

# North Carolina's Guide to Diabetes Prevention and Management

## 2015-2020



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

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## Introduction

The number of North Carolinians who have or who are at risk for diabetes is growing. The financial burden, human suffering and loss of productivity that are a part of this disease are real and will get worse if more people do not take action now. While diabetes can present challenges on a daily basis, it is now evident that steps can be taken to prevent or delay the onset of diabetes or manage existing diabetes with or without complications. All North Carolinians have a role in these efforts. We can all have a positive impact on the lives of those at risk for or with diabetes.

This guide includes basic information about diabetes, its effects on the North Carolina population, and suggestions on how individuals can prevent and manage the disease. The guide also includes specific strategies for community groups, employers and health care providers to help people manage their risk for developing diabetes, gain and maintain control of diabetes, and reduce risks for diabetes-related complications.



North Carolina Diabetes Advisory Council

# What is diabetes?

Diabetes is a chronic condition in which the body either fails to produce any or sufficient insulin or becomes resistant to that insulin. This leads to excess glucose levels in the blood.<sup>1</sup>

Sustained high blood glucose levels over time can cause damage to blood vessels, resulting in serious health complications such as high blood pressure, heart disease and stroke, blindness, kidney failure and amputations.<sup>2</sup> Persons with diabetes also have an increased risk for other diabetes complications: hearing loss, sleep apnea, periodontal disease, certain forms of cancer including colorectal and breast, sexual dysfunction and cognitive impairments including dementia.<sup>3</sup>

There are four primary types of diabetes: prediabetes; type 1 diabetes, which affects less than 10 percent of the population with diabetes; gestational, which is only present during pregnancy; and type 2 diabetes, which accounts for at least 90 percent of diagnosed diabetes.

## Prediabetes

Prediabetes is a condition where people have higher than normal blood 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 when it was detected.<sup>4</sup>



## Type 1 Diabetes

Type 1 diabetes may be caused by a genetic condition or environmental factors which cause the destruction of cells in the pancreas that produce insulin. Type 1 diabetes requires the person to take insulin, as his/her body does not produce insulin or produces insufficient amounts. Currently there is no cure for this type of diabetes, nor can the destruction of the cells in the pancreas be reversed.



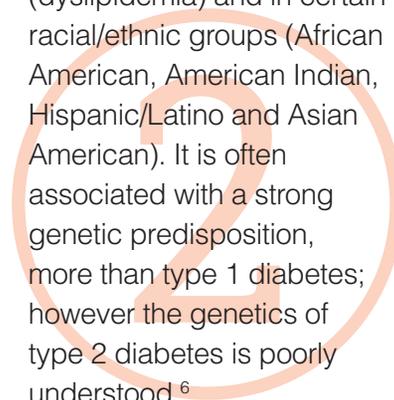
## Gestational Diabetes

Gestational diabetes occurs when insulin resistance (the inability of the body to use insulin for the uptake of glucose) intensifies during pregnancy. Gestational diabetes occurs in approximately nine percent of pregnancies. Without intervention, 35 to 60 percent of these women are expected to develop diabetes in 10–20 years.<sup>5</sup> Their children are also at increased risk of developing diabetes.



## Type 2 Diabetes

People who have type 2 diabetes are insulin resistant and may also have some insulin deficiency. Type 2 diabetes is the most prevalent form of diabetes. It affects nearly one in nine people in the United States. Most, but not all, patients with type 2 diabetes are obese. The risk of developing type 2 diabetes increases with age, obesity and physical inactivity. It occurs more frequently in women with prior gestational diabetes, among those with hypertension or high cholesterol (dyslipidemia) and in certain racial/ethnic groups (African American, American Indian, Hispanic/Latino and Asian American). It is often associated with a strong genetic predisposition, more than type 1 diabetes; however the genetics of type 2 diabetes is poorly understood.<sup>6</sup>



## Diagnosing Diabetes

There are several ways to diagnose diabetes, and the tests usually involve drawing blood at a health care provider's office or commercial facility and sending the sample to a lab for analysis.

- One way to diagnosis diabetes is to use a test called a hemoglobin A1c (A1c) to measure the average amount of glucose in a person's blood over a three-month period. When a person's A1c test is over 6.5 percent, he/she is considered to have diabetes. If the test shows an A1c between 5.7 percent and 6.4 percent, the person is considered to have prediabetes. It is possible for a person with prediabetes to lower his/her blood glucose so he/she never develops diabetes or at least delays the development of diabetes. The A1c test is also used for people already diagnosed with diabetes to assess hyperglycemia (high blood sugar). It is typical for a person with diabetes to try to keep his/her A1c level below seven percent to prevent complications.
- Another test used to diagnose diabetes is the fasting blood glucose (FBG) test which measures blood glucose in a person who has fasted for at least eight hours. This test is most reliable when given in the morning. People with a fasting glucose level of 100 to 125 mg/dl have prediabetes. A level of 126 mg/dl or above, confirmed by repeating the test on another day, indicates a diagnosis of diabetes. FBG is the most commonly used test for diagnosing diabetes.
- The oral glucose tolerance test (OGTT) is another method to diagnose diabetes, prediabetes, and gestational diabetes. This test is usually performed after overnight fasting and measures blood glucose before and two hours after a person drinks a liquid containing 75 grams of glucose dissolved in water. Prediabetes is diagnosed at a two-hour blood glucose level of 140 to 199 mg/dl, and diabetes is diagnosed at two hour blood glucose of greater than or equal to 200 mg/dl.

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 because it is more common and is preventable. For the remainder of this document, references to “diabetes” will be referring to type 2 diabetes unless indicated otherwise.



## Prediabetes Prevalence

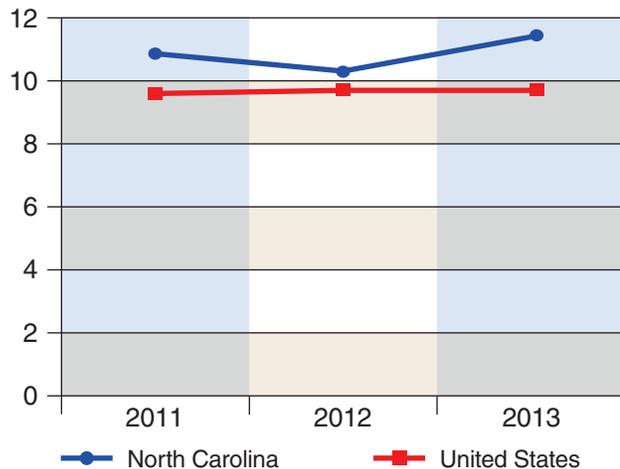
In 2013, approximately nine percent of North Carolinians (630,000 individuals) reported having prediabetes. The actual prevalence may be anywhere from 11.6 percent to 21.7 percent, as many people do not know they have prediabetes.<sup>7</sup>

## Diabetes Prevalence

In 2012, approximately 10.4 percent (age-adjusted) of North Carolinians (750,000 individuals) were diagnosed with type 1 and or type 2 diabetes (Figure 1).<sup>8</sup> This state level prevalence was slightly higher than the national prevalence of 9.7 percent.

