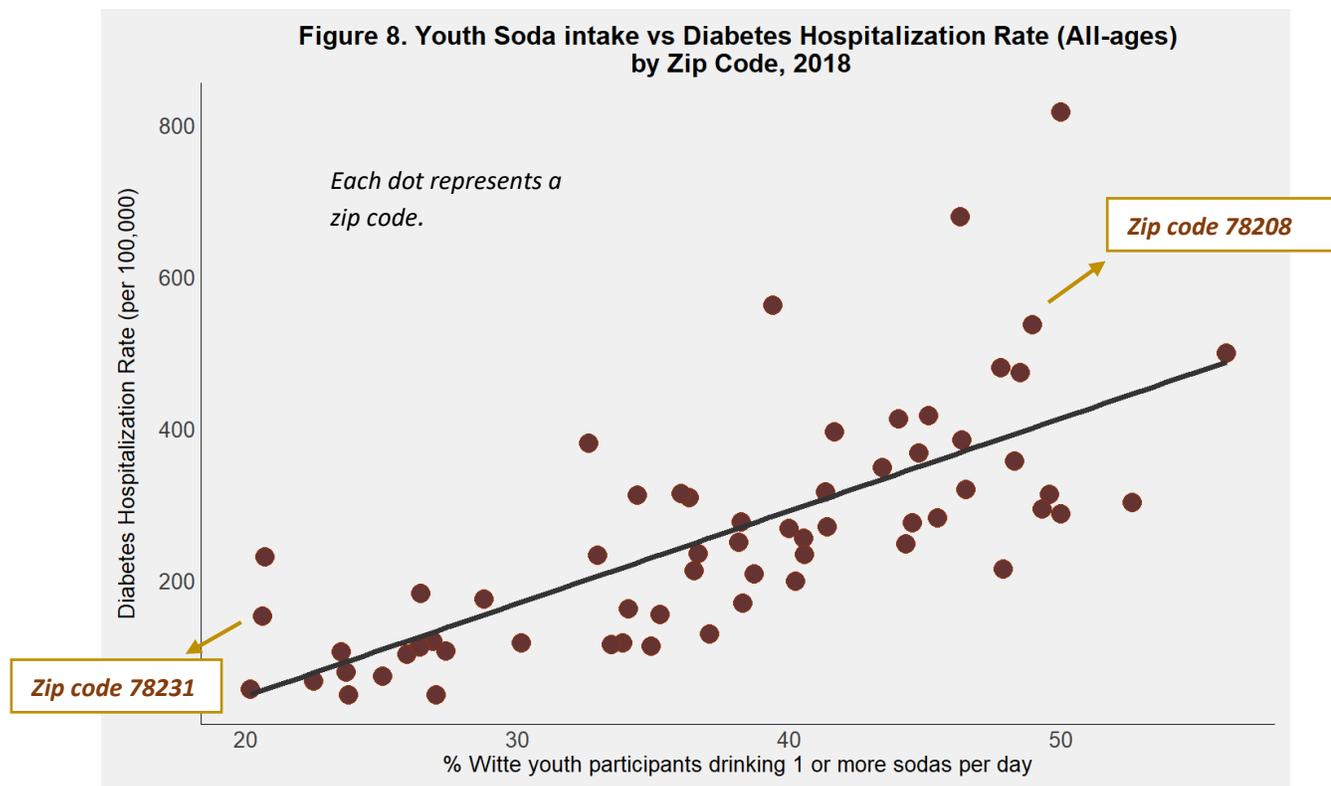


In Bexar County, the Witte Museum’s H-E-B Body Adventure Exhibit gathered data on nutrition and physical activity among children ages 8-18 starting in 2014 and continuing up to 2019. The following zip code-level correlation plots explore two of the factors assessed by the exhibit, consumption of sugar-sweetened beverages (SSBs) and physical activity, in relation to diabetes hospitalization data for Bexar County.

Sugar Sweetened Beverages

Regular consumption of SSBs is a risk factor for developing T2D.¹¹ SSBs including sodas are considered one of the largest contributors to added sugar intake in the US. People who consume 1-2 cans of sugary drinks or more per day have a 26% greater risk of developing T2D than people who rarely consume SSBs.¹²

The correlation plot (**Figure 8**) below shows that soda intake reported by Witte participants is positively correlated with diabetes hospitalization at the zip code level. Zip codes that have a higher percentage of Witte participants reporting 1+ intake per day are also often ones that have higher diabetes hospitalization rates.



Understanding Correlation Plots

Correlation plots help us understand how one factor may be related to another, and whether it is positively or inversely related. As a simple example, shorter individuals often have smaller shoe sizes and taller individuals often have bigger shoe sizes. This means that height is positively correlated with shoe size: as height increases, so does shoe size.

