



EXECUTIVE INNOVATION LAB
ON DIABETES AND PREDIABETES

PARTICIPANT PRE-READER
SEPTEMBER 27-29, 2017



WHY IS DIABETES A PROBLEM?

★ 90 - 95% of diabetes cases are type 2 diabetes



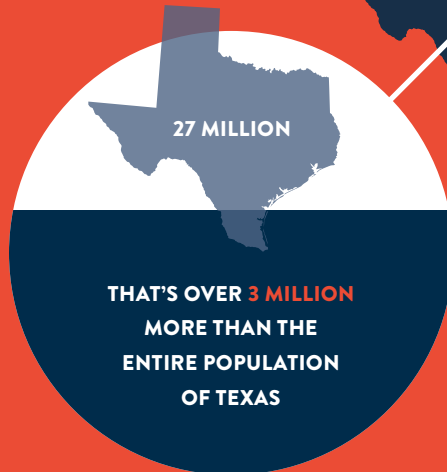
1 IN 7 US ADULTS HAS DIABETES¹



1 IN 3 US ADULTS HAS PREDIABETES



8 IN 10 US SENIORS HAVE DIABETES OR PREDIABETES



“ I lost my insurance and cannot afford a doctor...I no longer have access to a blood glucose meter and strips so I cannot monitor. I have severe neuropathy in my feet and am barely able to walk compared to last year. ”

DIABETES COMPLICATIONS IN THE US

168,000

ANNUAL HOSPITAL DISCHARGES DUE TO DIABETIC KETOACIDOSIS EACH YEAR⁴

245,000

ANNUAL ER VISITS DUE TO HYPOGLYCEMIA EACH YEAR⁵



ADULTS WITH DIABETES ARE 2-4 TIMES MORE LIKELY TO HAVE A HEART ATTACK OR STROKE⁶



DIABETES CAUSES A LOWER LIMB AMPUTATION IN THE US EVERY 5 MINUTES⁷



48 PEOPLE WITH DIABETES GO BLIND EVERY DAY⁹



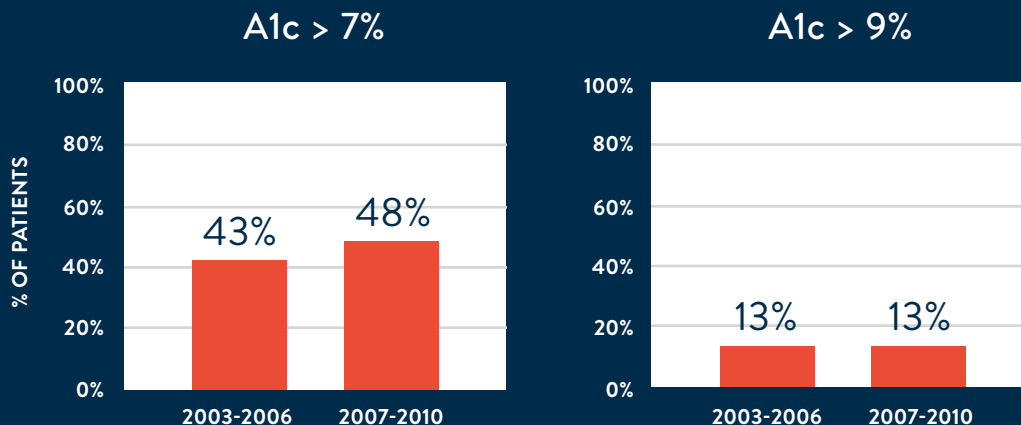
SOMEONE WITH DIABETES BEGINS TREATMENT FOR END-STAGE KIDNEY DISEASE EVERY 10 MINUTES⁸



TWO OUT OF THREE PEOPLE WITH DIABETES EXPERIENCE SOME FORM OF DIABETIC NEUROPATHY¹⁰

While much of the national diabetes data does not distinguish between type 1 and type 2 diabetes, for the purposes of d16 this document focuses primarily on type 2 diabetes and obesity.

HALF OF PATIENTS ARE NOT AT GOAL, AND ONE IN SEVEN PATIENTS HAVE BADLY UNCONTROLLED A1CS. MOREOVER, A1CS HAVE NOT IMPROVED OVER TIME DESPITE BILLIONS MORE DOLLARS SPENT ON DIABETES.



Each percentage point reduction in A1c correlates with a 35% reduction in microvascular complications (blindness, kidney disease, nerve damage) and a 14% reduction in cardiovascular disease.

COST OF DIABETES ON SOCIETY

Diabetes poses a huge economic burden on the United States. We spend **\$245 BILLION** a year on the direct (\$176 billion) and indirect (\$69 billion) costs of diabetes. Nearly half of direct costs are due to in patient hospitalizations, primarily from long-term diabetes-related complications, hypoglycemia, and DKA (diabetic ketoacidosis). While spending on diabetes has grown significantly over the past several decades (it was well under \$100 billion in the 1990s), at a population level A1c levels haven't significantly improved. Per capita costs have declined, due to improvements in long-term complications. However, overall costs are still growing as more people continue to get diabetes, and with people living longer with type 2 diabetes today than ever before, more people are at higher risk of costly long-term complications.