# What does diabetes look like and cost in North Carolina?

**FIGURE 1: North Carolina—Percentage of Adults (aged 18 years or older) with Diagnosed Diabetes, 2011–2013**



Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System

## Racial/Ethnic Inequalities in Diabetes Prevalence and Mortality

Among racial and ethnic groups in North Carolina, type 2 diabetes does not occur equally. In 2012, 14.5 percent of African-Americans and 19.0 percent of American Indians reported a diabetes diagnosis, compared to 9.7 percent of non-Hispanic whites and six percent of Hispanics, though the particularly low reported rate for Hispanics is likely due to under-sampling and under-reporting.<sup>9</sup> While diabetes prevalence increases with age for all racial groups, the disease disproportionately affects older African Americans, affecting 28.1 percent of African Americans aged 55 to 64 and more than a third (36.3 percent) of African Americans between the ages of 65 and 74 in 2012.<sup>10</sup> 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 in 2012.<sup>11</sup>



## 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 rate of diagnosed diabetes is 9.9 percent. In the eastern and western regions, the rate of diagnosis is higher at 11.1 percent.<sup>12</sup> Regional disparities also include racial disparities. For example, in the Piedmont, 13.7 percent of African Americans report a diabetes diagnosis, while nine percent of non-Hispanic whites do so.<sup>13</sup>



## Economic Burden

People with diabetes have medical expenses approximately 2.3 times higher than those without diabetes.<sup>14</sup> A majority (62.4 percent) of the medical costs are paid by government programs, including Medicare, Medicaid and military health programs.<sup>15</sup> Seventy-two percent of national diabetes costs are attributed to direct health care expenses while 28 percent represent lost productivity from work-related absenteeism, unemployment and premature mortality.<sup>16</sup>

Like the rest of the nation, North Carolina continues to face increases in diabetes-related spending. In 2012, roughly \$8.3 billion of excess medical costs and lost productivity were attributable to diabetes within the state.<sup>17</sup> Diabetes is associated with an elevated hospital admission rate (1.9 per 1,000 population), with an average stay of 4.73 days. Diabetes was the primary cause for 18,751 hospitalizations at a cost of \$454 million in hospital charges in North Carolina in 2013. That's over \$24,000 per hospitalized case of diabetes per year.<sup>18</sup> If the state does not take steps to help bring the diabetes epidemic under control, annual health care costs are projected to surpass \$17 billion by 2025.<sup>19</sup>

# How can diabetes be prevented, delayed and managed?

Given the enormity of the diabetes epidemic and the number of people at high risk, 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.<sup>20</sup>

## **This guide is designed to help community members, employers and health care providers:**

- Support diabetes prevention and management through strategies that shape the environment so that people are less likely to develop diabetes.
- Provide access to evidence-based education that prevents or delays diabetes for people who are at high risk of developing type 2 diabetes.
- Assist people who have already developed diabetes to remain healthy and reduce their risk for developing diabetes complications.

## **Type 2 diabetes prevention and management can be considered along a continuum including the recommendations for the following:**

- What all people can do to avoid developing diabetes (primary prevention).
- What people with multiple risk factors can do to delay or prevent it.
- How to manage the condition if it develops.
- How to avoid progression once it has been diagnosed.

It is important to understand how individuals can actively protect their own health. In North Carolina, diabetes stakeholders (listed at the end of this document as Plan Contributors) have selected eight evidence-based behaviors for diabetes prevention and management. Figure 2 shows the progression of diabetes and what individuals can do to prevent and manage diabetes at each stage.

Behaviors that are appropriate for everyone to prevent diabetes are also appropriate for people who are at high risk for diabetes. These same behaviors can help people with diabetes manage their condition and prevent complications. These behaviors are also actions that the community, health care providers and employers can facilitate or reinforce with strategies presented later in this guide. The eight behaviors are described below and are organized by the headers associated with the diabetes prevention continuum shown in Figure 2.

### **1. Diabetes Primary Prevention**

- a. Manage weight
- b. Follow healthy eating guidelines
- c. Participate in regular physical activity
- d. Live tobacco free
- e. Get adequate sleep

### **2. Diabetes Prevention for People at High Risk**

- a. Participate in diabetes prevention education programs

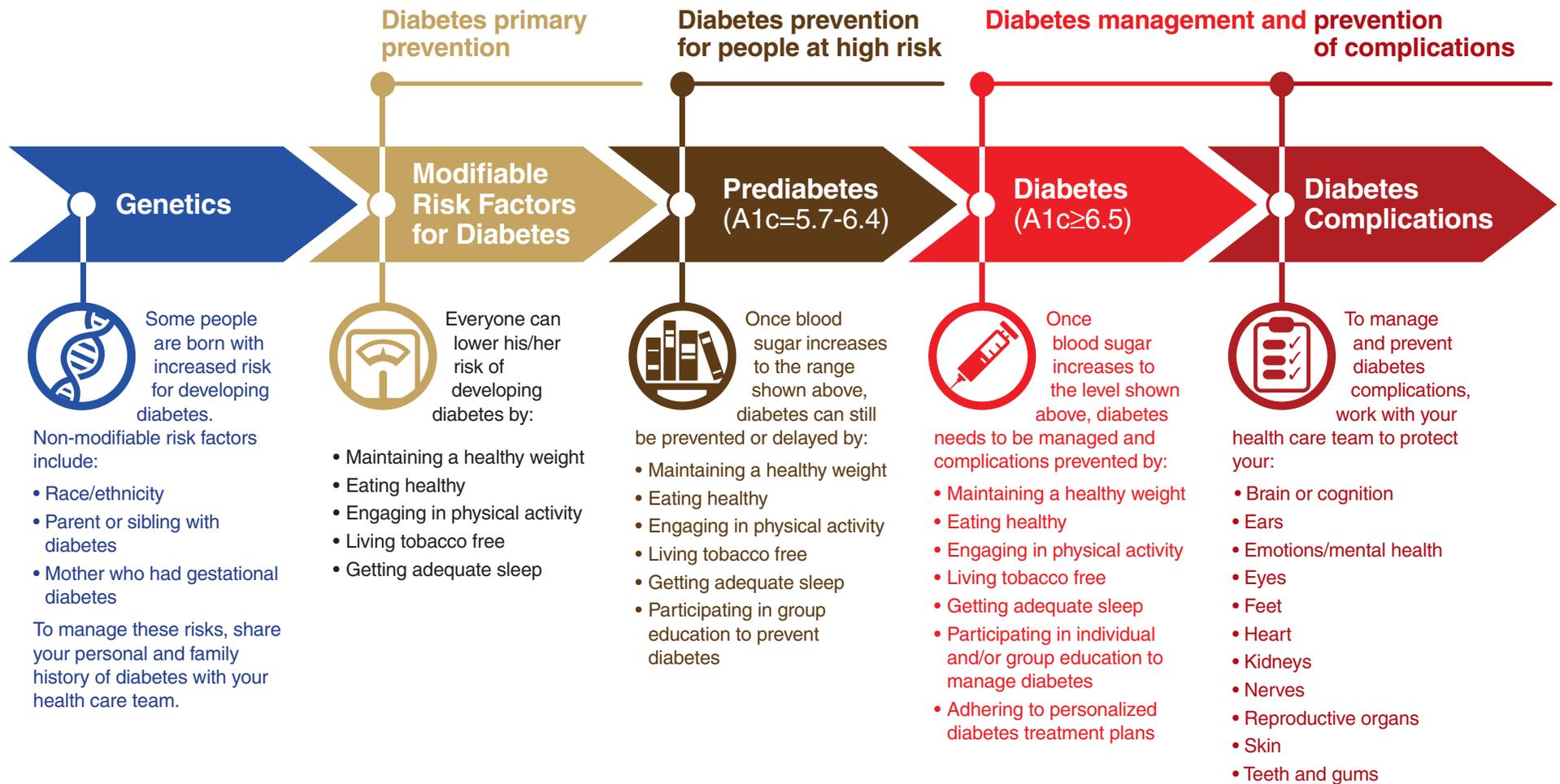
### **3. Diabetes Management and Prevention of Complications**

- a. Participate in individual and/or group self-management education
- b. Adhere to personalized diabetes treatment plans

FIGURE 2:

## Lifetime Risk Management for Developing and Controlling Type 2 Diabetes

The risk of developing diabetes increases with age.



# Diabetes Primary Prevention



## a. Manage weight

Excess weight is the single most important cause of type 2 diabetes. Being overweight increases the chances of developing type 2 diabetes sevenfold. Being obese makes someone 20 to 40 times more likely to develop diabetes than someone with a healthy weight.

For people who are overweight, losing five to seven percent of their current weight can cut their chances of developing type 2 diabetes in half. The most effective weight loss program is one that requires lifestyle changes. These lifestyle changes include adopting healthy eating habits, being more physically active and learning how to change behaviors.





## b. Follow healthy eating guidelines

In addition to being an important part of any weight loss program, healthy eating and increased physical activity can have a big impact on the risk of type 2 diabetes.

### A HEALTHY DIET INCLUDES:<sup>21</sup>

#### **Fruits, vegetables, whole grains and fat-free or low-fat milk and milk products.**

- There is convincing evidence that diets rich in whole grains protect against diabetes, whereas diets rich in refined grains lead to increased risk.<sup>22</sup>
- Strong evidence supports a diet high in fruits and vegetables for weight management. They are lower in calories and high in volume and fiber.

