



North Carolina's Guide to Diabetes Prevention and Management

2020



North Carolina Diabetes Advisory Council

MANAGE WEIGHT | LIVE TOBACCO FREE | PARTICIPATE IN LIFESTYLE CHANGE PROGRAMS
PARTICIPATE IN DIABETES EDUCATION | ADHERE TO TREATMENT PLAN | GET ADEQUATE SLEEP



North Carolina's Guide to Diabetes Prevention and Management 2020

Introduction

In 2020, nearly one-half of North Carolinians have diabetes (12.5% of the population¹) or are at high risk for developing diabetes (34.5% of adults have prediabetes²). It is also projected that over 3,000 people will die directly or indirectly because of diabetes and its complications, ranking North Carolina as 7th in the nation for diabetes related deaths.³

Diabetes is a complex disease and daily self-management can be challenging. Uncontrolled diabetes is associated with serious complications (e.g., heart disease, hypertension, stroke, vision loss, kidney failure, nerve damage, depression, and hearing loss), which negatively impact quality of life for persons with diabetes. In addition to the substantial personal burden of diabetes to those who have it, and the families who also are touched by caregiving, there are substantial financial burdens to individuals, employers, health systems, and communities across the state including multiple levels of government. The annual healthcare cost of diabetes in North Carolina is estimated to surpass \$17 billion by 2025.⁴

In addressing diabetes as a complex disease and the challenges of reducing its burdens, NC must consider personal and environmental factors at individual, relationship, community, and societal levels. Our behaviors as individuals shape and are shaped by our social, economic, and policy environment. Together these terms are often grouped and referred to as the Social Determinants of Health (SDoH). In addition to caring for those who already have diabetes, preventing diabetes and related complications, if not delaying onset of the disease, is important at the individual, community, and systems level.



This Guide is organized around four levels of social and environmental concepts described by the Centers for Disease Control and Prevention (CDC) and the Socio-Ecological Model of Health (SEM) (Figure 1).

The Guide:

1. Addresses what diabetes is and what diabetes looks like in North Carolina.
2. Focuses on actions that individuals at risk for diabetes or who have diabetes, families, and peers can implement to improve the health of North Carolinians.
3. Provides specific strategies for community groups, employers, and healthcare providers to implement toward assisting people to manage their risk for developing and/or managing diabetes, including reducing risk of complications.
4. Shares opportunities to focus on what we can do in our various communities to reduce the burden of diabetes, and the evolving role for our broader society including policy and advocacy in North Carolina.

Statistics Used in this Guide: Throughout this Guide, we have made every effort to cite the most recent statistics available at the time of going to press.

The Guide's mission is to reduce the burden of diabetes in North Carolina. The North Carolina Diabetes Advisory Council (NC DAC) hopes that the information presented in the Guide will increase understanding of the impact of diabetes in North Carolina for our audience (or readers), and what we as individuals, families, and our communities across the state can do to reduce these burdens.

This Guide is also a **Call to Action** to prevent and manage diabetes. After reading it, we hope you will join the NC DAC in our mission to make a difference.

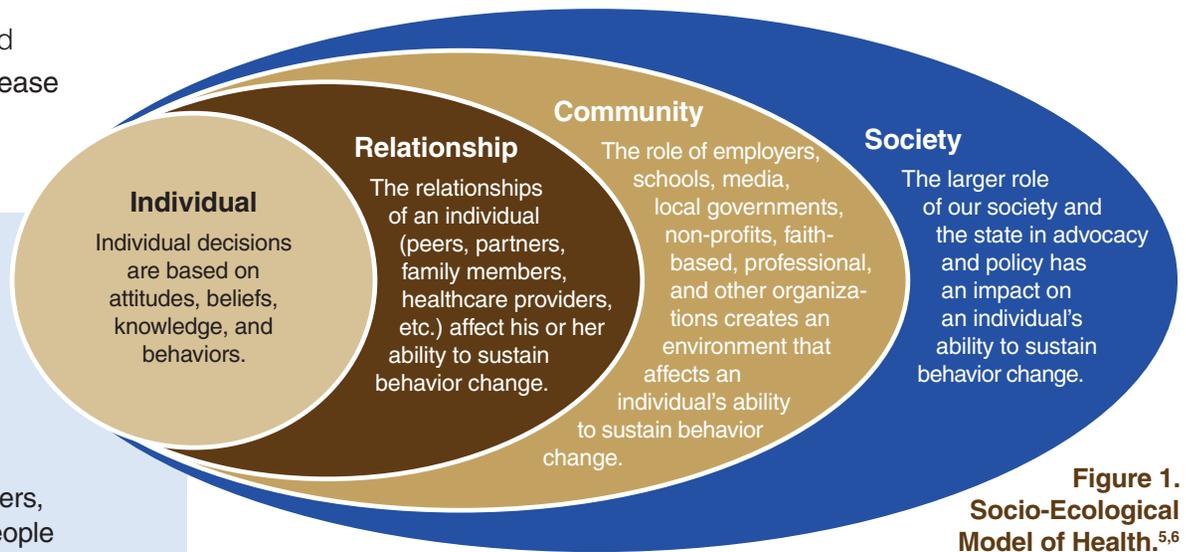


Figure 1.
Socio-Ecological Model of Health.^{5,6}

Modeling the Language of Diabetes

Words matter in diabetes care and management. Persons diagnosed with prediabetes or diabetes communicate and engage with their healthcare team, families, friends, employers, communities, etc., in order to successfully manage their diabetes. Language is the tool that makes effective communication possible and supports the person with diabetes on this journey. All language should be person centric. Words that promote inclusion, respect, positivity, and acceptance without judgment fosters collaboration between persons with or at risk for diabetes and their healthcare team.

Throughout this guide we will model language that enhances written and spoken communication when discussing diabetes. We have added the research recommendations from the joint task force of the American Diabetes Association (ADA) and the Association of Diabetes Care and Education Specialists (ADCES) that addresses language best practices in the delivery of diabetes care and diabetes self-care management education and support (DSMES).⁷

The term “**sugar**” is commonly used by persons with diabetes but can be confusing as there are many types of sugars. In fact, table sugar (sucrose) contains equal amounts of two sugars: glucose and fructose. The chief sugar our bodies use is “glucose” and the one whose level is regulated by insulin and the rest of our metabolism. Throughout this document we will use the term glucose.



According to the **CDC’s diabetes glossary**, **insulin resistance** refers to the body’s inability to respond to and use the insulin it produces. Insulin resistance may be linked to obesity, hypertension, and high levels of fat in the blood.

What Is Diabetes?

Diabetes, also known as diabetes mellitus, is a chronic condition in which the body either does not make any insulin or becomes resistant to insulin resulting in a relative deficiency of insulin. Insulin carries glucose (or sugar—see callout box), into the cells so it can be stored for energy. In Type 2 diabetes, the liver produces too much glucose which leads to excess glucose levels in the blood.⁸ Without enough insulin, or when insulin is not working properly, people with diabetes are unable to use the glucose that they eat in their diet, resulting in high blood glucose.

Keeping blood glucose in a healthy range is key to successfully reducing the risk of complications for people with diabetes. Sustained high glucose levels over time can result in serious health complications such as high blood pressure and cholesterol, heart disease and stroke, blindness, kidney failure, infections, peripheral neuropathy, and peripheral arterial disease. These latter three conditions increase the risk of amputation of the legs and arms.⁹ Persons with diabetes and prediabetes also have an increased risk for other complications: hearing loss, sleep apnea, oral diseases, certain forms of cancer including colorectal and breast, sexual dysfunction, diabetes distress including anxiety and depression, and cognitive impairments including dementia.¹⁰

There are three primary types of diabetes:

Type 1 diabetes

Gestational diabetes,
which is only present
during pregnancy

Type 2 diabetes¹¹



Prediabetes

Prediabetes is a condition where people have higher than normal glucose (sugar) levels, but not yet high enough to be diagnosed as diabetes.

Prediabetes is sometimes referred to as impaired glucose tolerance (IGT) or impaired fasting glucose (IFG), depending on the test that was used.¹² About 88 million American adults—approximately 1 in 3—have prediabetes.¹¹ Prediabetes is serious because it increases the chance of developing Type 2 diabetes, heart disease and stroke.¹³



Gestational Diabetes

Gestational diabetes mellitus (GDM) occurs in women who did not have diabetes prior to pregnancy, but whose increasing demand for insulin or resistance during their pregnancy becomes greater than what insulin their pancreas can produce. Gestational diabetes occurs in approximately 10% of pregnancies.¹⁴ During pregnancy, women with GDM require special care and attention to their glucose levels through proper diet, weight management and sometimes temporary use of medications and/or insulin. Without such care women and their babies are at risk for complications of the pregnancy including maternal death, stillbirth and infant death. After delivery, half of these women¹⁵ are expected to develop Type 2 diabetes in 10–20 years.¹⁶ Their children are also at increased risk of developing diabetes. After delivery, it is important that women with gestational diabetes return for a six-week postpartum visit for additional testing to be sure their gestational diabetes has resolved. Because of the increased risk for development of Type 2 diabetes, the ADA recommends screening for diabetes every 1–3 years for women with a history of gestational diabetes.¹⁷



Type 1 Diabetes

Type 1 diabetes is caused by an autoimmune destruction of cells in the pancreas that produce insulin.⁸ It affects approximately 5 to 10% of the population with diabetes. Type 1 diabetes requires the person to take insulin, as the body does not produce enough or any of its own insulin. Other than pancreas or islet cell transplants, there is no cure for this type of diabetes.



Type 2 Diabetes

People who have Type 2 diabetes may be insulin resistant, have relative insulin deficiency, have an overproduction of glucose, or a combination of all three. Type 2 diabetes is the most common form of diabetes, accounting for up to 90 to 95% of diagnosed diabetes.⁸ It affects about 1 in 10 people in the US.¹⁸ The risk of developing Type 2 diabetes increases with age, for those who are overweight or obese, or physically inactive across all genders. It occurs more frequently in women with a history of gestational diabetes, among those with high blood pressure (hypertension) or high cholesterol (dyslipidemia) and in certain racial/ethnic groups (African American, American Indian, Hispanic/Latinx and Asian American). It is often associated with a strong genetic predisposition.¹⁹

Older names such as insulin-dependent, juvenile-onset, non-insulin-dependent, and adult-onset diabetes are no longer used. Both Type 1 and Type 2 diabetes can occur at any age, and individuals with either type may require insulin for adequate blood sugar control.

3.5 million

1.3 million

\$1.1 billion

12.5%

What do prediabetes and diabetes look like and cost in North Carolina?

Prediabetes Prevalence

It is estimated that in 2020 over 3.5 million North Carolinians have prediabetes. While in 2018, approximately 12.1% of North Carolinians self-reported (in the **Behavioral Risk Factor Surveillance System Survey**) being told that they had prediabetes,²⁰ the actual prevalence may be as much as three times higher than this, since more than 80% of people who have prediabetes are not aware that they have the condition.²¹ In fact, the CDC now projects that on average at least 34.5% of all adults across the United States have prediabetes,² and North Carolina may exceed that average.

Diabetes Prevalence

In 2020 it is projected that 12.5% of the state's population, or 1.3 million North Carolinians, have Type 1 or Type 2 diabetes.¹ There has been more than a 33% increase in the percentage of people diagnosed with diabetes in North Carolina in the past decade (a prevalence of 9.3% in 2008). The actual number of people with diabetes in North Carolina is likely to be much higher, since about 21% of people with diabetes are undiagnosed.^{11, 22} Diabetes incidence and prevalence has been increasing in adults for many years, but disturbingly in the last few decades is now also increasing in children and youth.²³

The term “**prevalence**” refers to the number of people who have a disease or health condition in a particular population. This differs from “**incidence**” which refers to the number of newly diagnosed cases in a population in a specific time period, usually a year. Prevalence includes both newly diagnosed and existing cases, so it is larger than incidence.



Personal and Financial Burden of Diabetes Is Complicated by Racial/Ethnic and Geographic Disparities

North Carolinians do not equally share the burden of diabetes. Below are summaries of racial, ethnic, geographic, and economic inequalities in diabetes burden. The economic burden of diabetes affects us all, either directly for those who have diabetes, or indirectly for those without diabetes who pay higher premiums and other healthcare expenses because of shifts in cost coverage. More information on the implications of racial/ethnic disparities, and how social determinants of health factor into an even greater burden of diabetes in racial/ethnic minority groups, are included in the section of this Guide (page 26) about the Importance of Social Determinants of Health and Health Equity.

Racial/Ethnic Inequalities in Diabetes Prevalence and Mortality

Diabetes, particularly Type 2 diabetes, disproportionately affects all racial and ethnic minority groups in North Carolina. In 2018, the prevalence of diagnosed diabetes was about 31% higher for African Americans (15.9%) compared to non-Hispanic whites (12.2%).²⁰ While data are not available for 2018, earlier data (2012) indicate that about 19% of American Indians in North Carolina had been diagnosed with diabetes.²⁴ While only about 7.7% of Hispanics/Latinx in the state have been diagnosed with diabetes, the low reported rate for this population may be due to under-reporting.^{20, 25} While diabetes prevalence increases with age for all racial groups, the disease disproportionately affects older African Americans, affecting more than one-quarter of African Americans aged 55 to 64 and more than a third of African Americans between the ages of 65 and 74.^{26, 27} Statewide, diabetes was the third leading cause of death for American Indians, the fourth leading cause of death for African Americans, and the seventh leading cause of death for non-Hispanic whites.^{27, 28} In 2018, African Americans and American Indians were more than twice as likely to die from diabetes than non-Hispanic Whites.²⁹

Geographic Disparities

A regional analysis of North Carolina diabetes rates shows geographic differences across the state. In the Piedmont, where most of the state's largest cities are located (including Charlotte, Raleigh, Greensboro and Durham), the prevalence of diagnosed diabetes is 11.4%.³⁰ In the eastern and western regions, which are largely rural, the prevalence of diagnosis is higher at 14.4% and 13.0%, respectively.³⁰ Regional disparities also include racial disparities. For example, in the Piedmont, 12.5% of African Americans report a diabetes diagnosis, while 11.9% of non-Hispanic whites do so.³¹ The Eastern counties of NC make up what the CDC calls the "Diabetes Belt," where diabetes affects at least 15% of the population.³² Complications of diabetes, particularly lower extremity amputation (LEA)³³ and end stage renal disease (ESRD),³⁴ are higher for African Americans and American Indians.³⁵

Economic Burden

People with diabetes have medical expenses approximately 2.3 times higher than those without diabetes.²⁴ A majority (67.3%) of the medical costs are paid by government programs, including Medicare, Medicaid, Indian Health Service and military health programs.³⁶ Seventy-two percent of national diabetes costs are attributed to direct healthcare costs, while 28% represent lost productivity from work-related absenteeism, unemployment and premature death.³⁷

Like the rest of the nation, North Carolina continues to face increases in diabetes-related spending. In 2017, diabetes accounted for nearly \$11 billion in direct (\$7.79 billion) and indirect (\$2.90 billion) costs in North Carolina.³⁸ Diabetes is associated with an elevated hospital admission rate (1.9 per 1,000 population), with an average stay of 4.7 days.³⁹ Diabetes was the primary cause for 23,713 hospitalizations at a cost of \$790 million in hospital charges in North Carolina in 2018; that is over \$33,000 per hospitalized person with diabetes per year.³⁹ If the state does not take steps to help bring the diabetes epidemic under control, annual healthcare costs are projected to surpass \$17 billion by 2025.⁴

23,713
\$790million

How Can Diabetes Be Prevented or Delayed?

This section describes how to prevent diabetes from occurring or dramatically delaying it (primary prevention), including special considerations for those at high risk who should aggressively work on reducing their risk, and also be monitored for early onset of diabetes through early detection or screening. In the following section we will address the management of diabetes in persons already diagnosed and strategies to prevent complications through individual and group self-management programs and the importance of persistence with prescribed medical therapy (tertiary prevention).

Primary prevention in Type 1 diabetes remains a topic of intensive research, but few recommendations have emerged on how to prevent this form of diabetes. However, several long-term population studies and clinical trials show that most occurrences of Type 2 diabetes can indeed be prevented or delayed.

While the North Carolina Diabetes Advisory Council supports efforts to find a cure for Type 1 diabetes, a major focus of this Guide and the Diabetes Advisory Council is on Type 2 diabetes because it is more common and is potentially preventable. For the remainder of this document, the use of the word “diabetes” will be referring to Type 2 diabetes unless indicated otherwise.

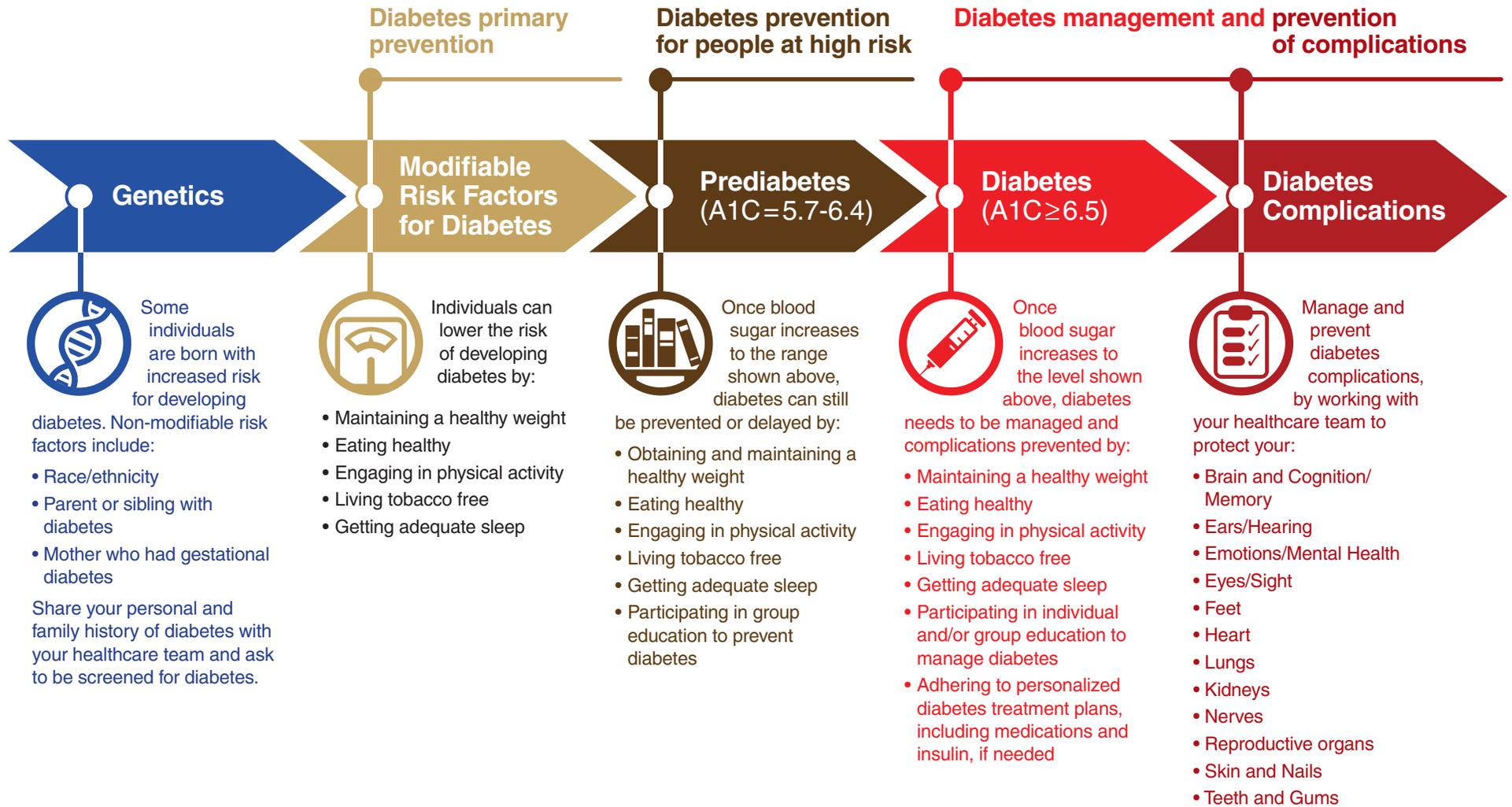
Figure 2 shows the progression of diabetes and what individuals can do to prevent and manage diabetes at each stage.



FIGURE 2.

Lifetime Risk Management for Developing and Managing Type 2 Diabetes

The risk of developing diabetes increases with age.