“ I no longer have the funds to buy the foods I need to eat to keep my diabetes under control. I eat far too many carbs because they are cheaper & go farther. I would rather be eating more meat and fruits & vegetables. ”



1 IN 5 US HEALTHCARE DOLLARS IS SPENT ON DIABETES

\$245 BILLION (2012)

41% INCREASE FROM 2007

PROJECTED TO DOUBLE BY 2034

OVER 140 WORLD NATIONS ALL HAVE TOTAL GDPs OF LESS THAN \$245 BILLION.



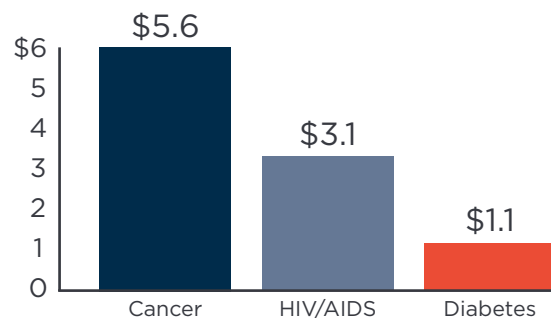
“I no longer have the funds to buy the foods I need to eat to keep my diabetes under control. I eat far too many carbs because they are cheaper and go farther. I would rather be eating more meat and fruits and vegetables.”¹¹

How Much Public Research Funding Goes To Diabetes?

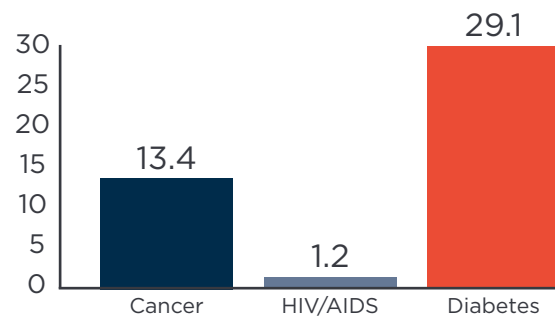
In 2012, cancer accounted for \$5.6 billion (roughly 16%) of total NIH funding, HIV/AIDS accounted for \$3.1 billion (roughly 9%) of total NIH funding, and diabetes accounted for \$1.1 billion (roughly 3%) of total NIH funding (chart 1). There were roughly 1.2 million people in the US with HIV/AIDS and 13.4 million people alive with a history of cancer (either past or current), compared to over 29 million people living with diabetes (chart 2). By that comparison, the NIH spends about \$2,583 each year per person with HIV/AIDS, \$418 each year per person with cancer, and only \$38 each year per person with diabetes (chart 3). These disease areas have benefitted tremendously from this amount of funding—and rightfully so—serving as a point of reflection on how funding dollars can impact outcomes.

Moreover, funding for innovation in health services and delivery, which examines access, care quality, and population health, **amounts to just 0.3% of total healthcare expenditures and roughly one-twentieth the sum that goes into science research.** These areas could move the needle on many aspects of diabetes management on a large scale, yet they continue to be underfunded and overly ignored.

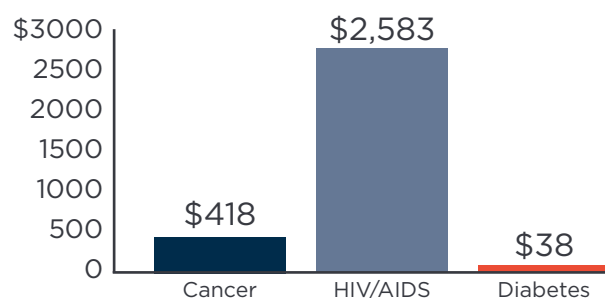
Total NIH Funding per Disease¹⁸
(in Billions)



Prevalence in the U.S.
(Number of People in Millions)



Annual NIH Dollars Spent
(Per Person with the Disease)



“Depression and stress have made it very hard for me to care about maintaining my diabetes. It’s one area I haven’t yet dealt with.”¹¹

The Challenge of Type 2 Diabetes

In Summary

Type 2 diabetes is not an easy disease to live with. While public perceptions of diabetes tend to paint it as simply a “touch of sugar” that is easily managed, that is not the case. Not only

can it lead to devastating complications, it causes a significant amount of emotional and financial stress for patients and their families.

What Do People With Type 2 Diabetes Think About?



Patient Perspectives

Diabetes is a complex condition that affects almost every part of day-to-day life. Everyone with diabetes has a different experience, but for most it represents a significant source of physical, emotional, and mental distress.

- Every bad glucose reading, high A1c, unhealthy meal choice, and day without physical activity represents a new failure, leading to feelings of helplessness, fear, and frustration.
- People with diabetes are twice as likely as the average person to have depression,¹⁹ and are also at risk for experiencing

burnout (exhaustion from the endless attention diabetes care requires).

