Burden of Diabetes in Nevada 2017 – Preliminary Report

Nevada Department of Health and Human Services

Division of Public and Behavioral Health

Bureau of Child, Family and Community Wellness

Chronic Disease Prevention and Health Promotion Section

Diabetes Prevention and Control Program

The Burden of Diabetes in Nevada

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Written by:

Marjorie Franzen-Weiss, MPH, CHES
Diabetes Prevention and Control Program Coordinator
Chronic Disease Prevention and Health Promotion Section
Bureau of Child, Family, and Community Wellness
Nevada Division of Public and Behavioral Health
Nevada Department of Health and Human Services

Adel Mburia-Mwalili, PhD, MPH
Office of Public Health Informatics and Epidemiology
Nevada Division of Public and Behavioral Health
Nevada Department of Health and Human Services

Edited by:

Masako Horino Berger, RD, MPH
Health Systems Manager
Chronic Disease Prevention and Health Promotion Section
Bureau of Child, Family, and Community Wellness
Nevada Division of Public and Behavioral Health
Nevada Department of Health and Human Services

Jenni Bonk, M.S.
Chronic Disease Prevention & Health Promotion Section Manager
Bureau of Child, Family, and Community Wellness
Nevada Division of Public and Behavioral Health
Nevada Department of Health and Human Services

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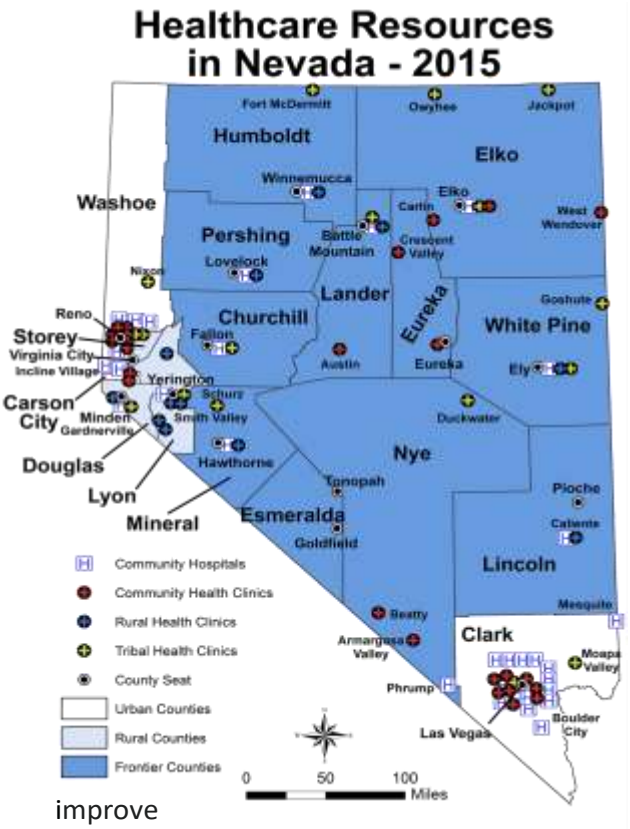
Nevada Demographic Profile

Nevada is the seventh largest state geographically with an area of 110,540 square miles. The population of Nevada increased by 12.96 % between 2006 and 2015 for a total of 2.8 million residents in 2015. Of the 17 counties, 89.9% of the state's population resides in the state's three urban counties of Clark, Washoe and Carson City. The remaining 14 counties consist of three rural counties (Douglas, Lyon, and Storey Counties), and the other eleven are considered frontier counties, thus creating pronounced geographic disparities. Although population growth has slowed recently, the state's rapid population growth in the past 20 years has put almost impossible pressure on health and human services to keep pace with spiraling demand for services, especially among older age groups and racial/ethnic minorities.

Nevada is also becoming a more diverse state. The percentage of minority races and ethnicities has increased over the past years. Currently, the greatest percentage of residents identify as white at 66%, followed by Hispanic or Latino at 26%, Black or African American at 8%, and Asian American at 7%.[1] As a Medicaid expansion state, Nevada's enrollment in Medicaid and the Children's Health Insurance Program (CHIP) increased 66 percent from an average of 221,450 July through September 2013 to 554,010 in April 2015. This far exceeds the national increase of 21%. Medicaid expansion is expected to improve the quality of life for many Nevadans, but provider shortages, low health literacy, and navigation of the health care system remain substantial challenges for all Nevadans.



Furthermore, this vast geographic distribution creates many health care delivery challenges in serving the residents of Nevada, especially those in rural and frontier areas. The average distance between acute care hospitals in rural Nevada, and the next level of care or tertiary care hospitals is 115 miles.

What Is Diabetes?

Diabetes is an endocrine system disease caused by the body's inability to create enough insulin or properly use the insulin it produces to break down blood sugar/glucose to use as fuel for the body. Insulin is a hormone that converts sugars, starches and other food components into the energy needed by the body to function. It unlocks the cells to allow blood glucose to enter and fuel the cells of the body. The cause of diabetes remains unknown, although both genetics and environmental factors, such as obesity and a lack of physical activity, appear to play a role in determining whether a person develops diabetes.

In the United States, the number of adults aged 18 years of age and older with diagnosed diabetes has almost quadrupled from 5.5 million to 29.1 million or 9.3% of adults from 1980 through 2014. This estimate includes 21.0 million adults diagnosed with the disease, and 8.1 million (27.8%) of adults with diabetes who

are undiagnosed.[2] As with other chronic illnesses, this increase is due to multiple factors including, the aging of the U.S. population, and the rising rate of obesity and physical inactivity. Furthermore, a greater incidence of diabetes is found among minority populations. In Nevada, according to the Behavioral Risk Factor Surveillance System (BRFSS) data, it is estimated that 215,082 or 9.7% of adults were diagnosed with diabetes in 2015.[3]

The Centers for Disease Control and Prevention (CDC) estimates that more than one in three adults have prediabetes. An individual with prediabetes has a blood glucose level that is too high to be considered normal, but does not meet the criteria for diabetes. Because of this increased blood glucose level, these individuals are at a higher risk for developing type 2 diabetes and other serious health problems, including heart disease, and stroke. Without lifestyle changes to improve their health, 15% to 30% of individuals with prediabetes will develop type 2 diabetes within five years.[4]

Moreover, diabetes imposes a considerable burden on the economy of the U.S. in the form of increased medical costs and indirect costs due to reduced labor force participation as a result of chronic disability, reduced productivity at work and home, work-related absenteeism, and premature mortality.[5,6] The occurrence of diabetes related costs are expected to more than double in the next 25 years from $113 billion to $336 billion.[7] For the year 2012, Nevada's total estimated medical cost for diabetes was $2,466 million with prediabetes representing $194 million.[8]

What Are The Different Types Of Diabetes?

Type 1 diabetes most often occurs among children and young adults, and was originally called juvenile-onset diabetes. Type 1 diabetes results from the body's failure to make insulin. People with type 1 diabetes control their disease by taking insulin, monitoring their blood sugars, meal planning and engaging in a physical activity program. Nationally, 5% to 10% of those who are diagnosed with diabetes have type 1 diabetes.[9]

Type 2 diabetes is a preventable disease and is the most common form of diabetes. Type 2 diabetes develops when the body no longer uses insulin properly or cannot make enough insulin to keep blood glucose at normal levels. Type 2 diabetes is a substantial and growing health problem which affects both adults and children and is related to a number of serious complications, including cardiovascular disease, blindness, kidney disease, amputation and premature death. The CDC estimates indicate that 90-95% of Americans diagnosed with diabetes have type 2 diabetes. Type 2 diabetes develops most often in middle-aged and older adults but an increasing number of younger adults and children are being diagnosed with type 2 diabetes. Individual with type 2 diabetes can control their disease through self-management by monitoring their blood glucose, eating healthy foods, and engaging in regular physical activity. In addition, medications may be needed to control blood glucose levels. [10]

Gestational diabetes mellitus (GDM) is defined as impaired glucose tolerance with onset or first recognition during pregnancy and in most cases resolves with delivery. In the U.S., approximately 7% of all pregnancies (ranging from 1 to 14%, depending on the population studied and the diagnostic tests employed) are complicated by GDM, resulting in more than 200,000 cases annually. GDM occurs when the pregnant women's body is not able to make and use all the insulin it needs for the pregnancy. In general GDM requires treatment only during pregnancy. However, women with GDM and their children are at higher risk for developing type 2 diabetes later in life. [11]

What Is Prediabetes?

Prediabetes is a condition that occurs when an individual's blood glucose levels are higher than normal but not high enough for a diagnosis of type 2 diabetes.[12] The Centers for Disease Control and Prevention (CDC) estimates that more than one in three adults have prediabetes. Because of their increased blood glucose level, those with prediabetes are at a higher risk of developing type 2 diabetes and other serious health problems, including heart disease, and stroke.[13] Research findings indicate complications associated with diabetes are present among individuals with undiagnosed diabetes and prediabetes at higher rates than among people with normal glucose levels.[14] Without lifestyle changes to improve their health, 15% to 30% of people with prediabetes will develop type 2 diabetes within five years.[15]

Certain risk factors make it more likely for an individual to develop prediabetes and type 2 diabetes. These risk factors include: age, especially after 45 years of age; being overweight or obese; a family history of diabetes; having an African-American, American Indian, Hispanic/Latino, Asian-American, or Pacific-Islander racial or ethnic background; a history of diabetes while pregnant (gestational diabetes) or having given birth to a baby weighing nine pounds or more; and being physically active less than three times a week.[16]

Many people with prediabetes can prevent or delay the onset of diabetes. The Community Preventive Services Task Force in its publication entitled, *Diabetes Prevention and Control: Combined Diet and Physical Activity Promotion Programs to Prevent Type 2 Diabetes among People at Increased Risk,* recommends combined diet and physical activity promotion programs for people at increased risk of type 2 diabetes.[17] This is based on evidence of effectiveness in reducing new-onset diabetes. In addition to improved health outcomes, the Task Force denotes that combined diet and physical activity promotion programs are cost-effective. Commencing January 1985 thru April 2015, 21 studies assessed the cost-effectiveness of combined diet and physical activity promotion programs by estimating incremental cost-effectiveness ratios (ICER) from the health system perspective. The health system perspective focused on the direct medical costs of care, as well as healthcare costs averted from preventing or delaying diabetes and its complications. The median ICER of combined diet and physical activity promotion programs per quality-adjusted life year (QALY) was $13,761. The cost per disability-adjusted life year (DALY) averted was $21,195 to $50,707, and the cost per life year gained (LYG) median was $2,684.[18.]

The CDC-Recognized Diabetes Prevention Lifestyle Change Program (DPP) established a 58% reduction in the development of diabetes over three years in people at high risk for diabetes who implemented small lifestyle interventions. The study found that people with prediabetes can prevent or delay the onset of diabetes by losing 5% to 7 % of their body weight (10 to 15 pounds for a 200 pound person), getting 30 minutes of physical activity 5 days a week and making healthy food choices.

On March 23, 2016, Health and Human Services (HHS) Secretary Burwell announced the

endorsement to expand the Medicare Diabetes Prevention Program (MDPP) nationwide. The Centers for Medicare and Medicaid Services (CMS) Office of the Actuary certified that an intervention program preventing diabetes saves the government money.[19] In July 2016, the CMS presented the MDPP Model Expansion rules in the *CY 2017 Medicare Physician Fee Schedule* with an implementation date of January 1, 2018.[20]

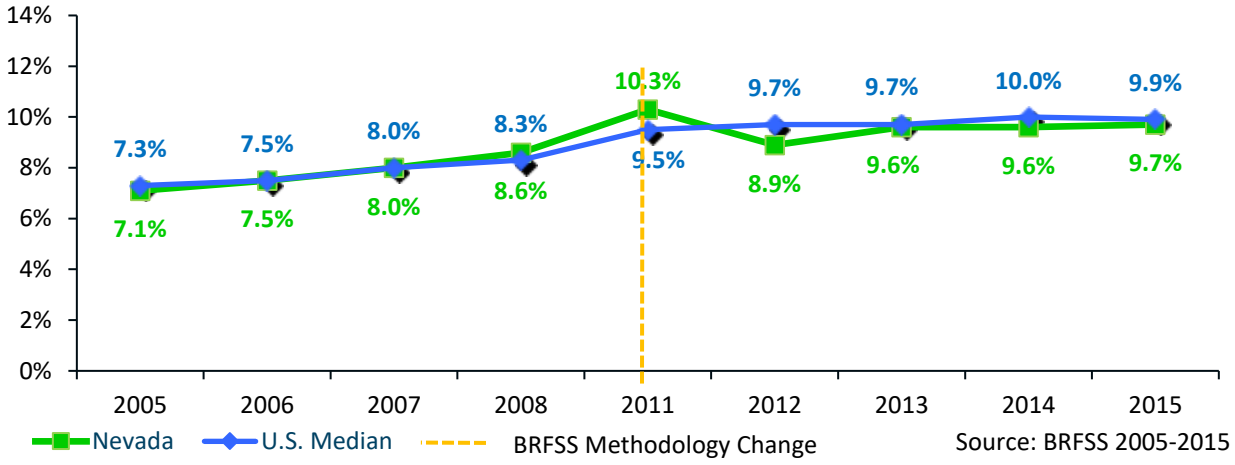
Diabetes in Nevada

Nevada along with the rest of the United States is headed for a ***diabetes tsunami***. Nationally 27.8% of people with diabetes are undiagnosed. It is estimated that one out of five individuals will have diabetes by 2030; increasing to one out of three by 2050 if the current trend continues.

Diabetes – Prevalence in Nevada

According to Nevada's 2015 BRFSS data, the prevalence of diabetes among Nevadan ≥ 18 years of age was estimated to be 9.7% or 197,570 adults which is slightly lower than the United States prevalence of 9.9%. Figure 1 compares the estimated diabetes prevalence in Nevada and U.S. adults from 2005 through 2015. Overall, the Nevada diabetes prevalence trend is similar to that of the national prevalence.

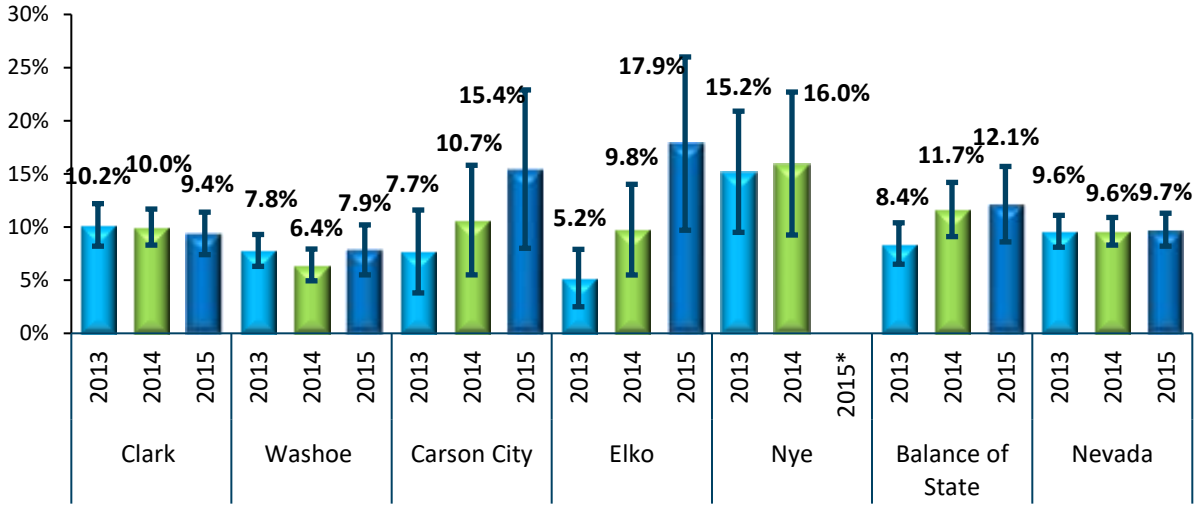
Figure 1 - Prevalence of Nevada Adults with Diabetes, 2005-2015



Diabetes – Prevalence by County

Figure 2 shows estimated diabetes prevalence by county. Rural and frontier counties have a higher prevalence than the overall state with Elko and Nye Counties showing higher at 17.9% (2015) and 16.0% (2014) respectively. Washoe County continues to have the lowest rates in Nevada at 7.9% (2015).

Figure 2 - Prevalence of Nevada Adults with Diabetes by select Counties, BRFSS 2013- 2015



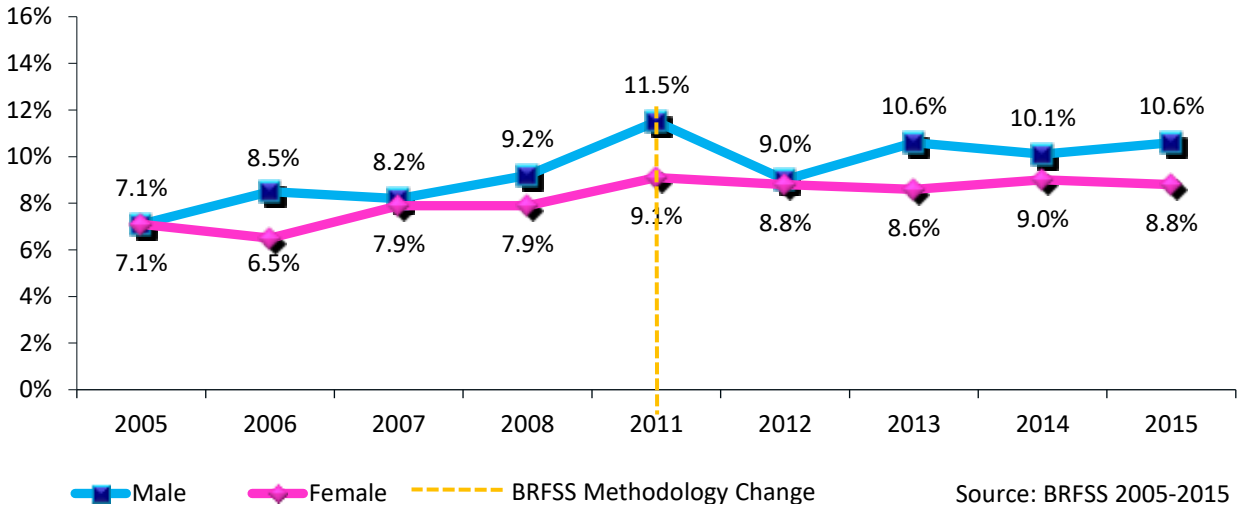
Source: BRFSS 2013, 2014 & 2015

Note: Balance of State includes Churchill, Douglas, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, Mineral, Pershing, Storey, and White Pine Counties for 2013 & 2014; *Nye is included in balance of State in 2015.

Diabetes Prevalence by Gender

In Nevada the BRFSS data shows higher estimated prevalence trends for adult males as compared to adult females in Figure 3. For males, the estimated diabetes prevalence increased from 7.1% in 2005 to 10.6% in 2015. The estimated diabetes prevalence for females in Nevada shows an upward trend from 7.1% in 2005 to 8.8% in 2015.

Figure 3 - Prevalence of Nevada Adults with Diabetes by Gender, 2005-2015



Source: BRFSS 2005-2015

Diabetes Prevalence by Age

Nationally from 1980 to 2014, adults aged 65–79 years of age have demonstrated nearly doubled the incidence of diagnosed diabetes, from 6.9 to 12.1 per 1000. In adults aged 45–64 years of age, incidence of diagnosed diabetes showed no consistent change during the 1980s, increased from 1991 to 2002, and leveled off from 2002 to 2014. Among adults aged 18–44 years, incidence

increased significantly from 1980 to 2003, showed little change from 2003 to 2006, then significantly decreased from 2006 to 2014. Figure 4 from the CDC shows the national trend over the last twenty-five years by age based on BRFSS data. Note that in 2011 there was a collection methodology change for the BRFSS.