Figure 8 above shows that the % of youth soda drinkers is positively correlated with diabetes hospitalization rates at the zip code level. Zip codes with high % of soda drinkers tend to also have high hospitalization rates while zip codes with low % of soda drinkers tend to also have low hospitalization rates. Two zip codes are highlighted to illustrate this:

Zip code 78231: has a relatively low % of youth reporting 1+ soda intake per day (20%) and also has a relatively low diabetes hospitalization rate (152 per 100,000 population).

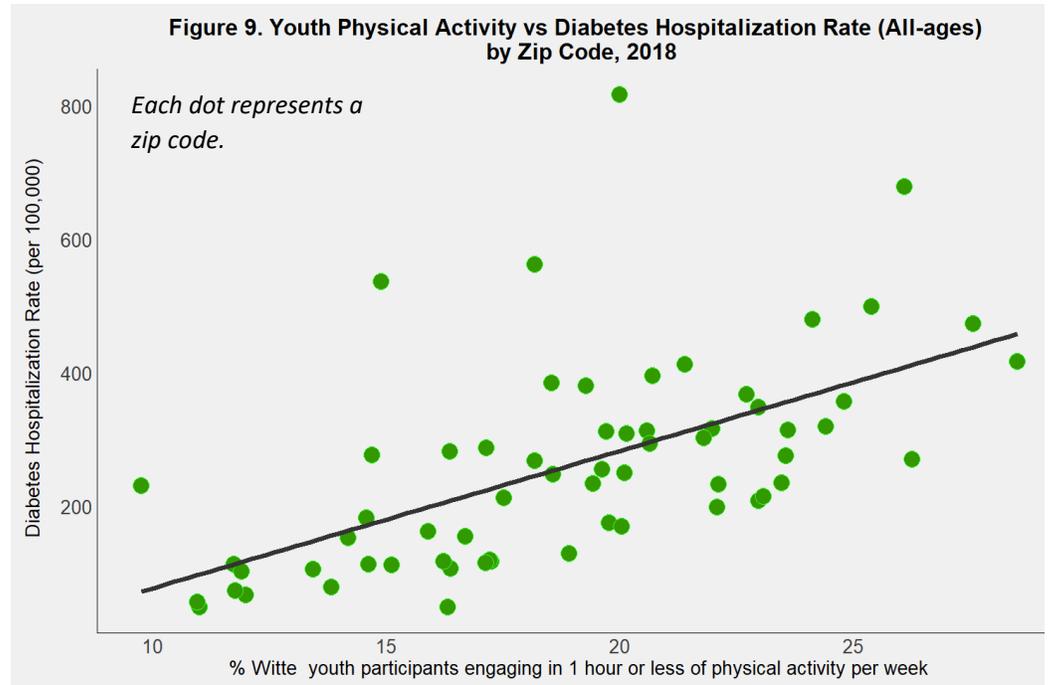
Zip code 78208: has a relatively high % of youth reporting 1+ soda intake per day (50%) and also has a relatively high diabetes hospitalization rate (537 per 100,000 population).



Physical Activity

Regular physical activity lowers blood glucose and improves body sensitivity to insulin in individuals with T2D and prediabetes. According to the CDC's 2020 National Diabetes Report, 38% of US adults with diabetes are physically inactive.²

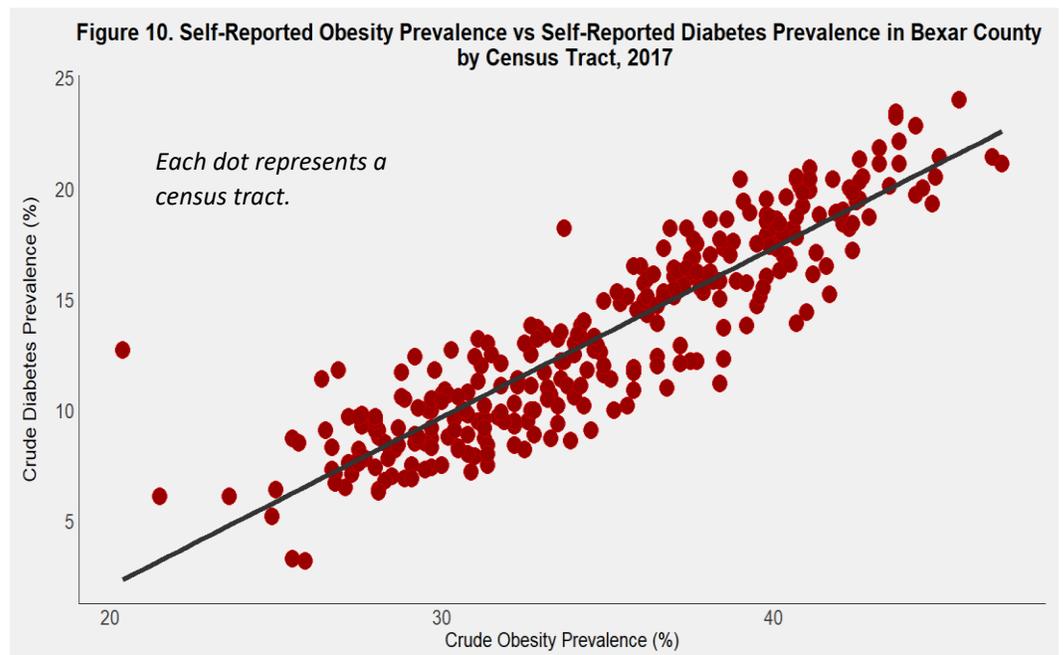
Associations between physical inactivity and diabetes are also evident in Bexar County. Zip codes that have higher percentages of H-E-B Body Adventure participants reporting little physical activity are often ones that also have higher diabetes hospitalization rates (Figure 9).