- The majority of people with diabetes feel stigma surrounding their disease. This can make people feel that they are a burden on friends, family, or society at large, and may ultimately hide their disease from others.
- For many, diabetes can feel like a full-time job, and there simply aren’t enough hours in the day to give it the attention it requires.
- Living with complications drastically impairs one’s daily life, impacting all aspects of social, professional, and personal life.

“During this last year I’ve had a terrible time controlling my cravings for carbs. My last two A1cs have been 7.3 and 7.5 where in the previous six years it was always 6 or under (usually under). I feel as though I’m losing control of my life and it’s quite frightening.”¹¹

Social Stigma: What Messages Do People with Type 2 Diabetes Hear from Society?

Just eat less sugar.

You have no self-control.

YOU DON'T CARE ABOUT YOUR HEALTH.

My grandpa died from diabetes.

YOU'RE GOING TO GO BLIND.

failed.

YOU

JUST LOSE WEIGHT.

YOU'RE LAZY.

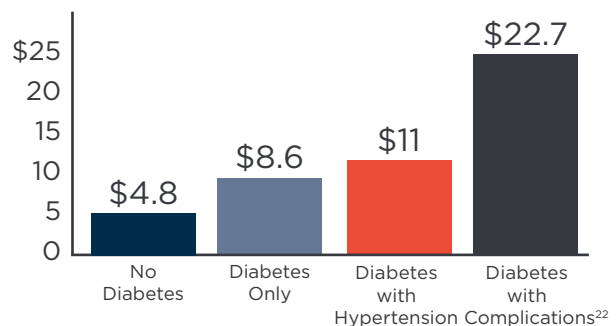
Diabetes is preventable. It's your fault that you are sick.

DIABETES IS EASY TO MANAGE.

Personal Expense of Diabetes

Diabetes is also expensive on the individual level. People with diagnosed diabetes incur annual average medical costs of about \$13,700, over two times higher than those without diabetes. The majority of these costs are attributed to treating the costs of hypoglycemia and diabetes complications. Each American adult spends over \$1200 per year to pay for diabetes healthcare costs, whether they themselves have diabetes or not.

Total Annual Healthcare Costs²⁰ per Person²¹
(in Thousands)





*“As it relates to our health, our zip code may be more important than our genetic code.” —Dr. James S. Marks,
Executive Vice President, Robert Wood Johnson Foundation*

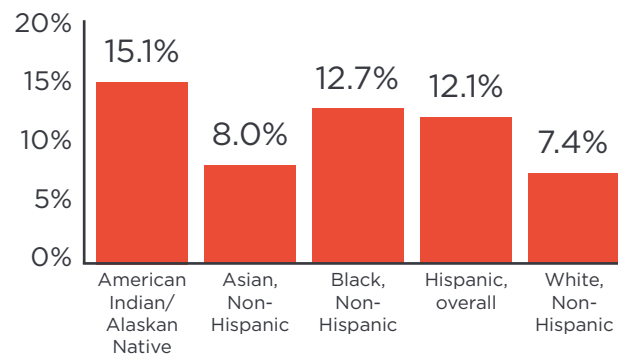
What Factors Contribute to Type 2 Diabetes Risk?

Type 2 diabetes is influenced by a host of complex factors. Genetics and lifestyle choices (namely, diet and exercise) are certainly major contributors. However, it is also impacted by a multi-factorial set of cultural, societal, and environmental factors that are less understood and often harder to address. According to Novo Nordisk’s Cities Changing Diabetes Program, the four greatest social contributors to type 2 diabetes risk include time constraints, financial constraints, geographic barriers, and resource constraints (e.g., lack of access to healthcare, medications, nutritious foods and exercise, etc.). These factors are absolutely critical to addressing and contextualizing diabetes—and why pharmaceutical therapies alone are not enough to fight this growing epidemic.

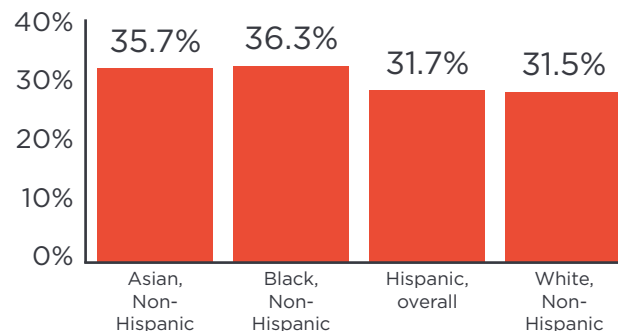
What Causes Diabetes?