Figure 4 - National Trend, Incidence of Diagnosed Diabetes by Age, 1980-2014 (BRFSS)

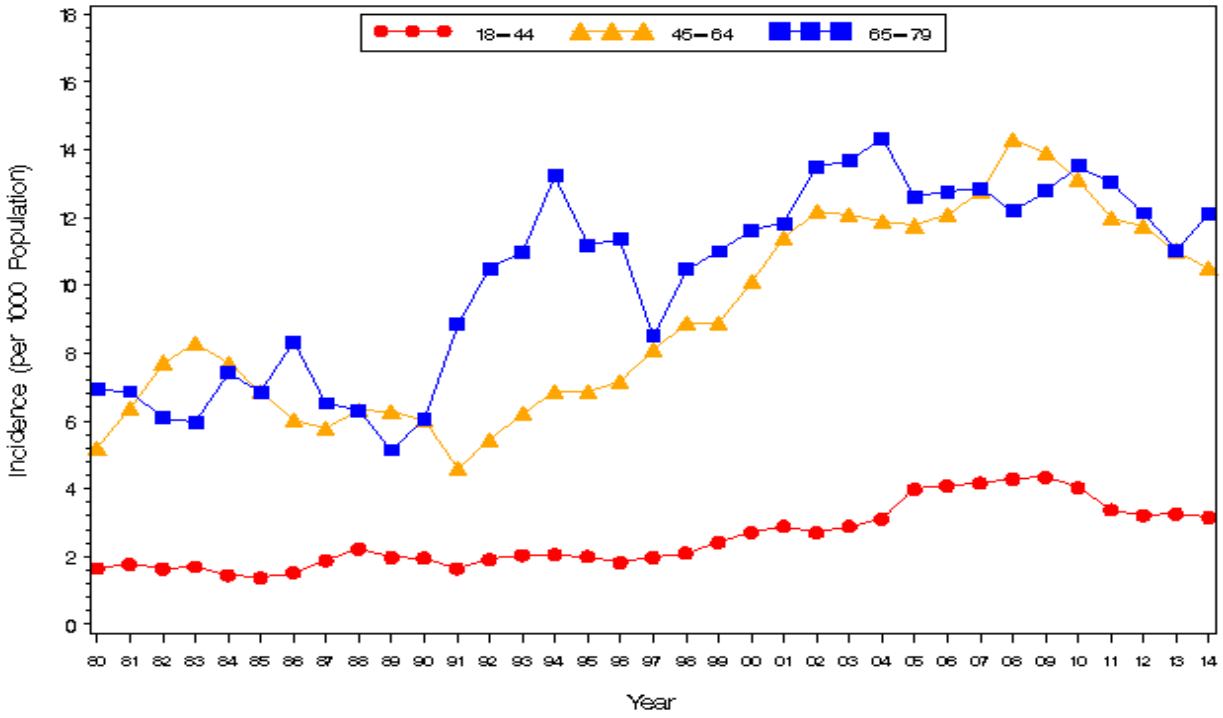
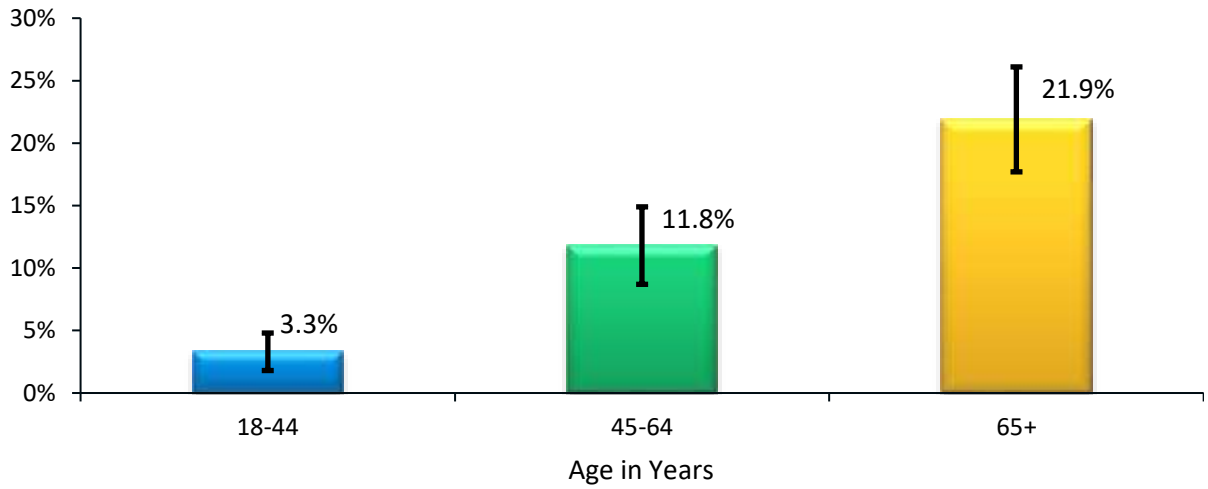


Figure 5 shows the diabetes prevalence differs among age groups with 21.9% of Nevada adults age 65 years and older and 11.8% of 45 to 64 year olds having been told by their doctor that they have diabetes in 2015.

Figure 5 - Prevalence of Nevada Adults with Diabetes by Age Group, 2015 BRFSS



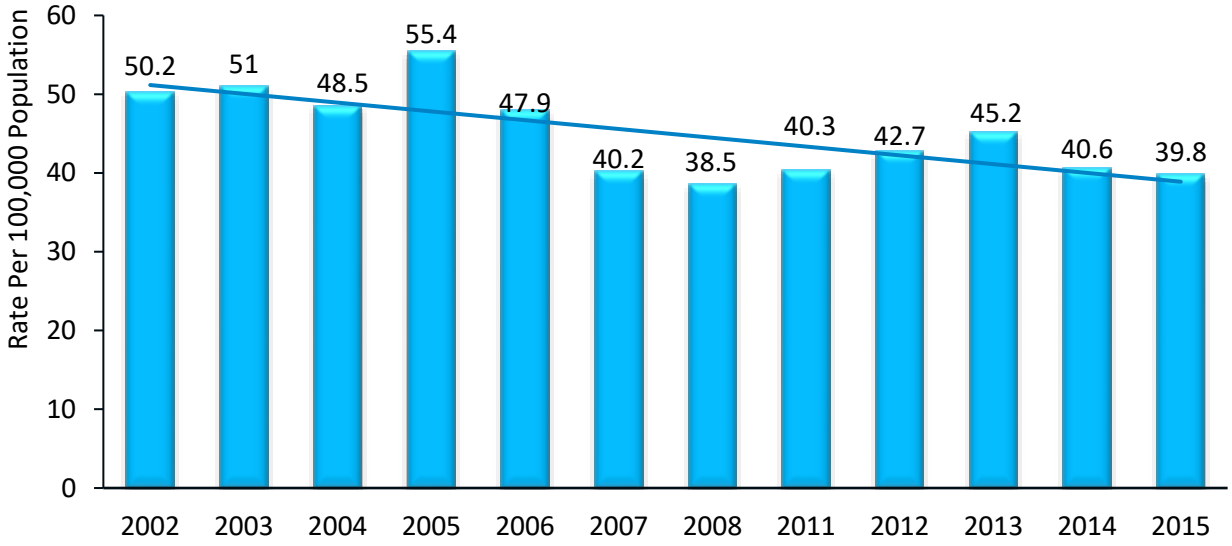
Source: BRFSS 2015

Diabetes-Mortality

Diabetes was the seventh leading cause of death in the United States in 2014 based on the 76,488 death certificates in which diabetes was listed as the underlying cause of death.[21]

As demonstrated in figure 6, the diabetes-related death rate in Nevada has been on a decreasing trend since 2002 and is the eighth leading cause of death in Nevada. In 2015 the diabetes death rate was 39.8 per 100,000 people.

Figure 6 - Diabetes-Related Mortality Rate, Nevada, 2002-2015



Source: Nevada Electronic Death Registry

Unfortunately, using mortality rates for diabetes from death certificates does not paint the true picture of the impact and burden of diabetes. Diabetes may be underreported as a cause of death according to the American Diabetes Association. Studies have found that only about 35% to 40% of people with diabetes who died, had diabetes listed anywhere on the death certificate and only about 10% to 15% had it listed as the underlying cause of death.[22] Diabetes, however, is a leading cause of cardiovascular mortality. Nearly two-thirds of people with diabetes die of cardiovascular disease.[23]

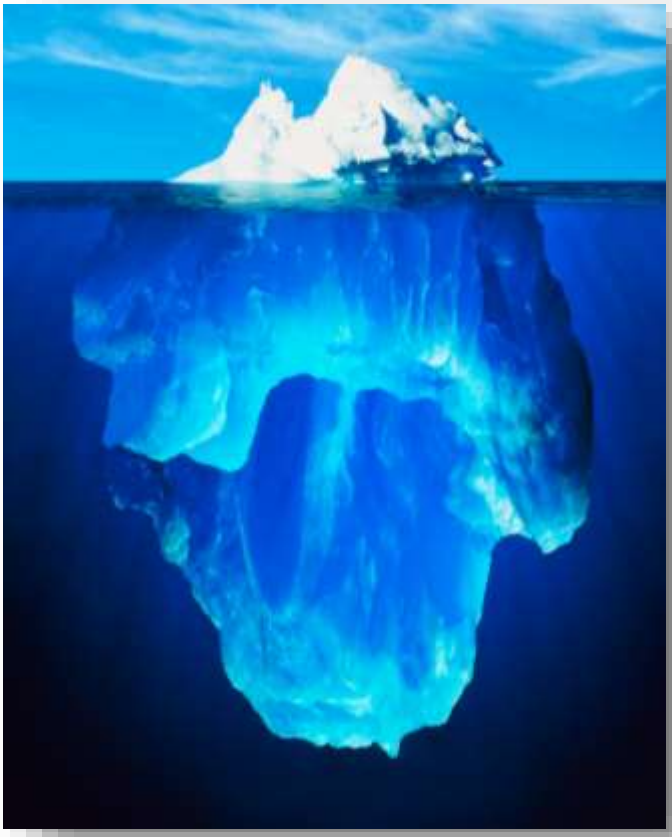
A study published in January 2017 attributes approximately 12% of deaths due to diabetes which would make diabetes the third leading cause of death in the U.S.[24]

Also, life expectancy for individuals with type 2 diabetes was showed to decrease as reported in a cohort study conducted using 383 general practices in England. The results showed that:

> At age 40, white men with diabetes lost 5 years of life and white women lost 6 years compared with those without diabetes. A loss of between 1 and 2 years was observed for South Asian and blacks with diabetes. . .The findings support optimized cardiovascular disease risk factor management, especially in whites with type 2 diabetes.[25]

Prediabetes

The CDC describes prediabetes akin to the ***tip of the iceberg***, which only a small percent is visible, since the majority of people with prediabetes are unaware they have it! CDC estimates more than one out of three adults currently have prediabetes, with 90% of these individuals uninformed to their condition.[26]

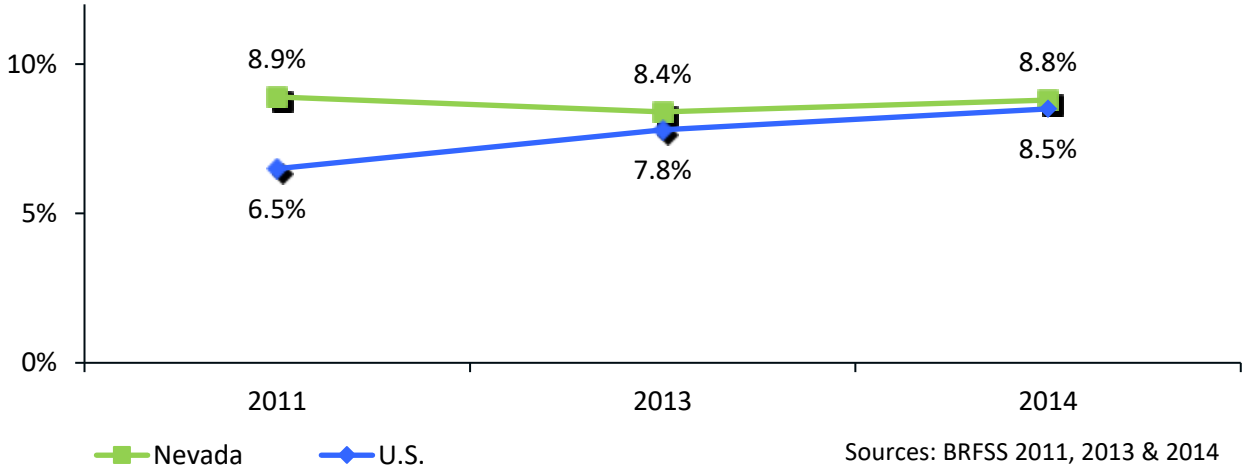


Prediabetes is a condition where blood glucose levels are higher than normal but not high enough for a diagnosis of diabetes. People with prediabetes have a much higher risk of developing type 2 diabetes, as well as, an increased risk for cardiovascular disease. Without intervention efforts, up to 30% of people with prediabetes will develop type 2 diabetes within five years, and up to 70% will develop diabetes within their lifetime.

Prediabetes – Prevalence in Nevada

Figure 7 indicates a much lower prevalence of prediabetes for Nevada adults than estimated by CDC. This difference is a result of data self-reported to the BRFSS question: *Have you ever been told by a doctor or other health professional that you have prediabetes or borderline diabetes?* This prevalence discrepancy indicates that knowledge of prediabetes status and healthcare screening for prediabetes in Nevada continues to be an issue, as it is nationally.

Figure 7 - Prevalence of Nevada Adults with Prediabetes, 2011, 2013 & 2014



Sources: BRFSS 2011, 2013 & 2014

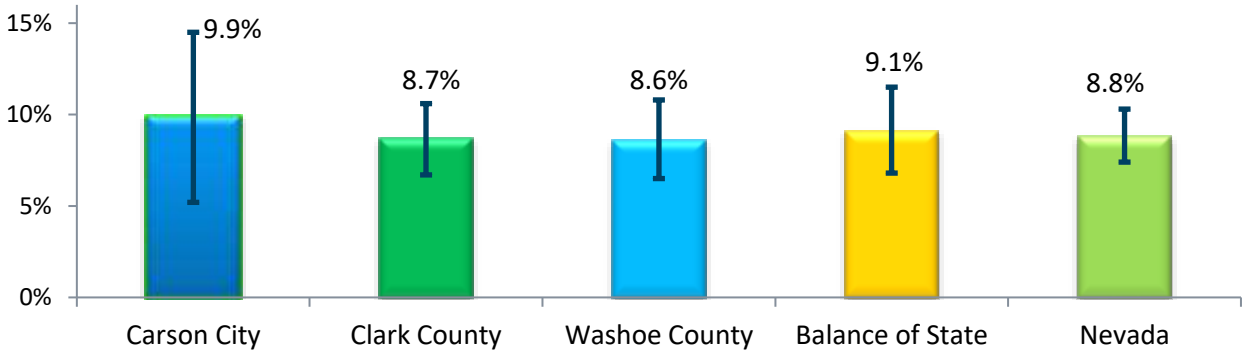
The American Medical Association (AMA) has partnered with the CDC to address this matter by educating healthcare providers. The focused message for the average primary care practice is possibly one-third of patients over age 18, and one-half over age 65, may be affected by prediabetes. The AMA collaborated with the CDC to create the Prevent ***Diabetes STAT: Screen, Test, Act – Today™ Toolkit*** which assist physician practices to screen patients based on the United States Preventive Services Task Force (USPSTF) guidelines and refer those with prediabetes to evidence-based diabetes prevention programs while not adding a burden to their practice.[27]

The USPSTF issued a Grade B recommendation for screening for diabetes in 2015. This guideline states that all adults aged 40 to 70 years of age who are overweight or obese should be screened for type 2 diabetes mellitus. The recommendation also notes that physicians can consider screening younger adults or adults with normal weight if they have a family history of type 2 diabetes mellitus, a past medical history of gestational diabetes or polycystic ovarian syndrome, or if they are a member of a racial or ethnic minority. Furthermore, the USPSTF recommends that all adults with abnormal glucose be referred to an intensive behavioral counseling intervention such as the CDC-Recognized Diabetes Prevention Program (DPP).[28]

Prediabetes – Prevalence by County

Figure 8 shows the prevalence of Nevadans by county who have ever been told by a doctor or other health professional that they have pre-diabetes or borderline diabetes.

Figure 8 - Prevalence of Nevada Adults with Prediabetes by County/Region, 2014



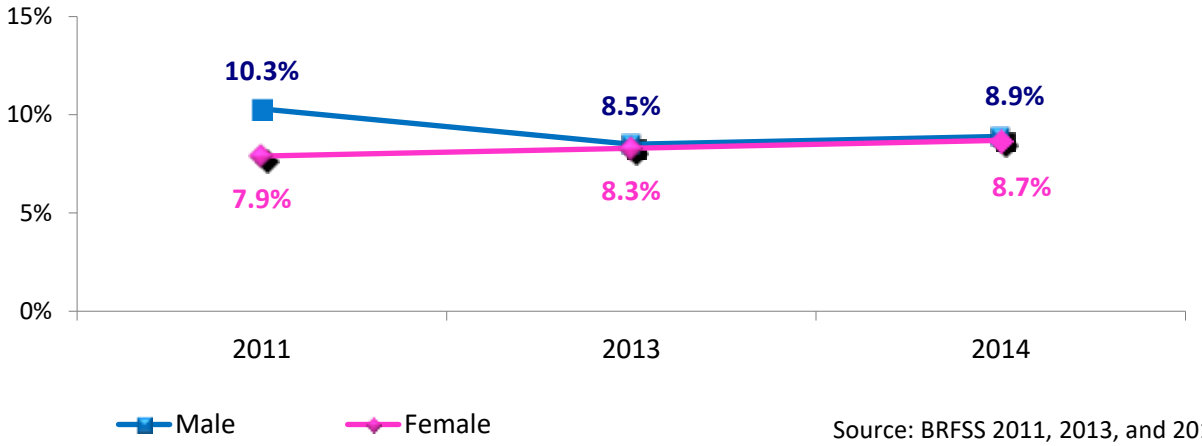
Source: BRFSS 2014

Note: Balance of State includes Churchill, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, Mineral, Nye, Pershing, Storey, and White Pine Counties.

Prediabetes – Prevalence by Gender

Gender difference for prediabetes are minimal in relation to the modifiable risk factors of obesity, hypertension and low HDL-cholesterol levels, except for alcohol consumption in men. The magnitude, however, of the associations was stronger for men than women with abdominal obesity demonstrating the strongest association with prediabetes. In men, alcohol consumption should be considered as an additional risk factor of prediabetes compared to women.[29] In Nevada, figure 9 shows a slightly higher rate of self-reported prediabetes in men.

Figure 9 - Prevalence of Nevada Adults with Prediabetes by Gender, 2011, 2013 & 2014

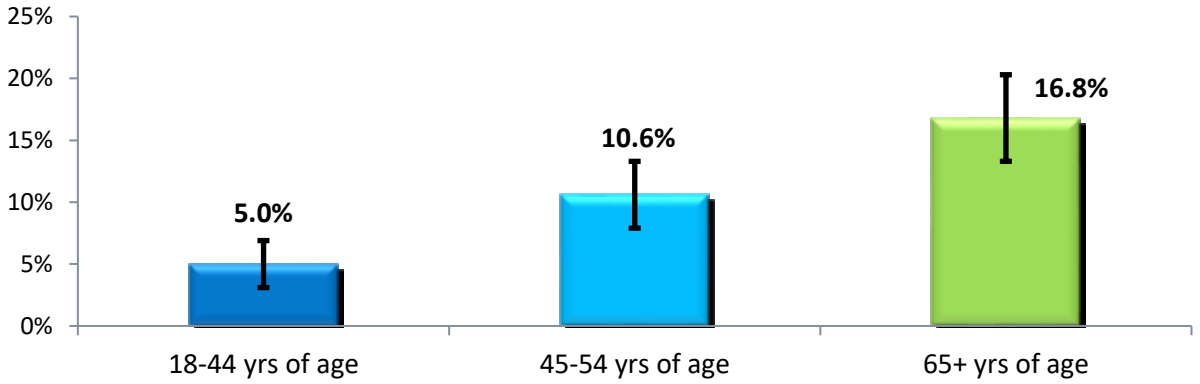


Source: BRFSS 2011, 2013, and 2014

Prediabetes – Prevalence by Age

Although rates of prediabetes increase with age, rates are also high among young adults with nationally up to one-third of those ages 18-39 years of age having prediabetes. Figure 10 displays the prevalence of Nevada adults told that they have prediabetes is 16.8% for adults 65 years of age and older and over ten percent for indviduals age 45-54 years old.