Diabetes Primary Prevention

Type 2 diabetes is the most common form of diabetes and can indeed be prevented if not delayed—sometimes for many years—by paying attention to the following healthy behaviors:

Maintain a healthy weight | Adopt healthy eating habits | Be more physically active | Live tobacco free | Get adequate sleep



Maintain a Healthy Weight

According to *North Carolina's Plan to Address Overweight and Obesity*, developed by Eat Smart, Move More NC, excess weight can be caused by calorie intake that is greater than energy used, a sedentary lifestyle, and insufficient sleep and stress. Being overweight increases

the chances of developing Type 2 diabetes by eight times.⁴⁰ On the other hand, for people who are overweight, losing 5 to 7% of their current weight can cut their chances of developing Type 2 diabetes in half.⁴¹ Effective weight loss programs are those that assist in the implementation of lifestyle changes such as adopting healthy eating habits, being more physically active, getting adequate sleep, managing stress, living tobacco free, and learning how to change behaviors.

Adopt Healthy Eating

Healthy eating can have a major impact on lowering the risk for prediabetes and Type 2 diabetes. There are a variety of healthy eating patterns which can be tailored to each person that incorporate their favorite foods, traditions, and cultural preferences as well as address

concerns related to religion or socioeconomic factors. Eating patterns represent the total of all foods and beverages consumed in a day.

A registered dietitian nutritionist (RD/RDN) can provide valuable information about how to eat healthy with prediabetes or diabetes, based the individual's needs, goals, medications, food patterns, and preferences.^{42, 43} In this process, the person with prediabetes or diabetes and the dietitian collaborate to design a healthy meal plan which can be integrated into daily life with ease while addressing their specific eating pattern and nutritional needs. All persons with prediabetes or diabetes should be referred to a RDN initially and ongoing to establish their healthy eating meal plan and then modify as needed.^{42, 43} There is no single “best” meal plan for people with prediabetes and diabetes; rather a variety for managing prediabetes and diabetes are acceptable. In terms of evidence-based research regarding the comparative benefits of different eating patterns, the outcome data presently is not strong enough to endorse one eating pattern over another.



Examples of some eating patterns

- Mediterranean Style
- DASH (Dietary Approaches to Stopping Hypertension)
- Vegetarian or Vegan
- Low Fat
- Low-Carbohydrate
- Diabetes Plate Method



Focus on the key factors that are common among the eating patterns:⁴³

- Food is comprised of three main nutrients that supply energy to the body—carbohydrates, proteins, and fats. All three should be incorporated into each meal in balance, which helps in improving glucose (sugar) and lipid (fat) levels.
- Emphasize non-starchy vegetables, fruits, whole grains, and dairy products.
- Although the Dietary Guidelines for Americans, 2015–2020, recommend fat-free or low-fat dairy products, current research suggests full fat dairy products do not increase the risk for heart disease, stroke, or diabetes. It is reasonable to have 2 to 3 servings per day of either full fat or low-fat non-sweetened dairy products. Individualized nutrition patterns should include foods that lower the risk for chronic diseases, such as fruits, vegetables, healthy fats, and whole grains. Additional information about healthy eating patterns is provided in Table 1.^{44, 45, 46}
- Minimize added sugars and refined grains.
- Choose whole foods over highly processed foods to the extent possible.
- Reduce overall carbohydrate intake for individuals with diabetes has the best evidence for improving high blood sugar and may be included in a variety of eating patterns that meet individual needs and preferences.
- Healthy eating also focuses on reducing trans fats, portion control, avoiding added sugars and sodium.
- Alcohol can be used in moderation if not contraindicated due to other medical issues. As alcohol use in diabetes can lead to hypoglycemia, weight gain and hypoglycemia, it is recommended that individuals discuss the risks with their healthcare providers and limit intake to one drink daily for women and two for men.^{42, 43}
- Studies show that one serving of a sugar sweetened beverage (SSB) per day increases the risk for Type 2 diabetes in adults with prediabetes by nearly 25%.⁴⁷ Dietary patterns that avoid SSB are encouraged, replacing them with water for fluid consumption. Persons with prediabetes or diabetes are encouraged to avoid SSBs although moderate use of natural and artificial sweeteners is acceptable. While non-nutritive sweeteners (NNS) do not appear to have a major effect on glucose management,⁴⁸ there is also evidence that they may actually contribute to excess weight gain and diabetes.⁴⁹
- Daily recommended sodium (salt) intake is <2300 mg/day for all adults.
- For those adults with Type 2 diabetes not meeting their blood glucose targets, or where reducing glucose lowering medications is a priority, reducing overall carbohydrate intake with low- or very low-carbohydrate eating plans may be considered in conjunction with ongoing guidance and follow-up by their healthcare team.
- Occasionally persons with diabetes may need to fast for religious reasons or before a medical procedure. Such fasting should be done carefully and with advice from their healthcare provider especially if taking insulin or medications that might lower blood sugar. Research on the risk and benefits of Intermittent Fasting as a dietary pattern in persons with diabetes remains limited and inconclusive. Persons with diabetes should not adopt this pattern without ongoing dialogue, monitoring and management by their diabetes care provider.⁵⁰

Table 1. Healthy Eating Patterns Include:⁵¹

Fruits, vegetables, whole grains and fat-free or low-fat dairy and dairy products.

There is convincing evidence that meal plans rich in whole grains decrease risks associated with diabetes. Eating patterns rich in refined grains lead to increased risk.⁵²

Strong evidence supports a meal plan high in fruits and vegetables for weight management. They are lower in calories and high in volume and fiber. These foods are efficient because they are low in calorie and make you feel full longer.

Additionally, avoid sugar sweetened beverages (SSB).

Lean meats, poultry, fish, beans, eggs and nuts.

There is growing evidence that consumption of red meat (beef, pork, lamb) and processed red meat (bacon, hot dogs, deli meats) increases the risk of diabetes, even among people who consume only small amounts.

Moderate amounts of saturated fats, sodium and added sugars, and no trans fats.

The types of fats in your meal plan can impact the development of diabetes. Healthy fats, including polyunsaturated or monounsaturated fats found in liquid vegetable oils, nuts and seeds can help decrease risks associated with prediabetes and Type 2 diabetes.

Calorie needs to achieve and maintain a healthy weight.

Maintaining a healthy weight requires keeping the number of calories consumed equal to the number of calories expended. Research shows that portion size influences how many calories a person consumes. Understanding portion sizes is important for individuals to accurately assess the number of calories he/she is consuming. Because oversized portions are common in restaurants, supermarkets and vending machines, it is important to be aware of and practice appropriate portions during meal preparation.⁵³



RESOURCES FOR HEALTHY EATING

Association of Diabetes Care and Education Specialists (ADCES)

- diabeteseducator.org/docs/default-source/living-with-diabetes/tip-sheets/aade7/aade7_healthy_eating.pdf?sfvrsn=16
- diabeteseducator.org/docs/default-source/living-with-diabetes/tip-sheets/aade7/aade7_healthy_eating_sp_rev.pdf?sfvrsn=6 (Spanish)

American Diabetes Association (English and Spanish)

- diabetes.org/nutrition

National Diabetes Education Program (English and Spanish and adapted for Chinese, African Americans, Southeastern and South Asian Americans, Filipino Americans, and Korean Americans)

- cdc.gov/diabetes/ndep/toolkits/choosing-healthy-foods.html

Center for Disease Control—Nutrition for Diabetes and Healthy Weight

- cdc.gov/diabetes/managing/eat-well/meal-plan-method.html
- cdc.gov/healthyweight (English)
- cdc.gov/healthyweight/spanish

Mobile Apps can be a game changer for people living with or working on preventing diabetes. However, when searching under “Diabetes” in an app store there are thousands of possibilities. In 2019, Ahn and Stahl reported on the pros and cons of apps and how these can be integrated into clinical practice.⁵⁴ These apps can help with a variety of self-care behaviors and help the person keep track of their goals, progress, and successes. Each app is unique and each person must be part of the selection process, as with any other diabetes technology, as they are the end user. The apps listed below have proved successful for people with prediabetes or diabetes.



Nutrition and Fitness

- **MyFitnessPal** (Apple/Android); free with in-app purchases
- **Weight Watchers** (Apple/Android); paid program; virtual DPP
- **Fooducate** (Apple/Android); free with in-app purchases
- **Calorie Mama AI** (Apple/Android); free with in-app purchases
- **Calorieking** (Apple and Android) free
- **Lose It!** (Apple/Android); free with in-app purchases
- **Zombies, Run!** (Apple); free with in-app purchases
- **FitBit** (Apple/Android); free with in-app purchases; requires wearable device

Management, Monitoring, and Education

- **Tidepool** (Apple/Android); free
- **MySugr** (Apple/Android); free with in-app purchases
- **One Drop** (Apple/Android); free with in-app purchases
- **Livongo** (Apple/Android); through employers
- **Omada Health** (Apple/Android); Virtual DPP and DSMES
- **WellDoc/BlueStar Diabetes** (Apple/Android); Virtual

Stress Management

- **Calm** (Apple/Android); free with in-app purchases
- **Breathe2Relax** (Apple/Android); free



Be More Physically Active

Increased physical activity plays a major role in the prevention and improvement of insulin resistance, prediabetes, gestational diabetes, Type 2 diabetes and diabetes-related health complications. Insulin resistance can be present in both those who have obesity and are overweight, as well as those at a healthy weight (lean diabetes mellitus).⁵⁵ Aerobic,

resistance training and intentional stretching improve insulin action and can assist with long-term management of blood glucose levels, lipids, blood pressure, cardiovascular risk, mortality and quality of life.

The ADA and the National Academy of Sports Medicine (NASM) recommend at least 150 minutes of moderate intensity, mostly aerobic physical activity, per week, spread over at least three days per week with no more than two consecutive days without exercise. According to the CDC, moderate activity can be assessed using a rating of perceived exertion (**Borg rating**) or how hard one feels they are working based on:

- Increased heart rate.
- Increased sweating.
- Increased respiration or breathing rate.
- Muscle fatigue.⁵⁶

Unless your healthcare provider recommends otherwise, resistance training should also be included at least twice per week, with one or more sets of at least five different resistance training exercises.⁸

Efforts to promote physical activity should focus on developing self-efficacy and fostering social support from family, friends and healthcare providers and working with communities on accessible, affordable physical activity options. Encouraging mild or moderate physical activity may be most beneficial to adoption and maintenance of regular

physical activity participation. Joining a gym or health club might be motivating and enjoyable, but everyone can increase their level of activity and physical fitness at home, including cardio and strength, with minimal resources and equipment.

Live Tobacco Free

Smoking is a proven risk factor for diabetes, with people who smoke being 30–40% more likely to develop Type 2 diabetes than those who don't smoke.⁵⁷ The more someone smokes, the greater the chance of developing diabetes.⁵⁸ While smoking can increase the risk of developing diabetes, it can also make diabetes management more difficult. Among those with diabetes, people who smoke are more likely to have problems maintaining proper blood sugar levels and may require larger doses of insulin to manage their blood sugar.

Most importantly, people with diabetes who smoke are at a heightened risk of premature death and morbidity from serious complications such as heart disease and stroke, circulation problems, nerve damage, eye problems leading to blindness and kidney disease.

The American Diabetes Association advises all people not to use cigarettes and other tobacco products or e-cigarettes. In recent years e-cigarettes have gained public awareness and popularity because of perceptions that e-cigarette use is less harmful than regular cigarette smoking. Nicotine can raise blood sugar regardless if delivered by smoking or vaping.⁵⁹ However, in light of recent CDC evidence of deaths related to e-cigarette use, no persons should be advised to use e-cigarettes, either as a way to stop smoking tobacco or as a recreational drug.⁶⁰



Get Adequate Sleep

Sleep is a complex and essential biological process that is required daily for all of us. Learning, memory processing, cellular repair and brain development are among the important functions of sleep.⁶¹ In addition to maintaining normal brain functioning, sleep has important



roles in controlling the functions of many other body systems. Reducing the total hours of sleep can lead to serious consequences for almost all bodily organs and systems.⁶²

Getting adequate sleep is important. Sleep deprivation can contribute to the development of glucose intolerance, insulin resistance, diabetes and metabolic syndrome. A distinct rise and fall of blood sugar

levels during sleep appears to be linked to sleep stages. Not sleeping at the right time, not getting enough sleep overall or not getting enough of each stage of sleep disrupts this pattern. For most adults getting seven to eight hours of quality sleep a day is needed to perform adequately, avoid a sleep debt and not have problem sleepiness during the day.⁶³ Those who work night shifts, or change shifts frequently, are at a higher risk of Type 2 diabetes.⁶⁴

Poor quality sleep may also be associated with overeating and making unhealthy food choices by stimulating hunger signals or suppressing signals of fullness. In turn, overeating especially before going to sleep/going to bed makes it harder to fall asleep or remain asleep.

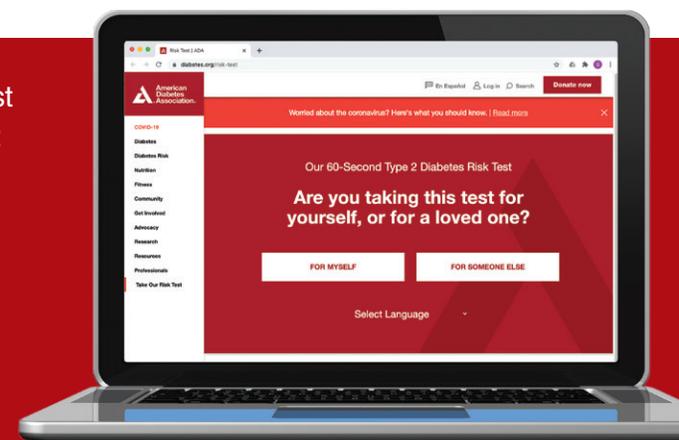
Obstructive sleep apnea (OSA) is a risk factor for cardiovascular disease, and is very common in those with obesity. People with symptoms suggestive of OSA such as excessive daytime sleepiness, snoring, and/or episodes of not breathing while sleeping, should

discuss these symptoms with their medical team. Sleep apnea treatment (lifestyle modification, continuous positive airway pressure, oral appliances, and surgery) significantly improves quality of life and blood pressure management and even the risk of sudden death.⁶⁵

Risk Factor Identification, Early Detection, and Screening⁸

Individuals at high risk for developing diabetes should seek annual screening to detect diabetes at its earliest stages when lifestyle and medication options might be most effective in preventing further progression or complications. Individuals who have one or more of the following: body mass index (BMI) greater than or equal to 25 kg/m²; family history of diabetes; member of certain racial and ethnic groups; or history of gestational diabetes are particularly at risk for developing diabetes.⁶⁶ Even without identifiable risk factors, early detection or screening recommendations for Type 2 diabetes suggest that non-pregnant adults 45 years or older be screened, regardless of risk. If screening results are normal, repeat testing should be completed every three years; sooner if adults have any of the risk factors mentioned above or if symptoms of hyperglycemia develop (e.g., excessive urination and thirst, blurred vision, frequent yeast infections, non-healing wounds).

ADA Diabetes Risk Test
diabetes.org/risk-test



Diabetes Prevention for People at High Risk

Some people are at higher risk than others of developing diabetes. In this section we will touch on preventing Type 1 diabetes, prediabetes—which is often considered a precursor to Type 2 diabetes, gestational diabetes that can occur in some pregnant women, and some of the other conditions associated with diabetes or special risks.

1

Preventing Type 1 Diabetes

People at highest risk for **Type 1 diabetes** are those who have a parent, brother, or sister with Type 1 diabetes. While

Type 1 diabetes can develop at any age it most commonly starts in children or young adults. This type of diabetes is thought to be the result of an autoimmune reaction where the body's immune system mistakenly attacks itself. Risk factors for Type 1 diabetes are not as clear as for prediabetes and Type 2 diabetes although Caucasians are more likely to develop Type 1 diabetes than African Americans and Hispanic/Latinx Americans. Currently, no one knows how to prevent Type 1 diabetes.⁶⁷

pre

Preventing Prediabetes or Early Type 2 Diabetes

You're at risk for developing **prediabetes**²¹ that can lead into Type 2 diabetes if you:

- Are overweight
- Are 45 years or older
- Have a parent, brother, or sister with Type 2 diabetes
- Are physically active less than 3 times a week
- Have ever had gestational diabetes (diabetes during pregnancy) or given birth to a baby who weighed more than 9 pounds
- Are African American, Hispanic/Latinx American, American Indian, or Alaska Native (some Pacific Islanders and Asian Americans are also at higher risk)

2

Middle-aged and older adults are at the highest risk for developing Type 2 diabetes,¹¹ particularly if they have prediabetes, or women who have had gestational diabetes during any of their pregnancies.

Once an individual is diagnosed with prediabetes, the main treatment goal is to delay or prevent progression to Type 2 diabetes primarily through behavioral changes and if indicated, medications. Losing a modest amount of weight (five to seven% of total body weight) through healthy eating and moderate physical activity (such as brisk walking 30 minutes a day, five days a week), within the context of a lifestyle change program, has proven to be effective.¹¹ Programs like the CDC-led **National Diabetes Prevention Program** can help you make healthy changes that have lasting results. North Carolina has over 75 CDC-recognized Diabetes Prevention Program providers that offer either online or onsite classes. Visit DiabetesFreeNC to find a program near you.



Preventing Gestational Diabetes

You're at risk for developing **gestational diabetes**¹⁴ (diabetes while pregnant) if you:

- Had gestational diabetes during a previous pregnancy
- Have given birth to a baby who weighed more than 9 pounds
- Are overweight
- Are more than 25 years old
- Have a family history of Type 2 diabetes
- Have a hormone disorder called **polycystic ovary syndrome (PCOS)**⁶⁹
- Are African American, Hispanic/Latinx American, American Indian, Alaska Native, Native Hawaiian, or Pacific Islander

Gestational diabetes usually goes away after the baby is born but increases the mother's risk for prediabetes and Type 2 diabetes later in life. Babies born from mothers with gestational diabetes are also more likely to become obese as a child or teen and are also more likely to develop Type 2 diabetes later in life. Before someone gets pregnant, they may be able to prevent gestational diabetes by losing weight if overweight, by eating healthier, and by getting regular **physical activity**.^{67, 70}

Other Conditions Associated with Diabetes

Other conditions can cause the body to gradually become more resistant to working with the insulin it produces causing a higher risk of developing Type 2 diabetes. Here we will touch on only some of the more common conditions associated with diabetes. A constellation of metabolic abnormalities known as the Metabolic Syndrome include high LDL (bad) cholesterol and triglycerides (another lipid) and low HDL (good) cholesterol, elevated blood pressure, excessive body fat especially around the waist, and insulin resistance that can lead to high blood sugar. The Metabolic Syndrome can be one of the most common causes of Prediabetes where resistance to our own insulin gradually increases to the point that we cannot fully metabolize the glucose we take in. If we cannot keep pace with the amount of insulin required to overcome that resistance, our blood sugar levels rise enough until we are diagnosed as having Type 2 diabetes. The good news is the Metabolic Syndrome, Prediabetes and many of the conditions listed below can be managed with diet, exercise and sometimes medications to prevent the onset of complications including diabetes.

Other metabolic states associated with insulin resistance include medical conditions such as Polycystic Ovary Syndrome, Cushing's Syndrome (an excess of cortisol hormones), Acromegaly (growth hormone excess) and liver disorders called nonalcoholic fatty liver disease (NAFLD)/nonalcoholic steatohepatitis (NASH).⁷¹

NAFLD is characterized by increased fatty deposits in the liver and is present over half of those with Type 2 diabetes.⁷² Some individuals with NAFLD further develop an inflammatory reaction that can lead to liver scarring, called NASH, which can further progress to cirrhosis. Because NAFLD/NASH either co-exists with or is just a different way that the underlying metabolic syndrome presents, as our population becomes more obese, these fatty liver disorders become part of the epidemic of Type 2 diabetes across all age groups world-wide. Currently the American Diabetes Association recommends that patients with Type 2 diabetes and elevated liver enzymes or fatty liver on an ultrasound should be evaluated for the presence of NASH and liver fibrosis.⁸

People with other autoimmune diseases such as celiac disease and autoimmune thyroid disease as well as those infected with the hepatitis C virus are also at higher risk of developing diabetes, probably due to additional insults on the pancreas by an overactive immune system reducing the proper output of insulin when needed. Therefore, people with autoimmune diseases should be monitored for developing diabetes through periodic screening.⁸



Medication Options to Prevent Diabetes among People at High Risk

As previously mentioned, there are currently no known strategies to prevent Type 1 diabetes. Those at high risk for prediabetes or Type 2 diabetes, and who already have underlying medical conditions also known to increase the risk of diabetes such as Polycystic Ovary Syndrome (PCOS), Cushing's disease, Acromegaly, NASH, etc., should seek medical care for adequate management of these disorders including medication and/or surgery as needed.