Obesity

Evidence from several studies indicates that obesity and excess weight gain are associated with an increased risk of diabetes and insulin resistance.¹³ Among US adults aged 18 years or older with diabetes, 89.0% experienced weight status in the overweight or obese categories.²

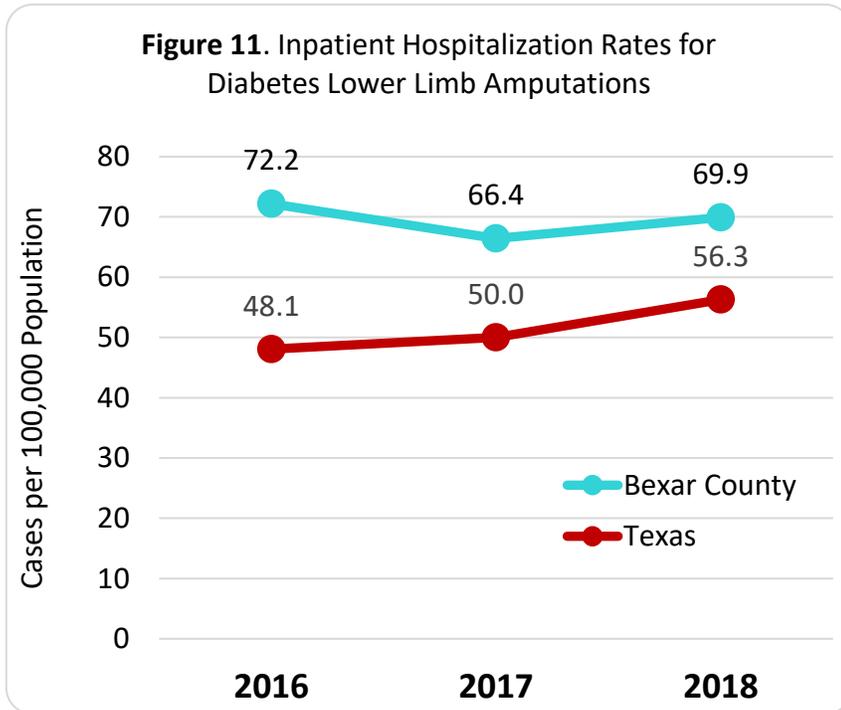
In San Antonio, Behavioral Risk Factor Surveillance Survey data shows that the prevalence of obesity is strongly correlated with the prevalence of diabetes at the census tract level: The higher the percentage of self-reported adult obesity in a census tract, the higher the percentage of self-reported adult diabetes in that tract (Figure 10).