Figure 10 - Prevalence of Nevada Adults with Prediabetes by Age Groups, 2014



Source: BRFSS 2014

Risk Factors for Diabetes and Prediabetes

Although the causes of type 2 diabetes are unknown, there are a number of factors that may contribute. There are a number of non-modifiable risk factors that can contribute to a individual's likelihood of developing type 2 diabetes and heart disease. The non-modifiable risk factors include: age, race and ethnicity, gender and family history. The American Diabetes Association states that accumulating research indicates there are a number of modifiable factors that contribute to the likelihood of developing type 2 diabetes and heart disease. These include: overweight/ obesity; high blood glucose; hypertension; abnormal inflammation; physical inactivity and smoking. Moreover, the chances of developing type 2 diabetes increase the more health risk factors that are present.[30]

Overweight/Obesity

The World Health Organization (WHO) defines overweight and obesity as abnormal or excessive fat accumulation that may impair health. WHO states:

> The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended - increased intake of energy-dense foods that are high in fat; and an increase in physical inactivity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization. . . Changes in dietary and physical activity patterns are often the result of environmental and societal changes associated with development and lack of supportive policies in sectors such as health, agriculture, transport, urban planning, environment, food processing, distribution, marketing, and education.[31]

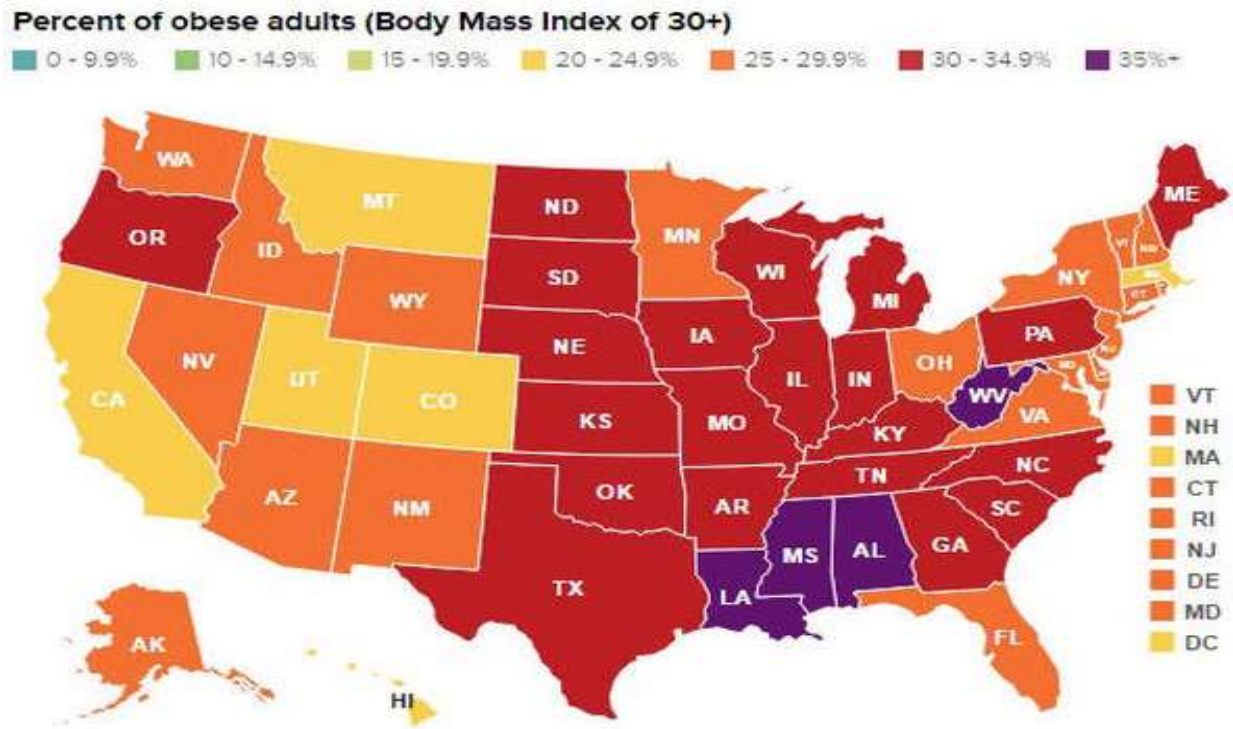
Obesity is associated with some of the leading preventable chronic diseases, including type 2 diabetes, heart disease, stroke, and some cancers.

Adults

The increase in obesity levels in the United States is believed to be largely the cause of the type 2 diabetes epidemic. Among adults nationally the medical costs associated with obesity are an estimated $147 billion.[32,33,34] Research at the Harvard School of Public Health showed that the single best predictor of type 2 diabetes is being overweight or obese.[35]

The adult obesity rate by state map below (figure 11) shows that although Nevada does not have the highest rates of obesity, but is still at an unacceptable rate.

Figure 11 - Adult Obesity Rate by State, 2015

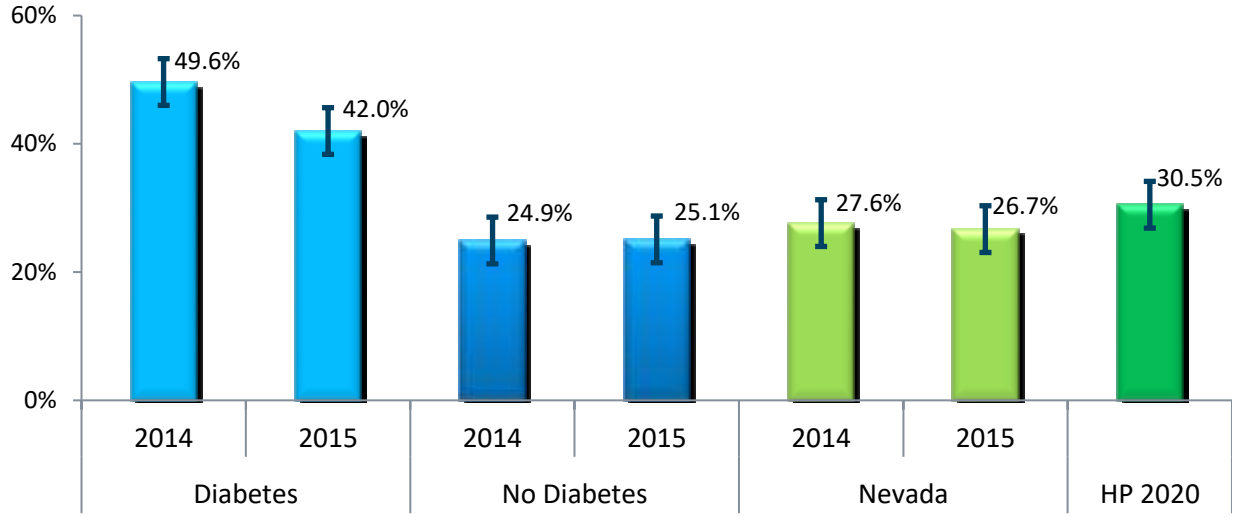


Fat cells, especially those stored around the waist, secrete hormones and other substances that fire inflammation. Although inflammation is an essential component of the immune system and part of the healing process, inappropriate inflammation causes a variety of health problems. Inflammation can make the body less responsive to insulin and change the way the body metabolizes fats and carbohydrates, leading to higher blood sugar levels and, eventually, to diabetes and its many complications.[36]

BRFSS 2015 data estimates that 38% of Nevada adults are overweight and 26.7% of Nevada adults were obese.[37]

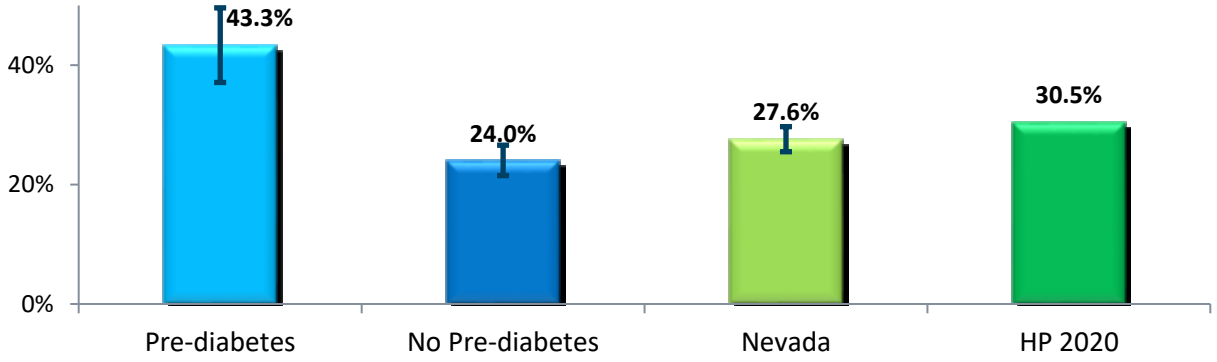
Figure 12 illustrates that the prevalence of Nevada adults with diabetes who are obese is close to double the prevalence for those who do not have diabetes. Obesity in the BRFSS is defined as having a body mass index (BMI) >30. Figure 13 shows similar trend for prediabetes.

Figure 12 - Prevalence of Nevada Adults Who Were Obese by Diabetes Status, 2014 & 2015



Source: BRFSS 2014 & 2015

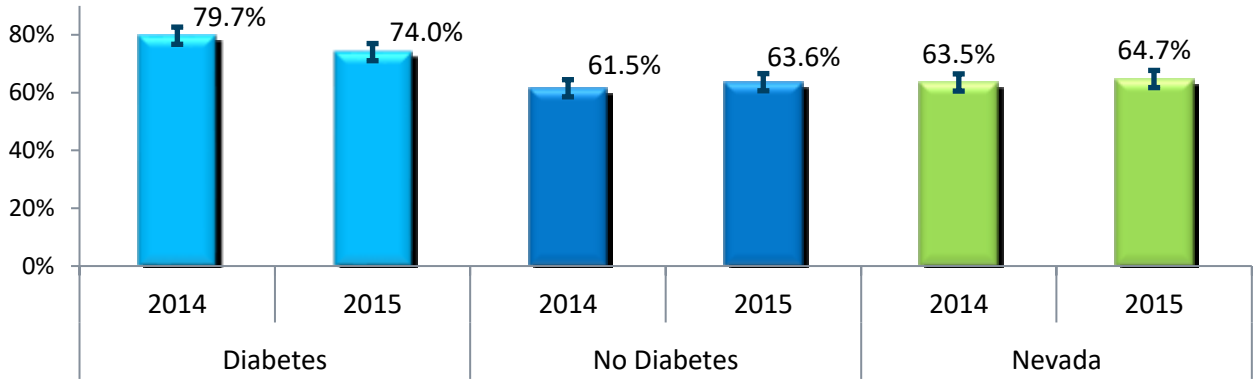
Figure 13 - Prevalence of Nevada Adults Who Were Overweight or Obese by Prediabetes Status



Source: BRFSS 2014

While not as drastic a ratio as seen for individuals who are obese, being overweight with a BMI between 25.0 and 29.9 is a risk factor for diabetes, as seen in Figure 14.

Figure 14 - Prevalence of Nevada Adults Who Were Obese or Overweight by Diabetes Status 2014 & 2015

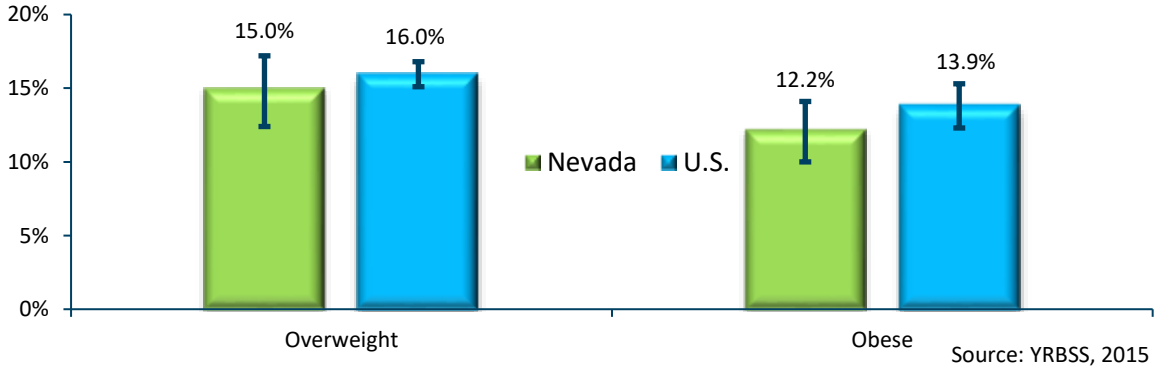


Source: BRFSS 2014 & 2015

Youth

Type 2 diabetes is increasingly being diagnosed in individuals under 18 years of age. It now accounts for 20% to 50% of new-onset diabetes case patients, and disproportionately affects youth from minority race/ethnic groups. Although few longitudinal studies have been conducted, it has been suggested that the increase in type 2 diabetes in youth is a result of an increase in the frequency of obesity in pediatric populations.[38] To acknowledge the growing risks for Nevada youth developing diabetes, it is important to recognize the prevalence of overweight and obesity among high school students as shown in Figure 15.

Figure 15 - Prevalence of Nevada High School Students Who Were Overweight or Obese, 2015



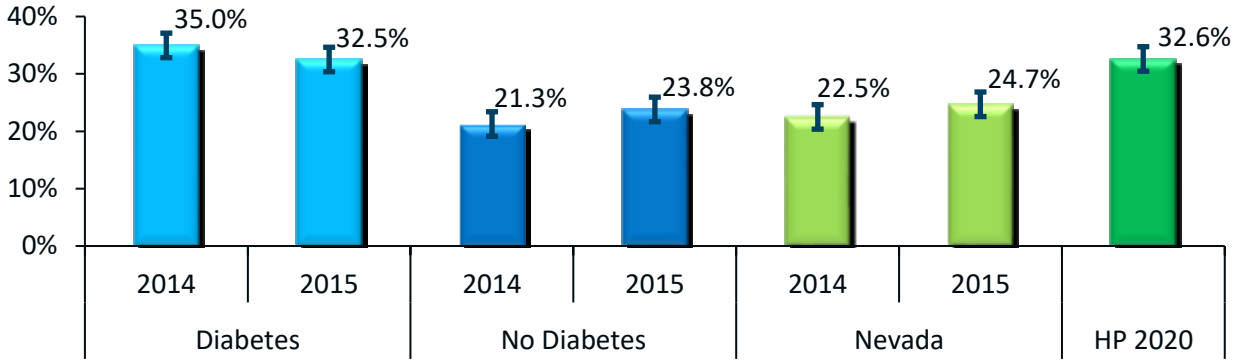
Source: YRBSS, 2015

Additionally, based on 2013 Youth Risk Behavior Surveillance System (YRBSS), 41.2% of adolescents in Nevada compared to 37.4% nationally had reported consuming fruit *less* than one time daily and 42.1% in Nevada versus 38.5% nationally reported consuming vegetables less than one time daily. Only 24.0% of Nevada students in grades 9-12 achieve 1 hour or more of moderate- and/or vigorous-intensity physical activity daily compared the national average of 27.1%.[39]

Physical Inactivity

Physical activity along with maintaining a healthy weight can facilitate prevention of the onset of diabetes, as well as, help control diabetes and prevent diabetes complications. Physical activity helps blood glucose levels stay in the target range by helping the hormone insulin absorb glucose into the body's cells, including muscles, to create energy. Since muscles use glucose better than fat, building and using muscles through physical activity can help prevent high blood glucose levels. Figure 16 shows a definite correlation between lack of regular physical activity and the prevalence of diabetes among adult Nevadans at prevalences of 35% (2014) and 32.5% (2015).

Figure 16 - Prevalence of Nevada Adults Who DID NOT Participate in Leisure Time Physical Activity* within the Past 30 Days Other Than Their Regular Job



Source: BRFSS 2014 & 2015

**Defined in BRFSS as at least 30 minutes of moderate physical activity on 5 or more days per week, or at least 20 minutes of vigorous physical activity on 3 or more days per week, or an equivalent combination.*

Hypertension and Diabetes

High blood pressure/hypertension is frequently a condition affecting Individuals with type 2 diabetes. A 2016 research study published in *Population Health Metrics* stated,

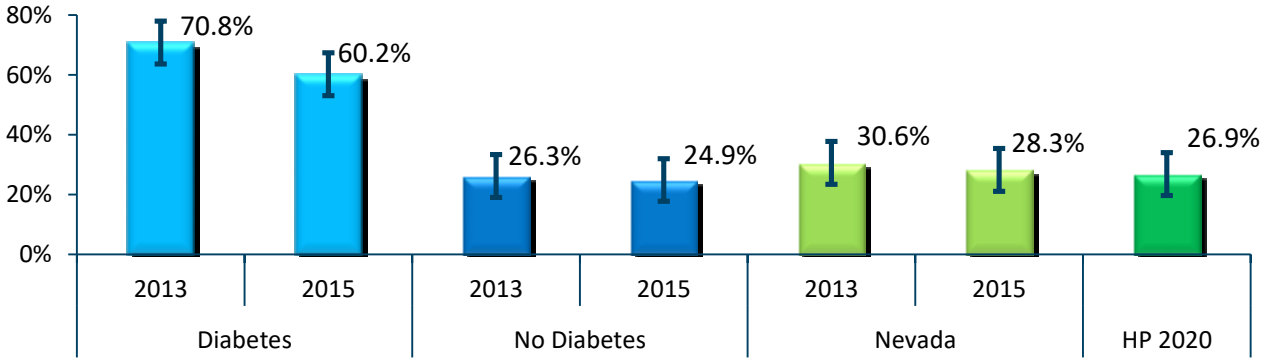
> Diagnosis codes and medication claims suggest 80% of adults diagnosed with type 2 diabetes had hypertension (controlled or uncontrolled, ranging from 91% for Medicare to 61% for Medicaid) [40]

It is unknown why there is such a significant correlation between these two chronic diseases, but it is assumed that obesity, a high-fat, high-sodium diet, and inactivity have led to a rise in both conditions.

According to the America Diabetes Association (ADA), the combination of hypertension and type 2 diabetes can significantly raise an individual's risk of suffering from a heart attack or stroke. Being affected by type 2 diabetes and hypertension also increases chances of developing other diabetes-

related diseases, such as kidney disease, and retinopathy which may causes blindness.[41] In figure 17 it is evident that this correlation between hypertension and diabetes exist for adults in Nevada with a prevalence of 70.8% and 60.2% in 2013 and 2015 respectively having both chronic diseases.

Figure 17 - Prevalence of Nevada Adults Who Had Ever Been Told They Have High Blood Pressure by Diabetes Status



Source: BRFSS 2013 & 2015

Smoking and Diabetes

Tobacco smokers are 30% to 40% more likely to develop type 2 diabetes than nonsmokers.[42] Additionally, an individual with diabetes who smokes is more likely than a nonsmoker to have trouble with insulin dosing and with controlling their diabetes. Furthermore, the individual with diabetes who smokes is more likely to develop serious complications. These include heart and kidney disease; poor blood flow in the legs and feet leading to infections, ulcers, and possible amputation; blindness from retinopathy; and peripheral neuropathy resulting in numbness, pain, weakness, and poor coordination caused by damage to nerves in the arms and legs.

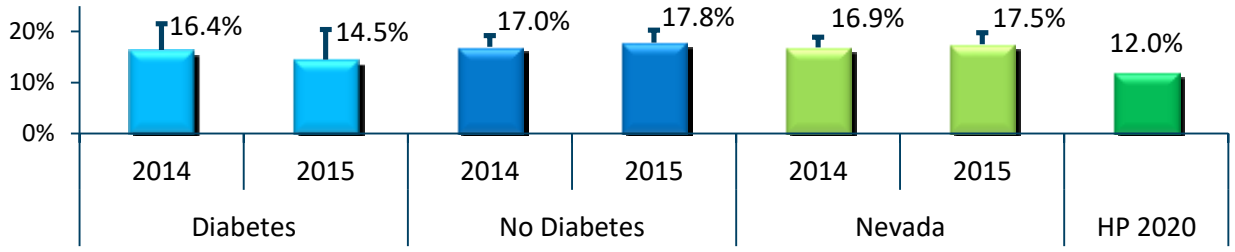
Several biologic mechanisms might explain the association between cigarette smoking and the incidence of type 2 diabetes. Multiple lines of evidence support the hypothesis that cigarette smoking and exposure to nicotine can adversely affect insulin action and the function of pancreatic cells, both of which play fundamental roles in the development of diabetes.[43]

Epidemiologic studies have shown that smoking is independently associated with an increased risk of central obesity which is a recognized risk factor for insulin resistance and diabetes.[44]

Moreover individuals with diabetes who smoke may be susceptible to the detrimental effects of nicotine on insulin resistance and thus require a larger dose of insulin to achieve a level of metabolic control similar to that of the nonsmokers. Finally, studies have found that nicotine can reduce the release of insulin through neuronal nicotinic acetylcholine receptors on islet cells of the pancreases.[45]

Quitting smoking, in spite of how long an individual has smoked, will improve the health of the individual with diabetes. Figure 18 indicates the prevalence of Nevada adults with diabetes and are current smokers is 16.4% and 14.5% respectively for 2014 and 2015.

Figure 18 - Prevalence of Nevada Adults Who Were Current Smokers by Diabetes Status



Source: BRFSS 2014 & 2015

Disparities Impact on Diabetes

The consequences of inadequate health care to low-income, underserved, uninsured and underinsured groups are becoming progressively serious, particularly for those who have or are at risk for developing diabetes. Disparities in health care are often a result of environmental conditions, social and economic factors, differences in the access to and quality of the services offered to different patient populations as illustrated in table 1. Health disparities refer to differences in patient outcomes. Some outcomes are related to the quality of care provided and some are related to the social determinants of health, such as poverty, poor housing, poor education, and inequitable access to healthy food and safe places to exercise. The roots of disparities in services and health outcomes for diabetes are multifactorial. These take into account barriers to access of high-quality health care; care systems not designed to sustain the needs of disparate patients; unconscious bias on the part of physicians or other healthcare team members; distrust among patients of health institutions; language barriers; limited health literacy and health numeracy; health beliefs and behaviors related to disease and self-management; barriers to accessing high-quality foods and safe places for physical activity; and social inequities, such as education and employment opportunities[46].