Persons with prediabetes might also consider medication supplements to reduce obesity in addition to health dietary patterns and exercise. Although not approved by the FDA for the purpose of preventing Type 2 diabetes, several clinical trials suggest that a drug called metformin may be beneficial in preventing progression of prediabetes to Type 2 diabetes.⁸



Getting Help Through Education and Diabetes Prevention Programs

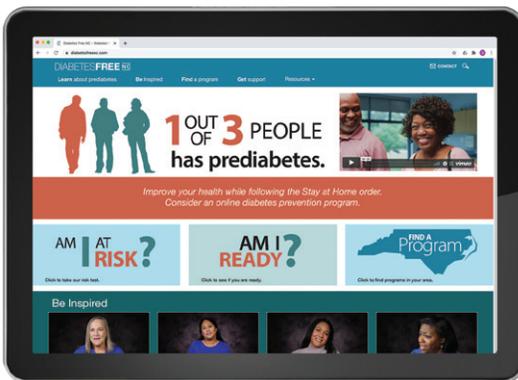
Healthcare providers, Diabetes Care and Education Specialists, registered dietitian nutritionists (RDN), pharmacists, lifestyle coaches, and other healthcare providers can assist in individual and group diabetes prevention education.

In 2010, The Centers for Disease Control and Prevention (CDC) created The National Diabetes Prevention Program (National DPP) to address prediabetes and Type 2 diabetes prevention through a CDC-recognized lifestyle change program. This yearlong lifestyle change program is evidence-based and helps people who have prediabetes and/or are at risk for Type 2 diabetes make achievable and realistic lifestyle changes and reduce their risk of developing Type 2 diabetes by up to 58%.^{7,9} Diabetes Prevention Program (DPP) classes are designed to empower people with prediabetes to take charge of their health and well-being. Participants learn ways to incorporate healthier eating and moderate physical activity, as well as problem-solving, stress-reduction and coping skills into their daily lives. The DPP classes are delivered either in-person or virtually with a trained lifestyle coach for at least 16 sessions in the first 6 months, then at least 6 follow-up sessions in the next 6 months. The CDC recognition assures that DPPs deliver quality and evidence-based support.

Diabetes Prevention Programs in North Carolina

North Carolina has over 75 CDC-recognized Diabetes Prevention Program providers that offer either online or onsite classes. Diabetes Prevention Programs are offered in varied community locations such as local health departments, YMCAs, community centers, faith-based organizations, hospitals and worksites. In 2016, the North Carolina General Assembly made funding available to the North Carolina Division of Public Health (NC DPH) for the North Carolina Office of Minority Health and Health Disparities (NC OMHHD) to establish and administer an evidenced-based diabetes prevention program targeting African-Americans, Hispanic/Latinx and American Indians (HB 1030, 2015-241, Section 12E.3). The goal of the North Carolina Minority Diabetes Prevention Program (NC MDPP) is to establish a statewide framework to decrease the incidence of diabetes in minority communities. The NC MDPP strives for health equity in all practices and policies, and was created to address the many barriers and challenges that exist within minority communities to seek and receive equitable programs and services.

NC Prevents Diabetes is a partnership between NC State University and the NC Division of Public Health with Blue Cross and Blue Shield of North Carolina to offer diabetes prevention programs to all North Carolinians regardless of insurance status. This project is made possible through \$5 million in funding from Blue Cross and Blue Shield of North Carolina. This funding supports both online and onsite programs across the state by covering the program registration fee (current average cost = \$430) as well as providing participant incentives and optional transportation and childcare supports. The goal of the project is to remove the barrier of cost to participate in a diabetes prevention program. Visit **DiabetesFreeNC** to find a program near you.



Medicare Diabetes Prevention Programs⁷⁴

Medicare's Diabetes Prevention Program expanded model is a structured behavior change intervention that aims to prevent the onset of type 2 diabetes among Medicare beneficiaries with an indication of prediabetes. It differs from other DPPs in that Medicare requires that a diabetes prevention program has received CDC Diabetes Prevention Recognition to be eligible for reimbursement. Check with your local Medicare Office if you have questions.

Medicare Part B (Medical Insurance) covers the costs of a diabetes prevention program once, if all of these conditions apply to you:

- You have prediabetes or are at risk for developing Type 2 diabetes hemoglobin A1C between 5.7 and 6.4%, or fasting plasma glucose of 110–125 mg/dL, or 2-hour plasma glucose of 140–199 mg/dL on an oral glucose tolerance test within 12 months before attending the first core session.
- You have a body mass index (BMI) of 25 or more (BMI of 23 or more if you are Asian).
- You've never been diagnosed with Type 1 or Type 2 diabetes or End-Stage Renal Disease (ESRD).
- You have never before participated in the Medicare Diabetes Prevention Program.

The program begins with 16 core sessions offered in a group setting over a 6-month period focused on

- Training to make realistic, lasting behavior changes
- Tips on how to get more physical activity
- Strategies for controlling your weight
- A behavior coach, specially trained to help keep you motivated
- Support from people with similar goals

Once you complete the core sessions, you are eligible for

- 6 more months of less intensive monthly follow-up sessions to help you maintain healthy habits
- An additional 12 months of ongoing maintenance sessions if you meet certain weight loss and attendance goals

Common Terms and Acronyms Used for Diagnosing Prediabetes and Diabetes⁷⁵

A1C:
Hemoglobin A1C

BMI:
Body Mass Index

FBG:
Fasting Blood Glucose

FPG:
Fasting Plasma Glucose

GDM:
Gestational Diabetes Mellitus

IFG:
Impaired Fasting Glucose

IGT:
Impaired Glucose Tolerance

OGTT:
Oral Glucose Tolerance Test

TIR:
Time in Range

Diagnosing Diabetes

Recommended Screening Guidelines for Prediabetes and Diabetes

Providers should consider testing in overweight or obese individuals with a BMI ≥ 25 kg/m², or 23 kg/m² in Asian Americans, with *one or more of the risk factors identified below*.⁷⁶

- First degree relative (parent or sibling) with diabetes
- High risk race/ethnicity (African American, Hispanic/Latinx, Native American, Asian American, or Pacific Islander)
- Age
- History of cardiovascular disease
- Hypertension (BP \geq to 130/80 mm/Hg /or on therapy for hypertension
- HDL Cholesterol \leq 35 mg/dl and /or Triglycerides \geq 250 mg/dl
- Women with Polycystic Ovarian Syndrome (PCOS)
- Physical inactivity
- Insulin resistance associated clinical conditions as noted above, acanthosis nigricans, pregnancy, or women who are overweight and currently planning pregnancy.
- A1C \geq 5.7%.

Frequency of Testing

- Those persons with an A1C \geq 5.7%, or with prediabetes, IGT, or IFG should be tested yearly.
- Women who had Gestational diabetes mellitus (**GDM**) should be tested 4–6 weeks postpartum and then 1 to 3 years for the remainder of their lives.
- Otherwise, **testing for diabetes should begin for all individuals beginning at age 45 years.**
 - *If results are normal, those individuals should be tested every 3 years or more frequently based on risk, lab results, diabetes symptoms, and/or change in health status.*

Diagnosis Criteria

There are several methods that can be used to diagnose both prediabetes and diabetes. These involve blood testing at either a healthcare provider's office or commercial laboratory. **It should be noted that a positive result based on one test alone in the absence of symptomatic hyperglycemia (high blood glucose levels) is insufficient.**

Diagnosis is best confirmed based on validation by two abnormal test results.⁷⁶

Hemoglobin A1C (A1C) is one test used to diagnose prediabetes or diabetes. This blood test measures the average amount of glucose circulating in the blood stream during the past three-month period. (Hemoglobin is a protein found in red blood cells that carries oxygen in the blood. Glucose adheres to the hemoglobin on these red blood cells; so, by measuring the Hemoglobin A1C, it is possible to know the average % of circulating glucose during this time frame.)

- A1C result in the range of ≥ 5.7 to 6.4% is considered a positive diagnosis for prediabetes.
- A1C result $\geq 6.5\%$ is considered a positive diagnosis of diabetes.

Facts about the A1C

- It is possible for persons with prediabetes to lower their A1C value below 5.7% to halt progression towards the development of diabetes.
- The **A1C** test is also used for people already diagnosed with diabetes to assess hyperglycemia (high blood sugar levels).
- It is recommended that persons with diabetes aim to keep their A1C level below 6.5% without **hypoglycemia** (low blood sugar levels) with the goal of preventing complications. **It should be noted this goal is individualized for each person** based on age, medications, concomitant health issues, and other factors such as barriers to care, personal issues, and social determinants of health.
- HbA1 can be inaccurate in patients with anemia, iron or b12 deficiency, sickle cell, thalassemia, or blood loss.

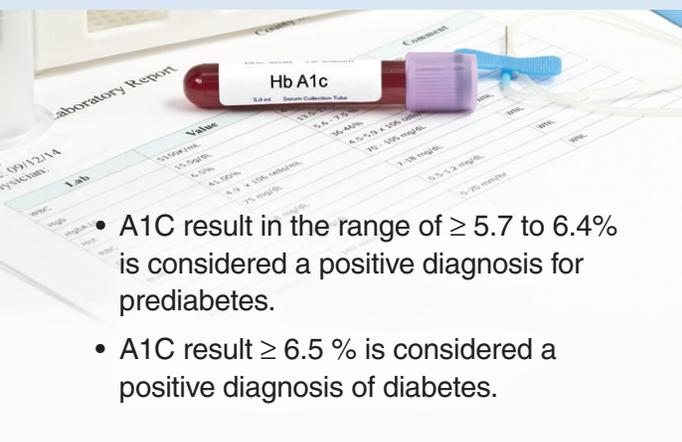
The **fasting plasma glucose (FPG)** can also be referred to as **fasting blood glucose (FBG)** is also used to diagnose prediabetes and diabetes. Fasting is defined as *no caloric intake for at least 8 hours*. This test is most reliable when given in the morning. FBG is one of the most commonly used tests for diagnosing diabetes.

- FPG less than 100 mg/dl fasting is considered normal.
- FPG ≥ 100 and ≤ 125 mg/dl are diagnostic for prediabetes
- FPG ≥ 126 mg/dL is positive for diabetes (when found on more than one occasion)

The **oral glucose tolerance test (OGTT)** is another method used to diagnose prediabetes, diabetes, and gestational diabetes. This test is usually performed after overnight fasting and measures blood glucose before and two hours after a person drinks a standardized liquid containing 75 grams of glucose dissolved in water. This test is often used for prediabetes screening as it identifies post meal hyperglycemia, which often presents prior to an increase in the fasting glucose level.

- Normal: a blood sugar level at 2 hours of ≤ 140 mg/dL
- Prediabetes is diagnosed at a two-hour blood glucose level of 140 to 199 mg/dl,
- Diabetes is diagnosed at two-hour blood glucose level ≥ 200 mg/dl.

For persons presenting to a healthcare provider or facility with symptoms of diabetes, or hyperglycemia crisis, a random plasma glucose ≥ 200 mg/dL whether fasting or not is also considered diagnostic for diabetes.



Diabetes Management and Prevention of Complications

For persons with diabetes, the key to managing their illness, blood sugars and preventing complications is following their health provider's clinical recommendations including medication adherence, screening for early signs of complications and adopting healthy behaviors.

Clinical Considerations

Several excellent guidelines lay out clinical recommendations such as those from the American Diabetes Association Standards of Medical Care in Diabetes.⁸

Scan the QRS code
(care.diabetesjournals.org/content/43/Supplement_1/S37.figures-only)
for more details from the American Diabetes Association on suggested "Components of the Comprehensive Diabetes Medical Evaluation at Initial, Follow-Up and Annual Visits."⁷⁷



Time in Range (TIR) and emerging tool for clinical management.

An estimated 30–40% of persons with Type 1 diabetes as well as a growing number of those with insulin requiring Type 2 diabetes use insulin pumps, continuous glucose sensor monitors (CGM), or integrated insulin pump/CGM devices as tools for diabetes management.⁷⁸

Today, the new "hybrid" models of insulin pumps are designed to deliver insulin, integrate glucose monitoring and provide diabetes management software that offers comprehensive data analysis related to both insulin doses and daily life activities. Many of these hybrid insulin pumps are now fully integrated with CGMs; offering the person with diabetes and their healthcare team real-time data to assist in the management of diabetes. Careful review of the comprehensive data provided by these hybrid pumps/CGM integrated systems has unveiled a new metric which can also be used to assess overall glycemic control called **Time in Range (TIR)**.⁷⁹

While A1C can be used to diagnose diabetes, it does not address the constant changes of glucose levels, hypoglycemia, or daily glucose patterns and trends. TIR identifies both the percentage of time and specific time frames where glucose is above or below the individual's recommended target and provides useful information regarding patterns and trends related to food timing, insulin dosing, exercise and daily activity, hypoglycemia, and illness.

TIR is also a more accurate measure than A1C for assessing glycemic control in persons with those conditions where A1C values are less accurate (iron deficiency and other anemias, hemoglobin abnormalities, and pregnancy).⁷⁹ A recent retrospective analysis of Diabetes Control and Complication Trial (DCCT)⁸⁹ and other studies⁸⁰ demonstrated that TIR is strongly



associated with reduced risk of microvascular complications (e.g., retinopathy and microalbuminuria: small amounts of protein in the urine above what is normal and typically an early sign of kidney disease) in persons with Type 1 and Type 2 diabetes when the TIR percent increased. A TIR value of 70% strongly aligns with an A1C of 7,^{81,82} and the clinical recommendation is to keep TIR \geq 70% for a minimal of 16 hours/day.⁷⁹ In clinical practice, time in range is a useful tool that complements A1C as metrics for both targets and outcomes in optimizing diabetes care and management.

A TIR Tip-Sheet is available.

TIR targets:

- A target range of 70–180 mg/dL for individuals with Type 1 diabetes and Type 2 diabetes,
- And 63–140 mg/dL during pregnancy, along with a set of targets for the time per day [% of CGM readings or minutes/hrs.].
- Recommendations also outline setting conservative CGM targets for persons with diabetes who are older and/or considered high-risk, with a strong focus on reducing the percentage of time spent in hypoglycemia/hyperglycemia.

Diabetes Self-Care Management Education and Support (DSMES)—A Critical Tool for Adopting (or Developing) Healthy Self-Care Behaviors

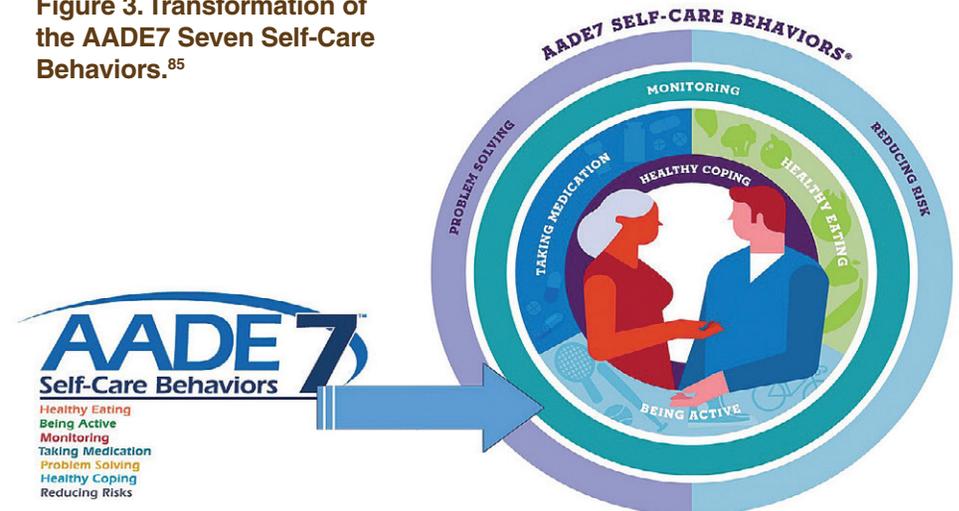
For persons with diabetes, a critical tool for managing blood glucose and preventing complications is successfully practicing the **AADE7 Self-Care Behaviors**[®] (Figure 3) and incorporating those skills and processes into their everyday routines. These behaviors are healthy eating, being active, monitoring, taking medications, problem solving, reducing risk, and healthy coping. These skills assist people with diabetes in their efforts to manage and stabilize their blood glucose levels within the range recommended by their healthcare team as well as providing recommended clinical preventative measures for overall health

maintenance and risk reduction. Evidence based research demonstrates that managing diabetes by keeping glucose within recommended individual target ranges reduces the risk for complications, slows the progression of the disease and improves health outcomes.^{83, 84}

This is best accomplished through a patient centric collaborative team approach that includes the individual's primary and diabetes healthcare providers, diabetes self-care management and support (DSMES) team, specialists if indicated and ongoing support.⁸⁵



Figure 3. Transformation of the AADE7 Seven Self-Care Behaviors.⁸⁵



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DSMES provides people affected by diabetes with the critical survival skills and strategies to manage their diabetes as well as ongoing support as they integrate these processes into daily life. Diabetes care and education (also referred to as diabetes self-management education and support or diabetes self-management training, or DSMT), is performed by healthcare professionals who have appropriate credentials and experience within their scope of practice. **DSMES services** are provided by a variety of credentialed professionals such as nurses, registered dietitian nutritionists (RDN), pharmacists, and Certified Diabetes Care and Educational Specialists (CDCES).

Definitions and Terms used in Diabetes Self-Care Management and Support (DSMES)⁷⁵

Lifestyle Management includes: DSMES, DSMT, MNT, physical activity, smoking cessation counseling, psychosocial care.

DSMES: Diabetes Self-Management Education and Support

The combination of education (DSME) and support (DSMS). With the inclusion of “support” in the most recent update in the National Standards for DSMES, this is now the preferred terminology

DSMT: Diabetes Self-management Training

Term used by the Centers for Medicare and Medicaid Services for DSMES. Preferred term for legislative activity and reimbursement/billing issues.

MNT: Medical Nutrition Therapy

DCES: Certified Diabetes Care and Education Specialist

DCES: Diabetes Care and Education Specialist

DSMES services are designed to address the person’s health beliefs, cultural needs, current knowledge, physical limitations, emotional concerns, family support, financial status, medical history, health literacy, numeracy, and other factors and barriers that influence each person’s ability to meet the challenges of self-care.⁸⁶ These providers can be found in a variety of settings: hospitals, physician offices, clinics, pharmacies, home health, wellness programs, health departments, or communities. The initial DSMES referral is provided by a primary care provider (PCP) to a formal DSMES program. Ongoing support services can be provided within PCP or endocrinology practices as well as in a variety of community-based resources such as rural health centers, health departments, support groups, faith-based programs, payer-based programs, or by community health workers. A flyer (**Thrive with Diabetes**) is available for more information about DSMES services and about when to refer.

Evidence-based research demonstrates that engaging adults with diabetes in DSMES results in statistically significant and clinically meaningful improvements in A1C. The greatest improvements are achieved when DSMES includes both individual and group education, is provided by a team, participants attend more than 10 hours, and is individualized to address each person’s unique needs. Additionally, DSMES is focused on behaviors and engages the person with diabetes in this process.⁸⁷

When to Refer for DSMES

There are four critical times when DSMES should be provided for Type 2 diabetes (Figure 4):

- At diagnosis
- Annually and when not meeting targets
- When complicating factors occur
- When transitions in care occur

Figure 4. Four Critical Times for DSMES Services⁸⁸



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Table 2. Target Goals for Glucose (Fasting, Pre-meal, Post-meal) and A1C goals⁹¹

Fasting glucose before your meal:	80 to 130 mg/dl
Glucose two hours after the start of the meal:	Below 180mg/dl
A1C goal:	< 7 % without frequent hypoglycemia—individualized for each person
A1C goal—adjusted:	< 8% for persons sensitive to hypoglycemia, elderly, history of severe heart disease, long duration of diabetes
Talk with your healthcare team about what blood sugar numbers are right for you.	



These times identified in Figure 4 are critical points when people with diabetes may need assistance to achieve and/or adjust their goals and care plans for successful daily self-management.⁸⁹ Because diabetes is a chronic disease that progresses over time, ongoing vigilance and flexibility are necessary to address and adjust changing needs or treatments. Referrals for DSMES may be needed more frequently than just these specific 4 times. Diabetes care and education plans at each of the 4 critical times include individual assessments that focus on the needs and experiences of the person with diabetes relevant to self-management and applicable treatment targets.⁹⁰

Self-Care Recommendations for Persons with Diabetes

For persons with diabetes, it is recommended to follow-up with your diabetes care team every 3 months to help stay healthy with living with diabetes. During these visits, people with diabetes should expect to have:

- A1C checked and compared to blood sugars from home
- Blood pressure checked
- Blood and/or urine chemistries to assess kidney function, with a referral to a specialist as needed
- Lipid (cholesterol) levels (at least once a year)
- A foot exam (take off those shoes and socks) and importance of daily self-foot exam at home to inspect for changes in skin or temperature, infections, fungus, cracks, fissures, corns or callous, ingrown nails, edema or decreased sensation
- Screening for depression or distress; let your provider know if you are overwhelmed by managing your diabetes, are feeling depressed, or find it challenging to cope
- Screening for tobacco use or vaping
- Reminder to see your dentist two times/year and to brush and floss teeth daily
- Assessment for sleep apnea, with a referral to a specialist as needed
- Referral to an audiologist at the time of diagnosis for hearing evaluation and screening for risk of falls (future evaluations might be required based on the full medical history)
- A review of your individualized, patient-focused plan of care for managing your diabetes
- Referral to an eye care provider at least once a year who can perform a dilated eye exam
- Review of all your immunizations to ensure you are up to date: flu vaccine (yearly), pneumonia vaccines, hepatitis B vaccine, and discuss the need for a Tdap and/or MMR booster, shingles and HPV vaccines with your provider
- Referral to see your DSMES team at the four critical times (e.g., when complicating factors occur) and annual follow-up review.

