

DIABETES EDUCATION  
IN TRIBAL SCHOOLS

# DIABETES AND AMERICAN INDIAN/ALASKA NATIVE HEALTH

Department of  
Health & Human Services  
USA



**NIDDK** | NATIONAL INSTITUTE OF  
DIABETES AND DIGESTIVE  
AND KIDNEY DISEASES



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## Diabetes Education in Tribal Schools

### Dear Teacher,

Thank you for your interest in teaching the Diabetes Education in Tribal Schools (DETS) curriculum in your classroom.

Diabetes was rare among American Indian and Alaska Native peoples until about 50 years ago. Since then, diabetes has become one of the most common and serious illnesses in the Tribal Nations of North America. In 2003, almost 100,000 American Indian and Alaska Native adults, or nearly 13 percent of those receiving care from the Indian Health Service (IHS), were estimated to have diabetes. Prevalence rates vary by Tribal Nations, rising to 26 percent among the Plains Tribes (Centers for Disease Control [CDC], 2005). In a new and alarming turn of events, type 2 diabetes, typically considered an adult disorder, is now emerging in all populations of youth in the United States, including American Indian and Alaska Native populations. The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) has determined that effective programs should be initiated to decrease the rising incidence and prevalence and the severe complications of diabetes in the American Indian and Alaska Native communities.

In response to these findings, NIDDK, the Centers for Disease Control and Prevention (CDC), Indian Health Service (IHS), Tribal Colleges and Universities (TCU), and the Tribal Leaders Diabetes Committee collaborated to develop this curriculum. The lessons are designed to enhance the understanding and appreciation of the problems of diabetes in American Indian and Alaska Native communities, to empower students to make healthy lifestyle choices, and to stimulate general student interest in diabetes-based science careers.

The DETS curriculum includes K–12, multidisciplinary units that are sequenced and interrelated to give a continuum of involvement with diabetes-based education. The curriculum is based on national education standards for the respective subject area, along with Native American cultural content. Teachers can assist in this critical prevention education effort while addressing the national content standards of their subject area. Culturally relevant activities are incorporated in the learning to increase the effectiveness of the diabetes prevention effort and to enhance students' cultural awareness.



The initial versions of the curriculum were tested in select K–12 schools to assess teacher acceptance and student reception of the message. Appropriate revisions followed before publication and distribution to schools serving American Indian and Alaska Native students.

The lessons are based on the BSCS 5E Instructional Model and feature multisubject integration. Each lesson includes learning activities that also serve as assessment tools. Activities promote active and collaborative learning, and are inquiry-based to help students develop problem-solving and critical-thinking skills.

The curriculum comes with a complete set of materials for both teachers and students, including printed materials and extensive background and resource information. It is distributed by the Indian Health Services at no cost to teachers. All materials may be copied for classroom use, but may not be sold.

Sincerely,

*The DETS Team*









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## Overview of the Diabetes Education in Tribal Schools Project

The Diabetes Education in Tribal Schools (DETS) project is part of a national effort to decrease the incidence of type 2 diabetes among American Indians and Alaska Natives, and also to improve the care of those who have type 2 diabetes. The DETS project is a K–12 curriculum that has a multidisciplinary approach and consists of units that incorporate national education standards, inquiry learning, and American Indian and Alaska Native cultural and community knowledge.

### Background

The Tribal Leaders Diabetes Committee formed a partnership with the Indian Health Service (IHS) in 1998 as a result of the Special Diabetes Program for Indians. The Tribal Leaders Diabetes Committee challenged the National Institutes of Health (NIH) to develop a curriculum to teach diabetes science in tribal schools. This challenge brought together multiple funding partners.

In 2001, the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), along with the Native Diabetes Wellness Program of the Centers for Disease Control and Prevention (CDC), and the Division of Diabetes Treatment and Prevention of the Indian Health Services (IHS), initiated a multiyear, national, K–12 curriculum project—Diabetes Education in Tribal Schools. This effort is a direct response to the recognition that type 2 diabetes is an epidemic in American Indian and Alaska Native communities.

Eight Tribal Colleges and Universities (TCU) were involved in this endeavor: Cankdeska Cikana Community College (Fort Totten, North Dakota); Fort Peck Community College (Poplar, Montana); Haskell Indian Nations University (Lawrence, Kansas); Keweenaw Bay Ojibwa Community College (Baraga, Michigan); Leech Lake Tribal College (Cass Lake, Minnesota); Northwest Indian College (Bellingham, Washington); Southwestern Indian Polytechnic Institute (Albuquerque, New Mexico); and Stone Child College (Box Elder, Montana).

### Purpose

The purpose of the DETS project is to develop and implement a school-based diabetes curriculum that supports the integration of American Indian and Alaska Native cultural and community knowledge with diabetes-related scientific knowledge.





## Goals of the DETS Project

The goals for the DETS project include the following:

- 1.** Increase the understanding of health, diabetes, and maintaining life in balance among American Indian and Alaska Native students.
  - a. Positive health is a continual process of maintaining life in balance.
  - b. Diabetes is an imbalance of health at many levels.
  - c. Some risk factors and imbalances contribute to the likelihood of diabetes.
  - d. Individuals, families, and communities can maintain health and balance and prevent type 2 diabetes risk.
- 2.** Increase American Indian and Alaska Native students' understanding and application of scientific and community knowledge about health, diabetes, and maintaining balance, and their understanding of the processes of the development of that knowledge.
  - a. Health, preventing and treating diabetes, and maintaining balance and enhancing health require both scientific and community knowledge.
  - b. Individuals, families, and communities can effectively apply scientific and community knowledge to maintain health and prevent type 2 diabetes.
  - c. Both scientific and community knowledge develop over time.
- 3.** Increase interest in science and health professions among American Indian and Alaska Native youth.
  - a. Science and health professionals can work with people and communities to prevent and care for type 2 diabetes.
  - b. American Indian and Alaska Native students can and do have future careers in science and health.



# INTRODUCTORY INFORMATION







## An Overview of Diabetes

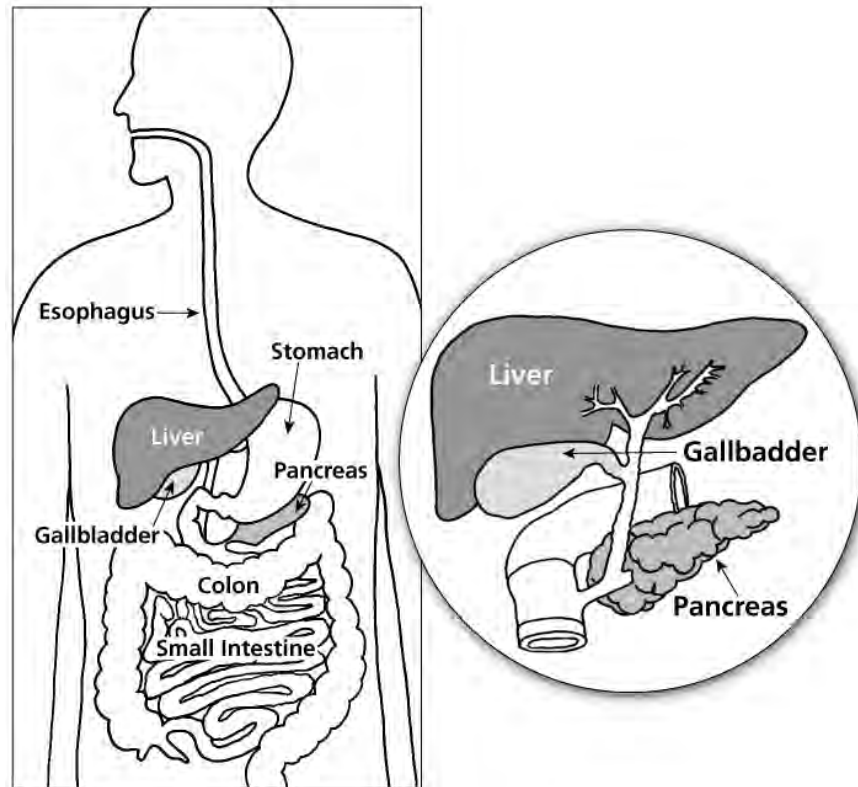
Almost everyone knows someone who has diabetes. An estimated 20.8 million people in the United States—7.0 percent of the population—have diabetes, a serious, lifelong condition. Of those, 14.6 million have been diagnosed, and 6.2 million have not yet been diagnosed. In 2005, about 1.5 million people aged 20 or older were diagnosed with diabetes.

### What Is Diabetes?

Diabetes is a disorder of metabolism—the way our bodies use digested food for growth and energy. Most of the food we eat is broken down into glucose, which is the form of sugar in the blood. Glucose is the main source of fuel for the body.

After digestion, glucose passes into the bloodstream, where it is used by cells for growth and energy. For glucose to get into most cells, insulin must be present. Insulin is a hormone produced by the pancreas, a large gland behind the stomach (figure I1).

**Figure I1:**  
Digestive tract and pancreas.



For most people, when we eat, the pancreas automatically produces the right amount of insulin to move glucose from the blood into our cells. In people with diabetes, however, the pancreas either produces too little or no insulin, or the cells do not respond appropriately to the insulin that is produced. Glucose builds up in the blood, overflows into the urine, and passes out of the body in the urine. As a result, the body loses its main source of fuel even though the blood contains large amounts of glucose.



## What Are the Types of Diabetes?

The three main types of diabetes are

- type 1 diabetes,
- type 2 diabetes, and
- gestational diabetes.

### Type 1 Diabetes

Type 1 diabetes is an autoimmune disease. An autoimmune disease results when the body's system for fighting infection (the immune system) turns against a part of the body. In diabetes, the immune system attacks and destroys the insulin-producing beta cells in the pancreas. The pancreas then produces little or no insulin. A person who has type 1 diabetes must take insulin daily to live.

At present, scientists do not know exactly what causes the body's immune system to attack the beta cells, but they believe that autoimmune, genetic, and environmental factors, possibly viruses, are involved. Type 1 diabetes accounts for about 5–10 percent of diagnosed diabetes cases in the United States. It develops most often in children and young adults but can appear at any age.

### Type 2 Diabetes

The most common form of diabetes is type 2 diabetes. About 90–95 percent of people with diabetes have type 2. This form of diabetes most often occurs in adults and in people who are obese, have a family history of diabetes, have a previous history of gestational diabetes, are physically inactive, and are of certain ethnicities. About 80 percent of people with type 2 diabetes are overweight. Type 2 diabetes is increasingly being diagnosed in children and adolescents.

When type 2 diabetes is diagnosed, the pancreas is usually producing some insulin, but for unknown reasons the body cannot use the insulin effectively, a condition called insulin resistance. After several years, insulin production decreases. The result of this condition is the same as for type 1 diabetes—glucose builds up in the blood and the body cannot make efficient use of its main source of fuel.

The symptoms of type 2 diabetes develop gradually. Symptoms may include fatigue, frequent urination, increased thirst and hunger, weight loss, blurred vision, and slow healing of wounds or sores. It is also important to realize that some people have no symptoms.

### Gestational Diabetes

Some women develop gestational diabetes late in pregnancy (figure I2). Although this form of diabetes usually disappears after the birth of the baby, women who have had gestational diabetes have a 20–50 percent chance of developing type 2 diabetes within five





**Figure 12:**  
Checking for  
gestational diabetes.

(Source: National Institute of Diabetes  
and Digestive and Kidney Diseases,  
National Institutes of Health)



to 10 years. Maintaining a reasonable body weight and being physically active may help prevent the development of type 2 diabetes.

### **How Is Diabetes Diagnosed?**

The fasting blood glucose test is the usual test for diagnosing diabetes in children and nonpregnant adults. It is most reliable when performed in the morning. However, a diagnosis of diabetes can be made based on certain test results, which are confirmed by retesting on a different day.

### **What Is Pre-diabetes?**

People with pre-diabetes have blood glucose levels that are higher than normal, but not high enough for a diagnosis of diabetes. This condition raises the risk of developing type 2 diabetes, heart disease, and stroke.

### **What Are the Scope and Impact of Diabetes?**

Diabetes is widely recognized as one of the leading causes of death and disability in the United States. In 2005, it was the sixth-leading cause of death. However, diabetes is likely to be underreported as the underlying cause of death on death certificates. About 65 percent of deaths among those with diabetes are attributed to heart disease and stroke.

The high blood glucose levels of diabetes are associated with long-term complications that affect almost every part of the body. The disease may lead to blindness, heart and blood vessel disease, stroke, kidney failure, amputations, and nerve damage. Uncontrolled



diabetes can complicate pregnancy, and birth defects are more common in babies born to women with diabetes. Diabetes also carries emotional, spiritual, and financial burdens for the individual, family, and community.

## Who Gets Diabetes?

Diabetes is not contagious. People cannot “catch” it from each other. Certain factors can increase the risk of developing diabetes.

Type 1 diabetes occurs equally among males and females but is more common in whites than in non-whites. Data from the World Health Organization’s Multinational Project for Childhood Diabetes indicate that type 1 diabetes is rare in most African, American Indian, and Asian populations.

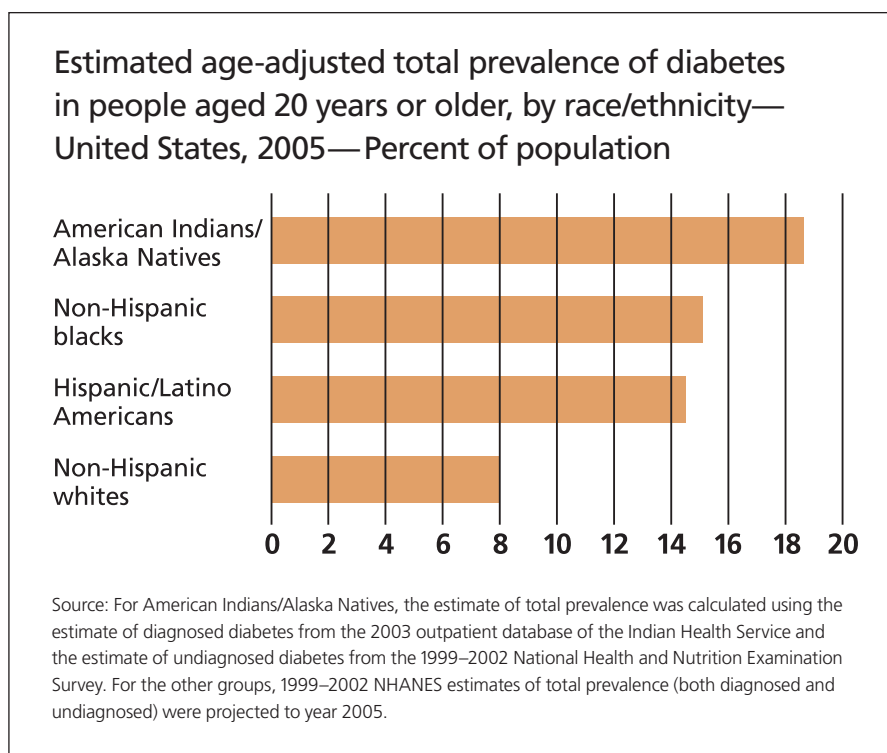
Type 2 diabetes is more common in adults, especially in people who are overweight. It occurs more often in African Americans, American Indians, some Asian Americans, Native Hawaiians and other Pacific Islander Americans, and Hispanic/Latino Americans. On average, non-Hispanic African Americans are 1.8 times as likely to have diabetes as non-Hispanic whites of the same age. Mexican Americans are 1.7 times as likely to have diabetes as non-Hispanic whites of similar age. (Data are not available for estimating diabetes rates in other Hispanic/Latino American groups.)

American Indians have one of the highest rates of diabetes in the world. On average, American Indians and Alaska Natives are 2.2 times as likely to have diabetes as non-Hispanic whites of similar age (figure I3). Although prevalence data for diabetes among Asian Americans and Pacific Islanders are limited, some groups, such as Native Hawaiians, Asians, and other Pacific Islanders residing in Hawaii (aged 20 or older) are more than twice as likely to have diabetes as white residents of Hawaii of similar age.

## How Is Diabetes Managed?

Before the discovery of insulin in 1921, everyone with type 1 diabetes died within a few years after diagnosis. Although insulin is not considered a cure, its discovery was the first major breakthrough in diabetes treatment.

**Figure I3:**  
Prevalence data.







**Figure I4:**

Keeping track of glucose levels.

Source: National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health.



Today, healthy eating, physical activity, and taking insulin are the basic therapies for type 1 diabetes. The amount of insulin must be balanced with food intake and daily activities. Blood glucose levels must be closely monitored through frequent blood glucose checking (figure I4).

Healthy eating, physical activity, and blood glucose testing are the basic management tools for type 2 diabetes. In addition, many people with type 2 diabetes require oral medication, insulin, or both to control their blood glucose levels.

People with diabetes must take responsibility for their day-to-day care. Much of the daily care involves keeping blood glucose levels from going too low or too high. When blood glucose levels drop too low—a condition known as hypoglycemia—a person can become nervous, shaky, and confused. Judgment can be impaired, and if blood glucose falls too low, fainting can occur. A person can also become ill if blood glucose levels rise too high, a condition known as hyperglycemia. The goal of diabetes management is to keep levels of blood glucose, blood pressure, and cholesterol as close to the normal range as safely possible.

### How Can People Lower Their Risk of Diabetes?

People can do a lot to lower their risk. Some ways to do that include the following:

- Reach and maintain a reasonable body weight
- Make wise food choices most of the time
- Be physically active every day (figure I5)

Doing these things can reduce the risk of developing type 2 diabetes.

**Figure I5:**

It's important to exercise every day.

Source: National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health.





## Solutions through Research

In 1996, NIDDK launched its Diabetes Prevention Program (DPP). The goal of this research effort was to learn how to prevent or delay type 2 diabetes in people with pre-diabetes, a strong risk factor for type 2 diabetes. The findings of the DPP, released in August 2001, showed that people at high risk for type 2 diabetes could sharply lower their chances of developing the disorder through diet and exercise. In addition, results of the oral diabetes drug metformin had a smaller reduction of diabetes risk.

In other research before the DPP, with the help and participation of many Akimel O'odham (Pima) Indians over the years, scientists at the National Institutes of Health identified several ways people with diabetes can improve their health. Scientists found that keeping blood glucose, blood pressure, and blood cholesterol under control is very important. Pregnant women with diabetes need to keep their blood glucose under control so that their babies will be healthy and have a lower risk of getting diabetes. Breastfeeding, even for a few weeks, helps protect babies from becoming overweight and developing diabetes.

Many people who might otherwise develop type 2 diabetes can prevent it by exercising regularly, lowering the amount of fat and number of calories they eat, and losing weight if they are overweight. Researchers are also studying the genetic and environmental factors that can lead to pre-diabetes and diabetes. About 100 tribes are evaluating demonstration programs to reduce the risk of developing type 2 diabetes or of developing heart disease, a complication of high blood glucose of diabetes that is not well controlled.

Adapted with permission from the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health.





## Life in Balance

*Though belief systems vary with every tribe, striving for harmony and balance in life seems central to many American Indians. Harmony and balance is the American Indian belief in interrelatedness and connectedness with all that is natural. The concept not only explains the interdependence of humans with other animates and inanimates in the world, but it also recognizes the need for individual wellness—of the interdependence of physical, emotional, psychological, and spiritual well-being.*

*Individuals are considered whole when their physical, mental, spiritual, and emotional selves exist in harmony. If there is something negative going on with one part of the self, it affects the other parts and causes an imbalance in the whole self.*  
(Cleary & Peacock, 1998)

### Overview

The Diabetes Education in Tribal Schools (DETS) curriculum is part of a national effort to decrease the incidence of type 2 diabetes among American Indians and Alaska Natives and to improve the care of people in these populations who already have the disease. The overarching goal of the multidisciplinary curriculum is to increase the understanding of health, diabetes, and maintaining life in balance. The curriculum recognizes that students bring to the classroom cultural values, and prior knowledge and experience in connection with health and diabetes.

American Indian and Alaska Native cultures embody many generations of oral traditions and stories that encompass values and sense of place. Among many other contributions, American Indians and Alaska Native peoples developed diverse belief systems and social structures; sophisticated and imaginative forms of art; agriculture; architecture; and earth sciences. The challenge of incorporating into teaching American Indian and Alaska Native cultures demands sensitivity to the unique features represented in the diverse array of over 560 federally recognized American Indian and Alaska Native tribes, and many other state and federally nonrecognized tribes. The DETS curriculum incorporates dance, oral history, storytelling, and the circle of balance to reflect American Indian and Alaska Native cultural teaching of prior and new knowledge.

### The Round Dance and Powwows

The Round Dance goes by many names for different tribes: *Kahomni*, 2-Step, Owl Dance, or Rabbit Dance. It is a social dance that is often a part of American Indian gatherings, including community social dances, ceremonies, and powwows.

A powwow is a celebration where people gather to sing, dance, see family and friends, conduct honor ceremonies, and compete in singing and dancing. Powwows take place all



over the United States and Canada. During the summer months, there is usually a powwow every weekend in different areas of the United States.

## Oral History and Storytelling

American Indian and Alaska Native cultures are filled with tradition. These cultures have sustained their traditions through oral history or storytelling. Oral history is a significant method in Native cultures where wisdom is passed down through tribal elders and leaders and through members of the extended family, such as grandparents and great-grandparents. The practice of storytelling developed over many centuries to teach life lessons and traditional Native values as well as to preserve tribal history.

Families pass their culture on to their children by socializing them to become participating members in that culture through the oral tradition—the spoken word. Within American Indian and Alaska Native communities, knowledge is transmitted through the stories, legends, and prayers. Native people's sense of self is embedded in their languages and the stories that hold the promises for a good life.

The written stories in the DETS curriculum are narratives that are culturally based. They are recitations of an individual's way to a balanced life, and they are written with concern for the well-being of the next generation. These stories are meant to help others understand that they can live a balanced, healthy life, and that living a healthy life is a positive journey.

## Circle of Balance

In recognizing and honoring cultural diversity, there are common themes: unity and balance in life, a profound sense of place, and strong values of family and community. The framing and relationship of place and balance interlock and are embedded within a spiritual and ecological-wisdom orientation—they are inseparable for Native peoples. Stewardship and the connectedness of self, community, and all that Mother Earth nurtures portray an integrated approach intrinsic to Native peoples. The premise of the circle of balance is that it is the foundation and the energy for all things.

The Circle of Balance is integrated multiple times within the curriculum. This interconnected approach for *self* is a metaphoric template that allows for the systematic discovery of balance within self and with the surrounding world. For Native people, the Circle of Balance is illustrated by four quadrants: spiritual, physical, emotional, and mental. This conceptual division helps frame the complexity of self in manageable ways, opening the way for reflection on how each quadrant interacts with the others that make up the circle. These four quadrants are always evolving throughout an individual's life span.





The DETS curriculum uses an integrated theme in illustrating the contextual content of Native culture throughout the units. Threading Native cultural themes and concepts throughout the K–12 curriculum provides a meaningful approach for students of all cultural backgrounds to understand their self-identity and expand it in ever-widening circles to include others. As students become engaged with their own cultural backgrounds, beliefs, attitudes, and ways of life, their engagement allows for connectedness and an understanding that *health is life in balance*.





## Science as Inquiry

When teachers talk about inquiry in the science classroom, many images come to mind. We like to see students doing science. But inquiry is much more than conducting investigations. We want students to be able to ask scientifically testable questions, design appropriate investigations to answer those questions, and develop explanations based on the evidence they collect. We also want them to be able to consider alternative explanations and use math and technology to help them answer questions when appropriate.