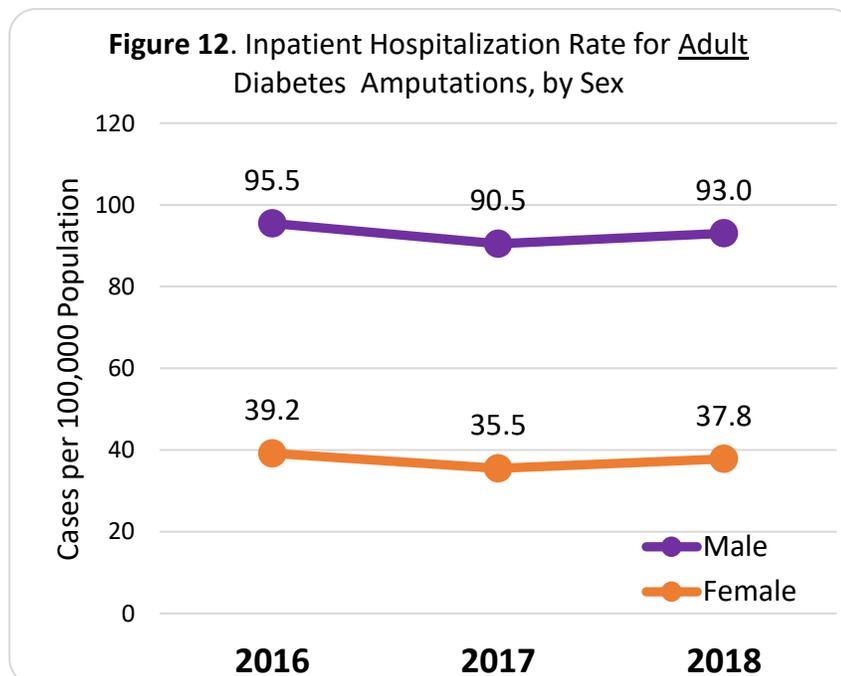
Diabetes and Complications

Diabetes can lead to complications, including kidney failure, leg amputation, vision loss and nerve damage. Furthermore, it can increase the overall risk of dying prematurely.



According to data from the Nationwide Inpatient Sample, nontraumatic lower extremity amputations in adults with diabetes decreased 43% between 2000 and 2009 but rebounded by 50% between 2009 and 2015.¹⁴

In Bexar County, inpatient hospitalization rates for diabetes lower limb amputations were consistently higher for Bexar County compared to Texas overall when looking at data from 2016 to 2018 (**Figure 11**).



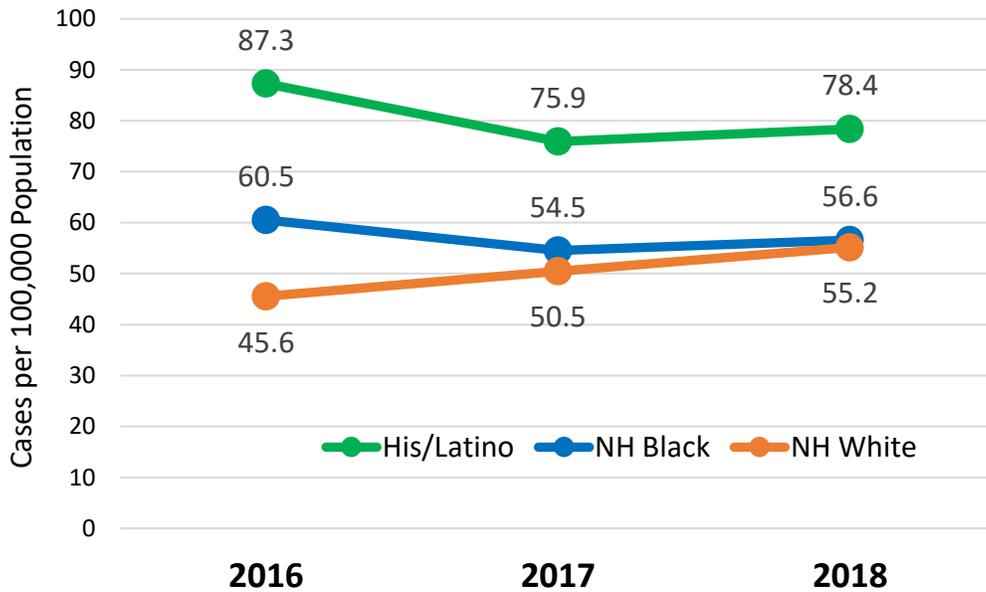
Diabetes amputation rates are consistently higher among males than females in Bexar County.

Diabetic amputation hospitalization rates for males have consistently been more than double the rate for females in Bexar County (**Figure 12**).

Research suggests that men are more likely to undergo the procedure and more likely to have some of the additional risk factors for amputations, such as diabetic foot ulceration, artery disease, cigarette use, and peripheral nerve damage.¹⁵



Figure 13. Inpatient Hospitalization Rate for Diabetic Amputations, by Race/Ethnicity



In Bexar County, Hispanic/Latinos experience the highest burden of diabetic amputations. From 2016-2018, inpatient hospitalization rates for diabetic amputations were consistently higher for Hispanic/Latinos in comparison to NH-White and NH-Black individuals (Figure 13).

Diabetes Mortality

Diabetes is also consistently among the top causes of death in Bexar County, and mortality from diabetes in Bexar County stands out compared to other regions. In 2019, the age-adjusted mortality rate for diabetes mellitus in Bexar County (28.1 per 100,000 population) was higher than the rate in Texas (23.6 per 100,000 population) and the US (21.6 per 100,000 population).