Table 1 - Social Determinants of Diabetes--Related Health Outcomes

Economic Stability	Neighborhood and Physical Environment	Education	Food	Community and Social Context	Health Care System
Employment Income Expenses Debt Medical bills Social support	Housing Transportation Safety Parks Playgrounds Walkability Grocers Community resources	Literacy Health literacy Language(s) spoken Early childhood education Vocational training Higher education	Hunger Food insecurity Access to healthy options Food deserts	Social integration Support systems Community engagement Discrimination Social disorder	Health insurance coverage Provider availability Provider linguistic and cultural competency Quality of care

Diabetes Health Outcomes

Clinical Outcomes (HbA1c, blood pressure, and cholesterol levels); Patient-Reported Outcomes (e.g., experience with care, self-reported health, health-related quality of life); Cost Outcomes; Population Health Outcomes

Race/Ethnicity

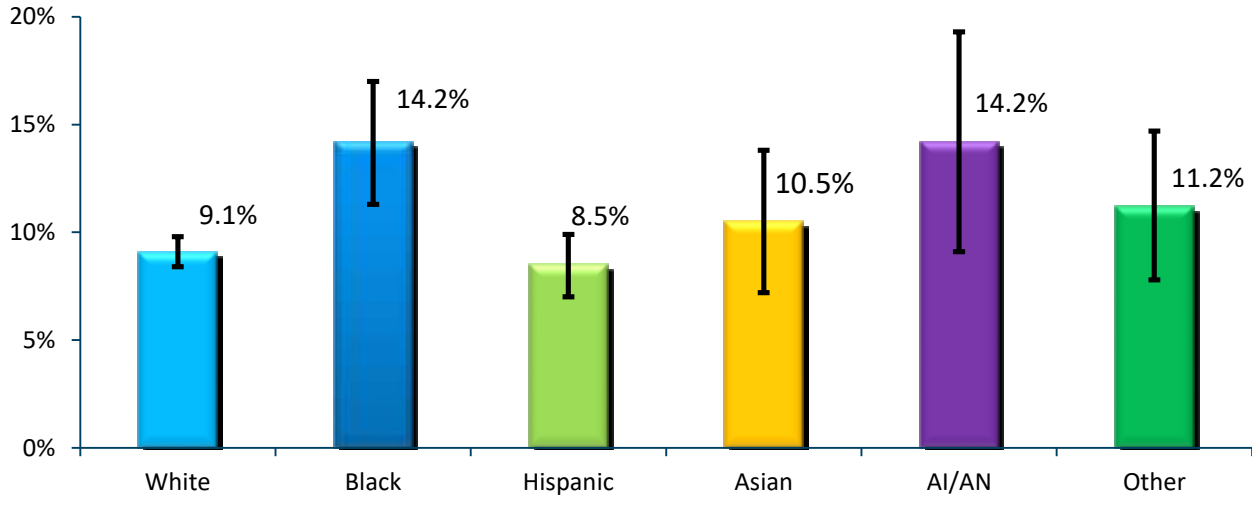
Individuals in specific racial and ethnic groups experience the greatest prevalence and widest disparity in outcomes for both type 1 and type 2 diabetes. Type 2 diabetes disproportionately affects African-Americans, American Indians, Hispanics/Latinos, Asian-Americans, and Pacific-Islanders. These groups also make up a disproportionate share of the poor and uninsured. Living in substandard housing or in low-income neighborhoods results in higher rates of overweight and obesity due to lack of healthy food options and opportunities to safely engage in physical activity. Even when minority populations do have access to good food and physical activity, many continue to receive a lower quality of care than non-minorities.[47]

The American Diabetes Association provides the following U.S. rates of diagnosed diabetes by race/ethnic background: 7.6% of non-Hispanic whites; 9.0% of Asian Americans; 12.8% of Hispanics; 13.2% of non-Hispanic blacks; 15.9% of American Indians/Alaskan Natives.[48]

Although it is unclear why people of certain races are more prone to the development of prediabetes, just as with the risk for diabetes, men and women of African-American, American Indian, Hispanic/Latino, and Asian-American descent are at a greater risk.

Figure 19 presents aggregated 2011-2015 BRFSS data by racial/ethnic group. American Indians/ Alaska Natives (AI/AN) and Black/African-Americans had the highest estimated diabetes prevalence among racial/ethnic groups in Nevada at 14.2%, followed by "Other" at estimated prevalence 11.2% and Asian-Americans at an estimated prevalence 10.5% followed by non-Hispanics whites and Hispanics at 9.1% and 8.5 % respectively.

Figure 19 - Prevalence of Nevada Adults with Diabetes by Race/Ethnicity, Aggregate Data (2011-2015)

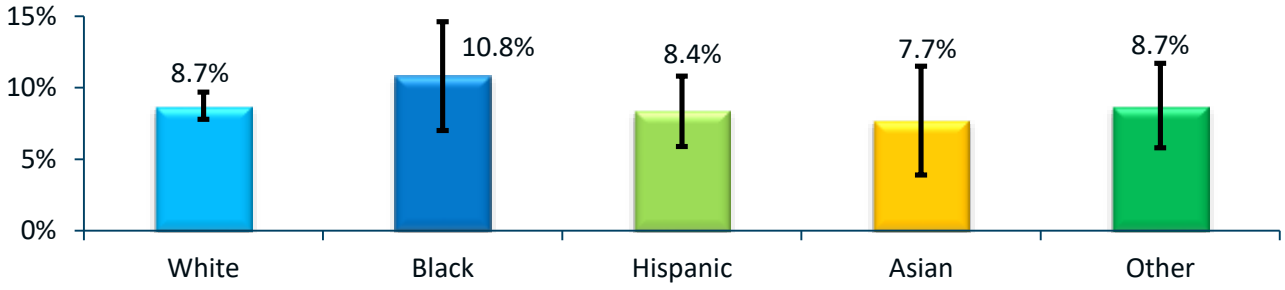


AI/AN = American Indian/Alaska Native
Other = Native Hawaiian/Pacific Islander, multi racial, and other race

Source: BRFSS 2011-2015

Figure 20 shows the prevalence of Nevadans reporting having been told by a healthcare professional that they have prediabetes by race and ethnicity.

Figure 20 - Prevalence of Nevada Adults with Prediabetes by Race/Ethnicity Aggregate Data (2011, 2013 & 2014)

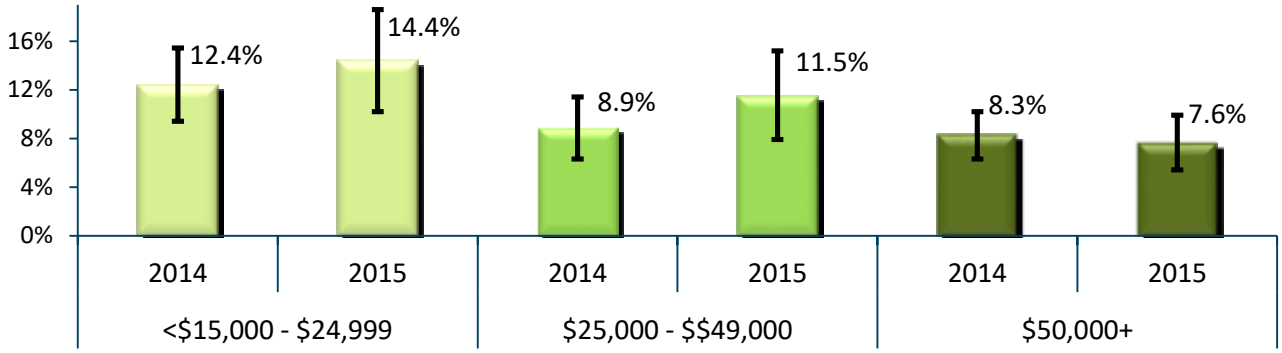


Source: BRFSS 2011, 2013 & 2014 (Pooled)

Income

Groups with the lowest levels of income and education continued to experience the greatest socioeconomic disparity in age-standardized prevalence and incidence rate of diagnosed diabetes. [49] Figure 21 shows estimated diabetes prevalence by household income level with the highest estimated prevalence among those earning less than $25,000; thus illustrating a definite social economic factor for risk of diabetes in Nevada.

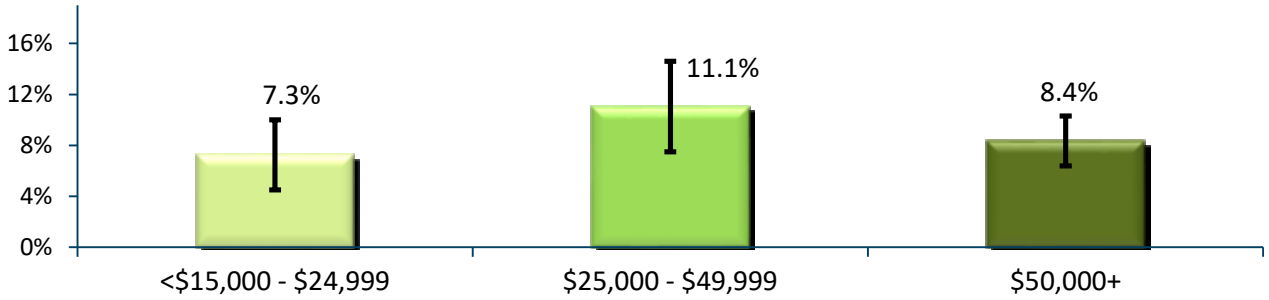
Figure 21 - Prevalence of Nevada Adults with Diabetes by Income Level



Source: BRFSS 2014 & 2015

Figure 22 indicates that more adult Nevadans below a household income of $50,000 annually report having been told by a healthcare professional that they have prediabetes.

Figure 22- Prevalence of Nevada Adults with Prediabetes by Income Level, 2014



Source: BRFSS 2014

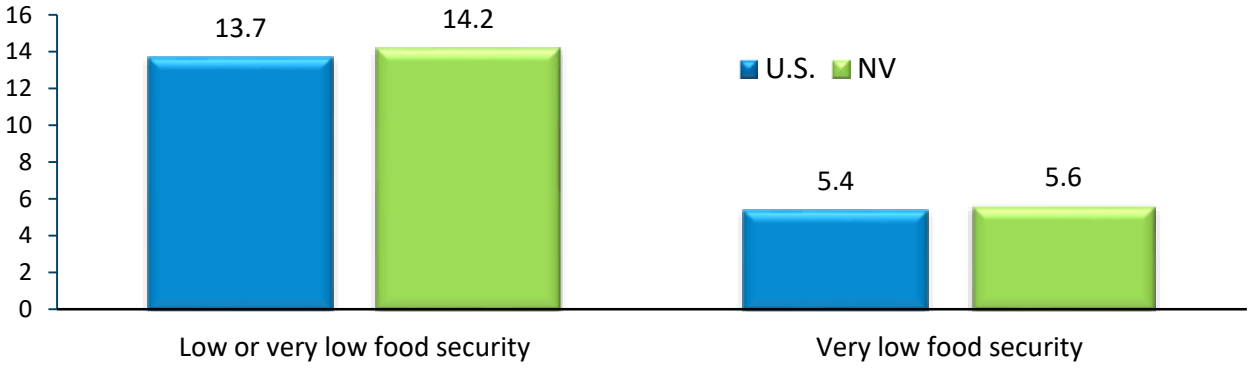
Food Insecurity and Diabetes

Food insecurity is a condition that occurs when there is a lack of access to safe and nutritious food. Thus preventing people from living healthy and active lives. Food insecurity can occur when an individual does not have physical or economic access to the food that meets his/her preferences and/or dietary needs. As illustrated in figure 23, the United States Department of Agriculture (USDA) Economic Research Service (ERS) estimated 14.2% of households in Nevada were food insecure based on a three-year average from 2013 to 2015 which is higher than the national average of 13.7% over the same time period.

The USDA defines low and very low food security as follows: ***Low food security—****Households reduced the quality, variety, and desirability of their diets, but the quantity of food intake and normal eating patterns were not substantially disrupted.*

Very low food security*—At times during the year, eating patterns of one or more household members were disrupted and food intake reduced because the household lacked money and other resources for food.*[50]

Figure 23 - Prevalence of Household Food Insecurity and Very Low Food Security



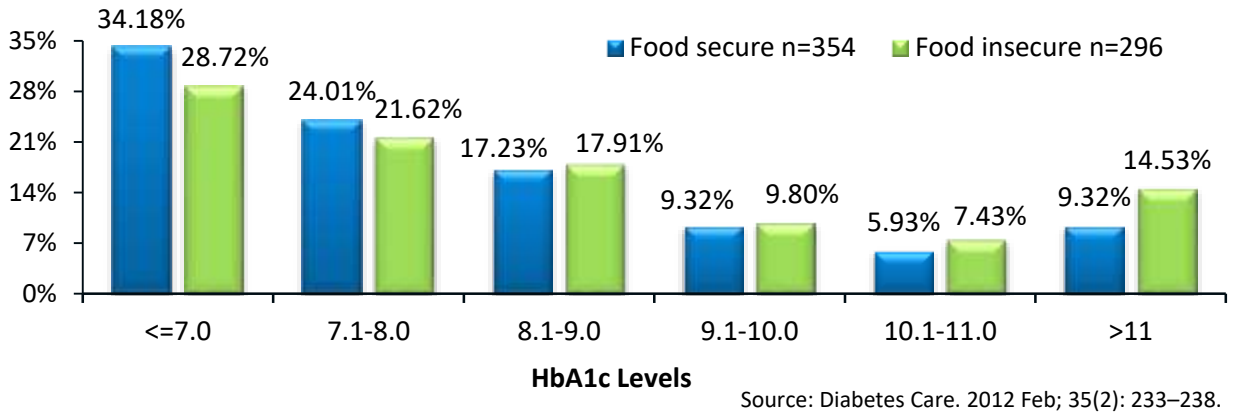
Source: USDA - ERS - Household Food Security in the United States in 2015.

Adjusting for socioeconomic status, food insecure adults are 48% more likely to have diabetes. Moreover, food insecurity can threaten diabetes management since an individual's ability to maintain a healthy blood sugar level and manage their diabetes is dependent on their access to healthy foods. Due to the cyclical eating practices among adults with food insecurity, those with diabetes risk having both blood sugars that are either too high (hyperglycemia) or too low (hypoglycemia). Binge-eating and reliance on high caloric foods makes blood sugar levels elevate. During periods of food scarcity the individual with diabetes can drop to dangerously low blood sugar levels.[51]

Food insecurity may increase the patients' difficulty to follow a diabetes appropriate diet because they shift their dietary intake toward inexpensive, calorically dense foods to maintain caloric needs. These foods include a high proportion of added fats, sugars, and other refined carbohydrates.

A study conducted in San Francisco among 711 patients with diabetes in a safety net clinic, and published in the February 2012 issue of *Diabetes Care* stated, *more food-insecure participants than food-secure participants had poor glycemic control, defined as an HbA1c ≥8.5% (41.9 vs. 32.8%), with an odds ratio (OR) of 1.48 (95% CI 1.07–2.04. The relationship between FI and poor glycemic control persisted after adjustment (OR 1.46; P = 0.05)*. Figure 19 provides a graphic representation of this relationship between food insecurity and glycemic control.[52]

Figure 19 - HbA1c and Food Security Status among Patients with Diabetes Receiving Care in Safety-Net Clinics



Source: Diabetes Care. 2012 Feb; 35(2): 233–238.

Diabetes Prevention, Care and Management

Overwhelming evidence proves that diabetes can be prevented or delayed in high risk population through lifestyle modification or pharmacological interventions. The Diabetes Prevention Study (DPS) and the Diabetes Prevention Program (DPP) compellingly showed that intensive lifestyle modification programs are highly effective in decreasing the risk of diabetes in a high risk population by 58%.[53]

Individual with a diagnosis of type 2 diabetes are able to manage their diabetes thru controlling blood sugar/glucose levels. Good glycemic control may help reduce the incidence of long-term diabetes complications such as vision decline, kidney disease or damage, nerve damage, and microvascular disease. Individuals with diabetes can achieve good glycemic control by eating healthy, regularly participating in

physical activity, achieving a healthy weight and appropriately taking prescribed medications to lower blood glucose levels. An additionally critical part of diabetes management is reducing cardiovascular disease risk factors, like high blood pressure, high lipid levels, and tobacco use.

Uncontrolled diabetes is a leading cause of cardiovascular mortality and morbidity and may contribute to other complications, such as vision loss, renal failure, and amputation.

Diabetes is the leading cause of kidney failure nationally, accounting for more than 44% of new cases of end-stage renal disease in 2011. Nontraumatic lower-limb amputations among individuals aged 20 years and older with diabetes occur at a rate of 60%.[54]

Reducing risk for diabetes complications requires active disease management by the individual with diabetes in partnership with a team of health care professionals including primary care physicians, endocrinologists, diabetes educators, and dietitians.

Patient education and self-management practices are important aspects of disease management that help people with diabetes stay healthy and manage their diabetes.

The ability to follow recommended preventive care practices and lifestyle changes relates directly to the patient accessing health care; participating in diabetes prevention or diabetes self-management education classes; securing healthy food; monitoring blood glucose levels via at least biannual A1c blood test; and receiving annual eye and foot exams, and vaccinations for influenza and pneumonia.[55]

Access to Care

Access to health services encompasses a broad set of issues that centers on the level to which an individual or group is able to obtain needed services from a healthcare system. Access to care is defined by four components: coverage, services, timeliness, and workforce. Insurance coverage and proximity of a healthcare provider is no guarantee that an individual who needs service will get them. The Institute of Medicine (IOM) has defined access to care as:

> The timely use of personal health services to achieve the best possible health outcomes. The IOM further clarifies, an important characteristic of this definition is that it relies on both the use of health services and health outcomes as yardsticks for judging whether access has been achieved.[56]

Access to health care is critical for people with diabetes. Lacking health insurance affects the treatment and outcome of diabetes care. Individuals without insurance coverage for blood glucose monitoring supplies have a 0.5% higher A1c than those with coverage.[57]

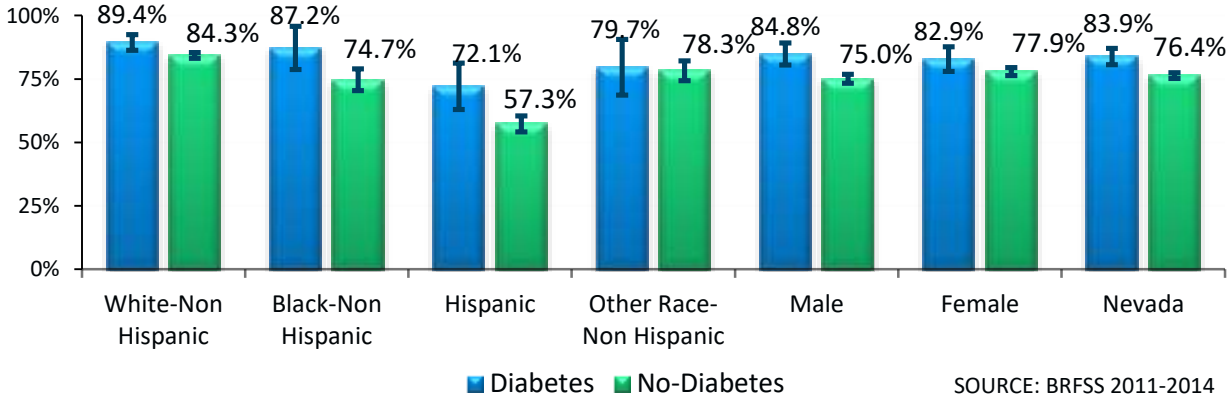
In Nevada, along with the rest of the country, progress has been made in the area of insurance coverage for persons with diabetes. The history of legislative action in Nevada includes coverage of diabetes medications, supplies, equipment, and Diabetes Self-Management Education (DSME) provided by either American Association of Diabetes Educators (AADE) - Accredited or American Diabetes Association (ADA) - Recognized program providers.

The Nevada Revised Statue (NRS) addresses coverage for management and treatment of diabetes as follows in these three laws: NRS 689A.0427 - Individual Health Insurance, NRS 695C.1727 - Health Maintenance Organizations, NRS 689B.0357 - Group and Blanket Health Insurance.

1. No policy of health insurance that provides coverage for hospital, medical or surgical expenses may be delivered or issued for delivery in this state unless the policy includes coverage for the management and treatment of diabetes, including, without limitation, coverage for the self-management of diabetes.
2. An insurer who delivers or issues for delivery a policy specified in subsection 1:
   a) Shall include in the disclosure required pursuant to NRS 689A.390 notice to each policyholder and subscriber under the policy of the availability of the benefits required by this section.
   b) Shall provide the coverage required by this section subject to the same deductible, copayment, coinsurance and other such conditions for coverage that are required under the policy.
3. A policy of health insurance subject to the provisions of this chapter that is delivered, issued for delivery or renewed on or after January 1, 1998, has the legal effect of including the coverage required by this section, and any provision of the policy that conflicts with this section is void.
4. As used in this section:
   a) "Coverage for the management and treatment of diabetes" includes coverage for medication, equipment, supplies and appliances that are medically necessary for the treatment of diabetes.
   b) "Coverage for the self-management of diabetes" includes:
      i. The training and education provided to an insured person after the insured person is initially diagnosed with diabetes which is medically necessary for the care and management of diabetes, including, without limitation, counseling in nutrition and the proper use of equipment and supplies for the treatment of diabetes;
      ii. Training and education which is medically necessary as a result of a subsequent diagnosis that indicates a significant change in the symptoms or condition of the insured person and which requires modification of the insured person's program of self-management of diabetes; and
      iii. Training and education which is medically necessary because of the development of new techniques and treatment for diabetes.
   c) "Diabetes" includes type I, type II and gestational diabetes.