In addition to being able to practice science, we want students to understand the nature of science. We want them to realize that science advances through logical skepticism, that different areas in science lead to different types of questions, and that people from different backgrounds and different ways of life have contributed to the scientific knowledge we have today.

When we think about what inquiry looks like in the science classroom, it is helpful to consider the work of the National Research Council. Following the release of the *National Science Education Standards* (National Research Council [NRC], 1996), the council also developed several addenda to further explore some fundamental ideas inherent in the standards. In one of the addenda, the National Research Council (2000, pp. 24–27) outlines five essential features of inquiry that define inquiry in the classroom across all grade levels. We provide this useful discussion here:

### **Essential Feature 1: Learners are engaged by scientifically oriented questions.**

Scientifically oriented questions center on objects, organisms, and events in the natural world; they connect to the science concepts described in the content standards. They are questions that lend themselves to empirical investigation and lead to gathering and using data to develop explanations for scientific phenomena. Scientists recognize two primary kinds of scientific questions. Existence questions probe origins and include many “why” questions. Why do objects fall toward the earth? Why do some rocks contain crystals? Why do humans have chambered hearts? Many “why” questions cannot be addressed by science. There are also causal/functional questions, which probe mechanisms and include most of the “how” questions. How does sunlight help plants to grow? How are crystals formed?

Students often ask “why” questions. In the context of school science, many of these questions can be changed into “how” questions and thus lend themselves to scientific inquiry. Such change narrows and sharpens the inquiry and contributes to its being scientific.





In the classroom, a question robust and fruitful enough to drive an inquiry generates a “need to know” in students, stimulating additional questions of “how” and “why” a phenomenon occurs. The initial question may originate from the learner, the teacher, the instructional materials, the Web, some other source, or some combination. The teacher plays a critical role in guiding the identification of questions, particularly when they come from students. Fruitful inquiries evolve from questions that are meaningful and relevant to students, but they also must be able to be answered by students’ observations and scientific knowledge they obtain from reliable sources. The knowledge and procedures students use to answer the questions must be accessible and manageable, as well as appropriate to the students’ developmental level. Skillful teachers help students focus their questions so that they can experience both interesting and productive investigations.

**Essential Feature 2: Learners give priority to evidence, which allows them to develop and evaluate explanations that address scientifically oriented questions.**

As the *Standards* note, science distinguishes itself from other ways of knowing through use of empirical evidence as the basis for explanations about how the natural world works. Scientists concentrate on getting accurate data from observations of phenomena. They obtain evidence from observations and measurements taken in natural settings such as oceans, or in contrived settings such as laboratories. They use their senses, instruments such as telescopes to enhance their senses, or instruments that measure characteristics that humans cannot sense, such as magnetic fields. In some instances, scientists can control conditions to obtain their evidence; in other instances, they cannot control the conditions or control would distort the phenomena, so they gather data over a wide range of naturally occurring conditions and over a long enough period of time so that they can infer what the influence of different factors might be. The accuracy of the evidence gathered is verified by checking measurements, repeating the observations, or gathering different kinds of data related to the same phenomenon. The evidence is subject to questioning and further investigation.

The above paragraph explains what counts as evidence in science. In their classroom inquiries, students use evidence to develop explanations for scientific phenomena. They observe plants, animals, and rocks, and carefully describe their characteristics. They take measurements of temperature, distances, and time, and carefully record them. They observe chemical reactions and moon phases and chart their progress. Or they obtain evidence from their teacher, instructional materials,



the Web, or elsewhere, to “fuel” their inquiries. As the *Standards* note, “explanations of how the natural world changes based on myths, personal beliefs, religious values, mystical inspiration, superstition, or authority may be personally useful and socially relevant, but they are not scientific.”

### **Essential Feature 3: Learners formulate explanations from evidence to address scientifically oriented questions.**

Although similar to the previous feature, this aspect of inquiry emphasizes the path from evidence to explanation rather than the criteria for and characteristics of the evidence. Scientific explanations are based on reason. They provide causes for effects and establish relationships based on evidence and logical argument. They must be consistent with experimental and observational evidence about nature. They respect rules of evidence, are open to criticism, and require the use of various cognitive processes generally associated with science—for example, classification, analysis, inference, and prediction, and general processes such as critical reasoning and logic.

Explanations are ways to learn about what is unfamiliar by relating what is observed to what is already known. So, explanations go beyond current knowledge and propose some new understanding. For science, this means building upon the existing knowledge base. For students, this means building new ideas upon their current understandings. In both cases, the result is proposed new knowledge. For example, students may use observational and other evidence to propose an explanation for the phases of the moon; for why plants die under certain conditions and thrive in others; and for the relationship of diet to health.

### **Essential Feature 4: Learners evaluate their explanations in light of alternative explanations, particularly those reflecting scientific understanding.**

Evaluation, and possible elimination or revision of explanations, is one feature that distinguishes scientific from other forms of inquiry and subsequent explanations. One can ask questions such as: Does the evidence support the proposed explanation? Does the explanation adequately answer the questions? Are there any apparent biases or flaws in the reasoning connecting evidence and explanation? Can other reasonable explanations be derived from the evidence?

Alternative explanations may be reviewed as students engage in dialogues, compare results, or check their results with those proposed by the teacher or instructional materials. An essential component of this characteristic is ensuring that students make the connection between their results and scientific knowledge





appropriate in their level of development. That is, student explanations should ultimately be consistent with currently accepted scientific knowledge.


### **Essential Feature 5: Learners communicate and justify their proposed explanations.**

Scientists communicate their explanations in such a way that their results can be reproduced. This requires clear articulation of the question, procedures, evidence, proposed explanation, and review of alternative explanations. It provides for further skeptical review and the opportunity for other scientists to use the explanation in work on new questions.

Having students share their explanations provides others the opportunity to ask questions, examine evidence, identify faulty reasoning, point out statements that go beyond the evidence, and suggest alternative explanations for the same observations. Sharing explanations can bring into question or fortify the connections students have made among the evidence, existing scientific knowledge, and their proposed explanations. As a result, students can resolve contradictions and solidify an empirically based argument.



## Essential Features of Classroom Inquiry and Their Variations

<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <b>Less More</b> </div> <div style="text-align: center;">  </div> <div style="text-align: center;"> <b>More Less</b> </div> </div>				
Feature				
<b>1. Learner engages in scientifically oriented questions</b>	<b>A.</b> Learner engages in question provided by teacher, materials, or other source	<b>B.</b> Learner sharpens or clarifies question provided by teacher, materials, or other source	<b>C.</b> Learner selects among questions, poses new questions	<b>D.</b> Learner poses a question
<b>2. Learner gives priority to evidence in responding to questions</b>	<b>A.</b> Learner given evidence (data) and told how to analyze	<b>B.</b> Learner given evidence (data) and guided in how to analyze it	<b>C.</b> Learner directed to collect certain evidence and asked to analyze	<b>D.</b> Learner determines what constitutes evidence, how to collect it, and how to analyze it
<b>3. Learner formulates explanations from evidence</b>	<b>A.</b> Learner provided with evidence and explanation	<b>B.</b> Learner given possible ways to use evidence to formulate an explanation	<b>C.</b> Learner guided in process of formulating explanations from evidence	<b>D.</b> Learner formulates explanation after summarizing evidence
<b>4. Learner connects explanations to scientific knowledge</b>	<b>A.</b> Learner given all connections between explanations and existing scientific knowledge	<b>B.</b> Learner given possible connections between explanations and existing scientific knowledge	<b>C.</b> Learner directed toward areas and sources of scientific knowledge in order to make connections to explanations	<b>D.</b> Learner independently examines other resources and forms connections to explanations
<b>5. Learner communicates and justifies explanations</b>	<b>A.</b> Learner given steps and procedures to justify and communicate explanations	<b>B.</b> Learner provided guidelines to justify and communicate explanations	<b>C.</b> Learner coached to form reasonable and logical arguments to justify and communicate explanations	<b>D.</b> Learner forms reasonable and logical arguments to justify and communicate explanations

**Figure I6:**  
Essential features of classroom  
inquiry and their variations.  
(NRC, 2000)





## BSCS 5E Instructional Model

The instruction of major concepts is organized around an instructional model that is based on the constructivist philosophy of learning. This philosophy of learning maintains that learners build or construct new ideas on top of their old ideas.

We call the instructional model the “5Es” because each unit is organized around five phases of learning that can best be described by using five words that begin with *E*: Engage, Explore, Explain, Elaborate, and Evaluate. This instructional model allows students to use and build on prior knowledge and experience, to experience common activities, to construct meaning, and to assess their understanding of a concept continually:

- **Engage:** This phase of the instructional model initiates the learning. The activity should (1) activate prior knowledge and help students make connections between past and present learning experiences and (2) anticipate activities and focus students’ thinking on the learning outcomes of upcoming activities. The learner should become mentally engaged in the concept, process, or skill to be explored.
- **Explore:** This phase of the instructional model provides students with a common set of experiences within which they identify and develop current concepts, processes, and skills. During this phase, students actively explore their environment or manipulate materials.
- **Explain:** This phase of the instructional model focuses learners on developing an explanation for the concepts they have been exploring. As a result, they have opportunities to verbalize their conceptual understanding or to demonstrate their skills or behaviors. This phase also provides opportunities for teachers to introduce formal labels, definitions, and explanations for concepts, processes, skills, or behaviors.
- **Elaborate:** This phase of the instructional model challenges and extends students’ conceptual understanding, and it allows further opportunity for students to practice desired skills and behaviors. Through new experiences, the learners develop deeper and broader understanding of major concepts, obtain more information about areas of interest, and refine their scientific skills.
- **Evaluate:** This phase of the instructional model encourages learners to assess their understanding and abilities and provides opportunities for teachers to evaluate students’ understanding of key concepts and development of essential skills.



Stage of the Instructional Model	The BSCS 5E Instructional Model: What the Teacher Does	
	That Is Consistent with This Model	That Is Inconsistent with This Model
<b>Engage</b>	<ul style="list-style-type: none"> <li>■ Creates interest</li> <li>■ Generates curiosity</li> <li>■ Raises questions</li> <li>■ Elicits responses that uncover what the students know or think about the concept or topic</li> </ul>	<ul style="list-style-type: none"> <li>■ Explains concepts</li> <li>■ Provides definitions and answers</li> <li>■ States conclusions</li> <li>■ Provides closure</li> <li>■ Lectures</li> </ul>
<b>Explore</b>	<ul style="list-style-type: none"> <li>■ Encourages the students to work together without direct instruction from the teacher</li> <li>■ Observes and listens to the students as they interact</li> <li>■ Asks probing questions to redirect the students' investigations when necessary</li> <li>■ Provides time for the students to puzzle through problems</li> <li>■ Acts as a consultant for students</li> </ul>	<ul style="list-style-type: none"> <li>■ Provides answers</li> <li>■ Tells or explains how to work through the problem</li> <li>■ Provides closure</li> <li>■ Tells the students that they are wrong</li> <li>■ Gives information or facts that solve the problem</li> <li>■ Leads the students step-by-step to a solution</li> </ul>
<b>Explain</b>	<ul style="list-style-type: none"> <li>■ Encourages the students to explain concepts and definitions in their own words</li> <li>■ Asks for justification (evidence) and clarification from students</li> <li>■ Formally provides definitions, explanations, and new labels</li> <li>■ Uses students' previous experiences as the basis for explaining concepts</li> </ul>	<ul style="list-style-type: none"> <li>■ Accepts explanations that have no justification</li> <li>■ Neglects to solicit the students' explanations</li> <li>■ Introduces unrelated concepts or skills</li> </ul>
<b>Elaborate</b>	<ul style="list-style-type: none"> <li>■ Expects the students to use formal labels, definitions, and explanations provided previously</li> <li>■ Encourages the students to apply or extend the concepts and skills in new situations</li> <li>■ Reminds the students of alternative explanations</li> <li>■ Refers the students to existing data and evidence and asks, "What do you already know?" "Why do you think ...?" (Strategies from Explore apply here also.)</li> </ul>	<ul style="list-style-type: none"> <li>■ Provides definitive answers</li> <li>■ Tells the students that they are wrong</li> <li>■ Lectures</li> <li>■ Leads students step-by-step to a solution</li> <li>■ Explains how to work through the problem</li> </ul>
<b>Evaluate</b>	<ul style="list-style-type: none"> <li>■ Observes the students as they apply new concepts and skills</li> <li>■ Assesses students' knowledge, skills, or both</li> <li>■ Looks for evidence that the students have changed their thinking or behaviors</li> <li>■ Allows students to assess their own learning and group-process skills</li> <li>■ Asks open-ended questions such as, Why do you think ...? What evidence do you have? What do you know about x? How would you explain x?</li> </ul>	<ul style="list-style-type: none"> <li>■ Tests vocabulary words, terms, and isolated facts</li> <li>■ Introduces new ideas or concepts</li> <li>■ Creates ambiguity</li> <li>■ Promotes open-ended discussion unrelated to the concept or skill</li> </ul>

**Figure I7:**  
BSCS Instructional Model:  
What the Teacher Does.  
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Stage of the Instructional Model	The BSCS 5E Instructional Model: What the Student Does	
	That Is Consistent with This Model	That Is Inconsistent with This Model
<b>Engage</b>	<ul style="list-style-type: none"> <li>Asks questions such as, Why did this happen? What do I already know about this? What can I find out about this?</li> <li>Shows interest in the topic</li> </ul>	<ul style="list-style-type: none"> <li>Asks for the “right” answer</li> <li>Offers the “right” answer</li> <li>Insists on answers or explanations</li> <li>Seeks one solution</li> </ul>
<b>Explore</b>	<ul style="list-style-type: none"> <li>Thinks freely, but within the limits of the activity</li> <li>Tests predictions and hypotheses</li> <li>Forms new predictions and hypotheses</li> <li>Tries alternatives and discusses them with others</li> <li>Records observations and ideas</li> <li>Suspends judgment</li> </ul>	<ul style="list-style-type: none"> <li>Lets others do the thinking and exploring (passive involvement)</li> <li>Works quietly with little or no interaction with others (only appropriate when exploring ideas or feelings)</li> <li>“Plays around” indiscriminately with no goal in mind</li> <li>Stops with one solution</li> </ul>
<b>Explain</b>	<ul style="list-style-type: none"> <li>Explains possible solutions or answers to others</li> <li>Listens critically to others’ explanations</li> <li>Questions others’ explanations</li> <li>Listens to and tries to comprehend explanations that the teacher offers</li> <li>Refers to previous activities</li> <li>Uses recorded observations in explanations</li> </ul>	<ul style="list-style-type: none"> <li>Proposes explanations from “thin air” with no relationship to previous experiences</li> <li>Brings up irrelevant experiences and examples</li> <li>Accepts explanations without justification</li> <li>Does not attend to other plausible explanations</li> </ul>
<b>Elaborate</b>	<ul style="list-style-type: none"> <li>Applies new labels, definitions, explanations, and skills in new but similar situations</li> <li>Uses previous information to ask questions, propose solutions, make decisions, and design experiments</li> <li>Draws reasonable conclusions from evidence</li> <li>Records observations and explanations</li> <li>Checks for understanding among peers</li> </ul>	<ul style="list-style-type: none"> <li>“Plays around” with no goal in mind</li> <li>Ignores previous information or evidence</li> <li>Draws conclusions from “thin air”</li> <li>In discussion, uses only those labels that the teacher provided</li> </ul>
<b>Evaluate</b>	<ul style="list-style-type: none"> <li>Answers open-ended questions by using observations, evidence, and previously accepted explanations</li> <li>Demonstrates an understanding or knowledge of the concept or skill</li> <li>Evaluates his or her own progress and knowledge</li> <li>Asks related questions that would encourage future investigations</li> </ul>	<ul style="list-style-type: none"> <li>Draws conclusions, not using evidence or previously accepted explanations</li> <li>Offers only yes-or-no answers and memorized definitions or explanations as answers</li> <li>Fails to express satisfactory explanations in his or her own words</li> <li>Introduces new, irrelevant topics</li> </ul>

**Figure 18:**  
BSCS Instructional Model:  
What the Student Does.  
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## Glossary

**A1c:** A test that measures a person's average blood glucose concentration over the past two to three months. Glucose sometimes joins with hemoglobin, the protein in red blood cells that carries oxygen. The A1c test shows the amount of glucose that sticks to the red blood cell, which is proportional to the amount of glucose in the blood. Also called hemoglobin A1c.

**adult-onset diabetes:** A term formerly used for type 2 diabetes.

**balance:** In general, being in harmony with the rest of one's world—physically, mentally, emotionally, and spiritually. In medicine and health, a similar concept: actively keeping major functions of the body within a narrow range or maintaining equilibrium. See homeostasis.

**blood glucose:** The main sugar found in the blood and the body's main source of energy. Also called blood sugar.

**blood glucose concentration (level):** The amount of glucose in a given amount of blood. It is noted in milligrams per deciliter, or mg/dL.

**blood glucose meter:** A small, handheld device used by people with diabetes to check their blood glucose concentration. The meter displays the blood glucose level as a number on the meter's digital display.

**blood sugar:** A popular term for glucose in the blood. This term is less accurate than blood glucose.

**body mass index (BMI):** A measure used to evaluate body weight relative to a person's height. For adults, BMI is used to find out if a person is underweight, normal weight, overweight, or obese. BMI is calculated differently for adults and children. For more information, go to the Centers for Disease Control Web site, <http://www.cdc.gov/nccdphp/dnpa/bmi/>.

**borderline diabetes:** A term formerly used for early type 2 diabetes or pre-diabetes. See pre-diabetes.

**calorie:** The amount of heat energy required to raise the temperature of 1 gram of water 1 degree Celsius. In this usage, calorie is spelled with a lowercase c. The food Calorie (written with a capital C) is actually a kilocalorie, or 1,000 calories. The Calorie is an indication of the amount of energy contained in food. The Calorie content written on food labels is actually kilocalories.

**carbohydrate:** One of the three main nutrients in food. Carbohydrates make up sugar, starch, and cellulose. Foods that provide carbohydrates include starches, vegetables, fruits, dairy products, and sugars.





**certified diabetes educator (CDE):** A health professional with expertise in diabetes education who has met eligibility requirements and successfully completed a certification exam. See diabetes educator.

**coma:** A sleeplike state in which a person is not conscious. In people who have diabetes, it may be caused by *hyperglycemia* (high blood glucose) or *hypoglycemia* (low blood glucose).

**concentration:** The amount of a substance in a specified volume of liquid or air.

**deciliter (dL):** A volume equal to one-tenth of a liter, or 100 milliliters. In diabetes, blood glucose concentrations are often measured as the number of milligrams of glucose in a deciliter of blood.

**diabetes educator:** A health professional who teaches people who have diabetes how to manage their diabetes. Diabetes educators work in hospitals, physicians' offices, managed care organizations, home health care, and other settings.

**diabetes mellitus:** A condition characterized by high blood glucose concentrations. Diabetes mellitus can be classified as either type 1 or type 2. Diabetes may cause serious health problems, such as heart disease, stroke, kidney failure, blindness, or amputations.

**Diabetes Prevention Program (DPP):** A study by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) conducted from 1998 to 2001 in people at high risk for type 2 diabetes. All study participants had impaired glucose tolerance (also called pre-diabetes) and were overweight. Basic information about the DPP and its results can be found at the NIDDK Web site, <http://diabetes.niddk.nih.gov/dm/pubs/preventionprogram/>.

**dialysis:** The process of cleaning wastes from the blood by a dialysis machine. The kidneys usually perform this function.

**dietitian:** A health professional who advises people about meal planning, weight control, and diabetes management. A registered dietitian (RD) has met eligibility requirements and successfully completed a certification exam.

**digestion:** The process of making food absorbable by mechanically and enzymatically breaking it down into simpler chemical compounds. Digestion begins in the mouth and continues in the esophagus, stomach, and intestines.

**epidemic:** An outbreak of disease affecting a large number of people at the same time. Or a disease that increases suddenly in numbers that exceed what is expected.

**fasting blood glucose test:** A medical test of the body's ability to metabolize glucose that is used to diagnose diabetes or pre-diabetes. It is also used to monitor people who have diabetes.



**fat:** 1. One of the three main nutrients in food. Foods that provide fat include butter, margarine, salad dressing, oil, nuts, meat, poultry, fish, and some dairy products. 2. Excess calories are stored as body fat, providing the body with a reserve supply of energy and other functions.

**gestational diabetes mellitus:** A type of diabetes mellitus that develops only during pregnancy and usually disappears upon delivery. Gestational diabetes increases the risk that the mother will develop diabetes later. It is managed with meal planning, activity, and, in some cases, insulin.

**glucagon:** A hormone produced in the pancreas. It is released in response to decreases in the blood glucose concentration. Glucagon acts to increase blood glucose by stimulating the breakdown of glycogen and the synthesis of glucose.

**glucose:** A simple sugar with the chemical formula  $C_6H_{12}O_6$ . Glucose is the main type of sugar used by cells.

**glycogen:** The chief carbohydrate used by animals for energy storage.

**homeostasis:** A fundamental characteristic of living systems; the tendency of an organism to maintain a stable, constant internal environment.

**hormone:** A regulatory chemical secreted by cells or glands and carried through the blood. Hormones act on specific target cells and organs elsewhere in the body to elicit a response; a chemical messenger.

**hyperglycemia:** Indicates excessive blood glucose.

**hypoglycemia:** A condition that occurs when blood glucose levels are lower than normal. Signs include hunger, nervousness, shakiness, perspiration, dizziness or light-headedness, sleepiness, and confusion. If left untreated, hypoglycemia may lead to unconsciousness.

**impaired fasting glucose (IFG):** A condition in which a blood glucose test, taken after an eight- to 12-hour fast, shows a level of glucose higher than normal but not high enough for a diagnosis of diabetes. IFG is one of two conditions (with impaired glucose tolerance) that are the basis for a diagnosis of pre-diabetes. See impaired glucose tolerance (IGT) and pre-diabetes.

**impaired glucose tolerance (IGT):** A condition in which blood glucose concentrations are higher than normal but not high enough for a diagnosis of diabetes. IGT is one of two conditions (with impaired fasting glucose) that are the basis for a diagnosis of pre-diabetes. Terms for IGT that are no longer used include borderline, subclinical, chemical, or latent diabetes. See impaired fasting glucose (IFG) and pre-diabetes.





**insulin:** A hormone produced by the pancreas and released in response to elevated blood glucose concentrations. Insulin decreases blood glucose by increasing the uptake and use of glucose by cells.

**insulin-dependent diabetes mellitus:** A term formerly used for type 1 diabetes.

**insulin receptors:** Specific proteins on the cell membrane that bind to insulin and trigger a series of biochemical events that result in the uptake of glucose into the cell. See receptor.

**insulin resistance:** The body's inability to respond to and use the insulin produced by the pancreas. Insulin resistance is linked to obesity, hypertension, and high levels of fat in the blood.

**juvenile diabetes:** The term formerly used for type 1 diabetes.

**kidney failure:** A chronic condition in which the kidneys do not work properly, causing the body to retain fluid and harmful wastes to build up. A person with kidney failure needs dialysis or a kidney transplant.

**kidneys:** The two organs that regulate water and salt levels, filter water and wastes from the blood, and get rid of the end products as urine.

**liver:** The body organ that changes food into energy, removes alcohol and poisons from a person's blood, and makes bile, a substance that breaks down fat and helps rid the body of wastes.

**metabolism:** The sum of all chemical and physical processes within a living organism. Specifically, all of the chemical changes in living cells by which energy is provided for vital processes and activities and new material are assimilated.