#### **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 diet can also affect the development of diabetes. Good fats, including polyunsaturated or monounsaturated fats found in liquid vegetable oils, nuts and seeds can help ward off type 2 diabetes.

#### **Calorie needs to achieve and maintain a healthy weight.**

- The key to maintaining a healthy weight is 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 and may hinder the ability of individuals to accurately assess the amount of calories he/she is consuming. Because oversized portions are pervasive in restaurants, supermarkets and vending machines, it is important to be aware of and regulate portion size.<sup>23</sup>



### **c. Participate in regular physical activity**

Increased physical activity plays a major role in the prevention and control of insulin resistance, prediabetes, gestational diabetes, type 2

diabetes and diabetes-related health complications. Both aerobic and resistance training 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 American Diabetes Association and the National Academy of Sports Medicine 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. According to the Centers for Disease Control and Prevention (CDC), moderate activity can be assessed using the Borg rating of perceived exertion or how hard one feels he/she is working based on:

- Increased heart rate.
- Increased respiration or breathing rate.
- Increased sweating.
- Muscle fatigue.<sup>24</sup>

Unless your health care 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.

Efforts to promote physical activity should focus on developing self-efficacy and fostering social support from family, friends and health care 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.

### **d. Live tobacco free**

Smoking is a proven risk factor for diabetes, with smokers being 30-40 percent more likely to develop type 2 diabetes compared to non-smokers.<sup>25</sup> The more someone smokes, the greater his/her chance of developing diabetes. Studies report that compared to non-smokers, heavy smokers ( $\geq 20$  cigarettes /day) had a 61 percent higher risk of developing diabetes, compared to a 29 percent increased risk among those who smoked fewer than 20 cigarettes per day, and a 23 percent increased risk among former smokers.<sup>26</sup> While smoking can increase the risk of developing diabetes, it can also make diabetes management more difficult. Among those with diabetes, smokers are more likely to have problems maintaining proper blood sugar levels and may require larger doses of insulin to control their blood sugar. Smokers with diabetes 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.



Given the serious implications of smoking, living tobacco free is a key public health strategy to prevent and control 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, 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 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.<sup>27</sup> 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, health care and in public places. Smoking cessation can be one of the most effective lifestyle interventions in limiting the burden of diabetes.<sup>28</sup> 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.<sup>29</sup> Smoking cessation improves blood sugar control by increasing insulin reception and reducing the risk of diabetes-related complications.<sup>30</sup> The following strategies have proven effective to help smokers quit:

- **Advice and assistance on quitting provided by a health care 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.<sup>31</sup> 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.

### **e. Get adequate sleep**

Sleep is a complex and essential biological process that is required daily for all humans.

Learning, memory processing, cellular repair and brain development are among the important functions of sleep.<sup>32</sup> 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.<sup>33</sup> Studies have described the association between sleep deprivation and the development of glucose intolerance, insulin resistance, diabetes mellitus 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. Studies suggest that the optimal amount of sleep needed to perform adequately, avoid a sleep debt and not have problem sleepiness during the day is seven to eight hours for adults.<sup>34</sup>

## Diabetes Prevention for People at High Risk

Once an individual is diagnosed with prediabetes, the main treatment goal is to delay or prevent progression to type 2 diabetes. Losing a modest amount of weight, five to seven percent 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.<sup>35</sup>

Diabetes Prevention Programs (DPPs) are designed to empower people with prediabetes to take charge of their health and well-being. The CDC recognizes programs that adhere to a verified curriculum. These year-long, evidence-based programs can help people who have prediabetes and/or are at risk for type 2 diabetes make achievable and realistic lifestyle changes and cut their risk of developing type 2 diabetes by 58 percent.<sup>36</sup> 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 sessions are held in groups or virtually with a trained lifestyle coach for 16 to 24 sessions over six months, then six or more follow-up sessions in the next six months.

Diabetes Prevention Programs are offered in varied community locations such as local health departments, YMCAs, community centers, faith-based organizations, hospitals and worksites. They also are offered online. The CDC recognition assures that DPPs deliver quality and evidence-based support.



# Diabetes Management and Prevention of Complications

## Group and Individual Diabetes Self-Management Education

People with diabetes can live well by being mindful about the lifestyle choices they make and learning effective techniques for managing the disease. Controlling diabetes reduces the risk of complications, slows the progression of the disease and improves health outcomes. This is accomplished through a combination of disease self-management and clinical preventive services, as well as collaboration between the person with diabetes and his or her health care provider.<sup>37</sup>

Diabetes self-management education and support (DSMES) is a process to teach people to manage their diabetes. The goals of DSMES are to control blood sugar levels, prevent acute and chronic complications that result from diabetes and achieve the best possible quality of life while keeping costs at an acceptable level for all people with diabetes.

The DSMES process incorporates the needs, goals and life experiences of the person with diabetes and is guided by evidence-based standards. The overall objectives of DSMES are to support informed decision-making, self-care behaviors, problem-solving and active collaboration with the health care team and to improve clinical outcomes, health status and quality of life. DSMES can be provided in a variety of community

settings, including community gathering places, the home, health departments, recreational camps, worksites, schools,<sup>38</sup> clinics and hospitals.

DSMES is cost effective as it reduces hospital admissions and readmissions, as well as lifetime health care costs due to a lower risk for complications. DSMES has been proven to improve hemoglobin A1c by as much as one percent in people with type 2 diabetes. DSMES is reported to reduce the onset and/or advancement of diabetes complications, to improve quality of life, to increase adoption of lifestyle behaviors such as healthy eating and physical activity, to enhance self-efficacy and empowerment, to increase healthy coping and to decrease the presence of diabetes-related distress and depression.<sup>39</sup>



## Adherence to personalized diabetes treatment plans

Diabetes is a complex condition that requires lifelong changes to diet, commitment to exercise, diligent monitoring of blood sugar and medication in order to achieve and maintain optimal blood sugar levels. Some people with type 2 diabetes can manage their diabetes with lifestyle changes alone, such as healthy eating and physical activity. For others, health care providers may also prescribe oral medications and/or insulin in order to meet individualized target blood sugar levels. The choice of medication takes into account the patient's underlying health status, effectiveness and side-effect profile of medications, medication compliance issues and cost. There are many different types of diabetes medications or anti-diabetic drugs including insulin.

Optimal adherence to prescribed medication improves health outcomes and can even lower health care costs by reducing morbidity and decreasing health care use, with especially striking benefits among those with diabetes.<sup>40</sup> However, studies have shown that people with diabetes are particularly prone to poor adherence to proper use of medications.<sup>41</sup> Adherence to oral diabetes medications ranges widely from 36 percent to 93 percent in patients treated for six months to two years, whereas adherence to insulin therapy among patients with type 2 diabetes was found to be from 62–64 percent.<sup>42</sup>

There are numerous reasons for poor adherence including age, social and psychological factors, education and a lack of understanding of the long-term

benefits of treatment, complexity of the medication regimen, cost of medication and negative treatment perceptions. Poor communication between doctor and patient, adverse outcomes such as weight gain and hypoglycemia, and failure of clinicians to modify medications appropriately can also affect adherence. Measures to increase medication adherence in type 2 diabetes patients include providing simplified drug regimens with improved safety profiles, patient education, improved patient-health care provider communication and social support.

Managing diabetes and preventing complications require increased collaboration between patients and their health care providers. In addition to the activities already described, health care

providers must follow specific clinical guidelines when treating people with diabetes. These clinical guidelines include:<sup>43</sup>

- At least two A1c tests per year.
- Annual check of kidney function.
- Annual dilated eye exam.
- Annual flu vaccine and other scheduled vaccinations.
- Blood pressure checks at every office visit in addition to patient self-monitoring.
- Comprehensive annual foot exam by the provider or more frequently if indicated and patients checking their own feet daily.