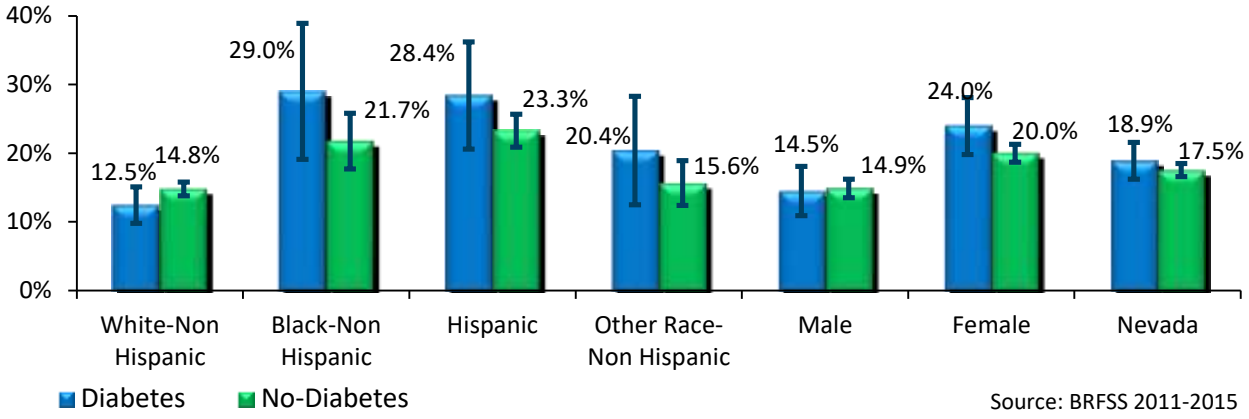
Even with legislative action to cover diabetes management, many Nevadan adults have lacked insurance coverage. Figures 20 and 21 show that while individuals with diabetes have a higher percentage of healthcare coverage than those without diabetes, there are is a high percentage of Black and Hispanic individual with diabetes that are not receiving adequate physician care.

Figure 20 - Percentage of Nevada Adults with Healthcare Coverage by Race/Ethnicity and Gender



SOURCE: BRFSS 2011-2014

Figure 21 - Percentage of Nevada Adults who COULD NOT See a Doctor Due to Cost within the Past 30 Days by Race/Ethnicity and Gender, Aggregate Data (2011-2015)



Source: BRFSS 2011-2015

Furthermore, Table 2 shows that in 2012, 580,573 or 24.5% of Nevadans under the age of 65 were uninsured statewide; and among the rural and frontier residents 50,533 or 22.9%

Table 2 - Health Insurance Coverage for Population under the Age of 65 in Nevada, by County 2012

Region/County	Estimated Population Under the Aged of 65				
	Uninsured Population		Insured Population		Total Population Aged 65 and Under
	Number	Percent	Number	Percent	
Rural and Frontier					
Churchill County	4,694	23.3	15,449	76.7	20,143
Douglas County	7,302	20.2	28,759	79.8	36,061
Elko County	9,672	21.1	36,119	78.9	45,791
Esmeralda County	182	31.4	399	68.6	582
Eureka County	356	20.9	1,345	79.1	1,701
Humboldt County	3,671	24.3	11,422	75.7	15,093
Lander County	1,042	20.3	4,091	79.7	5,133
Lincoln County	1,086	26.1	3,080	73.9	4,167
Lyon County	10,651	25.5	31,167	74.5	41,817
Mineral County	823	23.2	2,718	76.8	3,541
Nye County	7,854	24.7	23,910	75.3	31,764
Pershing County	1,055	25.1	3,151	74.9	4,206
Storey County	704	23.5	2,296	76.5	2,999
White Pine County	1,441	19.7	5,866	80.3	7,307
Region Subtotal	**50,533**	**22.9**	**169,772**	**77.1**	**220,305**
Urban					
Carson City	10,291	24.2	32,287	75.8	42,579
Clark County	433,402	25	1,301,388	75	1,734,790
Washoe County	86,347	23.5	281,827	76.5	368,174
Region Subtotal	**530,040**	**24.7**	**1,615,502**	**75.3**	**2,145,543**
Nevada Total	**580,573**	**24.5**	**1,785,274**	**75.5**	**2,365,848**

were uninsured (*Note: The Small Area Health Insurance estimates are single-year estimates produced annually using a model based upon and consistent with the American Community Survey areas of interest. These survey estimates are "enhanced" with administrative data, within a Hierarchical Bayesian framework. Data is consistent over time from 2008 to 2012.*

Table 3 indications that 573,874 Nevadans or 20.3% of the population were enrolled in 2014 in Nevada Medicaid, including 47,638 rural and frontier residents. This represents an increased by 374,388 or 187.7% in Nevada Medicaid enrollment from 2004 to 2014. (*Note: Enrollment increased between 2013 and 2014 due to the implementation of the Affordable Care Act*.)

Table 3 - Medicaid Enrollment in Nevada by County – 2004 & 2014

Region/County	Medicaid Enrollment					
	2004		2014		Change 2004 to 2014	
	Number	Percent of Population	Number	Percent of Population	Number	Percent
Rural and Frontier						
Churchill County	2,521	9.9	5,319	20.9	2,798	111%
Douglas County	1,684	3.5	4,939	10.2	3,255	193.3%
Elko County	3,317	6.1	6,797	12.5	3,480	104.9%
Esmeralda County	100	11	123	13.5	23	23%
Eureka County	70	3.4	136	6.6	66	94.3%
Humboldt County	1,358	7.6	2,644	14.8	1,286	94.7%
Lander County	454	6.9	917	14	463	102%
Lincoln County	453	8.9	688	13.6	235	51.9%
Lyon County	3,662	6.9	11,110	20.8	7,448	203.4%
Mineral County	783	17.5	1,088	24.3	305	39
Nye County	4,899	10.9	11,308	25.2	6,409	130.8
Pershing County	431	6.2	818	11.7	387	89.8
Storey County	46	1.1	140	3.5	94	204.3
White Pine County	981	9.6	1,611	15.7	630	64.2
Region Subtotal	**20,759**	**8.1**	**47,638**	**16.7**	**26,879**	**129.5**
Urban						
Carson City	6,370	11.6	13,133	24	6,763	106.2
Clark County	141,926	6.9	427,242	20.8	285,316	201
Washoe County	30,431	7	85,861	19.6	55,430	182.1
Region Subtotal	**178,727**	**8.3**	**526,236**	**20.7**	**347,509**	**194.4**
Nevada – Total	**199,486**	**8.3**	**573,874**	**20.3**	**374,388**	**187.7**

Diabetes Prevention Programs currently are not a covered benefit in Nevada. However, commencing on January 1, 2018, the Centers for Medicare and Medicaid Services (CMS) will provide coverage for the CDC Recognized Diabetes Prevention Programs for the Medicare population. The program has been named the Medicare Diabetes Prevention Program (MDPP).

The decision to cover MDPP stems from the CMS Office of the Actuary certification in March 2016 which was initiated from an innovation grant with the YMCA of the USA.[58] CMS is continuing groundbreaking efforts by launching the "Medicare Supplier" category for non-traditional healthcare team providers, such as Certified Health Education Specialist, Register Dieticians,

and Community Health Workers to be reimbursed for delivery of MDPP services. The fee schedules and other rules relating to MDPP will be finalized in 2017.

America's Health Insurance Plans (AHIP) Association has had a particular interest in diabetes prevention efforts. AHIP was one of six national grantees that received funding from the CDC to implement and expand the National DPP. Working with four AHIP member health plans, the National DPP has been implemented across the country through a number of innovative strategies. From AHIP's work with member organizations, they recommend; *Health plans in collaboration with other stakeholders including employers, providers, community organizations, and government – continue to demonstrate leadership in engaging consumers to promote wellness, prevent disease, and manage chronic conditions. To achieve this,* [AHIP] *remains committed to using evidence-based solutions and interventions, such as implementing the National DPP. Health plans and other stakeholders should leverage available resources and best practices, partnerships, technologies, tailored outreach with consumers, and continuous learning and quality improvement as they work to improve results in their diabetes prevention efforts. Policymakers, business, and the medical community should actively promote proven approaches in the area of diabetes and other diseases and conditions.*[59]

Not having health insurance affects the processes and outcomes of diabetes care. Individuals without insurance coverage for blood glucose monitoring supplies have a 0.5% higher A1c than those with coverage.[60]

Primary Care Provider Shortages

Generally, residents in isolated and underserved communities have only limited primary care providers, and specialty care is limited to the patient's willingness and ability to travel long distances to urban centers for face-to-face consultation and care.

Table 4 displays the numbers for licensed primary care physicians in Nevada in 2014. There were a total of 2,442 licensed primary care physicians in Nevada (2,127 Medical Doctors (M.D.) and 315 Doctors of Osteopathic Medicine (D.O.), including 141 primary care physicians (111 MDs and 30 DOs) in rural and frontier counties. The per capita number of primary care physicians in rural and frontier counties is 49.6 per 100,000 population, as compared to 90.4 per 100,000 population in urban areas.[61] Nevada's expansive rural regions, high rates of uninsured residents, and poverty make it harder to attract and retain practitioners.[62]

Region/County	Licensed Primary Care Physicians (MDs and DOs)			
	Number		Total	Number per 100,000
	MDs	DOs		
Rural & Frontier				
Churchill County	19	2	21	82.5
Douglas County	26	6	32	66.4
Elko County	20	4	24	44.2
Esmeralda County	0	0	0	0
Eureka County	0	1	1	48.6
Humboldt County	10	2	12	67
Lander County	0	0	0	0
Lincoln County	1	0	1	19.7
Lyon County	15	1	16	30
Mineral County	5	0	5	111.5
Nye County	10	8	18	40.1
Pershing County	0	2	2	28.7
Storey County	0	0	0	0
White Pine Co.	5	4	9	87.7
Region Subtotal	111	30	141	49.6
Urban				
Carson City	66	9	75	136.9
Clark County	1,480	233	1,713	83.5
Washoe County	470	43	513	117.2
Region Subtotal	2,016	285	2,301	90.4
Nevada – Total	2,127	315	2,442	86.3

Table 4 - Licensed Primary Care Physicians (MDs and DOs)

Diabetes Self-Management Education

Diabetes Self-Management Education and Support (DSME/S) is an important component of disease management that should part of a treatment regimen. DSME/S is defined as a collaborative process through which individuals with diabetes gain the knowledge and skills needed to modify their behavior and successfully self-manage their disease and its related conditions. This process incorporates the needs, goals, and life experiences of the person with diabetes and is guided by evidence-based standards.[63]

The 2015 Joint Position Statement of the ADA, AADE and Academy of Nutrition and Dietetic put forth the diabetes education algorithm which provides an evidence-based visual depiction (See Appendix A) of when to identify and refer individuals with type 2 diabetes to DSME/S. There are four critical times to assess, provide, and adjust DSME/S: (1) with a new diagnosis of type 2 diabetes, (2) annually for health maintenance and prevention of complications, (3) when new complicating factors influence self-management, and (4) when transitions in care occur.[64] This position statement is designed to serve as a resource for the healthcare team to make appropriate referrals to ADA-Recognized or AADE-Accredited DSME programs.[65]

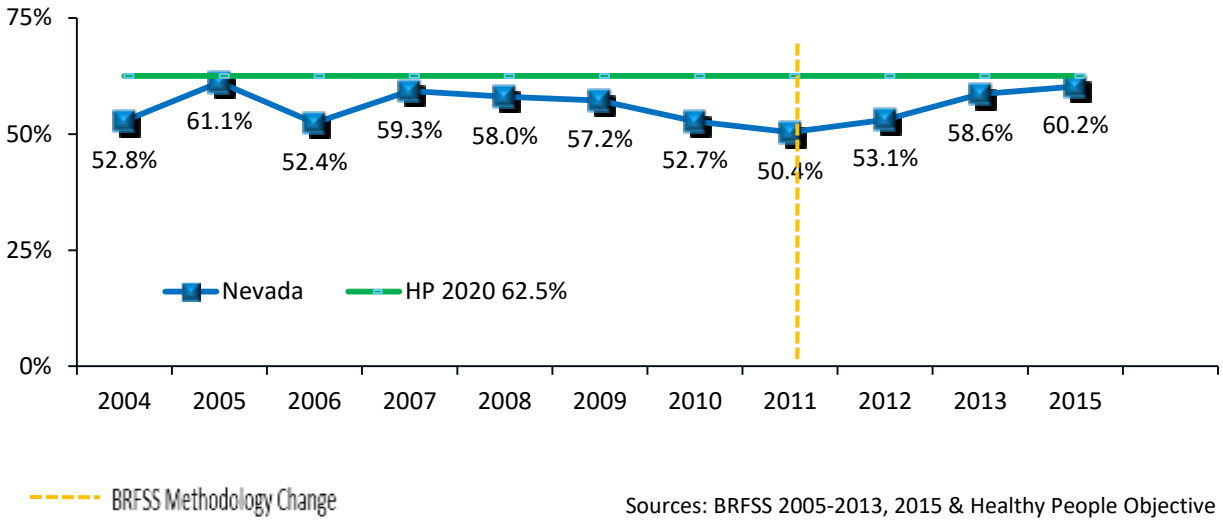
For the individual with diabetes, it is a necessity to daily elect a host of self-management decisions and perform complex care activities. A thorough understanding of diabetes is critical to knowing how to properly manage their disease. The National DSME standards call for an integrated approach that includes clinical content and skills, behavioral strategies (goal setting, problem solving), and engagement with psychosocial support, and connection to community resources.[66]

DSME is the process of facilitating the knowledge, skill, and ability necessary for diabetes self-care and has been shown to improve health outcomes. The design of DSME addresses the factors that influence each individual's ability to meet the challenges of self-management of their diabetes, including health beliefs, cultural needs, current understanding of diabetes, physical restrictions/limitations, emotional problems, family support, financial status, medical history, and health literacy. DSME reinforces informed decision making, self-care behaviors, problem solving, and active collaboration with the healthcare team to

improve clinical outcomes, health status, and quality of life. High-quality diabetes self-management education (DSME) has been shown to improve patient self-management, satisfaction, and glucose control.

Figure 22 shows data for 2004-2013 & 2015 of the estimated percentage of Nevada adults with diabetes who reported taking diabetes self-management education. This percentage has ranged from 52.8% in 2004, to a current prevalence of 60.2%. The Healthy People 2020 objective is 62.5%.

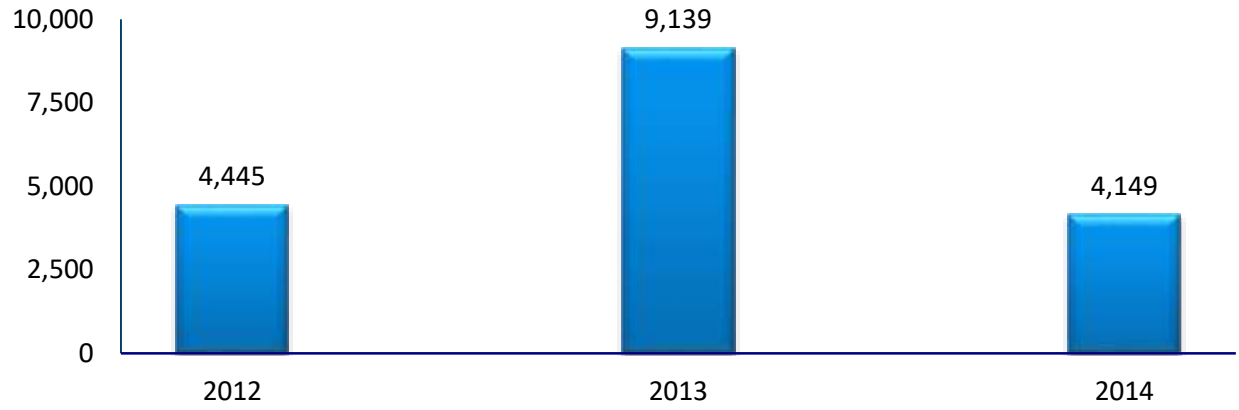
Figure 22 - Percentage of Nevada Adults with Diabetes who have had Diabetes Self-Management Training



Sources: BRFSS 2005-2013, 2015 & Healthy People Objective

In May 2016, the CDC provided grantees (Nevada Division of Public and Behavioral Health) with actual DSME encounter data provided by ADA – Recognized and AADE – Accredited Programs in Nevada. Figure 21 shows the actual number of individuals who attended a DSME class as reported by ADA and AADE sites in Nevada for 2012-2014.

Figure 23 - Number of ADA & AADE DSME Participants in Nevada, 2012-2014



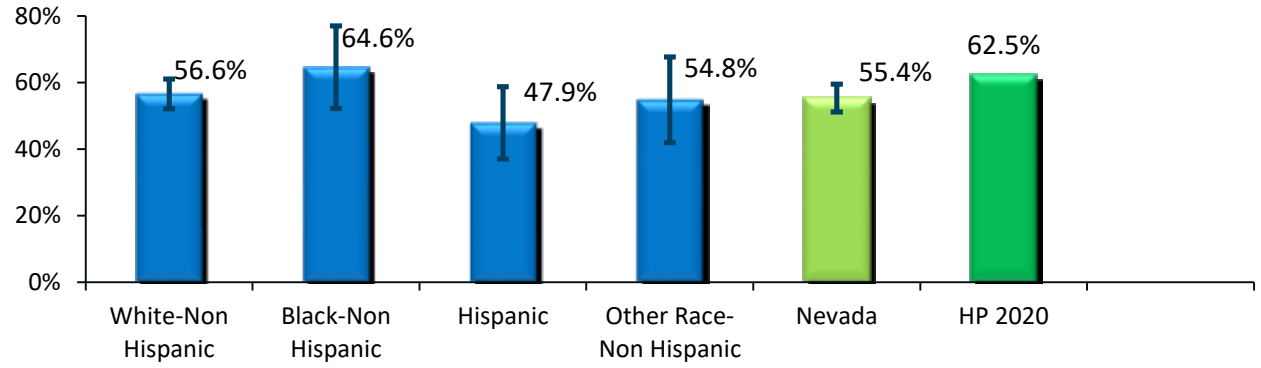
Nevada was not alone with this major increase from 2012-2013 and a very similar decrease from 2013-2014. Thus, CDC, ADA and AADE took a closer look at the data to get an understanding of the trends. They stated:

> The main reason for the data variances from year to year were:
> Data for programs with November or December anniversary dates were not being included in the annual counts if programs submitted their Annual Status Reports the following year. This problem has since been corrected. Large, multi-site DSME programs also closed in some states.
> In 2012 and 2013, there was a big jump in initial accreditation applications; therefore, program data were not available or included in the state totals until 2013 and 2014, respectively.[67]

Unfortunately, Nevada also lost two program delivery sites: the Valley Hospital site connected to Valley Health Systems in Las Vegas and Diabetes Health Services in Elko during this time which may reflect some of the drop in numbers in Nevada. To fill the gap in Elko the state has been working with the Partners Allied for Community Excelence (PACE) Coalition to offer Stanford DSMP in English and Spanish. See the map above and appendix B for DSME and DPP sites in Nevada.

Figure 24 illustrates aggregated data (2011-2013 & 2015) for the percentage of Nevada adults who have had diabetes self-management education/training by racial/ethnic group. The "Other Race-Non Hispanic" category includes Asian-American/Pacific-Islanders and American Indians/Alaska Natives. Hispanic people with diabetes reported the lowest rate of diabetes self-management training, at an estimated 47.9%.

Figure 24 - Prevalence of Nevada Adults with Diabetes Who Have Had Self-Management Training by Race/Ethnicity, 2011-2013, & 2015 Aggregate Data



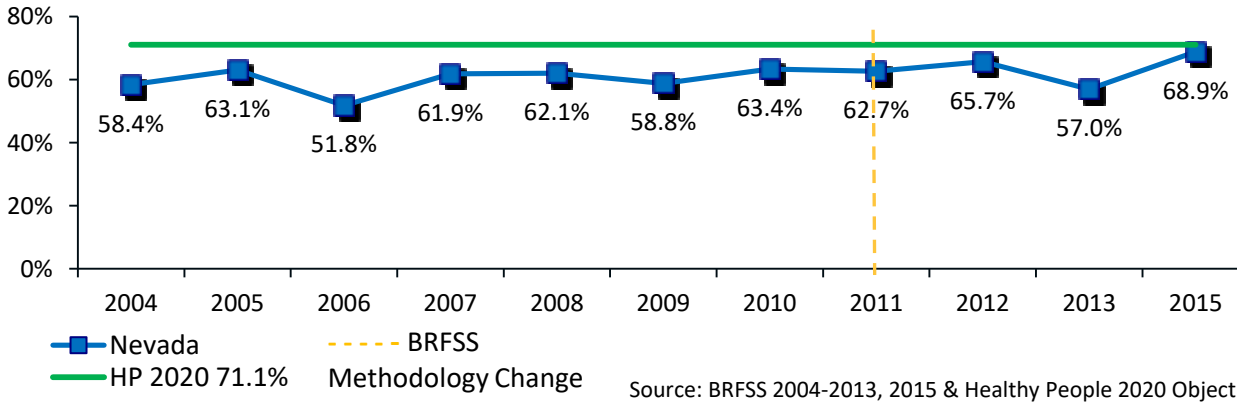
Source: BRFSS 2011-2013, 2015 & Healthy People Objective

One reason for this low participation rate among Hispanics may stem from the fact there is a language barrier. In an assessment completed in July 2014, only three ADA or AADE programs reported offering DSME serves in Spanish, two in Las Vegas and one in Reno.[68]

A1c Testing

Blood sugar control is a critical part of diabetes management. Whether an individual has their diabetes under control is generally determined by hemoglobin A1c levels – with A1c < 7% often considered tight control, A1c > 9% considered uncontrolled, and recommended individual patient targets as high as 8.5% depending on a patient's circumstances. [69] Hemoglobin A1c, also known as glycated hemoglobin or A1c, is formed in the blood when glucose attaches to hemoglobin. The higher the level of glucose in the blood, the more glycated hemoglobin is formed. The A1c test measures average blood sugar levels over a period of the last two to three months. Recommendations of current clinical practice stipulates that the A1c test be performed at least two times per year for patients who are meeting treatment goals and quarterly in patients whose therapy has changed or who are not meeting glycemic goals.[70] Figure 25 shows the percentage of persons with diabetes who report receiving an A1c test at least twice within the past year.