At its core, diabetes is a metabolic dysfunction in which the body cannot properly process glucose. In type 1 diabetes, the body’s own immune system attacks and kills the beta cells in the pancreas that produce insulin. Behind type 2 diabetes is a disease where the body’s cells have trouble responding to insulin—this is called insulin resistance. Over time, though, the beta cells in the pancreas will fatigue and will no longer be able to produce enough insulin—this is called “beta burnout.” While type 1 diabetes has no known cause, the majority of type 2 diabetes cases are ultimately due to a combination of people eating too much and not performing enough physical activity. This is why type 2 diabetes risk strongly correlates with obesity levels. Different people are at various levels of predisposed genetic risk for developing type 2 diabetes, which is partially why some overweight or obese individuals never develop type 2 diabetes, while others do.

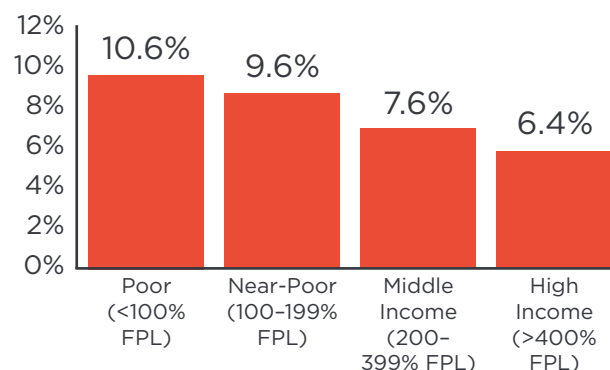
Rates of Diagnosed Diabetes²³



Prevalence of Prediabetes²⁴



Diabetes Prevalence by Income²⁵

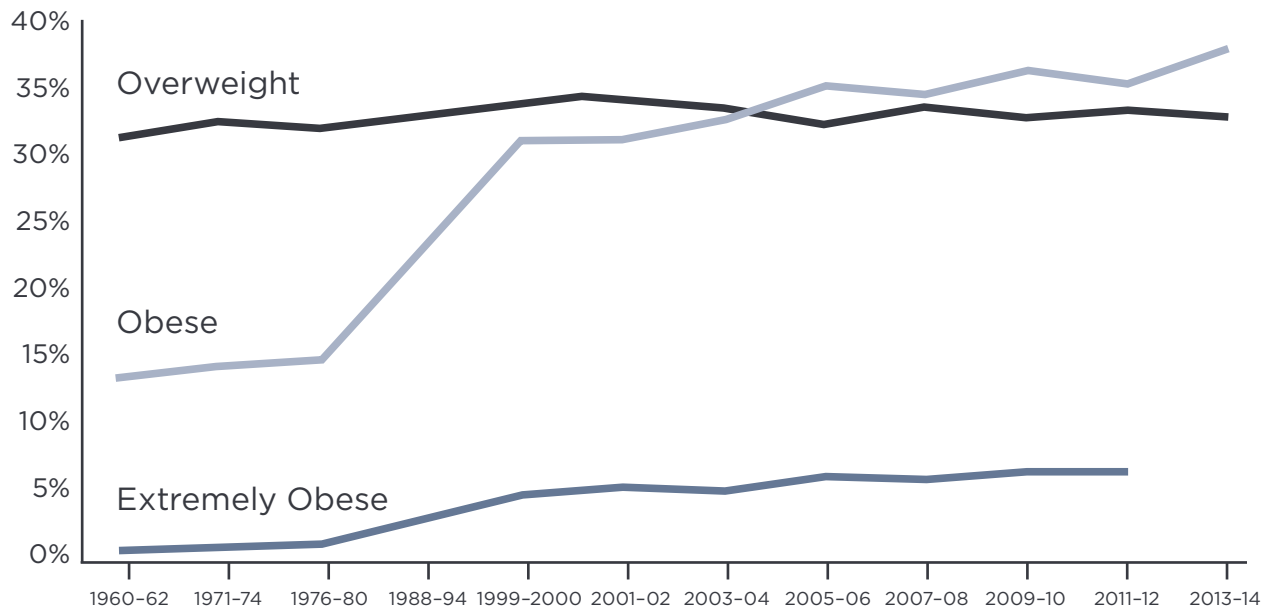




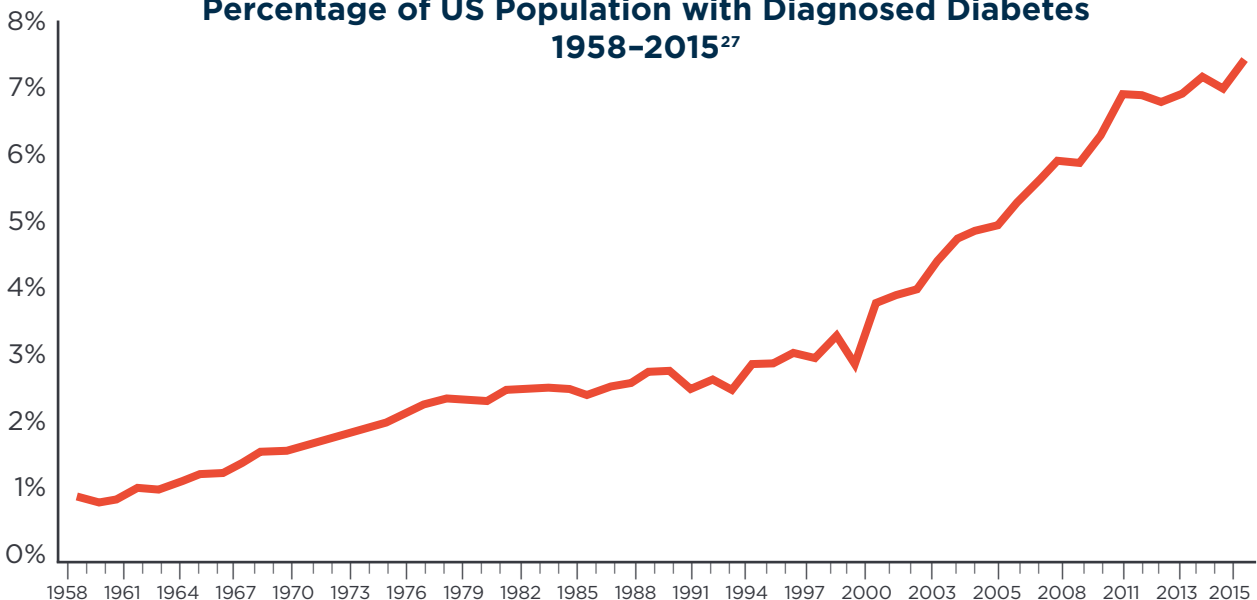
*"I've had some changes in my household. I now live by myself and dropped into kind of a depression. The main support for me to keep on my diet and follow what I'm supposed to do is no longer living in this house and I gave up. **I don't seem to have any willpower.**"¹¹*

Obesity and Type 2 Diabetes Trends Over Time

Trends in Overweight, Obesity, and Extreme Obesity Among Adults Aged 20-74 • United States 1960-2014²⁶