Preventing and Reducing Risks for Complications

Diabetes can lead to complications over time particularly when glucose levels remain elevated for extended periods of time and /or there is extreme glucose variability. Diabetes is associated with:

- Macrovascular changes of the large blood vessels which can lead to cardiovascular disease (heart attack, strokes, hypertension), clotting disorders, amputations, hearing loss
- Amputations: diabetes and complications of ulcerations lead to 50–75% of the non-traumatic amputations
- Microvascular changes to the small blood vessels which can impact the eyes (retinopathy), ears (hearing), kidneys, end stage renal disease and dialysis (nephropathy), feet, hands, and nerves (neuropathy)
- Gastroparesis (slower or incomplete emptying of the stomach) and impaired digestion secondary to central autonomic neuropathy
- Peripheral vascular disease (altered or decreased circulation to the feet and legs, edema, nails and skin)
- **Hearing Loss**, deafness (both a microvascular change and neuropathy)
- Periodontal (gum) disease, loss of dentition
- Skin changes (skin tags, oral skin lesions, itching, infections due to bacteria, fungus, or yeast)
- Vision changes or loss, Cataracts and Glaucoma
- Sleep Apnea
- Non-alcoholic Fatty Liver Disease (NAFLD)
- Other Endocrine or autoimmune disorders
- Persons with diabetes are at higher risk for Hepatitis B infection and more frequently develop complications from the flu or pneumonia
- Increased risk of falls from loss of vision, foot neuropathy, and vestibular complications leading to potential fractures and head injury
- Depression and diabetes distress

Preventing Other Complications

People with prediabetes, Type 1 and Type 2 diabetes are at high risk for developing cardiovascular disease including heart attack and stroke. They should be screened for other cardiovascular risk factors

such as lipid disorders (high total cholesterol, LDL cholesterol and triglycerides), high blood pressure and strongly counseled not to smoke.⁸

Immunizations are important for persons with diabetes as protection from complications of flu, pneumonia, Hepatitis B, Shingles, Tetanus, Pertussis, and Diphtheria. All illnesses and infections in persons with diabetes causes glucose to rise to high levels (hyperglycemia), which in turn increases the difficulty to resolve these illnesses, which is why immunizations are important.^{8, 92}

- Annual flu vaccine
- Hepatitis B vaccination for all adults with diabetes who have not previously been vaccinated for Hepatitis B and are younger than 60 years of age.
- Pneumococcal vaccines once as an adult before 65 years of age and then two more doses at 65 years or older
- Shingles vaccine
- Tdap (Tetanus, diphtheria, and pertussis): Initially and then every ten years

For additional information about immunizations and diabetes, visit the Association of Diabetes Care & Education specialists website [here](#) and [here](#).^{93, 94}

The Language of Diabetes

Diabetes is a challenging and complex medical condition that demands intense engagement in the daily management on the part of the person with diabetes. The learning curve is rapid and steep; requiring mastery of multiple critical self-care skills and problem-solving strategies to successfully navigate this condition. Persons with diabetes must also integrate these new responsibilities into their other roles and obligations (spouse, parent, grandparent, manager, employer, employee, community member, household manager, caregiver, teacher, mentor, etc.). Persons *and* families who live with diabetes every day need ongoing support and encouragement from their healthcare teams, community, families, friends, and co-workers.

Language is the primary channel for sharing knowledge and verbalizing understanding.⁷ Once heard or read, people transform words into meaning,^{95, 96} impacting their self-concept. Language is the center whereby a person determines their identity, social perception,

attitudes, bias, and stereotypes. The use of certain words or phrases can intentionally or unintentionally express bias about personal characteristics (e.g., race, religion, health, or gender).⁷ Thus, language shapes the experience for the person with diabetes and impacts both the context and their perception of the information. Studies have demonstrated that the language used in diabetes care and management makes a huge difference in terms of behaviors, outcomes, and motivation.

The Association of Diabetes Care and Education Specialists (ADCES) and the American Diabetes Association (ADA) formed a joint task force focused on language in diabetes care and education. This group reviewed the literature regarding language used in the delivery of diabetes care and education and made recommendations for language that enhances the communication process. Appropriate language should be used by all healthcare professionals and others when discussing diabetes through spoken or written words and can be used with a variety of audiences (people with diabetes, colleagues, or the public).⁷



There are four guiding principles:

- Stigma that has historically been attached to a diagnosis of diabetes can contribute to stress and feelings of shame and judgment
- Every member of the healthcare team can serve people with diabetes more effectively through a respectful, inclusive, and person-centered approach
- Empowering language that focuses on the individual's strengths can improve communication and enhance motivation, health, and well-being of people with diabetes.
- Specific themes and associated words should be avoided.

Words to Avoid

- **Judgment** (non-compliant, uncontrolled, don't care, should, failure)
- **Fear/Anxiety** (complications, blindness, death, Diabetic Ketoacidosis)
- **Labels/Assumptions** (Diabetic, all persons with diabetes are fat, suffer)
- **Oversimplifications/Directives** (lose weight, you should, you'll get used to it, at least it's not...)
- **Misunderstanding/Misinformation/Disconnected** (cure, reverse, bad kind, you are fine)
- **Body Language and Tone** (no eye contact, accusatory tone)

BE AWARE AND CHOOSE YOUR WORDS WITH CARE

Table 3. List of Problematic Words and Preferred Words to Use.

Problematic	Preferred
Diabetic	Person living with diabetes
Test blood glucose	Check or Monitor
Control (Verb)	Manage—describe what the person is doing
Control (Noun)	Define what you mean with control and use A1C, blood glucose level
Good/Bad/Poor	Safe/unsafe levels; target levels; use numbers and focus on facts instead of judgmental terms
Compliant/Adherent	Takes medicine about half the time; Eats vegetables a few times a week; describe engagement and participation

Our words and messages are powerful. When our mindset places the person first, the language will follow, removing the labels of shame, guilt, and blame. When we hear language that is negative, speak up and advocate for persons with diabetes while educating those around us.⁹⁷ Additional resources can be found at the **Association of Diabetes Care & Education Specialists**.⁹⁸

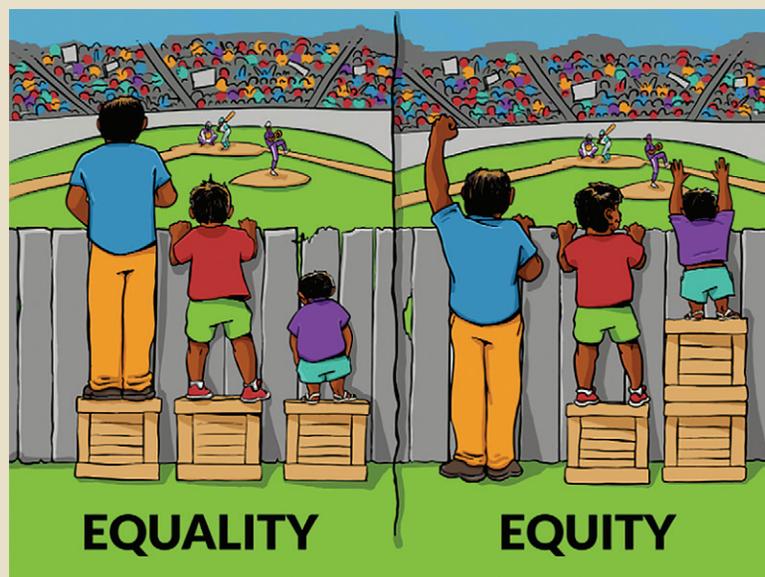
Importance of Social Determinants of Health and Health Equity to Prevent and Manage Diabetes

Traditionally, public health and healthcare agencies have focused on understanding and addressing **health disparities**, that is, alleviating the gap in health outcomes and/or processes of care between different groups of people.⁹⁹ With racial/ethnic health disparities, health disparities have been defined as the difference in both outcomes and healthcare processes of care between non-Hispanic Whites and racial and ethnic minority groups. For diabetes, racial and ethnic health disparities have been pronounced and persistent, particularly for African Americans, American Indians and Hispanics/Latinx.¹¹

Recently, the focus has shifted to **health equity**, defined as the achievement of the highest level of health for all people.¹⁰⁰ Health equity requires that efforts are made to address factors such as racism and power imbalances and to focus attention on “upstream” issues that contribute to the long-standing health disparities that exist in our society. Health equity also requires that extra efforts must be made to achieve this goal among our most vulnerable populations (Figure 5).



Figure 5. Equity and Equality



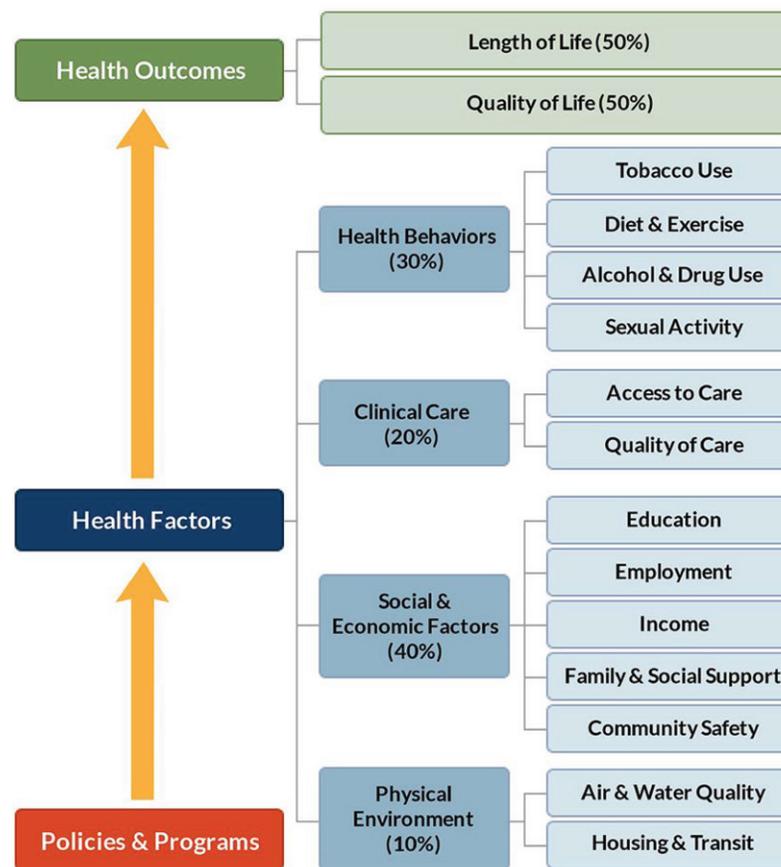
Interaction Institute for Social Change | Artist: Angus Maguire.

To that end, greater emphasis is being placed on these “upstream” issues, known as the **social determinants of health (SDOH)**, which are conditions in which people live, learn, work, and play and how those conditions affect health risks and outcomes. Social and economic factors are believed to contribute to 40% of the quality and length of life in communities¹⁰¹ (Figure 6). The 2018 Health Equity Report released by the North Carolina Office of Minority Health and Health Disparities²⁹ and the recently released Healthy North Carolina 2030 Report¹⁰² focused on the drivers of health as outlined in the County Health Rankings Model (Figure 6).

There is strong evidence that diabetes prevention and management is influenced by the social determinants of health.¹⁰⁴ Disparities in diabetes indicators are very prominent across educational, economic and geographic groups, with the greatest burden experienced by those

with limited formal education, those living below the poverty line and those living in rural communities with limited access to healthcare and resources to live healthy lives. In order to be as effective as possible in achieving our goals to reduce the burden of diabetes in our state, it is incumbent upon us to both recognize the impact of social determinants on diabetes prevention and management, but to also work collectively to ensure that health equity can be achieved through a concerted focus on the upstream factors.

Figure 6. County Health Rankings Population Health Model¹⁰³



County Health Rankings model © 2014 UWPHI

Working to Address Social Determinants of Health and Health Equity at Multiple Levels

There are many things that community organizations can do to help support persons with diabetes and to assist in reducing the burden of diabetes in our state. Examples of what you and the organizations you belong to can do appear in the following sections.

We use the Socioecological Model of Health (Figure 7) to serve as a bridge between the core behaviors that help individuals prevent and manage their diabetes to the policy strategies that community groups, employers and healthcare providers can implement to support diabetes prevention and management.

Based on the socioecological model (SEM), the individual who is at risk for or who has diabetes will need to follow the behaviors previously described to protect their individual health. The interpersonal relationships that they have with their families and friends influence their behaviors. This prevention and management Guide does not address actions for friends and families because a variety of websites exist that support people with and at risk for diabetes (e.g., **Diabetes Sisters**, **Children with Diabetes**, **Taking Control of your Diabetes**). A list of these websites is included as Appendix A.

The population-based strategies that follow are those that organizations can implement to support individuals in the prevention of

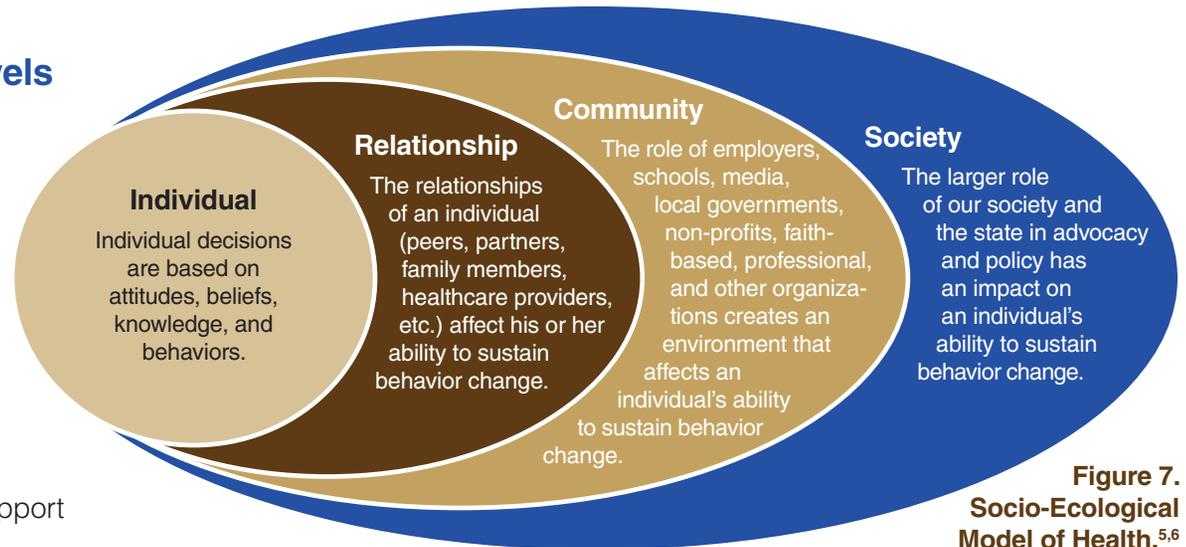
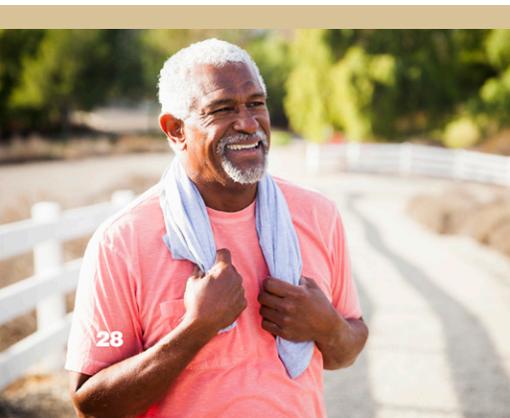


Figure 7.
Socio-Ecological Model of Health.^{5,6}

diabetes and its complications. The list of activities builds on primary prevention activities. The list is organized by the group that can initiate the action (community, healthcare, employer, society) and is shown according to the stages of diabetes prevention and management. A description of each group is provided prior to the list of strategies.

Taken as a whole these and other strategies help the state, community groups and other agencies use the principles of population health and risk stratification to complement what healthcare providers do in assisting individuals with or at risk for diabetes—thereby helping to reduce the burden of diabetes far beyond an individual or family.



Individual

Individual decisions are based on attitudes, beliefs, knowledge and behaviors.

Relationship

The relationships of an individual (peers, partners, family members, healthcare providers) affect their ability to sustain behavior.

Community

The role of employers, schools, media, local governments, non-profits, faith-based, professional and other associations creates an environment that supports an individual's ability to sustain behavior change.

Society

The larger role of our society and the state in advocacy and policy has an impact on an individual's ability to sustain behavior change.

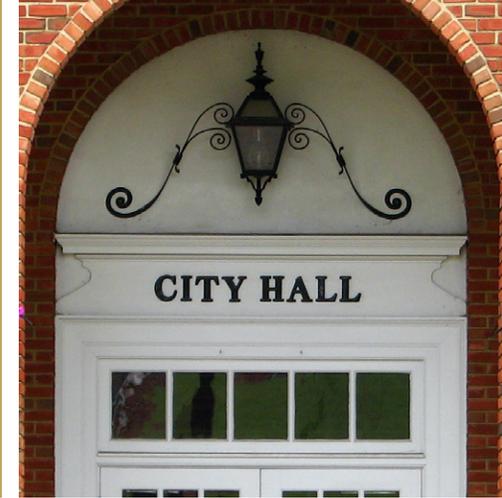


Taken together, the socioecological model, social determinants of health and health equity provide cues towards what organizations can do towards addressing diabetes. Working together always accomplishes more long-lasting change than individual efforts. The following sections of the Guide address what “Community” and “Society” might accomplish. We all should consider these statements that focus on solutions rather than problems¹⁰⁵ as we figure out how to collaborate.

1. Health starts long before illness, in our homes, schools and jobs.
2. All people should have the opportunity to make the choices that allow them to live a long, healthy life, regardless of their income, education or ethnic background.
3. Your neighborhood or job should not be hazardous to your health.
4. Your opportunity for health starts long before you need medical care.
5. Health begins where we live, learn, work and play.
6. The opportunity for health begins in our families, neighborhoods, schools, and jobs.

What Can Local Communities Do?

Community action is seen as necessary to the success of healthcare transformation. Communities that act through public participation on issues that affect their well-being see more relevant outcomes. Local knowledge and skills need to be equally valued in the planning and decision-making process to ensure that outcomes are aligned with communities' needs and assets. Integration of members of the community including local faith organizations, health departments, community health workers, and health systems in the planning process can help lead to more successful changes.¹⁰⁶



Supportive environments where we are born, grow, work, and play, are known to promote well-being and prevent chronic disease by being stable, safe, enjoyable, stimulating, and satisfying. Such environments are important in promoting active living and preventing diabetes. Healthy environments are what we make them, and we all have a role to play through our communities, schools, workplace, healthcare system, local governments, and the media.¹⁰²

Community groups, faith, non-faith based and non-profit organizations, all play an important role in building healthy environments and can have a meaningful impact on preventing diabetes or assisting those who have diabetes have healthier lives. Highlighted barriers for populations at high risk for diabetes include not having safe walking areas, green space, adequate lighting, and opportunities for social interaction and public transportation to

promote active living. Supportive social and community environments that increase social interactions are known to decrease depression, a highly linked comorbidity of diabetes. Communities with easy access to local grocery stores with fresh fruit and vegetables support more healthful diets.

Community has many components. Here we will outline what a few sectors of community can do—schools, media, local governments, faith-based organizations, non-profits/other organizations. Other sectors such as what healthcare providers, insurers, and employers and can do on a population-based or community perspective—separately from the direct care of persons with diabetes—are also covered in the What Can Local Communities Do? (p. 30), What Can Healthcare Providers and Insurers Do? (p. 34), and What Can Employers Do? (p. 40) sections of this Guide.

Schools, Community Colleges, and Universities

Though schools and universities belong to the larger area of communities, there are some specific actions schools can do to affect the health and wellbeing of their students and families. Healthy lifestyles start at the beginning. As children and young adults spend a large amount of time within the school walls, schools, school boards, and colleges/universities have a unique opportunity to influence the current and future health of students.

The incorporation of school nurses and/or student health services in the development of programs for those at risk for diabetes or with diabetes is essential. Educational institutions of all types should have adequate policies in place to support the diabetes prevention behaviors outlined above as well as sufficient staff, equipment and resources to provide routine and emergent care for their students who may have diabetes.