Among the five largest counties in Texas, Bexar County had the highest 2019 diabetes age-adjusted mortality rate (Table 1).

Table 1. Diabetes Mortality Rates across the Five Largest Counties in Texas, 2019

County	Deaths	Population	Age-Adjusted Mortality Rate
Bexar County	545	2,003,554	28.1
Dallas County	538	2,635,516	22.7
Tarrant County	444	2,102,515	22.5
Harris County	905	4,713,325	21.5
Travis County	159	1,273,954	15.3

Bexar County's 2019 age-adjusted mortality rate also ranked second when comparing rates in the 5 largest counties (by population size) within each of the 5 largest US states (Table 2).

Table 2. Diabetes Mortality Rates across the Largest Counties in the Largest US States, 2019

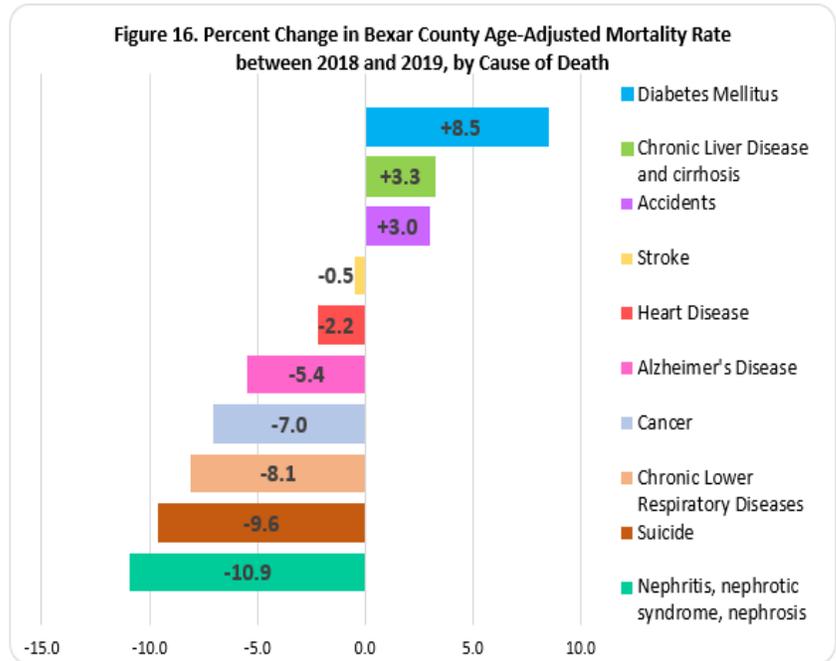
County	Deaths	Population	Age-Adjusted Mortality Rate
San Bernardino, CA	677	2,180,085	32.7
Bexar, TX	545	2,003,554	28.1
Bronx, NY	419	1,418,207	27.8
Miami-Dade, FL	704	2,716,940	19.6
Philadelphia, PA	334	1,584,064	19.4



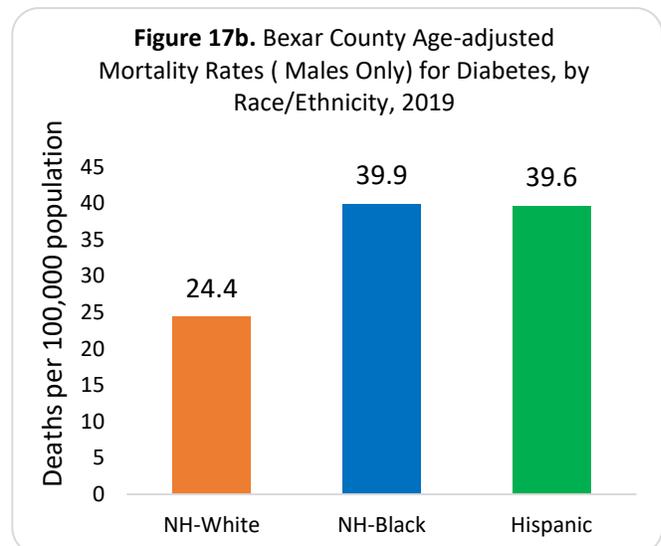
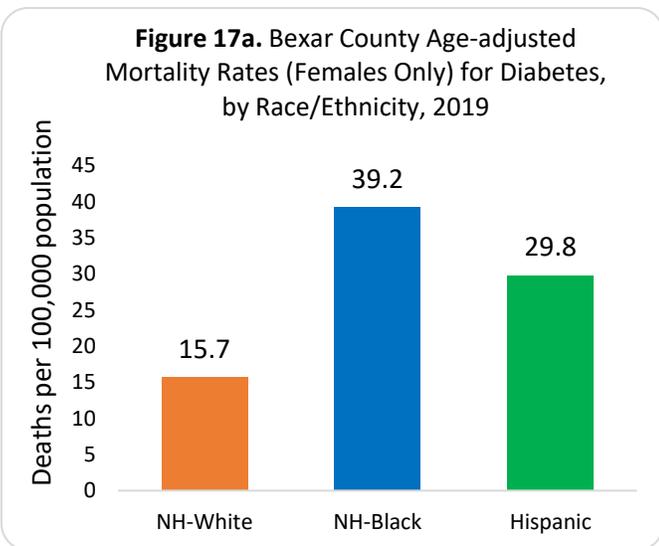
Between 2018-2019, Diabetes Mellitus had the largest increase in age-adjusted mortality rate compared to the other top causes of death (Figure 16).