Primary care providers must be able to refer to specialists such as endocrinologists or nephrologists when necessary.<sup>44</sup>

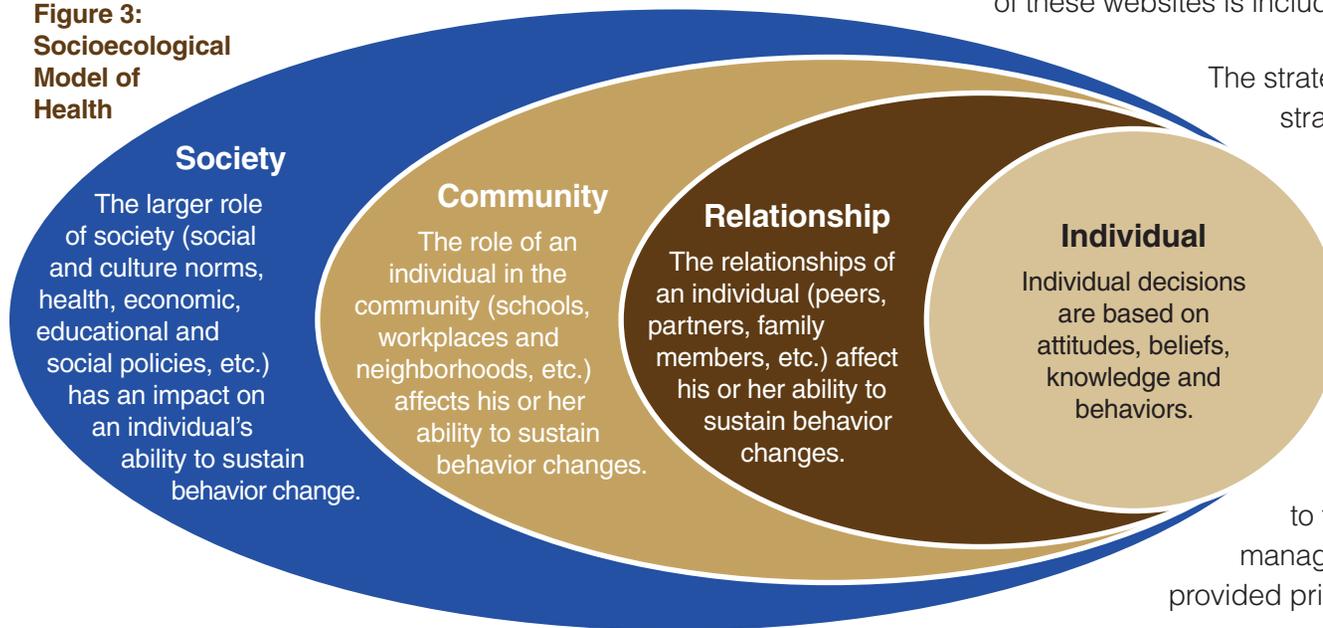


# What can my organization do to help prevent and manage diabetes in North Carolina?

The socioecological model of health can serve as a bridge between the core behaviors that help individuals prevent and manage diabetes to the policy strategies that community groups, employers and health care providers can implement to support diabetes prevention and management. The socioecological model of health is shown in Figure 3.

Based on the socioecological model, the individual person who is at risk for or who has diabetes will need to follow the behaviors previously described to protect his/her 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 legitimate websites exist that support people with and at risk for diabetes. A list of these websites is included as Appendix A.

**Figure 3:**  
**Socioecological Model of Health**



The strategies that follow are population-based strategies that organizations can implement to support individuals in the prevention of diabetes and its complications. The list is progressive in that activities implemented to prevent diabetes and diabetes complications build on primary prevention activities. The list is organized by the group that can initiate the action (community, health care and employer) 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.

# Community

Supportive environments where we are born, grow, work and play, promote well-being and prevent chronic disease by not only being stable and safe, but also enjoyable, stimulating and satisfying. Such environments are important in promoting active living and preventing diabetes. Having safe walking areas, green space, adequate lighting and opportunities for social interaction and public transportation promote active living and have been highlighted as barriers in certain populations at high risk of diabetes. Supportive social and community environments that increase social interactions are known to decrease

depression, a tightly linked comorbidity of diabetes. Communities with easy access to local grocery stores with fresh fruit and vegetables support healthier diets.

Community action is seen as necessary to the success of health care transformation. Communities that take action 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.

**Table 1: Activities for Community Groups (Faith, Non-Profit, Local Government)**

Diabetes Primary Prevention	Diabetes Prevention for People at High Risk	Diabetes Management and Prevention of Complications
<p><b>To help manage weight and/or follow healthy eating guidelines</b></p> <ol style="list-style-type: none"> <li>1. Offer free or low-cost community classes on eating healthy on a budget</li> <li>2. Ask local employers to work with food vendors who source locally</li> <li>3. Restrict sale of unhealthy foods in public spaces</li> <li>4. Tax unhealthful foods and subsidize nutritious foods</li> <li>5. Incentivize the building of supermarkets in low-income food deserts.</li> <li>6. Reformulate foods</li> <li>7. Regulate portion sizes</li> </ol>	<p><b>To help manage weight and/or participate in regular physical activity</b></p> <ol style="list-style-type: none"> <li>1. Establish walking clubs that continue after participating in diabetes prevention programs</li> </ol> <p><b>To help participation in diabetes prevention education programs</b></p> <ol style="list-style-type: none"> <li>1. Partner with a sponsoring agency such as a local health department to offer diabetes prevention programs in your congregation or community center</li> <li>2. Build partnerships with local health departments and local hospitals by sponsoring a health fair where the diabetes risk test is offered and classes can be scheduled for those who are identified with prediabetes</li> </ol>	<p><b>To help participation in individual and/or group self-management education programs</b></p> <ol style="list-style-type: none"> <li>1. Partner with a sponsoring agency to become an expansion site to deliver Diabetes Self-Management Education</li> <li>2. Offer support groups for people who have diabetes and their caregivers</li> <li>3. Partner with hospitals to offer diabetes education to reduce hospital readmissions</li> </ol> <p><b>To help adherence to personalized diabetes treatment plans</b></p> <ol style="list-style-type: none"> <li>1. Raise funds for Safety Net Providers to help them offset the cost of medications and supplies for people with diabetes</li> </ol>

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

1. Advocate for walkable communities
2. Sponsor walking challenges
3. Offer free group physical activity in public parks
4. Allow shared use of facilities (e.g., tracks)
5. Advocate for outdoor lighting for tracks and other recreational areas
6. Develop and implement land use and neighborhood design policies to support active lifestyles
7. Promote worksite policies that encourage physical activity
8. Promote comprehensive physical activity programs in schools

### To help live tobacco free

1. Increase the tax on tobacco products
2. Advocate for alternate tobacco advertising

### To promote adequate sleep

1. Promote sleep health

3. Work with health care providers or state agencies to train your Community Health Workers to screen for diabetes and refer to appropriate care
4. Promote awareness of prediabetes on national point days like Diabetes Alert Day, International Diabetes Day and Diabetes Awareness Month
5. 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

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

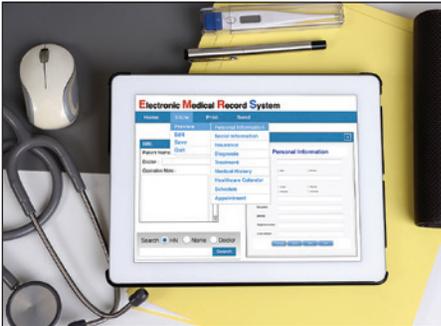


## Health care providers

Diabetes prevention and management is a joint responsibility between a patient and a health care provider. While the patient manages his/her health, he/she must have a provider who is familiar with current screening and management guidelines. The health care provider is the only one who can refer someone with diabetes to recognized Diabetes Self-Management Education. While communication between providers and patients is vital for effective individual compliance, policy change sets the stage for improving diabetes prevention and management for a practice.