The Media

Media is important in raising the profile of diabetes, helping to educate about the disease and risk factors as well as calling attention to how widespread and serious the epidemic is. Media has a critical responsibility in educating the public and integrating the language of diabetes into their PSA's, broadcasts, and printed materials. Media coverage can turn attention to the need for additional resources to fund diabetes research and care. Persons with diabetes, healthcare providers, and community leaders should partner with media to get messages about diabetes to general and specific audiences that are factual, accurate, and capture the attention and passion of the receiver. Sharing personal struggles and triumphs have particular value in calling attention to the issue. Whether local or national, print or electronic (radio, TV, digital and internet) reaching those at risk for or who have diabetes is critical, but so is reaching the attention of policy makers who might be influenced by the media that then, in turn, might help determine the availability of diabetes resources.¹⁰⁷ Media also brings attention to health disparities not only about access to healthy food and physical activity but also to ensure access to healthcare and therapy including rising cost of medications such as insulin.

Local and State Government

Government at the local and state level can highly influence the health of their communities by helping to convene dialogue on a broad range of health opportunities and assist in implementing programs and policies offered not only by local and state government, but encourage community action

beyond what local government can do thereby enhancing the health and wellbeing of the entire community. Local and state government leaders can help implement these actions focused on reducing the burden of diabetes in North Carolina through partnerships, support, and distribution of this plan to communities and stakeholders.

Faith-based Organizations^{108, 109}

Faith-based organizations are central to the community and are known for their role in health promotion among their congregations, particularly in the African American population. They are poised to address health disparities as well as health equity. Faith based organizations are also recognized for their outreach in addressing health barriers (financial, social, jobs, illness, hunger, transportation, child or elder care).^{110, 111} The trust and respect that exists between faith leaders, clergy, and congregants provides a strong foundation that supports discussion, education, and support related to all aspects of diabetes.

Non-profit/Other Organizations

Non-profit organizations also represent another spoke in the wheel of community support through outreach providing food, housing, clothing, transportation, monies, computers, assistance with employment, and health. Other organizations focus on advocacy, health policy, and ongoing support for persons with diabetes. All these organizations at the local, state and national level work tirelessly in their efforts to reduce the burden and improve quality of life for North Carolinians who have prediabetes or diabetes.

North Carolina has a plan to address overweight and obesity by advocating how we balance how we eat, drink and move called **North Carolina's Plan to Address Overweight and Obesity**.¹¹² It outlines the prevalence of overweight and obesity in North Carolina, the preventable costs of obesity, the hunger-obesity paradox, and the role of the Social Determinants of Health. It outlines eight core behaviors that, if addressed at the individual, interpersonal, institutional, community, public policy, and environmental levels, would reduce overweight and obesity. Note these same behaviors prevent diabetes.

- Move more
- Eat more healthy food, less junk and fast food
- Eat more fruits and vegetables
- Drink more water. Drink fewer sugar sweetened beverages
- Sit less
- Start and continue to breastfeed
- Get enough sleep
- Manage stress



Table 4: Activities for Community Groups (Faith, Non-Faith, Non-Profit, Local Government, Media)

Diabetes Primary Prevention	Diabetes Prevention for People at High Risk	Diabetes Management and Prevention of Complications
<p>To help manage weight and/or follow healthy eating guidelines</p> <ol style="list-style-type: none"> 1. Offer free or low-cost community classes on eating healthy on a budget. 2. Ask local employers to work with food vendors who source locally. 3. Incorporate programs such as a community garden to help bring fresh foods into communities, classrooms or lunchrooms. 4. Offer DPP programs through student health at community colleges and universities, or as family classes in primary and secondary schools. 5. Regulate portion sizes. 6. Reformulate foods. 7. Encourage the availability of healthful food in public spaces, all schools and universities, community colleges and colleges, and at public events (fairs, food truck rallies). 8. Restrict the availability of unhealthy foods in public spaces, such as vending machines. 9. Tax unhealthful foods and subsidize nutritious foods. 10. Incentivize the building of supermarkets in low-income food deserts. 11. Increase participation in federal, state and local government food and nutrition programs (WIC, SNAP, CACFP), etc. 12. Engage at the local and state government levels to develop and implement policies, programs and activities designed to improve the health of North Carolinians and reduce the burden of diabetes. 13. Refer people to evidence-based weight loss programs including those offered through diabetes prevention programs, or North Carolina's Eat Smart, Move More, Weigh Less or a registered dietitian nutritionist for weight management. 	<p>To help manage weight and/or participate in regular physical activity at the community level and to sustain those completing diabetes prevention programs</p> <ol style="list-style-type: none"> 1. Establish and promote walking and cycling clubs. 2. Partner with existing health and fitness facilities (e.g. YMCA, gyms, etc.). 3. Collaborate with local Cardio/Pulmonary Rehabilitation programs. <p>To help participation in diabetes prevention education programs</p> <ol style="list-style-type: none"> 1. Collect and disseminate information about local Diabetes Self-Management Education and Support (DSMES) services. 2. Partner with a sponsoring agency such as a local health department to offer diabetes prevention programs in your congregation or community center. 3. Build partnerships with local health departments and hospitals to sponsor health fairs, with diabetes risk screening and medical follow-up for those at high risk for prediabetes, and referrals to DPP. 4. Work with healthcare providers or state agencies to train Community Health Workers to screen for diabetes within communities and refer to appropriate care. 5. Promote awareness of prediabetes on national point days like Diabetes Alert Day, International Diabetes Day and Diabetes Awareness Month. 6. Partner with local public health safety net providers to offer tips for people at risk for diabetes on national point days like World Diabetes Day, Diabetes Alert Day and Diabetes Awareness Month. 	<p>To help participation in individual and/or group self-management education programs</p> <ol style="list-style-type: none"> 1. Partner with a sponsoring agency to become an expansion site to deliver Diabetes Self-Management Education and Support services. 2. Offer support groups for people who have diabetes and their caregivers. 3. Partner with hospitals to offer diabetes education to reduce hospital readmissions. 4. Partner with faith-based nursing/health groups throughout the state to offer further services within their congregations. 5. Encourage peer support programs. This may include offering of space to hold support groups, including time for peer support in community DSMES services. <p>To help persist with personalized diabetes treatment plans</p> <ol style="list-style-type: none"> 1. Raise funds for Safety Net Providers to help them offset the cost of medications and supplies for people with diabetes. 2. Promote proper diabetes care through use of posters, bulletin inserts, and sermons. 3. Create and support peer education programs targeting geographic gaps in available accredited programs.

To help manage weight and/or participate in regular physical activity

1. Advocate for walkable communities, including sidewalks, green spaces, walking trails.
2. Advocate for outdoor lighting for tracks and other recreational areas.
3. Promote comprehensive physical activity programs in schools and after school programs.
4. Offer free group physical activity in public parks.
5. Develop and implement land use and neighborhood design policies to support active lifestyles.
6. Promote worksite policies that encourage physical activity.
7. Allow shared and/or open use of facilities (e.g., school tracks).
8. Refer people to **Eat Smart, Move More, NC** for strategies to manage weight or participate in regular physical activity.

To help live tobacco free

1. Increase the tax on tobacco products
2. Limit the use of tobacco products in public spaces.
3. Support programs like **Escape the Vape** to educate about the dangers of Vaping.
4. Advocate for alternate tobacco advertising.

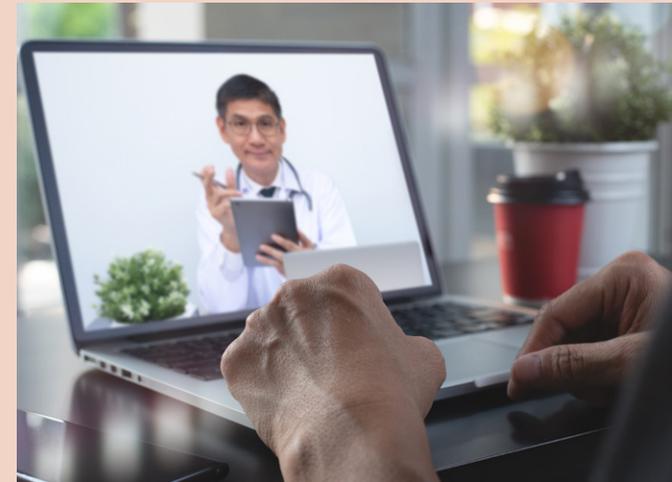
To promote adequate sleep

1. Promote sleep health for individuals.
2. Set expectations for minimal rest/sleep intervals for workers, especially those who make critical decisions (e.g. healthcare workers, transportation workers).
3. Identify additional resources to promote adequate sleep, such as those found in **Eat Smart, Move More, NC**.

Other Opportunities for Local Governments¹¹³

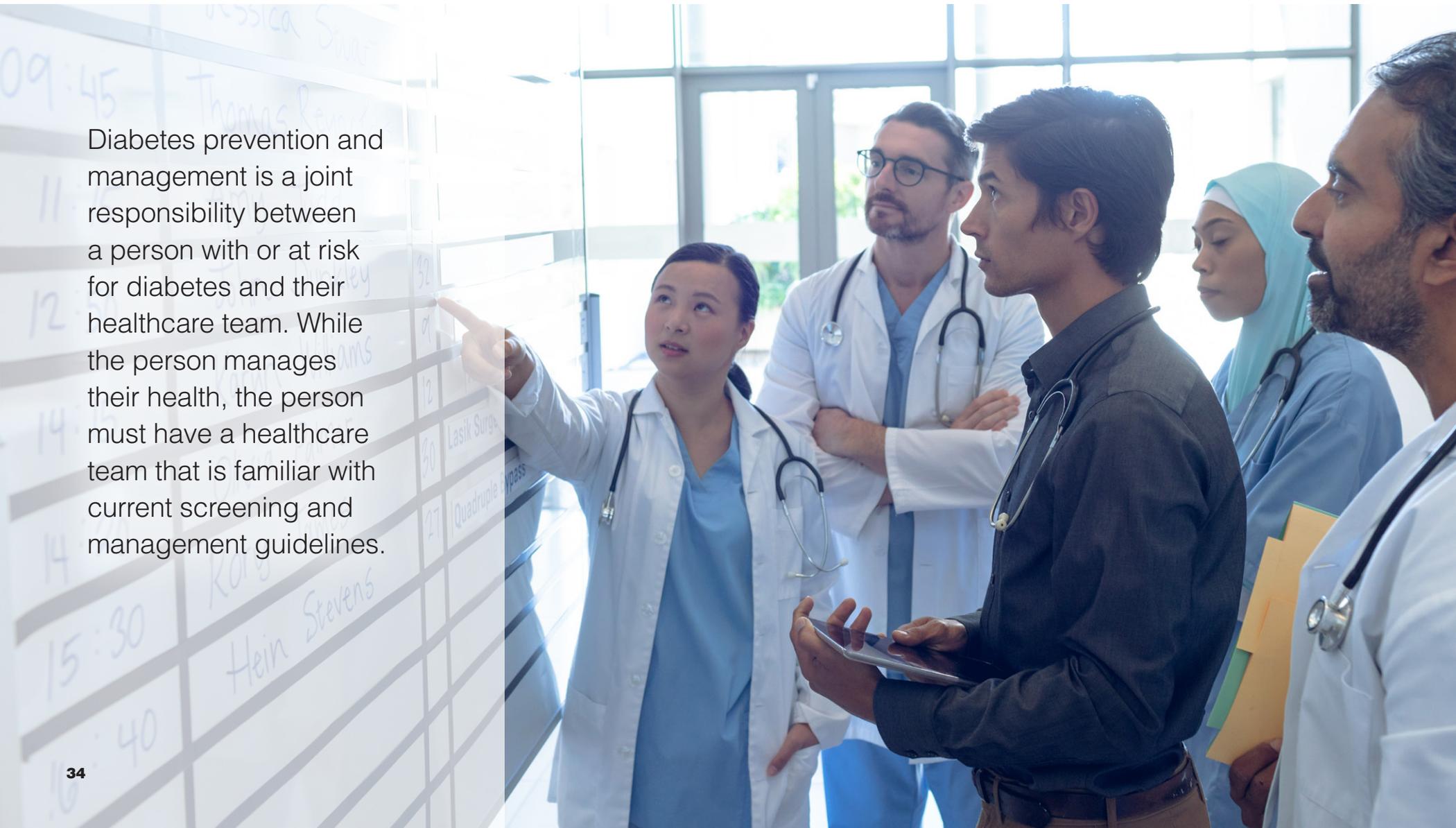
Consider this partial list of opportunities that your local government might do to encourage the prevention of diabetes through the encouragement of healthy body weight and adequate physical activity:

- Create complete streets and sidewalks.
- Support active transportation (walking, biking, transit).
- Develop shared and/or open use agreements so schools, libraries, and other sites can become places for community physical activity.
- Subsidize park, recreation, and fitness center memberships.
- Promote community gardens/urban agriculture.
- Encourage local stores to stock healthy foods.
- Develop licensing restrictions to reduce “food swamps.”
- Use menu/calorie labeling/appropriate portion sizes.
- Promote/support breastfeeding.
- Adopt healthy worksite policies.
- Pass a soda/sugar sweetened beverage tax.
- Offer on-site wellness programming (physical activity, nutrition, DPP) with focus on sites with at risk populations (police officers, firefighters, streets and sanitation workers, essential personnel).
- Support state Medicaid coverage for obesity treatment, National DPP, or DSMES.
- Double up food bucks for buying fruits and vegetables with SNAP at Farmers Markets.
- Provide universal healthcare and mental healthcare.
- Offer paid family leave.
- Be a leader in policy change that allows RNs and Pharmacists to be reimbursed for providing DSMES for persons who have Medicaid or private insurance in North Carolina.
- Be a leader in policy change and permanently make changes to Telehealth delivery and reimbursement of diabetes services that were approved during the COVID-19 public health emergency for Medicaid and private insurers in North Carolina.



What Can Healthcare Providers and Insurers Do?

Diabetes prevention and management is a joint responsibility between a person with or at risk for diabetes and their healthcare team. While the person manages their health, the person must have a healthcare team that is familiar with current screening and management guidelines.



Types of Healthcare Providers

Healthcare providers include those with general and specialized expertise in diabetes and its complications such as physicians, physician assistants, advanced practice nurses, pharmacists, podiatrists, ophthalmologists/optometrists, dentists, audiologists, registered dietitian nutritionists, nurses, diabetes care and education specialists, pharmacists, behavioral health/mental healthcare providers, and others. The healthcare provider counsels those at risk for diabetes on strategies to prevent or delay the onset of diabetes and its complications, makes the diagnosis of diabetes, and works with these individuals in managing their diabetes through lifestyle and behavioral changes, medication, and/or other therapies. *In addition, the healthcare provider is the only one who can refer someone with diabetes to recognized Diabetes Self-Management Education and Support (DSMES) services.* The term healthcare provider is commonly associated with physicians, physician assistants, and advanced practice nurses. However, there are many other healthcare providers (in addition to the ones listed above) who are important in diabetes care such as case managers, care coordinators, physical and occupational therapist, trainers and exercise physiologists. Community pharmacists and community health care workers have also developed unique roles in working with persons who have diabetes.

Community Pharmacists have a unique role in the care of people with diabetes. They are seen more often than most healthcare providers, with more accessibility and a collaborative relationship with people with diabetes. Community pharmacists greatly assist in medication therapy management and provide important safety checks with medications from multiple providers, a wellness coach on over the counter therapies, and a resource on various therapies available and affordable to people with diabetes. More community pharmacists are incorporating DSMES services into their practice as well. The inclusion of pharmacists within DSMES services and program development has led to increases in medication persistence by participants.^{114, 115}



Community Healthcare Workers (CHWs) are usually lay healthcare workers who can assist persons with diabetes, and their families as well as the community in general through education and other support services. CHWs typically work within their own communities, sharing linguistic, cultural, economic and social characteristics with those they serve. They tend to be trusted and respected which facilitates strong relationships within the community. CHWs also serve as bridges linking their community to healthcare systems and provide support, education and resources related to health crisis, preventions, maintenance or transitions of care. They serve as key links towards improving overall health of underserved communities, reducing health disparities, and improving health equity.¹¹⁶ A systematic review showed individuals who received interventions from CHWs improved their glycemic and lipid management and reduced their healthcare use.¹¹⁷ Additionally, the available economic evidence suggests the interventions of CHWs are cost-effective.¹¹⁸ Team-based strategies included adopting CHWs as members of the diabetes care team because they are realizing this could be an effective strategy to help people manage their diabetes. In 2017, the Community Preventive Services Task Force (CPSTF) initiated interventions that engaged community health workers to help patients manage their diabetes. These interventions were shown to improve patients' glucose and lipid management as well as reduce their healthcare use. Their interventions included education, support, coaching to improve glucose monitoring, taking medications as directed, healthy nutrition, physical activity, or weight management.

The **NC Community Health Worker Initiative** provides additional information. If your community does not have a CHW, the Centers for Chronic Disease Control and Prevention has developed a **CHW Toolkit**.

Challenges Faced by Healthcare Providers

North Carolina has made great strides in working to increase the availability of healthcare providers of all types across its diverse geography and communities. Nationally recognized programs such as Area Health Education Centers (AHEC), the state public health department and federally qualified health centers, strong commitment by the state's excellent institutions towards professional health education programs (medical, nursing, allied health), and leadership focused on developing physician assistants and advanced practice nurses, have all contributed to increasing high quality health care across diverse communities.

While having adequate numbers and distribution of healthcare providers has improved, there remain underserved communities and disparities described elsewhere in this Guide (see the section on Social Determinants of Health and Health Equity, p. 26). In addition, healthcare providers face other challenges such as adequate reimbursement for services and continuing education related to the adoption of new technologies, including telehealth. Also, with the ever-rapid increase in clinical developments, there is a need for quicker adaption of new therapeutic advances of proven value.

Therapeutic Inertia: Despite the availability of new technologies and therapies, about half of all people with diabetes in the United States continue to have blood sugar values above goal.¹¹⁹ In addition to supporting the care and management of each individual, the healthcare provider needs to stay informed as new therapeutic options become available, and as new information becomes available as to what may be more effective than previously thought. Clinical or therapeutic inertia, defined as the delay or lack of setting appropriate targets and progressing treatment to achieve the desired goal(s), is one of the largest barriers for healthcare providers and those they serve to adopt the latest advances in managing diabetes including monitoring, medications, and medication delivery.

One option to address therapeutic inertia may be working across disciplines or in team and group care models. Collaboration models, such as **Together 2 Goal**, allow healthcare providers to ensure best practices are being met.¹²⁰



Table 5: Understanding and Overcoming Therapeutic Inertia¹²¹

Did you know?

In the last 20 years despite more technology, more education and more drug therapies the average A1C for a person with diabetes has not changed. The number of people with an A1C over 9% has actually increased.

Treatment intensification is significantly behind recommendations.

Only 5% of people recently diagnosed with diabetes on Medicare are using DSMES services.

There is a significant gap in what people say they are willing to do and what physicians believe people are willing to do to reduce A1C.

Within one year of a diagnosis of diabetes, less than 50% of people are still taking the prescribed medication.

How healthcare providers and insurers can overcome therapeutic inertia:

Refer your first patient (or additional) people with prediabetes a to DPP program.

Stay up to date on emerging effective strategies—read and attend professional continuous education opportunities.

Consider being an early adopter for new therapies that interest you or those you treat and gain experience sooner than later to share with your those you treat.

Get involved in community, professional and other organizations whose mission is to reduce the burden of diabetes.

Partner with a Diabetes Care and Education Specialist to help bring emerging and effective therapies and technology into your practice or to those you treat.



Healthcare Insurers (“Payers”) also have multiple roles to play including:

For their insured members:

- Reimbursing persons with diabetes or their healthcare providers for covered services such as direct primary and specialty care, medications, equipment, and Diabetes Prevention Programs
- Establishing their own plan specific policy for what are and are not covered services

Participation with government, employers and advocacy groups:

- More broadly shaping reimbursement policy for what are covered services across North Carolina

Over the last decade in general in North Carolina the insured have experienced broader coverage for services, insulin and other medications, glucometer and testing supplies, vaccines, and participation in diabetes prevention programs especially for those at high risk. However, such coverage is still not universal.