Percentage of US Population with Diagnosed Diabetes 1958-2015²⁷

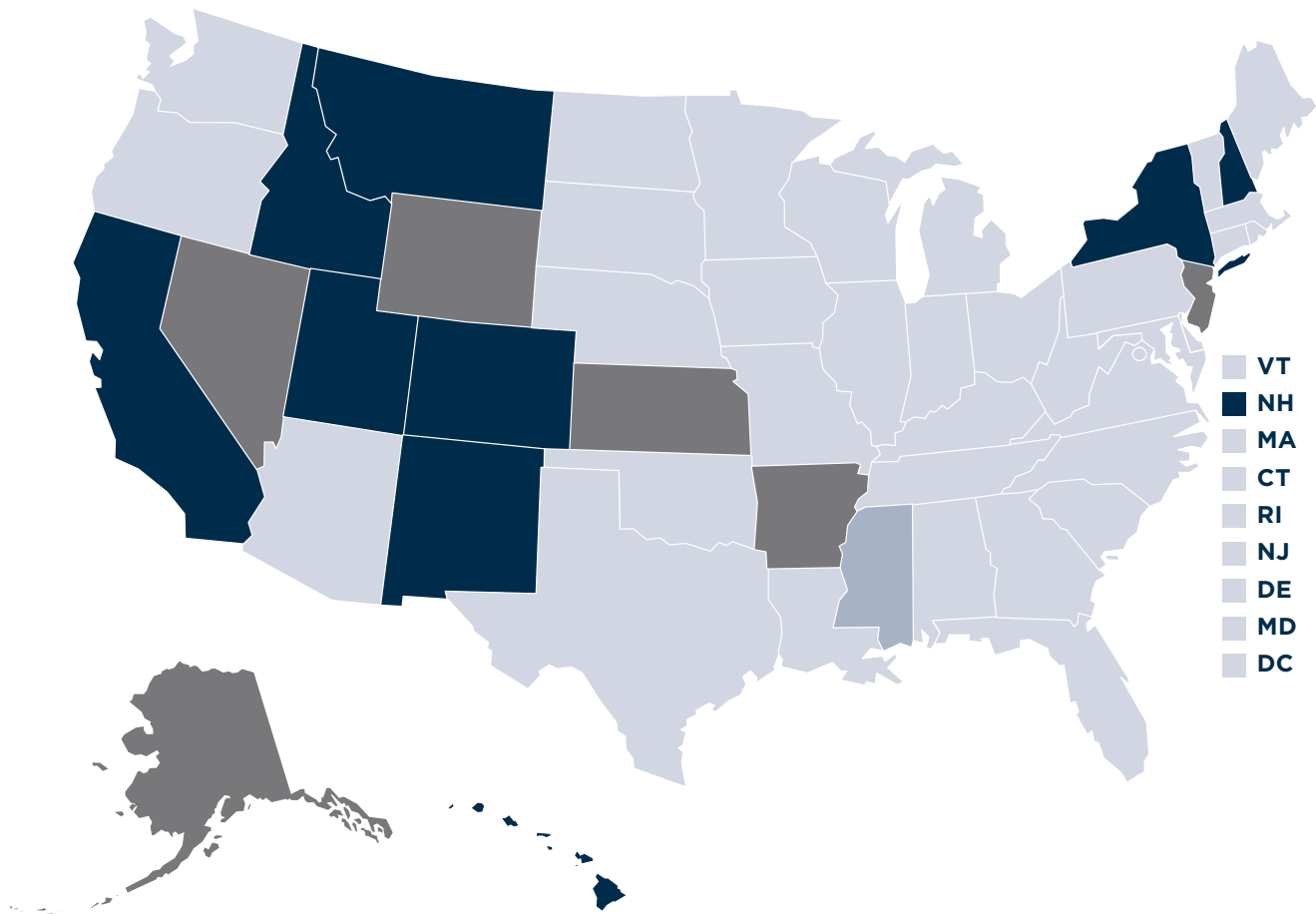




Adult Obesity Rate by State, 1995²⁸

Percent of obese adults (Body Mass Index of 30+)

0-9.9% 10-14.9% 15-19.9% 20-24.9% 25-29.9% 30-34.9% 35%+

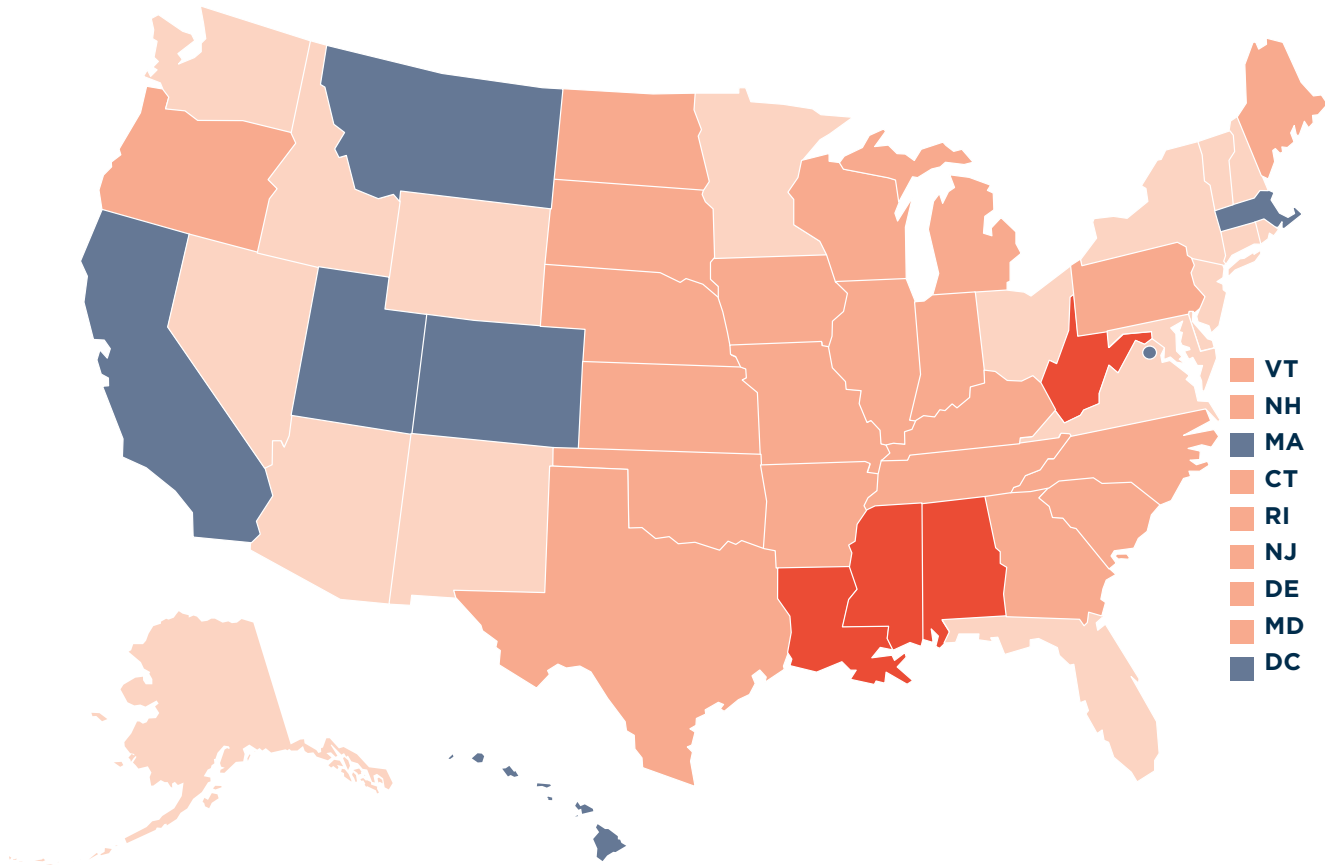




Adult Obesity Rate by State, 2016²⁸

Percent of obese adults (Body Mass Index of 30+)

0-9.9% 10-14.9% 15-19.9% 20-24.9% 25-29.9% 30-34.9% 35%+



“Dealing with a tremendous amount of stress and other issues, I have lost control of managing my diabetes to where my glucose was constantly high and my eyesight began to change as well. I’m working to get my health back under control.”¹¹

What Causes the Diabetogenic Environment?