**noninsulin-dependent diabetes mellitus:** A term formerly used for type 2 diabetes.

**nutritionist:** A person with training in nutrition. A nutritionist may or may not have specialized training or qualifications. See dietitian.

**obesity:** A condition in which the body has a greater than normal amount of fat. Obesity is a more severe condition than being overweight. In adults, obesity is defined as a body mass index (BMI) of 30 or more.

**oral glucose tolerance test (OGTT):** A test used to diagnose pre-diabetes and diabetes. The oral glucose tolerance test is given by a health professional after an overnight fast. After a blood sample is taken, the patient drinks a high-glucose beverage. Blood samples are taken during the three hours after drinking the glucose beverage. Test results are compared with a standard and show how the body uses glucose over time.

**overweight:** Having an above-normal body weight. In adults, being overweight means having a body mass index (BMI) of 25–29.9.



**pancreas:** The body organ that makes the hormones insulin and glucagon, as well as some enzymes used in digestion. The pancreas is located behind the lower part of the stomach and is about the size of a hand.

**pre-diabetes:** A condition in which blood glucose levels are higher than normal but are not high enough for a diagnosis of diabetes. People with pre-diabetes are at increased risk for type 2 diabetes, heart disease, and stroke. Pre-diabetes is diagnosed by having impaired fasting glucose, impaired glucose tolerance, or both. See impaired fasting glucose (IFG) and impaired glucose tolerance (IFT).

**protein:** 1. One of the three main nutrients in food. Foods that provide protein include meat, poultry, fish, cheese, milk, dairy products, eggs, and dried beans. 2. Proteins are produced in the body for cell structure, hormones such as insulin, and other functions.

**receptor:** A molecule (membrane protein) that recognizes specific chemicals, including hormones, neurotransmitters, or other body chemicals. When the hormone or other body chemical binds to its receptor, a biological response is triggered in the cells. See insulin receptors.

**sucrose:** A double sugar or disaccharide composed of glucose and fructose. Known as table sugar or white sugar, it is found naturally in sugarcane and in beets.

**sugar:** 1. A class of carbohydrates with a sweet taste; includes glucose, fructose, and

**sucrose.** 2. A term used to refer to blood glucose.

Adapted with permission from the *Diabetes Dictionary* by the National Institute of Diabetes and Digestive and Kidney Diseases; MedlinePlus Medical Dictionary; and *BSCS Biology: An Ecological Approach*, 10th edition (BSCS, 2006).





## Resource Directory

In an effort to provide teachers with additional high-quality resources of diabetes, we offer the following list of resources.

### General Information on Diabetes

#### 1. National Diabetes Information Clearinghouse (NDIC)

<http://diabetes.niddk.nih.gov>

The NDIC is a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). NDIC was created to increase knowledge and understanding about diabetes among patients, health professionals, and the general public. The NDIC Web site provides access to

- publications about diabetes, provided free of copyright, in varying reading levels;
- publications for health fairs and community events;
- the Combined Health Information Database;
- the diabetes subfile (which contains fact sheets, brochures, audiovisual materials, and reference materials for patients and health professionals); and
- an “A to Z list” of diabetes topics and titles.

#### 2. U.S. Department of Health and Human Services—National Institutes of Health (NIH)

<http://health.nih.gov>

The National Institutes of Health (NIH), a part of the U.S. Department of Health and Human Services, is the primary Federal agency for conducting and supporting medical research. The NIH Web site provides access to

- research health topics A–Z,
- search health topics, and
- browse health categories.

#### 3. U.S. Department of Health and Human Services—Indian Health Service

<http://www.ihs.gov>

The mission of the Indian Health Service (IHS) Division of Diabetes Treatment and Prevention is to develop, document, and sustain a public health effort to prevent and control diabetes in American Indian and Alaska Native peoples.

#### 4. Food Nutrition Information Center

<http://fnic.nal.usda.gov>

The Food and Nutrition Information Center has been a leader in food and human nutrition information dissemination since 1971. It provides credible, accurate, and practical resources for nutrition and health professionals, educators, government personnel and consumers. The Web site provides access to



- resources for teachers,
- downloadable nutrition education,
- training materials, and
- high-resolution images for educational use.

## 5. National Diabetes Education Program

<http://ndep.nih.gov/>

This National Diabetes Education Program is a joint program of the CDC (Centers for Disease Control and Prevention), NIH (National Institutes of Health), and 200-plus partners. It provides

- resources for health professionals,
- resources for educators, and
- opportunities and information for business professionals.

## 6. Children with Diabetes

<http://www.childrenwithdiabetes.com>

Children with Diabetes is an online community for kids, families and adults with diabetes, and provides

- the latest news and information for anyone with diabetes;
- an interactive database for children to use in e-mailing pen pals;
- forums;
- a parents' section with parent-specific information on diabetes;
- a home page for parents of kids with diabetes;
- an *Ask the Diabetes Team* feature; and
- a *Diabetes Basics* section (which offers basic medical information about diabetes, insulin, and research).

## 7. National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention (CDC)

<http://www.cdc.gov/diabetes>

CDC's Diabetes Public Health Resource Web site contains information about

- the National Diabetes Education Program,
- national conferences on diabetes,
- diabetes data and trends,
- national studies, and
- *Diabetes & Me* (basic information on diabetes and its complications and on ways to be active and eat right).





## 8. American Diabetes Association

<http://www.diabetes.org>

The American Diabetes Association is the nation's leading nonprofit health organization providing diabetes research, information, and advocacy. The mission of the association is to prevent and cure diabetes and to improve the lives of all people affected by diabetes.

## 9. Nutrition.gov

<http://www.nutrition.gov>

Nutrition.gov provides easy, online access to government information on food and human nutrition for consumers. It is a service of the National Agricultural Library, USDA. The Web site provides access to

- food and nutrition information;
- physical activity requirements;
- food safety for consumers, educators, and health professionals;
- healthy choices to reduce obesity and other food related diseases; and
- specialized nutritional requirements of infants, children, teens, adult women, men, and seniors.

## 10. Ask the Dietitian—Joanne Larson, MS, RD, LD

<http://www.dietitian.com>

An interesting feature is the Healthy Body Calculator. Just type in your information, and the results are shown on the third page. A list of commonly asked questions and answers is provided.

## 11. Nutrition Quest

<http://www.nutritionquest.com>

This Web site offers an excellent tool for personal nutrition analysis, including

- fat content in your diet,
- fruit content in your diet,
- vegetable content of your diet, and
- fiber intake.

## 12. Joslin Diabetes Center

<http://www.joslin.org>

The mission of the Joslin Diabetes Center is to improve the lives of people with diabetes and its complications through innovative care, education, and research that will lead to the prevention and cure of the disease. The Web site provides current diabetes education via

- the latest news and press releases,
- an online diabetes library,
- online classes,



- discussion boards, and
- an interactive learning center (which provides a series of interactive courses on diabetes).

### 13. U.S. Department of Agriculture—MyPyramid.gov

<http://www.mypyramid.gov/>

*The MyPyramid Plan* offers you a personal eating plan with the foods and amounts that are right for you. Use the advice at *Inside the Pyramid* to help you

- make smart choices from every food group,
- find your balance between food and physical activity,
- get the most nutrition out of your calories, and
- stay within your daily calorie needs.

## Teaching Tools

### 1. Discovery Kids

<http://yucky.discovery.com>

This interactive Web site promotes health education activities for kids, including

- games and quizzes,
- information on the endocrine system,
- information on the nervous system,
- information on the skeletal system, and
- information on the digestive system.

### 2. KidsHealth

<http://kidshealth.org>

Many topics are available, such as homework help, how the body works, information and news, and featured articles.

### 3. Mission Nutrition

<http://www.missionnutrition.ca/missionnutrition/eng/>

The Mission Nutrition Web site offers nutrition information for teachers, parents, or students. The links for educators are in the form of lesson plans and student activities.

### 4. Kateri Memorial Hospital Centre

<http://www.ksdpp.org>

This is the Web site of the Kahnawake Schools Diabetes Prevention Project. Their motto is “Healthy eating habits, daily physical activity, and positive attitude can prevent diabetes.” This main Web page is oriented toward the educator and focuses on teaching elementary school children about the prevention of diabetes.





## 5. NIH Office of Science Education

<http://science.education.nih.gov/>

The Office of Science Education provides educational resources on this Web site. The NIH Curriculum Supplement Series is a package of interactive teaching units that combine cutting-edge science research discoveries from the National Institutes of Health, one of the world's foremost medical research centers, with state-of-the-art instructional materials. The educational resources are listed by topic, grade level, and resource formats.

### Books

American Diabetes Association. (2005). *American Diabetes Association complete guide to diabetes*. Alexandria, VA: Author.

Kaufman, F. R. (2005). *Diabesity: The Obesity-diabetes epidemic that threatens America and what we must do to stop it*. New York: Bantam Dell.



Grades 9–12

# DIABETES AND AMERICAN INDIAN/ALASKA NATIVE HEALTH







## Unit Overview

The Diabetes Education in Tribal Schools (DETS) 9–12 Health Unit, *Diabetes and American Indian/Alaska Native Health*, consists of six lessons that can be completed in approximately 13 class periods. Type 2 diabetes is a growing concern for many American Indian and Alaska Native communities. The increase in the frequency of type 2 diabetes may be accompanied by misinformation and preconceptions about the disease. *Diabetes and American Indian/Alaska Native Health* is designed for use in high school health classes to provide accurate information that students can use to understand the symptoms, risks, and prevention of type 2 diabetes. By knowing the facts about the disease, students may be able to make choices and decisions in their lives that will lead to better health.

During the lessons, students will

- Assess what they know (or think they know) about diabetes at the beginning of the unit and compare that with the knowledge of other community members.
- Learn the symptoms, treatments, management, and prevention strategies for type 2 diabetes.
- Recognize that a variety of health professionals can provide high-quality, accurate information about type 2 diabetes to help individuals, families, and communities.
- Consider the impact that type 2 diabetes has on American Indian and Alaska Native communities.
- Learn the risk factors that influence a person's chances of developing type 2 diabetes.
- Consider how changes in lifestyle and environment that have occurred during the past 60 years may have influenced the increase in type 2 diabetes.
- Review the results of a scientific study, the Diabetes Prevention Program (DPP), to understand that improvements in diet, increased activity, and weight loss reduce the chance of developing type 2 diabetes.
- Learn that changes in lifestyle can be beneficial for living with type 2 diabetes.
- Be able to communicate their understanding of type 2 diabetes to others in the community.

*Diabetes and American Indian/Alaska Native Health* enables students to become knowledgeable about a health issue that many of them face every day in their communities. By replacing misperceptions and myths about type 2 diabetes, students learn that they can make choices and decisions in life that will reduce the chance that they will develop the disease or that will enable them to minimize the consequences of the disease.



# Enduring Understandings for the Unit

## Project Goal 1

To increase students' understanding of health and diabetes. To help American Indian and Alaska Native children learn how to maintain balance for themselves, their families, and their communities.

### 9–12 Specific Goals

1. Describe elements that promote health as life in balance.
2. Explain significant physical (including biological), social, and psychological elements that contribute to type 2 diabetes.
3. Analyze those major elements and risk factors contributing to type 2 diabetes that are changeable by individuals, families, and communities.
4. Design opportunities that foster maintenance of health and balance and prevention of type 2 diabetes.

## Project Goal 2

To increase American Indian and Alaska Native students' understanding of and appreciation for the process of developing scientific and community knowledge with respect to health, diabetes, and maintaining balance.

### 9–12 Specific Goals

1. Apply scientific and community knowledge to formulate questions and make informed decisions that promote health and prevent type 2 diabetes.
2. Recognize, demonstrate, and implement successful stories and programs that promote health and prevent type 2 diabetes.
3. Analyze how scientific and community knowledge change over time and their implications for present and future health.

## Project Goal 3

To improve attitudes toward and interest in entering science and health professions by developing a better understanding of how diabetes-related biomedical professionals work with communities and enhance health.

### 9–12 Specific Goals

1. Interact with Native American science and health professional role models.
2. Identify educational pathways to science and health professions.
3. Investigate and develop plans for career objectives.





# Correlation with National Standards

## The National Health Education Standards

In today's classroom, it is important that curriculum materials help teachers address the standards that have been set for various subject areas. The content of this curriculum unit ties directly to the *National Health Education Standards*. The following chart indicates which standards are addressed by the different lessons within this unit.

### Standards and Performance Indicators: Grades 9–12

Standard Number	National Health Education Standard	Correlation to the DETS 9–12 Health Unit
1	<b>Students will comprehend concepts related to health promotion and disease prevention to enhance health.</b>	
1.12.1	Predict how healthy behaviors can affect health status.	Lessons 3, 4, 5, 6
1.12.2	Describe the interrelationships of emotional, intellectual, physical, and social health.	Lessons 1, 4, 6
1.12.3	Analyze how environment and personal health are interrelated.	Lessons 1, 2, 4, 5
1.12.4	Analyze how genetics and family history can impact personal health.	Lessons 1, 2, 3, 5
1.12.5	Propose ways to reduce or prevent injuries and health problems.	Lessons 3, 4, 5, 6
1.12.7	Compare and contrast the benefits of and barriers to practicing a variety of healthy behaviors.	Lessons 4, 5
1.12.8	Analyze personal susceptibility to injury, illness or death if engaging in unhealthy behaviors.	Lessons 3, 4, 5
1.12.9	Analyze the potential severity of injury or illness if engaging in unhealthy behaviors.	Lessons 3, 5



Standard Number	National Health Education Standard	Correlation to the DETS 9–12 Health Unit
<b>2</b>	<b>Students will analyze the influence of family, peers, culture, media, technology and other factors on health behaviors.</b>	
2.12.2	Analyze how the culture supports and challenges health beliefs, practices and behaviors.	Lessons 1, 4
2.12.4	Evaluate how the school and community can impact personal health practice and behaviors.	Lessons 4, 6
2.12.6	Evaluate the impact of technology on personal, family and community health.	Lesson 4
2.12.7	Analyze how the perceptions of norms influence healthy and unhealthy behaviors.	Lessons 4, 5
2.12.8	Analyze the influence of personal values and beliefs on individual health practices and behaviors.	Lessons 1, 2, 3, 4
2.12.9	Analyze how some health risk behaviors can influence the likelihood of engaging in unhealthy behaviors.	Lessons 3, 4, 5
<b>3</b>	<b>Students will demonstrate the ability to access valid information and products and services to enhance health.</b>	
3.12.2	Use resources from home, school and community that provide valid health information.	Lessons 1, 2, 4, 6
<b>5</b>	<b>Students will demonstrate the ability to use decision-making skills to enhance health.</b>	
5.12.4	Generate alternatives to health-related issues or problems.	Lessons 3, 4, 5
5.12.5	Predict the potential short and long-term impact of each alternative on self and others.	Lessons 3, 5
5.12.7	Evaluate the effectiveness of health-related behaviors.	Lessons 3, 5
<b>7</b>	<b>Students will demonstrate the ability to advocate for personal, family, and community health.</b>	
7.12.1	Analyze the role of individual responsibility in enhancing health.	Lessons 1, 5, 6
<b>8</b>	<b>Students will demonstrate the ability to advocate for personal, family and community health.</b>	
8.12.1	Utilize accurate peer and societal norms to formulate a health-enhancing message.	Lessons 1, 2, 3, 4, 5, 6
8.12.3	Work cooperatively as an advocate for improving personal, family and community health.	Lesson 6
8.12.4	Adapt health messages and communication techniques to a specific target audience.	Lesson 6

Source: Reprinted with permission, from the American Cancer Society. *National health education standards: Achieving excellence* (2nd ed.). Atlanta, GA: American Cancer Society. 2007, [www.cancer.org/bookstore](http://www.cancer.org/bookstore).





## The National Science Education Standards

Although *Diabetes and American Indian/Alaska Native Health* is designed to be used primarily as part of a high school health curriculum, it does address several of the National Research Council's 1996 *National Science Education Standards*. The standards addressed in the lessons relate primarily to understandings of personal health. Some lessons also address aspects of scientific inquiry.

### Content Standards: Grades 9–12

Content	Correlation to the DETS 9–12 Health Unit
<b>Standard A: As a result of activities in grades 9-12, all students should develop</b>	
<b>Abilities necessary to do scientific inquiry</b>	
■ Use technology and mathematics to improve investigations and communications.	Lessons 3, 5
■ Formulate and revise scientific explanations and models using logic and evidence.	Lessons 3, 5
■ Communicate and defend a scientific argument.	Lessons 3, 6
<b>Understandings about scientific inquiry</b>	
■ Mathematics is essential in scientific inquiry.	Lessons 3, 5
■ Scientific explanations must adhere to criteria such as: a proposed explanation must be logically consistent; it must abide by the rules of evidence; it must be open to questions and possible modification; and it must be based on historical and current scientific knowledge.	Lessons 3, 5
<b>Content Standard F: As a result of their activities in grades 9–12, all students should develop an understanding of</b>	
<b>Personal and community health</b>	
■ The severity of disease symptoms is dependent on many factors, such as human resistance and the virulence of the disease-producing organism. Many diseases can be prevented, controlled, or cured.	Lessons 2, 3, 5, 6
■ Personal choice concerning fitness and health involves multiple factors.	Lessons 3, 4, 5, 6

Source: National Research Council. (1996). *National science education standards*. Washington, DC: National Academy Press.



# Teacher Strategies

## Timeline for the Lessons

The timeline provides a guideline for completing the six lessons in this unit. The lessons will require approximately 13 class periods of approximately 45 minutes each. The actual amount of class time needed for the unit will reflect the practice of individual teachers. Some classes will spend more time on activities and discussions than others. If your class periods are either shorter or longer than 45 minutes, you will need to adjust your schedule accordingly.

Lesson 1, *Diabetes and the Community*: 3 class periods

Lesson 2, *The Facts of Diabetes*: 2 class periods

Lesson 3, *Health Risks in Diabetes*: 2 class periods

Lesson 4, *History: Changes in Environment and Diet*: 1 class period

Lesson 5, *The Diabetes Prevention Program*: 1 class period

Lesson 6, *Letting Others Know about Diabetes*: 3 class periods

The timeline assumes that you will teach the lessons on consecutive days. If several days separate the lessons, you may need additional time to review the previous lessons. This review will help students make stronger connections between the lessons.

## Advance Preparation

### 2–3 Weeks Ahead

Begin reviewing lessons.

Invite community members to attend class for student interviews (see Lesson 1, *Preparation*, p. 54).

### 1 Week Ahead

Make photocopies and transparencies.

Gather necessary materials.

Purchase or prepare cards or gifts to thank community members for their participation (optional).

Decide acceptable formats for student projects in Lesson 6 (see p. 100). If applicable, reserve computer lab for student use.

### Teacher Materials for the Unit

overhead projector

transparency pens or markers

blank transparencies (optional)

chart paper





- markers for chart paper (preferably 5 different colors)
- masking tape
- thank-you cards or gifts for visiting community members (optional)
- art supplies (for example: construction paper, colored paper, poster board, pens, markers, scissors, glue; optional)
- computers with slide presentation software (optional)
- Teacher Resource CD (optional)
- 1 copy of Copymaster 1.3, *Interview Questions*, per classroom visitor
- transparency copies of each of the following:
  - Copymaster 1.2, *Interview Guidelines*
  - Copymaster 1.3, *Interview Questions*
  - Copymasters 3.1a–e, *Analyzing the Risk Factors for Type 2 Diabetes*
  - Copymaster 4.1, *Deaths Due to Diabetes*
  - Copymaster 4.2, *Summarizing Change*
  - Copymaster 5.1, *Overview of the Diabetes Prevention Program (DPP)*
  - Copymaster 5.2, *Results of the Diabetes Prevention Program (DPP): All Participants*
  - Copymaster 5.3, *Results of the Diabetes Prevention Program (DPP): Ethnic Groups*
  - Copymaster 6.2, *Rubric for Evaluating the Project*

## Student Materials for the Unit

### *For each student*

- different-colored pens or pencils
- 1 copy of Copymaster 1.1, *What Do I Know about Diabetes?*
- 1 copy of Copymaster 1.2, *Interview Guidelines*
- 1 copy of Copymaster 1.3, *Interview Questions*
- 2 copies of Copymaster 2.1, *Questions for Health Professionals*
- 1 copy of Copymaster 3.1a–e, *Analyzing the Risk Factors for Type 2 Diabetes* (optional)
- 1 copy of Copymaster 3.2, *Carla's Story*
- 1 copy of Copymaster 4.1, *Deaths Due to Diabetes* (optional)
- 1 copy of Copymaster 4.2, *Summarizing Change*
- 1 copy of Copymaster 6.1, *Philip John's Story*
- 1 copy of Copymaster 6.2, *Rubric for Evaluating the Project*
- 1 copy of Copymaster 6.3, *Project Score Sheet*
- 1 copy of Copymaster 6.4, *Has My Understanding of Type 2 Diabetes Changed?*



**For each team of 3–4 students**

1 copy of Copymaster 1.4, *Summarizing the Interview*

2 health professional roles from Copymasters 2.2a–e, *Health Professional Resource Information*:

- 2.2a, *Registered Nurse*
- 2.2b, *Clinical Laboratory Professional*
- 2.2c, *Dietitian*
- 2.2d, *Physician*
- 2.2e, *Diabetes Educator*

1 copy of Copymasters 3.1a–e, *Analyzing the Risk Factors for Type 2 Diabetes*

**For half the class**

1 copy of Copymaster 4.3, *Catherine’s Story*, per student

1 copy of Copymaster 4.4, *Larry’s Story*, per student

## Monitoring Students’ Progress

Assessing what students have learned during an activity, lesson, or unit is an important part of your role as a teacher. Because assessment can play a different role at different times, this unit has a variety of assessment strategies built in to the procedures.

The Engage lessons often include a mechanism for learning more about the preconceptions that students have before new content material is presented. From research on learning, we know that it is important for students to recall and think about their current knowledge and ideas. Some of this information is likely to be accurate and correct, but often this opportunity enables students to consider what they know, what questions they have, and even what discrepancies they have in their knowledge. Only after considering their prior knowledge will they be ready to add new information or revise incorrect ideas.

Assessment is also important as students progress through the lessons in the unit. In this unit, an icon in the margin denotes an opportunity for assessment. The icon indicates stages at which you can assess students’ understanding of the enduring understandings or major concepts the lesson is designed to convey. Specific strategies for evaluating students’ understanding are provided with the icon. Some of the strategies are informal and quick, while others may be more in depth. Based on students’ understanding at these points, you can modify your teaching practices accordingly.

The Evaluate lesson in the unit provides an opportunity for students to synthesize what they have learned during the previous lessons. By completing the Evaluate lesson, students demonstrate what they have learned and apply their understanding to new situations.







Finally, some teachers may wish to use an end-of-unit quiz to assess students' understanding of the ideas and concepts. The accompanying Teacher Resource CD-ROM (TRCD) includes a short test bank of questions that can be used for this purpose. The questions are in a variety of formats—multiple choice, true-false, short answer, and problem solving. As you design your end-of-unit quiz, select the questions from the test bank that represent the concepts you focused on and that align with the way you taught the unit.



# STUDENT LESSONS











# LESSON 1

## DIABETES AND THE COMMUNITY









## At a Glance

### Overview

Students begin Lesson 1, *Diabetes and the Community*, by writing their own definition and thoughts about type 2 diabetes. They then interview community members to learn more about what others know or think about type 2 diabetes. Students compare the community members' responses with each other and with their own responses. Through this activity, students see that different individuals have different information and thoughts about type 2 diabetes.