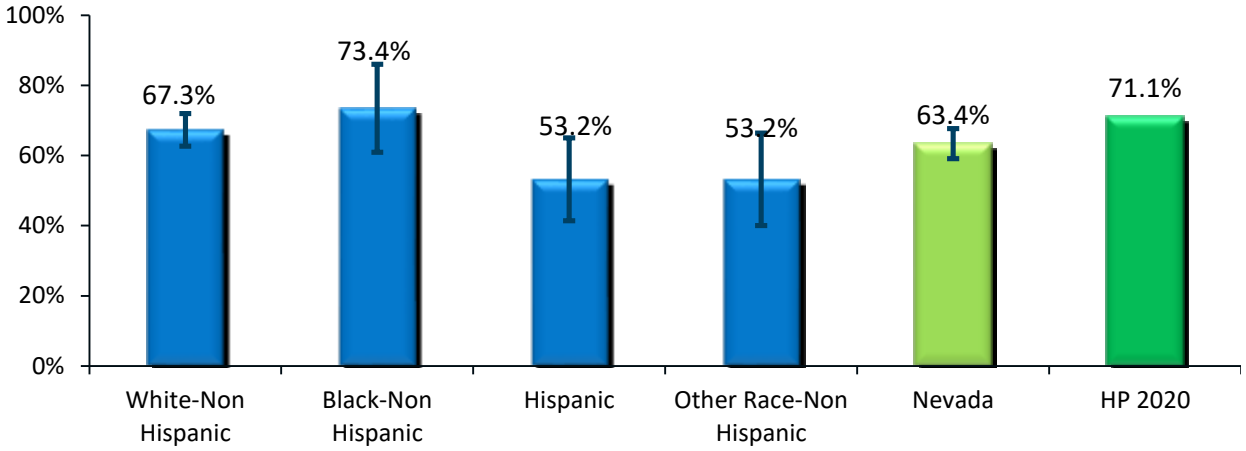
Figure 25 - Prevalence of Nevada Adults with Diabetes Receiving an A1C Test Twice within the Past Year, 2004-2013 & 2015



Source: BRFSS 2004-2013, 2015 & Healthy People 2020 Objectives

Figure 26 shows aggregated data (2011-2013 and 2015) for the percentage of Nevada adults with diabetes who receive A1c tests at least twice per year by racial/ethnic groups. The *Other* category includes Asian-Americans/Pacific-Islanders and American Indians/Alaska Natives.

Figure 26 - Prevalence of Nevada Adults with Diabetes Who Have Had an A1c Test Twice in the Past Year by Race/Ethnicity, Aggregate Data: 2011-2013, & 2015



Source: BRFSS 2011-2013, 2015 & Healthy People Objective

Table 5 from the Nevada Diabetes and Cardiovascular Disease Report, 2016, indicates that almost one thirds (30.9%) of Nevada type 2 diabetes patients covered by Medicaid had A1c levels above 9.0%. An A1c greater than 9% indicates patients who are in poor control and at highest risk of complications. Also noteworthy is commercial insurance patients had an A1c level in this highest range at a rate of one in six.[71]

Table 5 - Percentage of Type 2 Diabetes Patients, By A1c Level Range and by Payer, 2015

	< 7.0%			7.1-7.9%			8.0-9.0%			>9.0%		
	Commercial Ins.**	Medicare	Medicaid	Commercial Ins.**	Medicare	Medicaid	Commercial Ins.**	Medicare	Medicaid	Commercial Ins.**	Medicare	Medicaid
Las Vegas	49.9%	58.2%	42.1%	20.6%	21.2%	17.4%	13.7%	10.5%	16.4%	15.8%	10.1%	24.2%
Reno	47.3%	53.6%	37.4%	20.4%	22.6%	16.9%	15.9%	12.6%	12.1%	16.4%	11.1%	33.7%
Nevada	48.0%	56.0%	35.3%	20.5%	21.9%	16.8%	14.8%	11.8%	17.1%	16.7%	10.4%	30.9%
U.S.	47.7%	52.3%	42.5%	21.7%	21.9%	18.0%	13.9%	13.0%	14.3%	16.7%	12.8%	25.2%

*The A1c test measures the amount of glucose present in the blood during the past 2–3 months. Figures reflect the percentage of type 2 diabetes patients who have had at least one A1c test in a given year.

**Includes HMOs, PPOs, point-of-service plans, and exclusive provider organizations. Data source: IMS Health © 2016

Foot Exams and Lower Extremity Amputations

Diabetic foot complications can be frequent, complicated, and expensive. Foot ulcers and amputations are a major cause of morbidity, disability, as well as emotional trauma for people with diabetes. Early recognition and management of risk factors for ulcers and amputations can prevent or delay the onset of adverse outcomes.

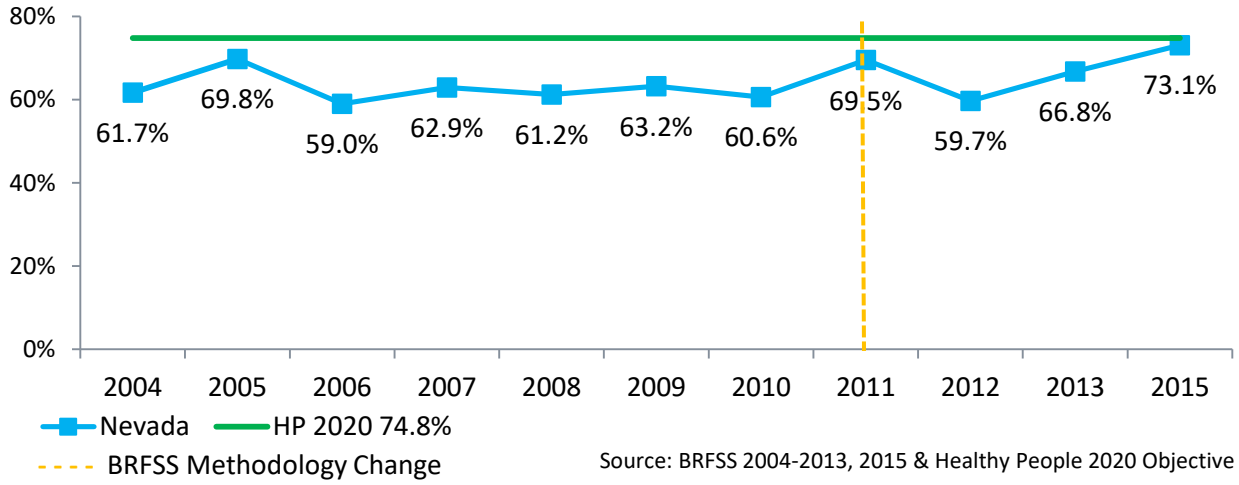
Diabetic neuropathy increases risk for foot problems. Neuropathy often causes pain, tingling, and numbness. Peripheral Arterial Disease (PAD) also occurs in individuals with diabetes when blood vessels in the feet and legs are narrowed or blocked by fatty deposits.[72]

All patients with diabetes should have their feet evaluated at least yearly for the presence of the predisposing factors for ulceration and amputation such as, neuropathy, vascular disease, and deformities. This action mandates aggressive and proactive preventative assessments by generalists and specialists.

For a diabetic patient, a mere nick while clipping nails, or a blister from an ill-fitting shoe, can begin the march toward amputation, according to Dr. Inman. "About 600,000 people with diabetes get foot ulcers every year," he says. "Poor blood flow in the lower legs makes those ulcers slow to heal. And loss of sensation in the feet, called neuropathy, makes patients slow to notice even small wounds that can rapidly turn gangrenous."

In figure 27, the prevalence of Nevada adults with diabetes reporting at least one foot exam by their health care provider in the previous year has ranged between 59% and 73.1%.

Figure 27 - Prevalence of Nevada Adults Who Had Their Feet Checked in the Past Year 2004-2015

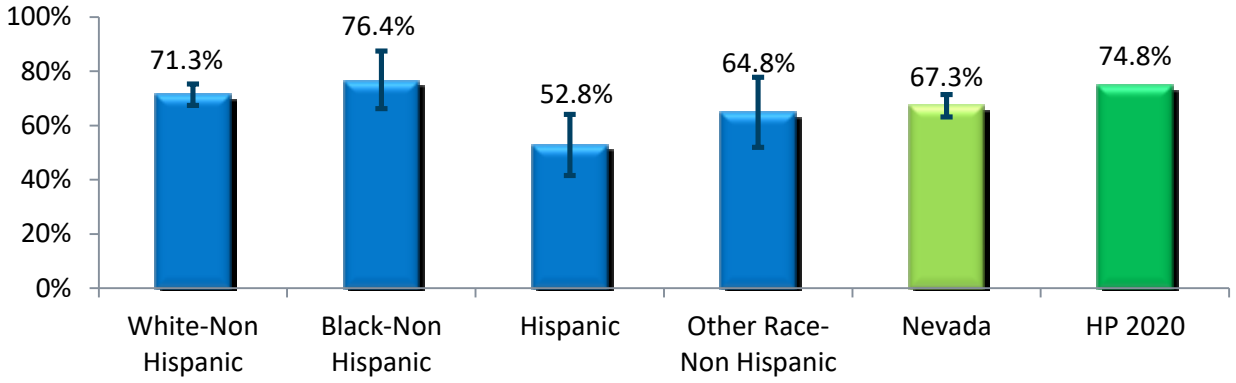


Source: BRFSS 2004-2013, 2015 & Healthy People 2020 Objective

Figure 28 shows aggregated data (2011-2013, 2015) for the estimated prevalence of Nevada adults with diabetes who receive annual foot exams by racial/ethnic group. The *Other* category includes Asian-American/Pacific-Islanders and American Indians/Alaska Natives. The racial/ethnic group with the highest estimated percentage of individuals with diabetes who receive an annual foot exam in Nevada was Black non-Hispanics at 73.2%.

Hispanics represented the lowest estimated percentage receiving an annual foot exam at 53.8%. All racial/ethnic groups were lower than the Healthy People 2020 objective of 74.8%.

Figure 28 - Prevalence of Nevada Adults with Diabetes Who Have Had Their Feet Checked in the Past Year by Race/Ethnicity, Aggregate Data: 2011-2013, & 2015

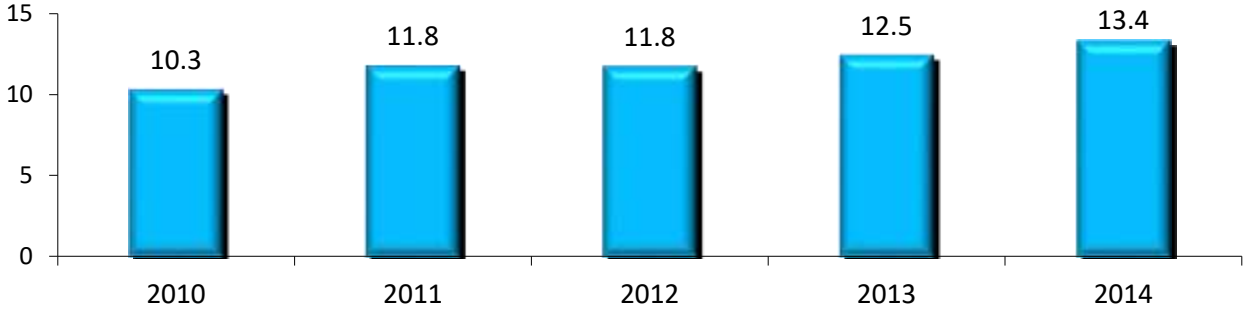


Source: BRFSS 2011-2013, 2015 & Healthy People Objective

According to the American Podiatric Medical Association (APMA), diabetes is the leading cause of preventable, non-traumatic lower limb amputation of which 73,000 were performed in the United States in 2010.[73] The average cost of each amputation was $70,434. Unfortunately, preventive foot exams by podiatrist are not cover a covered benefit by all public and private insurers in Nevada.

Figure 29 shows the crude rate for lower extremity amputations performed in Nevada from 2010 to 2014 where diabetes was the primary diagnosis.

Figure 29 - Crude Rate for Lower Extremity Amputations among Nevada Patients with Diabetes in Any Diagnoses Code 2010-2014



Source: Nevada Hospital Inpatient Billing

The APMA advises that the inclusion of care provided by podiatrists for those with diabetes would save the U.S. healthcare system $3.5 billion per year. This is based on the findings that every $1 invested in podiatric care results in $27 to $51 savings for commercial insurance and $9 to $13 savings for Medicare.[74]

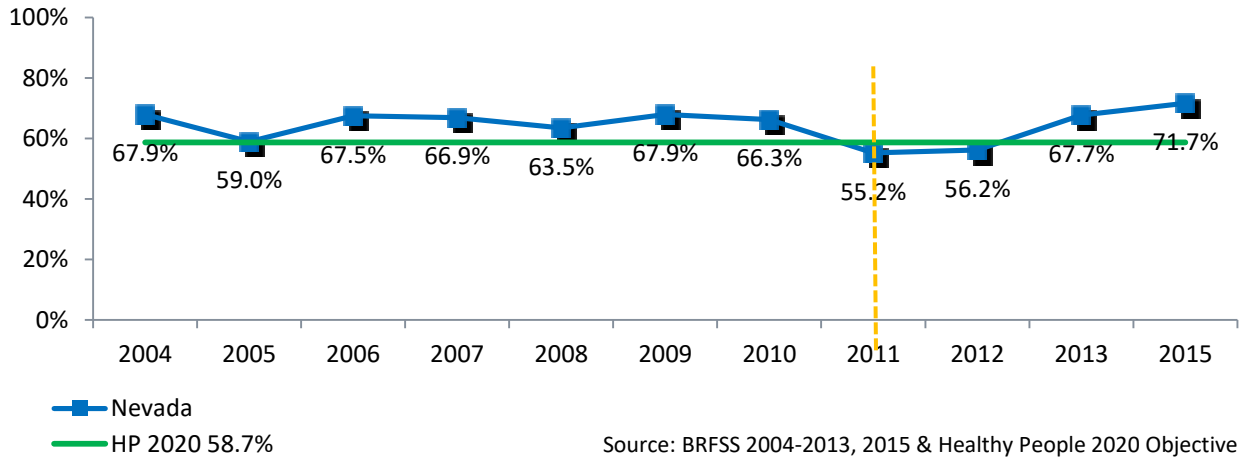
Furthermore, individuals with diabetes should practice self-care by checking their own feet weekly if they have not had complication; and daily if they have lost sensation and/or have a history of food sores, cuts or other problems. If any new issues or irregularities are noticed or if any ailments has worsened, the healthcare provider should be contacted.

Eye Exams

Diabetic retinopathy affects eight million Americans with diabetes and is the leading cause of blindness in adults. Diabetic retinopathy results from damage to the small blood vessels of the retina which can break down, leak, or become blocked. When this damage occurs, it affects oxygen and nutrient delivery to the retina. Over time this leads to impaired vision. An individual with diabetes is more likely to develop diabetic retinopathy if they have poorly controlled blood sugar. They are at increased risk for diabetic retinopathy if they also have high blood pressure, high cholesterol and/or smoke tobacco.[75]

Yearly dilated eye examination can be used to detect and prevent vision loss. Figure 30 shows the prevalence of adult Nevadans with diabetes reporting an annual dilated eye exam from 2004 to 2015. Except for 2011 and 2012, Nevada has exceeded the Healthy People 2020 objective of 58.7%.

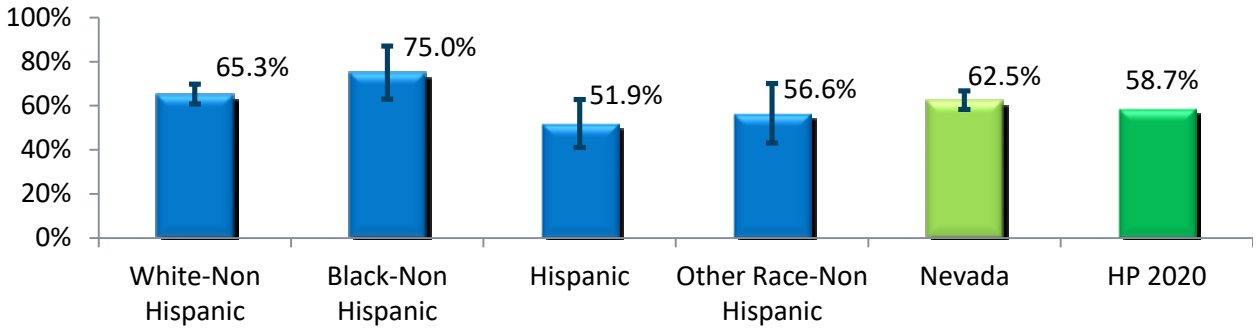
Figure 30 - Prevalence of Nevada Adults with Diabetes Who Have Had an Annual Dilated Eye Exam 2004-2013, 2015



Source: BRFSS 2004-2013, 2015 & Healthy People 2020 Objective

Figure 31 shows aggregated data (2011-2013, 2015) for the percentage of Nevada adults with diabetes who received an annual dilated eye exam by racial/ethnic group. The *Other* category includes Asian-Americans/Pacific-Islanders and American Indians/Alaska Natives. Black-Non Hispanics had the highest prevalence of receiving an annual dilated eye exam at 75%; while Hispanics had the lowest percentage at 51.9%.

Figure 31 - Prevalence of Nevada Adults with Diabetes Who Have Had an Annual Dilated Eye Exam by Race/Ethnicity, Aggregate Data: 2011-2013, 2015



Source: BRFSS 2011-2013, 2015 & Healthy People Objective

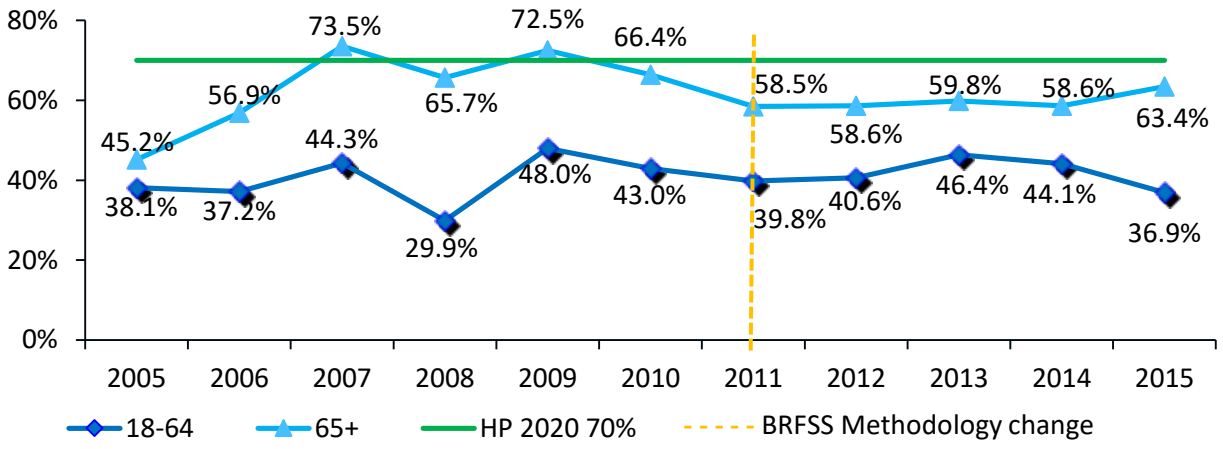
Immunizations

Immunizations are important for all adults to keep current. Individual with diabetes, even if well managed, may have an increased risk for more serious complications from an illness compared to people without diabetes.[76] People with diabetes (both type 1 and type 2) are at higher risk for serious problems from certain vaccine-preventable diseases. Thus, individuals with diabetes are more likely than people without diabetes to suffer from complications caused by influenza (flu) and pneumonia. Influenza, can raise blood glucose to dangerously high levels. People with diabetes are at increased risk of death from pneumonia (lung infection), bacteremia (blood infection) and meningitis (infection of the lining of the brain and spinal cord).[77] Flu and pneumonia immunizations are an effective strategy to reduce illness and deaths. Hence, individuals with diabetes are encouraged to receive an annual influenza vaccination.

Influenza Vaccination

Figure 32 shows the prevalence of Nevada adults with diabetes who report receiving an annual influenza vaccination. In 2015 the prevalence of Nevada adults with diabetes who received an annual influenza vaccination was 63.5% for those aged 65 years and older and 36.9% for those aged 18 to 64. Nevada is well below the recommended Healthy People 2020 rate of 70%.