**Table 2: Activities for Health Care Providers**

Diabetes Primary Prevention	Diabetes Prevention for People at High Risk	Diabetes Management and Prevention of Complications
<p><b>To help manage weight and/or participate in regular physical activity</b></p> <ol style="list-style-type: none"> <li>1. Advocate for walkable communities</li> <li>2. Refer patients who need to lose weight to Eat Smart, Move More, Weigh Less</li> </ol> <p><b>To help live tobacco free</b></p> <ol style="list-style-type: none"> <li>1. Refer patients to the Quitline</li> </ol> <p><b>To promote adequate sleep</b></p> <ol style="list-style-type: none"> <li>1. Ask patients about the quantity and quality of their sleep and advise accordingly</li> </ol>	<p><b>To help participation in diabetes prevention education programs</b></p> <ol style="list-style-type: none"> <li>1. Refer patients to diabetes prevention programs and build it into the electronic health record</li> <li>2. Use point of care testing for diabetes in order to facilitate referral to an appropriate program without an additional visit to the lab or to the provider</li> <li>3. Train community resource providers of diabetes prevention programs on how to provide feedback on program participation to health care providers</li> </ol>	<p><b>To help participation in individual and/or group self-management education programs</b></p> <ol style="list-style-type: none"> <li>1. Establish a professional relationship with hospital transition coordinators to ensure that they know about self-management education and support groups and that they will include this information with discharge paperwork</li> <li>2. Partner with a sponsoring agency to become an expansion site to deliver Diabetes Self-Management Education</li> <li>3. Refer patients to recognized diabetes self-management education and build it into the electronic health record</li> </ol>
	 	<p><b>To help adherence to personalized diabetes treatment plans</b></p> <ol style="list-style-type: none"> <li>1. Develop standing orders for diabetes screening</li> <li>2. Follow the USPTFS screening recommendations and build it into the practice electronic health record</li> <li>3. Follow clinical guidelines for diabetes care</li> <li>4. Build clinical guidelines into electronic health records for people with diabetes</li> <li>5. Work with Area Health Education Centers to improve diabetes care</li> <li>6. Work with pharmacists to ensure that patients are taking the least expensive drugs that are appropriate for their condition</li> <li>7. Follow clinical guidelines for post-partum screening of women who have had gestational diabetes</li> </ol>

# Employers

Each year, the costs for diabetes, its complications and associated diseases 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 2012 was more than \$245 billion, up from \$174 billion in 2007.

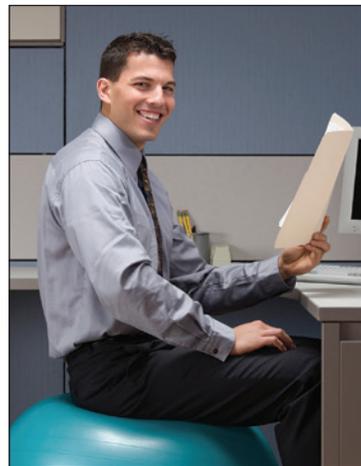
Employers are in a unique position to address diabetes through prevention and management education. Employees spend more than one third of their lives at work and are more likely to participate in health education, nutrition and physical activity offered in the workplace. Everyone benefits when employers work with their employees who have diabetes, or are at risk for the disease, to improve productivity and lower health costs, as well as help employees stay in good physical and mental health.

**Table 3: Activities for Employers**

Diabetes Primary Prevention	Diabetes Prevention for People at High Risk	Diabetes Management and Prevention of Complications
<p><b>To help manage weight and/or follow healthy eating guidelines</b></p> <ol style="list-style-type: none"> <li>1. Post nutrition information in cafeterias</li> </ol> <p><b>To help manage weight and/or participate in regular physical activity</b></p> <ol style="list-style-type: none"> <li>1. Subsidize gym memberships</li> <li>2. Sponsor weight loss competitions where the prize is related to health such as the purchase of activity trackers</li> <li>3. Promote stair climbing and walking at lunch</li> <li>4. Offer weight management programs as a covered benefit</li> </ol> <p><b>To help live tobacco free</b></p> <ol style="list-style-type: none"> <li>1. Connect with Quitline and smoking cessation opportunities</li> </ol>	<p><b>To help participation in diabetes prevention education programs/CDC recognized lifestyle change programs</b></p> <ol style="list-style-type: none"> <li>1. Offer diabetes prevention programs as a covered benefit</li> <li>2. Partner with a diabetes prevention program to offer classes at work</li> <li>3. Create direct referral links between worksites and diabetes education programs</li> <li>4. Offer on-site screening to identify employees with undiagnosed diabetes and prediabetes and to identify complications</li> <li>5. Provide incentives for milestone and/or completing the program</li> </ol>	<p><b>To help participation in individual and/or group self-management education programs</b></p> <ol style="list-style-type: none"> <li>1. Partner with local public health to offer recognized Diabetes Self-Management Education at work</li> </ol> <p><b>To help adherence to personalized diabetes treatment plans</b></p> <ol style="list-style-type: none"> <li>1. Allow employees time off for diabetes screening</li> <li>2. Offer health screenings at work, particularly on diabetes point days</li> <li>3. Cover insulin pumps as a co-pay instead of as durable medical equipment</li> <li>4. Offer refrigerators at work for insulin storage</li> <li>5. Offer coverage of insulin at the traditional co-pay</li> </ol>

## 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 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 difficulties 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.



6. Offset the cost of medications for persons who maintain an A1c under seven
7. Offer premium reductions for persons who maintain an A1c under seven
8. Ensure that your benefits package allows for similar co-pays on insulin pens and syringes

# How was this guide developed?

This guide to diabetes prevention and management was developed over a two-year period with input from key stakeholders across North Carolina. It was informed by several other documents and major diabetes related events. A list of plan contributors is shown at the end of this document. The documents/ events that preceded this guide and the years they were developed, along with the themes from those documents/events that are included in this guide, are summarized at right.

2011–  
2012

## **NC Diabetes Strategic Plan included recommendations to:**

- Highlight the social determinants of health and look for whole person solutions
- Provide coordination across disease states and risk factors like obesity and tobacco use
- Promote physical activity in planning and particularly walking
- Encourage use of community health workers to prevent and manage diabetes
- Promote quality clinical guidelines including diabetes screening and education recommendations

2013

## **NC Coordinated Chronic Disease and Injury Prevention State Plan included recommendations to:**

- Expand access to and increase coordination for screening and clinical preventive services for all North Carolinians
- Provide individuals with the tools and knowledge they need to manage their health condition(s)
- Maintain or improve quality of life and build community capacity to provide prevention and self-management programs for chronic diseases.

2014

## **Multiple Events by Partners (Center for Health Law and Policy Innovation at the Harvard Law School Public Policy Innovation Center, Kate B. Reynolds Charitable Trust, Centers for Disease Control and Prevention) that recommended initiatives to:**

- Increase the number of diabetes prevention programs
- Increase the number of people who are aware that they have prediabetes
- Increase access to diabetes and prediabetes education for the underserved population
- Provide third party reimbursement for diabetes prevention programs
- Provide technical assistance for billing Diabetes Self Management Education
- Extend pregnancy Medicaid to allow for A1c post-pregnancy diabetes testing

2015

## **NC Legislative Diabetes Action Plan that included recommendations to:**

- Offer third party reimbursement for diabetes prevention programs
- Extend pregnancy Medicaid to allow for A1c post-pregnancy diabetes testing

2015–  
2016

## **NC Guide to Diabetes Prevention and Management includes:**

- Eight core behaviors of diabetes prevention and management: increased physical activity, healthy eating, weight management, living tobacco free, adequate sleep, participation in diabetes prevention education, participating in individual and group diabetes self management education, adhering to an individualized treatment plan
- Policy strategies for communities, employers, healthcare providers
- Sorted by Primary Prevention, Diabetes Prevention for People at High Risk and Diabetes Management and Prevention of Complications

# How will we measure progress?

## GOAL: Prevent Diabetes and Diabetes Complications

This diabetes prevention and management guide will be monitored annually by the NC Diabetes Advisory Council (DAC). The DAC was created in 1988 as an advisory group to the NC Division of Public Health. When the DAC was first established, there were no standardized clinical guidelines for diabetes management. The DAC developed a 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. The DAC was vital in ensuring that North Carolina has 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 group

is led by a chair and vice chair who represent both the clinical 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 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 will include topics relevant to the eight core behaviors and/or the continuum of diabetes development. The guide will be available on the [www.diabetesnc.com](http://www.diabetesnc.com) website, and community members, employers and health care providers will have the opportunity to submit success stories that they experience as a result of using the guide. The evaluation measures shown below are included as indicators of progress.