### Enduring Understandings

- Individuals often have some knowledge about type 2 diabetes based on prior experiences.
- Some of the thoughts and ideas that people have may be different from other people's knowledge.

### Teacher Background

Consult the *Overview of Diabetes* and *Life in Balance* sections of *Introductory Information*.

### Outcomes and Indicators of Success

By the end of this lesson, students should be able to

1. appreciate that individuals have some knowledge about type 2 diabetes.

They will demonstrate their understanding by

- writing what they know about type 2 diabetes and
- interviewing other individuals to find out their thoughts or ideas about diabetes.

2. recognize that the information people have may differ from that of other people.

They will demonstrate their understanding by

- comparing people's ideas and beliefs about diabetes and
- concluding that differing ideas about diabetes emphasize the need to find out more about the disease.

## In Advance

### Teacher Materials

overhead projector

transparency pens or markers

chart paper (approximately 7–8 pieces)

markers for chart paper

masking tape

thank-you cards or gifts for community members (optional)

**Lesson 1:**  
**Diabetes and**  
**the Community**  
**Engage**  
**Explore**





- 1 transparency of Copymaster 1.2, *Interview Guidelines*
- 1 transparency of Copymaster 1.3, *Interview Questions*
- 1 copy of Copymaster 1.3, *Interview Questions*, per classroom visitor

## Student Materials

### *For each student*

- 1 copy of Copymaster 1.1, *What Do I Know about Diabetes?*
- 1 copy of Copymaster 1.2, *Interview Guidelines*
- 1 copy of Copymaster 1.3, *Interview Questions*

### *For each team of 3–4 students*

- 1 copy of Copymaster 1.4, *Summarizing the Interview*

## Preparation

This lesson asks students to interview community members to learn what people in their community know or think about diabetes. Approximately two to three weeks before beginning the unit, you will need to identify and invite community members to attend your classes for the interviews. If possible, invite approximately three members of the local American Indian or Alaska Native (AI/AN) community to participate in the student interviews. If your school includes multiple ethnic groups, you may wish to invite people who represent these different groups to help students gain a broader perspective. If you are unable to locate members of the AI/AN community who are available for the appropriate time, ask other teachers, school administrators, other school personnel, parents, or other adults from outside the school. Because the interviews are focused on learning what members of the public know and think about diabetes, you do not want to invite nurses, physicians, or other health professionals for these interviews. The purpose of these interviews is to help students realize that there are different levels of knowledge of and awareness about type 2 diabetes in their communities. Students will learn the facts about diabetes in later lessons.

The size of your class will influence the number of individuals you may wish to invite. Students will work in teams to conduct the interviews. Optimally, teams will include three to four students so that there is more personal interaction with the community member. However, larger teams can work well if necessary. Ultimately, the size of the teams will depend on the number of community members who accept the invitation to participate in this lesson.

When you invite individuals to participate in the interviews, discuss the purpose of the activity with them. Give each classroom guest a copy of Copymaster 1.3, *Interview Questions*, to help the guests know what to expect. Classroom guests do not need to prepare answers for the questions, as it is their opinions and current thoughts that will help the



students in their activity. However, providing questions ahead of time can help the guests feel more at ease. Be aware that some guests may have areas of their life that they are not comfortable discussing. Inform these community members that they do not have to discuss anything that is sensitive to them.

If your school has a policy for visitors, explain to each community member what they will need to do when they arrive at the school (e.g., checking in at the main office, finding a place to park). Also, inform the main office so it will know visitors will be coming to your class.

If appropriate, purchase or have students make a card or gift for each community member to thank them for their assistance.

Write interview Questions 1–6 from Copymaster 1.3 on separate pieces of chart paper. On the remaining chart paper, write “other questions and responses.”

## Process and Procedure

**Note to Teacher:** *This lesson has two main goals. The first goal is for students to bring to mind their own thoughts and ideas about type 2 diabetes. The other goal is for students to learn what other people in their community think about diabetes. Some of the information that both students and the community members have about diabetes may be correct, while other ideas may not be scientifically correct. By revealing that people have different ideas about type 2 diabetes, this lesson prepares students for the subsequent lessons that will clarify their understanding about what diabetes is, the impact that diabetes has on a person and a community, and how a person can take steps to reduce that impact.*

*It is important to remember, however, that many misconceptions are based on something a person has heard or an experience that a person has had. Often, misconceptions make sense in light of experience even if they don't fit scientific explanations. For example, young children may think that they should put on sweaters and hats in cold weather because those items will “make” them warm. This fits with their experience—they are warmer when they have those clothes on. However, the clothes do not make the heat that keeps the children warm. As adults, we know that wearing these clothes traps the heat made by and given off from your body—that is why you are warmer when you wear sweaters and hats. This is just an example of how some ideas may not be scientifically correct but are in line with experience. For the purpose of this lesson, it is important to recognize that individuals may have misconceptions about diabetes that can be attributed to personal experiences. Although a primary goal of this curriculum unit is to correct students' misconceptions, it is important to also recognize where some of these misconceptions may have come from.*





1. Ask students the following question: “What is the first thing that comes to your mind when you hear the words ‘type 2 diabetes’?”

Ask for volunteers to share their answers. The purpose of this step is to have students think about what they currently know about type 2 diabetes. Accept all student answers at this time. Do not correct misconceptions now. If the responses of different students contradict each other, simply inform students that they will be able to find out more in the upcoming lessons. After several students have shared their thoughts, move on to Step 2.

2. Inform students that they will be conducting interviews to find out what other people in the community know or think about type 2 diabetes. Give each student a copy of Copymaster 1.1, *What Do I Know about Diabetes?* Ask students to write their own responses to the questions.

The questions will draw out specific ideas that students have about diabetes and make students more comfortable with the questions for the interview. The questions are broad and allow for many ideas and opinions to come to mind.

Have students place their sheets in a folder or collect them at the end of class. These sheets will be used in Lesson 6, *Letting Others Know about Diabetes*.

3. Inform students that they will be interviewing visitors during the next class period. Explain to students that there are guidelines that interviewers need to follow when doing an interview. These guidelines are useful so that the person being interviewed is comfortable, and so that the interviewer gets the most appropriate information. Give each student a copy of Copymaster 1.2, *Interview Guidelines*. Also display a transparency of it on the overhead projector. Go over each point with the class to prepare them for the interview.

An interviewer should be respectful to the interview subject, especially when asking about personal health or opinions. The guidelines will help students be respectful while getting the most useful information.

4. Display a transparency of Copymaster 1.3, *Interview Questions*. Inform students that they will use these questions as the starting point for their interviews of the community members.

Students should recognize that these are the same questions that they answered themselves earlier in this lesson. If they do not, remind them of this fact.

Explain that these questions are the starting point for the interview. If students have other questions they would like to ask, explain that they should submit questions to you for review before the start of the interview.



**5. Explain the process that they will use for the interviews. Inform students of the following:**

- They will work with a team to conduct the interview.
- Each student will ask at least one of the questions.
- Students will alternate the task of writing notes during the interview.  
Two team members should take notes for each question.
- Teams will meet after the interview to summarize what they have learned.

If time allows, ask teams to meet briefly to decide who will be the note takers for each question. By assigning specific note takers for each question, not all members of the interview team will be writing. This should make it easier for the students to listen to the interviewee carefully. When teams meet to summarize the interviews, all team members can contribute to the summary whether they were a note taker or not.

**6. On the day of the interviews, introduce the community members to the class.**

Ask the community members if they have any questions about the procedure before beginning the interviews.

**7. Briefly review with students the interview guidelines and the procedure for the interviews.**

Allow students and interview subjects to ask questions about the interview process if anything is unclear to them. Remind students about the note-taking plan. Point out that students do not need to worry about spelling and grammar. The important task is to record the main points the interviewee makes.

Community members will probably find it helpful to hear a brief review of the guidelines and procedure before beginning so that they will know what to expect.

**8. Distribute Copymaster 1.3, *Interview Questions*, to each student.**

The students should think of themselves as investigators or detectives. Remind students that they can ask follow-up questions to clarify information or to probe more deeply.

**9. Divide the class into teams with one community member assigned to each team. Have students begin the interview.**

Depending on the physical space in your classroom, you can decide the best way to arrange the teams. If possible, you should spread the teams out to minimize the noise they hear and make it easier for the team members to hear their interviewee and for the interviewee to hear them.

As students conduct their interviews, circulate among the teams to make sure that the teams are staying focused and to see if they are getting the information they need.





10. At the end of the interviews, thank the community members.

If appropriate, present a gift or card of appreciation to the interviewees.

11. In the next class period, have students get back into their teams. Give each team a copy of Copymaster 1.4, *Summarizing the Interview*. Ask teams to work together to write a clear and organized answer to each question, using the information from the interview. Explain that after writing the team response, one student from each team will add the team's summary for each question to the chart paper posted around the room.

Remind students that the summary responses should capture only what their interview subject said—not their own opinions or what they have heard other people say. A good interviewer accurately reports the response given during the interview.

Tape up the chart paper around the room so that students can add their responses to each question. If teams asked additional questions during the interviews, they should write both the question and the response on the chart paper labeled “other questions and responses.” At the end, each chart paper will include answers from each team.

12. After all the summaries are completed and added to the chart paper, allow five to 10 minutes for students to move around the room and review all the responses. Ask them to look for things that are similar among the responses and for things that are different. Also, ask them to notice if any of the responses from the interviewees are different from what the students wrote themselves in Step 2.

You may want students to briefly review what they wrote earlier on Copymaster 1.1.

As students are moving around reading the various responses, read them yourself.

Try to notice discrepancies among answers so that you can discuss them in the next step.

13. Hold a class discussion about students' observations of the summaries. Ask students what they noticed while reading the summaries on the chart paper.

Students' observations will differ depending on the interviews. However, it is likely that students will notice some similarities and some differences among the interviewees' responses. Students may also notice similarities and differences between the interviewees' responses and their own responses.

In the unlikely event that all answers are in agreement, you can bring up a misconception about diabetes that differs from what came up in the interviews. One common misconception is that diabetes is contagious. If this idea has not been raised previously, you may wish to discuss it with the class at this time.

14. Conclude the lesson by asking students, “How can we be sure what information about diabetes is correct? Should we find out more about type 2 diabetes?”



Students should recognize that not all answers are the same and that the discrepancies emphasize the need to learn more about type 2 diabetes. You can prepare students for the upcoming lessons by explaining that they will find out more about diabetes during the next several lessons.

15. Ask students to save their copies of Copymaster 1.1, *What Do I Know about Diabetes?* Students will refer to them again in later lessons.







An illustration in a light orange color. On the left, an eagle is shown in flight, facing right. In the center, there is a teepee with a sunburst design on its front. The title text is overlaid on the teepee.

# LESSON 2

## THE FACTS OF DIABETES







## At a Glance

### Overview

In Lesson 2, *The Facts of Diabetes*, students learn about type 2 diabetes by playing the role of health professionals. Students then compare the information they learned through the role play with their previous knowledge of diabetes.

### Enduring Understandings

- Type 2 diabetes is a disease characterized by high blood glucose levels.
- Health professionals are a valuable source of information about the symptoms, treatment, prevention, and incidence of type 2 diabetes.

### Teacher Background

Consult the *Overview of Diabetes* section of *Introductory Information*.

### Outcomes and Indicators of Success

By the end of this lesson, students should be able to

1. understand several key points about type 2 diabetes.

They will demonstrate their understanding by participating in a role-playing activity to find answers to questions about the symptoms, treatment, prevention, and frequency of type 2 diabetes.

2. recognize that health professionals can be important sources of information about type 2 diabetes.

They will demonstrate this recognition by

- playing the role of a health professional and
- comparing the types of information that different health professionals can provide.

## In Advance

### Teacher Materials

chart paper (approximately 7–8 pieces)

markers for chart paper (preferably 5 different colors)

masking tape

### Student Materials

#### *For each student*

1 copy of Copymaster 1.1, *What Do I Know about Diabetes?*, from Lesson 1 (optional)

2 copies of Copymaster 2.1, *Questions for Health Professionals*





*For each team of 3-4 students*

2 health professional roles from Copymasters 2.2a–e, *Health Professional Resource Information*:

- 2.2a, *Registered Nurse*
- 2.2b, *Clinical Laboratory Professional*
- 2.2c, *Dietitian*
- 2.2d, *Physician*
- 2.2e, *Diabetes Educator*

## Preparation

Write each question from Copymaster 2.1, *Questions for Health Professionals*, on a separate piece of chart paper.

## Process and Procedure

1. Ask students to recall the conclusion from Lesson 1, *Diabetes and the Community*. Ask them if everyone knew the same information about type 2 diabetes.

If students don't recall, remind them that the individuals responded to the questions differently.

2. Ask students, "Is it important to find out what is true and not true about type 2 diabetes? Why?"

Students' answers to these questions will vary. They should recognize that knowing the correct information about type 2 diabetes may help individuals recognize the need for help, realize that a person's chance (risk) of getting type 2 diabetes can be reduced, and understand that type 2 diabetes can be treated effectively. Knowing the facts may also reduce the fear of or anxiety about the disease.

3. Ask students where they may find accurate information about type 2 diabetes.

Students may answer with a variety of sources, but steer them toward health professionals as a source.

4. Inform students that they will play the role of a health professional. Tell students they will be working in teams of three or four. Explain that one student in the team will be playing the role of a health professional. The other team members will ask questions to find out about type 2 diabetes and how that professional helps people learn about diabetes.

The students who are not playing the health professional could view themselves as journalists who need information about type 2 diabetes for a news story.

Inform students that they will role-play two professionals during the activity. For the second role play (Step 10), a different team member will play the role of the health professional.



**5. Give each student a copy of Copymaster 2.1, *Questions for Health Professionals*.**

Explain to students that the team members not playing the role of the health professional should write answers to each question they ask the health professional in their team. The students who are not playing the health professional (the journalists) should alternate asking the questions of the professional.

**6. Divide the class into teams. Have each team decide who will play the role of the health professional for the first role play. Give that individual a copy of one of the health professional roles on Copymasters 2.2a–e, *Health Professional Resource Information*.**

Different teams will role-play different health professionals. Give each team a different role from Copymaster 2.2. Depending on the number of student teams, you may have multiple teams role-playing the same professional. Alternatively, you may not have enough teams to cover all five health professions. If so, the unused cases can be done later in Step 10 when teams role-play their second health professional.

**7. Tell students to allow the student who is playing the health professional about five minutes to read and think about the information before beginning the interview. While the student playing the role is preparing, other students should read over the questions and decide who will ask each question. After the health professional has had a chance to read the career information, teams can begin the interview.**

The student playing the role of the health professional should understand that he or she should answer the questions as a real health professional would when speaking with a client or someone in the community who does not have a lot of knowledge about type 2 diabetes or health professions. The resource information will give the student the needed information, but the role play will be more interesting and memorable if the health professional doesn't just read answers to the other team members.

Each health professional in the role play will be able to answer several of the questions asked on Copymaster 2.1. Inform students that if an answer is not part of the health professional's information provided on Copymaster 2.2, the question should be left blank. Students should not fill in information from their own experience or from other sources.

When all the information from the different health professionals is pooled, all questions will be answered; see Step 11. Also, after students summarize information from all the different health professionals (Step 11), they can better understand that different health professionals play different roles and can assist in different aspects of health care (Step 12.)





**Note to Teacher:** *For the optimal success of this activity, the students who play the role of the health professional should, to the degree possible, really view themselves as the professional. They should act as that health professional would act if someone interviews them. If you think students would benefit from an example of how to answer the questions (as the person playing the professional), you could use a scenario of a journalist interviewing a high school coach about the current season. If the journalist asked the question, “What do you think are your team’s strengths compared with the team you are playing this weekend?” the coach would not begin the answer with, “My notes tell me that our team is faster and more experienced than the other team.” The coach would simply say, “Our team is faster and more experienced than the other team.” This scenario, or another one that teenagers would be familiar with, can help them realize that the health professional in the role play would not begin answering the question with, “My handout says that a doctor would ...” Instead, the doctor would simply say something like, “The people most likely to get type 2 diabetes are ...”*

8. After the student playing the health professional role has had time to read the resource information and ask questions about the material, have teams begin to interview the health professional.

As the health professional provides information, students should write answers to the questions on Copymaster 2.1. As the teams role-play, circulate among them to answer questions and make sure they are on task.

While students are working, post the chart paper on the walls around the classroom.

9. When each team finishes their questions, have team members write their answers on the chart paper for each question.

When students write the answers to the questions on the chart paper, they should indicate which health professional provided the information. If you have five different colored markers, you can assign a different color for each health profession.

10. When each team finishes, assign a new health profession. Give each student another copy of Copymaster 2.1. Students will alternate roles, with a different student playing the health professional.

Students will follow the same steps for this second health professional. The student who played the role of the health professional during the first role play should now ask questions and write answers to the questions. Again, team members will record answers on the chart papers posted around the room.

The different health professionals in the role-play activity provide different types and amounts of information. The pairings in figure 1 provide a good balance of information



and will help the students get the most well-rounded information about type 2 diabetes. Although these pairings may be helpful, it is not critical to match them up in this way—when students see the responses pooled in Step 11, they should have a good overview of type 2 diabetes.

If Students Role-Play This Health Professional First	Then Use This Role for the Second Part of the Role-Play Activity
Registered nurse (RN)	Dietitian (D)
Clinical laboratory professional (CLP)	Physician (MD)
Dietitian (D)	Diabetes educator (DE)
Physician (MD)	Clinical laboratory professional (CLP)
Diabetes educator (DE)	Registered nurse (RN)

**Figure 1:**  
Role-play activity pairings.

**11. As a class, review the answers for each question. Discuss similarities and resolve any differences.**

Students should recognize that, for most questions, more than one health professional provided information. Also, students may notice that different health professionals perform different types of tasks and have different responsibilities. See figure 2 on pages 68 and 69.

**12. After reviewing the answers to all of the questions, ask students if someone who has type 2 diabetes might benefit from seeing more than one health professional. Ask them to explain their answers.**

Students may recognize that different health professionals provide different types of information or help individuals use different types of skills manage their health.

**13. Ask the students if there is any information they have learned that is different from what they thought previously. Ask students to explain why getting the facts about type 2 diabetes can help people.**

You may ask students to review the answers they wrote to the questions on Copymaster 1.1, *What Do I Know about Diabetes?*, during Lesson 1 to compare what they learned in this lesson with their earlier ideas. Some of the knowledge about diabetes that students had before beginning this unit is likely to be correct, but some is likely to be incorrect or incomplete. This activity should help students begin to expand their knowledge of type 2 diabetes and to correct any misconceptions they have. If a person has misconceptions about diabetes, he or she might not seek help or realize that diabetes is a treatable condition.



**Assessment Opportunity**

Before the class discussion, ask students to write their answer to the question: “Why might someone who has type 2 diabetes benefit from seeing more than one health professional?” Collect their papers to assess each student’s understanding of the material.





**Figure 2:**

Sample answers to questions on Copymaster 2.1, *Questions for Health Professionals*, from the role-play activity. The specific health professional who provides this information is listed in parentheses following the answer to the question.

**1. What are the symptoms of type 2 diabetes?**

Going to the bathroom a lot (RN) (MD) (DE)

Thirsty (RN) (MD) (DE)

Tired (RN) (MD)

Irritable (RN) (MD)

Moody (RN)

Sick or nauseous (RN)

High blood glucose levels (CLP) (D) (MD)

Extreme hunger (MD) (DE)

Unexplained weight loss (MD) (DE)

Blurry vision (MD)

**2. How can people find out if they have type 2 diabetes?**

Blood test to check glucose levels (CLP) (MD)

**3. Who gets diabetes?**

Used to be only people over approximately age 40, but now all ages (D)

All ages (MD) (DE)

More frequent now in AI/AN communities (MD) (DE)

**4. What should people do to manage type 2 diabetes?**

Keep blood glucose levels under control (RN)

Use a digital meter to check blood glucose levels (RN) (DE)

Do physical activity almost every day (RN) (CLP) (MD) (DE)

Eat a healthy diet (RN) (CLP) (MD) (DE)

Get an A1c test regularly (RN) (CLP)

Balance food intake with exercise and medications (D)

Limit high-carbohydrate foods and sweets (D)



Fix foods in healthier way (D)  
Lose weight (D) (MD)  
Take medication (MD)  
Give insulin shots to themselves (MD)  
Have family get education about type 2 diabetes (DE)

**5. What can people do to reduce the chance they will get type 2 diabetes?**

Eat a healthy diet (RN) (D) (DE)  
Lose extra weight (RN) (D) (DE)  
Get more exercise (RN) (D) (DE)

**6. In what ways is diabetes a problem in American Indian and Alaska Native communities?**

Unmanaged type 2 diabetes can lead to serious health problems, such as heart problems, stroke, or blindness. (RN) (MD)

There has been an increase in type 2 diabetes in AI/AN communities. (D) (MD)

**7. Where can people go to get accurate information about type 2 diabetes?**

Nurse  
Doctor  
Dietitian  
Nutritionist  
Sports trainer  
Books  
Videos  
Pamphlets  
Community events, such as health fairs or school presentations







An illustration in a light orange tone. It features an eagle with its wings spread, perched on the back of a person. The person is shown from the waist up, wearing a long-sleeved shirt and pants, and is holding a cane. The eagle's head is turned towards the right, looking over the person's shoulder.

# LESSON 3

## HEALTH RISKS IN DIABETES







## At a Glance

### Overview

In Lesson 3, *Health Risks in Diabetes*, students analyze graphs to determine how certain factors affect a person's chance (or risk) of developing type 2 diabetes. They then read a story to see how risk factors affect a real person's life.

### Enduring Understandings

- Individuals have risk factors that influence their chance (risk) of developing type 2 diabetes.
- Some risk factors are beyond an individual's control and cannot be changed.  
Individuals can make changes to their life to reduce their risk from other risk factors.

### Teacher Background

Consult the *Overview of Diabetes* section of *Introductory Information*.

### Outcomes and Indicators of Success

By the end of this lesson, students should be able to

**1.** define the terms "risk" and "risk factor."

They will demonstrate their ability by

- learning definitions for each term,
- analyzing and interpreting data for a variety of factors, and
- applying their knowledge to a real-life case.

**2.** identify and explain why certain conditions are risk factors for type 2 diabetes.

They will demonstrate their understanding by

- analyzing and interpreting data for five different factors and
- identifying risk factors from a real-life case.

**3.** explain that people can control or change some of their risk factors and thereby influence the chance that they will get type 2 diabetes.

They will demonstrate their ability to explain by

- analyzing data for five different risk factors,
- answering questions about risk factors and a person's chance of getting type 2 diabetes, and
- recognizing how an individual has made changes to her life to reduce her risk for type 2 diabetes.

**Lesson 3:**  
**Health Risks**  
**in Diabetes**  
**Explain**  
**Elaborate**





## In Advance

### Teacher Materials

overhead projector

transparency pens or markers

chart paper (optional)

blank transparencies (optional)

1 transparency of Copymasters 3.1a–e, *Analyzing the Risk Factors for Type 2 Diabetes*

### Student Materials

#### *For each student*

1 copy of Copymaster 3.2, *Carla's Story*

#### *For each team of 3–4 students*

1 copy of Copymasters 3.1a–e, *Analyzing the Risk Factors for Type 2 Diabetes*

## Process and Procedure

1. Ask students, “Why do some people get diabetes and others do not?”

Write students’ responses on the board or chart paper.