Figure 32 - Prevalence of Nevada Adults with Diabetes Receiving an Annual Influenza Vaccination by Age Group, 2005-2015

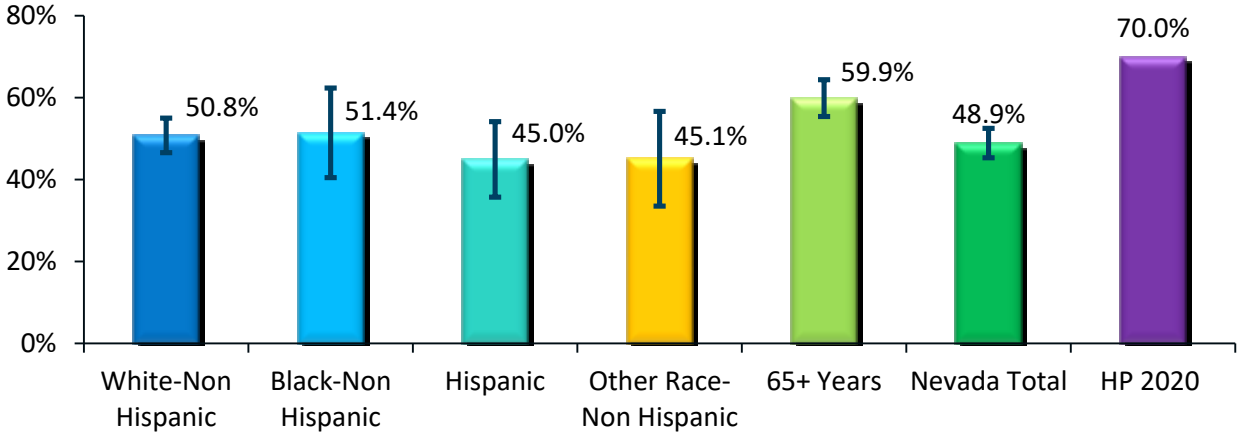


Sources: BRFSS 2005-2015 & 2020 Healthy People Objective

Note: The Healthy People targets are for the proportion of all adults receiving an annual influenza vaccination and are not specifically for those adults with diabetes.

Figure 33 shows aggregated data (2011-2015) for the prevalence of Nevada adults with diabetes who received an annual influenza vaccination by racial/ethnic group. The "Other Race Non-Hispanic" category includes Asian-American/Pacific-Islanders and American Indians/Alaska Natives who reported the lowest prevalence receiving an annual influenza vaccination at 45.1%.

Figure 33 - Prevalence of Nevada Adults with Diabetes Receiving an Annual Influenza Vaccination by Race/Ethnicity Aggregate Data (2011-2015)

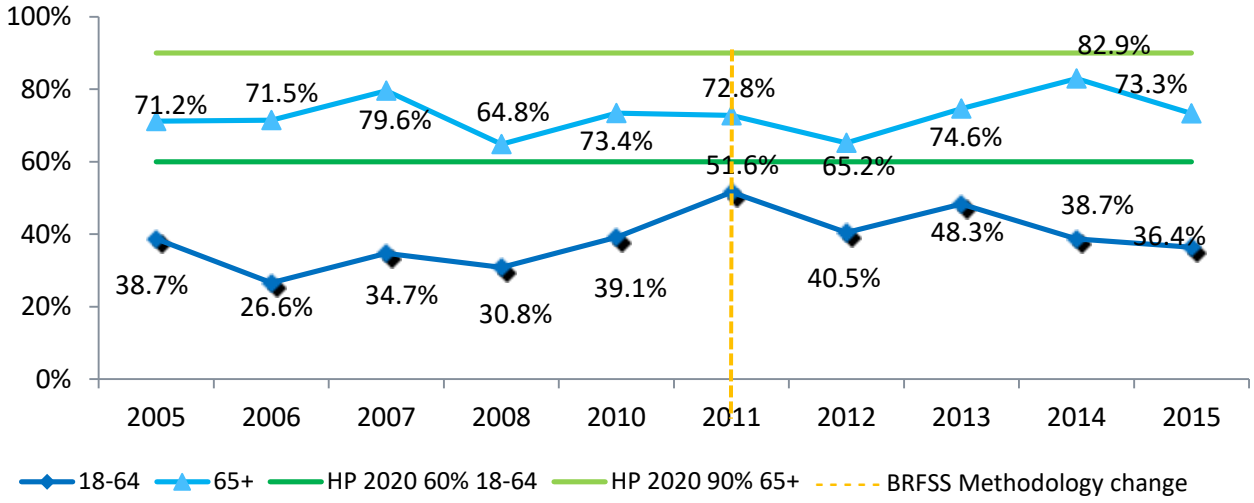


Source: BRFSS 2011-2015 & 2020 Healthy People Objective

Pneumococcal Vaccination

Figure 34 shows the estimated percentage of Nevada adults with diabetes who report ever receiving a pneumococcal vaccination. Among adults 18-64 years of age, the estimated percentage was at its highest prevalence of 51.6% in 2011 and has dropped to 36.4% in 2015. For adults 65 years and older, the estimated percentage reached the highest prevalence in 2014 at 82.9%.

Figure 34 - Prevalence of Nevada Adults with Diabetes Ever Receiving a Pneumococcal Vaccination by Age Group, 2005-2015

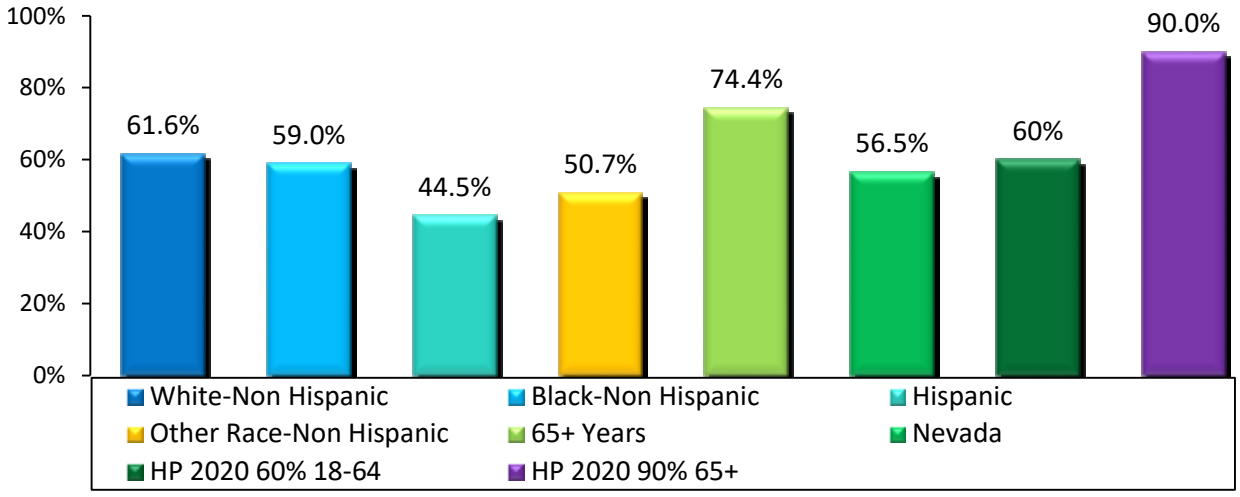


Sources: BRFSS 2005-2015 & 2020 Healthy People Objectives

Note: These Healthy People targets are for the proportion of all adults ever receiving a pneumococcal vaccination and are not specifically for those adults with diabetes.

Figure 35 shows aggregated data (2011-2015) for the percentage of Nevada adults with diabetes who had ever received a pneumococcal vaccination by racial/ethnic group. The *Other* category includes Asian-American/Pacific-Islanders and American Indians/Alaska Natives. Hispanic individuals with diabetes had the lowest estimated percentage of ever received a pneumococcal vaccination.

Figure 35 - Prevalence of Nevada Adults with Diabetes Ever Receiving a Pneumococcal Vaccination by Race/Ethnicity and Age Group, Aggregate Data (2011-2015)

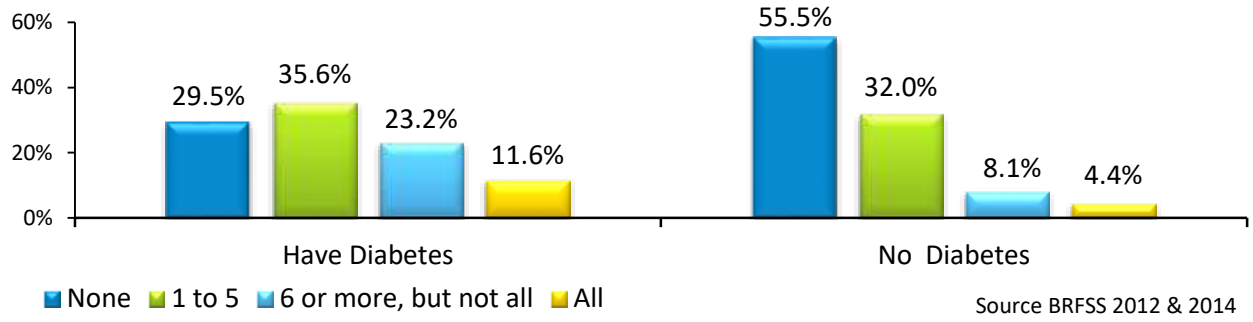


Source: BRFSS 2011-2015 & 2020 Healthy People Objectives

Dental Disease and Diabetes

Individuals with diabetes are at higher risk for oral health problems, such as gingivitis (an early stage of gum disease) and periodontitis (serious gum disease). Both are considered a complication of diabetes and individuals with poor glycemic control are at higher risk of getting gum disease more frequently and more severely than those with well controlled blood glucose levels. Emerging research indicates that the relationship between serious gum disease and diabetes is two-way; not only are individuals with diabetes more susceptible to serious gum disease, but serious gum disease may have the potential to affect blood glucose control and contribute to the progression of diabetes.[78] Figure 36 indicates that Nevada adults with diabetes have a significantly higher percentage of tooth loss verses those without diabetes.

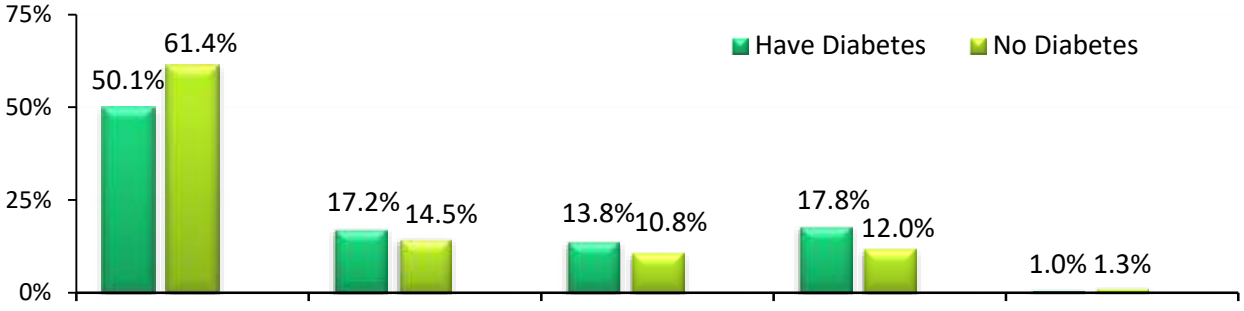
Figure 36 - Nevada Adults - How Many Permanent Teeth Removed due to Tooth Decay or Gum Disease 2012 & 2014 Pooled



Source BRFSS 2012 & 2014

Besides daily brushing and flossing, regular dental check-ups and good blood glucose control are the best defense against the oral complications of diabetes. Figure 37 shows that individuals with diabetes have fewer visits to a dentist or dental clinic. Although, there is no implicit explanation for this lower rate of dental visits among those Nevada adults with diabetes

Figure 37 - Time Since Last Visited a Dentist or a Dental Clinic for Any Reason, 2012 & 2014 Pooled Data



Source BRFSS 2012 & 2014

from this BRFSS data, a study conducted in northern California showed significant disparities in receipt of annual preventive dental care among "medically insured" patients with diabetes.[79] This was frequently due to no dental insurance, but also associated with social differences with respect to education, income, and race/ethnicity. These social disparities possibly reveal differences in underlying attitudes toward and knowledge of the importance of dental care or of the costs and benefits of maintaining teeth.[80]

Cost of Diabetes

Economic Burden

Diabetes imposes a considerable burden on the economy of the United States in the form of increased medical costs and indirect costs from reduced labor force participation due to chronic disability, reduced productivity at work and at home, work-related absenteeism, and premature mortality.[81,82] Prevalence of diabetes related costs are expected to more than double in the next 25 years.[83] *The economic burden associated with diagnosed diabetes (all ages) and undiagnosed diabetes, gestational diabetes, and prediabetes (adults) exceeded $322 billion in 2012, consisting of $244 billion in excess medical costs and $78 billion in reduced productivity.*

Table 6 illustrates that in 2012 Nevada's total estimated medical cost for diabetes was $1,924 million with indirect cost reaching $542 for a total economic cost of $2,466 *[84]*

Yang et al. stated in their research that:

> The sobering statistics presented . . . underscores the urgency to better understand the cost mitigation potential of prevention and treatment strategies.[85]

Thus, effective prevention strategies are crucial to decelerate the diabetes surge and its associated economic burden on Nevada.

Table 6 -- Economic Burden by Diabetes Category in 2012

	Medical Costs				Indirect Costs		
	DDM	UDM	PDM	GDM	DDM	UDM	Total Costs
Nevada	**$1,359**	**$194**	**$364**	**$7**	**$466**	**$76**	**$2,466**
Total U.S.	$175,819	$23,433	$43,910	$1,290	$68,646	$9,329	$322,427

Data reported in millions of dollars.
DDM - Diagnosed Diabetes Mellitus; UDM - Undiagnosed Diabetes Mellitus; PDM – Prediabetes; GDM – Gestational Diabetes

Part of the indirect cost was based on absenteeism which is defined as the number of workdays missed due to poor health. Researchers have found that people with diabetes have higher rates of absenteeism than the population without diabetes. Estimates of excess absenteeism associated with diabetes range from 1.8% to 7% of total workdays which is statistically higher for people with diabetes.[86]

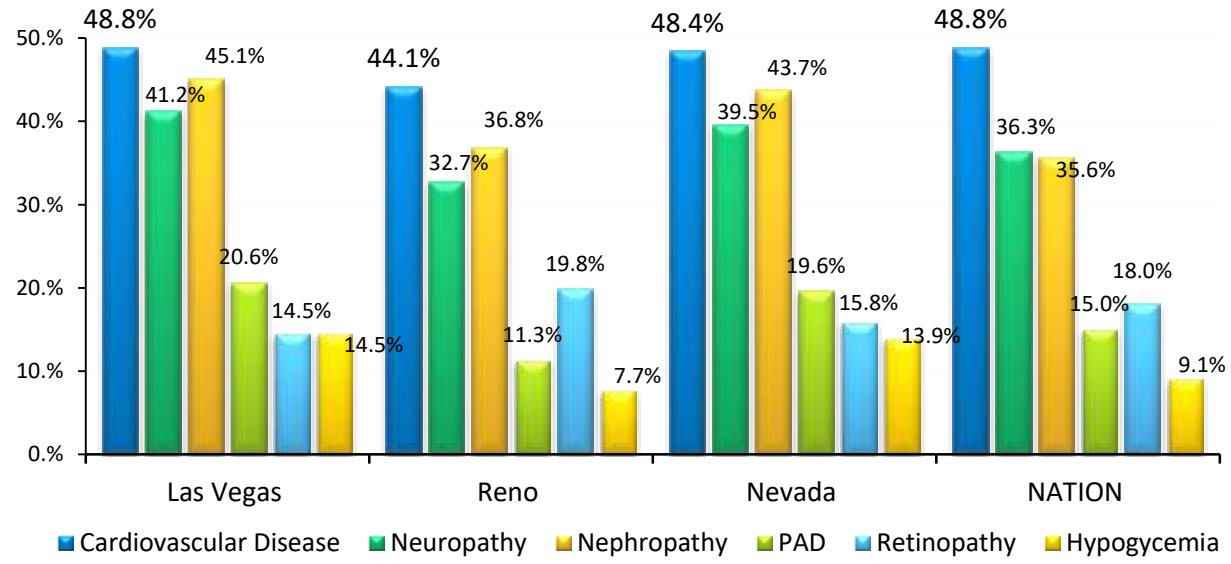
Medical Cost

As discussed previously Nevada's total estimated medical cost for diabetes was $1,924 million in 2012. Individuals with diabetes use health care services more frequently than persons without diabetes. Unless otherwise noted, the following information is taken from the Nevada Diabetes and Cardiovascular Report, 2016. 10th Edition. [87]

Complications

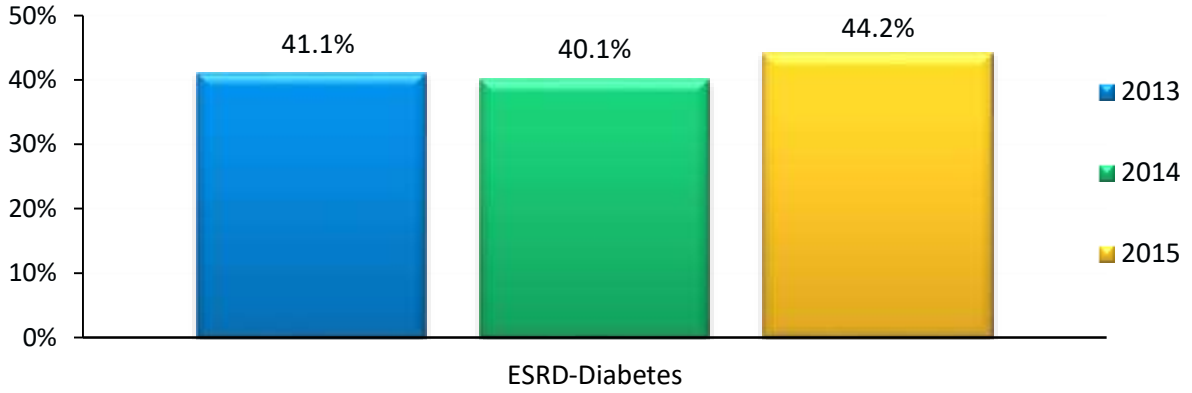
The higher rate of health care utilization for individuals with diabetes is related to treatment and metabolic control, as well as, to micro- and macrovascular complications associated with diabetes. Complications of type 2 diabetes include, but are not limited to, cardiovascular disease, peripheral artery disease (PAD), hypoglycemia, nephropathy (kidneys), neuropathy (nerves), and retinopathy (eyes). A complication is defined as a patient condition caused by the type 2 diabetes of the patient. These conditions are a direct result of having type 2 diabetes. Figure 38 illustrates the percentage of patients with type 2 diabetes by complications.

Figure 38 - Percentage of Type 2 Diabetes Patients by Complication, 2015



The development of chronic kidney disease (CKD) and its progression to end-stage renal disease (ESRD) is a major cause of reduced quality of life in the U.S., and is responsible for significant premature mortality. Nationally, the number of ESRD cases per year with diabetes or hypertension listed as the primary cause had been rising rapidly, but over the past five years has been generally stable. Between the dates of January 1 through December 31, 2015, the total incident of new End Stage Renal Disease (ESRD) patients in Nevada was 972. The primary cause of 44.2% of these new ESRD diagnoses was diabetes. As of December 31, 2015, there were 3,853 prevalent (currently treated) dialysis patients in Nevada; and 1,590 (41.3%) with the primary cause of ESRD being diabetes. Figure 39 shows the percentage of diabetes as the primary of new ESRD diagnoses in Nevada for 2013-2015.[88]

Figure 39 - New End Stage Renal Disease Patients with Diabetes as the Primary Cause in Nevada



Hospital Inpatient

Table 7 provides a depiction of inpatient diabetes mellitus case counts in Nevada hospital in 2013 and 2014. For all three payer types, the numbers of inpatient diabetes cases per hospital per year in Nevada were more than double what they were nationally for 2014. Nevada hospitals discharged, on average, 464.8 cases covered by commercial insurance, compared with 200.2 across the country.

Table 7 - Numbers of Inpatient Diabetes Mellitus Cases per Hospital per Year, by Payer, 2013–2014

	Commercial Insurance		Medicare		Medicaid	
	2013	2014	2013	2014	2013	2014
Las Vegas	400.4	464.8	979	1,252.60	185.2	388.8
Reno	370.3	1,094	1,093.3	3,575.5	132	979
Nevada	323.7	464.8	733.7	1,252.60	143	388.8
NATION	239.7	200.2	799	578.8	150.9	113.5

Figure 41 shows that Non-Medicare outpatient case volumes for diabetes diagnosis were also significantly higher in Las Vegas, Reno, and across Nevada than the national benchmarks.