## Primary Prevention of Diabetes

The continuum of diabetes prevention focuses on traditional areas of prevention (eat smart, move more and live tobacco free); it also adds an emerging body of research that shows the importance of sleep to prevent and manage chronic disease.<sup>45</sup> North Carolina has already established indicators to track progress toward increased physical activity, better eating and living tobacco free. The Healthy North Carolina 2020 primary prevention indicators are shown below. These indicators are tracked annually through a partnership with the NC Division of Public Health, the Center for Health Statistics and the Center for Healthy North Carolina. Strategies presented for employers, communities and health care providers are either evidence-based or evidence-informed, so it can be assumed that they will contribute to the culture of health that is described in the North Carolina 2020 plan. The established strategies to support primary prevention of diabetes which are included in this guide are shown below, and will be tracked annually as described above.

- Decrease the percentage of adults who are current smokers.
- Decrease the percentage of high school students reporting current use of any tobacco product.
- Decrease the percentage of people exposed to secondhand smoke in the workplace in the past seven days.
- Increase the percentage of high school students who are neither overweight nor obese.
- Increase the percentage of adults getting the recommended amount of physical activity.
- Increase the percentage of adults who consume five or more servings of fruits and vegetables per day.



The only indicators that will be tracked by the NC Diabetes Advisory Council that directly link to the diabetes prevention and management guide are:

- Increase the number of organizations that support diabetes primary prevention by 2020 (baseline to be established). (source: [www.diabetesnc.com](http://www.diabetesnc.com))
- Increase the number of legislative/regulatory policies that support diabetes primary prevention strategies by 2020. (source: [NCGA.org](http://NCGA.org) and [www.diabetesnc.com](http://www.diabetesnc.com))

These indicators will be tracked via submissions to the website and presentations made to the NC DAC.

## Diabetes Prevention for Those at High Risk

The North Carolina 2020 objective related to diabetes is related to decreasing prevalence. This objective will be hard to reach until efforts to prevent diabetes are more widespread. The measurable objectives related to strategies to prevent diabetes for those at high risk are shown below:

- Increase the number of people who know that they have prediabetes from 644,000 to 967,000 by 2020. (source: BRFSS and population data estimates for North Carolina from State Center for Health Statistics)
- Increase the number of people in North Carolina who enroll in a diabetes prevention program that is recognized by the CDC from 740 (in July 2015) to 5,000 by 2020. (source: CDC DPRP State Level report)
- Increase the number of North Carolina counties where people at high risk of developing diabetes can access at least one diabetes prevention program that is recognized by the CDC from 23 to 100 by 2020. (source: [https://nccd.cdc.gov/DDT\\_DPRP/Registry.aspx](https://nccd.cdc.gov/DDT_DPRP/Registry.aspx). Accessed 8/26/15)
- Increase the number of public employees and retirees who have diabetes prevention programs recognized by the CDC as a covered benefit from zero to 680,000 by 2020. (source: NC State Health Plan benefits)
- Increase the number of legislative/regulatory policies that support diabetes prevention strategies from zero to two by 2020. (source: grant documents)

## Diabetes Management and Prevention of Complications

As of August 2015 there were 126 recognized Diabetes Self-Management Education programs in North Carolina. Despite availability, program access is uneven as co-pays for the services vary and many programs are not sustainable due to low reimbursement and other billing challenges. The measurable indicators for diabetes management and prevention of complications are focused on attracting people to the program and the benefits that should follow.

- Increase the number of people in North Carolina with type 2 diabetes who have taken a diabetes class from 484,000 to 533,000. (source: BRFSS and population data estimates for North Carolina from State Center for Health Statistics)
- Increase the number of people in North Carolina with type 2 diabetes who enroll in a recognized Diabetes Self Management Program from 36,000 to 50,000 by 2020. (source: CDC report)
- Decrease the number of diabetes related emergency room visits where diabetes is listed as the primary cause of visit by 10 percent, from 47,085 ER visits to 42,377 ER visits by 2020. (source: NC Detect)
- Increase the number of legislative/regulatory policies that support diabetes management strategies. (baseline to be established, source: [www.diabetesnc.com](http://www.diabetesnc.com))



# Plan Contributors

The staff of the Community and Clinical Connections for Prevention and Health Branch of the NC Division of Public Health invited the following individuals to help develop the NC Diabetes Prevention and Management Guide on behalf of the NC Diabetes Advisory Council. Members met face-to-face three times (October 2014, February 2015 and June 2015) to add and review text. Additional meetings were held between the face-to-face meetings to check facts and update members on the status of the guide. While many people contributed to the plan, the Diabetes Advisory Council Chair, Ronny Bell and Vice-Chair, Jan Nicollerat provided extensive editing. Additionally, four co-chairs: Jeff Katula, Beth Lovette, Chris Memering and Michelle Mielke

led the small groups that developed the evidence-based strategies to prevent and manage diabetes. Our University partners from the Department of Health Behavior, Gilling's School of Global Public Health team, Carolyn Crump and Robert Letourneau, provided strategic guidance, helped develop worksheets that allowed plan contributor input to be easily extracted and assisted with editing. Various members of the staff of the Community and Clinical Connections for Prevention and Health Branch, along with the Chronic Disease and Injury Section leadership assisted in editing this document and providing overall leadership for its vision. The staff of the Health Systems Unit conducted much of the original research, evidence verification and writing.