Accept all reasonable answers. This will enable you to assess students’ prior knowledge.

2. Introduce students to the terms “risk” and “risk factor.” Risk can be defined as the chance or possibility of something negative or harmful happening. A risk factor is something that increases the chance that something negative or harmful will happen.

It may be helpful to write the definitions for risk and risk factor on the board or chart paper for students to refer to while completing the rest of this lesson.

As an example, you can ask students to list why some people get a cold and others do not. Colds are caused by viruses. The risk is the chance or likelihood that someone will get a cold. The risk factors are those things that make a person more likely to get a cold. One risk factor for a cold could be close proximity to someone who is sneezing. The close proximity makes it more likely that the person will contract the virus. Physical contact with someone who has a cold can also be a risk factor. Shaking hands with someone who has a cold and didn’t wash his or her hands increases the chance that the person will be exposed to the cold virus. A weak immune system is also a risk factor. If the immune system is weak, the body is less able to fight off infection.

A cold is a relatively simple example to illustrate risk and risk factors. The risk and risk factors for a cold are different from those for developing diabetes. Different diseases or conditions have different risk factors.



**3. Ask students to share any ideas they have about risk factors for type 2 diabetes.**

Ask students, “What are risk factors for developing type 2 diabetes?”

This is another opportunity to assess what students’ prior knowledge about diabetes is. Accept all reasonable answers and inform students that they will find out more about the risk factors for type 2 diabetes during the remainder of this lesson.

**4. Divide the class into teams of three or four students. Give each team a set of the five graphs on Copymasters 3.1a–e, *Analyzing the Risk Factors for Type 2 Diabetes*. Ask teams to analyze the graphs to determine which factors increase a person’s chance of getting type 2 diabetes.**

If you feel that students will struggle with analyzing the graphs, you may wish to review one of them first as a class before having teams work independently on the other graphs. If you choose this approach, display a transparency of Copymaster 3.1a on the overhead projector. Guide the analysis of this graph by asking students questions such as the following:

- **“What question will this data help you answer?”** Answer: Is age a risk factor for type 2 diabetes? (The question could also be phrased, “Does a person’s age increase the risk for developing type 2 diabetes?”)
- **“What are the groups of people studied for this graph?”** Answer: The graph shows three groups of people: ages 20–39, ages 40–59, and ages 60 and over.
- **“What are the conditions of the people represented in this graph?”** Answer: The main condition is having type 2 diabetes (and not having it, by inference).
- **“What do you see?”** Answer: The bars for the different groups are different lengths. The bar for the age group 20–39 is the shortest (about 3 percent). The bar for the age group 40–59 is intermediate length (about 10 percent). The bar for the age group 60+ is the longest at about 21 percent.
- **“What does it mean?”** Answer: The percentage of people who have type 2 diabetes is different in the different age groups. A higher percentage of people in the 60+ age group have type 2 diabetes than in the other groups. The group with the lowest percentage of people having type 2 diabetes is the 20–39 age group.
- **“Does the information answer the question?”** Answer: Yes, because the data show that people who are in the 60+ age group are more likely to have type 2 diabetes than those in either the 40–59 or 20–39 age groups.





- **“What conclusion can you make from the graph?”** Answer: Age is a risk factor for type 2 diabetes. Among those age groups included in the data, older individuals are more likely to have type 2 diabetes than are the younger people.
  - **“Can you make a conclusion about the risk of type 2 diabetes for people who are 15 years old?”** Answer: You cannot make a conclusion about the risk of type 2 diabetes for someone who is 15 years old. There are no data included on the graph to show the percentage of 15-year-olds who have type 2 diabetes.
5. After teams complete their analysis, review all the graphs during a class discussion. Ask different teams to present one of the five graphs to the class. As each team explains their graph, display a transparency of that graph on an overhead projector. Each team will state whether their graph represents a risk factor for type 2 diabetes and explain why they reached their conclusion. Ask the other class members if they agree with the conclusion and the explanation given by the presenting team.
- Because all teams analyzed each graph, students should be able to explain why they agree or disagree with the conclusions and explanations given by the presenting team. If there are disagreements about the correct conclusion, show the graph on the overhead projector and work through the data with the class until consensus is reached.
- If students ask, two factors that are not currently thought to influence the chance or risk of developing type 2 diabetes are gender and alcohol use.
6. List the risk factors for type 2 diabetes (age, ethnicity, family history, amount of physical activity, and obesity) on the board or chart paper. Discuss the following questions with the class:
- **“Does having one of the risk factors guarantee that you will develop type 2 diabetes? Explain your answer using information from the graphs if possible.”** Answer: No. Having a risk factor simply increases the chance that a person will develop type 2 diabetes. Some people who have the highest risk don’t develop type 2 diabetes. On each of the graphs, some individuals (even in the highest-risk group) do not have type 2 diabetes.
  - **“Do some people in the lowest-risk category for each risk factor develop type 2 diabetes?”** Answer: Yes. Almost everyone has some risk for developing type 2 diabetes. Some people are just more likely than others to develop the disease. On each of the graphs, even in the lowest-risk group, some individuals have type 2 diabetes.
  - **“Does having multiple risk factors increase your chances of developing type 2 diabetes? Explain your answer.”** Answer: Yes. Students do not have data to



answer this question, but by inference, most students will answer yes. Having multiple risk factors increases the chances of developing type 2 diabetes. However, even among people who have multiple risk factors, not everyone develops type 2 diabetes.

- **“Can you change any of these risk factors? If yes, which ones? Explain.”**

Answer: Yes. Some can be changed (controlled), but some cannot. The ones that cannot be changed are ethnicity, age, and family history. The factors you can control are physical activity, diet, and obesity.

- **“Do you think that changing or controlling a risk factor might change a person’s chance of getting type 2 diabetes? Explain your answer.”** Answer:

At this point, students don’t have the data on which to base their responses. However, this question makes a nice transition to the next activity in this lesson. Students who think they are doomed to getting type 2 diabetes because they have some of the risk factors will learn that there are things people can change to reduce their risk for developing type 2 diabetes. Students will explore this idea further in the next step.

7. Give each student a copy of Copymaster 3.2, *Carla’s Story*. Ask students to read the story. As the students read, write the following questions on the board or on a blank transparency:

- “Which risk factors did Carla have for type 2 diabetes?”
- “What did Carla do to change her risk for developing type 2 diabetes?”
- “Based on this story, do you think there are things people can do to change their risk for type 2 diabetes? Explain your answer.”

Carla’s risk factors were family history, obesity, and inactivity. She changed her risk factors of obesity and inactivity by losing weight and increasing activity over a long period of time.

You can point out to students that this is only one person’s story and you don’t know whether the changes that Carla made in her life really changed her risk—maybe she would not have developed type 2 diabetes even if she hadn’t changed her lifestyle. In Lesson 4, *History: Changes in Environment and Diet*, and Lesson 5, *The Diabetes Prevention Program*, students will continue thinking about the relationships among risk factors, lifestyle, and type 2 diabetes.



#### Assessment Opportunities

Ask students to write their answers to the three questions in Step 7 before you hold the class discussion. This gives students an opportunity to think through their answers before the discussion, and you can read each student’s responses to assess understanding.



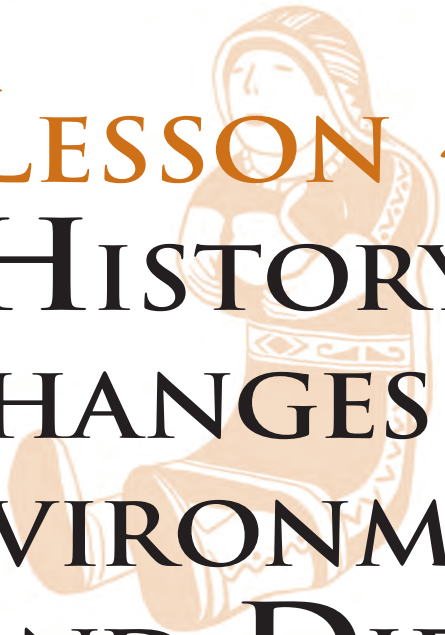






# LESSON 4

## HISTORY: CHANGES IN ENVIRONMENT AND DIET









## At a Glance

### Overview

By analyzing a graph, students learn in Lesson 4, *History: Changes in Environment and Diet*, that deaths due to diabetes have increased among American Indians and Alaska Natives during the past 60 years. They then read a story to learn how changes in the American Indian/Alaska Native environment and lifestyle (physical activity and diet) in the past 60–100 years may have contributed to the increase in type 2 diabetes.

### Enduring Understandings

- Changes in lifestyle (physical activity and diet) correlate temporally with the increase in type 2 diabetes among AI/AN peoples. These changes may have increased individuals' risks for, and may have led to, the increases in the disease seen today.
- An individual may use this information to make choices about healthy lifestyles.

### Teacher Background

Consult the *Overview of Diabetes* and *Life in Balance* sections of *Introductory Information*.

### Outcomes and Indicators of Success

By the end of this lesson, students should be able to

1. understand that type 2 diabetes has increased in prevalence among American Indians and Alaska Natives during the past 60 years.

They will demonstrate their understanding by correctly reading and interpreting a graph showing the number of deaths caused by diabetes over the past 60 years for both American Indians and all U.S. populations.

2. identify lifestyle factors that have changed during the past 60 years that correlate with the increase in type 2 diabetes.

They will demonstrate their understanding by

- reading an individual's story about lifestyle changes in an American Indian culture and
- identifying aspects of lifestyle that are different before the increase in type 2 diabetes compared with now or after the increase in type 2 diabetes began.

3. predict how choices today might influence an individual's risk for type 2 diabetes.

They will demonstrate their ability by

- recognizing that individuals can make choices that will affect their risk for type 2 diabetes and
- explaining how these choices may influence an individual's overall risk for type 2 diabetes.

### Lesson 4:

### History: Changes in Environment and Diet

### Explore





## In Advance

### Teacher Materials

overhead projector

transparency pens

1 transparency of Copymaster 4.1, *Deaths Due to Diabetes*

1 transparency of Copymaster 4.2, *Summarizing Change*

### Student Materials

#### *For each student*

different-colored pens or pencils

1 copy of Copymaster 4.2, *Summarizing Change*

#### *For half the class (see Preparation)*

1 copy of Copymaster 4.3, *Catherine's Story*, per student

1 copy of Copymaster 4.4, *Larry's Story*, per student

### Preparation

See Step 4 about preparing copymasters for half the class. If you wish to have all students read both stories, you will need one copy each of Copymaster 4.3, *Catherine's Story*, and Copymaster 4.4, *Larry's Story*, for each student in the class.

## Process and Procedure

1. Begin the lesson by asking students to recall what they learned about risk factors for type 2 diabetes in the Lesson 3, *Health Risks in Diabetes*. As students share what they learned, write the risk factors on the board or chart paper.

As students recall the risk factors, ask them also to recall how the risk for diabetes changed with each factor. For example, students should say that age is a risk factor and a person's chances of getting type 2 diabetes increase as the person gets older.

2. Display a transparency of Copymaster 4.1, *Deaths Due to Diabetes*, for the class. Ask the students to analyze the graph and draw a conclusion.

Students should conclude that the number of deaths caused by type 2 diabetes has increased during the last 60 years. Before 1951, the percentage of AI/AN people who died due to diabetes was lower than the percentage for the entire U.S. population (including all ethnic groups). Since the 1980s, the rate of death from diabetes for AI/AN people is increasing faster than that of the entire U.S. population (including all ethnic groups).

3. Ask students to think about the increase in the rate of type 2 diabetes for AI/AN people during the last 60 years. Which would be a more likely explanation for



the increase—changes in risk factors that a person *can* control (change) or changes in risk factors that a person *cannot* control (change)?

Accept reasonable answers. After students propose their ideas and the reasons behind their ideas, inform them that they will investigate this further during the rest of the lesson.

4. Give each student a copy of Copymaster 4.2, *Summarizing Change*. Point out that the chart in Part 1 lists the risk factors that they learned about previously. Explain to students that they will fill in the chart using information provided in stories. Begin the activity by asking students to work in teams of three to four for Part 1 of this task. Give each student in half the teams a copy of Copymaster 4.3, *Catherine's Story*. Give each student in the other half of the teams a copy of Copymaster 4.4, *Larry's Story*. Ask students to work with their team members to identify specific items from the stories that relate to the different risk factors.

Students should notice several things the authors present in their stories. Each story includes information comparing life at an earlier time with later times.

Students may have different degrees of knowledge about the issue of commodities. Commodities, sometimes called “commods,” were foods given to American Indian tribes by the U.S. government. Historically, these foods included things like white flour, high-fat cheese, and powdered milk. In general, commodity foods were high in fat and sugars and low in many vitamins or other nutrients. If you or your students want to learn more about government programs to distribute food to Indian reservations today, you can find information about the Food Distribution Program on Indian Reservations (FDPIR) at <http://www.fns.usda.gov/fdd/programs/fdpiir/>.

**Note to Teacher:** *Students may need to review the meaning of “inference.” An inference is a conclusion that logically follows the available evidence but is not directly based on evidence. For example, you could hold up a pen that has a red body or case and ask students what color the ink is. Most people would probably assume that the ink is red because many pens we see with red bodies also have red ink. However, you cannot tell that the ink is red just by seeing the outside of the pen. You would have to use the pen before you have evidence of the color of the ink.*

5. Allow time for teams to read and discuss their story and to make decisions about what information should be added to the chart. Ask students to stop when they finish Part 1 on Copymaster 4.2.

As students work, circulate among teams and listen to the discussions. Students may make inferences about the consequences of the changes described in the story.





For example, students may infer from Catherine's story that after the introduction of commodities, people used sugar rather than the juices of berries or the sap of trees to sweeten food. Another example would relate to the description of people working very hard physically before commodities were distributed. The inference is that people living after commodities distribution or now don't work as hard physically to gather food. It is fine for students to make inferences, but they should recognize that this is what they are doing.

6. **After teams have completed Part 1, reorganize the teams so that new teams include students who have read Catherine's story and students who have read Larry's story. Instruct students to discuss the story they read with their new team members who read the other story and to explain their entries in the chart on Part 1.**

Students can use a pen with a different color of ink or a pencil (if they used pen earlier) to add information to the chart.

This jigsaw approach is another strategy for encouraging student interaction. Students are responsible for summarizing what they read and their interpretations for the other team members. The students are still responsible for understanding the content in the story they didn't read, but they get the information in a different way. However, if you wish and time permits, students can read both stories and complete Part 1 for both stories.

7. **When teams have completed Part 1, ask them to stay in their new teams to work on Part 2. Explain that for Part 2 students should consider how life in their community today is similar to or different from the description in Catherine's or Larry's story. Also, they should use their understanding of risk factors for type 2 diabetes to predict how the changes in lifestyle may affect the risk for diabetes.**

Examples of how students' lives are different from the stories they read include things like eating at fast-food restaurants now instead of growing their own food or, as indicated in Larry's story, watching television instead of going outside to play games or do physical work.

Based on what students learned in Lesson 3, they should be able to predict that less physical activity, for example, increases the risk for type 2 diabetes.

8. **Display a transparency of Copymaster 4.2, *Summarizing Change*. Ask for volunteers to share information that they added to the chart.**

Students will have a variety of answers. Some students may even feel that an entry belongs in a different place on the table. Ask students to explain the reasoning behind their decisions if discrepancies arise.



## Sample Responses to Copymaster 4.2, Summarizing Change

### Part 1

*In the story, the author discusses change. What is the change that occurred?*

For Catherine's story, the main change would be the introduction of commodities. For Larry's story, the main change could be described as technology.

**Figure 3:**  
Sample answers to questions  
on Copymaster 4.2, *Summarizing  
Change*, Part 1.

Risk Factor	Before	After
Age		
Ethnicity		
Family history		
Physical activity levels	<p><b>Catherine</b></p> <ul style="list-style-type: none"> <li>Worked long hours</li> <li>Hunted every day</li> <li>Planted and preserved vegetables</li> <li>Cooked every day</li> </ul> <p><b>Larry</b></p> <ul style="list-style-type: none"> <li>Worked in garden</li> <li>Picked fruit</li> <li>Hunted</li> <li>Raised cattle and other farm animals</li> <li>Picked rock</li> <li>Cut and hauled hay</li> <li>Cut silage</li> <li>Stored grain</li> <li>Played outside</li> </ul>	<p><b>Catherine</b></p> <p>Less physical activity involved in hunting, gardening, and cooking</p> <p><b>Larry</b></p> <ul style="list-style-type: none"> <li>Less physical exertion involved in work</li> <li>More time spent watching television, playing video games, or searching on the Web</li> <li>Not much time spent working in gardens</li> <li>Jobs replaced by machinery</li> <li>More-sedentary jobs</li> </ul>
Obesity	<p><b>Catherine</b></p> <ul style="list-style-type: none"> <li>Ate fresh meat or game, ate fresh vegetables, sweetened food through juices of berries or tree sap</li> </ul> <p><b>Larry</b></p> <ul style="list-style-type: none"> <li>Ate a diet that included many vegetables grown in the garden</li> <li>Mother preserved foods by canning, drying, or freezing</li> <li>Hunting was to provide meat for food</li> <li>Raised animals for fresh meat</li> </ul>	<p><b>Catherine</b></p> <ul style="list-style-type: none"> <li>Ate commodity foods; used pork fat and lard</li> <li>Ate less fresh meat and fewer vegetables; less often used berries and tree sap for sweetness</li> </ul> <p><b>Larry</b></p> <p>Probably ate fewer fresh vegetables because people don't garden like they did before. Because fewer people preserve their own foods, they may be eating foods prepared or processed in less healthful ways.</p> <p>The issue of obesity was not directly discussed in either story. A logical inference might be that the switch away from fresh, natural foods often leads to obesity.</p>

**Note:** The bulleted items are from statements provided in the story. Other entries are changes that are implied in the story. If a space is blank, no information about that risk factor was included in the stories. For example, age (in the context of a risk factor for type 2 diabetes) was not discussed.





## Part 2

Risk Factor	How Is Life in Your Community Today Similar to or Different from the Situations Presented in Either Catherine's or Larry's Story?	How Do the Changes Discussed in the Stories or the Differences between the Situation in the Stories and Your Life Today Influence the Risk for Type 2 Diabetes?
Age		
Ethnicity		
Family history		
Physical activity levels	People are probably less physically active. Today, many people's lives and work are not as physically demanding as people's lives in the past. Answers may include things like riding the bus to school, riding in cars to go most places, and buying food in the grocery store instead of gardening and hunting.	For many individuals, the risk has increased because most people are less physically active.
Obesity	Processed and packaged foods are common; sugar is used extensively; there are many high-calorie and high-fat foods.	For most people today, the risk has increased because people are eating more food in relation to their amount of physical activity, and the foods tend to be higher in calories, higher in fat, or both.

**Note:** For the "today" category, students' answers are likely to vary greatly.

**Figure 4:**  
Sample answers to questions  
on Copymaster 4.2, *Summarizing  
Change*, Part 2.



### Assessment Opportunities

Listening to students' responses to questions can help you assess their understanding. If you wish, you could ask students to write their answers to the questions before holding a class discussion.

### 9. After students have contributed their ideas to the class chart, guide the class discussion by asking the following questions:

- "Which factors seem to be most closely tied to the changes during the last 40–100 years (before commodities and other changes until now)?"  
Answer: Most of the issues discussed in Catherine's and Larry's stories can be related most closely to diet or physical activity.
- "Which factors are under a person's control and which are not?" Answer: Age, ethnicity, and family history (genetics) are not changeable. Activity level and obesity are under a person's control to change.
- "Consider the factors that are not under a person's control (the ones that a person cannot change). Would you expect those factors to be very different in a population 60 years ago than they are today? Why?"  
Answer: If you consider a community 60 years ago in comparison to a community today, you would probably expect many of the unchangeable risk factors to be about the same. For example, a population 60 years ago would be made up of people of a wide variety of ages. You would expect the same thing today in



most cases. Therefore, age would not be a good explanation for the increase in type 2 diabetes.

Similarly, especially in an American Indian/Alaska Native community, ethnicity has probably not changed significantly. Most of the population today, as it would have been 60 years ago, is American Indian/Alaska Native. Family history (a person's genetic makeup) has also probably not changed dramatically. Because an individual's genetic makeup is determined by his or her parents, who in turn inherit their genes from their parents, the overall genetic makeup of the population doesn't change too dramatically.

- **“Assume that the risk factors that are beyond a person's control haven't changed much, but that there has been a significant increase in the incidence of type 2 diabetes. Changes in which risk factors may be most directly related to the increase in diabetes?”** Answer: If the risk factors that a person cannot control or change are similar, then the increase is most likely due to those risk factors that a person can change or control—physical activity and obesity levels.

- 10. Ask students to consider the questions, “Do you think the increase in type 2 diabetes over the last 60 years resulted from life being in or out of balance?” and “What is the evidence from this lesson that life is now out of balance?”**

The evidence students can draw upon are the graphs showing the change of death rates for the last 60 years and from Catherine's story about changes in diet and activity.

- 11. Conclude the lesson by asking students, “If people have some control over a risk factor, can they make changes that would influence that factor and help bring their lives back into balance?”**

Most people do have some control over their physical activity and their obesity level (through the food choices they make). Some students may say that they have little control over such things as the food they eat or how much exercise they get. Even if students are not controlling what is being prepared for meals at home, they can usually make choices on how much they eat or what they eat at other times of the day (meals at school, for example).









# LESSON 5

## THE DIABETES PREVENTION PROGRAM







## At a Glance

### Overview

In Lesson 5, *The Diabetes Prevention Program*, students analyze the results of the Diabetes Prevention Program (DPP) to become aware of ways that people can reduce their chances of, or delay the onset of, type 2 diabetes.

### Enduring Understandings

Among people who are at risk for but do not have type 2 diabetes, a scientific study shows that making positive changes to lifestyle, including improving the diet, increasing physical activity, and losing excess weight, reduces the risk that they will develop type 2 diabetes.

### Teacher Background

Consult the *Overview of Diabetes* section of *Introductory Information*.

### Outcomes and Indicators of Success

By the end of this lesson, students should be able to explain that changes in lifestyle related to diet, exercise, and body weight can reduce a person's risk for getting type 2 diabetes.

They will demonstrate their understanding by

- drawing conclusions from graphs,
- comparing results from different ethnic groups, and
- describing why the results from a scientific study make the conclusions more valid.

## In Advance

### Teacher Materials

overhead projector

1 transparency of Copymaster 5.1, *Overview of the Diabetes Prevention Program (DPP)*

1 transparency of Copymaster 5.2, *Results of the Diabetes Prevention Program (DPP):*

*All Participants*

1 transparency of Copymaster 5.3, *Results of the Diabetes Prevention Program (DPP):*

*Ethnic Groups*

### Student Materials

*For each student*

1 copy of Copymaster 3.1a–e, *Analyzing the Risk Factors for Type 2 Diabetes*,  
from Lesson 3 (optional)

1 copy of Copymaster 4.1, *Deaths Due to Diabetes*, from Lesson 4 (optional)





## Preparation

Copymasters 5.2, *Results of the Diabetes Prevention Program (DPP): All Participants*, and 5.3, *Results of the Diabetes Prevention Program (DPP): Ethnic Groups*, are used as transparencies in the procedures that follow. Students analyze the information as part of a class discussion. If you wish, students could work in teams of three to four to analyze one or both graphs before reviewing their conclusions in a class discussion. If you choose this option, prepare one copy of each copymaster per team of students.

## Process and Procedure

1. Ask students to recall the last two lessons. After students have shared the major points from the last two lessons, ask, “What were the changes that resulted with life being in or out of balance?”