45% of deaths were related to non-insulin dependent diabetes mellitus (i.e., type 2 diabetes).

Almost half (45%) of type 2 diabetes mellitus deaths had renal complications.



Non-Hispanic Black individuals had the highest age-adjusted mortality rate for diabetes in Bexar County in 2019. Among females, age-adjusted mortality rates were highest for NH-Black females (Figure 17a). Among males, both NH-Black males and Hispanic/Latino males had similarly high rates compared to NH-White males (Figure 17b).



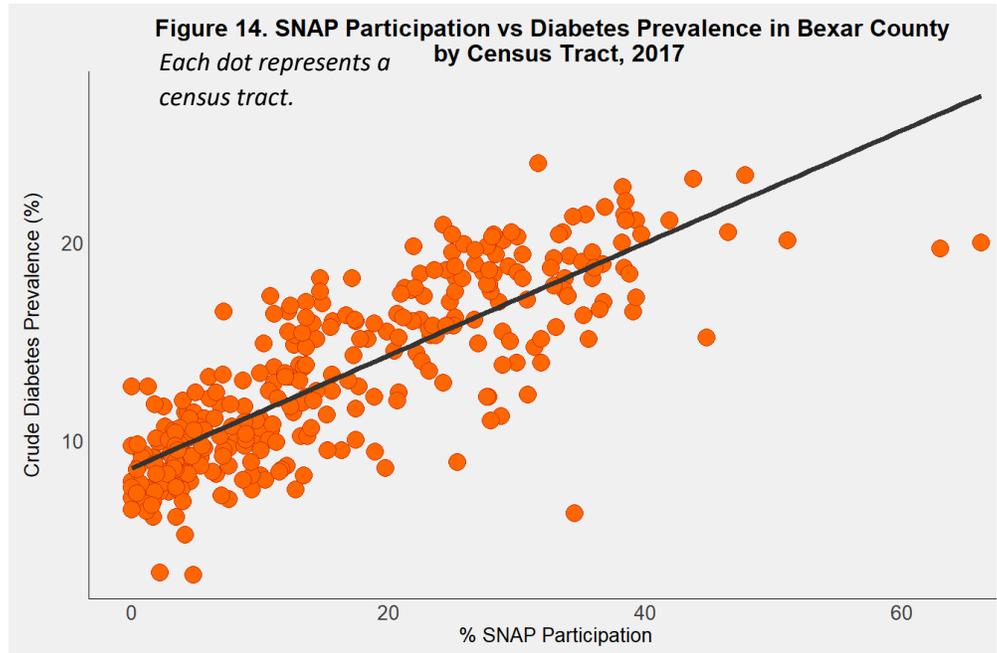
Socioeconomic Factors and Diabetes

Food Insecurity

Food insecurity is a significant issue affecting Bexar County families and their children. An estimated 11% of the total population and 21% of child population are food insecure without consistent access to nutritionally adequate food.¹⁶ Food insecurity has been associated with higher risk of diabetes mellitus.¹⁷ One indicator of food insecurity is the percentage of residents that rely on food assistance programs such as The Supplemental Nutrition Assistance Program (SNAP, also known as Food Stamps). SNAP is one of the largest US federal programs that aims to serve those who experience food insecurity.