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# References

1. *Diabetes Basics: Facts about Type 2*, AMERICAN DIABETES ASSOCIATION, [www.diabetes.org/diabetes-basics/type-2/facts-about-type-2.html](http://www.diabetes.org/diabetes-basics/type-2/facts-about-type-2.html) (last visited July 27, 2015).
2. *National Diabetes Statics Report*, 2014, CENTERS FOR DISEASE CONTROL & PREVENTION AND U.S. DEP'T HEALTH & HUMAN SERVS. (2014), available at [www.cdc.gov/diabetes/data/statistics/2014StatisticsReport.html](http://www.cdc.gov/diabetes/data/statistics/2014StatisticsReport.html).
3. Am. Diabetes Ass'n, *Standards of Medical Care in Diabetes—2015*, 38 DIABETES CARE (SUPPLEMENT 1) S11, S38 (2015), available at 22 Am. Diabetes [http://care.diabetesjournals.org/content/38/Supplement\\_1](http://care.diabetesjournals.org/content/38/Supplement_1).
4. [www.diabetes.org/diabetes-basics/diagnosis/?referrer=www.bing.com/#sthash.09Bttpol.dpuf](http://www.diabetes.org/diabetes-basics/diagnosis/?referrer=www.bing.com/#sthash.09Bttpol.dpuf).
5. Take Action Now to Prevent Diabetes Later. (2015, September 11). Retrieved from <http://ndep.nih.gov/am-i-at-risk/gdm/take-action.aspx>.
6. *A1C Test: Results*, THE MAYO CLINIC, [www.mayoclinic.com/health/A1c-test/MY00142/DSECTION=results](http://www.mayoclinic.com/health/A1c-test/MY00142/DSECTION=results) (last visited July 27, 2015).
7. Tchwenko, Samuel, and Eleanor Fleming. 'The Diabetes Prevention Recognition Program Prediabetes Screening Test—A Supplemental Tool in the Estimation of Prediabetes Prevalence, 2012 North Carolina'. 2015. Presentation.
8. North Carolina—Percentage of Adults (aged 18 years or older) with Diagnosed Diabetes, 1994–2010, CTRS. FOR DISEASE CONTROL AND PREVENTION, <http://apps.nccd.cdc.gov/DDTSTRS/Index.aspx?stateId=37&state=Northpercent20Carolina&cat=prevalence&Data=data&view=TO&trend=prevalence&id=1> (last visited July 27, 2015).
9. 2012 BRFSS Survey Results: North Carolina, Diabetes, N. C. STATE CTR. FOR HEALTH STATISTICS, [www.schs.state.nc.us/schs/brfss/2012/nc/all/DIABETE3.html](http://www.schs.state.nc.us/schs/brfss/2012/nc/all/DIABETE3.html) (last visited Nov. 20, 2013); Laura A. Young et al., Diabetes in North Carolina: Descriptive Epidemiology and Meaningful Use of Electronic Health Records, 72 N.C.MED. J.383 (2011).
10. 2012 BRFSS Survey Results: North Carolina, Diabetes-AFRICAN AMERICANS, N. C. STATE CTR. FOR HEALTH STATISTICS, [www.schs.state.nc.us/SCHS/brfss/2012/nc/afam/DIABETE3.html](http://www.schs.state.nc.us/SCHS/brfss/2012/nc/afam/DIABETE3.html) (last visited Nov. 20, 2013).
11. Leading Causes of Death, North Carolina Residents, 2012, N. C. STATE CTR. FOR HEALTH STATISTICS, [www.schs.state.nc.us/schs/deaths/lcd/2012/pdf/TblsA-F.pdf](http://www.schs.state.nc.us/schs/deaths/lcd/2012/pdf/TblsA-F.pdf) (last visited March 10, 2014).
12. 2012 BRFSS Survey Results: North Carolina, Diabetes, N. C. STATE CTR. FOR HEALTH STATISTICS, [www.schs.state.nc.us/schs/brfss/2012/nc/all/DIABETE3.html](http://www.schs.state.nc.us/schs/brfss/2012/nc/all/DIABETE3.html) (then sort by region) (last visited Nov. 20, 2013).
13. Id.
14. Id.
15. The Cost of Diabetes, AMERICAN DIABETES ASSOCIATION, [www.diabetes.org/advocate/resources/cost-of-diabetes.html](http://www.diabetes.org/advocate/resources/cost-of-diabetes.html).
16. Am. Diabetes Ass'n, Economic Costs of Diabetes in the U.S. in 2012, 36 DIABETES CARE 1033, 1038 (2013). <http://care.diabetesjournals.org/content/early/2013/03/05/dc12-2625.full.pdf+html><http://care.diabetesjournals.org/content/early/2013/03/05/dc12-2625.full.pdf+html> (last visited March 10, 2014).
17. Estimating the Annual Costs of Diabetes, AMERICAN DIABETES ASSOCIATION.
18. North Carolina Department of Health and Human Services, Division of Public Health, State Center for Health Statistics. Inpatient Hospital Utilization and Charges by Principal Diagnosis and County of Residence, North Carolina, 2013. Accessed at [www.schs.state.nc.us/schs/data/databook/](http://www.schs.state.nc.us/schs/data/databook/) on October 20, 2015.
19. Joseph Konen and Joyce Page, The State of Diabetes in North Carolina, 72 NORTH CAROLINA MEDICAL JOURNAL 5 (2012), [www.ncmedicaljournal.com/wp-content/uploads/2011/09/72505-web.pdf](http://www.ncmedicaljournal.com/wp-content/uploads/2011/09/72505-web.pdf).
20. [http://fampra.oxfordjournals.org/content/29/suppl\\_1/i13.full#sec-6](http://fampra.oxfordjournals.org/content/29/suppl_1/i13.full#sec-6).
21. [www.hsph.harvard.edu/nutritionsource/preventing-diabetes-full-story/#diet](http://www.hsph.harvard.edu/nutritionsource/preventing-diabetes-full-story/#diet).
22. AlEsha H, Bupathiraju S, Malik V, Wedick N, Campos H, Rosner B, Willett W, Hu FB. Carbohydrate quality measured using multiple quality metrics is negatively associated with type 2 diabetes. *Circulation*. 2015; 1-31: A: 20.
23. [www.cdc.gov/nccddphp/dnpa/nutrition/pdf/portion\\_size\\_research.pdf](http://www.cdc.gov/nccddphp/dnpa/nutrition/pdf/portion_size_research.pdf).
24. [www.cdc.gov/physicalactivity/basics/measuring/exertion.htm](http://www.cdc.gov/physicalactivity/basics/measuring/exertion.htm).
25. U.S. Department of Health and Human Services. The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General. Atlanta: 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 (accessed 2015 September 11).
26. Foy CG, Bell FA, Farmer DR, Goff DC, Wagenknecht LE. Smoking and incidence of diabetes among U.S. adults. *Diabetes Care* 2005 (October); 28(10): 2501-2507. Assuming 20 cigarettes in a pack, a "pack-year" is defined as the number of cigarettes smoked daily divided by 20 (assuming 20 cigarettes per pack) and multiplied by the number of years smoked.
27. A Report of the Surgeon General, Preventing Tobacco Use Among Children and Young Adults. [www.cdc.gov/tobacco/data\\_statistics/sgr/2012/consumer\\_booklet/pdfs/consumer.pdf](http://www.cdc.gov/tobacco/data_statistics/sgr/2012/consumer_booklet/pdfs/consumer.pdf) (accessed 2015, September 11).
28. Lycett, Deborah 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*, Volume 3, Issue 6, 423–430.
29. Id.
30. Id.
31. Martin Lajous, Laura Tondeur, Guy Fagherazzi, Blandine de Lauzon-Guillain, Marie-Christine Boutron-Ruault, and Françoise Clavel-Chapelon. Childhood and Adult Secondhand Smoke and Type 2 Diabetes in Women, *Diabetes Care* September 2013 36:9 2720-2725; doi: 10.2337/dc12-2173.
32. Altun, I., Cinar, N., & Dede, C. (2012). The contributing factors to poor sleep experiences in according to the university students: A cross-sectional study. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences*, 17(6), 557–561.
33. Sleep function and synaptic homeostasis. Tononi G, Cirelli C *Sleep Med Rev*. 2006 Feb; 10(1):49-62.
34. [www.nhlbi.nih.gov/files/docs/public/sleep/healthy\\_sleep.pdf](http://www.nhlbi.nih.gov/files/docs/public/sleep/healthy_sleep.pdf).
35. [www.cdc.gov/diabetes/basics/prevention.html](http://www.cdc.gov/diabetes/basics/prevention.html).
36. Diabetes Prevention Program Research Group. Reduction in the Incidence of Type 2 Diabetes with Lifestyle Intervention or Metformin. *N Engl J Med* 2002; 346:393-403 February 7, 2002.
37. [www.cmspulse.org/resource-center/health-topics/diabetes/documents/DSME-Toolkit.pdf](http://www.cmspulse.org/resource-center/health-topics/diabetes/documents/DSME-Toolkit.pdf).
38. [www.ncbi.nlm.nih.gov/pmc/articles/PMC2797385/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2797385/).
39. *J Acad Nutr Diet*. 2015 Jun 2. pii: S2212-2672(15)00549-3. doi: 10.1016/j.jand.2015.05.012. Diabetes Self-Management Education and Support in Type 2 Diabetes: A Joint Position Statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics. Powers MA, Bardsley J, Cypress M, Duker P, Funnell MM, Hess Fischl A, Maryniuk MD, Simi.
40. Elizabeth Lin, Paul Ciechanowski. Working with Patients to Enhance Medication Adherence. *Clinical Diabetes* January 2008 vol. 26 no. 1 17-19.L, Vivian E
41. Id.
42. Id.
43. Standards of Medical Care in Diabetes 2015. *Diabetes Care*. [http://care.diabetesjournals.org/content/38/Supplement\\_1](http://care.diabetesjournals.org/content/38/Supplement_1).
44. [www.diabetes.org/living-with-diabetes/treatment-and-care/whos-on-your-health-care-team/your-health-care-team.html](http://www.diabetes.org/living-with-diabetes/treatment-and-care/whos-on-your-health-care-team/your-health-care-team.html).
45. [www.cdc.gov/sleep/about\\_sleep/chronic\\_disease.htm](http://www.cdc.gov/sleep/about_sleep/chronic_disease.htm).

# Appendix A

A small number of websites for individuals who want to prevent and manage diabetes are shown below. This list is not inclusive.