In Lesson 3, students looked at graphs (Copymaster 3.1a–e, *Analyzing the Risk Factors for Type 2 Diabetes*) to find out what things are risk factors for type 2 diabetes. In Lesson 4, students looked at a graph (Copymaster 4.1, *Deaths Due to Diabetes*) showing how the incidence of type 2 diabetes has changed. They read Catherine’s and Larry’s stories and learned about some of the lifestyle changes that have occurred during the last 60 years. Students can refer to their materials from Lessons 3 and 4 about the risk factors for type 2 diabetes. Students should recall that the incidence of diabetes has increased and diet and activity levels have changed.

2. Continue the class discussion by asking the following questions:

- “If type 2 diabetes represents being out of balance, are the factors that caused people to be out of balance controllable or uncontrollable?”

Answer: This goes back to Lesson 3. An individual cannot change some of his or her risk factors for type 2 diabetes (such as age, ethnicity, or family history).

An individual can change the level of some risk factors (including the amount of physical activity and obesity).

- “For those factors that are controllable, what changes could you make to get closer to a balanced lifestyle?” Answer: Some of the factors that cause life to be out of balance are controllable. Students should recognize they can make changes to those risk factors by doing things such as eating better and exercising more. Those changes might lead to a better balance.

- “If people improve their diet and increase their physical activity, would they reduce their risk of developing type 2 diabetes? Why or why not?”

Answer: If students understand risk factors, they should predict that changing those risk factors in a positive way might lower the risk for developing type 2 diabetes.

If students understand the graphs from Lesson 3, they should be aware



that some people who were at lower risk levels for the different factors did not have type 2 diabetes. In contrast, some of the people in the lower-risk level groups (e.g., high activity levels) did have type 2 diabetes. Therefore, all you can do is make a prediction.

- “How can we find out if improving diet and activity really can reduce the risk of developing type 2 diabetes?” Answer: Students may suggest a variety of ways; accept reasonable answers. If students don’t mention it, ask them if a scientific research study might be a way to find out. This is an opportunity to explain that, just because a specific result would be expected, we can’t be sure that it would happen.

3. Inform students that scientists have done a study to find out if making changes to diet and activity levels reduces a person’s risk of developing type 2 diabetes.
4. Display a transparency of Copymaster 5.1, *Overview of the Diabetes Prevention Program (DPP)*. Explain to students that they will look at the results of a study called the Diabetes Prevention Program, or DPP for short. Before students can begin analyzing the data, they need to know how the study was done. Review the information on Copymaster 5.1 with students:

- The participants in the study did not have diabetes at the beginning of the study.
- The participants in the study were at high risk for developing type 2 diabetes.
- The scientists conducting the study assigned people randomly to one of two groups. The two groups were:
  - No change in lifestyle
  - Positive change in lifestyle (increased physical activity, healthy diet, and 7 percent weight loss)
- Scientists monitored people throughout the three-year study.
- Scientists recorded the number of people in each group who developed type 2 diabetes.

Emphasize to the students that no one in the study had type 2 diabetes at the beginning. It is not important for the students to know all the details, but the positive changes in lifestyle for the DPP were

- engaging in moderate exercise for 30 minutes a day, five days a week;
- eating a lower-calorie and low-fat diet; and
- maintaining at least a 7 percent weight loss. (All participants were overweight at the beginning of the study.)





As you will see in one of the graphs, the study included American Indians and Alaska Natives and other ethnic groups.

5. Display a transparency of Copymaster 5.2, *Results of the Diabetes Prevention Program (DPP): All Participants*. Ask students, “What conclusions can you make from this graph?”

The conclusions that the students can make from this graph include the following:

- Fewer people who made a “positive change in lifestyle” developed type 2 diabetes.
- More people who made “no change in lifestyle” developed type 2 diabetes.
- Some people who made a “positive change in lifestyle” did develop type 2 diabetes.
- Some people who made “no change in lifestyle” did not develop type 2 diabetes.

6. Display the transparency of the Copymaster 5.3, *Results of the Diabetes Prevention Program (DPP): Ethnic Groups*. Point out that this graph looks at the data by grouping participants according to their ethnic group. Ask the students, “What conclusions can you make from this graph of the DPP results?”

The conclusions that the students can make from this graph include the following:

- In all ethnic groups, fewer people who made a “positive change in lifestyle” developed type 2 diabetes.
- More people who made “no change in lifestyle” developed type 2 diabetes.
- Among American Indians and Alaska Natives, fewer people who made a “positive change in lifestyle” developed type 2 diabetes.

**Note to Teacher:** *This graph is more complicated than the preceding graph. Before asking students to make conclusions from this graph, you may wish to ask questions to make sure that students understand the construction of the graph. For example, “Why are there two bars shown for each ethnic group?”*

For more information about the DPP, visit the Web site:

<http://diabetes.niddk.nih.gov/dm/pubs/preventionprogram/>

7. Remind students that the DPP was a scientific study. As a scientific study, the conclusions made are based on evidence. Discuss with the class why it was important to do a scientific study and collect data rather than just suggesting that people who live a healthy lifestyle are probably going to reduce their chances of getting type 2 diabetes.

Scientific studies are designed to help ensure the study will answer the question the researchers are asking. The design of the study is done so that the groups are as similar as possible. For example, the DPP would not want to put all individuals who have a family history of type 2 diabetes in one group or to put all people from one ethnic



background into one study group. Because the researchers pay attention to the design of the study before beginning, the results they obtain are more likely to be accurate and to support a conclusion.

8. Ask the students to write the answer to the question, “Based on the DPP study, what can American Indians and Alaska Natives and other people do to reduce their risk for developing type 2 diabetes?”

If students understand the results of the DPP, they should state that people should make positive changes in lifestyle, including increasing physical activity, eating a healthy diet, and losing weight.



#### **Assessment Opportunities**

Students can share their answers to the question in Step 8 with the class or write their answers to turn in to you. Students should be able to explain their conclusions.









# LESSON 6

## LETTING OTHERS KNOW ABOUT DIABETES









## At a Glance

**Lesson 6:**  
**Letting Others Know**  
**about Diabetes**  
**Evaluate**

### Overview

Students begin Lesson 6, *Letting Others Know about Diabetes*, by recalling what they learned previously about preventing type 2 diabetes. They now consider whether people already diagnosed with type 2 diabetes can make changes to their lifestyles to help manage the disease. Students then prepare a project, such as a newsletter or a presentation, that summarizes what they have learned throughout the unit.

### Enduring Understandings

- A person's risk of getting type 2 diabetes can be reduced by making changes in lifestyle. Likewise, a person who has type 2 diabetes can improve his or her health by making changes including improving the diet, becoming more physically active, and losing excess weight.
- Learning the facts about diabetes can dispel misconceptions and provide information that helps people either reduce their risks for or help manage type 2 diabetes.

### Teacher Background

Because this is the Evaluate activity, no additional information is presented.

### Outcomes and Indicators of Success

By the end of this lesson, students should be able to

1. be aware of general treatment and management plans for type 2 diabetes.

They will demonstrate this awareness by reading and analyzing a case study of someone who has type 2 diabetes.

2. synthesize what they have learned and present important concepts about type 2 diabetes.

They will demonstrate their ability by

- developing a project that informs others about type 2 diabetes and
- critiquing a project done by other students and providing helpful feedback for improvement of that project.

3. assess how their understanding of type 2 diabetes has changed after completing this unit.

They will demonstrate this ability by

- answering questions about type 2 diabetes and
- comparing their answers written after completing this unit with their answers from the beginning of the unit.





## In Advance

### Teacher Materials

overhead projector

art supplies (for example, construction paper, colored paper, poster board, pens, markers, scissors, glue; optional; see *Preparation*)

computers with slide presentation software (optional; see *Preparation*)

1 transparency of Copymaster 6.2, *Rubric for Evaluating the Project*

### Student Materials

#### *For each student*

1 copy of Copymaster 1.1, *What Do I Know about Diabetes?*, from Lesson 1

1 copy of Copymaster 6.1, *Philip John's Story*

1 copy of Copymaster 6.2, *Rubric for Evaluating the Project*

1 copy of Copymaster 6.3, *Project Score Sheet*

1 copy of Copymaster 6.4, *Has My Understanding of Type 2 Diabetes Changed?*

### Preparation

Decide which options students will have for presenting their projects. Projects can be completed on paper with art supplies, or students could use a computer with slide presentation software. Your decision about project format will influence which supplies you should gather and prepare before beginning this lesson. When you select which formats are appropriate, also consider that students will need to view the projects during the critique phase (see Step 10). Reserve the computer lab if appropriate.

## Process and Procedure

### Activity 1: What Should People Know?

1. Open the lesson by asking students what they learned in Lesson 5 about the results of the Diabetes Prevention Program (DPP) and the relationship among diet, physical activity, and type 2 diabetes.

In the previous lesson, students learned that by improving diet and increasing physical activity, it is possible to reduce the risk for developing type 2 diabetes. Also remind them that we know these relationships because of the *evidence* gathered during a scientific study, the Diabetes Prevention Program.

2. Remind students that the participants in the DPP did not have type 2 diabetes at the beginning of the study. The DPP asked the question, "Can changes to diet, physical activity, and body weight reduce the chance that someone will



get diabetes?” Ask students to think about the question, “If someone already has type 2 diabetes, do you think that making some changes might be helpful?” Ask students to explain their answers.

Students’ responses will vary. Some students may say that these changes are helpful, because they have some prior experience with a family member or friend who is being treated for type 2 diabetes. It is important to note that the DPP does not provide evidence for this new question. The DPP asked only about the prevention of diabetes in people who did not already have the disease; it did not ask whether people who already have type 2 diabetes can improve by making changes in lifestyle.

3. Explain to students that they will now read the story of someone who has type 2 diabetes. Give each student a copy of Copymaster 6.1, *Philip John’s Story*. Explain to students that when reading the story, they should look for things that demonstrate the relationship between diet, physical activity, and type 2 diabetes.

Students may notice that this story, unlike others in the unit, is written in the third-person instead of the first-person perspective. This, like the other stories in the unit, is a real person’s story. In this case, Philip John told his story to another person who wrote the text provided on the copymaster.

4. Discuss Philip John’s story with the class. Ask for volunteers to share what they learned in the story about the effect of changes to diet, physical activity, and weight on type 2 diabetes. Write students’ responses on the board.

Philip John made significant changes to his physical activity level and diet. These changes resulted in lowered blood glucose levels. Philip was first able to reduce the number of pills and eventually to eliminate the need for any pills.

5. Inform students that doctors usually prescribe changes in diet, weight loss, and an increase in physical activity when someone is diagnosed with type 2 diabetes. In some cases, these changes may be adequate treatment for type 2 diabetes. In other cases, individuals with type 2 diabetes may need to take medication in pill form or get insulin shots.

Philip John’s story is a positive example of how someone who is diagnosed with type 2 diabetes can make changes in his life that effectively control high blood glucose levels and manage type 2 diabetes. His story is not unique in that physicians know that improved diet, increased activity, and loss of excess weight are often sufficient to manage type 2 diabetes.

6. Prompt students to recall what Philip John did after he learned he had type 2 diabetes. Ask students, “Do you think everyone should learn about





type 2 diabetes whether they have diabetes or not? Why?" "How could you help students, parents, and the public learn what you have learned about type 2 diabetes?"

Because there are many appropriate answers to these questions, this is an opportunity to get answers from most students in the class. Students may suggest that they could teach others about type 2 diabetes, prepare posters, develop radio or television spots, design brochures or magazine ads, or organize "type 2 diabetes awareness walks" or other similar events.

7. **Acknowledge that there are many ways to inform people about type 2 diabetes. Tell students that for this lesson, they will work in teams to develop a project. Conduct a brief class discussion in which you ask students to list some features that an effective project might include.**

Students should indicate that the project should have a clear and important message, include information that supports the message, use facts accurately, be eye-catching, and be easy to read.

8. **Display a transparency of Copymaster 6.2, *Rubric for Evaluating the Project*. Explain that after they have created their own project as a team, they will evaluate it using the criteria in the rubric. Go over the criteria with the class.**

It is important to review the evaluation criteria before the students design their projects. The rubric lets students know your expectations and helps them take responsibility for their learning.

If students have not used a rubric to evaluate information before, explain to them how the rubric has specific criteria and assigns points based on how effectively the information is presented. Students do not need to know all the specifics at this point. They will receive a copy of the rubric when they start their evaluation. But keep in mind that students should have some familiarity with the criteria that you will use to evaluate the project.

9. **Divide the class into teams of three or four. Each team will prepare a project. The projects should include information about one or more of the following topics:**

- Risk factors for type 2 diabetes
- Prevention of type 2 diabetes
- Management of type 2 diabetes

The purpose of this project is for students to use and apply the information they have learned in the previous lessons—not to do additional research. The students may use any information from the lessons (including worksheets or handouts) to assist in



preparing their projects. The information should give them ideas and remind them of what they have learned in the previous lessons. Encourage the students to focus on what they think the important ideas were in those activities.

As the teams work, circulate around the room and check that each team's message is something that students can address given the information they have learned in the previous lessons. If teams have difficulty narrowing the focus of their projects, help them by asking questions such as, "What one idea is the most important point you want to get across in your project?" and "What information supports that big idea?" Help students understand that the idea is not necessarily to tell everything they have learned during the unit, but to make decisions about what is most important and which facts best support that idea.

Instruct students to not put their names on the projects. Instead, assign a letter or number code to each team. In that way, you know who contributed to each project, but the names are not visible during the critique phase that follows in Step 10.

- 10. After completing their projects, the students will evaluate another team's project using Copymaster 6.2, *Rubric for Evaluating the Project*. Give each student a copy of the rubric. Also, give each student a copy of Copymaster 6.3, *Project Score Sheet*. Briefly go over the score sheet with the class and answer any questions. Assign each student a project to evaluate.**

Students should evaluate another team's project. Because students work in teams to create the projects, there will be fewer projects to evaluate than students in the class. More than one student can evaluate a project. Alternatively, if you have more than one class section, students can evaluate projects from another class section. Emphasize to students that they need to provide clear and specific reasons to justify the score they assign to each category on the rubric. Also, explain to students that, as reviewers preparing a critique, their comments should provide constructive criticism that would enable the authors of the project to make improvements.

This is an opportunity for students to demonstrate what they have learned about type 2 diabetes in the previous lessons. It will also allow students to practice their critical-thinking skills. In everyday life, we are all presented with information and have to make decisions based on that information. To be an informed citizen, it is important to be able to analyze information based on accuracy and relevance.

- 11. After completing the critiques and scoring the projects, the team members can share their projects with the entire class.**



#### **Assessment Opportunities**

By having students evaluate projects individually, you can assess each student's understanding of type 2 diabetes. The critiques may be one piece of your assessment. The projects may also provide valuable information for your assessment of students' understanding.





## Activity 2: What Do You Think about Type 2 Diabetes Now?

1. Distribute a copy of Copymaster 6.4, *Has My Understanding of Type 2 Diabetes Changed?*, to each student. Allow five to 10 minutes for students to answer the questions.

In this activity, students answer the same questions as in Lesson 1, *Diabetes and the Community*. This enables students to determine whether their understanding about type 2 diabetes has changed since their exposure to factual information about the subject.

2. After students have answered the questions, give each student the copy of Copymaster 1.1, *"What Do I Know about Diabetes?"* that he or she completed at the beginning of Lesson 1.

Allow a few minutes for students to compare their responses. Each student should look only at his or her responses. Ask students whether their answers are different today from when they answered them in Lesson 1 and, if so, how they are different.

3. Conduct a brief class discussion. Ask students the following questions:

- "If your answers are different today, why do you think they are different?"
- "Does learning about type 2 diabetes make a difference? Why?"

Students' responses will probably be different now that they have learned about type 2 diabetes.

## Possible Extension

Students may wish to share their knowledge of type 2 diabetes with the community. Their projects may be a basis for this. If students wish to do this, you may want them to select one of the projects as a starting point. As a class, students could work together to correct any problems, add detail, make the project more visually appealing, and ensure accuracy of the information. Students could then present their projects to a larger audience.



# COPYMASTERS



Copymaster 1.1, *What Do I Know about Diabetes?*

Copymaster 1.2, *Interview Guidelines*

Copymaster 1.3, *Interview Questions*

Copymaster 1.4, *Summarizing the Interview*

Copymaster 2.1, *Questions for Health Professionals*

Copymasters 2.2a–e, *Health Professional Resource Information*

Copymasters 3.1a–e, *Analyzing the Risk Factors for Type 2 Diabetes*

Copymaster 3.2, *Carla's Story*

Copymaster 4.1, *Deaths Due to Diabetes*

Copymaster 4.2, *Summarizing Change*

Copymaster 4.3, *Catherine's Story*

Copymaster 4.4, *Larry's Story*

Copymaster 5.1, *Overview of the Diabetes Prevention Program (DPP)*

Copymaster 5.2, *Results of the Diabetes Prevention Program (DPP): All Participants*

Copymaster 5.3, *Results of the Diabetes Prevention Program (DPP): Ethnic Groups*

Copymaster 6.1, *Philip John's Story*

Copymaster 6.2, *Rubric for Evaluating the Project*

Copymaster 6.3, *Project Score Sheet*

Copymaster 6.4, *Has My Understanding of Type 2 Diabetes Changed?*









## 1.1

# What Do I Know about Diabetes?

1. What do you know about diabetes?
2. Who gets diabetes?
3. How did you learn what you know about diabetes? Please explain.
4. How does diabetes affect someone's life? Give one or more examples.
5. Is diabetes a problem for our community? Please explain and give examples.
6. Do you think diabetes is something you should be concerned about? Explain your answer.











## 1.2

# Interview Guidelines

### ■ Before beginning the interview, introduce yourself to your interviewee.

Even though the interviewees have been introduced to the class, it is helpful for you to introduce yourself. This will make them feel more comfortable.

### ■ Interviewees may not feel comfortable answering personal questions.

Not all people will feel comfortable answering all questions. Tell interviewees they do not need to answer questions that make them feel uncomfortable.

### ■ Listen carefully to an individual's answers.

Listening attentively is an important part of an interview and shows respect to the individual you are talking to. You should not try to write the individual's answers word for word. Instead, write down some key ideas or phrases that will summarize the idea. Take time between questions to make sure you have clear notes, but don't ask the interviewee to repeat exactly what he or she said before.

### ■ Closed-ended questions lead to uninformative answers.

"Does diabetes affect a person's life?" is a closed-ended question. Most people would assume the answer to be "yes." A question that has an obvious yes or no answer is an example of a closed-ended question. These types of questions do not provide much information. A better question would be less leading and would not imply a specific answer. For example,

the question could be, "How do you think diabetes affects a person's life?" To this question, the interviewee would have more freedom and could discuss many aspects of diabetes.

Closed-ended questions are useful to direct the interview. For example, it may be helpful to know if the interviewee has diabetes so you know what questions to ask next. However, you want to limit the number of these questions.

### ■ Open-ended questions allow people to respond in their own way.

Open-ended questions do not have yes or no answers and encourage the person to speak freely about the topic. "How does diabetes affect a person's life?" is an open-ended question that allows the person to express a variety of thoughts, experiences, and descriptions.

### ■ Don't ask questions that imply a specific desired answer.

For example, "How did what you learned about diabetes make you feel better?" assumes that knowing about diabetes improved the person's life. Revising the question to "How did learning about diabetes change your life?" does not imply a positive or negative impact.

### ■ Avoid expressing your own opinions.

Expressing your own opinions may keep the interviewee from giving his or her true thoughts.











## 1.2

- **If the question asks the interviewee to share opinions or feelings about a topic, do not try to change the person's mind or disagree with him or her.**

Opinions and feelings are very personal. Unlike facts, opinions and feelings are not "wrong." If interviewees feel that you are judging them or disagreeing with them, you may not get their real or complete thoughts.

- **If the interviewee has already answered a question as part of a question you asked previously, you don't need to ask the question again.**

If interviewee answers a question as part of the answer to a previous question, you don't need to ask it again. You may, however, wish to ask another question that would allow the interviewee to provide additional information or clarify the answer.

- **Ask follow-up questions to get more information or to make sure you understand the answer.**

Follow-up questions are useful to clarify and expand the previous responses. These may follow either a closed- or open-ended question.

- **Ask a variety of questions that cover many aspects of the topic.**

Good interview questions encourage people to give answers from personal, family, and community experiences.

- **Ask enough questions to get the best information in the interview.**

This is your opportunity to get as much information as possible. Use the opportunity to ask additional questions that will really let you know what the interviewee thinks.











1.3

# Interview Questions

1. What do you know about diabetes?
2. Who gets diabetes?
3. How did you learn what you know about diabetes? Please explain.
4. How does diabetes affect someone's life? Give one or more examples.
5. Is diabetes a problem for our community? Please explain and give examples.
6. Do you think diabetes is something you should be concerned about? Explain your answer.

*Note: Additional questions and answers may be written on the back of this sheet.*











1.4

# Summarizing the Interview

1. What do you know about diabetes?
2. Who gets diabetes?
3. How did you learn what you know about diabetes? Please explain.
4. How does diabetes affect someone's life? Give one or more examples.
5. Is diabetes a problem for our community? Please explain and give examples.
6. Do you think diabetes is something you should be concerned about? Explain your answer.

*Note: Additional questions and answers may be written on the back of this sheet.*











## 2.1

# Questions for Health Professionals

**Directions:** Write answers to each question as you interview your health professional.

Which health professional did you interview? \_\_\_\_\_

1. What are the symptoms of type 2 diabetes?
2. How can people find out if they have type 2 diabetes?
3. Who gets diabetes?
4. What should people do to manage type 2 diabetes?
5. What can people do to reduce the chance they will get type 2 diabetes?
6. In what ways is diabetes a problem in American Indian and Alaska Native communities?
7. Where can people go to get accurate information about type 2 diabetes?

*Note: Additional questions and answers may be written on the back of this sheet.*











## 2.2a

# Health Professional Resource Information— Registered Nurse (RN)

I am a registered nurse (RN). I assess broad health needs of patients and carry out nursing care to maintain and restore health. I teach and advise patients and their families how to manage their illness or injury. You probably know from your own visits to the doctor's office that I collect some basic health information when people come in to the doctor's office: temperature, blood pressure, pulse, respiratory rate, height, and weight. I also ask people why they have come to see the doctor. All of this information helps us understand people's overall health and how we can better serve their needs. I work in many settings such as clinics, hospitals, nursing homes, industry, home health, health agencies, or schools. I can even teach nursing skills in classroom and clinical settings that are part of a nursing school. Sometimes I do home visits to see patients or their families. I work closely with tribal community health representatives (CHRs).

I teach patients who have type 2 diabetes and their families about aspects of diabetes. When I talk to someone who is worried about getting diabetes, I explain the symptoms of type 2 diabetes. Two of the most common symptoms are having to go to the bathroom frequently and being very thirsty all the time. People have other symptoms, too, including being tired a lot of the time, feeling weak, feeling irritable or moody, and sometimes even feeling sick and nauseous. I also explain that people who have type 2 diabetes really

need to keep their blood glucose levels under control. If they don't, they can have some serious health problems. People who have type 2 diabetes and don't take care of themselves have a high risk of having heart problems or strokes, problems with their blood vessels that can lead to amputations, or for becoming blind. I also make sure they know that it is possible for people who have type 2 diabetes to avoid these problems. If they eat a healthy diet and do some physical activity every day, many people can stay very healthy.