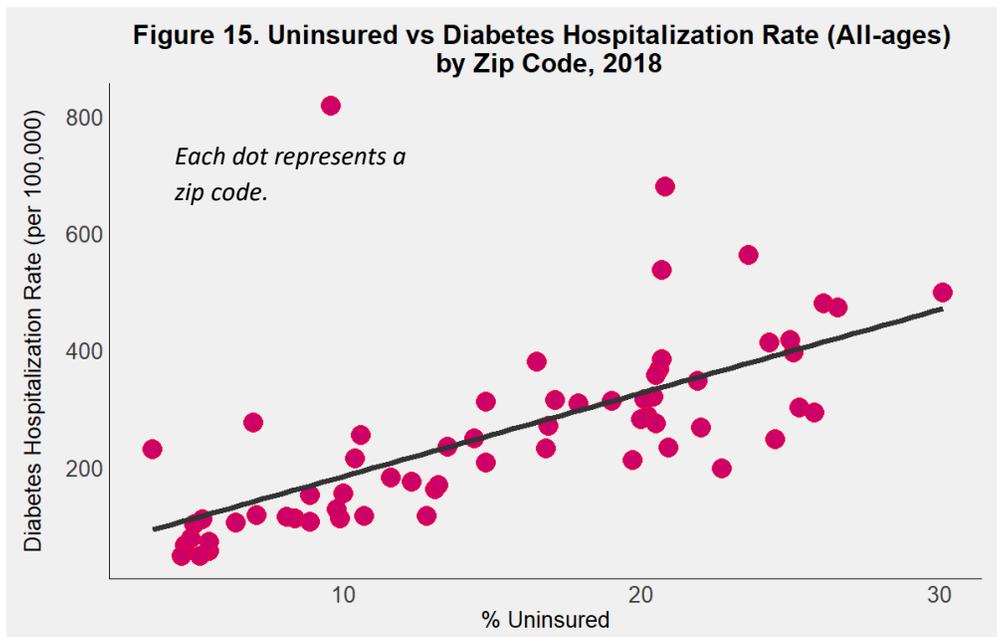
Figure 14 shows that higher participation rates in SNAP is positively correlated with diabetes prevalence by census tract in Bexar County. In other words, census tracts that have higher percentages of residents that rely on SNAP (i.e. higher food insecurity) also have higher percentages of residents reporting diabetes.



Insurance Status

Insurance coverage can change the health trajectory of people with diabetes by facilitating timely diabetes diagnosis and management. Health insurance coverage is especially important for diabetics who need regular checkups, laboratory studies, and prescription medications. In a national study, diabetics without health insurance had 60% fewer physician office visits and were prescribed 52% fewer medications than people with insurance coverage—but they also had 168% more emergency department visits.⁴ Improving access to affordable and comprehensive health care is needed to reduce the burden of diabetes and related complications.¹⁸ For example, diabetes management often requires specialty care, and a health coverage plan that does not provide access to diabetes specialists or endocrinologists may leave patients without the tailored care they need.

Figure 15 shows that insurance status is highly correlated with diabetes hospitalization at the zip code level. Bexar County zip codes that have higher percentages of uninsured individuals are more likely to have higher diabetes hospitalization rates, while zip codes with lower percentages of uninsured people are more likely to have lower diabetes hospitalization rates.





Implications for Policy

Diabetes Self-Management Education and Support Program Enrollment

The Diabetes Self-Management Support (DSMES) is an evidence-based approach that addresses the comprehensive blend of clinical, educational, psychological, and behavioral aspects of care needed to help people with diabetes navigate their daily self-care. People who completed more than 10 hours over 6-12 months had significant reductions in A1C, diabetes-related complications, and all-cause mortality.¹⁹ DSMES is cost effective by reducing emergency department visits as well as hospital admissions and readmissions.¹⁹

Despite DSMES effectiveness, the Centers for Disease Control and Prevention (CDC) and the Centers for Medicare and Medicaid Services (CMS) reported that only 6.8% of privately insured individuals and 5% of Medicare participants receive DSMES during the first year of diagnosis.¹⁹ The Texas Diabetes Council has developed a Texas Diabetes Action Plan with a set of priorities to improve diabetes education and diabetes management.⁵ These priorities emphasize that health care providers need to be aware of DSMES resources in their health system and communities, and need to have a systematic referral process to ensure that patients with type 2 diabetes receive DSMES in a consistent manner.

Metro Health started the Diabetes Prevention and Control program in 2013. It offers free services to the community to help prevent and control diabetes:

- The **Diabetes Prevention Program** aims to help adults who are overweight and/or at high risk of diabetes learn about healthy eating and physical activity.
- The **Diabetes Self-Management Education and Support Program** is for individuals diagnosed with diabetes to help them manage their symptoms.