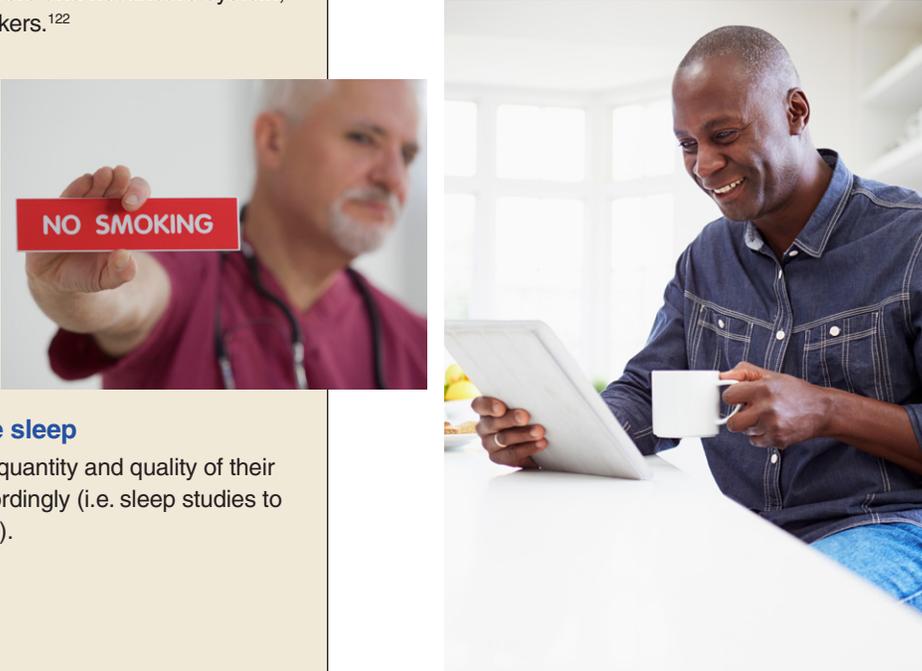
Recently several reimbursement issues driving policy deliberations in the state for broader coverage include:

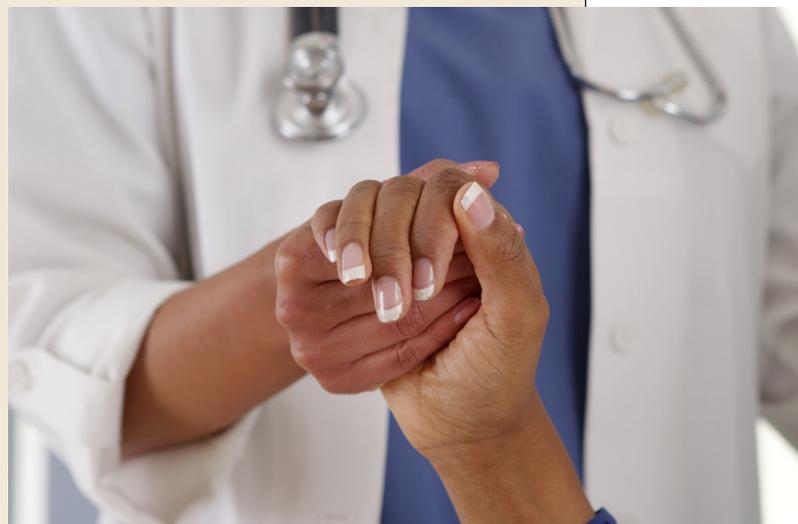
- **Universal reimbursement of Diabetes Prevention Programs**
- **Managed Medicaid**
- **Telehealth technology reimbursement**
- **Group medical or clinical visits**
- **Better reimbursement and coverage for DSMES and diabetes supplies, hearing aids, orthotics, reimbursement for pharmacists for DSMES**

Need for better reimbursement for telehealth services not only in rural areas with reduced healthcare access has been particularly emphasized across the state—urban, suburban and rural—due to the COVID-19 pandemic. Telehealth can provide a wide range of clinical and educational services including indirect care and diabetes prevention.

Additional ways healthcare insurers and providers can work together around policy change are included in Table 6.

Table 6: Activities for Healthcare Providers and Insurers

Diabetes Primary Prevention	Diabetes Prevention for People at High Risk	Diabetes Management and Prevention of Complications
<p>To help manage weight and/or participate in regular physical activity</p> <ol style="list-style-type: none"> 1. Advocate for walkable communities. 2. Refer people to evidence-based weight loss programs including those offered through diabetes prevention programs, or North Carolina’s Eat Smart, Move More, Weigh Less or a registered dietitian nutritionist for weight management. 3. Engage barbers and hair stylists as community ambassadors of diabetes prevention and management, supported by community grants, partnerships with insurers and healthcare system, community health workers.¹²² <p>To help live tobacco free</p> <ol style="list-style-type: none"> 1. Refer people to the Quitline. 2. Support programs like Escape the Vape to help educate on the dangers of vaping. <p>To promote adequate sleep</p> <ol style="list-style-type: none"> 1. Ask people about the quantity and quality of their sleep and advise accordingly (i.e. sleep studies to diagnose sleep apnea). 	<p>To help participation in diabetes prevention programs</p> <ol style="list-style-type: none"> 1. Refer people to diabetes prevention programs and build the referral into the electronic health record (may require A1C level with definite glucose metrics required). 2. Train community resource providers of diabetes prevention programs on how to provide feedback on program participation to healthcare providers. 	<p>To help participation in individual and/ or group Diabetes Self-Management Education and Support (DSMES) services</p> <ol style="list-style-type: none"> 1. Establish a professional relationship with hospital transition coordinators to ensure knowledge of local DSMES Services and develop integration of these services into discharge paperwork. 2. Partner with a sponsoring agency to become an expansion site to deliver DSMES services, either in person or via telemedicine. 3. Refer people with diabetes to recognized DSMES services and build the referrals into the electronic health record. 4. Consider the incorporation of a Diabetes Care and Education Specialist in the primary care office without the addition of a copay or separate visit for the person with diabetes. 5. Partner with local DSMES service providers, such as local pharmacies, podiatrists, ophthalmologists/optometrists, dentists, and audiologists.¹²³ 6. Ensure that DPP and DSMES are covered benefits for all and waive co-pays/ out of pocket deductibles. 7. Partner with CHWs in the communities to provide support, ongoing education, resources, and a link between providers and persons with prediabetes or diabetes.



To help with monitoring diabetes treatment for individual and population health

1. Develop standing orders for screening for diabetes.
2. Follow the United States Preventive Services Task Force screening recommendations and build it into the practice electronic health record.
3. Use plain language in communication with people with diabetes about diagnosis and plan of care. Consider health literacy and numeracy needs.
4. Follow clinical guidelines for diabetes care.
5. Encourage clinical decision support systems.
6. Work with Area Health Education Centers to improve continuing education about diabetes care.
7. Work with pharmacists to ensure that patients are taking the least expensive drugs that are appropriate for their condition, as well as simplification of medication plans to help reduce medication (pill) burden.
8. Follow clinical guidelines for post-partum screening of women who have had gestational diabetes.
9. Consider participating in the American Medical Group Association's Together 2 Goal program to ensure best practices.
10. Incorporate the use of technology in individualized treatment plans, including remote monitoring and real-time or flash continuous glucose monitoring.
11. Support the use of reimbursement of Telehealth for virtual clinical care and education.

What Can Employers Do?

Each year, the costs for diabetes, its complications, and associated diseases (comorbidities) continue to rise. In addition to the tremendous toll diabetes takes on individuals and families, it also has a significant impact in the workplace. People with diagnosed diabetes, on average, have medical expenses that are more than two times higher than those without diabetes. The national cost of diabetes in the United States in 2018 was more than \$327 billion, up from \$245 billion in 2012, a 26% increase.³⁶

Employers are in a unique position to address diabetes through prevention and management education and support of those with or at risk for diabetes. Employees spend more than one third of their

lives at work and are more likely to participate in health and nutrition education and physical activity offered in the workplace. Everyone benefits when employers work with their employees who have diabetes, or are at risk for diabetes, to improve productivity and lower health costs, as well as help employees stay in good physical and mental health.

Employers, large and small, should partner with local and state-wide community and government agencies to be engaged and take active roles in supporting not only their own employees, but workers and non-workers alike across North Carolina in reducing the risk for developing diabetes and supporting those who already do have diabetes.

Table 7: Activities for Employers

Diabetes Primary Prevention	Diabetes Prevention for People at High Risk	Diabetes Management and Prevention of Complications
<p>To help manage weight and/or follow healthy eating guidelines</p> <ol style="list-style-type: none"> 1. Post full nutrition information in cafeterias. 2. Offer healthful options within cafeterias and vending machines. 3. Establish regular Farmer's Markets at the worksite. 4. Provide educational/skill classes for healthy meal preparation. 5. Offer the benefit of employee participation in virtual or in-person Diabetes Prevention Programs through their health insurance programs. <p>To help manage weight and/or participate in regular physical activity</p> <ol style="list-style-type: none"> 1. Subsidize gym memberships. 2. Offer fitness centers or walking tracks on company property. 3. Sponsor weight loss programs which include a prize related to health such as the purchase of activity trackers. 	<p>To help participation in diabetes prevention education programs/CDC recognized lifestyle change programs</p> <ol style="list-style-type: none"> 1. Offer the benefit of employee participation in virtual or in-person Diabetes Prevention Programs through their health insurance programs. 2. Partner with a diabetes prevention program to offer classes at work. 3. Create direct referral links between worksites and DSMES services. 4. Offer on-site screening to identify employees with undiagnosed diabetes, prediabetes, and other risk factors. 5. Provide incentives for milestone and/or completing the program. 	<p>To help participation in individual and/or group self-management education programs</p> <ol style="list-style-type: none"> 1. Partner with healthcare providers, local public health, and community agencies to offer recognized Diabetes Self-Management Education and Support (DSMES) services at work. 2. Partner with local specialists for pharmacy, podiatry, optometry, dental, and audiology (PPOD+A) care. <p>To help persistence with personalized diabetes treatment plans</p> <ol style="list-style-type: none"> 3. Allow employees time off for diabetes screening and/or medical appointments without penalty. 4. Offer wellness programs to assist in diabetes management. These may include programs to: <ol style="list-style-type: none"> a. Offer coverage of insulin at the minimal co-pay/month.

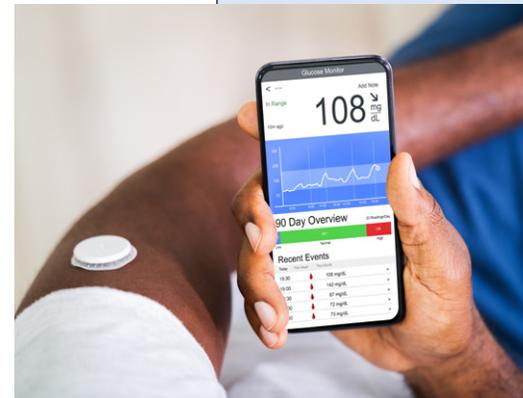
4. Promote stair climbing and walking at lunch.
5. Offer weight management programs as a covered benefit.
6. Offer the benefit of employee participation in virtual or in-person Diabetes Prevention Programs through their health insurance programs.

To help live tobacco free

1. Connect with Quitline and smoking cessation opportunities.
2. Offer insurance subsidies for non-smokers.

To promote adequate sleep

1. Establish at least 10 consecutive hours per day of protected time off-duty to allow workers to obtain no fewer than seven to eight hours of sleep.
2. Permit frequent brief rest breaks (e.g., every one to two hours) during mentally and physically demanding work, which are more effective against fatigue than a few longer breaks. Allow longer breaks for meals.
3. Schedule five eight-hour shifts or four 10-hour shifts per week, which are usually acceptable. Depending on the workload, 12-hour day shifts may be tolerated when interspersed with days off. During the evening and night, shorter shifts (e.g., eight hours) are better tolerated than longer shifts.
4. Examine work demands with respect to shift length. Twelve-hour shifts are more acceptable for “lighter” tasks (e.g., desk work).
5. Plan one to two full days of rest following five consecutive eight-hour shifts or four consecutive 10-hour shifts. Consider two rest days after three consecutive 12-hour shifts.
6. Provide training to inform workers of the challenges linked to shift work and long work hours and what resources are available to them to help with any difficulty they are having with their work schedule.
7. Examine close calls and incidents to determine the role, if any, of fatigue as a root cause or contributing cause to the incident.



- b. Offset the cost of medications for persons.
- c. Offer premium reductions for persons who maintain an A1C at their individualized goal.
- d. Offset costs of testing supplies and medications to assist in higher levels of self-management.
5. Offer health screenings at work, particularly on diabetes point days (e.g., Diabetes Alert Day, National Diabetes Month) including screenings for complications (eye, hearing, feet).
6. Cover insulin pumps as a co-pay instead of as durable medical equipment.
7. Offer refrigerators at work for insulin storage.
8. Ensure that your benefits package allows for similar co-pays on insulin pens and insulin vials.
9. Cover continuous glucose monitors for all peoples with diabetes, regardless of type of diabetes, as a co-pay instead of as durable medical equipment.
10. Avoid the use of restricted formularies as these tend to highly limit the medications available to people and tie the hands of healthcare professionals as to what may work best for the people being treated.

What Else Can North Carolina Do Together?

Given the enormity of the diabetes epidemic and the number of people at high risk of developing diabetes, approaches aimed exclusively at individual behavior change are inadequate. Improvements in policy and environmental factors that enable and reinforce healthy eating and active lifestyles are needed for widespread and sustained behavior change and overall impact.¹²⁴

The coordination of advocacy, formulating, and implementing policy to benefit our society can be roles for all the stakeholders highlighted in this Guide. The State of North Carolina has a special responsibility in coordinating these efforts and helping them make a difference.

Here we will call out just a few examples of many relevant opportunities for what we can do as North Carolinians to have broad impact across the state in reducing the burden of diabetes.

- Living Tobacco Free
- Improving Nutrition and Reducing Obesity
- Improved health coverage for all
- Offer health screenings at work, particularly on diabetes point days (e.g., Diabetes Alert Day, National Diabetes Month) including screenings for complications (eye, hearing, feet)
- Cover continuous glucose monitors for all peoples with diabetes, regardless of type of diabetes, as a co-pay instead of as durable medical equipment

Living Tobacco Free

Given the serious implications of smoking, living tobacco free is a key public health strategy to prevent and manage the epidemic of diabetes. It is extremely important for people to stop smoking, but prevention is critical, and a multi-component approach is required to prevent people from starting to use tobacco. According to the **Surgeon General's report on Smoking and Tobacco**, nearly all tobacco use begins during youth and young adulthood. Policies and programs that make tobacco use more difficult and less accepted can help prevent young people from using tobacco.

Policies that change the environment to support and encourage a tobacco-free life (cigarette smoking, vaping, and chewing) have also been found to be very effective in smoking prevention. For instance, making tobacco products less affordable, restricting tobacco marketing, banning smoking in public places and requiring labeling on tobacco packages are some policies that have been successful in deterring youth from starting tobacco use.¹²⁵ Additionally, mass-reach health communication interventions, primarily television broadcasts, have proven effective to reduce initiation among young people.

The most effective strategies to prevent tobacco use should combine elements such as use of evidence-based curricula and policy changes and should be implemented in a variety of settings such as work, home,

school, healthcare, and in public places. Smoking cessation can be one of the most effective lifestyle interventions in limiting the burden of diabetes. Studies have reported that smoking cessation reduces the risk for diabetes to the level of non-smokers after five years of cessation for women and 10 years for men. Smoking cessation improves blood sugar management by increasing insulin reception and reducing the risk of diabetes-related complications.¹²⁶ The following strategies have proven effective to help smokers quit:

- Advice and assistance on quitting provided by a healthcare provider.
- Individual, group or telephone counseling.
- Behavioral therapies.
- Treatment with more one-on-one contact and more intensity.
- Programs that deliver treatments using mobile phones.
- Medications: over-the counter and prescription.

Secondhand smoke, also known as passive smoking, is the inhalation of tobacco smoke by those other than the actual (active) smoker. It is linked to many of the same diseases as smoking including lung cancer, respiratory disease and cardiovascular disease. Studies have reported that the incidence of Type 2 diabetes increases with exposure to secondhand smoke during childhood and adulthood.¹²⁷ Smoking bans and increased smoke-free environments may prove to be an important approach in reducing the incidence of Type 2 diabetes. Policies that prohibit smoking indoors reduce exposure to secondhand smoke, reduce the number of cigarettes smoked each day and increase the number of smokers who quit.

Improving Nutrition and Reducing Overweight and Obesity

North Carolina has a plan to address overweight and obesity by advocating how we balance how we eat, drink and move called *North Carolina's Plan to address Overweight and Obesity*.¹¹² It outlines eight core behaviors, including those at the public policy and environmental

levels, would reduce overweight and obesity: move more; eat more healthy food, less junk and fast food; eat more fruits and vegetables; drink more water, drink fewer sugar sweetened beverages; sit less; start and continue to breastfeed; get enough sleep; and manage stress.

Improved Health Coverage for All

North Carolina is currently one of only a few states that have rejected federal dollars to expand Medicaid Expansion that was originally part of the Affordable Care Act. Medicaid expansion removes barriers for people with chronic diseases like diabetes by allowing people to qualify based on income, rather than on disability. Medicaid expansion would offer health insurance to the hundreds of thousands of North Carolinians who make too much money to qualify for traditional Medicaid, but do not earn enough to qualify for subsidies to buy an insurance plan on the Affordable Care Act marketplace. People who qualify for Medicaid include low-income children, low-income pregnant women, poor elderly, and people with disabilities.¹²⁸

Low-income adults who are currently ineligible for Medicaid and too poor for premium subsidies through the federal Health Insurance Marketplace fall in what has been called the “Medicaid Gap.” A study performed by the North Carolina Institute of Medicine found that those in the Medicaid gap compared to those above the federal poverty guidelines were 3 times as likely to have *no* regular source of care and twice as likely to report delaying needed care due to cost. They were also more likely to have multiple chronic conditions or a functional disability, have numerous healthcare access barriers and lower use of preventive care.¹²⁹ There are 389,000 uninsured adults, mostly low income without dependents who are in the “Medicaid Gap” in North Carolina.¹³⁰

Research on early experiences of several states who have participated in Medicaid expansion show improvements in access to healthcare, diabetes management, and health status. Non-Medicaid expansion states with high diabetes rates may be facing health inequalities. These findings provide policy implications for the diabetes care community and policy makers.¹³¹

We Will Be Successful When We Reach Our Goals

Accomplishing the following overarching goals will reduce the burden of diabetes in our state:

- Support efforts to find a cure for diabetes
- Lower the risk of pregnant women developing gestational diabetes so they and their babies can live healthy lives
- Increase efforts to reduce the incidence and prevalence of diabetes, including supporting the development and implementation of DPP programs across the state
- Decrease the rate of deaths directly and indirectly associated with diabetes
- Increase access to healthcare and personal care resources to reduce the risk of diabetes-related complications, particularly through DSMES programs
- Ensure that community stakeholders of all types are engaged and take action to create environments that support diabetes prevention as well as adequate education and care for those with diabetes including supporting behaviors that promote
 - Healthy weight
 - Healthy eating
 - Regular physical activity
 - Tobacco free
 - Adequate sleep



While there are a number of measures that are might be used to indicate changes in the burden of diabetes in North Carolina and monitor our progress towards our goals, collecting baseline and periodic outcome data consistently presents a number of challenges and will have to be left up to others.

We may however be able to assess the impact of this guide by documenting and measuring

- Presentations about and distributions of the guide at state conferences (e.g., NC Public Health Association, NC Primary Care Conference, NC Chronic Disease Conference, NC American Indian Unity Conference) and to state policymakers
- Distribution of print versions of the guide to stakeholders, particularly to those who work with populations at high risk for diabetes and its complications
- Number of times electronic versions of the guide are accessed via the NC DAC website and social media page
- Results of efforts of NC DAC members to advocate for guide implementation
- Communication and feedback on a regular basis at NC DAC meetings to ensure the guide is being effectively implemented

We will also know we are being successful in our goal of reducing the burden of diabetes when:

- Persons at risk for diabetes change behaviors enough to prevent progression of prediabetes to diabetes
- Everyone uses person-centric, affirmative, enabling, non-judgmental language when dealing with diabetes
- We prevent complications of all types, for those with diabetes, especially
 - Heart disease
 - Stroke
 - Kidney disease, including dialysis
 - Blindness
 - Amputation
 - Hearing loss
 - Risk of falls
- Everyone concerned about diabetes has access and affordability to
 - Medical treatment
 - Medications including insulin
 - Education
 - Diabetes Technology
- Community stakeholders of all types are engaged and take action to create environments that support diabetes prevention as well as adequate education and care for those with diabetes including supporting healthy behaviors that promote
 - Healthy weight
 - Healthy eating
 - Regular physical activity
 - Tobacco free
 - Adequate sleep





How This Guide Was Developed

NC Diabetes Advisory Council

The NC Diabetes Advisory Council (DAC) was created in 1988 as an advisory group to the NC Division of Public Health. When the DAC was first established, there were over 300 different sets of standardized clinical guidelines for diabetes management. In 1996, the American Diabetes Association published its first supplement, which organized all current standards and clinical recommendations for diabetes care and management, position and consensus statements, as well as the National Standards for DSME, into one issue of Diabetes Care, called a Supplement,¹³² which has been published in January ever since. The DAC received these and developed a uniform set of patient and provider clinical guidelines that were dispersed throughout the state. The DAC worked with NC Division of Public Health staff to create a diabetes self-management education curriculum prior to development of formal education curricula by either the American Association of Diabetes Educators or the American Diabetes Association.