Figure 40 - Number of Outpatient Diabetes Mellitus Cases per Hospital per Year Medicare vs. Non-Medicare, 2013-2014

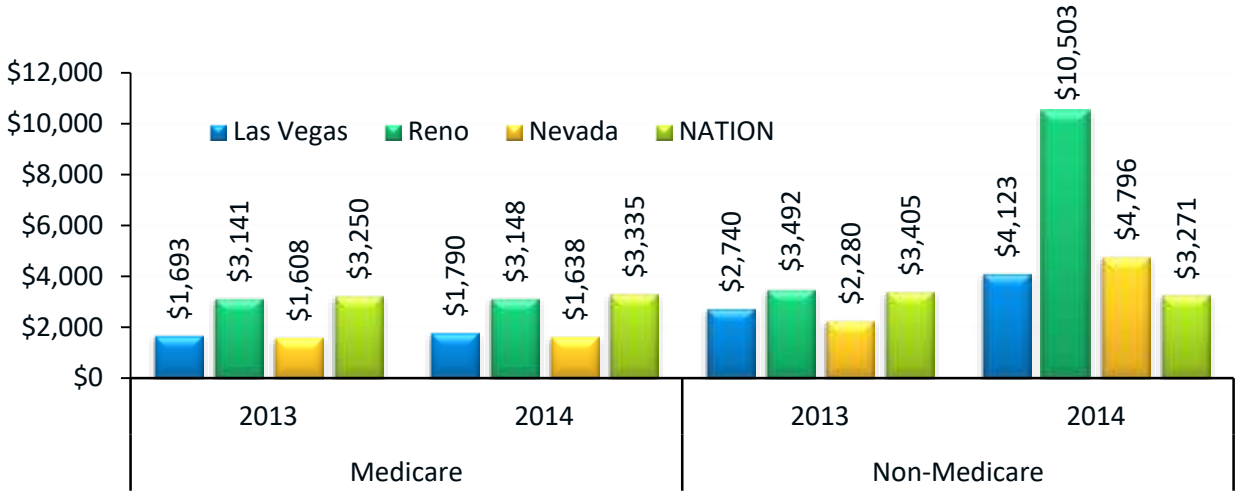
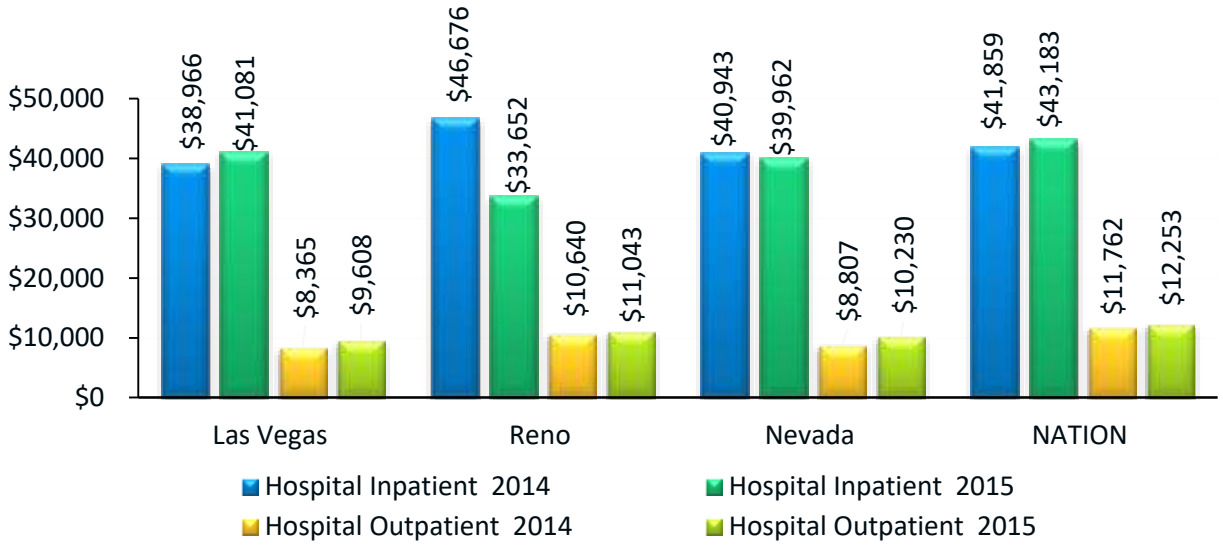


Figure 42 illustrates that facility charges are on the rise for type 2 diabetes patients in Las Vegas. From 2014 to 2015, average annual facility charges for type 2 diabetes patients in Las Vegas increased across both inpatient by $2,115 and outpatient settings by $1,243. Hospital outpatient charges also expanded in Reno from $10,640 to $11,043.

Figure 41 – Facility Charges per Year for Type 2 Diabetes, 2014, 2015*



** Figures reflect the charges generated by the facilities that delivered care. The data also reflect the amounts charged, not the amounts paid*

Life Expectancy

Life expectancy for individual with type 2 diabetes was showed to decrease as reported in a cohort study conducted in England using 383 general practices. The results showed that at age 40, white men with diabetes lost 5 years of life and white women lost 6 years compared with those without diabetes. A loss of between 1 and 2 years was observed for South Asian and blacks with diabetes. "The findings support optimized cardiovascular disease risk factor management, especially in whites with type 2 diabetes."[89]

Another report by the Gerontological Society of America states:

> Despite medical advances enabling those with diabetes to live longer today than in the past, a 50-year-old with the disease still can expect to live 8.5 years fewer years, on average, than a 50-year-old without the disease.[90]

Risks of death for individuals with type 2 diabetes, however, fluctuates depending on age, glycemic control and renal complications. Macrovascular disease is identified as the leading cause of mortality, followed by renal disease and cerebrovascular disease. According to a New England Journal of Medicine (NEJM) article, the rate of cardiovascular death in a group with diabetes was higher than for those without diabetes. Also the risk was increased in the people with diabetes who had worse glycemic control and greater severity of renal complications. NEJM noted:

> Although factors that are known to reduce the risk of myocardial infarction, including the use of lipid-lowering and antihypertensive medications and better glycemic control over time, have been noted in persons with type 2 diabetes, an excess risk of death still exists.[91]

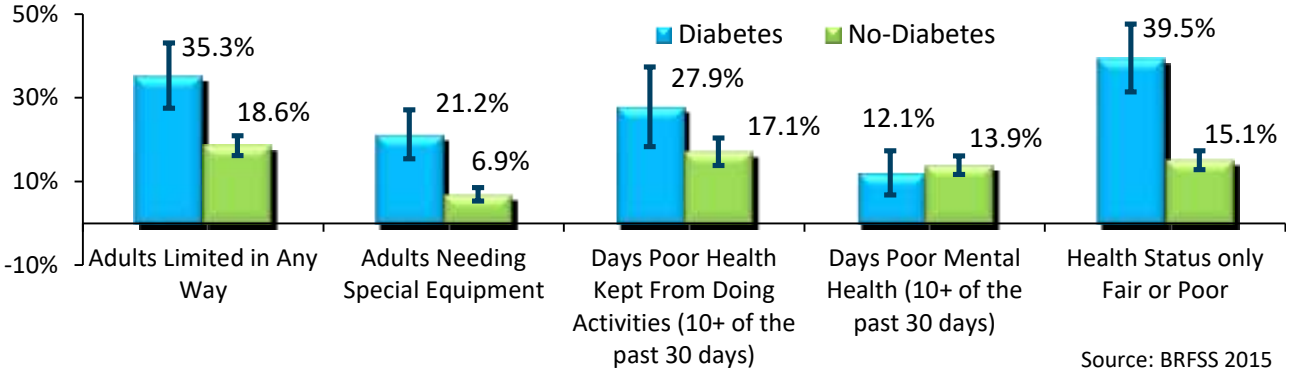
Quality of Life Indicators

Quality of life is measured as physical and social functioning, and perceived physical and mental well-being. People with diabetes have a worse quality of life than people with no chronic illness, but a better quality of life than people with most other serious chronic diseases. Individuals having better glycemic control report better quality of life than those with poor control.[92]
When quality of life scores were assessed based on glycated hemoglobin (HbA1c) values, the mean scores of physical function, pain, general health, social function of individuals with the target HbA1c values (<7.5%) was significantly higher than those above target values (≥7.5% and greater).

Looking at multiple quality of life indicators, Nevada adults with diabetes self-reported that quality of life remains significantly reduced as compared to those without the disease as seen in figure 43.

Clinical and educational interventions, however suggest that improving the patients' health status and their perceived ability to control their disease can improve quality of life for those with diabetes.

Figure 42 - Health-Related Quality of Life Indicators by Diabetes Status, 2015



Source: BRFSS 2015

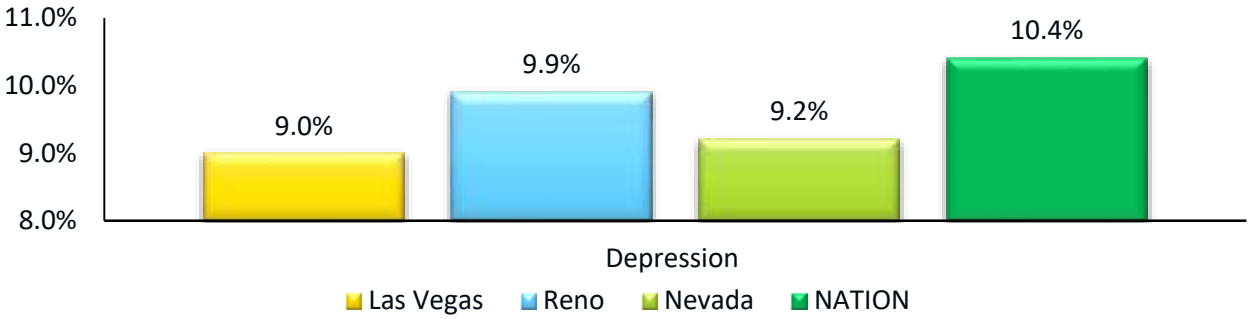
Depression and Diabetes

The presence of depression has been shown to adversely affect maintaining control of blood glucose and adherence to medication compliance. Patients with both diabetes and depression develop insulin resistance, and compliance to the treatment is impaired.

> Depression and type 2 diabetes are two leading global causes of morbidity and mortality, with type 2 diabetes currently affecting more than 9% and depression affecting 5% of the world's population in any given year. One of four patients with type 2 diabetes experiences a clinically significant form of depression at a prevalence five-times higher than observed in the general population [93]

The presence of depression was associated with elevated HbA1c level, high BMI, being single, low social support level, and low quality health insurance. Zhang, et.al, (2015) recommends routine screening and management of depression in patients with diabetes, especially for those in primary care, to reduce the number of the depressed or unrecognized depressed patients with diabetes.[94] Figure 44 displays the percentage of individuals with diabetes that were also diagnosed with depression in Nevada in 2015.[95]

Figure 43 - Percentage of Type 2 Diabetes Patients with Depression in 2015



A research study has shown that depression is strongly linked to increased mortality in individuals with type 2 diabetes.[96] This study found that men with diabetes, but not women, had excess mortality risk associated with depression and anxiety. Moreover, men with diabetes and symptoms of depression had the highest risk of death with a hazard ratio, of 3.47.

APPENDIX A - Diabetes Education Algorithm

The Algorithm of Care can be downloaded at: https://www.diabeteseducator.org/practice/practice-documents/practice-statements.

APPENDIX B – Diabetes Self-Management and Diabetes Prevention Program Sites in Nevada

Las Vegas/Henderson

- Adashek & Wilkes, LLP dba Desert Perinatal Associates - AADE DSME
  5761 S Fort Apache Road
  Las Vegas 89148-5506
  Tel: (702) 341-6610
- Damaj Horizonview Medical Center – ADA DSME
  6850 North Durango Drive, Suite 301
  Las Vegas 89149
  Tel: (702) 641-8500
- Desert Springs Hospital Medical Center Diabetes Self-Management Education Program - AADE & ADA – DSME, NDPP
  2075 E Flamingo Road, Suite 225
  Las Vegas 89119-5188
  Tel: (702) 369-7560
- Dignity Health St. Rose Dominican - Stanford Plus Program
  AADE & ADA – DSME, NDPP
  3001 Saint Rose Parkway
  Henderson 89052-3839
  Tel: (702) 616-4914
- Doctor's Health Network – ADA DSME
  Diabetes Self-Management Education
  5235 South Durango Drive
  Las Vegas 89148
  Tel: (702) 851-7287 x114
- DOLCRX Wellness Center
  AADE DSME
  801 S Rancho Drive, Suite A4
  Las Vegas 89106-3870
  Tel: (702) 436-5279
- Encore Wellness – NDPP
  7440 West Cheyenne Ave., Suite 104
  Las Vegas 89129
  Tel: (714) 823-4400 ext. 111
- Flourish Health and Wellness - NCPP
  5135 Camino Al Norte, Suite 250
  North Las Vegas 89031
  Tel: (702) 626-0357
- High Risk Pregnancy Center Diabetes Education Program – ADA DSME
  2011 Pinto Lane, Suite 200
  Las Vegas 89106
  Tel: (702) 382-3200
- Huntridge Pharmacy Diabetes Self-Management Education Program
  AADE DSME
  1144 E Charleston Boulevard
  Las Vegas 89104-1558
  Tel: (702) 382-7373

- Nevada Senior Services - DSME
  901 N. Jones Boulevard
  Las Vegas 89108
  Tel: (702) 648-3425 ext. 213
- Southwest Medical Associates Endocrinology - AADE DSME
  4475 S Eastern Avenue, Suite 2400
  Las Vegas 89119-7826
  Tel: (702) 669-5867
- UnitedHealthcare Nevada - Health Education & Wellness – ADA DSME
  2716 North Tenaya Way, 3rd Floor
  Las Vegas 89128
  Tel: (702) 750-3830
- University of Nevada School of Medicine UNSOM (South) – AADE DSME
  1707 W Charleston Blvd, Suite 220,
  Las Vegas, NV 89102-2353
  Tel: (702)671-6469
- Wellhealth Endocrinology –ADA DSME
  9260 W Sunset Rd Suite 207
  Las Vegas, 89148
  Tel: (702) 863-9663
- YMCA of Southern Nevada – YDPP
  141 Meadows Lane
  Las Vegas 89107
  Tel: (702) 476-6747

Carson City/Reno

- Carson Tahoe Health – ADA DSME, NDPP
  1600 Medical Parkway, PO Box 2168
  Carson City 89702
  Tel: (775) 445-8607
- Partnership Carson City Coalition - Stanford DSME
  1711 North Roop Street
  Carson City 89706
  Tel: (775) 841-4730
- Renown Health Management Services/Diabetes Center – ADA DSME
  10085 Double R Blvd. Suite 325
  Reno 89521
  Tel: (775) 982-5073
- Sanford Center for Aging, University of Nevada, Reno – Stanford DSME
  1664 North Virginia Street
  Reno 89557
  Tel: (775) 784-7557

Rural

- Humboldt General Hospital DBA Living Well with Diabetes – AADE DSME
  118 East Haskell Street
  Winnemucca 89445
  Tel: (775) 623-5222 Ext: 1756
- Nye Communities Coalition - Stanford DSME
  1020 East Wilson Road
  Pahrump 89048
  Tel: (775) 727-9970
- PACE Coalition – Stanford DSME

1645 Sewell Drive, Suite 41
Elko 89801
Tel: (775) 777-3451

- Southwest Medical Associates Endocrinology - AADE DSME
  2210 Calvada
  Pahrump 89048
  Tel: (702) 877-5306

Notes

AADE: American Association of Diabetes Educators Accredited Program for DSME
ADA: American Diabetes Association Recognized Program for DSME
NDPP: CDC – National Diabetes Prevention Program
YDPP: YMCA's National Diabetes Prevention Program

APPENDIX C - Data Sources & Technical Notes

The Behavioral Risk Factor Surveillance System (BRFSS) is the primary data source used to describe the burden of diabetes in Nevada. The BRFSS is a program funded by the Centers for Disease Control and Prevention supplemented by state program funds. This is the largest telephone health survey in the world and is conducted in all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam. The Nevada BRFSS surveys Nevada adults aged eighteen years or older. There are limitations to the BRFSS data in terms of the representations of all regions in the state and all population groups. The frequency of responses by particular population groups (e.g. racial and ethnic minorities) may be rather small, so in several instances multiple years of data were aggregated, or counties of the state were combined (rural counties and Carson City) to achieve reliable frequencies.

The Healthy People (HP) Initiative is a national strategy for significantly improving the health of Americans and provides a framework for national, state and local health agencies, as well as non-government entities, to assess health status, health behaviors, and health services. The HP Initiative began as an offshoot from the 1979 the Surgeon General's Report, Health Promotion and Disease Prevention, which was followed in 1980 by the report, Promoting Health/Preventing Disease: Objectives for a Nation, which detailed 226 health objectives to be reached by 1990. Subsequently the HP 2000, HP 2010, and HP 2020 were developed that documented objectives to be reached by 2000, 2010, and 2020 respectively. The goals of the HP Initiative are to increase quality and years of healthy life, and eliminate health disparities. Whenever applicable and available, HP 2020 objectives are included in this report along with their corresponding health indicators; in order to compare our progress towards the goals set for 2020.

The Hospital Inpatient Billing data provides health billing data for patients discharged from Nevada's non-federal hospitals. NRS 449.485 mandates all hospitals in Nevada to report information as prescribed by the director of the Department of Health and Human Services. The data are collected using a standard universal billing form. The data is for patients who spent at least 24 hours as an inpatient, but do not include patients who were discharged from the emergency room. The data includes demographics such as age, gender, race/ethnicity and uses International Classification of Diseases-9-Clinical Modification (ICD-9-CM) diagnoses codes (up to 33 diagnoses). In addition, the data includes billed hospital charges, procedure codes, length of hospital stay, discharge status, and external cause of injury codes. The billing data information is for billed charges and not the actual payment received by the hospital.

Network #15 is involved in the assurance of quality care to individuals with End-Stage Renal Disease (ESRD), and also in the collection and validation of information about and treatment of persons with ESRD. The Centers for Medicare and Medicaid Services (CMS) contracts with and funds 18 ESRD Network organizations covering all 50 states and U.S. territories. The territory of Network #15 includes six states: Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming. End stage renal disease (ESRD) is irreversible kidney disease which requires treatment with an artificial kidney (dialysis) or a kidney transplant for a person to maintain life and health. In 1972, legislation was passed to extend Medicare coverage to virtually all people with ESRD. There are over 300 dialysis and 14 transplant facilities within Network 15. These facilities serve over 20,000 dialysis and 1,000 transplant patients each year.

The *Nevada Type 2 Diabetes and Cardiovascular Report 2016* contains data gathered by SDI, Plymouth Meeting, Pa., a leading provider of innovative health care data products and analytic services. The data provides employers with independent, third-party information that they can use to benchmark their own data on patient demographics, professional (provider) and facility (hospital) charges, service utilization and pharmacotherapy.

The Office of Vital Records collects, processes, analyzes, and maintains the state of Nevada's Electronic Vital Records Systems. Funeral directors, or persons acting as such, are legally responsible with filling death certificates. The Electronic Vital Records Systems include those individuals who died in Nevada (residents and non-residents) as well as Nevada residents who died outside the state of Nevada, as reported to the Office of Vital Records. Mortality data include demographic data of the individual,

occupation, gender, age, date of birth, age at death, place of death, manner of death, state of residence, and cause of death (identified by International Classification of Disease codes—10 (ICD-10)), among other fields. Mortality data in this report may include both the immediate cause of death and any conditions leading to the immediate cause of death.

The Youth Risk Behavior Surveillance System (YRBSS) is a national, biennial, school-based survey administered to samples of students in grades 9-12. The survey collects data on health risk behaviors such as injury, tobacco use, alcohol, and other drug use, sexual behavior, diet, nutrition, and physical activity.

Statistics based on samples of a population are subject to sampling error. Sampling error refers to a random variation that occurs because only a subset of the entire population is sampled and used to estimate a finding for the entire population. Confidence intervals provide a range of values that can describe the uncertainty around an estimate. In this report Statistical Analysis Software (SAS) was used to compute 95% confidence intervals, i.e. there is a 95% chance that the confidence intervals cover the true values. Confidence intervals have been included as error bars in the graphs representing diabetes prevalence among Nevada adults by the demographic breakdowns region, age, race/ethnicity, and household income levels.

APPENDIX D – Acronyms

- AADE: American Association of Diabetes Educators, https://www.diabeteseducator.org/
- ADA: American Diabetes Association, http://www.diabetes.org/
- AMA: American Medical Association, https://www.ama-assn.org/
- APMA: American Podiatric Medical Association, http://www.apma.org/index.cfm
- BMI: Body mass index, https://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmicalc.htm
- BRFSS: Behavioral Risk Factor Surveillance System, https://www.cdc.gov/brfss/
- CDC: Centers for Disease Control and Prevention, https://www.cdc.gov/
- CKD: Chronic Kidney Disease, https://www.kidney.org/atoz/content/about-chronic-kidney-disease
- CMS: Centers for Medicare and Medicaid Services, https://www.cms.gov/
- DPP: Diabetes Prevention Program, https://www.cdc.gov/diabetes/prevention/index.html , and https://www.niddk.nih.gov/about-niddk/research-areas/diabetes/diabetes-prevention-program-dpp/Pages/default.aspx
- DSME: Diabetes Self-Management Education, http://nevadawellness.org/community-wellness/diabetes-education/i-have-diabetes/
- ERS: Economic Research Service, https://www.ers.usda.gov/
- ESRD: End-Stage Renal Disease, https://www.cms.gov/Medicare/Coordination-of-Benefits-and-Recovery/Coordination-of-Benefits-and-Recovery-Overview/End-Stage-Renal-Disease-ESRD/ESRD.html
- HHS: United States Department of Health & Human Services, https://www.hhs.gov/
- IOM: Institute of Medicine, National Academy of Medicine, https://nam.edu/about-the-nam/
- MDPP: Medicare Diabetes Prevention Program, https://innovation.cms.gov/initiatives/medicare-diabetes-prevention-program/
- NEJM: New England Journal of Medicine, http://www.nejm.org/
- PAD: Peripheral Artery Disease, https://www.nhlbi.nih.gov/health/health-topics/topics/pad/
- USDA: United States Department of Agriculture, https://www.usda.gov/
- USPSTF: United State Preventive Services Task Force, https://www.uspreventiveservicestaskforce.org/
- WHO: World Health Organization, http://www.who.int/en/
- YRBSS: Youth Risk Behavior Surveillance System, https://www.cdc.gov/healthyyouth/data/yrbs/index.htm

APPENDIX E - Endnotes

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