From October 2018 -September 2019, a total of 85 workshops were conducted in partnership with the YMCA of Greater San Antonio. To learn more if you are at risk of Type 2 diabetes, please visit:

<https://www.diabeteshelpsa.com/risk-assessment/>

Access to Healthy Food and Nutrition Assistance Programs for Individuals with Diabetes

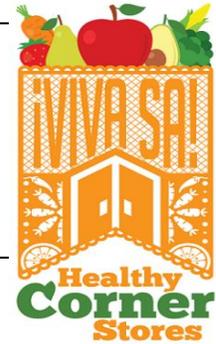
Among individuals with diabetes, food insecurity is associated with poorer glycemic control, hospital outpatient visits, emergency department visits and hospitalizations.²⁰ Additionally, food-insecure individuals are often exposed to low-cost, energy dense and nutritionally poor foods. Despite availability of food and nutrition assistance programs, common barriers to participation include lack of awareness about the program, difficulties navigating the application process, and the perception of stigma applied to participating.²¹ Additionally, it is well documented that participants run out of benefits before they are renewed, creating a cycle of food adequacy/inadequacy also known as the SNAP-cycle.¹⁷ Adults without reliable access to food also report reducing the amount of medication they take in order to have enough money for food or conversely, going hungry in order to afford medications.¹⁷ This cycle leads to poor diabetes control and increased health care cost. Health care systems need to consider universal screening for food insecurity in healthcare settings, provide assistance with enrollment in food and nutrition assistance programs, and link patients to community resources (i.e. food banks, soup kitchens, etc.) that support diabetic patients with food insecurity.²² It is also crucial to improve the quality of foods provided to food insecure individuals with diabetes. As an



example, in Southern Dallas, Parkland Health and Hospital System partnered with North Texas Food Banks' partner agencies to identify individuals with uncontrolled diabetes and food insecurity and link their patients to adequate food resources using information exchange portals.²³ These information exchange portals give access to a summary of Parkland patient's history and dietary needs, which is used by the food bank to recommend appropriate nutritional choices and provide reminders of upcoming doctor appointments.²³ Additionally, in a six-month pilot intervention conducted in Texas, California and Ohio, diabetics were provided with appropriate foods, blood sugar monitoring, primary care referrals and self-management support. Pre-post analysis showed improvements in HbA1C, fruit and vegetable consumption, self-efficacy and medication adherence.²⁴

The **VIVA SA Healthy Corner Stores** is a collaborative effort to improve access to affordable healthy foods in convenience stores already embedded within communities in San Antonio. The program started with 8 stores in District 3 and has been expanded to a total of 22 stores across the city. For more information about corner store locations please visit:

<https://www.sanantonio.gov/Health/HealthyEating/Healthy-Corner-Stores>



Diabetes and Obesity Prevention among Youth

Due to the extended time children spend in schools, schools present as a perfect setting to identify children at risk of experiencing obesity and diabetes and prevent the life-long cycle of disease from setting in.²⁵ The Texas Risk Assessment for Type 2 Diabetes is a state-mandated program²⁶ that screens children for a skin marker associated with high insulin resistance during vision/hearing screenings. Only if this marker is identified, then children are also assessed for BMI and blood pressure.²⁶ Based on the data available, the majority of children with the skin marker are within the overweight and obese categories. However, school height and weight measurement programs targeted at *all* children can help identify a larger number of children at risk and at an earlier stage before the onset of obesity, thus better getting at prevention and even reducing any stigma associated with screening.^{27,28} The CDC recommends these programs follow 10 safeguards to minimize potential negative consequences and stigma in the school setting. Furthermore, health education and physical activity should be essential parts of school programs, and children should have the opportunity to learn more about diabetes and how to prevent it. The Health Education Texas Essential Knowledge and Skills (TEKS) for k-12 does not make reference to diabetes.⁵ In addition, the evidence-based diabetes prevention program (DPP) widely used in the US is only for adults. As incidence and prevalence of diabetes in children and youth is increasing, there is a need for effective Youth Diabetes Prevention Programs that include a strong parental engagement component. Obesity interventions with such a component have been proven successful in childhood obesity interventions.²⁹ Additionally, school health programs can increase physical activity by enhancing physical education, providing daily recess, and incorporating physical activity into regular classroom lessons and after school programs.³⁰ CDC sets minimal physical activity requirements for children at 60 minutes daily, thus schools should make all efforts to help children meet such requirements as often as possible.⁵



Data sources: Diabetes prevalence: Behavioral Risk Factor Surveillance System Survey Data, Centers for Disease Control and Prevention. Diabetes prevalence by census tract: 500 Cities Project (CDC), 2017 data released in 2019. Diabetes hospitalization: Texas Hospital Inpatient Discharge Public Use Data File, Texas Department of State Health Services; ICD-10 diagnosis codes used: E8-E13 and OY6. Food Stamps/ Supplemental Nutrition Assistance Program (SNAP) participation by census tract: US Census American Community Survey (ACS) Table 2201. Insurance status by census tract: US Census American Community Survey (ACS) 2017 5-year estimates, table S2701. Population denominators: US Census American Community Survey (ACS): Tables S0101 (2017, 2018, or 2019 data used where appropriate).

Report produced by San Antonio Metro Health's Informatics Team. Authors: Maciel Ugalde, PhD; Golareh Agha, PhD.





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