North Carolina Diabetes Advisory Council

The DAC was vital in ensuring that North Carolina enacted legislation requiring insurance companies to cover diabetes medication, supplies and education. Thanks to the work of the DAC and legislators, North Carolina was one of the first states to pass legislation to protect schoolchildren with diabetes. The DAC serves as a professional resource for the NC Division of Public Health. The membership is comprised of health professionals, providers, community and business leaders, persons with diabetes, advocacy groups, coalitions, stakeholders, partners, etc., who are all committed to reducing the burden of diabetes in North Carolina. The council for the group is led by a chair and vice chair who represent both the clinical, research, and community aspects of diabetes prevention and management. It is staffed by a coordinator who works for the NC Division of Public Health. The group meets in person (or virtually depending on limitations) three times a year, and the chair, vice-chair and coordinator meet monthly to plan activities and carry out assignments. The by-laws also allow for ad-hoc committee meetings as needed. The three annual DAC council meetings include topics relevant to diabetes prevention and management information outlined in this Guide.

Guide Development Process

The *2020 Guide to Diabetes Prevention and Management* was developed to build on the successful strategy used to create the *2015–2020 Guide*. The previous *Guide* was influenced by the *NC Diabetes Strategic Plan (2011–2012)*, the *NC Coordinated Chronic Disease and Injury Prevention State Plan (2013)*, and the *NC Legislative Diabetes Action Plan (2015)*, and through collaborations with representatives from the Center for Health Law and Policy Innovation at the Harvard Law School Public Policy Innovation Center, Kate B. Reynolds Charitable Trust, and Centers for Disease Control and Prevention.

The *2020 Guide* has expanded the focus on health disparities/health equity and social determinants of health. There is compelling evidence indicating that social determinants are a major driving force behind the rise and racial/ethnic disparities in diabetes in our state and across the county. The team also felt it was important to ensure that the *2020 Guide* aligned with other statewide guides with similar missions with the NC DAC, including those developed by Eat Smart Move More NC and the Justus-Warren Heart Disease and Stroke Prevention Task Force.

For the *2020 Guide*, a writing team led by **Jan Nicollerat**, MSN, ACNS-BC, CDCES (NC DAC Vice Chair), and **Joseph Konen**, MD, MSPH (former NC DAC Chair and current Council member). The team was supported in their efforts by **Carolyn Crump**, PhD, and **Robert J. Letourneau**, MPH, from *UNC Healthy Solutions* in the Department of Health Behavior, Gillings School of Global Public Health at the University of North Carolina at Chapel Hill. In addition to Ms. Nicollerat and Dr. Konen, team members included NC DAC members (in alphabetical order):

- **Ronny Bell**, PhD, MS (NC DAC Chair, Professor and Chair, ECU Department of Public Health)
- **Laura Edwards**, RN, MPA (President and CEO, Collaborative Health Solutions)
- **Kristie Hicks**, MPH, CHES (Diabetes Prevention Program Coordinator, Division of Public Health, Community and Clinical Connections for Prevention and Health Branch)
- **Chris E. Memering**, MSN, RN, CDCES, FADCES (Inpatient Diabetes Care and Education Specialist at CarolinaEast Medical Center, and 2019–2021 Association of Diabetes Care & Education Specialist Board of Directors Member)
- **Joanne Rinker**, MS RDN, CDCES, LDN, FADCES (Director of Practice and Content Development at Association of Diabetes Care & Education Specialists)

Beginning in Fall 2019, the team reviewed recent research evidence and policies to update recommendations from the *2015–2020 Guide*. Each team member was assigned sections of the *2015–2020 Guide*, with the assignment to ensure that the most recent evidence base was used to inform the structure of the new *Guide*. The team met in person and by phone in 2020 and reviewed drafts of *Guide* sections.

After several additional rounds or revisions from the leadership of the writing team, external reviewers provide feedback, which was incorporated into the *Guide* by the writing team leadership. Reviewers included (in alphabetical order)

- **Kathy Dowd**, AuD, CCC-A, The Audiology Project
- **Susan Kansagra**, MD, MBA Chronic Disease and Injury (CD) Section, NC Division of Public Health
- **Raven King Edwards**, MPH, Office of Minority Health and Health Disparities, NC Department of Health and Human Services
- **Sanga Krupakar**, MD, MSPH, North Carolina Community Health Center Association
- **Deb Porterfield**, MD, MPH, Department of Family Medicine, School of Medicine, The University of North Carolina at Chapel Hill
- **April Reese**, National Association of Chronic Disease Directors
- **Carmen Samuel-Hodge**, RD, PhD, Department of Nutrition, Gillings School of Global Public Health, The University of North Carolina at Chapel Hill
- **Tish Singletary**, Community and Clinical Connections for Prevention and Health Branch, CDI Section, NC Division of Public Health
- **Susan Spratt**, MD, Duke University Department of Medicine, Division of Endocrinology, Metabolism and Nutrition

- **Sheree Thaxton Vodicka**, MA, North Carolina Alliance of YMCAs
- **Marti Wolf**, RN, MPH, PCMH CCE, North Carolina Community Health Center Association (retired)
- **Cornell Wright**, MPA, Office of Minority Health and Health Disparities, NC Department of Health and Human Services
- **Larry Wu**, MD, Blue Cross and Blue Shield of North Carolina

After the *2020 Guide* was formatted, members of the NC DAC reviewed and provided input. The *Guide* was finalized and launched on August 27, 2020. The *Guide* will be available on the [Diabetes North Carolina website](#).



Appendix: Websites for Diabetes Prevention and Management

**These websites are provided for those who want to prevent and manage diabetes.
This list is not comprehensive.**

Association of Diabetes Care & Education
Specialists
diabeteseducator.org

American Diabetes Association
diabetes.org

CDC Diabetes
cdc.gov/diabetes/home

CDC Diabetes Prevention Recognition
Program
cdc.gov/diabetes/prevention/recognition

Diabetes Advocacy Alliance
diabetesadvocacyalliance.org

Diabetes at Work
diabetesatwork.org

Diabetes Patient Advocacy Coalition
diabetespac.org

Diabetes Sisters
diabetessisters.org

Juvenile Diabetes Research Foundation
jdrf.org

National Diabetes Education Program
ndep.nih.gov

National Diabetes Prevention Program
**cdc.gov/diabetes/prevention/prediabetes.
htm**

National Institute of Diabetes and Digestive
and Kidney Diseases
niddk.nih.gov

NC Division of Public Health
diabetesnc.com
diabetesfreenncc.com
diabetesmanagementnc.com

Partnerships for Prescription Assistance
pparx.org

Taking Control of Your Diabetes (TCOYD)
tcoyd.org

References

1. Annual Report: North Carolina Summary 2019. America's Health Rankings, United Health Foundation. americashealthrankings.org/explore/annual/measure/Diabetes/state/NC. Accessed July 9, 2020.
2. Centers for Disease Control and Prevention. *National Diabetes Statistics Report, 2020*. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services. 2020; page 10. cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf.
3. Diabetes Mortality by State. National Center for Health Statistics. cdc.gov/nchs/pressroom/sosmap/diabetes_mortality/diabetes.htm. Updated April 29, 2020. Accessed July 9, 2020.
4. Konec J, Page J. The state of diabetes in North Carolina. *N C Med J*. 2011; 72(5): 373-378. classic.ncmedicaljournal.com/wp-content/uploads/2011/09/72505-web.pdf.
5. Israel BA, Schulz AJ, Parker EA, Becker AB, Allen AJ, Guzman JR. Critical issues in developing and following CBPR principles. In Minkler M, Wallerstein N, ed. *Community-based participatory research for health*. San Francisco, CA: Jossey-Bass; 2003:53-76.
6. Models and Frameworks for the Practice of Community Engagement. Agency for Toxic Substances and Disease Registry. atsdr.cdc.gov/communityengagement/pce_models.html. Updated June 25, 2015. Accessed July 10, 2020.
7. Dickinson JK, Guzman SJ, Maryniuk MD, O'Brian CA, Kadohiro JK, Jackson RA, et al. The use of language in diabetes care and education. *The Diabetes Educator*. 2017 Dec 1; 43(6): 551-564. doi.org/10.1177/0145721717735535.
8. American Diabetes Association. Standards of Medical Care in Diabetes—2020. *Diabetes Care*. 2020 Jan; 43(S1): S1-S212. doi.org/10.2337/dc20-S1NT.
9. Boyko EJ, Seelig AD, Ahroni JH. Limb- and person-level risk factors for lower-limb amputation in the Prospective Seattle Diabetic Foot Study. *Diabetes Care*. 2018 Apr; 41(4): 891-898. doi.org/10.2337/dc17-2210.
10. American Diabetes Association. Standards of Medical Care in Diabetes—2015. *Diabetes Care*. 2015 Jan; 38 (S1): S11, S38. care.diabetesjournals.org/content/38/Supplement_1.
11. Centers for Disease Control and Prevention. *National Diabetes Statistics Report, 2020*. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services. 2020. cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf.
12. Diabetes Overview: Diagnosis. American Diabetes Association. diabetes.org/a1c/diagnosis. Accessed July 8, 2020.
13. The Surprising Truth About Prediabetes. cdc.gov/diabetes/library/features/truth-about-prediabetes.html. Updated June 11, 2020. Accessed July 8, 2020.
14. Gestational Diabetes. cdc.gov/diabetes/basics/gestational.html. Updated May 30, 2019. Accessed July 8, 2020.
15. Gestational Diabetes and Pregnancy. cdc.gov/pregnancy/diabetes-gestational.html. Updated February 27, 2020. Accessed July 8, 2020.
16. American Diabetes Association. Management of Diabetes in Pregnancy: Standards of Medical Care in Diabetes—2020. *Diabetes Care*. 2020 Jan; 43(S1): S190. doi.org/10.2337/dc20-S014.
17. American Diabetes Association. Management of Diabetes in Pregnancy: Standards of Medical Care in Diabetes—2020. *Diabetes Care*. 2020 Jan; 43(S1): S183-S192. doi.org/10.2337/dc20-S014.
18. Type 2 Diabetes. cdc.gov/diabetes/basics/type2.html. Updated May 30, 2019. Accessed July 8, 2020.
19. American Diabetes Association. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes—2020. *Diabetes Care*. 2020 Jan; 43(S1): S19-20. doi.org/10.2337/dc20-S002.
20. 2018 BRFSS Survey Results: North Carolina, Prediabetes. NC State Center for Health Statistics. schs.dph.ncdhhs.gov/data/brfss/2018/nc/all/prediab.html. Published August 16, 2019. Accessed July 8, 2020.
21. Prediabetes – Your Chance to Prevent Type 2 Diabetes. cdc.gov/diabetes/basics/prediabetes.html. Updated June 11, 2020. Accessed July 8, 2020.
22. 2012 BRFSS Survey Results: North Carolina, Diabetes. NC State Center for Health Statistics. schs.dph.ncdhhs.gov/data/brfss/2012/nc/all/DIABETE3.html. Accessed November 20, 2013.
23. Divers J, Mayer-Davis EJ, Lawrence JM, et al. Trends in incidence of type 1 and type 2 diabetes among youths—Selected counties and Indian reservations, United States, 2002–2015. *MMWR Morb Mortal Wkly Rep*. 2020; 69: 161–165. doi.org/10.15585/mmwr.mm6906a3.
24. 2012 BRFSS Survey Results: North Carolina, Diabetes. NC State Center for Health Statistics. schs.dph.ncdhhs.gov/data/brfss/2012/nc/all/DIABETE3.html. Published August 2, 2013. Accessed November 20, 2013.
25. Young LA et al. Diabetes in North Carolina: Descriptive epidemiology and meaningful use of electronic health records. *N C Med J*. 2011 Sep-Oct; 72(5): 383-386. ncbi.nlm.nih.gov/pmc/articles/PMC3392185.
26. 2012 BRFSS Survey Results: North Carolina, Diabetes—African Americans. NC State Center for Health Statistics. schs.dph.ncdhhs.gov/data/brfss/2012/nc/afam/DIABETE3.html. Published August 6, 2013. Accessed November 20, 2013.
27. North Carolina Resident Population Health Data by Race and Ethnicity. NC State Center for Health Statistics. schs.dph.ncdhhs.gov/schs/pdf/NCPopHealthDataByRaceEthOct2019v2.pdf. Published October 2019. Accessed July 8, 2020.
28. Leading Causes of Death, North Carolina Residents, 2012. NC State Center for Health Statistics. schs.dph.ncdhhs.gov/data/vital/lcd/2012/pdf/TblsA-F.pdf. Published December 2013. Accessed March 10, 2014.
29. North Carolina Department of Health and Human Services, Office of Minority Health and Health Disparities. *Racial and Ethnic Health Disparities in North Carolina: North Carolina Health Equity Report 2018*. schs.dph.ncdhhs.gov/SCHS/pdf/MinorityHealthReport_Web_2018.pdf. Accessed March 1, 2020.
30. 2018 BRFSS Survey Results: North Carolina, Diabetes. NC State Center for Health Statistics. schs.dph.ncdhhs.gov/data/brfss/2018/nc/all/DIABETE3.html. Published August 16, 2019. Accessed April 8, 2020.
31. 2018 BRFSS Survey Results: Piedmont North Carolina, Chronic Health Conditions. NC State Center for Health Statistics. schs.dph.ncdhhs.gov/data/brfss/2018/pied/DIABETE3.html. Published August 16, 2019. Accessed July 8, 2020.
32. Barker LE et al. Geographic distribution of diagnosed diabetes in the U.S.: A diabetes belt. *Am J Prev Med*. 2011 Apr; 40(4): 434-439. doi.org/10.1016/j.amepre.2010.12.019.
33. Harding JL et al. Trends of nontraumatic lower-extremity amputation in end-stage renal disease and diabetes: United States, 2000-2015. *Diabetes Care*. 2019 Aug; 42(8): 1430-1435. doi.org/10.2337/dc19-0296.
34. Norton JM et al. Social determinants of racial disparities in CKD. *JASN*. 2016 Sep; 27(9): 2576-2595. doi.org/10.1681/ASN.2016010027.
35. Glantz NM et al. Racial disparities in the burden of end-stage renal disease due to diabetes among Medicare beneficiaries. *Diabetes*. 2018 Jul; 67(S1). doi.org/10.2337/db18-1281-P.

36. The Cost of Diabetes. American Diabetes Association. diabetes.org/resources/statistics/cost-diabetes. Accessed July 8, 2020.
37. American Diabetes Association. Economic costs of diabetes in the U.S. in 2012. *Diabetes Care*. 2013 Apr; 36(4): 1033, 1038. doi.org/10.2337/dc12-2625.
38. American Diabetes Association. Economic costs of diabetes in the U.S. in 2017. *Diabetes Care*. 2018 May; 41(5): Supplementary data. doi.org/10.2337/dci18-0007.
39. Inpatient Hospital Utilization and Charges by Principal Diagnosis and County of Residence, North Carolina, 2018. NC State Center for Health Statistics. schs.dph.ncdhhs.gov/data/databook. Accessed June 12, 2019.
40. Guh DP, Zhang W, Bansback N, Amarsi Z, Birmingham CL, Anis AH. The incidence of co-morbidities related to obesity and overweight: A systematic review and meta-analysis. *BMC Public Health*. 2009 Mar 25; 9: 88. doi.org/10.1186/1471-2458-9-88.
41. Franz MJ. Weight management: Obesity to diabetes. *Diabetes Spectrum*. 2017 Aug; 30(3): 149-153. doi.org/10.2337/ds17-0011.
42. American Diabetes Association. Facilitating behavior change and well-being to improve health outcomes: Standards of Medical Care in Diabetes—2020. *Diabetes Care*. 2020 Jan; 43(S1): 50-54. doi.org/10.2337/dc20-S005.
43. Evert AB, Dennison M, Gardner CD, Garvey WT, Lau KHK, MacLeod J, Mitri J, Pereira RF, Rawlings K, Robinson S, Saslow L, Uelmen S, Urbanski PB, Yancy WS Jr. Nutrition therapy for adults with diabetes or prediabetes: A consensus report. *Diabetes Care*. 2019 May; 42(5): 731-754. doi.org/10.2337/dci19-0014.
44. Hirahatake KM, Bruno RS, Bolling BW, Blesso C, Alexander LM, Adams SH. Dairy foods and dairy fats: New perspectives on pathways implicated in cardiometabolic health. *Adv Nutr*. 2020 Mar 1; 11(2): 266-279. doi.org/10.1093/advances/nmz105.
45. Bhupathi V, Mazariegos M, Cruz Rodriguez JB, Deoker A. Dairy intake and risk of cardiovascular disease. *Curr Cardiol Rep*. 2020 Jan 29; 22(3): 11. doi.org/10.1007/s11886-020-1263-0.
46. Fontecha J, Visitación Calvo M, Juarez M, Gil A, Martínez-Vizcaino V. Milk and dairy product consumption and cardiovascular diseases: An overview of systematic reviews and meta-analyses. *Adv Nutr*. 2019 May 1; 10(S2): S164-S189. doi.org/10.1093/advances/nmy099.
47. Malik VS, Hu FB. Fructose and cardiometabolic health: what the evidence from sugar-sweetened beverages tells us. *J Am Coll Cardiol*. 2015 Oct; 66(14): 1615–1624. doi.org/10.1016/j.jacc.2015.08.025.
48. Rogers PJ, Hogenkamp PS, de Graaf C, et al. Does low-energy sweetener consumption affect energy intake and body weight? A systematic review, including meta-analyses, of the evidence from human and animal studies. *Int J Obes*. 2016 Mar; 40(3): 381–394. doi.org/10.1038/ijo.2015.177.
49. Azad MB, Abou-Setta AM, Chauhan BF, et al. Nonnutritive sweeteners and cardiometabolic health: A systematic review and meta-analysis of randomized controlled trials and prospective cohort studies. *CMAJ*. 2017 Jul 17; 189(28): E929–E939. doi.org/10.1503/cmaj.161390.
50. Horne BD, Grajower MM, Anderson JL. Limited evidence for the health effects and safety of intermittent fasting among patients with type 2 diabetes. *JAMA*. 2020 July 2. doi.org/10.1001/jama.2020.3908.
51. Simple Steps to Preventing Diabetes. Harvard T.H. Chan School of Public Health. hsph.harvard.edu/nutritionsource/preventing-diabetes-full-story/#diet. Accessed July 9, 2020.
52. AlEsa H, Bupathiraju S, Malik V, Wedick N, Campos H, Rosner B, Willett W, Hu FB. Carbohydrate quality, measured using multiple carbohydrate quality metrics, is negatively associated with risk of type 2 diabetes in US women. *Circulation*. 2015 Mar 4; 131(S1): A20. ahajournals.org/doi/abs/10.1161/circ.131.suppl_1.20.
53. NCCDPHP Division of Nutrition and Physical Activity. *Research to Practice Series No. 2: Portion Size*. Atlanta, GA: Centers for Disease Control and Prevention. 2006. [cdc.gov/nccdphp/dnpa/nutrition/pdf/portion_size_research.pdf](https://www.cdc.gov/nccdphp/dnpa/nutrition/pdf/portion_size_research.pdf).
54. Ahn DT, Stahl R. Is there an app for that? The pros and cons of diabetes smartphone apps and how to integrate them into clinical practice. *Diabetes Spectrum*. 2019 Aug; 32(3): 231-236. doi.org/10.2337/ds18-0101.
55. Ding C, Chan Z, Magkos F. Lean, but not healthy: the 'metabolically obese, normal-weight' phenotype. *Curr Opin Clin Nutr Metab Care*. 2016 Nov; 19(6): 408-417. doi.org/10.1097/MCO.0000000000000317.
56. Perceived Exertion (Borg Rating of Perceived Exertion Scale). [cdc.gov. cdc.gov/physicalactivity/basics/measuring/exertion.htm](https://www.cdc.gov/physicalactivity/basics/measuring/exertion.htm). Updated April 10, 2020. Accessed July 9, 2020.
57. U.S. Department of Health and Human Services. *The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. 2014. [cdc.gov/tobacco/data_statistics/sgr/50th-anniversary/index.htm](https://www.cdc.gov/tobacco/data_statistics/sgr/50th-anniversary/index.htm). Accessed September 11, 2015.
58. Foy CG, Bell FA, Farmer DR, Goff DC, Wagenknecht LE. Smoking and incidence of diabetes among U.S. adults: Findings from the insulin resistance atherosclerosis study. *Diabetes Care*. 2005 Oct; 28(10): 2501-2507. doi.org/10.2337/diacare.28.10.2501.
59. How Does Nicotine Affect Blood Sugar? WebMD.com. [webmd.com/diabetes/nicotine-blood-sugar](https://www.webmd.com/diabetes/nicotine-blood-sugar). Published July 1, 2019. Accessed March 25, 2020.
60. American Diabetes Association. Facilitating behavior change and well-being to improve health outcomes: Standards of Medical Care in Diabetes—2020. *Diabetes Care*. 2020 Jan; 43(S1): S48-S65. doi.org/10.2337/dc20-S005.
61. Altun I, Cinar N, Dede C. The contributing factors to poor sleep experiences in according to the university students: A cross-sectional study. *J Res Med Sci*. 2012 Jun; 17(6): 557–561. [ncbi.nlm.nih.gov/pmc/articles/PMC3634295](https://pubmed.ncbi.nlm.nih.gov/pmc/articles/PMC3634295).
62. Tononi G, Cirelli C. Sleep function and synaptic homeostasis. *Sleep Med Rev*. 2006 Feb; 10(1): 49-62. doi.org/10.1016/j.smrv.2005.05.002.
63. U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute. *Your Guide to Healthy Sleep*. 2005 Nov, revised 2011 Aug; NIH Publication No. 11-5271. [nhlbi.nih.gov/files/docs/public/sleep/healthy_sleep.pdf](https://www.nhlbi.nih.gov/files/docs/public/sleep/healthy_sleep.pdf).
64. Vetter C, Dashti HS, Lane JM, Anderson SG, Schernhammer ES, Rutter MK, Saxena R, Scheer FAJL. Night shift work, genetic risk, and type 2 diabetes in the UK biobank. *Diabetes Care*. 2018 Apr; 41(4): 762-769. doi.org/10.2337/dc17-1933.
65. Gami AS, Olson EJ, Shen WK, et al. Obstructive sleep apnea and the risk of sudden cardiac death: A longitudinal study of 10,701 adults. *J Am Coll Cardiol*. 2013 Aug 13; 62(7): 610–616. doi.org/10.1016/j.jacc.2013.04.080.
66. Pippitt K, Li M, Gurgle HE. Diabetes mellitus: Screening and diagnosis. *Am Fam Physician*. 2016 Jan 15; 93(2): 103-109. [aafp.org/afp/2016/0115/p103.html](https://www.aafp.org/afp/2016/0115/p103.html).
67. Diabetes Risk Factors. [cdc.gov. cdc.gov/diabetes/basics/risk-factors.html](https://www.cdc.gov/diabetes/basics/risk-factors.html). Updated March 24, 2020. Accessed February 24, 2020.
68. National Diabetes Prevention Program. [cdc.gov. cdc.gov/diabetes/prevention/index.html](https://www.cdc.gov/diabetes/prevention/index.html). Updated August 10, 2019. Accessed July 9, 2020.
69. PCOS (Polycystic Ovary Syndrome) and Diabetes. [cdc.gov. cdc.gov/diabetes/basics/pcos.html](https://www.cdc.gov/diabetes/basics/pcos.html). Updated March 24, 2020. Accessed July 9, 2020.
70. Make Your Workout Work for You. [cdc.gov. cdc.gov/features/diabetes-physical-activity/index.html](https://www.cdc.gov/features/diabetes-physical-activity/index.html). Updated April 12, 2019. Accessed July 9, 2020.