I work closely with the patients' doctors to make sure that they know how to check the level of glucose in the blood. Most people who have type 2 diabetes use a digital blood glucose meter. I explain that people who have type 2 diabetes should check their blood glucose levels several times a day—usually before and after meals or exercise and before bedtime. I also explain that they should get an A1c test every few months. This test gives the doctor and the rest of the health care team a measure of how well the patients are managing their blood glucose level over a three-month time period.

I really like helping people learn how to manage their diabetes. Sometimes I get to teach families and community members that they can do things to lower the chance of getting diabetes. I explain that eating a healthy diet, losing extra weight, and getting more exercise can help lower the chance of getting diabetes.











## 2.2b

# Health Professional Resource Information— Clinical Laboratory Professional

I work as a laboratory technician in a hospital. Often, I just tell people I'm a lab tech, for short. I used to work at the clinic in the town where I grew up. As a lab technician, I get samples of blood, body fluids, or even body tissues to analyze. I then give the results back to the doctor so he or she can know what is happening in the person's body. It is very important that every test I do is done correctly. People's health care decisions depend on getting accurate results.

In the hospital, I conduct tests to help the doctor learn what disease or health problem people have. It is common for doctors to send samples of a patient's blood for us to analyze. A doctor can tell a lot about what is wrong with a person just by knowing whether the number of red and white blood cells is within a normal range and whether the levels of different minerals in the blood, such as potassium and iron, are normal.

We often analyze the blood samples of people who doctors think may have type 2 diabetes. If a doctor thinks a person has type 2 diabetes, the person will need to get his or her blood tested. For this blood test, a person can't eat or drink for eight hours before blood is drawn. This is called a fasting blood glucose test. It is important that the person doesn't eat or drink for this time so that the test will give accurate results. After the nurse takes the blood sample, I begin my testing. For type 2 diabetes, I measure the amount of glucose that is in

the blood. For a healthy person, the fasting blood glucose concentration is usually between 70 and 99 milligrams per deciliter (mg/dL). A blood glucose concentration above 100 milligrams per deciliter indicates there may be a problem. A result above 126 indicates the person may have diabetes. Usually if the level is high, the doctor will want to have the test done again. As a lab technician, I can't diagnose what is wrong with people. I report the test results to the physician—the physician has the training to actually make the diagnosis.

Another laboratory test that I do is called a hemoglobin A1c test. Sometimes this is just called an A1c test. This is pronounced A-one-C. The A1c test is also a test of the blood. People who have already been diagnosed with diabetes usually get an A1c test every few months. This test gives the doctor an idea of the person's average blood glucose concentration over the past three months. The results of this test give the doctor an idea of how well a person has been managing his or her diabetes over a period of time.

I work very closely with the doctors and nurses at the hospital. I know that even though I don't see patients myself, I have a very important role in their health care. The doctors and nurses who I work with really depend on me to do the tests correctly and to make sure my reports to them are accurate.











## 2.2c

# Health Professional Resource Information— Dietitian

I am a dietitian. I work in a health clinic, but other dietitians work in hospitals, schools, or even run their own businesses. I work with lots of different people. Some people come see me because they just want to learn how to eat more healthfully. Other people come because they want to lose weight and need some help with planning low-calorie or low-fat meals. I also work with athletes who want to eat very healthy meals so they can give their best performance.

Sometimes I work with people who have a specific health problem. In some cases, their doctor suggests they come see me to learn how they can make changes to their diet and eating behaviors that will improve their health or make it easier to live with their health problem.

In my clinic, I often work closely with people who have type 2 diabetes. I help people with diabetes learn to balance the food they eat with their physical activity and diabetes medications (if the doctor has prescribed them). Some people come because they have just been diagnosed with diabetes and they want to find out how they can change their diet to keep their blood glucose under better control. I explain to them how the foods they eat break down during digestion. Foods, especially those high in carbohydrates, break down into smaller units, including glucose. People with type 2 diabetes have high glucose

levels in their blood. I work with my clients to find out the types of foods they like to eat and how they normally prepare them. Usually we can find ways to fix their favorite foods so they are healthier and still taste good. Also, I help them plan how they can still eat some high-carbohydrate foods, including sweets. People with type 2 diabetes can still have treats, but they may just need to limit the amount and make choices about when they eat them.

Other people I meet with have had type 2 diabetes for a longer time and have had trouble losing weight. Losing extra weight is one way that people with type 2 diabetes can keep their blood glucose in balance and reduce their risk for developing real serious problems, like blindness or circulation problems.

I really enjoy my work. I see all ages of people. It used to be that only people over about 40 years of age got type 2 diabetes. Now I'm seeing more people of all ages who have type 2 diabetes. I even see teenagers who have been diagnosed with it. If I have a client who is a teenager, I usually want to meet with the parents, too, so they can learn how to make meals healthier for the teenager who has diabetes and for everyone in the family. Among Native Americans, there has been a large increase in the number of people who get this disease.











## 2.2d

# Health Professional Resource Information— Physician

I am a physician. Mostly, people just call me doctor. I work in a clinic on the reservation because I want to be close to where I grew up and help members of my tribe. I could also work at a hospital or have my own private practice.

I specialize in family medicine. This means I work with people of all ages and treat many different kinds of diseases. One disease I see a lot now is type 2 diabetes. Type 2 diabetes is much more common now in the United States than it used to be, especially among Native Americans. Sixty years ago, type 2 diabetes was rare among Native Americans. Later, people only got it when they were adults. Now we even see it in kids.

When people come into my clinic, I ask them what their symptoms are. If they say they are really thirsty all the time or they are going to the bathroom a lot, I suspect they may have diabetes. These are two symptoms that are characteristic of diabetes. People may also have other symptoms, such as extreme hunger, tiredness, fatigue, irritability, unexplained weight loss, or blurry vision. Not everyone will have all of these symptoms.

If I think someone has diabetes because the symptoms he or she has are typical of the disease, I may ask the nurse to check the person's blood sugar or blood glucose level with a blood glucose meter. Or I might ask the patient to go to the lab for some initial blood tests. If the initial blood test results show that the blood glucose level is very high (greater than 200 milligrams per deciliter), I know the patient has diabetes. If the blood glucose test is only slightly high, then I may ask the patient to go for a fasting blood glucose test, which is a different

kind of blood test. For this test, the person needs to fast. That means that the person doesn't eat or drink anything except water for eight hours before the test. When I get the results of the test from the lab technician, I can tell if the person has type 2 diabetes. If the blood glucose concentration is high, the diagnosis is diabetes.

If a person does have type 2 diabetes, I will prescribe some changes to his or her life. For type 2 diabetes, many people can control their blood glucose levels by improving their diet and increasing the amount of exercise or physical activity they get. Losing extra weight helps people control their diabetes, too. Other people may need to do more after being diagnosed with type 2 diabetes. Some people should take medication in the form of pills every day. Other people may need to give themselves insulin shots.

Most people can control their diabetes if they do what I prescribe. If they don't control their blood glucose levels, they may, over time, develop serious problems like blindness, heart problems, nerve damage, or blood circulation problems that lead to amputation.

I usually suggest that people who have type 2 diabetes get additional help and information from other health professionals. For example, I recommend that patients meet with a dietitian or nutritionist, diabetes nurse, health educator, or sports trainer to help bring life more into balance. These professionals can help people learn about eating healthfully and increasing the amount of exercise they get. This information can help people learn more about how to take care of themselves, and how to live well with diabetes.











2.2e

# Health Professional Resource Information— Diabetes Educator

I work as a diabetes educator to help individuals, families, and communities learn about diabetes and health. I work closely with doctors, nurses, dietitians, and exercise trainers. To become a diabetes educator, I went to school to become a social worker. Other people may choose to be nurses, psychologists, dietitians, or doctors before becoming diabetes educators. After finishing school, I got additional training about diabetes, its effects on the body, how it is treated, and how to help people make changes to their lives to manage their diabetes.

Sometimes I talk to people who have heard a little about diabetes and wonder if they might have it. I know the common symptoms of type 2 diabetes—things like being thirsty a lot, going to the bathroom more than usual, being hungry, or losing weight even if not trying to. I tell them that if they are having these or other symptoms, they should see their doctor. Unless I were also a physician like some of the diabetes educators I know, I can't diagnose someone with having diabetes. The person's doctor can order the blood tests needed for a diagnosis. Sometimes I do talk with people who do not have diabetes to help them learn about the signs or to help them make changes to their lifestyle that reduce their risk of getting type 2 diabetes in the future.

Usually I see patients who have been diagnosed with diabetes already. Their doctors usually explain that I can help them learn how to deal with the disease and make some changes in their lifestyles. I show them how to use a blood glucose meter. I also help them learn when and how often they should check their blood glucose levels and

what the blood glucose numbers mean. Many people who have type 2 diabetes want some help with an exercise plan. Increasing the amount of physical activity people get is usually an important part of the treatment for type 2 diabetes. For many people, walking 30 minutes a day, five times a week, can make a big difference. I also help people with type 2 diabetes learn how to make changes in what they eat so that their blood glucose stays more stable. Many people think that if they have type 2 diabetes, they have to give up all the foods they like. I can usually figure out different ways to prepare favorite foods but in a more healthy way. Or I work with people to help them find ways that they can have smaller amounts of their favorite foods as part of their overall food plan.

Type 2 diabetes only became a concern for Native Americans during the last 60 years. Until about 10 to 15 years ago, it was usually older adults who were diagnosed with type 2 diabetes. But now I see type 2 diabetes even in children and teenagers. I like to meet with the person who has type 2 diabetes and the rest of the family. It can really help if the whole family understands why it is important for people who have type 2 diabetes to take care of themselves. This is especially true if the individual is a teenager. The parents need to know how they can help their child manage his or her diabetes and stay healthy.

As a diabetes educator, I have many videos, books, and pamphlets to help people, families, and communities learn more. I also set up activities within the local community, such as health fairs, clinic screenings, and presentations to schools.







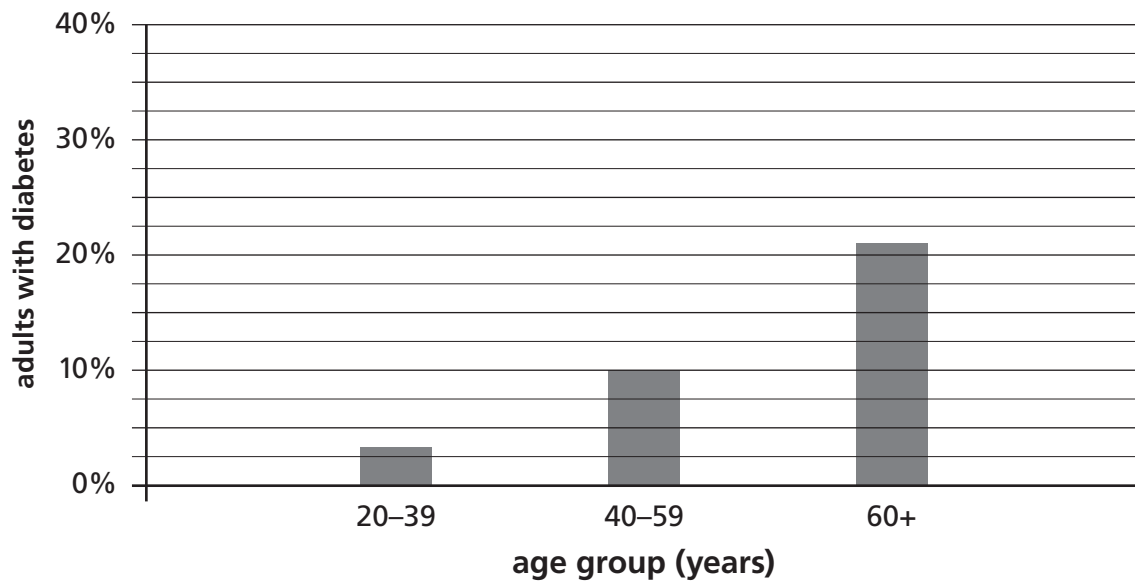




3.1a

# Analyzing the Risk Factors for Type 2 Diabetes

**Is age a risk factor for type 2 diabetes?**







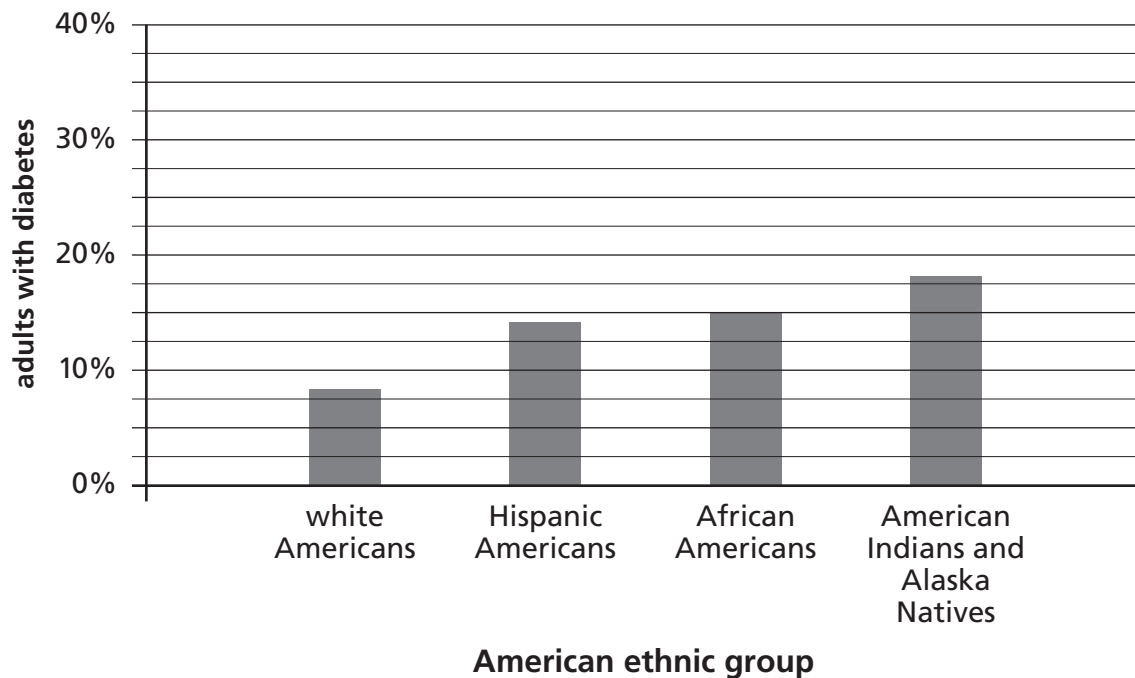




3.1b

# Analyzing the Risk Factors for Type 2 Diabetes

**Is ethnicity a risk factor for type 2 diabetes?**







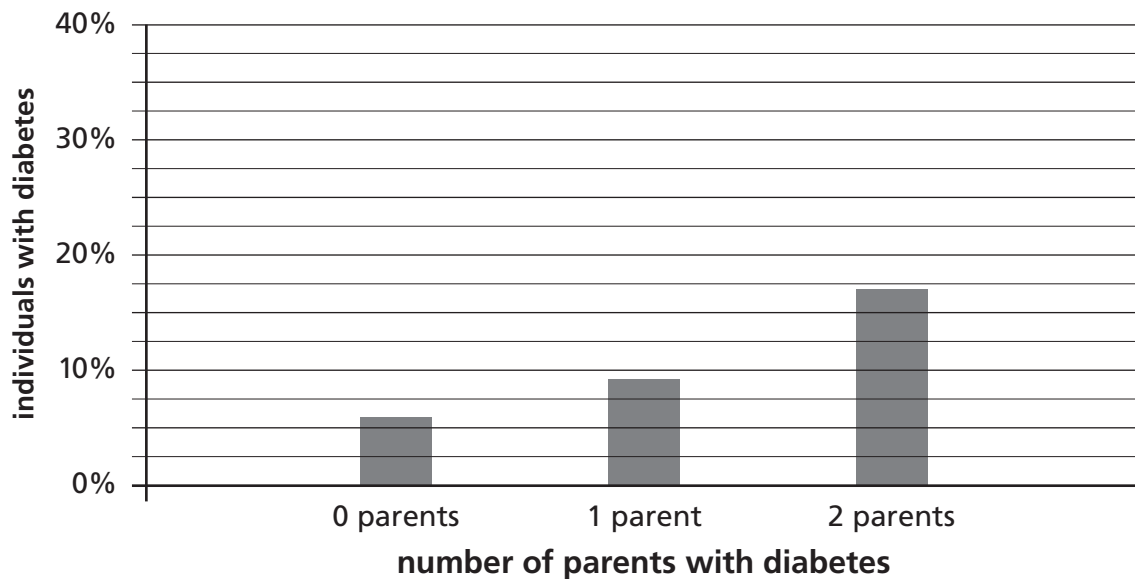




3.1c

# Analyzing the Risk Factors for Type 2 Diabetes

**Is family history a risk factor for type 2 diabetes?**







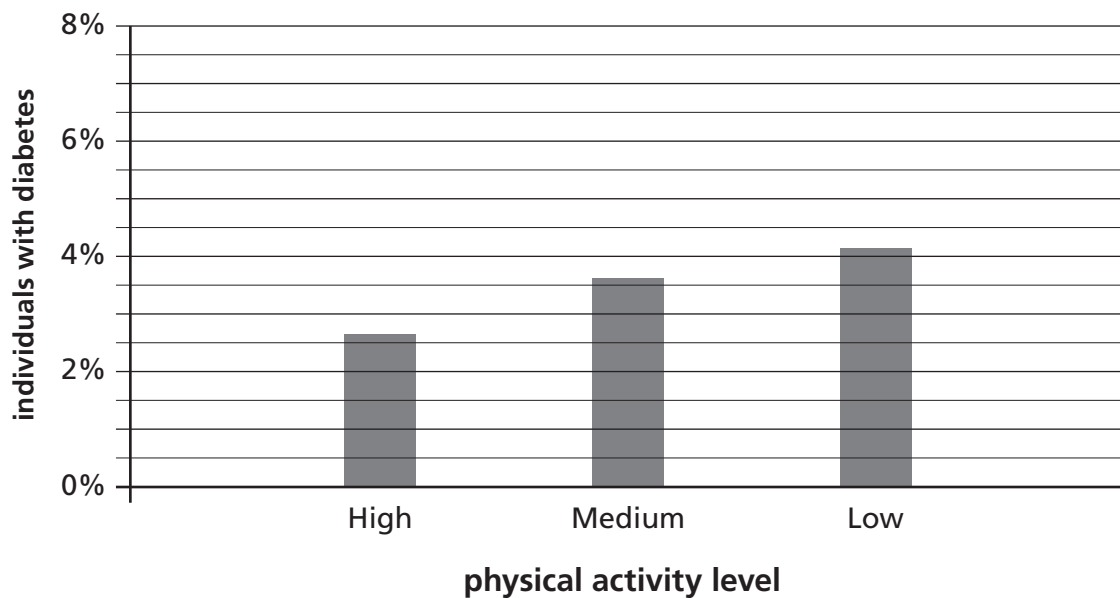




3.1d

# Analyzing the Risk Factors for Type 2 Diabetes

**Is the amount of physical activity a risk factor for type 2 diabetes?**







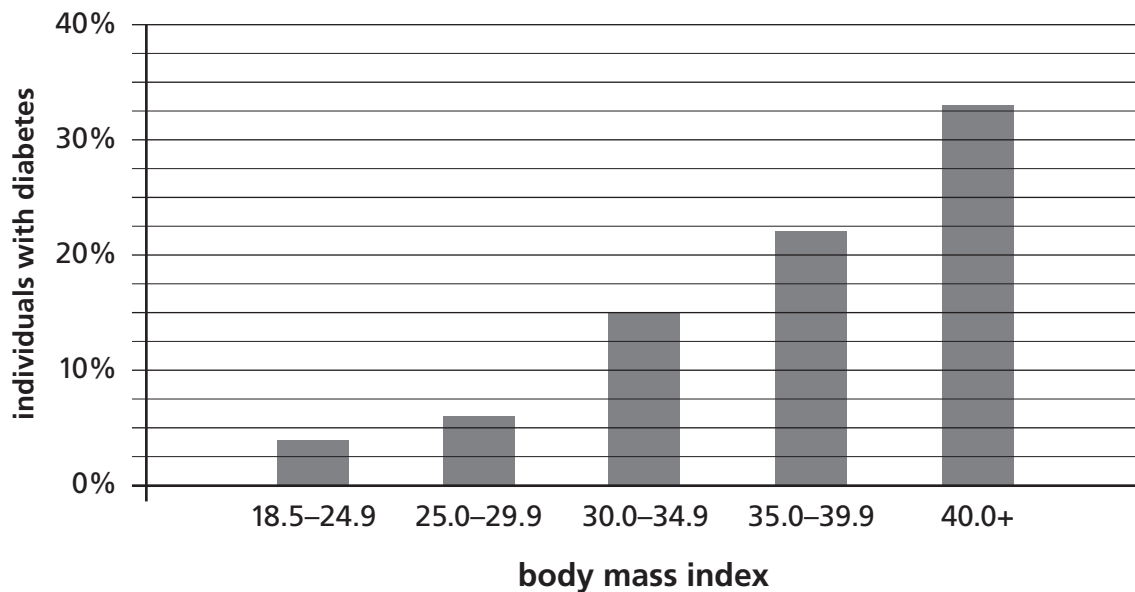




3.1e

# Analyzing the Risk Factors for Type 2 Diabetes

**Is obesity a risk factor for type 2 diabetes?**



Body mass index (BMI) is a measure used to evaluate body weight relative to a person's height. BMI provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems.

BMI	Weight Status
Below 18.5	Underweight
18.5–24.9	Normal
25.0–29.9	Overweight
30.0 and above	Obese











## 3.2

# Carla's Story



## Part 1

My name is Carla. The name of my tribe is Lummi Nation that is located in the upper left corner of Washington State near the Canadian border. I come from a small family, with three sisters, one brother, and one parent, my mother.

When I was about 17, my mother developed type 2 diabetes. My grandmother already had diabetes, so we thought we had an idea of what diabetes was. Since we did not really know anything about diabetes, though, we did not take it too seriously until it was too late.

My grandmother seemed to be fine with her diabetes. She did not have any complications of high blood sugar; she died of colon cancer in 1984. So we still did not take diabetes very seriously, because my grandmother had been fine with it.

Later, I started college in Tacoma, Washington, with no idea what I would major in. I just knew that I wanted to be in medicine. As I started to learn more about diabetes, my mother's health started to worsen. Still I had no idea how serious this disease was.

My daughter was born in 1989. That fall, I left for Grand Forks, North Dakota, to start a college career in medical technology. I was so excited to learn more about medicine.

When I went home for Christmas break, I found out that my mother had been getting worse. She had serious complications of high blood sugar. First, she had developed heart problems and then nerve damage

to her feet. That meant that she needed a walker to walk at all. I was heartbroken to watch my own mother, whom I had always considered so "strong", suffer with this crippling disease. So every day I would take her for a walk down our road for only two telephone poles. It was so heartbreaking to see this when all my life I have been the one who depended on her.

We did this for the three weeks that I was home, until I had to return to North Dakota to start my next courses of study. I was four weeks into my new classes, and I was so excited I was learning more about the medicines that my mother was taking for her diabetes. I could hardly wait until I got back to my apartment, to call her to tell her about my new found knowledge.