On a broad scale, economic growth in the US coupled with our increasingly Westernized, modern lifestyle have led to a significant increase in type 2 diabetes over recent decades. While the problem is complex and the list below is by no means exhaustive, certain key areas of influence include:

Food Culture

On a national scale, calorie-dense foods with low-nutritional value are often the cheapest, most readily available option. Moreover, foods of all kind come in larger portion sizes than ever before. While intake of specific foods, such as sugar, has increased over time, so has our intake of food overall.

Urban Planning and Physical Activity

The built environment can encourage or deter physical activity. For instance, a lack of green space and urban violence can pose barriers to exercise, especially in low-income neighborhoods where residents may not be able to afford gym memberships.

Healthcare Coverage

Healthcare coverage is associated with type 2 diabetes diagnosis rates and glycemic control. Even with the Affordable Care Act, 20 states have not expanded Medicaid, leaving some of the most vulnerable individuals uninsured.

Food Deserts

Food deserts are areas without ready access to fresh, healthy, and affordable food. These environments often foster poor dietary habits, especially in children, that can contribute to the onset of type 2 diabetes.

Geographical Barriers

Distance from healthcare can influence how often patients seek healthcare. This is particularly a problem in rural areas, as the US is facing a shortage of primary care providers and endocrinologists. In 2011, there was an estimated shortage of 1,500 endocrinologists based on patient demand. Moreover, an estimated shortage of up to 45,000 primary care providers (who provide 85% of diabetes care) is expected by 2020.²⁹ As a result, patients often have to travel long distances while facing transportation barriers in order to receive care.

Time Constraints

Type 2 diabetes prevention and management is time consuming, often requiring more time than people have in their daily lives. One study found that if people with type 2 diabetes followed every recommendation by the American Diabetes Association, it would add two hours to their daily routines.³⁰ When conflicted between jobs, caring for children and family, and other life priorities—diabetes prevention and management can fall to the side.

Lack of Peer Support

Studies have shown that social isolation can be as lethal as cigarette smoking.³¹ For people with diabetes—a disease that comes with a great deal of social stigma—peer support can often be challenging to attain.



“I am fatter than ever. I feel like giving up just trying to manage diabetes. I know that by not trying to exercise and keep numbers down I am damaging my organs, but I don’t care at this point.”¹¹

What Causes the Diabetogenic Environment? (cont.)

Cultural Attitudes

How people perceive diabetes can play a significant role in our ability to prevent and treat it. From how people prioritize diabetes in their own lives (is diabetes management a top priority?), to societal perceptions of “normal” body weight, to public perception of the severity of diabetes compared to other diseases, these cultural attitudes influence behavior and ultimately health outcomes.

Limited Health Literacy

In the US, only 12% of US adults have proficient health literacy, and over one third have issues with common medical tasks such as following prescription directions. Moreover, health literacy disproportionately affects different groups of people: 28% of white adults have “basic” or “below basic” health literacy, compared to 65% of Hispanic adults.³² Of course, limited health literacy influences many other factors that contribute to type 2 diabetes risk.

Where Is Diabetes Care Today?

What are Some of the Current Focus Areas in Type 2 Diabetes?





“I gained a lot of weight after the birth of my daughter. I am not eating as well and have stopped exercising because of time constraint. I have had to go back on medication.”¹¹

Where Is Diabetes Care Today? (cont.)

The Anthology of Bright Spots

The Anthology of Bright Spots in Type 2 Diabetes was conceived during The diaTribe Foundation’s d16 Executive Innovation Lab on Diabetes and Obesity. Several participants in the Innovation Lab asked, quite simply, “What’s working? Where can we find out about existing successes? What’s scalable?” It quickly became clear that no such inventory exists—which meant we had no way of identifying common traits of successful interventions across different populations. By creating a unified collection of success, or “Bright Spots,” we hope to promote awareness, collaboration, further innovation, and investment.

The Anthology is divided into three sections: **Prevention, Workplace Wellness, and Healthcare Teams of the Future.** The

Prevention section details prevention programs that have demonstrated positive outcomes, inspire others, and show potential for impact, scalability, and investability. Workplace Wellness delves into programs that aim to improve health outcomes for employees, while Healthcare Teams of the Future explores structural initiatives to reorganize, streamline, and improve how practitioners interact to care for patients. Though there is inevitably some overlap between the three categories, each section also details the top insights distinguishing its key needs and priorities.

The Anthology of Bright Spots will launch online at the end of September, 2017. You will be able to read about these programs at www.diatrife.org/foundation/anthology.