American Association of Diabetes Educators  
[www.diabeteseducator.org](http://www.diabeteseducator.org)

American Diabetes Association  
[www.diabetes.org](http://www.diabetes.org)

CDC Diabetes  
[www.cdc.gov/diabetes/home](http://www.cdc.gov/diabetes/home)

CDC Diabetes Prevention Recognition Program  
[www.cdc.gov/diabetes/prevention/recognition](http://www.cdc.gov/diabetes/prevention/recognition)

Diabetes Advocacy Alliance  
[www.diabetesadvocacyalliance.org](http://www.diabetesadvocacyalliance.org)

Diabetes at Work  
[www.diabetesatwork.org](http://www.diabetesatwork.org)

Diabetes Hands  
<http://diabeteshandsfoundation.org>

Diabetes Patient Advocacy Coalition  
[www.diabetespac.org](http://www.diabetespac.org)

Diabetes Sisters  
<https://diabetessisters.org>

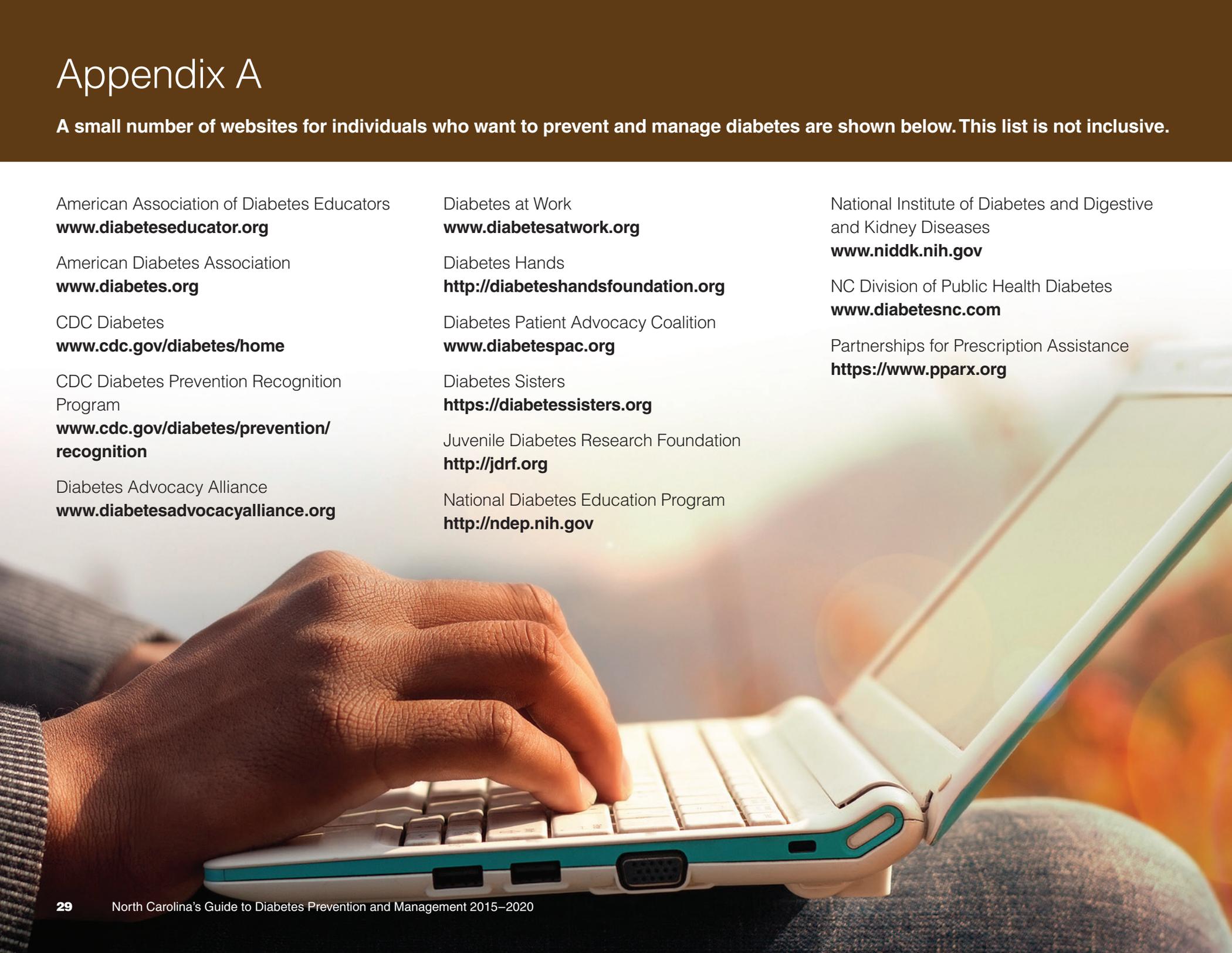
Juvenile Diabetes Research Foundation  
<http://jdrf.org>

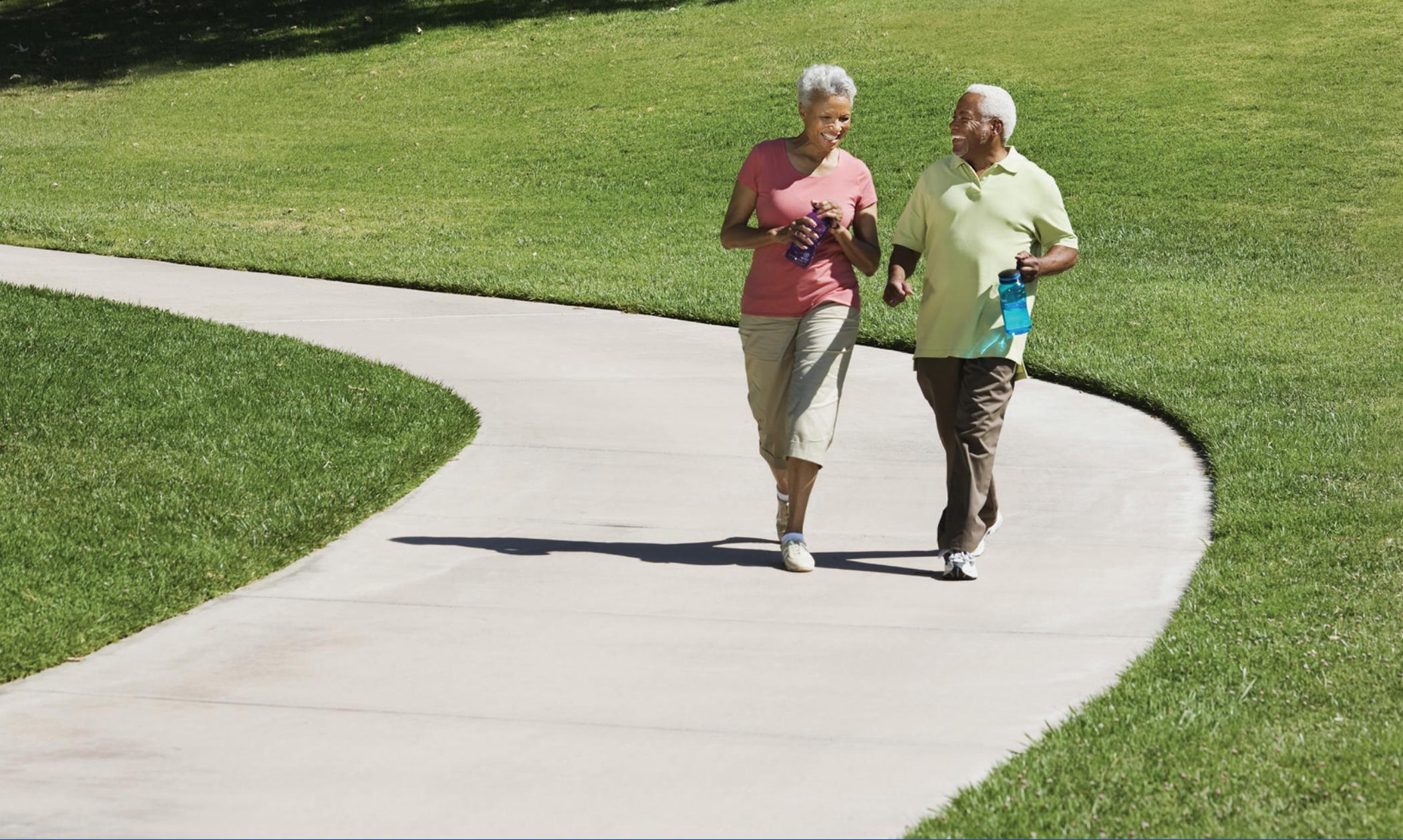
National Diabetes Education Program  
<http://ndep.nih.gov>

National Institute of Diabetes and Digestive and Kidney Diseases  
[www.niddk.nih.gov](http://www.niddk.nih.gov)

NC Division of Public Health Diabetes  
[www.diabetesnc.com](http://www.diabetesnc.com)

Partnerships for Prescription Assistance  
<https://www.pparx.org>





Manage weight | Live tobacco free | Participate in lifestyle change programs | Participate in diabetes education | Adhere to treatment plan | Get adequate sleep