71. Wilcox G. Insulin and insulin resistance. *Clin Biochem Rev.* 2005 May; 26(2): 19-39. [ncbi.nlm.nih.gov/pmc/articles/PMC1204764.](https://pubmed.ncbi.nlm.nih.gov/pmc/articles/PMC1204764/)
72. Portillo-Sanchez P, Bril F, Maximos M, et al. High prevalence of nonalcoholic fatty liver disease in patients with type 2 diabetes mellitus and normal plasma aminotransferase levels. *J Clin Endocrinol Metab.* 2015 Jun; 100(6): 2231-2238. [doi.org/10.1210/jc.2015-1966.](https://doi.org/10.1210/jc.2015-1966)
73. Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med.* 2002 Feb 7; 346: 393-403. [doi.org/10.1056/NEJMoa012512.](https://doi.org/10.1056/NEJMoa012512)
74. Diabetes prevention program. [Medicare.gov. medicare.gov/coverage/diabetes-prevention-program.](https://www.medicare.gov/coverage/diabetes-prevention-program) Accessed February 27, 2020.
75. American Diabetes Association. Standards of Medical Care in Diabetes—2017. *Diabetes Care.* 2017 Jan 1; 40(S1): S1-S135. [doi.org/10.2337/dc17-S001.](https://doi.org/10.2337/dc17-S001)
76. American Diabetes Association. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes—2020. *Diabetes Care.* 2020 Jan; 43(S1): S14-S31. [doi.org/10.2337/dc20-S002.](https://doi.org/10.2337/dc20-S002)
77. American Diabetes Association. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Medical Care in Diabetes—2020. *Diabetes Care.* 2020 Jan; 43(S1): S37-S47. [doi.org/10.2337/dc20-S004.](https://doi.org/10.2337/dc20-S004)
78. Umpierrez GE, Klonoff DC. Diabetes technology update: Use of insulin pumps and continuous glucose monitoring in the hospital. *Diabetes Care.* 2018 Aug; 41(8): 1579–1589. [doi.org/10.2337/dci18-0002.](https://doi.org/10.2337/dci18-0002)
79. Battelino T, Danne T, Bergenstal RM, Amiel SA, Beck R, Biester T, Bosi E, Buckingham BA, Cefalu WT, Close KL, Cobelli C, Dassau E, DeVries JH, Donaghue KC, Dovc K, Doyle FJ 3rd, Garg S, Grunberger G, Heller S, Heinemann L, Hirsch IB, Hovorka R, Jia W, Kordonouri O, Kovatchev B, Kowalski A, Laffel L, Levine B, Mayorov A, Mathieu C, Murphy HR, Nimri R, Nørgaard K, Parkin CG, Renard E, Rodbard D, Saboo B, Schatz D, Stoner K, Urakami T, Weinzimer SA, Phillip M. Clinical targets for continuous glucose monitoring data interpretation: Recommendations from the international consensus on time in range. *Diabetes Care.* 2019 Aug; 42(8): 1593-1603. [doi.org/10.2337/dci19-0028.](https://doi.org/10.2337/dci19-0028)
80. Lu J, Ma X, Zhou J, et al. Association of time in range, as assessed by continuous glucose monitoring, with diabetic retinopathy in type 2 diabetes. *Diabetes Care.* 2018 Nov; 41(11): 2370–2376. [doi.org/10.2337/dc18-1131.](https://doi.org/10.2337/dc18-1131)
81. American Diabetes Association. Glycemic Targets: Standards of Medical Care in Diabetes—2020. *Diabetes Care.* 2020 Jan; 43(S1): S68. [doi.org/10.2337/dc20-S006.](https://doi.org/10.2337/dc20-S006)
82. Beck RW, Bergenstal RM, Cheng P, et al. The relationships between time in range, hyperglycemia metrics, and HbA1c. *J Diabetes Sci Technol.* 2019 Jan 13; 13(4): 614-626. [doi.org/10.1177/1932296818822496.](https://doi.org/10.1177/1932296818822496)
83. Strawbridge L, Lloyd J, Meadow A, Riley G, Howell B. One-year outcomes of diabetes self-management training among Medicare beneficiaries newly diagnosed with diabetes. *Med Care.* 2017 Apr; 55(4): 391-397. [doi.org/10.1097/MLR.0000000000000653.](https://doi.org/10.1097/MLR.0000000000000653)
84. Davies MJ, D'Alessio DA, Fradkin J, Kernan WN, Mathieu C, Mingrone G, Rossing P, Tsapas A, Wexler DJ, Buse JB. Management of Hyperglycemia in Type 2 Diabetes, 2018: A Consensus Report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care.* 2018 Dec; 41(12): 2669–2701. [doi.org/10.2337/dci18-0033.](https://doi.org/10.2337/dci18-0033)
85. American Association of Diabetes Educators. An effective model of diabetes care and education: Revising the AADE7 Self-Care Behaviors®. *The Diabetes Educator.* 2020 Apr 1; 46(2): 139-160. [doi.org/10.1177/0145721719894903.](https://doi.org/10.1177/0145721719894903)
86. Beck J, Greenwood D, Blanton L, et al. 2017 national standards for diabetes self-management education and Support. *The Diabetes Educator.* 2017 Oct 1; 43(5): 449-464. [doi.org/10.1177/0145721717722968.](https://doi.org/10.1177/0145721717722968)
87. Chrvala CA, Sherr D, Lipman RD. Diabetes self-management education for adults with Type 2 diabetes mellitus: a systematic review of the effect on glycemic control. *Patient Educ Couns.* 2016 Jun; 99(6): 926-943. [doi.org/10.1016/j.pec.2015.11.003.](https://doi.org/10.1016/j.pec.2015.11.003)
88. Powers MA, Bardsley JK, Cypress M, Funnell MM, Harms D, Hess-Fischl A, Hooks B, Isaacs D, Mandel ED, Maryniuk MD, Norton A, Rinker K, Siminerio LM, Uelmen S. Diabetes self-management education and support in adults with type 2 diabetes: A consensus report of the American Diabetes Association, the Association of Diabetes Care & Education Specialists, the Academy of Nutrition and Dietetics, the American Academy of Family Physicians, the American Academy of PAs, the American Association of Nurse Practitioners, and the American Pharmacists Association. *Diabetes Care.* 2020 Jul; 43(7): 1636-1649. [doi.org/10.2337/dci20-0023.](https://doi.org/10.2337/dci20-0023)
89. Beck J, Greenwood DA, Blanton L, Bollinger ST, Butcher MK, Condon JE, Cypress M, Faulkner P, Fischl AH, Francis T, Kolb LE, Lavin-Tompkins JM, MacLeod J, Maryniuk M, Mensing C, Orzeck EA, Pope DD, Pulizzi JL, Reed AA, Rhinehart AS, Siminerio L, Wang J. 2017 national standards for diabetes self-management education and support. *The Diabetes Educator.* 2020 Feb; 46(1): 46-61. [doi.org/10.1177/0145721719897952.](https://doi.org/10.1177/0145721719897952)
90. American Diabetes Association. Facilitating behavior change and well-being to improve health outcomes: Standards of Medical Care in Diabetes—2020. *Diabetes Care.* 2020 Jan; 43(S1): S49. [doi.org/10.2337/dc20-S005.](https://doi.org/10.2337/dc20-S005)
91. Know your Blood Sugar Numbers: Use Them to Manage Your Diabetes. National Institute of Diabetes and Digestive and Kidney Diseases. [niddk.nih.gov/health-information/diabetes/overview/managing-diabetes/know-blood-sugar-numbers.](https://niddk.nih.gov/health-information/diabetes/overview/managing-diabetes/know-blood-sugar-numbers) Published March 2016.
92. Healthy Living with Diabetes: Getting the Vaccines You Need. [cdc.gov. cdc.gov/vaccines/adults/rec-vac/health-conditions/diabetes/infographic/index.html.](https://www.cdc.gov/cdc.gov/vaccines/adults/rec-vac/health-conditions/diabetes/infographic/index.html) Updated May 2018. Accessed July 10, 2020.
93. Association of Diabetes Care and Education Specialists (ADCES). *Vaccination Practices for Adults with Diabetes.* Chicago, IL; Association of Diabetes Care and Education Specialists; 2019. [diabeteseducator.org/docs/default-source/practice/educator-tools/vaccination-practices-for-adults-with-diabetesv2.pdf?sfvrsn=2.](https://diabeteseducator.org/docs/default-source/practice/educator-tools/vaccination-practices-for-adults-with-diabetesv2.pdf?sfvrsn=2)
94. Diabetes and Vaccines. Association of Diabetes Care and Education Specialists (ADCES). [diabeteseducator.org/living-with-diabetes/Tools-and-Resources/vaccine-resources.](https://diabeteseducator.org/living-with-diabetes/Tools-and-Resources/vaccine-resources) Accessed July 17, 2020.
95. Fleischman S. I am... I have... I suffer from...: a linguist reflects on the language of illness and disease. *J Med Human.* 1999 Mar; 20(1): 3-32. [link.springer.com/article/10.1023/A:1022918132461.](https://link.springer.com/article/10.1023/A:1022918132461)
96. Benedetti F. How the doctor's words affect the patient's brain. *Eval Health Prof.* 2002 Dec 1; 25(4): 369-386. [doi.org/10.1177/0163278702238051.](https://doi.org/10.1177/0163278702238051)
97. Dickinson JK. The experience of diabetes-related language in diabetes care. *Diabetes Spectrum.* 2018 Feb; 31(1): 58-64. [doi.org/10.2337/ds16-0082.](https://doi.org/10.2337/ds16-0082)
98. What You Say Matters. Association of Diabetes Care and Education Specialists (ADCES). [diabeteseducator.org/practice/practice-tools/app-resources/diabetes-language-paper.](https://diabeteseducator.org/practice/practice-tools/app-resources/diabetes-language-paper) Accessed July 17, 2020.
99. Disparities. US Department of Health and Human Services, Office of Disease Prevention and Health Promotion. [healthypeople.gov/2020/about/foundation-health-measures/Disparities.](https://healthypeople.gov/2020/about/foundation-health-measures/Disparities) Accessed March 1, 2020.
100. What is Health Equity? Robert Wood Johnson Foundation. [rwjf.org/en/library/research/2017/05/what-is-health-equity-.html.](https://www.rwjf.org/en/library/research/2017/05/what-is-health-equity-.html) Published May 1, 2017. Accessed March 1, 2020.
101. County Health Rankings Model. County Health Rankings & Roadmaps. [countyhealthrankings.org/explore-health-rankings/measures-data-sources/county-health-rankings-model.](https://www.countyhealthrankings.org/explore-health-rankings/measures-data-sources/county-health-rankings-model) Accessed March 1, 2020.

102. North Carolina Institute of Medicine and North Carolina Department of Health and Human Services. *Healthy North Carolina 2030: A Path Towards Health*. Morrisville, NC: North Carolina Institute of Medicine; 2020. nciom.org/wp-content/uploads/2020/01/HNC-REPORT-FINAL-Spread2.pdf. Accessed March 1, 2020.
103. University of Wisconsin Population Health Institute. *What Works? Social and Economic Opportunities to Improve Health for All*. September 2018. countyhealthrankings.org/reports/what-works-social-and-economic-opportunities-to-improve-health-for-all.
104. Addressing Health Disparities in Diabetes. cdc.gov/diabetes/disparities.html. Updated April 15, 2019. Accessed March 1, 2020.
105. Robert Wood Johnson Foundation. *A New Way to Talk about the Social Determinants of Health*. Robert Wood Johnson Foundation; 2010. societyforhealthpsychology.org/wp-content/uploads/2016/08/rwjf63023.pdf.
106. Allen NA, Colicchio VD, Litchman ML, Gibson B, Villalta J, Sanchez-Birkhead AC. Hispanic community-engaged research: Community partners as our teachers to improve diabetes self-management. *Hispanic Health Care International*. 2019 Sep 1; 17(3): 125-132. doi.org/10.1177/1540415319843229.
107. Wroe JB. How can the media be best used to influence the diabetes policy makers? *Practical Diabetes International*. 2006 May; 23(4): 178-182. doi.org/10.1002/pdi.939.
108. Gross TT, Story CR, Harvey IS, et al. "As a community, we need to be more health conscious": Pastors' perceptions on the health status of the black church and African American communities. *J Racial Ethn Health Disparities*. 2018 Jun; 5(3): 570-579. doi.org/10.1007/s40615-017-0401-x.
109. National Diabetes Education Program. *Faith Leaders Toolkit: Diabetes Prevention and Management*. National Institutes of Health and Centers for Disease Control and prevention; 2017. peersforprogress.org/wp-content/uploads/2016/06/160627-faithleaders_toolkit.pdf.
110. Miller RS, Mars D. Effectiveness of a diabetes education intervention in a faith-based organization utilizing the AADE7. *ADCES in Practice*. 2020 Jan 1; 8(1): 10-14. doi.org/10.1177/2633559X20887746.
111. Sawani J. A new type of church outreach: Diabetes education. Michigan Health Lab. labblog.uofmhealth.org/body-work/a-new-type-of-church-outreach-diabetes-education. Published October 4, 2018.
112. Eat Smart, Move More North Carolina. *North Carolina's Plan to Address Overweight and Obesity*. Raleigh, NC: Eat Smart, Move More North Carolina; 2020. eatsmartmovemorenc.com/who-we-are/#ObesityPlan.
113. Acting Locally. In Institute of Medicine (US) and National Research Council (US) Committee on Childhood Obesity Prevention Actions for Local Governments; Parker L, Burns AC, Sanchez E, ed. *Local Government Actions to Prevent Childhood Obesity*. Washington (DC): National Academies Press (US); 2009. ncbi.nlm.nih.gov/books/NBK219685.
114. Olenik NL, Fletcher LM, Gonzalvo JD. The community pharmacist as diabetes educator. *AADE in Practice*. 2015 Sep 1; 3(5): 46-50. doi.org/10.1177/2325160315597197.
115. Claypool TM. Pharmacy medication therapy management: A critical piece of the diabetes management puzzle. *AADE in Practice*. 2015 Mar 1; 3(2): 12-16. doi.org/10.1177/2325160314568368.
116. Association of Diabetes Care and Education Specialists (ADCES). *Community Health Workers as Diabetes Paraprofessionals in DSMES and Prediabetes*. Chicago, IL; Association of Diabetes Care and Education Specialists; 2019. 1-5. diabeteseducator.org/docs/default-source/practice/practice-documents/practice-papers/adces-community-health-workers-as-diabetes-paraprofessionals-in-dsmes-and-prediabetes---final-4-1-20.pdf?sfvrsn=4.
117. Crespo R, Hatfield V, Hudson J, Justice M. Partnership with community health workers extends the reach of diabetes educators. *AADE in Practice*. 2015 Mar 1; 3(2): 24-29. doi.org/10.1177/2325160315569046.
118. Diabetes Prevention: Interventions Engaging Community Health Workers Improve Risk Factors and Health Outcomes. The Guide to Community Preventive Services (The Community Guide): Recommendations from the Community Preventive Services Task Force (CPSTF). thecommunityguide.org/content/community-health-worker-interventions-help-prevent-diabetes. Published April 2017.
119. Brunton S. Therapeutic inertia is a problem for all of us. *Clinical Diabetes*. 2019 Apr; 37(2): 105-106. doi.org/10.2337/cd19-0009.
120. Together 2 Goal. together2goal.org. Accessed July 10, 2020.
121. Overcoming Therapeutic Inertia. American Diabetes Association. professional.diabetes.org/meeting/other/overcoming-therapeutic-inertia. Accessed March 2020.
122. Local Barbershops and Beauty Salons are the "Heart" of New Program to Improve Heart Health. Blue Cross Blue Shield of North Carolina. mediacenter.bcbsnc.com/news/local-barbershops-and-beauty-salons-are-the-heart-of-new-program-to-improve-heart-health. Published February 24, 2020.
123. Pearson TL, Bardsley J, Weiner S, Kolb L. Population Health: The diabetes educator's evolving role. *The Diabetes Educator*. 2019 Aug 1; 45(4): 333-348. doi.org/10.1177/0145721719857728.
124. Green LW, Brancati FL, Albright A, the Primary Prevention of Diabetes Working Group. Primary prevention of type 2 diabetes: Integrative public health and primary care opportunities, challenges and strategies. *Family Practice*. 2012 Apr 1; 29(S1): i13-i23. doi.org/10.1093/fampra/cm126.
125. Centers for Disease Control and Prevention, Office on Smoking and Health. *Preventing Tobacco Use Among Children and Young Adults: A Report of the Surgeon General*. 2012. cdc.gov/tobacco/data_statistics/sgr/2012/consumer_booklet/pdfs/consumer.pdf. Accessed September 11, 2015.
126. Lycett D et al. The association between smoking cessation and glycemic control in patients with Type 2 diabetes: A THIN database cohort study. *The Lancet Diabetes & Endocrinology*. 2015 June; 3(6): 423-430. doi.org/10.1016/S2213-8587(15)00082-0.
127. Lajous M, Tondeur L, Fagherazzi G, de Lauzon-Guillain B, Boutron-Ruault M, Clavel-Chapelon F. Childhood and adult secondhand smoke and type 2 diabetes in women. *Diabetes Care*. 2013 Sep; 36(9): 2720-2725. doi.org/10.2337/dc12-2173.
128. Knopf T. For many, Medicaid expansion is personal. *North Carolina Health News*. 2019 Feb 28. northcarolinahealthnews.org/2019/02/28/for-many-medicaid-expansion-is-personal.
129. Spencer JC, Gertner AK, Silberman PJ. Health status and access to care for the North Carolina Medicaid gap population. *NC Med J*. 2019 Sep-Oct; 80(5): 269-275. doi.org/10.18043/ncm.80.5.269.
130. Garfield R, Orgera K, Damico A. The Coverage Gap: *Uninsured Poor Adults in States That Do Not Expand Medicaid*. Henry J Kaiser Family Foundation; January 2020. files.kff.org/attachment/Issue-Brief-The-Coverage-Gap-Uninsured-Poor-Adults-in-States-that-Do-Not-Expand-Medicaid.
131. Lee J, Callaghan T, Ory M, Zhao H, Bolin JN. The impact of Medicaid expansion on diabetes management. *Diabetes Care*. 2020 May; 43(5): 1094-1101. doi.org/10.2337/dc19-1173.
132. American Diabetes Association. *Diabetes Care*. 1996 Jan; 19(S1): S1-S118. doi.org/10.2337/diacare.19.1.S1; care.diabetesjournals.org/content/19/Supplement_1.



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