Current Efforts in Type 2 Diabetes Prevention

While the field of diabetes prevention is extensive, a few key areas of focus include (but are not limited to) the below:

Diabetes Screening

- Increased screening can help catch prediabetes and type 2 diabetes in its earlier stages of development, allowing patients to begin treatment earlier and help prevent long-term complications.
- Recent guidelines³³ published by the US Preventative Services Task Force recommended blood glucose checks for overweight people 40-70.

- An observational study from Quest Diagnostics found that states that expanded Medicaid as part of the Affordable Care Act saw a 23% rise in new diabetes cases vs. a 0.4% increase in states that had not expanded Medicaid over the same period.

National Diabetes Prevention Program

- Several prediabetes interventions exist based on evidence from the landmark Diabetes Prevention Program (DPP) study.³⁴ The DPP study reported that moderate weight loss (5-7% of body weight), counseling, and education on healthy eating and behavior reduced the risk of developing type 2 diabetes by 58%. Data

"I have gained 30 lbs. back of the 70 I had lost. My eating habits have gone back to my prediagnosis ways. I am not feeling good about myself." ¹¹

Current Efforts in Type 2 Diabetes Prevention (cont.)

presented at the ADA 2014 conference showed that after 15 years of follow-up of the DPP study groups, the results were still encouraging: 27% of those in the original lifestyle group had a significant reduction in type 2 diabetes progression compared to the control group.

- The CDC offers a one year long lifestyle change program through its National Diabetes Prevention Program (NDPP) at various locations throughout the US to help participants adopt healthy habits and prevent or delay progression to type 2 diabetes.

Digital Health

- Omada Health, Noom Health, and Canary Health have all taken the DPP curriculum and translated it onto an online format.
- Omada Health's program, *Prevent*, was recently found to be effective among Medicare Advantage members, showing an average 8.7% reduction in body fat for the 491 participants³⁵ over a six-month period.

Community Health Initiatives

- The Partnership for a Healthier America³⁶ is a non-profit organization with extensive partnerships in the private sector to collectively combat childhood obesity, including companies such as Mercedes-Benz, Dannon, Walmart, and Birds Eye.
- Michelle Obama's initiative, *Let's Move!*³⁷ was a comprehensive initiative to tackle obesity and type 2 diabetes, specifically among children. The program encouraged kids, families, schools, elected officials, and

healthcare providers to work together to change kids' lifestyles to be healthier.

Nutrition Policies

- Sugar-sweetened beverage taxes have been passed in Albany, Berkeley, San Francisco, and Oakland (CA), Boulder (CO), Cook County (IL), Philadelphia (PA), the Navajo Nation, and Mexico. While there is no long-term data on these initiatives yet, early data found that in the first year after Mexico's 10% on soda, the purchasing of sugary beverages decreased by 6%.³⁸
- One 2015 cost-effectiveness study modeled that a national excise tax on sugar-sweetened beverages would prevent 576,000 cases of childhood obesity and would save \$14.2 billion dollars in healthcare costs over 10 years. This represents a significant return on investment, saving \$32 for every \$1 invested.
- The FDA has mandated all retail food establishments, chain restaurants, and vending machines must include calorie labeling on their menus, though the effectiveness of this approach is up for debate.
- The FDA has proposed several changes to nutrition facts labels, such as the inclusion of percent daily value (%DV) for added sugars and a greater emphasis on calorie count per serving. This proposal is indefinitely on hold under the Trump administration.

d17: Where do we come in?

As showcased in the Anthology of Bright Spots, there is no shortage of work being done in type 2 diabetes and prediabetes today. From prevention programs to science research to digital health, the diabetes ecosystem is large and varied. All of these efforts—and the people behind them—are doing difficult, important work in the fight against diabetes.

Obviously, there will be no one single solution to diabetes. If one thing is clear, it's that diabetes is an incredibly diverse and complex disease. No one person with diabetes is the same, and solutions will only come from collective impact.

Although we are heartened that there are new therapies that significantly reduce cardiovascular and kidney disease, drugs and devices will not solve diabetes by themselves. Policy changes will not solve diabetes by themselves. Patient education will not solve diabetes by itself. What will solve diabetes are these and countless other factors coming together to address diabetes from multiple angles. We need an integrated, cross-systems approach focused on prevention and behavior change to reverse these trends. That's where d17 comes in. Together, we will focus on collaborative approaches that have potential to generate collective impact.

Key questions we will consider include:

1. How might we mobilize patients and leaders to reduce stigma and improve public attitudes and social norms surrounding diabetes and prediabetes?
2. How might we re-design the acute-care-oriented healthcare system to better serve chronic disease management?
3. How might we make prevention of diabetes and prediabetes a priority in the health system and beyond?
4. How might we design programs that result in behavior change?
5. How might we change/create policies that promote health and wellness?

We look forward to diving into these and other critical questions during d17.



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EXECUTIVE INNOVATION LAB
ON DIABETES AND OBESITY

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