One day, I was about to enter my biochemistry lab class, to start the experiment to test for the drug she was taking, when the instructor handed me a message. Because I was so excited about the experiment, I thought to myself that the message could wait until after class. When the instructor saw that I kept on walking into the room, she said to me, "I think you had better call right now." My heart sank. I knew it was bad news. I called the number, and it was my college counselor. She asked me where I was, and to wait there and she would be right there to get me. The message echoed in my head, "Your mother passed away this morning."

I hurt so much. All those years that I could have helped her with her disease, with the knowledge I know now. And 16 years later, it still hurts.

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## 3.2

After my mother's funeral, I told myself that I would not put my daughter through the pain that I had just gone through, from watching my mother suffer and pass away due to type 2 diabetes. So I looked at myself. I had definite risks for type 2 diabetes—a strong family history, being overweight. I wanted to prevent me from getting type 2 diabetes, not just for my own health but also for my daughter, to protect her from going through the pain I had experienced.

### Part 2

When I returned home to Lummi, I began to exercise and to watch what I ate and successfully lost 35 pounds. I still have a lot of weight to lose so I continue to struggle with my weight.

My sister and her family started a canoe club, and my daughter and nephew, whom I have custody of, really wanted to paddle. Two years later, I joined and have been paddling now for 10 years.

I have been exercising and watching my diet for 16 years now, and counting. Yearly, I check my glucose and hemoglobin A1c. This year my glucose was 96 milligrams per deciliter (mg/dL) and my A1c was 4.7, which are both in normal ranges.

Ever since I can remember, I have always wanted to be a doctor, but thought I was not smart enough to get into medical school. Since I have been working as a clinical laboratory scientist, I realized that my next goal is to become a nurse practitioner. A nurse practitioner is more realistic, because not only can I see and treat patients, but I can also do nursing work and keep my license in the lab.

This year, our canoe club is going to go to New Zealand to compete in the World Championship Outrigger Sprint Races to compete against the world's best paddlers. I feel very honored to have the privilege to compete in this race. In the past, we have traveled to various places, like Australia, Hawaii, Fiji, and have made it as far as the semi finals, so considering we are up against the "best of the best", I think that is pretty darn good. Our canoe club trains very hard. We train each day, which includes paddling anywhere from one to two hours and running 3–5 miles a day and competing on the weekends. Also, we follow our traditional ways, by paddling in the traditional war canoes, and we avoid drugs and alcohol and tobacco. The canoe season begins in February, and some of us train until October.





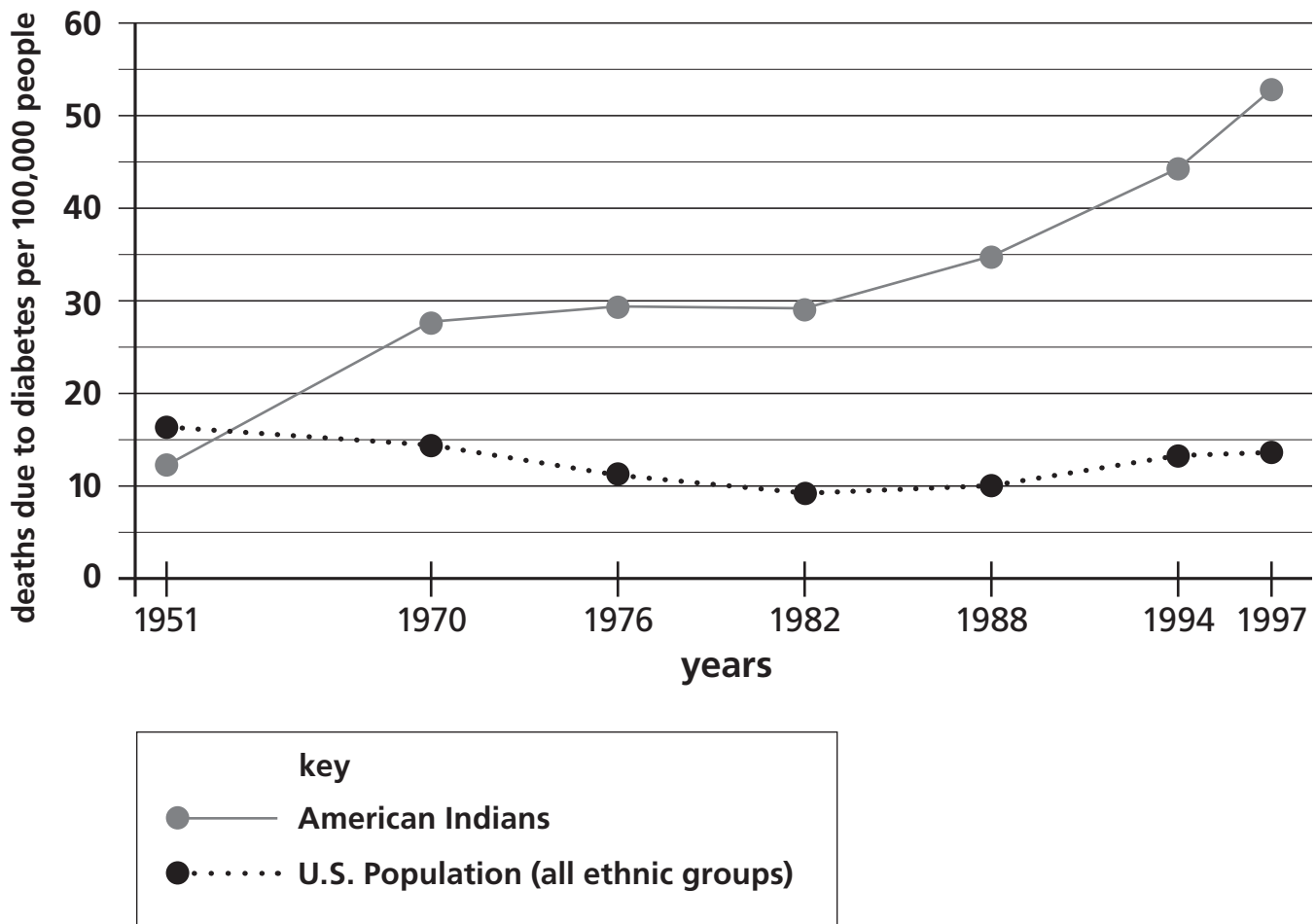






4.1

# Deaths Due to Diabetes











4.2

# Summarizing Change

**Part 1**

**Directions:** *Work with your team members to identify changes that the author discusses in the story.*

Which story did you read? \_\_\_\_\_

In the story, the author discusses change. What is the change that occurred? \_\_\_\_\_

Risk Factor	Before	After
Age		
Ethnicity		
Family history		
Physical activity levels		
Obesity		

After reading your story and completing the chart, work with students who have read the other story. Add information about the other story to your chart.











## 4.2

# Summarizing Change

### Part 2

**Directions:** Consider how your life today is different from what is in the stories. Predict how the changes may have contributed to the risk for developing type 2 diabetes. Be sure to explain your point of view.

Risk Factor	How Is Life in Your Community Today Similar to or Different from the Situations Presented in Either Catherine's or Larry's Story?	How Do the Changes Discussed in the Stories or the Differences between the Situation in Stories and Your Life Today Influence the Risk for Type 2 Diabetes?
Age		
Ethnicity		
Family history		
Physical activity levels		
Obesity		

After reading your story and completing the chart, work with students who have read the other story. Add information about the other story to your chart.

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## 4.3

# Catherine's Story

One way to understand the onslaught of diabetes is to see the changes that have occurred through the eyes of a person who is a member of an afflicted population. Catherine Howard is a Dakota Sioux and member of the Spirit Lake Nation, Fort Totten, North Dakota.

Based upon a visit with her sister Christine Cavanaugh, who was born in 1921, here is Catherine's story:

*Many years ago, there wasn't any diabetes on the reservations, but there was tuberculosis (TB). TB killed most of the Dakota Nation. The Indians started to get commodities from the U.S. government. The Indians called it commodities not surplus. And that's when they noticed that diabetes started on the reservations. Diabetes spread like wildfire, killing many Dakotas because some had nothing to eat but*

*commodities. Salt pork was given out that had to be boiled before it could be eaten because it was so salty. Pork fat was also distributed so families could make lard. The lard from pork fat was better than the lard distributed. Before commodities came to the reservation, Dakotas hunted and ate wild game. They planted their gardens and canned their vegetables. The Dakota would hunt fresh meat every day. They worked long hours every day. Even the vegetables would be picked right before they ate. Everything was thoroughly cooked or prepared by outside fire, especially wild game. Juices of berries and the sap of trees, not sugar, were used to sweeten the food. Mothers nursed their babies and their babies never got sick. Babies were born every two years."*











## 4.4

# Larry's Story

I grew up in the 1960s and early 1970s. What I remember of my childhood years was we all had to help my mother plant a garden every year. Everyone who lived with us had to help with the garden. We always planted a big garden with lettuce, tomatoes, corn, onions, carrots, cucumbers, peas, potatoes, green beans, dill, different types of squash, and watermelon.

In addition to the garden, we also had apple and plum trees. Up until I was 10, I had to help pick chokecherries and different types of berries when they were ripe.

In late summer and early fall, or when the fruits were ripe, my mother would can, dry, or freeze the vegetables and other fruits. She would make jelly and jams, apple butter and plum butter, and other sauces.

In the summer, we would fish. During the fall and winter months, my father and uncles would hunt, and we joined them when we were old enough. At that time, hunting was to put food on the table.

The types of wild game in our freezer were mostly rabbit and deer. About once a year, one of my uncles would go hunting in Canada and would give us either moose or elk, whichever it was that he brought back. We also had pheasant, duck, and geese.

My father and two uncles raised cattle, one uncle also raised pigs, and my mother raised chickens and geese. So we had beef, pork, and chicken in the freezer, and once in a while a fresh goose.

When we were old enough to work, there was always work available. We would begin in the spring with picking rock in the fields. Over the summer and early fall, we would help with cutting and hauling hay; there were always farmers cutting hay and needing to get the bales off the field so more grass would grow to be cut.

Late summer and early fall there was harvesting work to be done hauling and storing grain. In the fall, many farmers would cut silage, and this would need to be put in silos or put in long piles on the ground. There was always work for anyone who wanted to work, whether farming or ranching.

Growing up there were no video games, computers, or internet, and on TV there were just two channels to watch, three if you were lucky, so we spent most of our free time outside playing or doing other activities.

Today, we have electronic entertainment, which contributes to the inactivity of people of all ages. There is less work on farms and ranches because the jobs have been replaced by machinery and large round or square bales. Many jobs today are sedentary or have little physical activity or exertion.

There are very few gardens, and the gardens that are planted are small, in my estimation, less than a quarter of those that we planted when I was young. It is difficult to find someone who knows how to can, dry, or prepare food for freezing or make preserves, jelly and jam, or sauces.











## 5.1

# Overview of the Diabetes Prevention Program (DPP)

## Goal of the DPP

The Diabetes Prevention Program (DPP) was a major clinical trial, or research study, aimed at discovering whether diet, exercise, and weight loss could prevent or delay the onset of type 2 diabetes in people who have a high risk of developing the disease. In the DPP, participants were randomly split into two different groups.

One group, the control group, received standard general information on lifestyle such as brief handouts. But they did not receive intensive counseling efforts on lifestyle. And they did not receive specific information about what to change and how much to change it.

Another group, the positive lifestyle change group, received intensive education, counseling, and training about specific changes in diet, exercise, and weight loss. Each person was helped and strongly encouraged to do moderate exercise 30 minutes a day, five days a week (such as brisk walking); to eat foods with less fat and to eat fewer calories overall; and to lose 7 percent of his or her weight and keep it off.

## How did researchers do the DPP?

- The participants in the study did not have diabetes at the beginning of the study.
- The participants in the study were at high risk for developing type 2 diabetes.
- The scientists conducting the study assigned people randomly to one of two groups. The two groups were:
  - No change in lifestyle
  - Positive lifestyle change (increased physical activity, healthier diet, and 7 percent weight loss)
- Scientists monitored people throughout the three-year study.
- Scientists recorded the number of people in each group who developed type 2 diabetes.





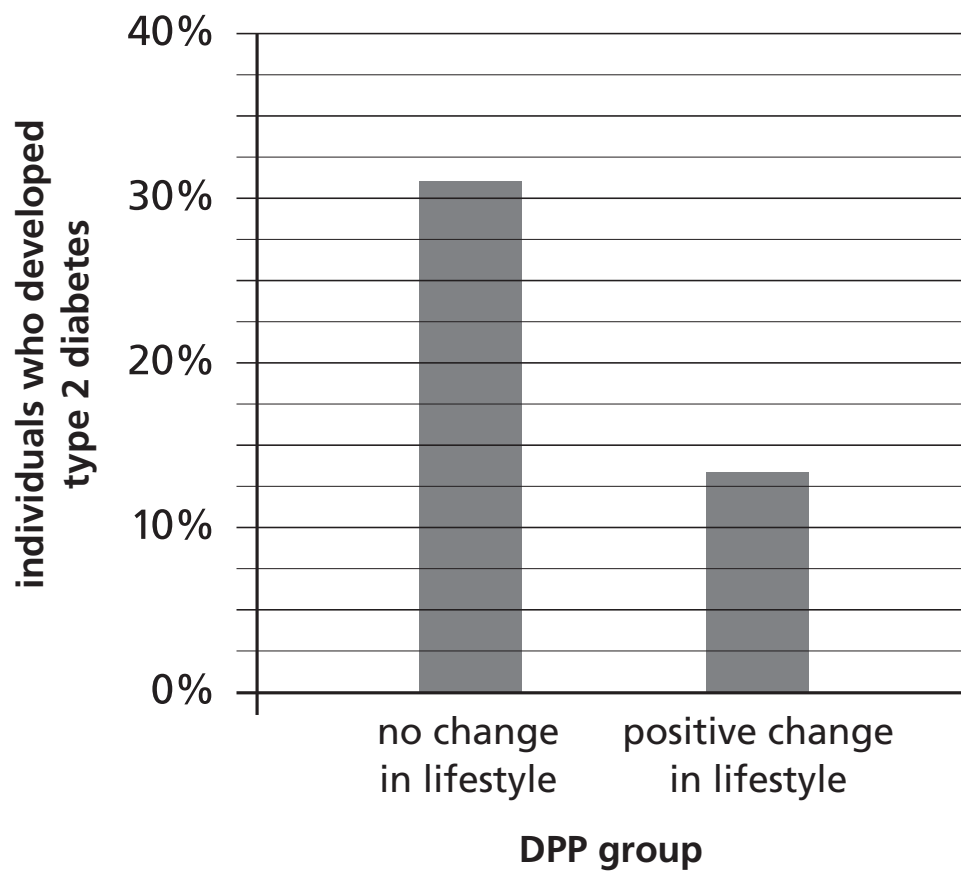






## 5.2

# Results of the Diabetes Prevention Program (DPP): All Participants





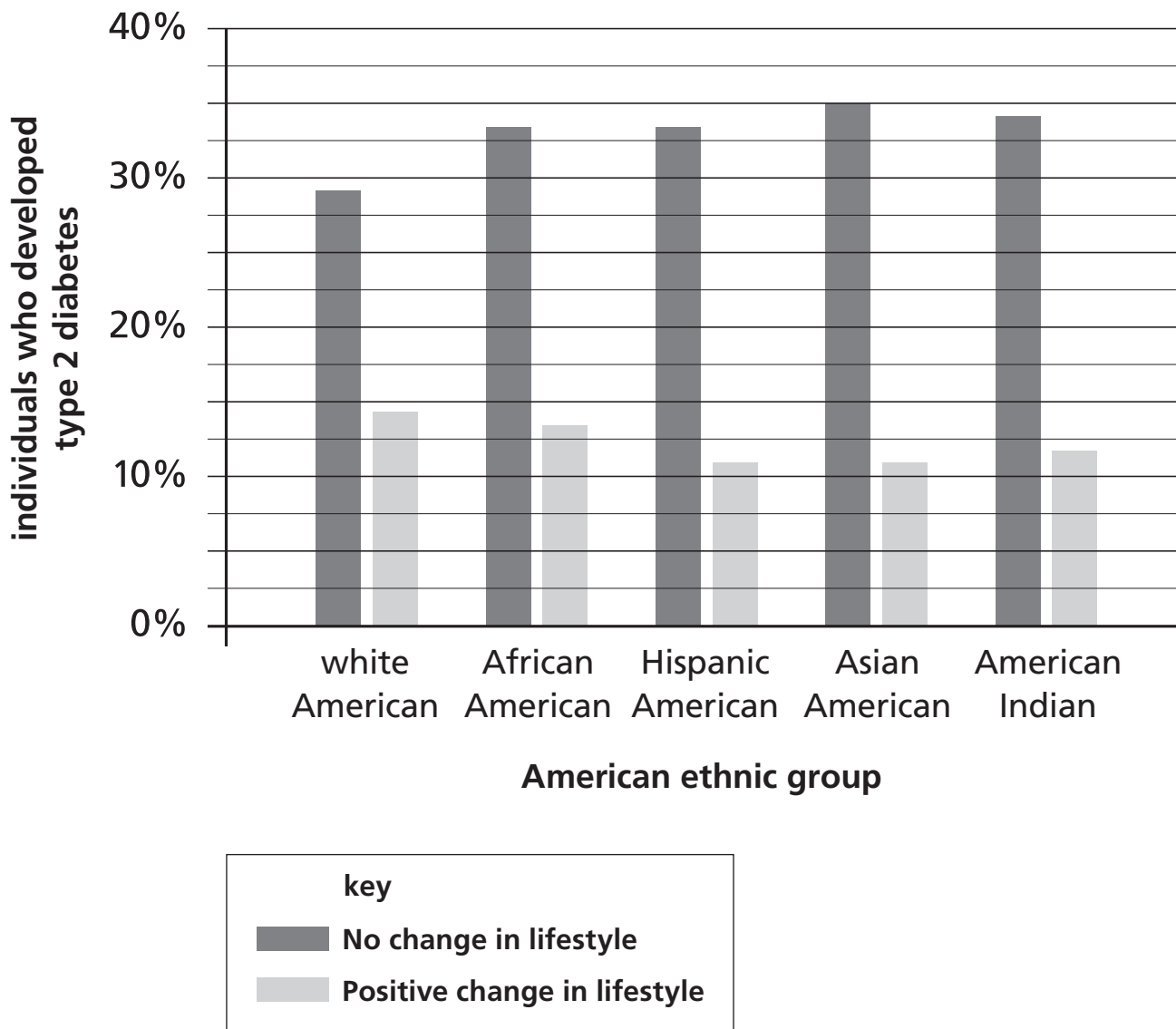






### 5.3

# Results of the Diabetes Prevention Program (DPP): Ethnic Groups











## 6.1

# Philip John's Story



Philip John is a Dakota and an enrolled member of the Spirit Lake Nation, located in Fort Totten, North Dakota. Philip John was diagnosed with type 2 diabetes 15 years ago. Before he went to see his doctor, he felt tired, urinated frequently, and was thirsty all the time. His

doctor ordered a glucose tolerance test. The test showed that his body was not able to clear glucose from his blood in a normal fashion, and Philip John was diagnosed with type 2 diabetes. His doctor ordered him to start taking pills six times a day.

In the beginning, Philip John did not want to believe he had type 2 diabetes, but the symptoms and the doctor's diagnosis were clear. His doctor asked him to start exercising, take pills, and to change his diet. Philip John decided to get more information so he went to the library to read about type 2 diabetes. He found out that increased physical activity would help to bring his body back into balance, so he went to the fitness center and started a regimen of walking on the treadmill

three times a week. He also changed his diet according to his doctor's advice. He stopped drinking soft drinks and he ate smaller meals at regular intervals during the day. He also eliminated fatty foods from his diet. As a result of this, he started losing the excess weight he was carrying around.

His doctor was monitoring his health with regular checkups every three months in the beginning. After a few visits to his doctor's office, his doctor sat Philip John down and showed him two charts. The first one was the initial one that was charted during his first visit, the second one was his latest. Philip John could see the changes in his blood sugar levels before and after he changed his activity level and diet. Looking at the charts, Philip John realized that he could help himself with simple lifestyle changes in diet and exercise. He continued to exercise and modified his diet even further to include more vegetables, fruits, water, and lean meats. Eventually, his doctor reduced the number of pills he had to take daily.

It has been three years since Philip John took any pills. Now he controls his type 2 diabetes through physical activity and a healthy, balanced diet.











## 6.2

# Rubric for Evaluating the Project

Category	Excellent (5 Points)	Good, But Could Be Improved (3 Points)	Needs a Lot of Improvement (1 Point)
The project has a clear idea or message.	<ul style="list-style-type: none"> <li>The main message of the project is very clear.</li> <li>The project focuses on a single idea.</li> </ul>	<ul style="list-style-type: none"> <li>The main message of the project is somewhat clear.</li> <li>The project's theme is correct, but it includes more than one main idea.</li> </ul>	<ul style="list-style-type: none"> <li>The main message of the project is not clear at all.</li> <li>The ideas are not focused on a single theme. The project tries to include too many different ideas.</li> </ul>
The project's message is important for people to know.	<ul style="list-style-type: none"> <li>The main message is very important for people to understand.</li> </ul>	<ul style="list-style-type: none"> <li>The main message is somewhat important for people to understand, but not the most important thing.</li> </ul>	<ul style="list-style-type: none"> <li>The message is only slightly important for people to understand.</li> </ul>
The project includes accurate information.	<ul style="list-style-type: none"> <li>The message of the project is supported by many facts.</li> <li>The facts that support the message are accurate.</li> </ul>	<ul style="list-style-type: none"> <li>Some important facts that would support the idea are missing.</li> <li>Some of the facts are not accurate.</li> </ul>	<ul style="list-style-type: none"> <li>The project does not include facts to support the idea.</li> <li>Most of the facts that support the message are not accurate.</li> </ul>
The project is well written.	<ul style="list-style-type: none"> <li>There are no spelling or grammar errors in the project.</li> </ul>	<ul style="list-style-type: none"> <li>There are only a few spelling or grammar errors in the project.</li> </ul>	<ul style="list-style-type: none"> <li>There are many spelling and grammar errors in the project.</li> </ul>
The project makes good use of the media.	<ul style="list-style-type: none"> <li>The project is appropriate to the media being used.</li> <li>The project uses visual (art and color), audio, or both techniques effectively.</li> <li>The project is engaging.</li> </ul>	<ul style="list-style-type: none"> <li>The use of media could be improved.</li> <li>The project is somewhat engaging.</li> </ul>	<ul style="list-style-type: none"> <li>The project does not use media well.</li> <li>The project is not engaging.</li> </ul>











## 6.3

# Project Score Sheet

Name \_\_\_\_\_ Date \_\_\_\_\_

*Directions: When you evaluate a project, use the rubric to score each category. Enter your score for each category on this form. Then give a specific reason (or reasons) why you assigned that score.*

ID code for the project I am evaluating is \_\_\_\_\_.

Category	Score	Reason for Score (Give specific reasons or examples to explain the score that you gave for each category. If a statement is wrong, indicate what it should say to be correct.)
The project has a clear idea or message.		
The project's message is important for people to know.		
The project includes accurate information.		
The project is well written.		
The project makes good use of the media.		
Total score _____		











## 6.3

1. What is the best thing about this project?

2. What suggestions do you have for improving this project?











## 6.4

# Has My Understanding of Type 2 Diabetes Changed?

1. What do you know about diabetes?
2. Who gets diabetes?
3. How did you learn what you know about diabetes? Please explain.
4. How does diabetes affect someone's life? Give one or more examples.
5. Is diabetes a problem for our community? Please explain and give examples.
6. Do you think diabetes is something you should be concerned about? Explain your answer.









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